

**Date and Time:** Monday 9 September 2024 16:30:00 CEST

**Job Number:** 233025990

**Documents (25)**

1. [*Anglo African Agriculture PLC - Annual Financial Report as at 31 October 2021*](https://advance.lexis.com/api/document?id=urn:contentItem:6545-SSR1-DXP3-R1Y3-00000-00&idtype=PID&context=1516831)

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| **Content Type** | **Narrowed by** |
| News | Timeline: 22 jun 2021 tot 22 jun 2022; Taal: English; Locatie: International; Plaats van publicatie: Europe |

2. [*Invesco Select Trust Plc - Annual Financial Report*](https://advance.lexis.com/api/document?id=urn:contentItem:639K-3MP1-DXP3-R2RN-00000-00&idtype=PID&context=1516831)

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3. [*Federal Register: Endangered and Threatened Wildlife and Plants; Threatened Species Status With Section 4(d) Rule for Western Fanshell and “ Ouachita ” Fanshell and Designation of Critical Habitat Pages 12338 - 12384 [FR DOC #2022-02994]*](https://advance.lexis.com/api/document?id=urn:contentItem:64XS-XNS1-JDG9-Y3NK-00000-00&idtype=PID&context=1516831)

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4. [*Federal Register: Endangered and Threatened Wildlife and Plants; Threatened Species Status for Streaked Horned Lark With Section 4(d) Rule Pages 21783 - 21812 [FR DOC #2022-07920]*](https://advance.lexis.com/api/document?id=urn:contentItem:657B-0HX1-JDG9-Y3V2-00000-00&idtype=PID&context=1516831)

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5. [*Federal Register: Endangered and Threatened Wildlife and Plants; Foothill Yellow-Legged Frog; Threatened Status With Section 4(d) Rule for Two Distinct Population Segments and Endangered Status for Two Distinct Population Segments Pages 73914 - 73945 [FR DOC #2021-27512]*](https://advance.lexis.com/api/document?id=urn:contentItem:64DN-YWG1-JDG9-Y4DM-00000-00&idtype=PID&context=1516831)

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6. [*Pensana Plc - Interim results for the 6 months ended 31 Dec 2021*](https://advance.lexis.com/api/document?id=urn:contentItem:653X-6Y91-JB72-154D-00000-00&idtype=PID&context=1516831)

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7. [*Federal Register: Endangered and Threatened Wildlife and Plants; Endangered Species for Prostrate Milkweed and Designation of Critical Habitat Pages 8509 - 8543 [FR DOC #2022-02544]*](https://advance.lexis.com/api/document?id=urn:contentItem:64SY-P891-F0YC-N2H0-00000-00&idtype=PID&context=1516831)

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8. [*Recent developments in hazardous pollutants removal from wastewater and water reuse within a circular economy*](https://advance.lexis.com/api/document?id=urn:contentItem:671W-P2B1-JCWX-C1TT-00000-00&idtype=PID&context=1516831)

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9. [*Waste-derived biochar for water pollution control and sustainable development*](https://advance.lexis.com/api/document?id=urn:contentItem:693W-H851-F129-P058-00000-00&idtype=PID&context=1516831)

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10. [*Fidelity China Special Situations Plc - Annual Financial Report*](https://advance.lexis.com/api/document?id=urn:contentItem:65K4-D5Y1-JB72-13SD-00000-00&idtype=PID&context=1516831)

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11. [*Seawater desalination concentrate—a new frontier for sustainable mining of valuable minerals*](https://advance.lexis.com/api/document?id=urn:contentItem:671W-P2B1-JCWX-C1TS-00000-00&idtype=PID&context=1516831)

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12. [*Federal Register: National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units-Revocation of the 2020 Reconsideration, and Affirmation of the Appropriate and Necessary Supplemental Finding; Notice of Proposed Rulemaking Pages 7624 - 7673 [FR DOC #2022-02343]*](https://advance.lexis.com/api/document?id=urn:contentItem:64RP-67Y1-JDG9-Y3RM-00000-00&idtype=PID&context=1516831)

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13. [*Picton Property Income Ltd - Preliminary Annual Results*](https://advance.lexis.com/api/document?id=urn:contentItem:65J2-JCN1-DXP3-R120-00000-00&idtype=PID&context=1516831)

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14. [*Cadogan Petroleum Plc - Annual Financial Report*](https://advance.lexis.com/api/document?id=urn:contentItem:65B9-BB41-JB72-128B-00000-00&idtype=PID&context=1516831)

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15. [*Australia politics live news update: Victoria lockdown restrictions to ease in September; NSW records 1,116 Covid cases, four deaths; ACT 23 cases*](https://advance.lexis.com/api/document?id=urn:contentItem:63H1-03P1-JBNF-W3W5-00000-00&idtype=PID&context=1516831)

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16. [*Command Agriculture and Food Security: An Interrogation of State Intervention in the Post-Fast Track Land Redistribution Era in Zimbabwe*](https://advance.lexis.com/api/document?id=urn:contentItem:6BH2-VXY1-JBMY-H4F0-00000-00&idtype=PID&context=1516831)

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17. [*NA Proactive news snapshot: Mountain Valley MD , Nextleaf Solutions , Ridgeline Minerals , Equity Metals Corp UPDATE ...*](https://advance.lexis.com/api/document?id=urn:contentItem:65C0-3VC1-JCMN-Y3VD-00000-00&idtype=PID&context=1516831)

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18. [*Federal Register: Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Coastal Distinct Population Segment of the Pacific Marten Pages 58831 - 58858 [FR DOC #2021-22994]*](https://advance.lexis.com/api/document?id=urn:contentItem:63XV-XDC1-JDG9-Y334-00000-00&idtype=PID&context=1516831)

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19. [*Federal Register: Protection of Stratospheric Ozone: Listing of HFO-1234yf Under the Significant New Alternatives Policy Program for Motor Vehicle Air Conditioning in Nonroad Vehicles and Servicing Fittings for Small Refrigerant Cans Pages 26276 - 26295 [FR DOC #2022-08923]*](https://advance.lexis.com/api/document?id=urn:contentItem:65D1-KHP1-JDG9-Y1MC-00000-00&idtype=PID&context=1516831)

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20. [*Federal Register: Endangered and Threatened Wildlife and Plants; Threatened Species Status With Section 4(d) Rule for Sand Dune Phacelia and Designation of Critical Habitat Pages 16320 - 16363 [FR DOC #2022-05326]*](https://advance.lexis.com/api/document?id=urn:contentItem:652D-90F1-F0YC-N4M7-00000-00&idtype=PID&context=1516831)

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21. [*Federal Register: Renewable Fuel Standard (RFS) Program: RFS Annual Rules Pages 72436 - 72501 [FR DOC #2021-26839]*](https://advance.lexis.com/api/document?id=urn:contentItem:64C7-CFY1-F0YC-N4FY-00000-00&idtype=PID&context=1516831)

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22. [*Federal Register: Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards Pages 74434 - 74526 [FR DOC #2021-27854]*](https://advance.lexis.com/api/document?id=urn:contentItem:64DX-S8G1-F0YC-N2HH-00000-00&idtype=PID&context=1516831)

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23. [*Federal Register: Reissuance and Modification of Nationwide Permits Pages 73522 - 73583 [FR DOC #2021-27441]*](https://advance.lexis.com/api/document?id=urn:contentItem:64D9-35T1-JDG9-Y42T-00000-00&idtype=PID&context=1516831)

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24. [*TOP 50 FUNDS Bargain shares*](https://advance.lexis.com/api/document?id=urn:contentItem:63K1-WSF1-JCBW-N02R-00000-00&idtype=PID&context=1516831)

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25. [*Administrative Appeals Tribunal of Australia Decision: Emanuel Exports Pty Ltd; EMS Rural Exports Pty Ltd and Secretary, Department of Agriculture, Water and the Environment [2021] AATA 4393 (26 November 2021)*](https://advance.lexis.com/api/document?id=urn:contentItem:6477-1SR1-JDG9-Y442-00000-00&idtype=PID&context=1516831)

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# [***Anglo African Agriculture PLC - Annual Financial Report as at 31 October 2021***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:6545-SSR1-DXP3-R1Y3-00000-00&context=1516831)

PR Newswire UK Disclose

March 31, 2022 Thursday 11:59 AM EST

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**Length:** 24444 words

**Dateline:** London, March 31

**Body**

PR Newswire

The information contained within this announcement is deemed to constitute inside information pursuant to the EU (Withdrawal) Act and amended pursuant to Market Abuse (Amended) (EU Exit) Regulations 2019. Upon the publication of this announcement, this inside information is now considered to be in the public domain.

31 March 2022

Anglo African ***Agriculture*** plc

(“AAAP” or the “Company”)

DIRECTORS’ REPORT AND FINANCIAL STATEMENTS

FOR THE YEAR ENDED 31 OCTOBER 2021

Company Registration No. 07913053 (England and Wales)

Overview

The most recent financial period was a very disappointing year in that after 30 months of trying to reverse the Comarco port and marine operations into AAA (“the Company”) the vendors decided in September 2021 to withdraw from the transaction.  AAA made a $1m loan available to Comarco in November 2018 for an initial period of 24 months (the “Loan”). The Loan was subsequently extended and was due for repayment on 30 September 2021. The Loan, together with accrued interest, amounting in aggregate to $1.5m, has now been repaid although no full and final settlement was signed by Comarco.

As mentioned previously the Company’s 100% subsidiary, Dynamic Intertrade, on its own cannot sustain an LSE listing. As a result of the aborted Comarco transaction the board is looking at various alternative transactions to increase the size of the Company and thus secure its future prospects. The Board recognises that it needs to find a transaction with certainty to prevent a repeat of the failed Comarco transaction and it is also aware of the recent FCA rule changes to Standard listing requirements. As such, the Board is also looking to complete a transaction as soon as practicably possible.

AAA’s primary operations and source of revenue remains Dynamic Intertrade (“Dynamic”), our Cape Town based spice blender and trader. The Company’s operations have been negatively affected by COVID-19 with sales in local currency falling 23.2% and 20.8% in reporting currency. This was primarily driven by the South African economy being impacted by COVID-19. In addition, fish stocks for Dynamic’s largest customers dwindled and the clients in effect had no production for a number of months during the year under review. Lastly, the product mix requested by Dynamic’s material customers changed and price increases could not be passed on to the company’s customers, which reduced the gross margin. Group turnover reduced by 20.8% (2020: a reduction of 2.5%). Group operating losses decreased to £515,660(increased to £1,079,505 in 2020) for the current year. Included in the prior year’s group operating losses is the impairment of the investment in AAA’s subsidiary, Dynamic, amounting to £226,644, being a once off write off. Excluding the impairment, normal operating losses for the year were £515,660 (2020: £852,861).

COVID-19 has had a devasting effect on the world economy and social fabric. Although the company has been affected by the pandemic, the effects have been minimised. There is a concern however that the long term effects may be more than what is currently being experienced.

As announced on 15 December 2021, since the year end we have reached agreement with all of AAA’s creditors. This has left the group with a cash balance currently in excess of £0.4 million.

Andrew Monk

Non-Executive Chairman

31st March 2022

Directors and Advisors

Directors:                                        Robert Scott

                                                         Andrew Monk

                                                          Matthew Bonner

Secretary:                                       Stephen Clow

Company Number:                        07913053

Registered Address:                       Park House

                                                          16-18 Finsbury Circus

                                                          London

                                                          EC2M 7EB

Head Office                                     Park House

                                                          16-18 Finsbury Circus

                                                          London

                                                          EC2M 7EB

Financial Advisor and Broker      VSA Capital Limited

                                                          Park House

                                                          16-18 Finsbury Circus

                                                          London

                                                          EC2M 7EB

Auditors                                          Jeffreys Henry LLP

                                                          Finsgate

                                                          5-7 Cranwood Street

                                                          London

                                                          EC1V 9EE

Solicitors to the Company              Keystone Law

                                                        48 Chancery Lane

                                                        London

                                                        WC2A 1JF

Registrars                                    Neville Registrars Limited

                                                        Neville House

                                                        Steelpark Road

                                                        Halesowen

                                                        West Midlands

                                                         B63 3DA

Strategic Report

Overview

The primary objective of the strategic report is to provide information for the shareholders and help them to assess how the directors have performed their duty, under section 172 of the Act, to promote the success of the Company and to provide context for the related financial statements as well as assist them in their decision making.

The duty of a director, as set out in section 172 of the Act, is to act in the way he considers, in good faith, would be most likely to promote the success of the company for the benefit of its members, and in doing so have regard (amongst other matters) to:

(a) the likely consequences of any decision in the long term;

(b) the interests of the company's employees;

(c) the need to foster the company's business relationships with suppliers, customers and others;

(d) the impact of the company's operations on the community and the environment;

(e) the desirability of the company maintaining a reputation for high standards of business conduct; and

(f) the need to act fairly as between members of the company.

As a Board, we must always seek and be open to feedback from anyone affected by our activities. This enables the Board to understand the impact of its decisions on key stakeholders, but also ensures that we are aware of any significant changes in the market or the external environment, including the identification of emerging risks, which can be fed into our strategy discussions and our risk management process. The Board considers our strategic stakeholders as follows:

Customers

We listened to our customers and endeavoured to supply them with relevant product – this was particularly true throughout the crisis where not only did we supply relevant products but also in line with safety protocols as recommended by the Government Health Department.

Suppliers

We have worked with a number of our suppliers for many years, and any loss of our sales or product mix impacts their business. We communicated to them where possible to reduce the impact on their businesses.

Shareholders and Lenders

We have a clear responsibility to engage with shareholders and lenders of our business and their views are an important driver of our strategy. We keep our shareholders regularly informed while lenders receive quarterly updates on the performance of the organisation.

Staff

During the year under review and in particular during the pandemic, Dynamic Intertrade endeavoured to keep its staff fully employed although operating times were erratic due to supply chain disruptions. We managed to do this, however in order to ensure we are competitive we underwent a s189 review of staffing efficiencies at our subsidiary during the year. This is now completed.

During the year under review the group had 20 staff and directors. The company had 3 male directors. The subsidiary had 2 female and 2 male directors of which 1 male director was a director of both. The subsidiary had 7 female and 6 male staff.

Social, community and human rights issues

The company and its subsidiary comply with all national and international laws and regulations pertaining to human rights and social interaction. Additionally, the South African subsidiary is ensuring, where possible, with BBBEE which aims to address the social, community and economic issues within the South African context.

Review of the Group’s Business

Dynamic Intertrade (Pty) Ltd (“Dynamic”) is based in Cape Town, South Africa and is involved in the importation, milling, blending and packaging of products that include herbs, spices, seasonings and confectionary for the domestic market.

Dynamic recorded a 20.8% reduction in top line revenue to £1.4 million (2020: a decrease of 2.5% to £1.77 million). The required product mix changed and lower margin commodities saw general price increases which could not be passed on to customers for our core spice lines of commodity paprika and chilli-based products as well as our value-added blended products. In addition, our major customers had a reduction in their fish supplies which affected production, and hence purchases, negatively for a number of months during the year under review.

Gross profits decreased by 10.3% to £379,804 (ZAR7.7 million) for the current year (2020: a decrease of 29.3% to £423,509 (ZAR8.8 million)) and represents a 27.05% gross margin (2020: 23.9%).

Operating losses for the year decreased to £515,660 from £1,079,505 in 2020.

Basic and diluted loss per share from continuing operations for the year was 2.66p (2020: 5.16p).

Financing

During the year under review, the Company issued no new ordinary shares (2020: Nil).

Acquisition Strategy

The Directors continue to evaluate potential acquisition targets and mergers that would create a sustainable platform for the Group.

Key Performance Indicators

Principal Risks and Uncertainties

The Directors consider the following risk factors to be of relevance to the Group’s activities. It should be noted that the list is not exhaustive and that other risk factors not presently known or currently deemed immaterial may apply. The risk factors are summarised below:

i.       Development Risk

The Group’s development will be, in part, dependent on the ability of the Directors to continue to improve the current business, to identify suitable investment opportunities and to implement the Group’s strategy. There is no assurance that the Group will be successful in acquiring suitable investments.

ii.     Sector Risk

The ***agriculture*** and agri-processing sectors are highly competitive markets and many of the competitors will have greater financial and other resources than the Company and as a result may be in a better position to compete for opportunities.

The development of these enterprises involves significant uncertainties and risks including unusual climatic conditions such as drought, improper use of pesticides, availability of labour and seasonality of produce, any one of which could result in security of supply, damage to, or destruction of crops, environmental damage or pollution. Each of these could have a material adverse impact on the business, operations and financial performance of the Group.

The market price of ***agricultural*** products and crops is volatile and affected by numerous factors which are beyond the Group’s control.  These include international supply and demand, the level of consumer product demand, international economic trends, currency exchange rate fluctuations, the level of interest rates, the rate of inflation, global or regional political events, as well as a range of other market forces. Sustained downward movements in ***agricultural*** prices could render less economic, or un-economic, any development or investing activities to be undertaken by the Group. Certain ***agricultural*** projects involve high capital costs and associated risks. Unless such projects enjoy long term returns, their profitability will be uncertain resulting in potentially high investment risk.

iii.    Political and Regulatory Risk

African countries experience varying degrees of political instability. There can be no assurance that political stability will persist in those countries where the Group may have operations going forward. In the event of political instability or changes in government policies in those countries where the Group may operate, the operations and financial condition of the Group could be adversely affected.

iv.    Environmental Risks and Hazards

All phases of the Group’s operations are subject to environmental regulation in the areas in which it operates. Environmental legislation is evolving in a manner that may require stricter standards and enforcement, increased fines and penalties for non-compliance, more stringent environmental assessments of proposed projects and a heightened degree of responsibility for companies and their officers, directors and employees.

There is no assurance that existing or future environmental regulation will not materially adversely affect the Group’s business, financial condition and results of operations. Environmental hazards may exist on the properties on which the Group holds interests that are unknown to the Group at present. The Board manages this risk by working with environmental consultants and by engaging with the relevant governmental departments and other concerned stakeholders.

v.      Internal Control and Financial Risk Management

The Board has overall responsibility for the Group’s systems of internal control and for reviewing their effectiveness. The Group maintains systems which are designed to provide reasonable but not absolute assurance against material loss and to manage rather than eliminate risk.

The key features of the Group’s systems of internal control are as follows:Management structure with clearly identified responsibilities;Production of timely and comprehensive historical management information presented to the Board;Detailed budgeting and forecasting;Day to day hands on involvement of the Executive Director and Senior Management; andRegular board meetings and discussions with the Non-executive directors.

The Group’s activities expose it to several financial risks including cash flow risk, liquidity risk and foreign currency risk.

vi.    Environmental Policy

The Group is aware of the potential impact that its subsidiary and associate companies may have on the environment. The Group ensures that it complies with all local regulatory requirements and seeks to implement a best practice approach to managing environmental aspects.

The wholly owned subsidiary, Dynamic Intertrade operates a Food Safety System Certification (“FSSC”) compliant facility in Cape Town. The FSSC provides a framework for effectively managing the organization's food safety responsibilities and is fully recognized by the Global Food Safety Initiative (GFSI) and is based on existing ISO Standards.

vii.Health and Safety

The Group’s aim is to achieve and maintain a high standard of workplace safety. In order to achieve this objective, the Group provides ongoing training and support to employees and sets demanding standards for workplace safety.

viii.  Financing Risk

The development of the Group’s business may depend upon the Group’s ability to obtain financing primarily through the raising of new equity capital or debt. The Group’s ability to raise further funds may be affected by the success of existing and acquired investments. The Group may not be successful in procuring the requisite funds on terms which are acceptable to it (or at all) and, if such funding is unavailable, the Group may be required to reduce the scope of its investments or the anticipated expansion. Further, Shareholders’ holdings of Ordinary Shares may be materially diluted if debt financing is not available.

ix.    Credit Risk

The directors have reviewed the forecasts prepared by both AAA and Dynamic and believe that Dynamic has adequate resources available to meet its obligations to make capital repayments of the loan to AAA.

If Dynamics’ trading performance is below that forecast, AAA will exercise a degree of flexibility on the repayment timetable. With the Dynamic turnover increasing and the Group forecasting profitability there is no requirement for any impairment charge.

x.      Liquidity Risk

The Directors have reviewed the working capital requirements of AAA and Dynamic Intertrade and believe that, following stress tests and variance analysis on the forecasts, there is sufficient working capital to fund the business while expanding turnover and achieving sustainable profitability. The directors further highlight the inherent uncertainties involved in making the assessment that the entity is a going concern.

xi.Capital Risk

The Group manages its capital resources to ensure that entities in the Group will be able to continue as a going concern, while maximising shareholder return.

The capital structure of the Group consists of equity attributable to shareholders, comprising issued share capital and reserves. The availability of new capital will depend on many factors including a positive operating environment, positive stock market conditions, the Group’s track record, and the experience of management. There are no externally imposed capital requirements. The Directors are confident that adequate cash resources exist or will be made available to finance operations and controls over expenditure are carefully managed.

xii.COVID-19 Risk

The group has assessed the impact that the global COVID-19 pandemic has had on its operations. As stated above, the group supplies spices and spice blends to the food industry. The factory complies with FSSC requirements and as a result staff wear, as a matter of course, masks and sanitise regularly, and hence the COVID-19 preventative measures  have been adhered to. The majority of its customers supply their products to the lower end of the consumer spectrum. Based on the directors’ assessment, the products that it supplies form an essential component of the flavour profile that the end consumers prefer to consume. Based on the group’s assessment of the associated risks, the risks associated with the pandemic are as follows: 1) the risk that the gross margin will be squeezed, due to our customers’ inability to pass on or absorb price increases; and 2) the risk that the end consumer will not be able to afford the prepacked flavoured food which could lead to our customers having an over-supply of our spices and spice blends.

To manage the above risks, management are in regular contact with our customers and are actively exploring new markets and customers in order to diversify these risks.

Going Concern

These consolidated financial statements are prepared on the going concern basis. The going concern basis assumes that the Group will continue in operation for the foreseeable future and will be able to realise its assets and discharge its liabilities and commitments in the normal course of business. The Group has incurred significant operating losses and negative cash flows from operations during the year under review.

During the year, the Group raised additional equity funding of Nil (2020: £102,676) in gross funding through share subscriptions to fund working capital.

The directors have agreed to defer the payment of their directors fees until such time that the company is in a position to pay such fees without affecting its ability to pay current liabilities as they become due and without affecting its ability to support Dynamic Intertrade (Pty) Ltd, given the potential for future cashflow deficits. The Directors have prepared cash flow forecasts, which include several cost saving initiatives undertaken and the appointment of a chief executive officer, for the period ended 31 March 2023. These forecasts consider operating cash flows and capital expenditure requirements for the Company and Dynamic Intertrade, available working capital and forecast expenditure, including overheads and other costs. As in prior years, in the event that additional funding is required, the directors have agreed to participate in any fund raises that may be necessary at the time. Based upon the company’s forecast, it has sufficient cash for the foreseeable future.

If Dynamic Intertrade fails to meet revenue predictions and any other relevant risk factors arise, the Group will need to obtain additional debt finance or equity to fund its operations for the period to 31 March 2023. The cash flow forecast is dependent on production targets being met at Dynamic Intertrade, maintaining the invoice financing arrangements, generating future sales and the selling prices remaining stable during the period to 31 March 2023.

After careful consideration of the matters set out above, the Directors are of the opinion that the Group will be able to undertake its planned activities for the period to 31 March 2023 from production and from additional fund raising and have prepared the consolidated financial statements on the going concern basis. Nevertheless, due to the uncertainties inherent in meeting its revenue predictions and obtaining additional fund raising there can be no certainty in these respects. The financial statements do not include any adjustments that would result if the Group was unable to continue as a going concern. For this reason, the directors believe that there is a material uncertainty relating to the group’s going concern.

As at year end, the transaction to acquire the port and marine assets of the Comarco Group had been terminated and the loan advanced to the Comarco Group and the interest charged thereon had been repaid by in full. It the intention of the directors to look for acquisitions to make the company more sustainable.

On behalf of the Board

Andrew Monk, Chairman

31st March 2022

The Directors present their Report and Financial Statements for the year ended 31 October 2021.

Principal Activities

The principal activity of the Group in the year was investing and trading in the ***agriculture*** and ancillary sectors in Africa.

Emissions

The group is not an intensive user of fossil fuels or electricity. During the year Dynamic Intertrade consumed an average of 8,418 kwh (2020: 19,432kwh) per month based on using actual charges levied by the Cape Town City Council. As per the University of Cape Town’s assessment of the South African average of 1.015kg/kwh, the group contributed 102,539kg (2020: 236,682kg) of carbon emissions during the financial year. Due to the nature of the business, there is limited scope to reduce emissions materially as all power is sourced from the Cape Town City Council. There were no operations in the UK and as such no emissions in the UK.

Investing Policy

AAA was established to invest in or acquire companies engaged in the ***agriculture*** and ancillary sectors in Africa. The Directors intend to use their ***collective*** experience to identify appropriate investment opportunities in the production, transportation and trading of food products as well as ports and ancillary industries.

Directors

The following Directors have held office in the year:

David Lenigas (Resigned 31 July 2021)

Andrew Monk

Robert Scott

Matthew Bonner

Andrew Monk, Non-Executive Chairman

Andrew has a successful stock broking career spanning 38 years. In that time, he has built up strong relationships with many major UK institutions. He was employed by Hoare Govett ABN AMRO for 12 years before founding Oriel Securities as Joint CEO. Andrew later became CEO of Blue Oar Plc, and Chief Executive of VSA Capital, an investment banking and institutional broking firm.

Robert Scott, Executive Director

Rob has over 20 years of finance experience, with the last eleven years specifically focused in Africa within the mining industry and general investments. He has held executive and senior positions with several companies, as well as having served on both public and private company boards. He has been involved in companies with locations in South Africa, Angola, Mozambique, Zimbabwe, DRC, CAR, Tanzania, Kenya and Namibia amongst others. Rob has also previously been involved in mining, hotels, ***agriculture*** and construction industries.

Matthew Bonner, Non-Executive Director

Matthew Bonner has significant financial leadership experience within the mining, energy and ***agriculture*** sectors. He is currently Chief Operating Officer at EAS Advisors LLC, a New York based corporate advisory firm focused on supporting public and private companies operating in the natural resource and commodity sectors in emerging markets.

Directors’ remuneration, shareholding and options

The Directors’ remuneration in the year ended 31 October 2021 is set out in note 8 of the accounts. None of the directors receive share options, long term incentives, bonus or the like as part of their remuneration packages. Remuneration for all directors, both executive and non-executive, is £1,000 per month. UK based directors have statutory National Health Insurance and Pension contributions added to their remuneration. There are no contracts in place for any of the company directors.

Shareholding

As at 31st March 2022, the Directors of the Company held the following shares:

\*\* Andrew Monk’s entire shareholding is held within his SIPP (Fitel Nominees Limited) and Hargreaves Hale Limited.

Share options and warrants

As at 31 October 2021 the Directors share options and warrants were:

The total warrants and share options outstanding at 31 October 2021 were 25,379,430 (2020: 13,319,430). Refer to note 24 for more detail.

Dividends

No dividends will be distributed for the current year (2020 - nil).

Supplier Payment Policy

It is the Group’s payment policy to pay its suppliers in conformance with industry norms. Trade payables are paid in a timely manner within contractual terms, which is generally 30 to 45 days from the date an invoice is received.

Substantial Interests

The Group has been informed of the following shareholdings that represent 3% or more of the issued Ordinary Shares of the Company as at 31 October 2021:

The Group has been informed of the following shareholdings that represent 3% or more of the issued Ordinary Shares of the Company as at 18th of March 2022:

Auditors

Jeffreys Henry LLP has expressed its willingness to continue in office and a resolution to reappoint them will be proposed at the Annual General Meeting.

Statement of Directors’ Responsibilities

The Directors are responsible for preparing the Directors’ Report and the financial statements in accordance with applicable law and regulations. Company law requires the Directors to prepare financial statements for each financial year. Under that law the Directors have elected to prepare the financial statements in accordance with International Financial Reporting Standards (IFRS) as adopted for use in the United Kingdom. Under company law the Directors must not approve the financial statements unless they are satisfied that they give a true and fair view of the Company and the Group and of the profit or loss of the Company and the Group for that year. In preparing these financial statements, the Directors are required to:

Select suitable accounting policies and then apply them consistently;Make judgements and accounting estimates that are reasonable and prudent;State whether the Group and Parent Company financial statements have been prepared in accordance with IFRS as adopted by the United Kingdom, subject to any material departures disclosed and explained in the Financial Statements;Prepare the financial statements on the going concern basis unless it is inappropriate to presume that the Company will continue in business.

The Directors are responsible for keeping adequate accounting records that are enough to show and explain the Group and Parent Company's transactions, disclose with reasonable accuracy at any time the financial position of the Company and the Group and enable them to ensure that the financial statements comply with the Companies Act 2006.

The Directors are responsible for safeguarding the assets of the Group and Parent Company and hence for taking reasonable steps for the prevention and detection of fraud and other irregularities.

The Directors are responsible for the maintenance and integrity of the corporate and financial information included on the Group’s website.

Statement of Disclosure to Auditors

Each person who is a Director at the date of approval of this Annual Report confirms that:

So far as the Directors are aware, there is no relevant audit information of which the Group and Parent Company’s auditors are unaware;Each Director has taken all the steps he ought as Director, in order to make himself aware of any relevant audit information and to establish that the Group and Parent Company’s auditors are aware of that information, andEach Director is aware of and concurs with the information included in the Strategic Report.

Branches Outside the UK

The Group head office is in London and Dynamic Intertrade (Pty) Limited’s office is located in South Africa.

Events after the Reporting Period

Further information on events after the reporting date is set out in note 33.

Strategic Report

In accordance with Section 414C (11) of the Companies Act 2006, the group chooses to report the review of the business, the outlook and the risk and uncertainties faced by the Company in the Strategic Report on pages 5 to 10. The directors’ assessment of the risks faced by the Group are set out in the Strategic Report and in Note 30 to the financial statements.

On Behalf of the Board

Andrew Monk, Chairman

31st March 2022

Directors’ Remuneration Report

Introduction

The information included in this report is not subject to audit other than where specifically indicated.

Remuneration Committee

The remuneration committee consists of Andrew Monk and Matt Bonner. This committee's primary function is to review the performance of executive directors and senior employees and set their remuneration and other terms of employment.

The committee is also responsible for administering any share option schemes. The table indicates share options held by the current directors, directors of the subsidiary and former directors of the company.

The Company has one executive director.

The remuneration policy

It is the aim of the committee to remunerate executive directors competitively and to reward performance. The remuneration committee determines the company's policy for the remuneration of executive directors, having regard to the UK Corporate Governance Code 2018.

Service agreements and terms of appointment

The directors have service contracts with the company.

Directors' interests

The directors' interests in the share capital of the company are set out in the Directors’ report.

Directors' emoluments (Audited)

\* Included in Andrew Monk’s remuneration is £1,966 (2020: £1,896) for National Insurance.

No pension contributions were made by the company on behalf of its directors other than for Andrew Monk.

At the year-end a total of £70,232 (2020: £194,266) was outstanding in respect of directors’ emoluments.

Approval by shareholders

At the next annual general meeting of the company a resolution approving this report is to be proposed as an ordinary resolution.

This report was approved by the board on 31st March 2022.

On Behalf of the Board

Andrew Monk - Committee Chairman

31st March 2022

Chairman’s Corporate Governance Statement

The Directors recognise the importance of sound corporate governance while taking into account the Group’s size and stage of development. We recognise that we require the company to:

provide details of a recognised corporate governance code that the board of directors has decided to applyexplain how the Company complies with that code, and where it departs from its chosen corporate governance code provide an explanation of the reasons for doing so.

The corporate governance disclosures need to be reviewed annually, and the company is also required to state the date on which these disclosures were last reviewed. This Chairman’s Corporate Governance Statement sets out how Anglo African ***Agriculture*** Plc seeks to comply with these requirements. The Directors acknowledge that they have overall responsibility for the Company’s system of internal control and for reviewing its effectiveness. Such a system is designed to manage rather than eliminate the risk of failure to achieve business objectives and even the most effective system can provide only reasonable, and not absolute, assurance with respect to the preparation of financial information and the safeguarding of assets. The close involvement of the Directors in all decisions and actions undertaken by the Company is intended to ensure that the risks to the Company are minimised.

Overview

As Chairman of the Board of Directors it is my responsibility to ensure that the company has both sound corporate governance and an effective Board. The company is listed on the main board of the London Stock Exchange and its principal activity is as an investor in the African continent. The Group is currently focused on companies located in South Africa.

The company’s Board has adopted the principles of the Quoted Companies Alliance Corporate Governance Code 2018 Edition (QCA Code) in accordance with the London Stock Exchange. The QCA Code identifies ten principles to be followed in order for companies to deliver growth in long term shareholder value, encompassing an efficient, effective and dynamic management framework accompanied by communication to promote confidence and trust. This report follows the structure of these guidelines and explains how we have applied the guidance as well as disclosing any areas of non-compliance. We will provide annual updates on our compliance with the QCA Code. The Board considers that the Group complies with the QCA Code so far as it is practicable having regard to the size, nature and current stage of development of the Company, and will disclose any areas of noncompliance in the text below.

The sections below set out the ways in which the Group applies the ten principles of the QCA Code in support of the Group’s medium to long-term success.

Key governance changes during the year include the formal adoption of the QCA Code.

QCA Principles

1) Establish a strategy and business model which promotes long-term value for shareholders

Anglo African ***Agriculture*** Plc is an investment company focused on opportunities principally in the African continent. The Company currently has an investment in the food sector in South Africa.

The Company may exploit a wide range of investment opportunities within the target Sectors as they arise and, to this end, the Company has complete flexibility in selecting the specific investment and trading strategies that it sees fit in order to achieve its investment objective. In this regard, the Company may seek to gain Board representation and/or managerial control in its underlying investments if it deems to be the best way of generating value for Shareholders. Opportunities will be chosen through a careful selection process which will appraise both the fundamental factors specific to the opportunity as well as wider economic considerations. Typical factors that will be considered are the strength of management, the quality of the asset base, the investment’s scale and growth potential, the commodity price outlook, any geopolitical concerns, the underlying financial position, future working capital requirements as well as potential exit routes. Investments may be in the form of buy-outs, controlling positions (whether initially or as a result of additional or follow-on investments) or strategic minority investments. There is no fixed limit on the number of projects or companies into which the Company may invest, nor the proportion of the Company’s gross assets that any investment may represent at any time. No material change will be made to the Company’s investing policy without the approval of Shareholders.

Challenges to delivering strategy, long-term goals and capital appreciation are uncertain in relation to organisational, operational, financial and strategic risks, all of which are outlined in the Strategic Report on pages 7 - 9, as well as steps the Board takes to protect the Company by mitigating these risks and secure a long-term future for the Company.

2) Seek to understand and meet shareholder needs and expectations

The Board recognises the importance of communication with its stakeholders and is committed to establishing constructive relationships with investors and potential investors in order to assist it in developing an understanding of the views of its shareholders. The Company also maintains a dialogue with shareholders through formal meetings such as the AGM, which provides an opportunity to meet, listen and present to shareholders, and shareholders are encouraged to attend in order to express their views on the Company’s business activities and performance. Members who have queries regarding the Company’s AGM can contact the Company’s Registrars, Neville Registrars or the Company Secretary. The Board welcomes feedback from key stakeholders and the Chairman of the Board is the shareholder liaison, who meets shareholders regularly, and informs other directors of their views and suggestions. Analysts provide the Board with updates on the Company’s business and how strategy is being implemented, as well as to hear views and expectations from shareholders. The views of the shareholders expressed during these meetings are reported to the Board, ensuring that all members of the Board are fully aware of the thoughts and opinions of shareholders. The Company maintains effective contact with its principal shareholders and welcomes communications from its private investors. Information on the Investor Relations section of the Company’s website is kept updated and contains details of relevant developments, Annual and Interim Results, Regulatory News Service announcements, presentations and other key information.

3) Take into account wider stakeholder and social responsibilities and their implications for long-term success

The Board recognises that the long-term success of the Company is reliant upon the efforts of employees, regulators and many other stakeholders. The Board has put in place a range of processes and systems to ensure that there is close oversight and contact with its key resources and relationships. The Company prepares and updates its strategic plan regularly together with a detailed rolling budget and financial projections which consider a wide range of key resources including staffing, consultants and utility providers. The Board is kept updated on questions / issues raised by stakeholders and incorporates information and feedback into future decision making. Anglo African ***Agriculture*** Plc fully abides by the provisions of the 2015 Modern Slavery Act. In accordance with its Code of Business Conduct and Ethics, the Company opposes the crime of slavery in all of its forms, including child labour, servitude, forced or compulsory labour and human trafficking.

All employees within the Group are valued members of the team, and the Board seeks to implement provisions to retain and incentivise all its employees. The Group offers equal opportunities regardless of race, gender, gender identity or reassignment, age, disability, religion or sexual orientation. The directors are in constant contact with employees and seek to provide continual opportunities in which issues can be raised allowing for the provision of feedback. This feedback process helps to ensure that new issues and opportunities that arise may be used to further the success of the Company. Share options and other equity incentives are offered to employees. The Company complies fully with all employment legislation where it has operations.

4) Embedded effective risk management, considering both opportunities and threats, throughout the organisation

The Board recognises the need for an effective and well-defined risk management process and it oversees and regularly reviews the current risk management and internal control mechanisms. The Board regularly reviews the risks facing the Company as detailed in the Strategic Report and seeks to exploit, avoid or mitigate those risks as appropriate. The Board is responsible for the monitoring of financial performance against budget and forecast and the formulation of the Company’s risk appetite including the identification, assessment and monitoring of the Company’s principal risks. Additionally, the Board reviews the mechanisms of internal control and risk management it has implemented on an annual basis and assesses both for effectiveness. On the wider aspects of internal control, relating to operational and compliance controls and risk management, the Board, in setting the control environment, identifies, reviews, and regularly reports on the key areas of business risk facing the Group.

The Group Board and subsidiary Boards maintain close day to day involvement in all of the Group’s activities which enables control to be achieved and maintained. This includes the comprehensive review of both management and technical reports, the monitoring of interest rates, environmental considerations, government and fiscal policy issues, employment and information technology requirements and cash control procedures. In this way, the key risk areas can be monitored effectively, and specialist expertise applied in a timely and productive manner.

The effectiveness of the Group’s system of internal financial controls, for the year to 31 October 2021 and for the period to the date of approval of the financial statements, has been reviewed by the Directors. Whilst they are aware that although no system can provide for absolute assurance against material misstatement or loss, they are satisfied that effective controls are in place.

5) Maintain the Board as a well-functioning, balanced team led by the Chair

The Board recognises the QCA recommendation for a balance between Executive and Non-Executive Directors and the recommendation that there be at least two Independent Non-Executives. The Board currently comprises of one Executive Director, two Non-Executive Directors and one Non-Executive Chairman. The Board will take this into account when considering future appointments. However, all Directors are encouraged to use their judgement and to challenge matters, whether strategic or operational, enabling the Board to discharge its duties and responsibilities effectively. The Board maintains that the Board’s composition will be frequently reviewed as the Company develops. The Company is small and as a result has an audit and risk committee and a remuneration and nominations committee. It is not deemed appropriate to have more committees.

The Group is controlled and led by the Board of Directors with an established schedule of matters reserved for their specific approval. The Board meets regularly throughout the year and is responsible for the overall Group strategy, acquisition and divestment policy, approval of major capital expenditure and consideration of significant financial matters. It reviews the strategic direction of the Company and its individual subsidiaries, their annual budgets, their progress towards achievement of these budgets and their capital expenditure programmes. The role of the Chairman is to supervise the Board and to ensure its effective control of the business, and that of the Executive Director is to manage the Group on the Board’s behalf. All Board members have access, at all times, to sufficient information about the business, to enable them to fully discharge their duties. Also, procedures exist covering the circumstances under which the Directors may need to obtain independent professional advice. The Board meets regularly and is responsible for formulating, reviewing and approving the Group’s strategy, budgets, performance, major capital expenditure and corporate actions. Detailed biographies of the Board members can be found on the website and summaries can be found on page 11.

Throughout the year, there have been four Board meetings, with all meetings being quorate. The Directors of the Company are committed to sound governance of the business and each devotes enough time to ensure this happens.

Directors’ conflict of interest

The Board is aware of the other commitments and interests of its Directors, and changes to these commitments and interests are reported to and, where appropriate, agreed with the rest of the Board.

6) Ensure that between them the Directors have the necessary up-to-date experience, skills and capabilities

The Company believes that the current balance of skills in the Board as a whole reflects a very broad range of personal, commercial and professional skills, and notes the range of financial and managerial skills. The Non-Executive Directors maintain ongoing communications with the Executive between formal Board meetings. Biographical details of the Directors can be found on the Company’s website and in the Directors’ Report of this report.

Stephen Clow is the Company Secretary and helps the Company comply with all applicable rules, regulations and obligations governing its operation.  The company can also draw on the advice of its solicitors and corporate and financial advisors – VSA Capital. The Directors have access to all advisors, Company Secretary, lawyers and auditors as and when required and are able to obtain advice from other external bodies when necessary. If required, the Directors are entitled to take independent legal advice and if the Board is informed in advance, the cost of the advice will be reimbursed by the Company. Board composition is always a factor for consideration in relation to succession planning. The Board will seek to consider any Board imbalances for future nominations, with areas considered including board independence and gender balance. The Group considers however that at this stage of its development and given the current size of its Board, it is not necessary to establish a formal Nominations Committee. Instead, the appointments to the Board are made by the Board as a whole and this position is reviewed on a regular basis by the Board.

7) Evaluate Board performance based on clear and relevant objectives, seeking continuous improvement

The Directors consider that the Company and Board are not yet of a sufficient size for a full Board evaluation to make commercial and practical sense. In the frequent Board meetings/calls, the Directors can discuss any areas where they feel a change would benefit the Company, and the Company Secretary remains on hand to provide impartial advice. As the Company grows, it expects to expand the Board and with the Board expansion, re-consider the need for Board evaluation. The Board continues to conduct internal and external Board evaluations which consider the balance of skills, experience, independence and knowledge of the Company. The evaluation process, the Board refreshment, use of third-party search companies and succession planning elements are discussed. The Board evaluation of the Executives’ performance is carried out on a regular basis. Given the level of activity and size of the Company, no other evaluation is seen as appropriate. In view of the size of the Board, the responsibility for proposing and considering candidates for appointment to the Board as well as succession planning is retained by the Board. All Directors submit themselves for re-election at the AGM at regular intervals.

8) Promote a corporate culture that is based on ethical values and behaviours

The Board recognises that its decisions regarding strategy and risk will impact the corporate culture of the Company as a whole and that this will impact the performance of the Company. The Board is aware that the tone and culture set by the Board will greatly impact all aspects of the Company as a whole and the way that employees behave. The corporate governance arrangements that the Board has adopted are designed to ensure that the Company delivers long term value to its shareholders, and that shareholders have the opportunity to express their views and expectations for the Company in a manner that encourages open dialogue with the Board. Therefore, the importance of sound ethical values and behaviours is crucial to the ability of the Company to successfully achieve its corporate objectives. The Board places great importance on their responsibility for producing accurate financial statements. The Board also places great importance on accuracy and honesty and seeks to ensure that this aspect of corporate life flows through all that the Company does. A large part of the Company’s activities is centred upon an open and respectful dialogue with employees, clients and other stakeholders. Therefore, the importance of sound ethical values and behaviours is crucial to the ability of the Company to successfully achieve its corporate objectives. The Directors consider that the Company has an open culture facilitating comprehensive dialogue and feedback and enabling positive and constructive challenge. Whilst the Company has a small number of employees, the Board maintains that as the company grows it intends to maintain and develop strong processes which promote ethical values and behaviours across all hierarchies.

The Board has adopted an anti-corruption and bribery policy (Bribery Policy). The Bribery Policy applies to all Directors and employees of the Group, and sets out their responsibilities in observing and upholding a zero-tolerance position on bribery and corruption, as well as providing guidance to those working for the Company on how to recognise and deal with bribery and corruption issues and the potential consequences.

The Board complies with Rules relating to dealings in the Company’s securities by the Directors and other Applicable Employees. To this end, the Company has adopted a code for Directors’ dealings appropriate for a company whose shares are admitted to trading on LSE and takes all reasonable steps to ensure compliance by the Directors and any relevant employees.

9) Maintain governance structures and processes that are fit for purpose and support good decision-making by the Board

The Board is committed to, and ultimately responsible for, high standards of corporate governance. The Board reviews the Company’s corporate governance arrangements regularly and expect to evolve this over time, in line with the Company’s growth.

The Board delegates responsibilities to Committees and individuals as it sees fit.

The Chairman’s principal responsibilities are to ensure that the Company and its Board are acting in the best interests of shareholders.

His leadership of the Board is undertaken in a manner which ensures that the Board retains integrity and effectiveness and includes creating the right Board dynamic and ensuring that all important matters, in particular strategic decisions, receive adequate time and attention at Board meetings.

The Chairman of Anglo African ***Agriculture*** is the key contact for shareholder liaison and all other stakeholders.

The Executive Director is responsible for the general day-to-day running of the business and developing corporate strategy.

The Executive Director has, through powers delegated by the Board, the responsibility for leadership of the management team in the execution of the Group’s strategies and policies and for the day-to-day management of the business. He is responsible for the general day-to-day running of the business and developing corporate strategy while the Non-Executive Directors are tasked with constructively challenging the decisions of executive management and satisfying themselves that the systems of business risk management and internal financial controls are robust.

All Directors participate in the key areas of decision-making, including the following matters:

StrategyBudgetsPerformanceMajor Capital ExpenditureCorporate Actions

The Board would normally delegate authority to a number of specific Committees to assist in meeting its business objectives, and the Committees, comprising of at least two independent Non-Executive Directors, would meet independently of Board meetings.

However, the current Board structure does not permit this, and the Directors will seek to take this into account when considering future appointments. As a result, matters that would normally be referred to the Nominations Committee are dealt with by the Remuneration Committee.

The Chairman and the Board continue to monitor and evolve the Company’s corporate governance structures and processes, and maintain that these will evolve over time, in line with the Company’s growth and development.

10) Communicate how the company is governed and is performing by maintaining a dialogue with shareholders and other relevant stakeholders

The Board is committed to maintaining effective communication and having constructive dialogue with its stakeholders. The Company intends to have ongoing relationships with both its private and institutional shareholders (through meetings and presentations), and for them to have the opportunity to discuss issues and provide feedback at meetings with the Company. In addition, all shareholders are encouraged to attend the Company’s Annual General Meeting. The Board already discloses the result of General Meetings by way of announcement and discloses the proxy voting numbers to those attending the meetings. In order to improve transparency, the Board has committed to publishing proxy voting results on its website in the future.

The Company communicates with shareholders through the Annual Report and Accounts, full-year and half-year results announcements and the Annual General Meeting (AGM). Information on the Investor Relations section of the Group’s website is kept updated and contains details of relevant developments, regulatory announcements, financial reports and shareholder circulars. A range of corporate information (including all Company announcements and presentations) is also available to shareholders, investors and the public on the Company’s corporate website.

Shareholders with a specific enquiry can contact us on the website contact page. The Company uses electronic communications with shareholders in order to maximise efficiency.

On behalf of the Board

Andrew Monk, Chairman

31st March 2022

Corporate Governance Report

Introduction

The Board continues to recognise that an effective governance framework is fundamental in ensuring that the Group’s ability to deliver long term shareholder value. The Group continues to apply the principles and is compliant with the provisions of the UK Corporate Governance 2018.

Board composition

It is critical that the Board has the right composition, so it can provide the best possible leadership for the Group and discharge its duties to shareholders. This includes the right balance of skills and experience, ensuring that all directors have a good working knowledge of the Group’s business and that the Board retains its independence and objectivity.

The board currently comprises of two non-executive directors and one executive director. Andrew Monk was appointed chairman on 31 July 2021.

The articles of association require a third, but not greater than a third, of the directors to retire by rotation each year.

There are regular board meetings each year and other meetings are held as required to direct the overall company strategy and operations. Board meetings follow a formal agenda covering matters specifically reserved for decision by the board. These cover key areas of the company's affairs including overall strategy, acquisition policy, approval of budgets, major capital expenditure and significant transactions and financing issues.

During the year there were four Board meetings that were held. The previous Chairman excused himself for three meetings and other than this all meetings were attended by the full Board. All meetings were quorate

The Board has delegated certain responsibilities, within defined terms of reference, to the audit committee and the remuneration committee as described below. The appointment of new directors is made by the board as a whole. During the year ended 31 October 2021, there were four Board meetings, two audit committee meeting and one remuneration committee meeting. Not all meetings were fully attended however each was quorate.

The Board undertakes a formal annual evaluation of its own performance and that of its committees and individual directors, through discussions and one-to-one reviews.

Board effectiveness

The Board is unanimous in its view that the Board appointments have a range of experience, skills and strength of leadership. The Company’s procedures for new directors include undergoing a full induction process, and will continue with ongoing training, tailored to their knowledge and previous experience. A short biography of all Directors can be found in the Directors’ Report herein.

Shareholder engagement

As Chairman, I am responsible for the effective communication between shareholders and the Company and for ensuring the Board understands the views of major shareholders.

I look forward to listening to the views of our shareholders at the Company’s 2021 AGM. Directors regularly meet with a cross section of the Company shareholders to ensure an ongoing dialogue is maintained and report to the Board on feedback received from shareholders. I also make myself available to meet any of our shareholders who wish to discuss matters regarding the Company.  An investor relations report is part of our regular Board meetings.

Audit committee

The audit committee is currently headed by Andrew Monk, the Chairman, and comprises Robert Scott and Matthew Bonner. The committee's terms of reference are in accordance with the UK Corporate Governance Code. The committee reviews the company's financial and accounting policies, interim and final results and annual report prior to their submission to the board, together with management reports on accounting matters and internal control and risk management systems. It reviews the auditor’s management letter and considers any financial or other matters raised by both the auditors and employees.

The committee considers the independence of the external auditors and ensures that, before any non-audit services are provided by the external auditors, they will not impair the auditor’s objectivity and independence. During the year, non-audit services totalled £Nil (2020: £800).

There is currently no internal audit function within the Group. The directors consider that this is appropriate of a Group of this size.

The committee has primary responsibility for making recommendations to the board in respect of the appointment, re-appointment and removal of the external auditors.

On Behalf of the Board

Andrew Monk, Chairman

31st March 2022

Independent Auditor’s Report

Independent auditor’s report to the members of Anglo African ***Agriculture*** Plc

Opinion

We have audited the financial statements of Anglo African ***Agriculture*** Plc (the ‘parent Company’) and its subsidiaries (the ‘Group’) for the year ended 31 October 2021 which comprise the Group and Company statements of comprehensive income, statements of changes in equity, statements of financial position, statements of cash flows and notes to the financial statements, including a summary of significant accounting policies. The financial reporting framework that has been applied in the preparation of the Group and Parent Company financial statements is applicable law and International Financial Reporting Standards (IFRSs) as adopted by the United Kingdom.

In our opinion:

the financial statements give a true and fair view of the state of the Group’s and of the parent Company’s affairs as at 31 October 2021 and of the Group’s and parent Company’s loss for the year then ended;the Group and Parent Company financial statements have been properly prepared in accordance with IFRSs as adopted by the United Kingdom;the financial statements have been prepared in accordance with the requirements of the Companies Act 2006.

Basis for opinion

We conducted our audit in accordance with International Standards on Auditing (UK) (ISAs (UK)) and applicable law. Our responsibilities under those standards are further described in the Auditor’s responsibilities for the audit of the financial statements section of our report. We are independent of the Company in accordance with the ethical requirements that are relevant to our audit of the financial statements in the UK, including the FRC’s Ethical Standard as applied to listed entities, and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Material uncertainty related to going concern

We draw attention to note 2a in the financial statements, which explains that the Group has incurred significant operating losses and negative cash flows from operations. The Group forecasts indicate that no additional funding will be required and that sufficient cash should be available for the following 12 months to settle all working capital requirements. In the event that Dynamic Intertrade fails to meet its revenue predictions, the Group will need to obtain additional debt or equity financing in order to fund its operations for at least the next twelve months. Furthermore, the directors have agreed to defer the payment of their fees until such time that the company is in a position to pay such fees without affecting its ability to pay current liabilities as become due and without affecting its ability to support its subsidiary, Dynamic Intertrade (Pty) Ltd, given the potential for future cashflow deficits. These events or conditions, along with other matters as set out in note 2a indicate that a material uncertainty exists that may cast significant doubt on the Group’s ability to continue as a going concern. Our opinion is not modified in respect of this matter.

In auditing the financial statements, we have concluded that the directors’ use of the going concern basis of accounting in the preparation of the financial statements is appropriate. Our evaluation of the directors’ assessment of the entity’s ability to continue to adopt the going concern basis of accounting included:

a review of management’s budgets and cashflow forecasts for the 12 months from proposed sign off date;a review of the inputs and assumptions utilised in the budgets and cashflow forecasts taking into account our knowledge of the group and its levels of operating cashflows;obtaining signed salary deferral letters from the directors of the Company to ensure the Group maintains a positive cashflow balance;stress testing of the forecasted cashflows and comparison to actual result post year-end to date;a review of the cash balances held by the group at year end date and at sign-off date.

Our responsibilities and the responsibilities of the directors with respect to going concern are described in the relevant sections of this report.

Our audit approach

Overview

Key audit matters

Key audit matters are those matters that, in our professional judgment, were of most significance in our audit of the financial statements of the current period and include the most significant assessed risks of material misstatement (whether or not due to fraud) we identified, including those which had the greatest effect on: the overall audit strategy, the allocation of resources in the audit; and directing the efforts of the engagement team. These matters were addressed in the context of our audit of the financial statements as a whole and in forming our opinion thereon, and we do not provide a separate opinion on these matters. This is not a complete list of all risks identified by our audit:

Recoverability of the long-term loansCarrying value of the long-term investment

These are explained in more detail below.

Audit scope

We conducted audits of the complete financial information of Anglo African ***Agriculture*** Plc, Dynamic Intertrade (Pty) Limited and Dynamic Intertrade Agri (Pty) Limited;We performed specified procedures over certain account balances and transaction classes at other Group companies.Taken together, the Group companies over which we performed our audit procedures accounted for 100% of the absolute profit before tax (i.e. the sum of the numerical values without regard to whether they were profits or losses for the relevant reporting units) and 100% of revenue.

Key audit matters

Our application of materiality

The scope of our audit was influenced by our application of materiality. We set certain quantitative thresholds for materiality. These, together with qualitative considerations, helped us to determine the scope of our audit and the nature, timing and extent of our audit procedures on the individual financial statement line items and disclosures and in evaluating the effect of misstatements, both individually and in aggregate on the financial statements as a whole.

Based on our professional judgment, we determined materiality for the financial statements as a whole as follows:

For each component in the scope of our Group audit, we allocated a materiality that is less than our overall Group materiality. The range of materiality allocated across components was between £14,000 and £22,200.

We agreed with the Audit Committee that we would report to them misstatements identified during our audit above £1,230 (Group audit) (31 October 2020: £4,150) and £1,110 (Company audit) (31 October 2020: £2,800) as well as misstatements below those amounts that, in our view, warranted reporting for qualitative reasons.

An overview of the scope of our audit

As part of designing our audit, we determined materiality and assessed the risks of material misstatement in the financial statements. In particular, we looked at where the directors made subjective judgments, for example in respect of significant accounting estimates that involved making assumptions and considering future events that are inherently uncertain. As in all of our audits we also addressed the risk of management override of internal controls, including evaluating whether there was evidence of bias by the directors that represented a risk of material misstatement due to fraud.

How we tailored the audit scope

We tailored the scope of our audit to ensure that we performed enough work to be able to give an opinion on the financial statements as a whole, taking into account the structure of the Group and the Company, the accounting processes and controls, and the industry in which they operate.

The Group financial statements are a consolidation of 3 reporting units, comprising the Group’s operating businesses and holding companies.

We performed audits of the complete financial information of Anglo African ***Agriculture*** Plc and Dynamic Intertrade (Pty) Limited reporting units, which were individually financially significant and accounted for 100% of the Group’s revenue and 100% of the Group’s absolute profit before tax (i.e. the sum of the numerical values without regard to whether they were profits or losses for the relevant reporting units). We also performed specified audit procedures over certain account balances and transaction classes that we regarded as material to the Group at the 3 reporting units, one based in the United Kingdom and 2 more in South Africa.

Other information

The directors are responsible for the other information. The other information comprises the information included in the annual report, other than the financial statements and our auditor’s report thereon. Our opinion on the financial statements does not cover the other information and, except to the extent otherwise explicitly stated in our report, we do not express any form of assurance conclusion thereon.

In connection with our audit of the financial statements, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit or otherwise appears to be materially misstated. If we identify such material inconsistencies or apparent material misstatements, we are required to determine whether there is a material misstatement in the financial statements or a material misstatement of the other information. If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact. We have nothing to report in this regard.

Opinions on other matters prescribed by the Companies Act 2006

In our opinion the part of the directors’ remuneration report to be audited has been properly prepared in accordance with the Companies Act 2006.

In our opinion, based on the work undertaken in the course of the audit:

the information given in the strategic report and the directors’ report for the financial year for which the financial statements are prepared is consistent with the financial statements; andthe strategic report and the directors’ report have been prepared in accordance with applicable legal requirements; andthe Directors’ Remuneration report has been properly prepared in accordance with the Companies Act 2006.

Matters on which we are required to report by exception

In the light of the knowledge and understanding of the Group and parent Company and its environment obtained in the course of the audit, we have not identified material misstatements in the strategic report or the directors’ report.

We have nothing to report in respect of the following matters in relation to which the Companies Act 2006 requires us to report to you if, in our opinion:

adequate accounting records have not been kept by the parent Company, or returns adequate for our audit have not been received from branches not visited by us; orthe parent Company financial statements are not in agreement with the accounting records and returns; orcertain disclosures of directors’ remuneration specified by law are not made; orwe have not received all the information and explanations we require for our audit.

Responsibilities of directors

As explained more fully in the directors’ responsibilities statement set out on page 14, the directors are responsible for the preparation of the financial statements and for being satisfied that they give a true and fair view, and for such internal control as the directors determine is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, the directors are responsible for assessing the Group’s and parent Company’s ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless the directors either intend to liquidate the Group or the parent Company or to cease operations, or have no realistic alternative but to do so.

Auditor’s responsibilities for the audit of the financial statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor’s report that includes our opinion. Reasonable assurance is a high level of assurance but is not a guarantee that an audit conducted in accordance with ISAs (UK) will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

Explanation as to what extent the audit was considered capable of detecting irregularities, including fraud

Our approach to identifying and assessing the risks of material misstatement in respect of irregularities, including fraud and non-compliance with laws and regulations, was as follows:

the senior statutory auditor ensured the engagement team collectively had the appropriate competence, capabilities and skills to identify or recognise non-compliance with applicable laws and regulations.we identified the laws and regulations applicable to the group through discussions with directors and other management.we focused on specific laws and regulations which we considered may have a direct material effect on the financial statements or the operations of the company, including taxation legislation, ***data*** protection, anti-bribery, employment, environmental, health and safety legislation and anti-money laundering regulations.we assessed the extent of compliance with the laws and regulations identified above through making enquiries of management and inspecting legal correspondence.identified laws and regulations were communicated within the audit team regularly and the team remained alert to instances of non-compliance throughout the audit; andwe assessed the susceptibility of the group’s financial statements to material misstatement, including obtaining an understanding of how fraud might occur, by:making enquiries of management as to where they considered there was susceptibility to fraud, their knowledge of actual, suspected and alleged fraud;considering the internal controls in place to mitigate risks of fraud and non-compliance with laws and regulations.

To address the risk of fraud through management bias and override of controls, we:

performed analytical procedures to identify any unusual or unexpected relationships;tested journal entries to identify unusual transactions;assessed whether judgements and assumptions made in determining the accounting estimates set out in note 3 of the group financial statements were indicative of potential bias;investigated the rationale behind significant or unusual transactions.

In response to the risk of irregularities and non-compliance with laws and regulations, we designed procedures which included, but were not limited to:

agreeing financial statement disclosures to underlying supporting documentation;reading the minutes of meetings of those charged with governance;enquiring of management as to actual and potential litigation and claims;reviewing correspondence with HMRC and the group’s legal advisors.

There are inherent limitations in our audit procedures described above. The more removed those laws and regulations are from financial transactions, the less likely it is that we would become aware of noncompliance. Auditing standards also limit the audit procedures required to identify non-compliance with laws and regulations to enquiry of the directors and other management and the inspection of regulatory and legal correspondence, if any.

Material misstatements that arise due to fraud can be harder to detect than those that arise from error as they may involve deliberate concealment or collusion.

A further description of our responsibilities for the audit of the financial statements is located on the Financial Reporting Council’s website at:[*http://www.frc.org.uk/auditorsresponsibilities*](http://www.frc.org.uk/auditorsresponsibilities). This description forms part of our auditor’s report.

Other matters which we are required to address

We were appointed by the shareholders on 10 July 2013 to audit the financial statements for the period ending 31 March 2013. Our total uninterrupted period of engagement is 8 years, covering the periods ending 31 March 2013 to 31 October 2021.

The non-audit services prohibited by the FRC’s Ethical Standard were not provided to the Group or the parent Company and we remain independent of the Group and the parent Company in conducting our audit.

Our audit opinion is consistent with the additional report to the audit committee.

Use of this report

This report is made solely to the Company’s members, as a body, in accordance with Chapter 3 of Part 16 of the Companies Act 2006. Our audit work has been undertaken so that we might state to the Company’s members those matters we are required to state to them in an auditor’s report and for no other purpose. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than the Company and the Company’s members as a body, for our audit work, for this report, or for the opinions we have formed.

Sudhir Rawal (Senior Statutory Auditor)

For and on behalf of Jeffreys Henry LLP, Statutory Auditor

Finsgate

5-7 Cranwood Street

London EC1V 9EE

31st March 2022

Statement of Comprehensive Income

For the Year Ended 31 October 2021

All amounts relate to continuing operations.

Group Statement of Changes in Equity

Share capital is the amount subscribed for shares at nominal value.

The share premium has arisen on the issue of shares at a premium to their nominal value.

Share-based payments reserve relate to the charge for share-based payments in accordance with IFRS 2.

Retained earnings represent the cumulative loss of the Group attributable to equity shareholders.

Company Statement of Changes in Equity

Statement of the Financial Position

The notes on pages 36 to 83 form part of these financial statements

Approved by the Board and authorised for issue on 31st March 2022.

Andrew Monk, Non-Executive Chairman

Company Registration No. 07913053

Statement of Cash Flow

Notes to Group Annual Financial Statements

1. General Information

Anglo African ***Agriculture*** plc is a company incorporated in the United Kingdom. Details of the registered office, the officers and advisors to the Company are presented on the Directors and Advisors page at the beginning of this report. The Company has a standard listing on the London Stock Exchange main market. The information within these financial statements and accompanying notes have been prepared for the year ended 31 October 2021 with comparatives for the year ended 31 October 2020.

2. Basis of Preparation and Significant Accounting Policies

The consolidated financial statements of Anglo African ***Agriculture*** plc have been prepared in accordance with International Financial Reporting Standards as adopted by the United Kingdom (IFRS as adopted by the UK), IFRS Interpretations Committee and the Companies Act 2006 applicable to companies reporting under IFRS.

The consolidated financial statements have been prepared under the historical cost convention in the Group’s reporting currency of Pound Sterling.

The preparation of financial statements in conformity with IFRS requires the use of certain critical accounting estimates. It also requires management to exercise its judgement in the process of applying the Group’s accounting policies. The areas involving a higher degree of judgment or complexity, or areas where assumptions and estimates are significant to the consolidated financial statements are disclosed in Note 3. The preparation of financial statements in conformity with IFRS requires management to make judgments, estimates and assumptions that affect the application of accounting policies and reported amounts of assets, liabilities, income and expenses. Although these estimates are based on management’s experience and knowledge of current events and actions, actual results may ultimately differ from these estimates.

The estimates and underlying assumptions are reviewed on an ongoing basis. Revisions to accounting estimates are recognised in the year in which the estimates are revised if the revision affects only that year or in the year of the revision and future year if the revision affects both current and future year.

a.    Going Concern

These consolidated financial statements are prepared on the going concern basis. The going concern basis assumes that the Group will continue in operation for the foreseeable future and will be able to realise its assets and discharge its liabilities and commitments in the normal course of business. The Group has incurred significant operating losses and negative cash flows from operations as the Group continued to expand its operations during the year under review.

There remains an active and liquid market for the Group’s shares.

As at 31 October 2021 the Group held £1,109,774 (2020: £45,251) in cash and cash equivalents.

The directors have agreed to defer the payment of their directors fees until such time that the company is in a position to pay such fees without affecting its ability to pay current liabilities as they become due and without affecting its ability to support Dynamic Intertrade (Pty) Ltd, given the potential for future cashflow deficits. The Directors have prepared cash flow forecasts, which include several cost saving initiatives undertaken and the appointment of a chief executive officer, for the period ended 31 March 2023. These forecasts consider operating cash flows and capital expenditure requirements for the Company and Dynamic Intertrade, available working capital and forecast expenditure, including overheads and other costs. The forecasts include additional funding requirements, which the directors believe will be met. As in prior years, in the event that additional funding is required, the directors have agreed to participate in any fund raises that may be necessary at the time. Based upon the company’s forecast, it has sufficient cash for the foreseeable future.

In the event that Dynamic Intertrade fails to meet revenue predictions and any other relevant risk factors arise, the Group will need to obtain additional debt finance or equity to fund its operations for the period to 31 March 2023. The cash flow forecast is dependent on production targets being met at Dynamic Intertrade, maintaining the invoice financing arrangements, generating future sales and the selling prices remaining stable during the period to

31 March 2023.

After careful consideration of the matters set out above, the Directors are of the opinion that the Group will be able to undertake its planned activities for the period to 31 March 2023 from production and from additional fund raising and have prepared the consolidated financial statements on the going concern basis. Nevertheless, due to the uncertainties inherent in meeting its revenue predictions and obtaining additional fund raising there can be no certainty in these respects. The financial statements do not include any adjustments that would result if the Group was unable to continue as a going concern. For this reason, the directors believe that there is a material uncertainty relating to the group’s going concern.

b. New and Amended Standards Adopted by the Company

The group have implemented IFRS as adopted by UK. At the point of transition from IFRS as adopted by EU the underlying requirements were identical. The following standards, amendments and interpretations are new and effective for the year ended 31 October 2021 and have been adopted. None of the IFRS standards below had a material impact on the financial statements.

The following new standards, amendments to standards and interpretations have been issued, but are not effective for the financial year beginning 1 November 2021 and have not been early adopted:

The Directors anticipate that the adoption of these standards and the interpretations in future periods will not have a material impact on the financial statements of the Group.

c.    Basis of Consolidation

The consolidated financial statements incorporate the financial statements of the Company and entities controlled by the Company (its subsidiaries) made up to 31 October each year. Control is achieved where the Company has the power to govern the financial and operating policies of an investee entity so as to obtain benefits from its activities.

The results of subsidiaries acquired or disposed of during the year are included in the consolidated statement of comprehensive income from the effective date of acquisition or up to the effective date of disposal, as appropriate. Where necessary, adjustments are made to the financial statements of subsidiaries to bring their accounting policies into line with those used by other members of the Group. All intra-group transactions, balances, income and expenses are eliminated on consolidation.

Changes in the Group’s ownership interests in subsidiaries that do not result in the Group losing control over the subsidiaries are accounted for as equity transactions. The carrying amounts of the Group’s interests and the non-controlling interests are adjusted to reflect the changes in their relative interests in the subsidiaries.

When the Group loses control of a subsidiary, the profit or loss on disposal is calculated as the difference between (i) the aggregate of the fair value of the consideration received and the fair value of any retained interest and (ii) the previous carrying amount of the assets (including goodwill), and liabilities of the subsidiary and any non-controlling interests. Where certain assets of the subsidiary are measured at revalued amounts or fair values and the related cumulative gain or loss has been recognised in other comprehensive income and accumulated in equity, the amounts previously recognised in other comprehensive income and accumulated in equity are accounted for as if the Company had directly disposed of the related assets (i.e. reclassified to profit or loss or transferred directly to retained earnings). The fair value of any investment retained in the former subsidiary at the date when control is lost is regarded as the fair value on initial recognition for subsequent accounting under IFRS 9 “Financial Instruments: Recognition and Measurement” or, when applicable, the cost on initial recognition of an investment in an associate or a jointly controlled entity.

Business Combinations

Acquisitions of businesses are accounted for using the acquisition method. The consideration transferred in a business combination is measured at fair value, which is calculated as the sum of the acquisition-date fair values of the assets transferred by the Group, liabilities incurred by the Group to the former owners of the acquiree and the equity interests issued by the Group in exchange for control of the acquiree. Acquisition-related costs are recognised in profit or loss as incurred.

At the acquisition date, the identifiable assets acquired, and the liabilities assumed are recognised at their fair value at the acquisition date, except that:

Deferred tax assets or liabilities and liabilities or assets related to employee benefit arrangements are recognised and measured in accordance with IAS 12 Income Taxes and IAS 19 Employee Benefits respectively;Liabilities or equity instruments related to share-based payment transactions of the acquiree or the replacement of an acquiree’s share-based payment transactions with share-based payment transactions of the Group are measured in accordance with IFRS 2 Share-based Payment at the acquisition date; andAssets (or disposal groups) that are classified as held for sale in accordance with IFRS 5 Non-current Assets Held for Sale and Discontinued Operations are measured in accordance with that standard.

Goodwill

Goodwill is measured as the excess of the sum of the consideration transferred, the amount of any non-controlling interests in the acquiree, and the fair value of the acquirer’s previously held equity interest in the acquiree (if any) over the net of the acquisition-date amounts of the identifiable assets acquired and the liabilities assumed. If, after assessment, the net of the acquisition-date amounts of the identifiable assets acquired and liabilities assumed exceeds the sum of the consideration transferred, the amount of any non-controlling interests in the acquiree and the fair value of the acquirer’s previously held interest in the acquiree (if any), the excess is recognised immediately in profit or loss as a bargain purchase gain.

Joint Ventures and Associates

A joint venture is a contractual agreement under which two or more parties conduct an economic activity and unanimous approval is required for the financial and operating policies. Associates are all entities over which the Group has significant influence but not control, generally accompanying a shareholding between 20% and 50% of the voting rights. Joint ventures and associates are accounted for using the equity method, which involves recognition in the consolidated income statement of AAA’s share of the net result of the joint ventures and associates for the year. Accounting policies of joint ventures and associates have been changed where necessary to ensure consistency with the policies adopted by the Group. AAA’s interest in a joint venture or associate is carried in the statement of financial position at its share in the net assets of the joint venture or associate together with goodwill paid on acquisition, less any impairment loss. When the share in the losses exceeds the carrying amount of an equity-accounted company (including any other receivables forming part of the net investment in the company), the carrying amount is written down to nil and recognition of further losses is discontinued, unless we have incurred legal or constructive obligations relating to the company in question.

d.    Property, Plant and Equipment

Property, plant and equipment are stated at historical cost less subsequent accumulated depreciation and accumulated impairment losses, if any. Historical cost includes expenditure that is directly attributable to the acquisition of the items. Subsequent costs are included in the asset’s carrying amount or recognised as a separate asset, as appropriate, only when it is probable that future economic benefits associated with the item will flow to the Group and the cost of the item can be measured reliably. All other repairs and maintenance are charged to profit or loss during the financial year in which they are incurred. Depreciation on property, plant and equipment is calculated using the straight-line method to write off their cost over their estimated useful lives at the following annual rates:

Useful lives and depreciation method are reviewed and adjusted if appropriate, at the end of each reporting year.

An item of property, plant and equipment is derecognised upon disposal or when no future economic benefits are expected to arise from the continued use of the asset. Any gain or loss arising on the disposal or retirement of an item of property, plant and equipment is determined as the difference between the sales proceeds and the carrying amount of the relevant asset and is recognised in profit or loss in the year in which the asset is derecognised.

e.    Leased assets

The group leases various offices and equipment. Rental contracts are typically made for fixed periods of 3 years but may have extension options for an additional 2 years. Lease terms are negotiated on an individual basis and contain a wide range of different terms and conditions. The lease agreements do not impose any covenants, but leased assets may not be used as security for borrowing purposes.

The right-of use asset is depreciated over the shorter of the asset's useful life and the lease term as per the table below:

Assets and liabilities arising from a lease are initially measured on a present value basis. Lease liabilities include the net present value of the following lease payments:

fixed payments (including in-substance fixed payments), less any lease incentives receivable.

The lease payments are discounted using the interest rate implicit in the lease. If that rate cannot be determined, the lessee's incremental borrowing rate is used, being the rate that the lessee would have to pay to borrow the funds necessary to obtain an asset of similar value in a similar economic environment with similar terms and conditions.

Right-of-use assets are measured at cost comprising the following:

the amount of the initial measurement of lease liabilityany lease payments made at or before the commencement date less any lease incentives received any initial direct costs, andrestoration costs.

Payments associated with short term leases and leases of low-value assets are recognised on a straight-line basis as an expense in profit or loss. Short-term leases are leases with a lease term of 12 months or less. Low-value assets comprise moving equipment rented on a day to day basis.

f.     Investments in Subsidiaries

Investments in subsidiaries are stated at cost less, where appropriate, provisions for impairment.

g.    Inventories

Inventories are carried at the lower of cost and net realisable value. Cost is determined using specific identification and in the case of work in progress and finished goods, comprises the cost of purchase, cost of ***conversion*** and other costs incurred in bringing the inventories to their present location and condition. Net realisable value is the estimated selling price in the ordinary course of business less the estimated cost of completion and applicable selling expenses.

When the inventories are sold, the carrying amount of those inventories is recognised as an expense in the year in which the related revenue is recognised. The amount of any write-down of inventories to net realisable value and all losses of inventories are recognised as an expense in the year in which the write-down or loss occurs. The amount of any reversal of any write-down of inventories is recognised as an expense in the year in which the reversal occurs.

h.    Impairment

Non-derivative financial assets

Credit-impaired financial assets

At each reporting date, the Group assesses whether financial assets carried at amortised cost and debt securities at FVOCI are credit-impaired. A financial asset is “credit-impaired” when one or more events that have a detrimental impact on the estimated future cash flows of the financial assets have occurred.

Evidence that a financial asset is credit-impaired includes the following observable ***data***:

•       significant financial difficulty of the borrower or issuer;

•       a breach of contract such as a default or being more than 90 days past due;

•       the restructuring of a loan or advance by the Group on terms that the Group would not consider otherwise;

•       it is probable that the borrower will enter bankruptcy or other financial reorganisation; or

•       the disappearance of an active market for a security because of financial difficulties.

A 12 months approach is followed in determining the Expected Credit Loss (“ECL”).

Presentation of allowance for ECL in the statement of financial position

Loss allowances for financial assets measured at amortised cost are deducted from the gross carrying amount of the assets.

For debt securities at FVOCI, the loss allowance is charged to profit or loss and is recognised in OCI.

Write-off

The gross carrying amount of a financial asset is written off when the Group has no reasonable expectations of recovering a financial asset in its entirety or a portion thereof. For corporate customers, the Group individually makes an assessment with respect to the timing and amount of write-off based on whether there is a reasonable expectation of recovery from the amount written off. However, financial assets that are written off could still be subject to enforcement activities in order to comply with the Group’s procedures of recovery of the amounts due.

i.     Financial Instruments

The Group classifies non-derivative financial assets into the following categories: loans and receivables and FVTPL and FVTOCI financial assets.

The Group classifies non-derivative financial liabilities into the following category: other financial liabilities.

i.       Non-derivative financial assets and financial liabilities – Recognition and derecognition

The Group initially recognises loans and receivables on the date when they are originated. All other financial assets and financial liabilities are initially recognised on the trade date when the entity becomes a party to the contractual provisions of the instrument.

The Group derecognises a financial asset when the contractual rights to the cash flows from the asset expire, or it transfers the rights to receive the contractual cash flows in a transaction in which substantially all of the risks and rewards of ownership of the financial asset are transferred, or it neither transfers nor retains substantially all of the risks and rewards of ownership and does not retain control over the transferred asset. Any interest in such derecognised financial assets that is created or retained by the Group is recognised as a separate asset or liability.

The Group derecognises a financial liability when its contractual obligations are discharged or cancelled or expire. Gains or losses on derecognition of financial liabilities are recognised in profit or loss as a finance charge.

Financial assets and financial liabilities are offset, and the net amount presented in the statement of financial position when, and only when, the Group currently has a legally enforceable right to offset the amounts and intends either to settle them on a net basis or to realise the asset and settle the liability simultaneously.

ii.      Loans and receivables- Measurement

These assets are initially measured at fair value plus any directly attributable transaction costs. Subsequent to initial recognition, they are measured at amortised cost using the effective interest method.

iii.     Assets at FVOCI - Measurement

These assets are initially measured at fair value plus any directly attributable transaction costs. Subsequent to initial recognition, they are measured at fair value and changes therein, other than impairment losses, are recognised in OCI and accumulated in the revaluation reserve.

When these assets are derecognised, the gain or loss accumulated in equity is reclassified to profit or loss.

iv.     Non-derivative financial liabilities – Measurement

Other non-derivative financial liabilities are initially measured at fair value less any directly attributable transaction costs. Subsequent to initial recognition, these liabilities are measured at amortised cost using the effective interest method.

v.      Convertible loan notes and derivative financial instruments

The presentation and measurement of loan notes for accounting purposes is governed by IAS 32 and IFRS 9. These standards require the loan notes to be separated into two components:

•       A derivative liability, and

•       A debt host liability.

This is because the loan notes are convertible into an unknown number of shares, therefore failing the ‘fixed-for-fixed’ criterion under IAS 32. This requires the ‘underlying option component’ of the loan note to be valued first (as an embedded derivative), with the residual of the face value being allocated to the debt host liability (refer financial liabilities policy above).

Compound financial instruments issued by the Group comprise convertible notes denominated in British pounds that can be converted to ordinary shares at the option of the holder, when the number of shares to be issued is fixed and does not vary with changes in fair value.

The liability component of compound financial instruments is initially recognised at the fair value of a similar liability that does not have an equity ***conversion*** option. The equity component is initially recognised at the difference between the fair value of the compound financial instrument as a whole and the fair value of the liability component. Any directly attributable transaction costs are allocated to the liability and equity components in proportion to their initial carrying amounts.

Subsequent to initial recognition, the liability component of a compound financial instrument is measured at amortised cost using the effective interest method. The equity component of a compound financial instrument is not remeasured.

Interest related to the financial liability is recognised in profit or loss. On ***conversion*** at maturity, the financial liability is reclassified to equity and no gain or loss is recognised.

The Group’s financial liabilities include amounts due to a director, trade payables and accrued liabilities. These financial liabilities are classified as FVTPL are stated at fair value with any gains or losses arising on re-measurement recognised in profit or loss. Other financial liabilities, including borrowings are initially measured at fair value, net of transaction costs.

j.     Borrowings

Borrowings are presented as current liabilities unless the Group has an unconditional right to defer settlement for at least 12 months after the reporting period, in which case they are presented as non-current liabilities.

Borrowings are initially recorded at fair value, net of transaction costs and subsequently carried for at amortised costs using the effective interest method. Any difference between the proceeds (net of transaction costs) and the redemption value is recognised in profit or loss over the year of the borrowings using the effective interest method. Borrowings which are due to be settled within twelve months after the reporting period are included in current borrowings in the statement of financial position even though the original term was for a period longer than twelve months and an agreement to refinance, or to reschedule payments, on a long-term basis is completed after the reporting period and before the financial statements are authorised for issue.

k.    Revenue Recognition

Performance obligations and service recognition policies

Revenue is measured based on the consideration specified in a contract with a customer. The Group recognises revenue when it transfers control over of goods or services to a customer.

The following table provides information about the nature and timing of the satisfaction of performance obligations in contracts with customers, including significant payment terms, and the related revenue recognition policies.

l.     Cost of Sales

Cost of sales consists of all costs of purchase and other directly incurred costs.

Cost of purchase comprises the purchase price, import duties and other taxes (other than those subsequently recoverable by the Group from the taxing authorities), if any, and transport, handling and other costs directly attributable to the acquisition of goods. Trade discounts, rebates and other similar items are deducted in determining the costs of purchase. Cost of ***conversion*** primarily consists of hiring charges of subcontractors incurred during ***conversion***.

m.  Finance Income and Finance Costs

The Group’s finance income and finance costs include:

•       Interest income;

•       Interest expense;

•       Dividend income;

Interest income and expense is recognised using the effective interest method. Dividend income is recognised in profit or loss on the date on which the Group’s right to receive payment is established.

The “effective interest rate” is the rate that exactly discounts estimated future cash payments or receipts through the expected life of the financial instrument to:

•       the gross carrying amount of the financial asset; or

•       the amortised cost of the financial liability.

In calculating interest income and expense, the effective interest rate is applied to the gross carrying amount of the asset (when the asset is not credit-impaired) or to the amortised cost of the liability. However, for financial assets that have become credit-impaired subsequent to initial recognition, interest income is calculated by applying the effective interest rate to the amortised cost of the financial asset, if the asset is no-longer credit-impaired, then the calculation of interest income reverts to the gross basis.

n.    Taxation

Income tax expense represents the sum of the tax currently payable and deferred tax.

The tax currently payable is based on taxable profit for the year. Taxable profit differs from net profit as reported in the statement of comprehensive income because it excludes items of income and expense that are taxable or deductible in other years, and it further excludes items that are never taxable or deductible. The Group’s liability for current tax is calculated using tax rates that have been enacted or substantively enacted by the end of the reporting year.

Deferred tax is recognised on temporary differences between the carrying amount of assets and liabilities in the consolidated financial statements and the corresponding tax bases used in the computation of taxable profit. Deferred tax liabilities are generally recognised for all taxable temporary differences.

Deferred tax assets are generally recognised for all deductible temporary differences to the extent that it is probable that taxable profits will be available against which those deductible temporary differences can be utilised. Such deferred tax assets and liabilities are not recognised if the temporary differences arise from goodwill or from the initial recognition (other than in a business combination) of other assets and liabilities in a transaction that affects neither the taxable profit nor the accounting profit.

Deferred tax liabilities are recognised for taxable temporary differences associated with investments in subsidiaries, except where the Group is able to control the reversal of the temporary difference and it is probable that the temporary difference will not reverse in the foreseeable future. Deferred tax assets arising from deductible temporary differences associated with such investments are only recognised to the extent that it is probable that there will be sufficient taxable profits against which to utilise the benefits of the temporary differences and they are expected to reverse in the foreseeable future.

The carrying amount of deferred tax assets is reviewed at the end of each reporting year and reduced to the extent that it is no longer probable that sufficient taxable profits will be available to allow all or part of the asset to be recovered.

Deferred tax assets and liabilities are measured at the tax rates that are expected to apply in the year in which the liability is settled or the asset realised. The measurement of deferred tax assets and liabilities reflects the tax consequences that would follow from the manner in which the Group expects, at the end of the reporting year, to recover or settle the carrying amount of its assets and liabilities.

Current or deferred tax for the year is recognised in profit or loss, except when it relates to items that are recognised in other comprehensive income or directly in equity, in which case the current and deferred tax is also recognised in other comprehensive income or directly in equity respectively. Where current tax or deferred tax arises from the initial accounting for a business combination, the tax effect is included in the accounting for the business combination.

o.    Cash and Cash Equivalents

Cash and cash equivalents comprise cash at bank and on hand, demand deposits with banks and other financial institutions, and short-term, highly liquid investments that are readily convertible into known amounts of cash and which are subject to an insignificant risk of changes in value, having been within three months of maturity at acquisition. Bank overdrafts that are repayable on demand and form an integral part of the Group’s cash management are also included as a component of cash and cash equivalents for the purpose of the consolidated statement of cash flows.

p.    Provisions and Contingencies

Provisions are recognised when the Group has a present obligation as a result of a past event, and it is probable that the Group will be required to settle that obligation. Provisions are measured at the Directors’ best estimate of the expenditure required to settle the obligation at the statement of financial position date and are discounted to present value where the effect is material. Provisions are not recognised for future operating losses.

Where there are a number of similar obligations, the likelihood that an outflow will be required in settlement is determined by considering the class of obligations as a whole. A provision is recognised even if the likelihood of an outflow with respect to any one item included in the same class of obligations may be small.

When the effect of discounting is material, the amount recognised for a provision is the present value at the reporting date of the future expenditures expected to be required to settle the obligation. The increase in the discounted present value amount arising from the passage of time is included in finance costs in the statement of comprehensive income.

Contingent liabilities are not recognised in the financial statements. They are disclosed unless the possibility of an outflow of resources embodying economic benefits is remote. A contingent asset is not recognised in the financial statements but disclosed when an inflow of economic benefits is probable.

q.    Share Capital

Ordinary shares are classified as equity. Proceeds from issuance of ordinary shares are classified as equity. Incremental costs directly attributable to the issuance of new ordinary shares are deducted against share capital and share premium.

r.    Foreign Currencies

In preparing the financial statements of each individual group entity, transactions in currencies other than the functional currency of that entity (foreign currencies) are recorded in the respective functional currency (i.e. the currency of the primary economic environment in which the entity operates) at the rates of exchanges prevailing on the dates of the transactions. At the end of the reporting year, monetary items denominated in foreign currencies are retranslated at the rates prevailing at that date. Non-monetary items carried at fair value that are denominated in foreign currencies are retranslated at the rates prevailing on the date when the fair value was determined. Non-monetary items that are measured in terms of historical costs in a foreign currency are not retranslated.

Exchange differences arising on the settlement of monetary items, and on translation of monetary items, are recognised in profit or loss in the year in which they arise. Exchange differences arising on the retranslation of non-monetary items carried at fair value are included in profit or loss for the year except for differences arising on the retranslation of non-monetary items in respect of which gains, and losses are recognised directly in other comprehensive income, in which cases, the exchange differences are also recognised directly in other comprehensive income.

For the purposes of presenting the consolidated financial statements, assets and liabilities of the Group’s foreign operations are translated from South African Rand into the presentation currency of the Group of Pound Sterling at the rate of exchange prevailing at the end of the reporting year, and their income and expenses are translated at the average exchange rates for the year, unless exchange rates fluctuate significantly during that year, in which case, the exchange rates prevailing at the dates of transactions are used. Exchange differences arising, if any, are recognised in other comprehensive income and accumulated in equity.

The principal exchange rates during the year are set out in the table below:

s.    Employee Benefits

Salaries, annual bonuses, paid annual leave and the cost to the Group of non-monetary benefits are accrued in the year in which employees of the Group render the associated services. Where payment or settlement is deferred and the effect would be material, these amounts are stated at their present values.

t.    Segmental Reporting

Operating segments are reported in a manner consistent with the internal reporting provided to the chief operating decision maker. The chief operating decision-maker, who is responsible for allocating resources and assessing performance of the operating segments, has been identified as the executive Director who makes strategic decisions.

3. Critical Accounting Estimates and Judgements

Estimates and judgements are continually evaluated and are based on historical experience and other factors, including expectations of future events that are believed to be reasonable under the circumstances.

In the application of the Group’s accounting policies, which are described above, management is required to make estimates and assumptions about the carrying amounts of assets and liabilities that are not readily apparent from other sources. The estimates and assumptions that had a significant risk of causing a material adjustment to the carrying amount of assets and liabilities are discussed below.

a.    COVID-19 Pandemic and "lockdowns"

With the declaration that COVID-19 was a pandemic on 13 March 2020 and the South African "lockdown" being announced on 23 March 2020 falling before 31 October 2021, the Directors have adopted that the COVID-19 pandemic as a current period event for both the current and prior financial years. As a result the Directors have considered the impact of the COVID-19 pandemic on all areas of Judgment that impact the current accounting period including all the areas of Judgment included in note 3. Where appropriate to do so the Directors have made adjustments to estimates as a result of COVID-19 as a current period adjusting event and considered this in all areas requiring review of impairment including property, plant and equipment, intangible assets, trade receivables and inventory carrying values. The impact of the pandemic has also been considered in the preparation of the forecast for the review of the going concern assumptions.

b.    Inventory Valuation

Inventory is valued at the lower of cost and net realisable value. Net realisable value of inventories is the estimated selling price in the ordinary course of business, less estimated costs of completion and selling expenses. These estimates are based on the current market conditions and the historical experience of selling products of a similar nature. It could change significantly as a result of competitors’ actions in response to severe industry cycles. The Group reviews its inventories in order to identify slow-moving merchandise and uses markdowns to clear merchandise. Inventory value is reduced when the decision to markdown below cost is made.

c.    Impairment of long term Inter-company Receivables

The Group’s management reviews long-term inter-company receivables on a regular basis to determine if any provision for impairment is necessary. The policy for the impairment of long-term inter-company receivables of the Group is based on, where appropriate, the evaluation of collectability, the trading performance of the relevant subsidiary and on management’s judgement. A considerable amount of judgement is required in assessing the ultimate realisation of these outstanding amounts, including the current and estimated future trading performance of the relevant subsidiary. If the financial conditions of inter-company debtors of the Group were to deteriorate, resulting in an impairment of their ability to make payments, a provision for impairment may be required.

d.    Impairment of Receivables

The Group’s management reviews receivables on a regular basis to determine if any provision for impairment is necessary. The policy for the impairment of receivables of the Group is based on, where appropriate, the evaluation of collectability and ageing analysis of the receivables and on management’s judgement. A considerable amount of judgement is required in assessing the ultimate realisation of these outstanding amounts, including the current creditworthiness and the past ***collection*** history of each debtor. If the financial conditions of debtors of the Group were to deteriorate, resulting in an impairment of their ability to make payments, provision for impairment may be required.

e     Incremental borrowing cost of Right of Use Assets and Lease Liabilities

In assessing the Group’s right of use assets and lease liabilities, the Group has to assess its incremental borrowing costs. As an approximation of the Group’s incremental long term borrowing costs, the Group estimated the borrowing costs associated with similar long term, asset based financing arrangements. The Group based the implied incremental borrowing costs on the South African prime lending rate applicable at the date of commencement of the agreement and added an appropriate lending premium that would be typically applied by lenders. At the year end the estimated incremental borrowing costs used amounted to 8.5% (2020: 8.5%).

f.     Income Taxes

The Group is subject to income taxes in South Africa and the UK. The South African income taxes are administered by South African accountants. Significant judgement is required in determining the provision for income taxes and the timing of payment of the related tax. There are certain transactions and calculations for which the ultimate tax determination is uncertain during the ordinary course of business. The Group recognises liabilities for anticipated tax based on estimates of whether additional taxes will be due. Where the final tax outcome of these matters is different from the amounts that were initially recorded, such differences will impact the income tax provision in the year in which such determination is made.

g.    Share Based Payments

The fair value of share-based payments recognised in the income statement is measured by use of the Black Scholes model, which considers conditions attached to the vesting and exercise of the equity instruments. The expected life used in the model is adjusted; based on management’s best estimate, for the effects of non-transferability, exercise restrictions and behavioural considerations. The share price volatility percentage factor used in the calculation is based on management’s best estimate of future share price behaviour based on past experience, future expectations and benchmarked against peer companies in the industry.

h.    Equity portion of Convertible Loan Notes

The Group provides for the equity portion of convertible loan notes by applying an estimated interest rate in determining the present values of the convertible loan notes and the interest payable thereon over the life of the convertible loan notes.

i.     Depreciation and Amortisation

The Group depreciates property, plant and equipment and amortises the leasehold buildings and land use rights on a straight-line method over the estimated useful lives. The estimated useful lives reflect the Directors’ estimate of the years that the Group intends to derive future economic benefits from the use of the Group’s property, plant and equipment.

4. Segmental Reporting

In the opinion of the Directors, the Group has one class of business, being the trading of ***agricultural*** materials. The Group’s primary reporting format is determined by the geographical segment according to the location of its establishments. There is currently only one geographic reporting segment, which is South Africa. All revenues and costs are derived from the single segment.

5. Revenue

6.Other Income

7.Personnel Expenses and Staff Numbers (Including Directors)

8.Directors’ Remuneration

\* Included in Andrew Monk’s remuneration is £1,966 for National Insurance.

No pension contributions were made by the Company on behalf of its directors other than for Andrew Monk.

At the year-end a total of £70,232 (2020: £194,266) was outstanding in respect of directors’ emoluments.

9.Expenses - Analysis by Nature

10.Impairments

During the financial year, the recoverability of the investment was evaluated and in management’s estimation, it was considered necessary to impair the goodwill on consolidation, the investment in the subsidiary and the intercompany loans receivable.

11.Finance Costs

Finance costs represent interest and charges in respect of the discounting of invoices, the interest accrual for the Convertible Loan Notes issued and the interest charged on capitalised right-of use lease liability.

12.Finance Income

13.Taxation

The charge for the year can be reconciled to the profit before taxation per the consolidated statement of comprehensive income as follows:

The Company has excess management expenses of £1,043,509 (2020: £868,259) available for carry forward against future trading profits. The deferred tax asset in these tax losses at 19.0% of £193,369 (2020: 19.0% of £164,969) has not been recognised due to the uncertainty of recovery.

14.Loss Per Share

Loss per share ***data*** is based on the Group result for the year and the weighted average number of shares in issue.

Basic loss per share is calculated by dividing the loss attributable to equity shareholders by the weighted average number of ordinary shares in issue during the year:

Basic and diluted loss per share are the same, since where a loss is incurred the effect of outstanding share options and warrants is considered anti-dilutive and is ignored for the purpose of the loss per share calculation. As at 31 October 2021 there were 21,966,087 (2020: 21,966,087) shares in issue, 26,148,289 (2020: 12,421,622) outstanding share warrants and 897,809 (2020: 897,809) outstanding options, both are potentially dilutive.

15.Investments

14.1. Investment in Associate

Management have committed to selling its investment in the associate, Dynamic Intertrade Agri (Pty) Ltd. The asset is available for immediate sale to a willing buyer. A buyer for the asset has been identified and a preliminary price of £6,154 has been discussed. It was anticipated that the sale will be concluded within the last financial year ending 31 October 2021, however COVID-19 delayed the process. The investment is still being held for sale to the existing buyer. Accordingly, for the current year the investment is reflected under current assets as held for sale. As part of the process of selling the group’s investment in the associate a fair value exercise was undertaken. Management considered the financial performance of the company, the price that a willing buyer was prepared to pay for the investment as well as the prevailing market conditions. Based on the above, the directors are of the opinion that the fair value of the company is £6,154.

As at 31 October 2021, the Company directly and indirectly held the following subsidiary and associate:

16.Long Term Intercompany Loans

The loan is unsecured and bears interest at rates linked to LIBOR +2% p.a. As indicated in Note 10, both the capital and the interest elements of the above loan have been fully impaired during the year ended 31 October 2020. The additional loan provided to the subsidiary was impaired during the current year.

17.Property, Plant and Equipment

The holding company held no tangible fixed assets at 31 October 2021 and 2020.

18.Loan Receivable

The loan was advanced to Touchwood Investments Ltd, a company that is part of the Comarco Group, which operates a port in Mombasa. This loan bears interest at 12% for the first 9 months, where after the rate increased to 15%. The loan was initially for a period 24 months and was initially repayable in full on 12 November 2020, however due to the COVID-19 pandemic the repayment of the loan has been extended to 30 April 2021, and then once again to 30 September 2021. The loan was repaid in full on 26 October 2021.

19.Inventories

20.Trade and other receivables

The receivables are considered to be held within a held-to-***collect*** business model consistent with the Group’s continuing recognition of the receivables.

As at 31 October 2021 the Group does not have any contract assets nor any contract liabilities arising out of contracts with customers relating to the Group’s right to receive consideration for ***agricultural*** products sold but not billed. Group Trade receivables represent amounts receivable on the sale of ***agricultural*** products and are included after provisions for doubtful debts.

Credit and market risks, and impairment losses

The Group did not impair any of its trade receivables as at 31 October 2021, as all trade receivables generated during the financial year, and outstanding at 31 October 2021 are considered to be recoverable during the ordinary course of business.

Information about the Group’s exposure to credit and market risks and impairment losses for trade receivables is included in Note 30.

The Directors consider that the carrying amount of trade receivables and other receivables approximates their fair value.

21.Cash and Cash Equivalents

22.Trade and Other Payables

Trade payables represent amounts due for the purchase of ***agriculture*** materials and administrative expenses. The Directors consider that the carrying amount of trade payables approximates to their fair value.

Included in Other payables is a loan from G Roach: The loan bears interest at the South African prime overdraft rate. The interest will be calculated and paid when the loan is repaid. The loan is repayable as decided upon from time to time.

The related party financial liabilities comprise:

Terms:

M Bonner: The loan bears interest at the South African prime overdraft rate. The interest is calculated and paid quarterly. The loan is repayable as decided upon from time to time.

R Scott: The loan bears interest at the South African prime overdraft rate. The interest is calculated and paid quarterly. The loan is repayable as decided upon from time to time.

23.Share Capital and Share Premium

Share capital is the amount subscribed for shares at nominal value.

During the 2019 financial year the company consolidated all existing and issued shares and share options on the basis of 20 existing shares/options for 1 new share/option.

Retained losses represent the cumulative loss of the Group attributable to equity shareholders.

Share-based payments reserve relate to the charge for share-based payments in accordance with IFRS 2.

During the prior year the company placed these shares and as the number of placing shares comprised more than 10% of the companies issued share capital, and although the placing shares has been allotted, admission of the placing shares required publication of a Prospectus within a twelve-month period.

24.Share Based Payments Reserve

The Company has a share-ownership compensation scheme for senior executives of the Company whereby senior executives may be granted options to purchase Ordinary Shares in the Company.

Warrants

During the 2019 financial year the company consolidated all existing and issued shares and share options on the basis of 20 existing shares/options for 1 new share/option.

There are 26,148,289 warrants to subscribe for ordinary shares at 31 October 2021 (2020: 12,421,622).

Warrants were attached to the Convertible Loan Notes issued on 23 March 2021, with an exercise price of 5.0p per ordinary share and expire 12 months from allotment of the Subscription Shares. These warrants will only be issued once the convertible loan notes are converted into shares.

Warrants were attached to the Subscription Shares on 24 July 2020 a 1-for-1 basis, with an exercise price of 5.0p per ordinary share and expire 12 months from allotment of the Subscription Shares. Further warrants were attached to any new ordinary shares that are issued as a result of ***conversion*** of any Loan Notes, on a 1-for-1 basis on the same terms as the Subscription Warrants.

Warrants were attached to the Subscription Shares on 14 September 2018 a 1-for-1 basis, with an exercise price of 20.0p per ordinary share and expire 12 months from allotment of the Subscription Shares. Further warrants were attached to any new ordinary shares that are issued as a result of ***conversion*** of any Loan Notes, on a 1-for-1 basis on the same terms as the Subscription Warrants. A maximum of 20,450,222 new ordinary shares could potentially be issued in the event that all Subscription Warrants and Loan Note warrants are exercised.

Options

At 31 October 2021 there were 897,809 share options issued to the directors and past directors of the Company. During the current year nil share options were granted (2020: Nil). During the financial year the Company consolidated all existing and issued shares and share options on the basis of 20 existing shares/options for 1 new share/option.

The movement on the share-based payment charge for the year was £nil (2020 - £nil) in respect of the issued options. The details of warrants and options are as follows:

The remuneration committee’s aim is to remunerate executive directors competitively and to reward performance. The remuneration committee determines the company's policy for the remuneration of executive directors, having regard to the UK Corporate Governance Code and its provisions on directors' remuneration.

The number of options outstanding to the Directors that served in the year, as at 31 October 2021 were as follows:

The estimated fair value of the options in issue was calculated by applying the Black-Scholes option pricing model.

The assumptions used in the calculation were as follows:

The share options outstanding at the year-end had a weighted average remaining contractual life of 0.5 years (2020: 1.5 years).

25.Equity portion of convertible loan notes

As per note 24, during the 2021 financial year, on the 23rd of March 2021, the company converted £383,000 owed to the directors and a company owned by a director for 7,660,000 convertible loan notes and, simultaneously, issued 4,400,000 convertible loan notes to the value of £220,000 for cash. The equity portion of the convertible loan notes is presented below.

26.Convertible loan notes

The Loan Notes holder will be paid an annual interest rate of 12 per cent in cash, semi-annually, with a term of 24 months. The Loan Notes will not be admitted to trading on any exchange.

As per note 24, during the 2021 financial year, on the 23rd of March 2021, the company converted £383,000 owed to the directors and a company owned by a director for 7,660,000 convertible loan notes and, simultaneously, issued 4,400,000 convertible loan notes to the value of £220,000 for cash.

As per note 24, during the 2020 financial year, as part of the subscription dated 24 July 2020, 3,333,333 additional share warrants were allocated to the capital portion of the convertible loan notes and 750,000 additional share warrants were allocated to the outstanding interest portion of the convertible loan notes, which at the subscription date was £37,500.

The new ordinary shares issued as a result of ***conversion*** of all Loan Notes would represent 17,060,000 (2020: 5,000,000) ordinary shares, or 43.71 (2020: 18.54) per cent of the issued share capital of the Company, as enlarged by the 2018 Fundraising. On 14 September 2018 issued £250,000 of convertible loan notes for 50,000,000 loan notes of 0.50p (the “Loan Notes”) with a ***conversion*** price of 0.75p (the “***Conversion*** Price”). The Subscription Price was at the last closing price of 0.50p per ordinary share as at 13 September 2018. Further, the ***Conversion*** Price represents a premium of 50.0 per cent to this same closing price. The Subscription included the issue of 50,000,000 Convertible Loan Notes of 0.50p with a ***conversion*** price of 0.75p which after the 20:1 share consolidation of 2018 resulted in there being 2,500,000 Convertible Loan Notes of 10.0p with a ***conversion*** price of 15.0p.

If the Convertible Loan Notes were converted, up to 17,810,000 (2020: 5,750,000) new Ordinary Shares will be issued (“Loan ***Conversion*** Shares”). Further, Warrants will be attached to any Loan ***Conversion*** Shares that are issued on a 1-for-1 basis on the same terms as the Warrants attached to the New Ordinary Shares (“Loan ***Conversion*** Warrants”). A maximum of 32,510,222 (2020: 20,450,222) New Ordinary Shares could potentially be issued in the event that all New Ordinary Shares Warrants and Loan ***Conversion*** Warrants are exercised.

However, under the terms of the Loan Note Instrument, the maximum number of Loan Notes that can be converted into ordinary shares at any one time will be restricted such that Mike Joseph’s total voting rights cannot exceed 29.9 per cent. of the shares in issue of the Company.

The fair value of the liability component, included in non-current liabilities, is calculated using a market interest rate for an equivalent non-convertible loan note at the date of issue. The residual amount, representing the value of the equity ***conversion*** component, is included in shareholder’s equity in Equity portion of convertible loan notes (Note 25).

The carrying amount of the liability component of the convertible loan notes at the balance sheet date are derived as follows:

27.Borrowings

The Group’s wholly owned subsidiary Dynamic Intertrade has entered into a funding agreements with Euro 2 Afrisko Ltd and Onga Wari CRS (Pty) Ltd whereby Euro 2 Afrisko pay the suppliers directly and this is then repaid by Dynamic Intertrade to purchase stock from suppliers where deposits are required.

The borrowings are secured by a Security Agreement from the Company. The loans bear interest at 14% per annum.

28.Leases

Right of use assets and lease liability

Right-of use assets were measured at the amount equal to the lease liability, adjusted by the amount of any prepaid or accrued lease payments relating to that lease recognised in the statement of financial position as at 31 October 2019. There were no onerous lease contracts that would have required an adjustment to the right-of-use assets at the date of initial application. The recognised right of-use assets relate to the following types of assets:

On the 3rd of March 2020 a new lease was signed for the Group’s main trading address, 104 Bofors Circle, Epping Industrial 2, Cape Town, South Africa with commencement date of 1 July 2020. On the commencement date, the Group recognised a lease liability and right-of-use asset of £430,973.

Impact on earnings per share

Depreciation on the right-of-use asset amounting to £67,519 (2020: £21,549) and interest on the right-of-use lease liability of £31,468 (2020: £11,552) were charged to the statement of profit and loss for the current year. As a result, the earnings per share decreased by 0.005p.

29.Notes to the Statement of Cash Flows

Net Debt Reconciliation for the Group

Net Debt Reconciliation for the Company

30.  Financial Instruments – Fair values and risk management

The following table shows the carrying amounts and fair values of financial assets and financial liabilities, including their levels in the fair value hierarchy. It does not include fair value information for financial assets and financial liabilities not measured at fair value if the carrying amount is a reasonable approximation of fair value.

Trade and other receivables and trade and other payables classified as held-for-sale are not included in the table below. As at 31 October 2021 the Group did not have any trade and other receivables nor any trade and other payables that were classified as held-for-sale.

The Group has not disclosed the fair values of financial instruments such as short-term trade receivables and payables, because their carrying amounts are a reasonable approximation of their fair value.

Financial instruments – Fair values and risk management

B.   Measurement of fair values

i.       Valuation techniques and significant unobservable inputs

The following tables show the valuation techniques used in measuring Level 3 fair values for financial instruments measured at fair value in the statement of financial position, as well as the significant unobservable inputs used. Related valuation processes are described in Note 3.

Financial instruments measured at fair value

ii.      Transfers between Levels 1 and 2

There were no transfers between Levels 1 and 2 in either the current financial year or in the prior financial year.

C.    Financial Risk Management

The Group has exposure to the following risks arising from financial instruments:

credit risk;liquidity risk; andmarket risk.

Risk management framework

The Company’s board of directors has overall responsibility for the establishment and oversight of the Group’s risk management framework.

The Group’s risk management policies are established to identify and analyse the risks faced by the Group, to set appropriate risk limits and controls and to monitor risks and adherence to limits. Risk management policies and systems are reviewed regularly to reflect changes in market conditions and the Group’s activities.

The Group’s audit committee oversees how management monitors compliance with the Group’s risk management policies and procedures and reviews the adequacy of the risk management framework in relation to the risks faced by the Group. The Group’s audit committee undertake ad hoc reviews of risk management controls and procedures, the results of which are reported to the audit committee.

Credit risk

Credit risk is the risk of financial loss to the Group if a customer or counterparty to a financial instrument fails to meet its contractual obligations and arises principally from the Group’s receivables from customers and investments in debt securities.

The carrying amounts of financial assets represent the maximum credit exposure. There was no impairment loss in the current year nor in the prior year.

Trade receivables

The Group’s exposure to credit risk is influenced mainly by the individual characteristics of each customer. However, management also considers the factors that may influence the credit risk of its customer base, including the default risk associated with the industry and country in which its customers operate. Details of concentration of revenue are included in Note 6.

The Group has established a credit policy under which each new customer is analysed individually for creditworthiness before the Group’s standard payment terms and conditions are offered. The Group’s review includes external ratings, if they are available, financial statements, credit agency information, industry information and in some cases bank references. Sales limits are established for each customer and are reviewed regularly.

The Group limits its exposure to credit risk from trade receivables by establishing a maximum payment period of one month.

The Group does not require collateral in respect of trade and other receivables. The Group does not have trade receivables for which a no allowance is recognised because of collateral.

Expected credit loss assessment for corporate customers as at 31 October 2020 and 31 October 2021

The Group allocates each exposure to a credit risk grade based on ***data*** that is determined to be predictive of the risk of loss (including but not limited to external ratings, audited financial statements, management accounts and cash flow projections and available press information about customers) and applying experienced credit judgement. Credit risk grades are defined using qualitative and quantitative factors that are indicative of the risk of default.

The company had no exposure to credit risk for the year ended 31 October 2021.

Movements in the allowance for impairment in respect of trade receivables

The movement in the allowance for impairment in respect of trade receivables during the year amounted to nil.

Cash and cash equivalents

As at 31 October 2021, the Group held £1,109,774 in cash and cash equivalents (2020: £45,251) and had a bank overdraft of £nil. The cash and cash equivalents are held with bank and financial institution counterparties which are rated Baa3 to A1+ by Moody’s.

Impairment on cash and cash equivalents has been measured on a 12-month expected loss basis and reflects the short maturities of the exposures. The Group considers that its cash and cash equivalents have low credit risk based on the external credit ratings of the counterparties. On the implementation of IFRS 9 the Group did not impair any of its cash and cash equivalents.

Liquidity risk

Liquidity risk is the risk that the Group will encounter difficulty in meeting the obligations associated with its financial liabilities that are settled by delivering cash or another financial asset. The Group’s approach to managing liquidity is to ensure, as far as possible, that it will have sufficient liquidity to meet its liabilities when they are due, under both normal and stressed conditions, without incurring unacceptable losses or risking damage to the Group’s reputation.

Exposure to liquidity risk

The following tables present the remaining contractual maturities of financial liabilities at the reporting date. The amounts are gross and undiscounted and include contractual interest payments and exclude the impact of netting agreements.

The interest payments on the financial liabilities represent the fixed interest rates as per the respective contracts.

The Group aims to maintain the level of its cash and cash equivalents and other highly marketable debt investments at an amount in excess of expected cash outflows on financial liabilities other than trade payables. The Group also monitors the level of expected cash inflows on trade and other receivables together with expected cash outflows on trade and other payables.

Market risk

Market risk is the risk that changes in market prices – such as foreign exchange rates, interest rates and equity prices – will affect the Group’s income or the value of its holdings of financial instruments. The objective of market risk management is to manage and control market risk exposures within acceptable parameters, while optimising the return.

Foreign currency risk

The Group undertakes certain transactions denominated in foreign currencies. Hence, exposures to exchange rate fluctuations arise.

The carrying amounts of the Group’s foreign currency denominated monetary assets and monetary liabilities at the reporting date are as follows:

Exposure to currency risk

The summary quantitative ***data*** about the Group’s exposure to currency risk as reported to the management of the Group is as follows:

The followingsignificant exchange rates in relationto the reporting currency are applicable:

The presentation currency of the Group is British Pound Sterling.

The Group is exposed primarily to movements in USD and ZAR, the currency in which the Group receives most of its funding, against other currencies in which the Group incurs liabilities and expenditure.

Sensitivity analysis

Financial instruments affected by foreign currency risk include cash and cash equivalents, trade other receivables and trade and other payables. The following analysis, required by IFRS 7 Financial Instruments: Disclosures, is intended to illustrate the sensitivity of the Group’s financial instruments (at year end) to changes in market ***variables***, being exchange rates.

The following assumptions were made in calculating the sensitivity analysis:

All income statement sensitivities also impact equityTranslation of foreign subsidiaries and operations into the Group’s presentation currency have been excluded from this sensitivity as they have no monetary effect on the results

Income Statement / Equity

The above sensitivities are calculated with reference to a single moment in time and will change due to a number of factors including:

Fluctuating other receivable and trade payable balancesFluctuating cash balancesChanges in currency mix

Interest rate risk

The Group has entered into fixed rate agreements for its finance leases and shareholders loans. The Group does not hedge its interest rate exposure by entering into ***variable*** interest rate swaps.

Exposure to interest rate risk

The interest rate profile of the Group’s interest-bearing financial instruments as reported to the management of the Group is as per the table below.

Fair value sensitivity analysis for fixed-rate instruments

The Group does not account for any fixed-rate financial assets of financial liabilities at FVTPL. Therefore, a change in interest rates at the reporting date would not affect profit or loss.

Other market price risk

The Group is exposed to equity price risk, which arises from equity securities at FVOCI are held as a long-term investment.

The Group’s investments in equity securities comprise small shareholdings in unlisted companies. The shares are not readily tradable and any monetisation of the shares is dependent on finding a willing buyer.

Valuation techniques and assumptions applied for the purposes of measuring fair value

The fair value of cash and receivables and liabilities approximates the carrying values disclosed in the financial statements.

Capital management

The Group manages its capital resources to ensure that entities in the Group will be able to continue as a going concern, while maximising shareholder return.

The capital structure of the Group consists of equity attributable to shareholders, comprising issued share capital and reserves. The availability of new capital will depend on many factors including a positive operating environment, positive stock market conditions, the Group’s track record, and the experience of management. There are no externally imposed capital requirements.  The Directors are confident that adequate cash resources exist or will be made available to finance operations but controls over expenditure are carefully managed.

31.Related Party Transactions

Directors’ fees

Andrew Monk, a non-executive director of the company, is a director of VSA Capital Limited and that company provided services amounting to £57,384 (2020: £113,575) to the Company during the year.

During the year ended 31 October 2021 £46,966 was paid to Directors of the company (2020: £49,896). At the year-end a total of £62,126 (2020: £194,266) was outstanding in respect of directors’ emoluments.

Other related party transactions

Included in trade and other payables are the following related party financial liabilities:

Terms:

M Bonner and R Scott: The loan bears interest at the South African prime overdraft rate. The interest will be calculated and paid when the loan is repaid. The loan is repayable as decided upon from time to time.

Outstanding director’s salaries and related party transactions

Included in trade and other payables are the following outstanding directors’ salaries and fees payable to related parties for other services:

32.Controlling Party Note

There is no single controlling party. Significant shareholders are listed in the Directors Report and Business Review.

33.Events Subsequent to 31 October 2021

Subsequent to 31 October 2021, the company entered into settlement agreements with several of its trade creditors for work done on the Comarco transaction. This resulted in settlement discounts totalling £273,677 being realised.

For further information please contact:

**Load-Date:** March 31, 2022

**End of Document**



[***Invesco Select Trust Plc - Annual Financial Report***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:639K-3MP1-DXP3-R2RN-00000-00&context=1516831)

PR Newswire UK Disclose

August 6, 2021 Friday 2:00 AM EST

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**Length:** 30643 words

**Dateline:** London, August 5

**Body**

PR Newswire

Invesco Select Trust plc

Annual Financial Report Announcement

Year Ended 31 May 2021

Financial Performance

Cumulative Total Returns(1)(2)To 31 May 2021

Year end Net Asset Value, Share Price and Discount

(1) Alternative Performance Measure (APM). See Glossary of Terms and Alternative Performance Measures on pages 110 to 113 of the financial report for details of the explanation and reconciliations of APMs.

(2) Source: Refinitiv.

Chairman’s Statement

Highlights

– All four portfolios delivered positive outperformance over the period.

– Dividends rose to 6.65p per UK Equity Share and 7.10p per Global Equity Income Share.

– Company size increased to £230.6 million at 31 May 2021 following the combination of Invesco Income Growth Trust plc with the UK Equity Share Class.

– Lower investment management fees negotiated for the UK Equity & Global Equity Income share classes.

– UK Equity portfolio now managed in partnership between James Goldstone and Ciaran Mallon, with income growth added to the objective.

– Derek Steeden appointed to run Managed Liquidity Share Portfolio.

– Change of benchmark for Balanced Risk Allocation Portfolio.

This is my first statement as Chairman of your Company, since being appointed Chair on 1 June 2021. I would like to thank my predecessor, Graham Kitchen, for his hard work, valuable inputs and effective chairmanship of your Company since 2019, through both the pandemic and the combination of Invesco Income Growth Trust plc with the UK Equity Share Portfolio.

The Company

The Company’s investment objective is to provide shareholders with a choice of investment strategies and policies, each intended to generate attractive risk-adjusted returns.

The Company’s share capital comprises four share classes: UK Equity Shares, Global Equity Income Shares, Balanced Risk Allocation Shares and Managed Liquidity Shares, each of which has its own separate portfolio of assets and attributable liabilities.

The investment objectives and policies of each of the Portfolios are set out on pages 39 to 41.

The Company’s structure enables shareholders to adjust their asset allocation to reflect their views of the prevailing market outlook. As set out on the inside of the front cover, shareholders have the opportunity to convert between share classes, free of capital gains tax, every three months.

Performance

The NAV total return of the UK Equity Share Portfolio over the year was 34.6%, which compares with the total return of 23.1% from the FTSE All-Share Index. The share price total return was 31.6%.

The NAV total return of the Global Equity Income Share Portfolio over the year was 35.9%, which compares with the total return from the MSCI World Index (£) of 22.3%. The share price total return was 32.6%.

The NAV total return of the Balanced Risk Allocation Share Portfolio was 25.4%, which compares with its benchmark of 3 months LIBOR plus 5%, which returned 5.1%. The share price total return was 26.4%.

The NAV total return of the Managed Liquidity Share Portfolio was 3.6%. The share price total return was 0.5%. Shareholders will recall that a historical management fee error was reported in the Chairman’s Statement for the 30 November 2017 half year report, which resulted in an overcharging of management fees by the Manager. As part of the restitution, it was agreed that the Manager would make payments directly to affected shareholders. Having exhausted all reasonable avenues to locate all affected shareholders, an amount remained unpaid for shareholders that could not be located and has been returned to the Managed Liquidity Share portfolio under the restitution agreement. This receipt has contributed to a 2% uplift to the NAV at the year end.

It was pleasing to note, both for the Board and for shareholders, that all four Portfolios outperformed their benchmarks over the period.

Investment Management Changes

The Managed Liquidity Portfolio saw Derek Steeden being appointed as portfolio manager with effect from 1 December 2020. Derek is a Portfolio Manager for the Invesco Investment Solutions team, which provides customised, multi-asset investment strategies for clients. He joined Invesco in 2019, having begun his investment career in 2005. The Portfolio continues to be invested in other ***collective*** investment vehicles, but the principal investment was changed to the iShares – Sterling Ultrashort Bond UCITS ETF.

Balanced Risk Allocation Benchmark Change

Since adopting the strategy in 2012, the returns of the Balanced Risk Allocation Portfolio have been compared against 3-month LIBOR + 5% per annum. Following discussion, the Directors have taken the view that a cash plus benchmark does not reflect the strategy. The new comparator benchmark is a composite whose components are approximate proxies for the portfolio’s holdings. The new benchmark took effect from 1 June 2021 and is a blend comprising 50% 30-year UK Gilts Index, 25% GBP hedged MSCI World Index (net) and 25% GBP hedged S&P Goldman Sachs Commodity Index (all total return).

Business Combination with Invesco Income Growth Trust plc

On 23 April 2021 the proposed combination of Invesco Income Growth Trust plc (‘IIGT’) with the Company’s UK Equity Share Portfolio was completed, resulting in a transfer of approximately £120 million of assets into the Company in exchange for the issue of new UK Equity shares to IIGT shareholders.

Ciaran Mallon, who has managed IIGT’s portfolio since 2005, became joint portfolio manager of the UK Equity Share Portfolio, with James Goldstone, who has managed it since October 2016. The Board believes that the two managers’ combined and complementary skills, with a disciplined investment process, can deliver attractive returns for shareholders. Ciaran and James jointly manage Invesco’s largest open-ended UK equity funds, which have outperformed their benchmark since appointment.

The size of your Company’s combined UK Equity portfolio will give the managers freedom to invest across the market capitalisation and liquidity spectrum and to offer the prospect of a genuine best ideas portfolio, clearly distinguished from their open-ended funds, where stock selection is limited to larger, more liquid investments. The change will bring the benefits of increased scale, including enhancing secondary market liquidity and the spreading of fixed costs over a larger cost base.

Fees

Additionally, the Board negotiated improved management fee arrangements to apply from the scheme effective date of 23 April 2021. The flat annual management fee of 0.55% of net assets payable by the UK Equity Share Portfolio was reduced, with 0.55% now payable on its net assets up to £100 million and 0.50% over £100 million; and the performance fee was also removed. In the interests of alignment, the 0.55% management fee on the Company’s Global Equity Income Share Portfolio was amended in the same way, and its performance fee removed. The costs of the transaction were significantly mitigated by Invesco waiving its accrued performance fee of £531,000 in respect of the UK Equity Share Portfolio.

The Portfolio is able to employ gearing by means of a bank loan facility. Your Board has recently extended the size of this facility, from £20 million to £40 million, to allow a similar percentage level of gearing, if desired, across the larger post-merger Portfolio.

The Company will retain its innovative capital structure, offering investors the opportunity to switch (on a quarterly basis) between its UK Equity, Global Equity Income, Balanced Risk Allocation and Managed Liquidity share classes in order to position their portfolios for changing investment conditions.

Outlook

We live in continuing uncertain times. Whilst we have witnessed a significant increase in M&A activity, Covid-19 resurgence and variance fears are continuing to cause market jitters regarding global economic recovery. The debate and concerns around inflation and the application of central bank policy will, no doubt, go on for some time yet. There are mixed views at the Monetary Policy Committee regarding the need to tighten policy and whether the pick-up in inflation is temporary. The immense support provided by the Treasury and the Bank of England has avoided deep economic scarring. The route back out from restricted economies across the globe is likely to experience road-bumps which after a period of relative calm could give rise to increased market volatility.

In an environment such as this, Select’s multi-portfolio structure provides a flexible tool for shareholders, or their advisors, to reflect their future market expectations. The Company’s two equity Portfolios are run by forward-looking active fund managers, whose bottom-up stock-picking approach is not constrained by a rigid target benchmark. Both sets of equity fund managers have sought to build balance in their portfolios, so that any unexpected Covid curve-balls do not derail the progress of the overall share class. The equity managers also have the additional tool of gearing that they can employ (within overall parameters set by your board) to reflect their view of the attractiveness of the asset class. Income is an important component of the total return of these share classes and the ability of companies to start, resume or increase dividend distributions is closely monitored. Alongside this, your board has the capacity to supplement the dividend paid out to shareholders with any revenue reserves and capital reserves.

Complementary to the equity share classes, the Balanced Risk Allocation Share Portfolio looks to provide shareholders with attractive total returns regardless of the economic or inflationary backdrop, across the three asset classes of debt securities, equities and commodities. Lastly, the Managed Liquidity Share Portfolio offers a higher degree of security for those with a more conservative outlook. I believe your Company’s structure and portfolios should be well positioned to traverse a variety of market outcomes over the long term.

The Board

I am delighted to welcome Davina Curling, Mark Dampier and Tim Woodhead, who joined the Board on completion of the business combination on 23 April 2021. As part of the business combination, Alan Clifton and three long-standing directors of Invesco Income Growth Trust plc, the chair, Hugh Twiss, Jonathan Silver and Roger Walsom retired from their positions. We thank them for their significant contribution in bringing the combination to fruition.

Graham Kitchen stepped down from the Board on 31 May 2021 and I succeeded him as Chairman on 1 June 2021. The Board extend their gratitude to Alan and Graham for their extensive contribution, knowledge and guidance during their time on the Board.

Dividends

We have continued to apply the dividend policy adopted five years ago, and supported by shareholder advisory votes, whereby for both UK Equity and Global Equity Income Shares, dividends are paid by way of three equal interim dividends declared in July, October and January with a ‘wrap-up’ fourth interim declared in April. For the year under review the first three dividends declared for the UK Equity Shares were 1.50p per share and for the Global Equity Income Shares 1.55p per share. The fourth interim dividends were 2.15p per share for the UK Equity Shares, bringing the total to 6.65p per share for the year, and 2.45p per share for the Global Equity Income Shares, bringing that total to 7.10p per share for the year.

There were a number of dividend cuts in the year, due to Covid-19, meaning a greater contribution from capital was required for the Company’s dividends again this year to meet the Board’s target level. For the Global Equity Income a contribution from capital of approximately 3.15p per share was required to achieve the dividend level (2020: 0.4p per share). For the UK Equity Shares a contribution from capital of approximately 2.75p per share was required to achieve the dividend level (2020: 2.5p per share).

We intend to continue with the policy of a partial augmentation from capital where appropriate and investors are again being given advisory votes on it. However, whereas in recent years we have set a target of at least maintaining the dividend level from year to year for each of the equity Portfolios, with the current uncertainty of future income flows due to Covid-19 the Directors have not set dividend targets for the year to 31 May 2022.

The first interim dividends declared in respect of the year to May 2022, which will be paid on 16 August 2021 to shareholders on the register on 23 July 2021, were 1.50p per share for UK Equity, 1.55p per share for Global Equity Income and 1.00p per share for Managed Liquidity.

It continues to be the case that in order to maximise the capital return on the Balanced Risk Allocation Shares, the Directors only intend to declare dividends on the Balanced Risk Allocation Shares to the extent required, having taken into account the dividends paid on the other Share classes, to maintain the Company’s status as an investment trust. No dividends have been paid on the Balanced Risk Allocation Shares over the period.

Despite continuing low interest rates, it remains the Directors’ intention to distribute substantially all net revenues earned by the Portfolio going forward. Given the quantum involved it is unlikely that such payments will be more frequent than annually and may indeed be less frequent. Following the receipt of a £34,000 payment, which has been returned to the Portfolio as part of the management fee restitution agreement, the Board declared an interim dividend of 1.00p per share and intend to use the remaining amount to smooth dividend payments over the next couple of years.

Discount Policy

The Company adopted a discount control policy for all four Share classes in January 2013, whereby the Company offers to issue or buy back Shares of all classes with a view to maintaining the prices of the Shares at close to their respective net asset values. The policy has been successful to date and your Board remain committed to its utilisation. The ongoing implementation of this policy is dependent upon the Company’s authority to buy back Shares, and the Directors’ authority to issue Shares for cash on a non pre-emptive basis being renewed at general meetings of the Company.

Share Capital Movements

During the year to 31 May 2021, the Company bought back and placed in treasury 10,769,463 UK Equity Shares, 4,939,000 Global Equity Income Shares, 951,000 Balanced Risk Allocation Shares and 569,000 Managed Liquidity Shares. In connection with the business combination, 66,628,879 UK Equity Shares were issued on 26 April 2021. Other than this and as an artefact of the share ***conversion*** process, no other Shares were issued or sold from treasury and no treasury shares were cancelled. Since the year end a further 4,860,000 UK Equity Shares and 63,000 Managed Liquidity Shares have been bought back into treasury. The Board intends to use the Company’s buy back and issuance authorities when this will benefit existing shareholders as a whole and to operate the discount control policy mentioned above, and will ask shareholders to renew the authorities as and when appropriate.

Share Class Conversions

The Company enables shareholders to adjust their asset allocation to reflect their views of future market conditions. Shareholders have the opportunity to convert their holdings of Shares into any other class of Share, without incurring any tax charge (under current legislation). The ***conversion*** dates for the forthcoming year are as follows: 2 August 2021; 1 November 2021; 1 February 2022; and 3 May 2022. Should you wish to convert Shares at any of these dates, ***conversion*** forms, which are available on the Manager’s website at[*http://www.invesco.co.uk/investmenttrusts*](http://www.invesco.co.uk/investmenttrusts), or CREST instructions must be received at least ten days before the relevant ***conversion*** date.

Articles Refresh

One of the resolutions being proposed at this AGM is an amendment to the Company’s articles of association (the “Articles”) to allow for ‘hybrid’ shareholder meetings to be held where some attendees are based in a single physical location and others attend, participate and vote by electronic means. Certain consequential changes to the Articles in order to facilitate this amendment will also be made. While the Board does not currently intend to hold meetings in this way, the resolution would allow the Board to hold hybrid meetings when in the best interests of shareholder safety, for example, in the event of a continuing lockdown. The amendments will not prevent the Company from holding physical meetings and the Board’s intention is always to hold a physical general meeting when safe and practical to do so. A summary of the changes being introduced can be found in the Appendix section on page 104.

Annual General Meeting (‘AGM’)

Following the Government’s lifting of all legal restrictions on social contact on 19 July 2021, I am pleased to once again invite all our shareholders to the Company’s AGM and have the opportunity to meet and question the Directors and the Manager. The business of the AGM is summarised in the Directors’ Report on pages 51 to 56. The AGM will be held at 43-45 Portman Square, London W1H 6LY at 11.30am on 5 October 2021. I hope as many of you as possible will attend. However, should further restrictions be re-imposed the AGM may have to be held as a closed meeting again. In this eventuality, the Board will communicate any necessary changes to shareholders in the form of an RNS announcement and on the Company’s web page at[*http://www.invesco.co.uk/investmenttrusts*](http://www.invesco.co.uk/investmenttrusts). It is recommended that shareholders exercise their votes by means of registering them with the Company’s registrar ahead of the meeting, online or by completing paper proxy forms, and appoint the Chairman of the meeting as their proxy. The Board has considered all the resolutions proposed in the Notice of the AGM and believe they are in the best interests of shareholders and the Company as a whole. Accordingly, the Directors recommend that shareholders vote in favour of each resolution, as will the Directors in respect of their own shareholdings. All shareholders are welcome and may bring a guest with them. To register your interest in attending, please contact us [*atinvestmenttrusts@invesco.com*](mailto:atinvestmenttrusts@invesco.com)

Shareholder Web Call

We also note that online meetings have been very popular during Covid-19 restrictions and so for those shareholders unable to travel to the AGM and also for potential investors, we will be holding an online presentation on 28 September 2021 at 11.30am. Presentations will be made by James Goldstone, Ciaran Mallon and Stephen Anness followed by a question and answer session.

Shareholders can submit questions during the presentation or in advance by writing to the Company Secretary at the address given on page 109 or by email [*toinvestmenttrusts@invesco.com*](mailto:toinvestmenttrusts@invesco.com) Details on how to register for the event are available via the Company’s website[*http://www.invesco.co.uk/investmenttrusts*](http://www.invesco.co.uk/investmenttrusts).

Engagement with Shareholders and Investors

In combination with the Distribution Team of the Manager we are exploring new avenues to enhance our engagement with private clients, to ensure that we are able to provide updates and insight into the management of each of the strategies. One such initiative that we have recently supported, is a new start-up called Doceo, which currently provides our investors with a 2 minute overview of the UK Equity portfolio managers’ approach, as well as a slightly longer video providing an update on the Portfolio. We will continue to assess these opportunities and provide an update in future reports.

I hope to meet as many of you as possible at the AGM or on the webinar.

Victoria Muir

Chairman

5 August 2021

Strategic Report

UK Equity Share Portfolio Manager’s Report

Q          How has the Company performed in the 12 months to 31 May 2021?

A          The Portfolio outperformed its benchmark over the 12 months to 31 May 2021, with a net asset value total return of +34.6%. Over the same period the FTSE All-Share Index rose +23.1%. Whilst volatile, the UK equity market performed strongly over the 12 month period. The social and economic impact of the pandemic dominated market sentiment together with the additional issues of Brexit, UK domestic politics, US-China trade relations and the US Presidential Election. The rapid and meaningful response by central banks and governments around the world to loosen monetary and fiscal policy in order to cushion the economic shock of the pandemic provided an effective level of support.

In the autumn, news of a number of successful Coronavirus vaccine trials boosted sentiment and the UK equity market rose in response. The subsequent roll out of vaccinations in 2021 has progressed rapidly in the UK and there has also undoubtedly been a positive effect following the negotiation of a Brexit deal.

Q          What have been the key contributors and detractors to performance over the year?

A          Over the period, positive performance relative to the benchmark was seen in nine out of the eleven sectors in which the portfolio is invested. The decision making behind the allocation of capital across the major sectors was strong, as was the stock selection within some of these sectors.

The biggest contribution to positive performance versus the FTSE All-Share Index over the period was from the portfolio’s significant underweight to the large pharmaceutical companies GlaxoSmithKline and AstraZeneca for most of the time. This was helpful to relative performance as both underperformed the Index. A position in AstraZeneca has now been added to the portfolio, a reflection of improved execution in its pipeline of clinical success and the prospects for improvement in cash flows following the acquisition of Alexion.

Medical technology company PureTech Health contributed strongly to relative performance against the Index. The company aims to address significant areas of un-met medical need with novel and lower risk route to market products and approaches, along the brain-immuno-gut axis. There have been some significantly positive developments over the last twelve months, most notably the approval of group company Gelesis’s obesity product “Plenity”.

Consumer discretionary stocks also performed well on a relative basis over the period. The retail sector had a particularly strong period of performance with the holdings of veterinary services group CVS and Next key contributors to relative performance. CVS released very strong half year results, and Next performed well as demand remained robust for those companies with strong online offerings.

Technology company Future, which publishes a range of special interest websites and magazines including TechRadar was again one of the portfolio’s better performing holdings. The company also generates revenue through online advertising and commissions from reader ‘click through’ and recently acquired the price comparison website Go Compare which was well received by the market.

Being underweight the consumer staples sector was helpful to relative performance. Whilst the holdings of Tesco and British American Tobacco detracted from relative performance this was more than offset by the benefit of not having any exposure to very highly rated international consumer staples which underperformed over the past year.

Within financials, Banks were overall positive for relative performance and Barclays, which was a top five contributor, reported better than expected results on lower loan losses and a sharp increase in trading activity within the investment bank.

Industrials and basic materials were the main detractors to relative performance over the 12 month period. Babcock International underperformed over the period but the new management team have recently provided a more positive update in respect of liquidity and financing in their strategic review than many had expected which has been supportive of the share price recently. However, this underperformance was partially offset by the positive relative performance of industrial equipment rental business Ashtead.

Not owning any significant holdings in any of the industrial metals & mining companies proved to be biggest detractor from relative performance. In a reflationary environment, industrial commodities have in the near term been particularly strong (iron ore & copper). The portfolio is positioned to benefit from what we believe to be more sustainable long-term dynamics favouring gold miners. Whilst the price of gold increased modestly over the period as a whole, it was volatile as the debate continued around expectations for future inflation and the impact of negative real interest rates. In the absence of any significant corporate news flow, the gold mining holdings Barrick Gold, Agnico Eagle Mines, Wheaton Precious Metals and Newmont detracted from relative performance.

Q          How has gearing impacted the performance and what is your strategy going forward?

A          The use of gearing in the portfolio over the period enhanced performance. Gearing at the start of the 12 month period was around 10% and this was increased to approaching 20% at the end of 2020. Following the combination with Invesco Income Growth Trust plc in April the gearing has been reduced to around 10%. This level is below the limit of 25% set by the Board.

The appropriate level of gearing is under regular review. Looking forwards we are comfortable that the current level of gearing provides an opportunity to enhance the Portfolio’s returns relative to the FTSE All-Share Index as our view remains that the UK companies remain attractively valued compared to their 20 year average and compared to other developed markets such as the US.

Q          Has the crisis changed your approach at all?

A          Fundamentally there has been no change in the approach we have taken to managing the portfolio during the crisis. We believe that there is significant opportunity within the UK equity market with some highly favoured companies trading on excessively high valuations, whilst other stocks remain heavily out of favour and undervalued.

We are now co-managing the portfolio using the joint investment process that has been applied with good effect to other portfolios that we have co-managed since May 2020. We have reduced the number of stocks in the portfolio as part of the combination of the two trusts so that the portfolio is more concentrated in stocks in which we have the most conviction. The portfolio is also positioned in holdings that we believe will withstand the various possible economic environments and different market outcomes that follow as we transition out of the crisis.

Q          How is the UK Equity Share Portfolio positioned following the appointment of Ciaran as joint manager?

A          On a sectoral basis and relative to the FTSE All-Share Index, we are over-weight Utilities and Consumer  Discretionary stocks. Overall, the position in the utilities sector has been increased with additions to the holdings of National Grid, United Utilities and SSE. These additions offer an inflation linked return that is in our view underappreciated. In addition, we have increased our exposure to Energy companies which have a lot of the same characteristics of the metals and mining companies.

Existing positions of RELX and Barratt Developments have also been added to whilst positions in Barclays, Tesco, British American Tobacco and Babcock International were reduced.

We are under-weight Financials in general but have a sizeable position in Barclays because our view is that it is still the standout company among UK Banks. We are also under-weight what we see as expensive Consumer Staples and Basic Materials businesses (principally, industrial metals and mining).

But a perhaps a more meaningful way of looking at the portfolio is to think in terms of five broad investment themes that the portfolios are exposed to, and our conviction in key stocks that fall within these themes:

1.  “UK Domestics” (approx. 27% of the portfolios): companies that are particularly exposed to the UK. Examples include Barclays, Legal & General, National Grid, and United Utilities.

2.  “International Value” (approx. 27%): companies that though listed in the UK, derive much of their earnings overseas. Examples include BP and Royal Dutch Shell. AstraZeneca is a recent addition in this theme.

3.  “International Growth” (approx. 27%): UK listed, world-class businesses, with real potential to deploy more capital and grow returns overseas. Examples include: RELX, Smith & Nephew and JD Sports Fashion.

4.  “Recovery” (5-10%): companies that are in the early stages of recovery either from a particular dislocation in markets, or from company specific issues. Examples include: Compass, Whitbread and Young & Co’s Brewery.

5.  “Transformers” (5-10%): companies that are changing to take advantage of new opportunities. Examples include: PureTech Health, Next, SSE, and Drax.

Underlying Portfolio Characteristics at Year End

Q          What is your outlook for the next 12 months and beyond? Why invest in the UK now?

A          All things considered we are optimistic for a recovery in the global economy over next 12 months as vaccines continue to be distributed around the world and lock-downs ease. There is undoubtedly still some uncertainty with regard to how the pandemic might evolve and what government policy, in reacting to the pandemic, might look like. Consequently, we are keen to have a balanced portfolio that can perform in a range of economic outcomes. If we continue to see strong economic growth on the back of strong growth in earnings then we have a part of the portfolio that will benefit from that very constructive backdrop but by the same token, if there are some roadblocks along the way and it is more of a stuttering recovery, then we have a part of the portfolio that will provide some element of protection in such an environment.

We have frequently referenced our analysis that shows UK equities to be cheap across a blend of valuation measures, relative to history, and also particular relative to the US market. We have also said that this opportunity is evident in every major sector, not just at an index level.

We are excited at the prospects for the UK Equity Portfolio, which comprises our highest conviction, best ideas. The portfolio is concentrated around very high quality, cash generative businesses, with strong liquidity, that are likely to emerge from the pandemic in an even better competitive position than beforehand, which leaves us very optimistic for the second half of 2021 and beyond.

James Goldstone & Ciaran Mallon

Joint Portfolio Managers

5 August 2021

UK Equity Share Portfolio List of Investments

AT 31 May 2021

Ordinary shares listed in the UK unless stated otherwise

AIM      Investments quoted on AIM.

†          FTSE Industry Classification Benchmark.

Global Equity Income Share Portfolio Manager’s Report

Q          How has the Company performed in the year to 31 May 2021?

A          The NAV of the share class grew by 35.9% (total return in sterling terms). This compares to a rise of 22.3% (total return in sterling terms) in the MSCI World Index (£) which we use as a benchmark. Global equity markets were strong throughout the year as optimism around economic recovery post the Covid-19 crisis grew through the summer of 2020 on the back of coordinated central bank monetary and governmental fiscal stimulus. The rally in markets gathered pace in the autumn of 2020 when strong clinical trial ***data*** from a number of vaccine candidates showed high levels of efficacy, raising expectations of a path back to normality in 2021.

Q          What were the key contributors to and detractors from performance in the year?

A          Overall, through the year the portfolio has been relatively over-exposed to more economically sensitive companies and sectors, which has clearly been beneficial to performance. Our view through Spring/Summer 2020 was that we were being asked to pay too high a price for the safe, secure winners from the crisis, and that the opportunity for gains was elsewhere in the market. As Spring 2021 approached our positioning became more balanced as those gains in cyclical sectors were realised.

Our holdings in two of the world’s largest semiconductor companies delivered strong outperformance. Both Samsung Electronics, the South Korean company, and Taiwan Semiconductor Manufacturing, based in Taiwan, have built formidable technological and scale leadership in the production of a range of semiconductors. Demand for semiconductors continued to be strong through the pandemic across a range of applications from cloud computer storage, to mobile telephony and the automotive industry. Our sense is that the trend towards ‘the digitalisation of everything’ may mean these companies continue to see strong growth in the years to come, our challenge is to judge when all the good news is priced into the shares.

Through the dark days of Spring 2020 we retained exposure to companies which we believed had strong, durable business models which would emerge from the crisis stronger than before. Companies such as Ashtead, the UK listed industrial equipment hire company, the bulk of whose business is in the US, and Next, the UK retail group with a strong online offering, are good examples of such business. These companies performed particularly well through the latter part of 2020 as the market began to price in a more normal world in 2021/2.

Some of our biggest detractors in terms of relative performance have included companies such as Tesla, which we have not owned due to its valuation which, in our view, is extremely extended. We have, however, owned Volkswagen, a company with a chequered history in terms of governance, the ‘Dieselgate’ scandal of 2016 being a significant example. We have, like many other investors, engaged with this company in order to drive improvements in its corporate culture. Whilst we acknowledge the company has much work to do, we note it is likely to be the largest electric vehicle manufacturer in the world by 2023. The shares were strong performers in the past year.

In terms of negative performance contributors, we would highlight the pharmaceutical sector which underperformed in all regions over the year. Overall, we were underweight in the sector compared to the benchmark, nevertheless our two key holdings, Roche and Novartis, both based in Switzerland, lagged the performance of the market and peers in the sector. Concerns around reforms to drug pricing in the US market as well as company specific issues drove this underperformance. We continue to own these companies in the view of the strength of scientific research, strong balance sheets and cash generation which funds an attractive growing dividend stream.

Source: Invesco.

Q          How has the portfolio evolved over the period?

A          At the beginning of the period we were in the midst of the crisis, and the consensus was being willing to pay an extremely high price for security of earnings, consequently shunning any stock or sector vulnerable to negative profits revisions. In fund manager parlance ‘the valuation dispersion’ in the market was extremely high both between sectors and stocks within sectors. We took the view that the opportunity going forward lay in more economically sensitive sectors of the market such as financials, as well as certain technology, industrial and consumer discretionary companies where valuations seemed to discount a permanent lockdown and economic recession. We also added to positions in certain consumer orientated stocks which were badly impacted by Covid-19, such as Coca-Cola, and Diageo, the UK drinks company.

As the year went on, and especially after the strong market rally we saw in the fourth quarter of 2020, our analysis began to indicate many more economic cyclicals were discounting a full normalisation of consumer behaviour and a continued strong economic recovery into 2022. The good news was in the price. Hence over the last quarter of the period the portfolio has become more balanced between companies and sectors more sensitive to the economic cycle and those with more defensive earnings streams such as consumer staples and certain stocks in the insurance and real estate sectors.

Underlying Portfolio Characteristics at Year End

Q          Have you altered your investment approach in response to the Covid-19 crisis?

A          No, absolutely not. Our process, seeks to identify high quality companies in all sectors of the market. We aim to acquire them when for whatever reason they are trading at a discount to our estimate of their intrinsic value. We like to buy good companies when they are ‘on sale’.

This crisis is however (hopefully) a once in a career event, and we have used it to completely re-examine our investment case for all the companies in the portfolio. We are conscious of the evolution in business models and the strenuous efforts management teams have taken to adapt to new circumstances. Our sense is, providing vaccines continue to offer strong protection, most companies and sectors will revert to something close to the ‘old normal’ in a year or two. However, we are constantly alert for evidence of permanent change which may reduce the long term earnings power of our holdings.

Perhaps the one area where we are taking a more cautious view is financial leverage. Whilst corporate debt helps to enhance returns to equity holders, too much debt increases risk, especially in an environment where interest rates may trend modestly higher in the coming years.

Q          How has the ability to use some gearing influenced performance over the past 12 months?

A          Clearly it has been a positive for the Portfolio in the rising markets which we have enjoyed over the last year. Our view in May/June 2020 was that the consensus was assuming the Covid-19 crisis to be semi-permanent, and hence equities were oversold and undervalued. We were therefore happy to use our leverage capability for the benefit of shareholders. We have been comfortable to remain with between 10-13% leverage ever since. Rest assured, when we feel the risk/reward balance tilts towards the negative we will reduce our leverage and indeed run a net cash position when we feel it to be appropriate.

Q          What is your outlook for the next 12 months and beyond?

A          On balance we would be constructive on the outlook for global equities over the next 12 months. There appears to be no appetite from governments around the world to impose post GFC-style austerity policies. The huge sums borrowed will need to be repaid, and strong economic growth is the best way to generate the tax revenue required. Hence, we sense a willingness to run the global economy ‘hot’ in the coming few years. We acknowledge equity valuations are relatively high at present, and we would therefore expect positive returns from equities to fall well short of corporate earnings growth, allowing valuations to somewhat normalise over the next year to 18 months.

We would judge the key risk to our benign scenario as signs of the current pick-up in inflation, most of which we view as temporary, becoming more permanently incorporated into investor and consumer expectations leading to a more material derating of equity valuations.

In the longer term, we know changes to consumption and investment patterns will occur, not least because of our move towards a ‘net zero carbon’ economy, which will gather pace as we move through the decade. How that will impact investor returns from the global equity market is still too early to assess.

Q          After the strong performance in 2020/21, why invest in Global Equities now?

A          The great thing about the ability to invest globally is the sheer range of opportunities we have access to around the world, from larger companies to smaller, from new

business models targeting industries of the future to older business models which offer sustainable growth. Whilst we acknowledge valuations today are relatively high, we see nothing in the economic, or market outlook  to suggest the investor with patience and a longer term time horizon will do any worse owning equities than someone who invested in the asset class 10 or 20 years ago.

Stephen Anness

Portfolio Manager

5 August 2021

Global Equity Income Share Portfolio List of Investments

AT 31 May 2021

Ordinary shares unless stated otherwise

ADR   American Depositary Receipts – are certificates that represent shares in the relevant stock and are issued by a US bank. They are denominated and pay dividends in US dollars.

H       H-Shares – shares issued by companies incorporated in the People’s Republic of China (PRC) and listed on the Hong Kong Stock Exchange.

R       Red Chip Holdings – holdings in companies incorporated outside the PRC, listed on the Hong Kong Stock Exchange, and controlled by PRC entities by way of direct or indirect shareholding and/or representation on the board.

†        MSCI and Standard & Poor’s Global Industry Classification Standard.

Balanced Risk Allocation Share Portfolio Manager’s Report

Q          How has the strategy performed in the year under review?

A          The Invesco Balanced Risk Allocation Portfolio posted a strong return of 25.4% over the fiscal year, outperforming the benchmark by 20.3%. The recovery from Covid-19 lows was bumpy at the beginning of the period as positive developments in the form of expanding economic and manufacturing activity were met with concerns over pockets of increased incidence of Covid-19 infections and the potential for a rollback of reopening efforts. However, 2020 finished off strong with the development of several vaccines igniting a powerful rally in risky assets. The combination of the possibility of an end to lockdowns, along with the staggering degree of monetary and fiscal stimulus introduced to combat the negative economic impact from the virus, led to a broad-based rally in global equities and across the four commodity complexes. Bonds, which had fulfilled their role as safe-haven assets earlier in the year, saw prices drift lower as fear gave way to hope.

The increase in total vaccinations along with easing restrictions sparked a powerful rebound in risky assets to start 2021. Equity markets posted gains in the first five months of 2021 as pent-up demand was released, and commodity prices generally rose as demand outstripped supply. Bond yields predominately rose over the period on a lack of safe-haven demand and central banks’ apparent willingness to tolerate higher rates at the long end of the curve.

Q          What were the biggest contributors and detractors to performance?

A          Exposure to commodity markets was the top contributor to performance with all four subcomplexes posting positive returns. Energy was the top contributor of the complexes as demand increased with the reopening of economies. ***Agriculture*** also contributed due to increased demand from China after their crops got wiped out in floods in 2020. Industrial metals generated gains as both aluminium and copper prices rose in response to strong manufacturing activity and, in the case of copper, the strong performance of clean energy and electric vehicle positions coupled with supply shortages due to Covid-related mine disruptions in South America. Precious metals posted positive returns but muted relative to the other complexes after leading the asset class at the beginning period. Both gold and silver saw prices fell later in the fiscal year on a stronger dollar, higher real rates and lack of a safe-haven bid.

Equity markets contributed to results led by US equities with small caps benefitting from the dramatic rise in industries like clean energy and biotechnology. Asian markets posted handsome contributions from both Japan and Hong Kong. Increased manufacturing activity along with an earlier exit from Covid-19 lockdowns were likely factors contributing to the strong relative performance. European and UK equities saw share prices rise despite having a protracted battle with the virus and attendant restrictions. Central bank support and expectations for a continued rebound in demand despite the reimposed restrictions helped improve sentiment.

Exposure to government bonds detracted from performance with four markets producing negative returns as strong growth and concerns about mounting inflationary pressures elevated yields. Japanese yields were flat.

Q          How did the tactical allocation perform?

A          The tactical allocation added to results with gains in all three asset classes. Tactical equity was the top contributor, primarily due to timely overweights in US small caps. Gains from tactical positioning within commodities were driven by overweights in ***agriculture***, industrial metals and precious metals. Tactical positioning within energy detracted due to underweight positioning.

Q          What is your 30-day outlook?

A          The Balanced Risk Allocation Portfolio strategy is rebalanced monthly and its time horizon is 30 days as part of the investment process/philosophy. The continued rollout of vaccines, along with the seemingly successful application of therapeutics such as ivermectin in Latin America and India, have allowed further relaxing of restrictions put in place to contain Covid-19 infections. The reopening has led to a further increase in demand while supply is constrained either as a result of supply chain issues or labour shortages. Much has been made about the uptick in inflation and whether the effects will be transitory or more persistent. To be sure, low base effects are having an impact, but if the supply issue and labour shortages continue, inflation may prove stickier than not.

Tactical positioning for June has overweights to all six equity markets. In fixed income, the strategy is neutral Australia and Japan, but underweight Canada, the UK and the US. Due to the negative yields in Germany, the portfolio continues to exclude fixed income from this country. Across commodities, the strategy is overweight coffee, corn, cotton, the soy complex, sugar, wheat, gold and silver. The strategy is underweight gasoil, natural gas, heating oil and industrial metals. The rest of the commodity exposures are carried at neutral.

Scott Wolle

Portfolio Manager

5 August 2021

Balanced Risk Allocation Share Portfolio List of Derivative Instruments

AT 31 May 2021

Target Annualised Risk

The targeted annualised risk (volatility of monthly returns) for the portfolio as listed above is analysed as follows:

List of Investments

(1) The hedge fund investments are residual holdings of the previous investment strategy, which are awaiting realisation of underlying investments.

Derivative instruments held in the Balanced Risk Allocation Share Portfolio are shown on the previous page. At the year end all the derivative instruments held in the Balanced Risk Allocation Share Portfolio were exchange traded futures contracts. Holdings in futures contracts that are not exchange traded are permitted as explained in the investment policy on page 40.

Managed Liquidity Share Portfolio Manager’s Report

Q          How does the portfolio generate returns?

A          The investment objective of the Portfolio is to produce an appropriate level of income return combined with a high degree of security.  We aim to generate returns by investing mainly in sterling-based high quality debt securities and similar assets but with the flexibility to invest in assets with a greater weighted average maturity than a money market fund. Accordingly the value of the Portfolio may rise or fall.

The majority of the portfolio is invested in the iShares – Sterling Ultrashort Bond UCITS ETF. We reviewed the Exchange Traded Fund (ETF) universe in December 2020 and as a result switched from the PIMCO Sterling Short Maturity Source UCITS ETF to improve the portfolio’s characteristics. This resulted in a moderate reduction in average maturity and charges and a moderate improvement in average credit quality and liquidity, with the expectation of a moderately higher net yield as a result.  We also hold a portion of the Portfolio in the Sterling Liquidity Portfolio of Invesco Liquidity Funds plc. to meet short term payment obligations.

The iShares – Sterling Ultrashort Bond UCITS ETF invests in Sterling denominated investment grade corporate bonds and quasi-government bonds, aiming to track performance of the Markit iBoxx GBP Liquid Investment Grade Ultrashort Index and has a weighted average maturity of around one year.

Q          What has the performance of your fund been over the last year?

A          The Managed Liquidity Portfolio NAV total return for the year ended 31 May 2021 was 1.6%, excluding the one-off rebate of management fee referred to in the Chairman’s statement, which accounted for 2% of the total return.

While low relative to historical cash rates, and particularly in comparison with strong equity returns over the year, the Portfolio’s return remained meaningfully above the Bank of England’s Base Rate (0.1% since March 2020) and the average overnight interbank rate (SONIA, 0.05%) over the year.

Q          What’s the outlook for returns given low interest rates and rising inflation?

A          We expect interest rates to remain low into 2022 as central banks globally continue to provide emergency support to businesses emerging from Covid-19 related restrictions. However, this support also benefits the Portfolio, as facilities such as the Bank of England’s Coronavirus Business Interruption Loan Scheme (CBILS) provide working capital to those large firms who need it.

The additional spread of credit returns over base rates are also tight, as demand for low-risk paper remains strong, limiting the potential for returns from ultrashort bonds.

Regarding inflation, changes in consumer preferences, and supply/demand imbalances have led to some variability in the calculation of consumer price inflation over the past 12 months. As the economy reopens we expect to see the transitory effect of this in rising inflation over the next year. Brexit-related trade and labour frictions may contribute to moderately higher UK inflation over the longer term, although negative real interest rates remain a global and structural phenomenon. As such would expect liquidity portfolios to continue to deliver returns below inflation.

Nevertheless, we expect ultrashort bonds to continue to deliver a meaningful pickup over base rates while providing ready access to capital with a high degree of security.

Derek Steeden

Portfolio manager

5 August 2021

Managed Liquidity Share Portfolio List of Investments

Environmental, Social and Corporate Governance (ESG) statement from the Managers

UK Equity Share Portfolio & Global Equity Income Share Portfolio

Ciaran Mallon

UK Equities Fund Manager

James Goldstone

UK Equities Fund Manager

Stephen Anness

Global Equities Fund Manager

What does ESG mean to us?

•    Investing in stocks which have the right Environmental, Social and Governance (ESG) momentum behind them can be a positive way for our portfolios to potentially generate returns in excess of the benchmark

•    We draw upon ESGintel, Invesco’s proprietary tool, which helps us to better understand how companies are addressing ESG issues

•    Engaging with companies to understand corporate strategy today in order to assess how this could evolve in the future

•    Monitoring how companies are performing from an ESG perspective and if the valuations fairly reflect the progress being made

Our focus as active fund managers is always on finding mispriced stocks and ESG integration underpins our investment process.

The incorporation of ESG into our investment process considers ESG factors as inputs into the wider investment process as part of a holistic consideration of the investment risk and opportunity, from valuation through investment process to engagement and monitoring. The core aspects of our ESG philosophy include: materiality; ESG momentum; and engagement.

•    Materiality refers to the consideration of ESG issues that are financially material to the company we are analysing.

•    The concept of ESG Momentum, or improving ESG performance over time, indicates the degree of improvement of various ESG metrics and factors and help fund managers identify upside in the future. We find that companies which are improving in terms of their ESG practices may enjoy favourable financial performance in the longer term.

•    Engagement is part of our responsibility as active owners which we take very seriously, and we see engagement with companies as an opportunity to encourage continual improvement. Dialogue with portfolio companies is a core part of the investment process for our investment team. As such, we often participate in board level dialogue and are instrumental in giving shareholder views on management, corporate strategy, transparency, and capital allocation as well as wider ESG aspects.

ESG integration is an ongoing strategic effort to systematically incorporate ESG Factors into fundamental analysis. The aim is to provide a 360 degree evaluation of financial and non-financial materially relevant considerations and to help guide the portfolio strategy.

Our investment process has four stages. In this note we go through in detail how ESG is integrated into each stage of our process.

Idea Generation

We believe it is important to spread our nets as wide as possible when trying to come up with stock ideas which may find their way into our portfolios. We remain open minded as to the type of companies we will consider. This means not ruling out companies just because they happen to be unpopular at that time and vice versa. ESG can create opportunities too – for example, the benefits of moving towards more sustainable sources of energy like wind, solar and hydroelectric power generation. This was one of the reasons we became interested in some of our utility holdings which are held in the UK portfolio. This highlights the importance of opportunities brought about by ESG and not just the risks. Investing in stocks which have the right ESG momentum behind them – by focussing on fundamentals and the broader investment landscape – can be a unique way for our portfolios to potentially generate returns in excess of the benchmark as those businesses that have got ESG momentum behind them have the potential to be rerated.

Fundamental Research & ESG Analysis

Research is at the core of what we do. Our fundamental analysis covers many drivers, for example, corporate strategy, market positioning, competitive dynamics, the macroeconomic environment, financials, regulation, valuation, and, of course, ESG considerations, which guide our analysis throughout.

We use a variety of tools from different providers to measure ESG factors. In addition, at Invesco, we have developed ESGintel, Invesco’s proprietary tool built by our Global ESG research team in collaboration with our Technology Strategy Innovation and Planning (SIP) team.

ESGintel provides fund managers with environmental, social and governance insights, metrics, ***data*** points and direction of change. In addition, ESGintel offers fund managers an internal rating on a company, a rating trend, and a rank against sector peers. The approach ensures a targeted focus on the issues that matter most for sustainable value creation and risk management.

This provides a holistic view on how a company’s value chain is impacted in different ways by various ESG topics, such as compensation and alignment, health and safety, and low carbon transition/ climate change.

We always try to meet with a company prior to investment. Based on our fundamental research, including any ESG findings, we focus on truly understanding the key drivers and, most importantly, the path to change. This helps us better understand corporate strategy today and how this could evolve in the future. Today, the subject of ESG is increasingly part of these discussions, led by us.

Portfolio Construction

We aim to create a well-diversified portfolio of active positions that reflect our assessment of the potential upside for each stock weighted against our assessment of the risks. Sustainability and ESG factors will be assessed alongside other fundamental drivers of valuation. The impact of any new purchases will need to be considered at a portfolio level. How will it affect the shape of the portfolio having regard to objectives, existing positions, overall size of the portfolio, liquidity and conviction?

We do not seek out stocks which score well on internal or third party research simply to reduce portfolio risk.

Ongoing Monitoring

Our fund managers and analysts continuously monitor how the stocks are performing as well as considering possible replacements. Is the company performing from an ESG perspective and are the valuations fairly reflecting the progress being made or not?

How do we monitor our holdings from an ESG perspective? Again, the same resources used during the fundamental stage are available to us. Our regular meetings with the management teams of the companies we own provides an ideal platform to discuss key ESG issues, which will be researched in advance. We draw on our own knowledge as well as relevant analysis from our ESG team and ***data*** from our previously mentioned proprietary system ESGintel which allows us to monitor progress and improvement against sector peers. Outside of company management meetings we constantly discuss as a team all relevant ESG issues, either stimulated internally or from external sources.

Additional ESG analysis is carried out by the team, when warranted, on particular companies. Such cases would be those that are more controversial, considered to be higher risk and viewed poorly by ESG providers, resulting in a valuation discount. We don’t just look at the specific issue considered to be higher risk either, for example the environmental risk of an oil company, but all areas of ESG. This means undertaking extensive analysis of social and governance policies and actions at the same time.

Challenge, Assessing & Monitoring Risk

In addition, there are two more formal ways in which our portfolios are monitored:

There is a rigorous semi-annual review process which includes a meeting led by the ESG team to assess how our portfolios are performing from an ESG perspective. This ensures a circular process for identifying flags and monitoring of improvements over time. These meetings are important in capturing issues that have developed and evolved whilst we have been shareholders.

There is also the ‘CIO challenge’, a formal review meeting held between the Henley Investment Centre’s Chief Investment Officer (CIO) and each fund manager. This review includes a full breakdown of the ESG performance using Sustainalytics and ISS ***data***, such as the absolute ESG performance of the portfolio, relative performance to benchmarks, stocks exposed to severe controversies, top and bottom ESG performers, carbon intensity and trends. The ESG team review the ESG ***data*** and develop stock specific or thematic ESG questions. The ESG performance of the portfolio is discussed with the CIO using the ***data*** and the stock specific questions to analyse the fund manager’s level of ESG integration. The aim of these meetings is not to prevent a fund manager from holding any specific stock: rather, what matters is that the fund manager can evidence understanding of ESG issues and show that they have been taken into consideration when building the investment case.

Company Specific ExamplesIn the selection below, we highlight some of the recent engagements that we have had with companies to give you a flavour of how active engagement can create positive outcomes.

UK Equity Portfolio Example

International transmission and distributor of electricity and gas

Our assessment

–   The company outlined their ESG strategy in October 2020 and the key role they will play in facilitating the electrification of high carbon emitting industries and products such as electric vehicles, and thus helping the UK achieve its ambitious greenhouse gas targets by promoting decarbonisation of the grid. They outlined their carbon reduction targets, which include a 2050 net-zero target as well announcing on the webinar an interim scope 3\* reduction target for 2030.

–   The company’s business model means it is less exposed to carbon risk than utilities that have greater generation capacity (the company are distributors), but the company lags many peers in terms of supporting the transition to a less carbon-intensive grid according to Sustainalytics. We know from our conversations with the company, however, that they are trialling new products in order to promote transition.

–   We provided feedback to the company that although the overall vision is very strong, more clarity is needed about how their gas business can be decarbonised and the feasibility of proposed solutions such as Renewable Natural Gas (RNG) or hydrogen blending.

\* Scope 3 refers to the indirect emissions that occur at different points in the full range of activities undertaken in order to create the products or services of the reporting company.

International vending and catering services

Our assessment

–   Over the past two years and particularly in during the Covid-19 Pandemic, we have been engaging with the board, management and advisors to this company.

–   During this time we have discussed and challenged management on its business plan and strategy and the impact of Covid-19. We have 1-1 conversations with the CFO and Head of Investor Relations on issues including challenges in attracting labour and ensuring work force safety.

–   We have challenged the company on end to end chain food wastage and what schemes can be implemented to significantly reduce waste. We have also challenged their performance on recent issues surrounding the provision of free school meals under lockdown.

–   We have questioned and tested their remuneration policies to ensure management is aligned with shareholders, incentivised and stable and that there are adequate succession plans in place for the future. We have discussed the company’s cultural values and concluded that their culture is one of safety, for both employees and consumers.

Global Equity Income Portfolio Example

US building materials company

Our assessment

–   This company is a leading installer of insulation products to the US residential and commercial construction sectors. Building sustainable cities and communities is an Sustainable Development Goal (SDG) and we view insulation as one of the most cost effective ways to save energy. Its annual report contained little of substance to allow investors to ascertain both its role in reducing carbon emissions, and its policies towards reducing its own and its suppliers carbon footprint. Furthermore, there was a lack of disclosure around certain elements of the sustainability programme, particularly around human capital to allow 3rd party rating agencies to form a proper view of procedures.

–   We have actively engaged with the company, our internal ESG team has been extremely helpful to the company in order to identify which issues around human capital were merely related to lack of disclosure, and others, particularly around carbon footprint, which have required more detailed audit and ***data*** ***collection*** which the company has undertaken. We note a step change in how the company present their ESG ***data*** in investor presentations. Better disclosure we believe will help reclassify the company from the ‘homebuilders’ to building materials sectors of 3rd party rating agencies which will allow better peer to peer comparison.

–   There remain issues around governance which are not unusual for founder owned companies and we would note the founder CEO has been an excellent steward of shareholder capital over the last 20 years.

Consumer and Industrial electric and equipment provider

Our assessment

–   The team actively engaged with the company on ESG issues since inception of the position and believes it has seen tangible progress on issues of concern.

–   These would include improvements in shareholder returns policy, improvements in the human rights (notably whistle-blower policy) and employee safety.

–   Furthermore, in corporate governance policies, a greater level of transparency is apparent and independent board members have been appointed.

–   The team continues to engage with the company to achieve progress on outstanding ESG issues of concern.

Voting Policy

We review AGM and EGM proposals taking into account our own knowledge of the companies in which our portfolios are invested, as well as the comments and recommendations of proxy voting analysis providers ISS\*, Glass Lewis and IVIS\*\*. In addition, Invesco provides proprietary proxy voting recommendations and publishes these recommendations via its PROXYintel platform. All voting decisions remain with the portfolio manager, however, where a portfolio manager votes against an Invesco voting recommendation, the rationale for such decision is recorded and available on the platform. There will be times when we will follow the recommendations made by proxy research providers but times where we disagree with the stance being taken.

Voting in line with management recommendations should not be seen as evidence of a lack of engagement or challenge on our part, but rather that we believe that the governance of the companies in which we are invested is appropriately robust and worthy of support. There may be instances where we vote in support of management, but the ESG performance of the company is not perfect and issues have been identified. In this situation we would seek to engage with the company leading up to the vote and if necessary, would have raised concerns and likely given a time horizon or measure for improvement which, if not met, could lead to a vote against in the future. In that respect, our approach to governance is one of engagement and improvement.

We do not expect companies to change overnight but we do expect continual review of governance processes and continued improvement. Further details of how the manager has voted on holdings in the portfolio is available on the company’s webpage at[*http://www.invesco.co.uk/selectukandhttp*](http://www.invesco.co.uk/selectukandhttp)://[*www.invesco.co.uk/selectglobal*](http://www.invesco.co.uk/selectglobal).

A recent example of voting engagement involved director remuneration at a large international distribution and outsourcing services group. We reviewed the company’s director remuneration policy ahead of the AGM and noted that the group has formalised its policy on post-employment shareholdings for directors which was an issue we had raised previously. Given this, overall we were supportive of the policy. However, prior to voting at the AGM we continued to have an outstanding query on executive directors pension benefits, and whether the pension contribution would be aligned over time to those available to the wider workforce as this did not appear to be the case. This was also flagged by a third party research provider. We engaged with the company on the matter and shortly after the company issued an announcement setting out how the CEO’s remuneration would align with the pension contribution rate for the majority of the wider workforce in the UK. As a result we felt able to support all the resolutions at the AGM and had successfully discharged our stewardship duties.

\* ISS – Institutional Shareholder Services.

\*\* IVIS – Institutional Voting Information Service.

Conclusion

The regulatory landscape is rapidly evolving, which increasingly compels organisations and investors alike to clearly demonstrate their awareness of ESG issues in their decisions. Landmark initiatives such as the European Union’s new Sustainable Finance Disclosure Regulation (SFDR) are at the forefront of this shift.

We believe that our approach is honest, coherent and pragmatic. Whilst we consider ESG aspects, we are not bound by any specific ESG criteria and have the flexibility to invest across the ESG spectrum from best to worst in class, but we think that the principles behind ESG deserve to be embedded in an investment framework which encourages positive change. Coupling this with a focus on valuation is, to our minds, the best way to deliver strong investment outcomes for our clients’ long term. This reinforces our fundamental belief that responsible investing demands a long-term view and that a stakeholder-centric culture of ownership and stewardship is at the heart of ESG integration.

Business Review

Purpose, Business Model and Strategy

Invesco Select Trust plc is a UK investment company with four Share classes, each of which has separate investment objectives, as set out below, and is represented by a separate Portfolio. The Company’s purpose is to generate sustainable returns for its shareholders by providing a choice of investment strategies and the ability to switch between them, free of cost, according to their needs. The underlying strategies are each targeted at achieving returns corresponding with specified objectives through a disciplined investment process. The strategy the Board follows to achieve its overall objective and those of each Share class is to set investment policy and risk guidelines, together with investment limits, and to monitor how they are applied. These are also set out below.

The business model the Company has adopted to achieve its objective has been to contract investment management and administration to appropriate external service providers. The Board has oversight of the Company’s service providers, and monitors them on a formal and regular basis. The Board has a collegiate culture and pursues its fiduciary responsibilities with independence, integrity and diligence, taking advice and outside views as appropriate and constructively challenging and interacting with service providers, including the Manager.

The principal service provider is Invesco Fund Managers Limited (‘IFML’ or the ‘Manager’). In addition to managing the Portfolios in accordance with the Board’s strategy and under its oversight, the Manager is also responsible for providing company secretarial, marketing, accounting and general administration services. In practice, many of these services are performed under delegated authority by Invesco Asset Management Limited (IAML), a company related to IFML. References to the Manager in this annual financial report should consequently be considered to include both entities.

All administrative support is provided by third parties under the oversight of the Board. In addition to the management and administrative functions of the Manager, the Company has contractual arrangements with Link Group to act as registrar and The Bank of New York Mellon (International) Limited (BNYMIL) as depositary and custodian.

Investment Policy

The Company’s and respective Share classes’ investment objectives, investment policies and risk and investment limits combine to form the ‘Investment Policy’ of the Company.

The Company

Investment Objective and Policy

The Company’s investment objective is to provide shareholders with a choice of investment strategies and policies, each intended to generate attractive risk-adjusted returns.

The Company’s share capital comprises four Share classes: UK Equity Shares, Global Equity Income Shares, Balanced Risk Allocation Shares and Managed Liquidity Shares, each of which has its own separate portfolio of assets and attributable liabilities. The investment objectives, policies and risks and limits of the Portfolios for these Share classes follow. With the exception of borrowings, the limits for the Company and the four Share classes are measured at the point of acquisition of investments, unless otherwise stated.

Investment Limits of the Company

The Board has prescribed limits on the Investment Policy of the Company, which include the following:

•    no more than 15% of the gross assets of the Company may be invested in a single investment; and

•    no more than 10% of the gross assets of the Company may be invested in other listed investment companies (excluding property companies structured as REITs).

UK Equity Share Portfolio

Investment Objective

The investment objective of the UK Equity Portfolio is to provide shareholders with an attractive real long-term total return, with an income that will grow over time, by investing primarily in UK quoted equities.

Investment Policy and Risk

The UK Equity Portfolio is invested primarily in UK-quoted equities and may also hold equity-related or fixed interest securities of UK companies across all market sectors. The Portfolio will not invest in companies which are not listed, quoted or traded at the time of investment, although it may have exposure to such companies where, following investment, the relevant securities cease to be listed, quoted or traded.

The Manager invests the UK Equity Portfolio so as to maximise exposure to the most attractive sectors and securities, within a portfolio structure that reflects the Manager’s view of the macroeconomic environment. The Manager does not set out to manage the risk characteristics of the UK Equity Portfolio relative to the FTSE All-Share Index (the ‘benchmark index’) and the investment process may result in potentially very significant over or underweight positions in individual sectors versus the benchmark. The size of weightings will reflect the Manager’s view of the attractiveness of a security and the degree of conviction held. If a security is not considered to be a good investment, it will not be held in the UK Equity Portfolio, irrespective of its weight in the benchmark index.

The Manager controls the stock-specific risk of individual securities by ensuring that the UK Equity Portfolio is always diversified across market sectors. In-depth and continual analysis of the fundamentals of investee companies allows the Manager to assess the financial risks associated with any particular security.

It is expected that, typically, the Portfolio will hold between 40 and 50 securities.

The Directors believe that the use of borrowings can enhance returns to shareholders and the UK Equity Portfolio will generally use borrowings in pursuing its investment objective.

Investment Limits

The Board has prescribed limits on the investment policy of the UK Equity Portfolio, which include the following:

•    no more than 12% of the gross assets of the UK Equity Portfolio may be held in a single investment;

•    no more than 10% of the gross assets of the UK Equity Portfolio may be held in other listed investment companies (excluding REITs);

•    no more than 20% of the gross assets of the UK Equity Portfolio may be held in overseas assets; and

•    borrowings may be used to raise equity exposure up to a maximum of 25% of the net assets of the UK Equity Portfolio when it is considered appropriate.

Global Equity Income Share Portfolio

Investment Objective

The investment objective of the Global Equity Income Portfolio is to provide an attractive and growing level of income return and capital appreciation over the long term, predominantly through investment in a diversified portfolio of equities worldwide.

Investment Policy and Risk

The Portfolio will be invested predominantly in a portfolio of listed, quoted or traded equities worldwide, but may also hold other securities from time to time including, inter alia, fixed interest securities, preference shares, convertible securities and depositary receipts. Investment may also be made in regulated or authorised ***collective*** investment schemes. The Portfolio will not invest in companies which are not listed, quoted or traded at the time of investment, although it may have exposure to such companies where, following investment, the relevant securities cease to be listed, quoted or traded. The Manager will at all times invest and manage the Portfolio’s assets in a manner that is consistent with spreading investment risk, but there will be no rigid industry, sector, region or country restrictions.

The Portfolio may utilise derivative instruments including index-linked notes, contracts for differences, covered options and other equity-related derivative instruments for efficient portfolio management and investment purposes. Any use of derivatives for investment purposes will be made on the basis of the same principles of risk spreading and diversification that apply to the Portfolio’s direct investments, as described above.

It is expected that, typically, the Portfolio will hold between 40 and 55 securities.

The Directors believe that the use of borrowings can enhance returns to shareholders, and the Global Equity Income Portfolio may use borrowings in pursuing its investment objective.

The Company’s foreign currency investments will not be hedged to sterling as a matter of general policy. However, the Manager may employ currency hedging, either back to sterling or between currencies (i.e. cross hedging of portfolio investments).

Investment Limits

The Board has prescribed the following limits on the investment policy of the Global Equity Income Portfolio:

•    no more than 20% of the gross assets of the Global Equity Income Portfolio may be invested in fixed interest securities;

•    no more than 10% of the gross assets of the Global Equity Income Portfolio may be held in a single investment;

•    no more than 10% of the gross assets of the Global Equity Income Portfolio may be held in other listed investment companies (excluding REITs); and

•    borrowings may be used to raise equity exposure up to a maximum of 20% of the net assets of the Global Equity Income Portfolio, when it is considered appropriate.

Balanced Risk Allocation Share Portfolio

Investment Objective

The investment objective of the Balanced Risk Allocation Portfolio is to provide shareholders with an attractive total return in differing economic and inflationary environments, and with low correlation to equity and bond market indices by gaining exposure to three asset classes: debt securities, equities and commodities.

Investment Policy and Risk

The Portfolio utilises two main strategies: the first seeks to balance the risk contribution from each of three asset classes (equities, bonds and commodities), with the aim of reducing the probability, magnitude and duration of capital losses, and the second seeks to shift tactically the allocation among the assets with the aim of improving expected returns.

The Portfolio is constructed so as to achieve appropriate diversity and to balance risk by asset class (bonds, equities and commodities) and by asset within each asset class. Neutral risk weighting is achieved when each asset class contributes an equal proportion of the total Portfolio risk and each asset contributes an equal proportion of the total risk for its respective asset class. The Manager is permitted to actively vary asset class weightings, subject to a maximum of 150% and a minimum of 50% of each asset class’s neutral weight. The Manager is also permitted to actively vary individual asset weightings, provided the asset class guidelines are not violated. Asset weights may not be less than zero (short) and will not exceed twice the neutral weight. For the purposes of the maximum weighting only, commodity exposures are aggregated and measured by commodity complex rather than by individual assets.

The Portfolio will be mainly invested directly in highly liquid and transparently priced exchange-traded futures contracts, with cash and cash equivalents being held as collateral. However, the Portfolio may also be invested in equities, equity-related securities and debt securities (including floating rate notes). Financial derivative instruments (including but not limited to futures and total return swaps) are used only to achieve long exposure to the three asset classes. The Portfolio may also use financial derivative instruments, including currency futures and forwards, for efficient portfolio management, hedging and investment purposes. Financial derivative instruments will not be used to create net short positions in any asset class. The derivatives portfolio will typically comprise between 20 and 33 investment positions.

It is expected that the Portfolio’s investments will mainly be denominated in sterling. Any non-sterling derivative investments may be hedged back into sterling at the discretion of the Manager when it is economic to do so.

Investment Limit

The Board has prescribed the following limits on the investment policy of the Balanced Risk Allocation Portfolio:

•    the aggregate notional amount of financial derivative instruments positions may not exceed 250% of the net assets of the Balanced Risk Allocation Portfolio; and

•    no more than 10% of the gross assets of the Balanced Risk Allocation Portfolio may be held in other listed investment companies.

Managed Liquidity Share Portfolio

Investment Objective

The investment objective of the Managed Liquidity Portfolio is to produce an appropriate level of income return combined with a high degree of security.

Investment Policy and Risk

The Managed Liquidity Portfolio invests mainly in a range of sterling-based or related high quality debt securities and similar assets (which may include transferable securities, money market instruments, warrants, ***collective*** investment schemes and deposits), either directly or indirectly through authorised funds investing in such instruments, including funds managed by Invesco.

The Managed Liquidity Portfolio generally invests in funds authorised as UCITS schemes (Undertakings for ***Collective*** Investments in Transferable Securities, being open ended retail investment funds), which are required under governing regulations to provide a prudent spread of risk. In the event that the Managed Liquidity Portfolio is invested directly in securities and instruments, the Manager will observe investment restrictions and risk diversification policies that are consistent with UCITS regulations.

Investment Limits

The Board has prescribed limits on the investment policy of the Managed Liquidity Portfolio, which include the following:

•    no more than 10% of the gross assets of the Managed Liquidity Portfolio may be held in a single investment, other than authorised funds or high quality sovereign debt securities; and

•    no more than 5% of the gross assets of the Managed Liquidity Portfolio may be held in unquoted investments, other than authorised funds.

Investors should note that the Managed Liquidity Shares are not designed to replicate the returns or other characteristics of a bank or building society deposit or money market fund. In particular, the Portfolio will typically contain some assets with a greater residual maturity, and as a whole will have greater weighted average maturity, than is prescribed by regulation governing money market funds.

Key Performance Indicators

The Board reviews the performance of the Company by reference to a number of Key Performance Indicators, at either a Company or Portfolio level, which include the following:

•           Investment Performance

•           Revenue and Dividends

•           Discount/Premium

•           Ongoing Charges

Investment Performance

To assess investment performance the Board monitors the net asset value (NAV) performance of the individual Share classes relative to that of benchmark indices it considers to be appropriate. However, given the requirements and constraints of the investment objectives and policies followed, no index can be expected to fully represent the performance that might reasonably be expected from any one or all of the Company’s Share classes.

The NAV total return performance of each of the Portfolios over the year to 31 May 2021 and of relevant benchmark indices were as follows:

Source: Refinitiv.

Other performance periods, together with share price total returns, are shown on pages 9, 16, 23 and 29.

Revenue and Dividends

The Directors review revenue estimates and prospective dividend levels at each Board meeting. For the equity Share classes the Directors have become more focused on total return since sanctioning contributions to dividends from capital, but dividends paid continue to be mostly constituted from revenue and revenue is an important element of overall Portfolio returns.

UK Equity Shares

Revenue earnings per Share for the UK Equity Share Portfolio was 3.90p (2020: 4.12p), based on net revenue for the year of £1,322,000 (2020: £1,340,000) with no receipts of special dividends (2020: £61,000 receipts of non-recurring special dividends, equivalent to 0.19p).

Dividend Policy:

It is the Board’s policy that the Directors will declare four dividends in respect of each accounting year (with payment in the month following) comprising of three equal interim dividends, declared in July, October and January, and a ‘wrap-up’ fourth interim dividend, declared in April. Depending on the level of income received in each quarter, and in the year, these four dividends may be enhanced with contributions from capital profits to achieve the Board’s target level. In recent years the Directors have set a target of at least maintaining, in the absence of unforeseen circumstances, the level of annual UK Equity dividends per share from year to year. The impact of Covid-19 constitutes unforeseen circumstances in this context and, given uncertainty of income flows, the Directors did not set dividend targets for the year to 31 May 2021 and have not done so for the year to 31 May 2022.

Dividends Declared:

The Directors have declared and paid four interim dividends for the year ended 31 May 2021 totalling 6.65p per UK Equity Share (2020: 6.60p) of which 3.90p was met from revenue earned in the year. The aggregate of dividends paid in respect of the year was £1,814,000 (2020: £2,145,000) – the decrease reflects the reduction of shares in issue following conversions and buybacks in the year.

A first interim dividend for the year to 31 May 2022 of 1.50p was declared on 15 July 2021. In the absence of unforeseen circumstances, and in accordance with the dividend policy set out above, the Board intends for this to set the level for the next two quarterly dividends.

Global Equity Income Shares

Revenue earnings per Share for the Global Equity Income Share Portfolio was 3.95p (2020: 5.39p), based on net revenue for the year of £1,024,000 (2020: £1,639,000), which included £192,000 (2020: £49,000) of non-recurring special dividends.

Dividend Policy:

It is the Board’s policy that the Directors will declare four dividends in respect of each accounting year (with payment in the month following) comprising of three equal interim dividends, declared in July, October and January, and a ‘wrap-up’ fourth interim dividend, declared in April. Depending on the level of income received in each quarter, and in the year, these four dividends may be enhanced with contributions from capital profits to achieve the Board’s target level. In recent years the Directors have set a target of at least maintaining, in the absence of unforeseen circumstances, the level of annual Global Equity Income dividends per share from year to year. The impact of Covid-19 constitutes unforeseen circumstances in this context and, given uncertainty of income flows, the Directors did not set dividend targets for the year to 31 May 2021 and have not done so for the year to 31 May 2022.

Dividends Declared:

The Directors have declared and paid four interim dividends for the year ended 31 May 2021 totalling 7.10p (2020: 7.05p) per Global Equity Income Share, of which 3.83p was met from revenue earned in the year. The aggregate of dividends paid in respect of the year was £1,815,000 (2020: £2,138,000) – the decrease reflects the reduction of shares in issue following conversions and buybacks in the year.

A first interim dividend for the year to 31 May 2022 of 1.55p was declared on 15 July 2021. In the absence of unforeseen circumstances, and in accordance with the dividend policy set out above, the Board intends for this to set the level for the next two quarterly dividends.

Balanced Risk Allocation Shares

In order to maximise the capital return on the Balanced Risk Allocation Shares, the Directors only intend to declare dividends on the Balanced Risk Allocation Shares to the extent required, having taken into account the dividends paid on the other Share classes, to maintain the Company’s status as an investment trust under section 1158 of the Corporation Tax Act 2010. The Portfolio recorded a net revenue loss of £8,000 in the year (2020: £1,000 net loss).

No dividends are required to be declared or paid for the year to retain investment trust status.

Managed Liquidity Shares

The Board intends to declare dividends on the Managed Liquidity Share Portfolio when the level of income available allows. No dividends were paid in the year (2020: 0.80p). The Managed Liquidity Portfolio recorded a net revenue profit for the year of £33,000 (2020: £23,000).

A first interim dividend for the year to 31 May 2022 of 1.00p was declared on 15 July 2021. It is unlikely, given the quantum of revenue being earned, that future dividends will be more frequent than annual and they could be less frequent.

Discount/(Premium)

The Company has a discount control policy in place for all four Share classes, whereby the Company offers to issue or buy back Shares of all classes with a view to maintaining the market price of the shares at close to their respective net asset values and, by so doing, avoid significant overhangs or shortages in the market. It is the Board’s policy to buy back shares and to sell shares from treasury on terms that do not dilute the net asset value attributable to existing shareholders at the time of the transaction.

The operation of this policy is dependent upon the authorities to buy back and issue shares being renewed by shareholders. Notwithstanding the intended effect of this policy, there can be no guarantee that the Company’s shares will trade at close to their respective net asset values. Shareholders should also be aware that there is a risk that this discount policy may lead to a reduction in the size of the Company over time.

The Board and the Manager closely monitor movements in the Company’s share prices and dealings in the Company’s shares. Share movements in the year are summarised on page 43. At 31 May 2021, the share prices, net asset values (NAV) and the discounts of the four Share classes were as follows:

The following charts show the premium/(discount) at which the Shares traded over the two years to 31 May 2021. The Shares of all four Portfolios have, historically, generally traded in a range of 0% to 4%. As can be seen below, although this continued in the past year it was somewhat more volatile from the onset of the market disruptions from Covid-19, in March 2020, with higher levels of discount being seen sporadically throughout the pandemic influenced period.

Source: Refinitiv.

Ongoing Charges

The expenses of managing the Company are reviewed by the Board at every meeting. The Board aims to minimise the ongoing charges figure which provides a guide to the effect on performance of all annual operating costs of the Company. The ongoing charges figure is calculated by dividing the annualised ongoing charges, including those charged to capital, by the average daily net asset value during the year, expressed as a percentage.

At the year end the ongoing charges figure of the Company and that for the different Share classes were as follows:

The above excludes rebates received by the Managed Liquidity Portfolio. Performance fee arrangements were removed from both the UK Equity and Global Equity Income Share Portfolios and no performance fees were paid during the year. In addition to inflationary effects, shrinkage from buybacks in connection with the discount control policy will tend to cause the ongoing charge percentages to gradually increase.

Financial Position

Assets and Liabilities

The Company’s balance sheet on page 77 shows the assets and liabilities at the year end. Details of the Company’s borrowing facility are shown in note 12(b) of the financial statements on page 88, with interest paid (finance costs) in note 5.

Owing to the readily realisable nature of the Company’s assets, cash flow does not have the same significance as for an industrial or commercial company. The Company’s principal cash flows arise from the purchases and sales of investments and the income from investments against which must be set the costs of borrowing and management expenses.

Borrowing Policy

Borrowing policy is under the control of the Board, which has established effective parameters for the Portfolios. Borrowing levels are regularly reviewed. As part of the Company’s Investment Policy, the approved borrowing limits are 25% of the net assets of the UK Equity Portfolio and 20% of net assets of the Global Equity Income Portfolio. The Balanced Risk Allocation Portfolio does not use borrowings, but is geared by means of the derivative instruments used to implement its investment policy. The Managed Liquidity Portfolio does not use borrowings.

Issued Share Capital

All Share classes have a nominal value of 1 penny per Share.

The following table summarises the Company’s share capital at the year end and movements during the year.

Since the year end another 4,860,000 UK Equity Shares and 63,000 Managed Liquidity Shares have been bought into treasury at average prices of 179p and 104p respectively.

Further details on net changes in issued share capital are set out in note 13 to the financial statements on pages 89 and 90. No treasury shares were cancelled during the year.

Current and Future Developments

As part of the Company’s overall strategy, the Company seeks to manage its affairs so as to maximise returns for shareholders. The Board also has a longer-term objective, consistent with the business combination with Invesco Income Growth Trust plc in April 2021, to increase the size of the Company in the belief that increasing the assets of the Company in this way will make the Company’s Shares more attractive to investors and improve the liquidity of the Shares.

Details of trends and factors likely to affect the future development, performance and position of the Company’s business can be found in the Chairman’s Statement and the portfolio managers’ reports. Further details as to the risks affecting the Company are set out under ‘Principal Risks and Uncertainties’ below.

Principal Risks and Uncertainties

The Audit Committee regularly undertakes a robust assessment of the risks the Company faces, including those that would threaten its business model, future performance, solvency, reputation or liquidity and emerging risks, on behalf of the Board (see Audit Committee Report on pages 59 and 60).

The following are considered to be the most significant risks to the Company and to shareholders in relation to their investments in the Company. Further details of risks and risk management policies as they relate to the financial assets and liabilities of the Company are detailed in note 16 to the financial statements.

Investment Objectives and Attractiveness to Investors

There is no guarantee that the Investment Policy of the Company and of each Portfolio will provide the returns sought by the Company. There can be no guarantee, therefore, that the Company will achieve its investment objectives or that the Shares will continue to meet investors’ needs.

The Board monitors the share registers and the performance of the Company and each Portfolio. It has established a structure offering a range of options for investors and has set guidelines to ensure that the Investment Policy of the Company and each Portfolio is pursued by the Manager.

Market Movements and Portfolio Performance

Individual Portfolio performance is substantially dependent on the performance of the securities (including derivative instruments) held within the Portfolio. The prices of these securities are influenced by many factors including the general health of regional and worldwide economies; interest rates; inflation; government policies; industry conditions; political and diplomatic events; tax laws; environmental laws; and by the demand from investors. The Manager strives to maximise the total return from Portfolios, but the investments held are influenced by market conditions and the Board acknowledges the external influences on the performance of each Portfolio. Further risks specifically applicable to the Balanced Risk Allocation Shares are set out on page 45.

The extreme market volatility experienced in February and March 2020 from the market reaction to Covid-19, and the continuing effects, exemplify the risks from external influences. All of the Company’s Portfolios, except for Managed Liquidity, were, and are still being, affected. There is an ongoing risk to global economies from the measures taken in response to Covid-19, many companies are at risk from the effects of the imposed lockdowns on their production and revenues and this has a consequential effect on the availability of investment income.

The performance of the Manager is carefully monitored by the Board and the continuation of the Manager’s mandates is reviewed each year. The Board has established guidelines to ensure that the investment policies of each class of Share are pursued by the Manager.

For a fuller discussion of the economic and market conditions facing the Company and the current and future performance of the different Portfolios of the Company, please see both the Chairman’s Statement on pages 6 to 8 and the portfolio managers’ reports starting on pages 11 to 31.

Risks Applicable to the Company’s Shares

Shares in the Company are designed to be held over the long-term and may not be suitable as short-term investments. There can be no guarantee that any appreciation in the value of the Company’s Shares will occur and investors may not get back the full value of their investments. Owing to the potential difference between the mid-market price of the Shares and the prices at which they are sold, there is no guarantee that their realisable value will reflect their mid-market price.

The market value of a Share, as well as being affected by its net asset value (NAV), is also influenced by investor demand, its dividend yield, where applicable, and prevailing interest rates, amongst other factors. As such, the market value of a Share can fluctuate and may not reflect its underlying NAV. Shares may therefore trade at discounts to their NAVs. However, the Board has adopted a discount control policy that applies to all Share classes and the Board and the Manager monitor the market rating of each Share class.

Past performance of the Company’s Shares is not necessarily indicative of future performance.

While it is the intention of the Directors to pay dividends to holders of the UK Equity, Global Equity Income and Managed Liquidity Shares, this will be affected by the returns achieved by the respective Portfolios and the dividend policy adopted by the Board. Accordingly, the amount of dividends paid to shareholders may fluctuate. Any change in the tax or accounting treatment of dividends received or other returns may also affect the level of dividend paid on the Shares in future years. The Directors have resolved, in the absence of unforeseen circumstances, to supplement revenue with capital profits in order to pay equity Portfolio dividends at target levels set by the Board (see pages 41 and 42).

Viability and Compulsory ***Conversion*** of a Class of Share

It is possible that through poor performance, market sentiment, or otherwise, lack of demand for one of the Company’s Share classes could result in the relevant Portfolio becoming too small to be viable. The Board monitors share conversions and Portfolio sizes and liaises with the Manager on the continued viability of each Share class. The Board has received assurances from the Manager that the size of the portfolios is not critical to the Manager being able to continue to offer its investment management services in respect of any of the Company’s four portfolio strategies.

The continued listing on the Official List of each class of Share is dependent on at least 25% of the Shares in that class being held in public hands. This means that if more than 75% of the Shares of any class were held by, inter alia, the Directors, persons connected with Directors or persons interested in 5% or more of the relevant Shares, the listing of that class of Share might be suspended or cancelled. The Listing Rules state that the FCA may allow a reasonable period of time for the Company to restore the appropriate percentage if this rule is breached, but in the event that the listing of any class of Shares were cancelled the Company would lose its investment trust status.

Accordingly, if at any time the Board considers that the listing of any class of Share on the Official List is likely to be cancelled and the loss of such listing would mean that the Company would no longer be able to qualify for approval as an investment trust under section 1158 of the Corporation Tax Act 2010, the Board may serve written notice on the holders of the relevant Shares requiring them to convert their Shares into another Share class.

Liability of a Portfolio for the Liabilities of Another Portfolio

The Directors intend that, in the absence of unforeseen circumstances, each Portfolio will effectively operate as if it were a stand-alone company. However, investors should be aware of the following factors:

•    As a matter of law, the Company is a single entity. Therefore, in the event that any of the Portfolios has insufficient funds or assets to meet all of its liabilities, on a winding-up or otherwise, such a shortfall would become a liability of the other Portfolios and would be payable out of the assets of the other Portfolios in such proportions as the Board may determine; and

•    The Companies Act 2006 prohibits the Directors from declaring dividends in circumstances where, following the distribution, the Company’s assets would represent less than one and a half times the aggregate of its liabilities or the amount of net assets would be less than the aggregate of its share capital and undistributable reserves. If the Company were to incur material liabilities in the future, a significant fall in the value of the Company’s assets as a whole may affect the Company’s ability to pay dividends on a particular class of Share, even though there are distributable profits attributable to the relevant Portfolio.

Gearing

Performance may be geared by use of the £40 million 364 day multicurrency revolving credit facility. The Company also has an uncommitted overdraft facility of up to 10% of net assets. There is no guarantee that these facilities will be renewed at maturity or on terms acceptable to the Company. If it were not possible to renew these facilities or replace them with one from another lender, the amounts owing by the Company would need to be funded by the sale of securities. This facility was increased to its current limit of £40 million in connection with the Company’s combination with Invesco Income Growth Trust plc in April 2021, having previously stood at £20 million.

The Balanced Risk Allocation Portfolio may also be geared (by up to 250%, according to the investment policy set out on page 40) by means of the derivative instruments in which it invests. This is discussed separately below, under the heading: Additional Risks Applicable to Balanced Risk Allocation Shares.

Gearing levels of the different Portfolios will change from time to time in accordance with the respective portfolio managers’ assessments of risk and reward. Where market exposure is geared, any reduction in the value of the geared Portfolio’s investments may lead to a correspondingly greater percentage reduction in its NAV (which is likely to affect Share prices adversely). Any reduction in the number of Shares in issue (for example, as a result of buy backs) will, in the absence of a corresponding reduction in borrowings, result in an increase in a Portfolio’s gearing.

Whilst the use of borrowings by the Company should enhance the total return on a particular class of Share where the return on the underlying securities is rising and exceeds the cost of borrowing, it will have the opposite effect where the underlying return is falling, further reducing the total return on that Share class. Similarly, the use of gearing by investment companies or funds in which the Company invests increases the volatility of those investments.

Hedging

The Company may use derivatives to hedge its exposure to currency or other risks and for the purpose of efficient portfolio management. There may be a correlation between price movements in the underlying securities, currency or index, on the one hand, and price movements in the investments, which are the subject of the hedge, on the other hand. In addition, an active market may not exist for a particular hedging derivative instrument at any particular time.

Regulatory and Tax Related

The Company is subject to various laws and regulations by virtue of its status as a public limited investment company registered under the Companies Act 2006, its status as an investment trust and its listing on the London Stock Exchange. Loss of investment trust status could lead to the Company being subject to UK Capital Gains Tax on the sale of its investments. A serious breach of other regulatory rules could lead to suspension from the London Stock Exchange, a fine or a qualified Audit Report. Other control failures, either by the Manager or any other of the Company’s service providers, could result in operational or reputational problems, erroneous disclosures or loss of assets through fraud, as well as breaches of regulations.

The Manager reviews the level of compliance with the Corporation Tax Act 2010 and other financial regulatory requirements on a daily basis. All transactions, income and expenditure are reported to the Board. The Board regularly considers the risks to which the Company is exposed, the measures in place to control them and the potential for other risks to arise. The Board ensures that satisfactory assurances are received from service providers. The depositary and the Manager’s compliance and internal audit officers report regularly to the Company’s Audit Committee.

The risks and risk management policies and procedures as they relate to the financial assets and liabilities of the Company are also detailed in note 16 to the financial statements.

Additional Risks Applicable to Balanced Risk Allocation Shares

The use of financial derivative instruments forms part of the investment policy and strategy of the Balanced Risk Allocation Portfolio. The Portfolio’s ability to use these instruments may be limited by market conditions, regulatory limits and tax considerations. The absence of a liquid market for any particular instrument at any particular time may inhibit the ability of the Manager to liquidate a financial derivative instrument at an advantageous price. However, the Manager actively seeks the most liquid means of obtaining the required exposures. The financial derivative instruments used for the strategy are geared instruments and the aggregate notional exposure will usually exceed the net asset value of the Portfolio. Whilst this could result in greater fluctuations in the net asset value, and consequently the share price, the use of leverage is normally necessary to achieve the target volatility required to meet the return objective. The degree of leverage inherent in futures trading potentially means that a relatively small price movement in a futures contract may result in an immediate and substantial loss and it would be necessary to increase the collateral held at the clearing broker to cover such loss. This is mitigated by the Company not using financial derivative instruments to create net short positions in any asset class combined with holding cash balances sufficient to meet collateral requirements.

Reliance on Third Party Service Providers

The Company has no employees and the Directors have all been appointed on a non-executive basis. The Company is therefore reliant upon the performance of third party service providers for its executive function. In particular, the Manager performs services that are integral to the operation of the Company and the custodian appointed by the depositary holds assets on its behalf. Failure by any service provider to carry out its obligations to the Company in accordance with the terms of its appointment could have a materially detrimental impact on the operation of the Company and could affect the ability of the Company to successfully pursue its Investment Policy.

The Manager may be exposed to reputational risks. In particular, the Manager may be exposed to the risk that litigation, misconduct, operational failures, negative publicity and press speculation, whether or not it is valid, will harm its reputation. Any damage to the reputation of the Manager could result in potential counterparties and third parties being unwilling to deal with the Manager and by extension the Company. This could have an adverse impact on the ability of the Company to successfully pursue its Investment Policy.

The Directors continue to monitor the Covid-19 situation closely, together with the Manager and third-party service providers. A range of actions have been implemented to ensure that the Company and its service providers are able to continue to operate as normal, even in the prolonged disruption being experienced. The Manager’s business continuity plans are reviewed on an ongoing basis and the Directors are satisfied that the Manager has in place robust plans and infrastructure to minimise the impact on its operations so that the Company can continue to trade, meet regulatory obligations, report and meet shareholder requirements.

The Manager has mandated work from home arrangements and split team working will be implemented when business premises reopen. Any meetings are being held virtually or via conference calls.

The Company’s other service providers have similar working arrangements in place.

Viability Statement

The Company is an investment company which operates as a ***collective*** investment vehicle, designed and managed for long term investment. The Board considers long term for this purpose to be at least three years and so has assessed the Company’s viability over this period. However, the life of the Company is not intended to be limited to that or any other period.

In assessing the viability of the Company the Board considered the principal risks to which it is exposed, as set out on pages 44 to 46, together with mitigating factors. The risks of failure to meet the Company’s and the Portfolios’ investment objectives, contributory market and investment risks and the challenges of lack of scale have been considered to be of particular importance. The Board also took into account the capabilities of the Manager and the varying market conditions already experienced by the Company since its launch in 2006, including from Covid-19 in the past year. Despite the disruption to markets from Covid-19 and the impact on global economies, the Directors remain confident that the Company’s investment strategies will continue to serve shareholders well over the longer term. On the question of scale, this has been mitigated by the business combination of Invesco Income Growth Trust plc into the UK Equity Portfolio and the Board has also concluded that if an individual Portfolio became too small it should not cause the Company itself to be unviable.

In terms of financial risks to viability, materially all of the investments comprising the portfolios are readily realisable. The equity portfolios also produce a stream of dividend income, which may fluctuate but which the Board expects to continue. The Company has no long term liabilities and the total value of the portfolios is a multiple of the value of the Company’s short term liabilities and annual operating costs. In arriving at this assessment, the Board considered stressed scenario-testing for both income and loan covenants; borrowing structure; level of gearing; and the liquidity of the portfolios. Consequently, there appears little to no prospect of the Company not being able to meet its financial obligations as they fall due in the next three years.

Based on the above, the Board has a reasonable expectation that the Company will be able to continue in operation and meet its liabilities as they fall due over the three-year period of their assessment.

Audit Committee Report

The extended audit committee report required by the UK Corporate Governance Code is set out on pages 59 and 60. There are no areas of concern in relation to the financial statements to bring to the attention of shareholders.

Board’s Duty to Promote the Success of the Company (s.172)

As set out in the Directors’ Report on page 51 the Directors have a statutory duty to promote the success of the Company, whilst also having regard to certain broader matters, including the need to engage with employees, suppliers, customers and others, and to have regard to their interests (s172 Companies Act 2006). However, the Company has no employees and no customers in the traditional sense.

In fulfilling these duties, and in accordance with the Company’s nature as an investment trust, the Board’s principal concern has been, and continues to be, the interests of the Company’s shareholders taken as a whole. Notwithstanding this, the Board has a responsible governance culture and also has due regard for broader matters so far as they apply. In particular, the Board engages with the Manager at every Board meeting and reviews the Company’s relationships with other service providers, such as the registrar, depositary and custodian, at least annually. During the year the most significant engagement was with the Manager and, in particular the individual portfolio managers. Matters engaged upon included discussions in connection with the successful business combination of Invesco Income Growth Trust plc into the UK Equity Portfolio, the management of the enlarged UK Equity Portfolio and the appointment of Ciaran Mallon as joint manager, related investment management fee reduction and removal of the performance fee for both the UK Equity and Global Equity Income portfolios. Furthermore, Derek Steeden was appointed as the designated portfolio manager for the Managed Liquidity Portfolio. As would be expected, there was also engagement with service providers generally in connection with the extended lockdown conditions due to Covid-19, all of which were able to report business as usual capability.

The Board is committed to maintaining high standards of Corporate Governance. The Corporate Governance Statement required by the UKLA Listing Rules is set out on page 58.

Environment, Social and Governance considerations are dealt with in a separate section of this Strategic Report on pages 34 to 38.

Shareholder relations are given high priority by the Board and the Manager. The prime means by which the Company communicates with shareholders are the annual and half-yearly financial reports, which aim to provide shareholders with a full understanding of the Company’s activities and its results. This information is supplemented by daily publication of the NAVs of the Company’s shares via the London Stock Exchange, ad hoc regulatory announcements, monthly factsheets and other information on the Manager’s website, including pre-investment information, key information document (KID), shareholder circulars, Portfolio disclosures, ***conversion*** forms and instructions, Stock Exchange announcements, schedule of matters reserved for the Board, terms of reference of Board Committees, Directors’ letters of appointment, the Company’s share price and proxy voting results.

The Chairman and Directors welcome contact with shareholders, although this has been difficult recently with the Covid-19 situation. There is a regular dialogue between the Manager and individual major shareholders to discuss aspects of investment performance, governance and strategy and to listen to shareholder views in order to help develop a balanced understanding of their issues and concerns. The Company’s corporate broker, Investec Bank plc, is also consulted. General presentations to institutional shareholders and analysts take place throughout the year. All meetings between the Manager and institutional shareholders are reported to the Board.

It is the intention of the Board that the annual financial report and the notice of the AGM be issued to shareholders so as to provide at least twenty working days’ notice of the AGM. Shareholders wishing to lodge questions in advance of the AGM are invited to do so, either on the reverse of the proxy card or in writing to the Company Secretary at the address given on page 109.

There is a clear channel of communication between the Board and the Company’s shareholders via the Company Secretary. The Company Secretary has no express authority to respond to enquiries addressed to the Board and all such communication, other than junk mail, is redirected to the Chairman or Senior Independent Director as appropriate.

Shareholders normally have the opportunity to communicate directly with the Directors at the AGM. It is hoped that by the date of this year’s AGM on 5 October 2021 restrictions due to Covid-19 will have eased and, if so, shareholders are encouraged to attend the AGM. However, should this not be the case the AGM may have to be held as a closed meeting again. In this eventuality it is recommended that shareholders exercise their votes by means of registering them with the Company’s registrar ahead of the meeting, online or by completing paper proxy forms, and appoint the Chairman of the meeting as their proxy. Questions, on the business of the meeting or otherwise, may be addressed to the Company Secretary, by email [*toinvestmenttrusts@invesco.comor*](mailto:toinvestmenttrusts@invesco.comor), by letter, to 43-45 Portman Square, London W1H 6LY.

Board Diversity

The Company’s policy on diversity is set out on page 53. At the year end the Board comprised four male and two female non-executive Directors resulting in female representation of 33%. This figure increased to 40% from 1 June 2021. Summary biographical details of all the current Directors are set out on page 50. The Company has no employees.

Environment, Social and Governance (ESG) Matters

As an investment company with no employees, property or activities outside investment, environmental policy has limited application. A greenhouse gas emissions statement is included in the Directors’ Report on page 54. In relation to the portfolios, the Company has delegated the management of the Company’s investments to the Manager, who has an ESG Guiding Framework which sets out a number of principles that are intended to be considered in the context of its responsibility to manage investments in the financial interests of shareholders.

The Manager is committed to being a responsible investor and applies, and is a signatory to, the United Nations Principles for Responsible Investment, which demonstrates its extensive efforts in terms of ESG integration, active ownership, investor collaboration and transparency. The Manager also achieved a global ‘A+’ rating for its overall approach to responsible investment for the fourth consecutive year since 2018 as well as achieving an ‘A’ or ‘A+’ across all categories in the 2020 assessment period from PRI for Strategy and Governance. In addition, the Manager is an active member of the UK Sustainable Investment and Finance Association as well as a supporter of the Task Force for Climate Related Financial Disclosure (TCFD) since 2019. The Manager has published its inaugural Climate Change report in line with the TCFD in July 2020. Although TCFD does not apply directly for the Company at present, the Board confirms that it will comply with all reporting regulations as they are implemented.

The Manager has voluntarily complied with the Sustainable Finance Disclosure Regulation (SFDR) which came into effect within the European Union on 10 March 2021 and introduces a number of sustainability-related disclosure requirements for financial market participants.

The Manager is also a signatory to the FRC Stewardship Code 2020, which seeks to improve the quality of engagement between institutional investors and companies to help improve long-term returns to shareholders and the efficient exercise of governance responsibilities.

The equity investment teams incorporate ESG considerations in their investment processes as part of the evaluation of new opportunities, with identified ESG concerns feeding into the final investment decision and assessment of relative value. The portfolio managers make their own conclusions about the ESG characteristics of each investment held and about the overall ESG characteristics of the portfolio, although third party ESG ratings may inform their view. Additionally, the Manager’s ESG team provides formalised ESG portfolio monitoring. This is a rigorous semi-annual process where the portfolios are reviewed from an ESG perspective.

Regarding stewardship, the Board considers that the Company has a responsibility as a shareholder towards ensuring that high standards of corporate governance are maintained in the companies in which it invests. To achieve this, the Board does not seek to intervene in daily management decisions, but aims to support high standards of governance and, where necessary, will take the initiative to ensure those standards are met. The principal means of putting shareholder responsibility into practice is through the exercise of voting rights. The Company’s voting rights are exercised on an informed and independent basis. The Company’s stewardship functions have been delegated to the Manager, which has adopted a clear and considered policy towards its responsibility as a shareholder on behalf of the Company. As part of this policy, the Manager takes steps to satisfy itself about the extent to which the companies in which it invests look after shareholders’ value and comply with local recommendations and practices, such as the UK Corporate Governance Code. A copy of the current Manager’s Stewardship Policy, which is updated annually, can be found at[*http://www.invesco.co.uk/investmenttrusts*](http://www.invesco.co.uk/investmenttrusts). Further details are shown in the ESG Statement from the Managers on pages 34 to 38.

As an investment vehicle the Company does not provide goods or services in the normal course of business, and does not have customers. Accordingly, the Directors consider that the Company is not within the scope of the Modern Slavery Act 2015.

This Strategic Report was approved by the Board on 5 August 2021.

Invesco Asset Management Limited

Company Secretary

Statement of Directors’ Responsibilities

IN RESPECT OF THE PREPARATION OF THE ANNUAL FINANCIAL REPORT.

The Directors are responsible for preparing the annual financial report in accordance with applicable law and regulations.

Company law requires the Directors to prepare financial statements for each financial year. Under the law the Directors have elected to prepare financial statements in accordance with UK Accounting Standards, including FRS 102 ‘The Financial Reporting Standard applicable in the UK and Republic of Ireland.’ Under company law, the Directors must not approve the financial statements unless they are satisfied that they give a true and fair view of the state of affairs of the Company and of the profit or loss of the Company for that period.

In preparing these financial statements, the Directors are required to:

•    select suitable accounting policies and then apply them consistently;

•    make judgements and estimates that are reasonable and prudent;

•    state whether applicable accounting standards have been followed, subject to any material departures disclosed and explained in the financial statements; and

•    prepare the financial statements on the going concern basis unless it is inappropriate to presume that the Company will continue in business.

The Directors are responsible for keeping adequate accounting records that are sufficient to show and explain the Company’s transactions and disclose with reasonable accuracy at any time the financial position of the Company and which enable them to ensure that the financial statements comply with the Companies Act 2006. They have general responsibility for taking such steps as are reasonably open to them to safeguard the assets of the Company and to prevent and detect fraud and other irregularities.

Under applicable law and regulations, the Directors are also responsible for preparing a Strategic Report, a Directors’ Report, which includes a Corporate Governance Statement, and a Directors’ Remuneration Report that comply with that law and those regulations.

The Directors confirm that:

•    in so far as they are aware, there is no relevant audit information of which the Company’s Auditor is unaware; and

•    each Director has taken all the steps that they ought to have taken as a Director in order to make themselves aware of any relevant audit information and to establish that the Company’s Auditor is aware of that information.

The Directors of the Company each confirm to the best of their knowledge that:

•    the financial statements, prepared in accordance with the applicable set of accounting standards, give a true and fair view of the assets, liabilities, financial position, net return and cash flows of the Company; and

•    this annual financial report includes a fair review of the development and performance of the business and the position of the Company together with a description of the principal risks and uncertainties that it faces.

The Directors consider that this annual financial report, taken as a whole, is fair, balanced and understandable and provides the information necessary for shareholders to assess the Company’s position and performance, business model and strategy.

Signed on behalf of the Board of Directors

Victoria Muir

Chairman

5 August 2021

Income Statement

FOR THE YEAR ENDED 31 MAY

The total column of this statement represents the Company’s profit and loss account, prepared in accordance with UK Accounting Standards. The return after taxation for the financial year is the total comprehensive income and therefore no additional statement of other comprehensive income is presented. The supplementary revenue and capital columns are presented for information purposes in accordance with the Statement of Recommended Practice issued by the Association of Investment Companies. All items in the above statement derive from continuing operations of the Company. On 23 April 2021 the Company acquired the assets of Invesco Income Growth Trust plc following a scheme of reconstruction. No other operations were acquired or discontinued in the year. Income Statements for the different Share classes are shown on pages 15, 22, 28 and 32 for the UK Equity, Global Equity Income, Balanced Risk Allocation and Managed Liquidity Share Portfolios respectively.

Statement of Changes in Equity

FOR THE YEAR ENDED 31 MAY

Balance Sheet

AS AT 31 MAY 2021

The financial statements were approved and authorised for issue by the Board of Directors on 5 August 2021.

Signed on behalf of the Board of Directors

Victoria Muir

Chairman

Balance Sheet

AS AT 31 MAY 2020

Cash Flow Statement

FOR THE YEAR ENDED 31 MAY

(1) For definition of business combination refer to Glossary of Terms and Alternative Performance Measures on page 110.

The accompanying accounting policies and notes are an integral part of these financial statements.­

Notes to the Financial Statements

1.         Accounting Policies

Accounting policies describe the Company’s approach to recognising and measuring transactions during the year and the position of the Company at the year end.

The principal accounting policies are set out below:

(a)        Basis of Preparation

            (i)         Accounting Standards Applied

The financial statements have been prepared in accordance with applicable United Kingdom Accounting Standards, including FRS 102 ‘the Financial Reporting Standard applicable in the UK and Republic of Ireland’, and applicable law (UK Generally Accepted Accounting Practice (UK GAAP)) and with the Statement of Recommended Practice Financial Statements of Investment Trust Companies and Venture Capital Trusts, issued by the Association of Investment Companies (AIC) in October 2019. The financial statements are issued on a going concern basis as disclosed on page 53.

The revised SORP issued in April 2021 is applicable for accounting periods beginning on or after 1 January 2021. The SORP has no substantive changes but has been updated to reflect changes to IFRS standards and regulatory requirements. No accounting policies or disclosures have changed as a result of the early adoption of the revised SORP.

The accounting policies applied to these financial statements are consistent with those applied for the preceding year.

            (ii)         Definitions used in the financial statements

‘Portfolio’ the UK Equity Share Portfolio, the Global Equity Income Share Portfolio, the Balanced Risk Allocation Share Portfolio and/or the Managed Liquidity Share Portfolio (as the case may be). Each comprises, or may include, an investment portfolio, derivative instruments, cash, loans, debtors and other creditors, which together make up the net assets as shown in the balance sheet.

‘Share’     UK Equity Share, Global Equity Income Share, Balanced Risk Allocation Share, Managed Liquidity Share and/or Deferred Share (as the case may be).

The UK Equity, Global Equity Income, Balanced Risk Allocation and Managed Liquidity Share Portfolios’ income statements and summaries of net assets (shown on pages 15, 22, 28 and 32) do not represent statutory accounts, are not required under UK Generally Accepted Accounting Practice and the auditor does not express an opinion on each individual portfolio. These have been disclosed to assist shareholders’ understanding of the assets and liabilities, and income and expenses of the different Share classes.

In order to better reflect the activities of an investment trust company and in accordance with guidance issued by the AIC, supplementary information which analyses the income statement between items of a revenue and capital nature has been presented alongside the income statement.

            (iii)        Functional and presentational currency

The Company’s investments are made in several currencies, however, the financial statements are presented in sterling, which is the Company’s functional currency. In arriving at this conclusion, the Directors considered that the Company’s shares are listed and traded on the London Stock Exchange, the shareholder base is predominantly in the United Kingdom and the Company pays dividends and expenses in sterling.

            (iv)        Transactions and balances

Transactions in foreign currency, whether of a revenue or capital nature, are translated to sterling at the rates of exchange ruling on the dates of such transactions. Foreign currency assets and liabilities are translated to sterling at the rates of exchange ruling at the balance sheet date. Any gains or losses, whether realised or unrealised, are taken to the capital reserve or to the revenue account, depending on whether the gain or loss is of a capital or revenue nature. All gains and losses are recognised in the income statement.

            (v)        Significant Accounting Estimates and Judgements

The preparation of the financial statements may require the Directors to make estimations where uncertainty exists. It also requires the Directors to make judgements, estimates and assumptions, in the process of applying the accounting policies. There have been no significant judgements, estimates or assumptions for the current or preceding year.

            (vi)        Issue of Shares Pursuant to a Scheme of Reconstruction of Invesco Income Growth Trust plc (“business combination”)

During the year, the UK Equity Share Portfolio issued new ordinary shares to shareholders of Invesco Income Growth plc (‘IIGT’) in respect of assets received following the business combination. This transaction has been accounted for as a business combination under Section 19 of FRS102 on the basis of the assets and shareholder base added to the Company. The assets acquired comprised of investments, accrued income and cash. These assets have been recognised in share capital and share premium, as disclosed in note 13(f) of the financial statements. Costs in respect of the shares issued have been recognised in share premium, whereas other professional costs in relation to the business combination have been recognised  as transaction costs included within investment gains and losses.

(b)        Financial Instruments

The Company has chosen to apply the provisions of Sections 11 and 12 of FRS 102 in full in respect of the financial instruments, which is explained below.

            (i)         Recognition of Financial Assets and Financial Liabilities

The Company recognises financial assets and financial liabilities when the Company becomes a party to the contractual provisions of the instrument. The Company will offset financial assets and financial liabilities if the Company has a legally enforceable right to set off the recognised amounts and interests and intends to settle on a net basis.

            (ii)         Derecognition of Financial Assets

The Company derecognises a financial asset when the contractual rights to the cash flows from the asset expire or it transfers the right to receive the contractual cash flows on the financial asset in a transaction in which substantially all the risks and rewards of ownership of the financial asset are transferred. Any interest in the transferred financial asset that is created or retained by the Company is recognised as an asset.

            (iii)        Derecognition of Financial Liabilities

The Company derecognises financial liabilities when its obligations are discharged, cancelled or expire.

            (iv)        Trade Date Accounting

Purchases and sales of financial assets are recognised on trade date, being the date on which the Company commits to purchase or sell the assets.

            (v)        Classification and measurement of financial assets and financial liabilities

Financial assets

The Company’s investments, including financial derivative instruments, are classified as held at fair value through profit or loss.

Financial assets held at fair value through profit or loss are initially recognised at fair value, which is taken to be their cost, with transaction costs expensed in the income statement, and are subsequently valued at fair value.

Fair value for investments, including financial derivative instruments, that are actively traded in organised financial markets is determined by reference to stock exchange quoted bid prices at the balance sheet date. For investments that are not actively traded or where active stock exchange quoted bid prices are not available, fair value is determined by reference to a variety of valuation techniques including broker quotes and price modelling. Where there is no active market, unlisted/illiquid investments are valued by the Directors at fair value with regard to the International Private Equity and Venture Capital Valuation Guidelines and on recommendations from Invesco’s Pricing Committee, both of which use valuation techniques such as earnings multiples, recent arm’s length transactions and net assets.

Financial liabilities

Financial liabilities, excluding financial derivative instruments but including borrowings, are initially measured at fair value, net of transaction costs and are subsequently measured at amortised cost using the effective interest method.

(c)        Derivatives and hedging

Derivative instruments are valued at fair value in the balance sheet. Derivative instruments may be capital or revenue in nature and, accordingly, changes in their fair value are recognised in revenue or capital in the income statement as appropriate.

Forward currency contracts entered into for hedging purposes are valued at the appropriate forward exchange rate ruling at the balance sheet date. Profits or losses on the closure or revaluation of positions are included in capital reserves.

Futures contracts may be entered into for hedging purposes and any profits and losses on the closure or revaluation of positions are included in capital reserves. Where futures contracts are used for investment exposure any income element arising on bond futures is recognised as a gain on derivative instruments in the income statement and shown in revenue.

(d)        Cash and cash equivalents

Cash and cash equivalents may comprise cash (including short term deposits which are readily convertible to a known amount of cash and are subject to an insignificant risk of change in value) as well as cash equivalents, including money market funds. Investments are regarded as cash equivalents if they meet all of the following criteria: highly liquid investments held in the Company’s base currency that are readily convertible to a known amount of cash, are subject to an insignificant risk of change in value, have a maturity of less than three months at date of origination and provide a return no greater than the rate of a three-month high quality government bond. For the Balanced Risk Allocation and Managed Liquidity Portfolios, cash and cash equivalents do not include investments in Invesco Liquidity Funds plc – Sterling as this forms part of those Portfolio’s fixed assets.

(e)        Income

Dividend income from investments is recognised when the shareholders’ right to receive payment has been established, normally the ex-dividend date. UK dividends are stated net of related tax credits. Interest income arising from cash is recognised on an accruals basis and underwriting commission is recognised as earned. Special dividends are taken to revenue unless they arise from a return of capital, when they are allocated to capital in the income statement. Income from fixed income securities is recognised in the income statement using the effective interest method.

(f)         Expenses and finance costs

All expenses are accounted for on an accruals basis. Expenses are charged to the income statement and shown in revenue except where expenses are presented as capital items when a connection with the maintenance or enhancement of the value of the investments held can be demonstrated and thus management fees and finance costs are charged to revenue and capital to reflect the Directors’ expected long-term view of the nature of the investment returns of each Portfolio.

Expenses charged to the Company in relation to a specific Portfolio are charged directly to that Portfolio.

Expenses charged to the Company that are common to more than one Portfolio are allocated between those Portfolios in the same proportions as the net assets of each Portfolio at the latest ***conversion*** date.

Finance costs are accounted for on an accruals basis using the effective interest rate method.

The management fees and finance costs are charged in accordance with the Board’s expected split of long-term returns, in the form of capital gains and income, to the applicable Portfolio as follows:

(g)        Dividends

Dividends are accrued in the financial statements when there is an obligation to pay the dividends at the balance sheet date.

(h)        Taxation

Tax expense represents the sum of tax currently payable and deferred tax. Any tax payable is based on taxable profit for the period. Taxable profit differs from profit before tax as reported in the income statement because it excludes items of income or expenses that are taxable or deductible in other years and it further excludes items that are never taxable or deductible. The Company’s liability for current tax is calculated using tax rates that have been enacted or substantively enacted by the balance sheet date.

For the Company, any allocation of tax relief to capital is based on the marginal basis, such that tax allowable capital expenses are offset against taxable income. Where individual Portfolios have extra tax capacity arising from unused tax allowable expenses which can be used by a different Portfolio, this extra tax capacity is transferred between the Portfolios at a valuation of 1% of the amount transferred.

Deferred taxation is recognised in respect of all timing differences that have originated but not reversed at the balance sheet date where transactions or events that result in an obligation to pay more tax or a right to pay less tax in the future have occurred. Timing differences are differences between the Company’s taxable profits and its results as stated in the financial statements. Deferred taxation assets are recognised where, in the opinion of the Directors, it is more likely than not that these amounts will be realised in future periods.

A deferred tax asset has not been recognised in respect of surplus management expenses as the Company is unlikely to have sufficient future taxable revenue to offset against these.

Investment trusts which have approval under the appropriate tax regulations are not liable for taxation on capital gains.

2.         Income

This note shows the income generated from the portfolios (investment assets) of the Company and income received from any other source.

(1)   Includes a £34,000 (1.40p per share) refund of unpaid management fees in respect of historic overcharges. As reported in the 2017 half year financial report, it was agreed that the refund would be paid directly to affected shareholders and any unpaid amounts would be returned to the Company.

2020

Income from investments:

There were £539,000 of special dividends in respect of the UK Equity Portfolio recognised in capital during the year (2020: £48,000 in respect of the UK Equity Portfolio and £32,000 in respect of the Global Equity Income Portfolio).

3.         Investment management and performance fees

This note shows the fees paid to the Manager. These are made up of the individual Portfolio investment management fees calculated quarterly on the basis of their net asset values and the performance fees of the UK Equity and Global Equity Income Portfolios.

2020

Details of the investment management agreement are given on page 54 in the Directors' Report.

Pursuant to the issue of shares pursuant to the Scheme of Reconstruction of Invesco Income Growth Trust plc (“the transaction”), an improved fee structure was proposed for the UK Equity Share Portfolio and Global Equity Income Share Portfolio. The management fee payable by the Company in respect of these two share portfolios will be reduced to 0.55 per cent. per annum on the net assets of up to £100 million, and 0.50 per cent. per annum on the net assets of over £100 million.

As a result of the business combination the Manager agreed to remove the performance fee arrangements which were in place for both the UK Equity and Global Equity Income Share Portfolios. Furthermore, the historical performance fee accrued on the UK Equity Share Portfolio of £531,000 was also waived by the Manager as a benefit towards the costs of the transaction and written-back to capital in the Income Statement. No performance fee was earned or paid during the year (2020: none).

4.         Other Expenses

The other expenses of the Company, including those paid to Directors and the auditor, are presented below; those paid to the Directors and the auditor are separately identified.

(i)  The Director’s Remuneration Report provides information on Directors’ fees. Included within other administrative expenses is £12,000 (2020: £12,000) of employer’s national insurance payable on Directors’ remuneration.

(ii) As at 31 May 2021, the amounts outstanding on Directors’ fees and employer’s national insurance was £26,000 (2020: £22,000).

(iii) The Auditor’s fees shown include out of pocket expenses, but exclude VAT, which is included in other administrative expenses. Grant Thornton LLP provided non-audit services related to work on the business combination with Invesco Income Growth Trust plc, which amounted to £23,000 (2020: none). This amount is recognised in investment gains and losses as part of professional fees in respect of the business combination.

(iv)   Includes fees for custody, depositary, broker, registrar, printing, postage, listing costs and other administrative expenses.

5.         Finance Costs

Finance costs arise on any borrowing the Company has utilised in the year. The Company has a committed £40 million revolving credit facility (see note 12(b) for further details).

2020

6.         Tax

As an investment trust, the Company pays no tax on capital gains. However, the Company suffers tax on certain overseas dividends that is irrecoverable and this note shows details of the tax charge. In addition, this note clarifies the basis for the Company having no deferred tax asset or liability.

(a)        Tax charge

The accounting policy for taxation is disclosed in note 1(h).

(b)        Reconciliation of tax charge

2020

Given the Company’s status as an investment trust, and the intention to continue meeting the conditions required to retain such status for the foreseeable future, the Company has not provided any UK corporation tax on any realised or unrealised capital gains or losses arising on investments.

(c)        Factors that may affect future tax charges

The Company has excess management expenses and loan relationship deficits of £15,258,000 (2020: £14,735,000) that are available to offset future taxable revenue. A deferred tax asset of £3,814,000 (2020: £2,800,000), measured at the substantively enacted corporation tax rate of 25% (2020: 19%) has not been recognised in respect of these expenses since the Directors believe that there will be no taxable profits in the future against which the deferred tax assets can be offset.

7.         Return per Ordinary Share

Return per share is the amount of profit (or loss) generated for each share class in the financial year divided by the weighted average number of the shares in issue. The basic and diluted returns per share are identical as the ordinary shares for each of the of portfolio are not dilutive.

Revenue, capital and total return per ordinary share is based on each of the returns after taxation shown by the income statement for the applicable Share class and on the following numbers of Shares being the weighted average number of Shares in issue throughout the year for each Share class:

8.         Dividends

Dividends are distributions of Portfolio returns to shareholders. These are determined by the Directors and paid four times a year.

Dividends paid for each applicable Share class, which represent distributions for the purpose of s1159 of the Corporation Tax Act 2010, follows:

No dividends have been paid to Balanced Risk Allocation shareholders during the year (2020: nil).

The Company’s dividend policy permits the payment of dividends by the UK Equity, Global Equity Income and Managed Liquidity Portfolios from capital. An analysis of dividends paid in the year from revenue and capital follows.

9.         Investments held at fair value

The portfolio is made up of investments which are listed, i.e. traded on a regulated stock exchange, and a small proportion of investments which are valued by the Directors as they are unlisted or not regularly traded. Gains and losses are either:

•      realised, usually arising when investments are sold; or

•      unrealised, being the difference from cost on the investments held at the year end.

(a)        Analysis of investments:

(i)  Includes the Invesco Liquidity Funds plc – Sterling, money market fund positions held by the Balanced Risk Allocation Portfolio of £2,359,000 (2020: £2,330,000) and Managed Liquidity Portfolio of £140,000 (2020: £40,000).

(b)        Analysis of investment gains

The Company received £127,485,000 (2020: £109,974,000) from investments sold in the year. The book cost of these investments when they were purchased was £125,833,000 (2020: £105,970,000) realising a profit of £1,652,000 (2020: £4,004,000). These investments have been revalued over time and until they were sold any unrealised profits/losses were included in the fair value of the investments.

(c)        Transaction costs

Transaction costs were £257,000 (2020: £158,000) on purchases and £64,000 (2020: £49,000) on sales and are included in investment gains and losses. Transaction costs in relation to investments acquired from the business combination are shown in 9(d) below.

(d)        Purchases at cost

During the year £118,144,000 of investments were acquired in respect of the business combination. Stamp duty of £475,000 plus professional costs of £512,000 less cash benefits of £534,000 were incurred and recognised in investment gains and losses.

10.        Derivative instruments

Derivative instruments are contracts whose price is derived from the value of other securities or indices. The Balanced Risk Allocation Portfolio uses futures, which represent agreements to buy or sell commodities or financial instruments at a pre-determined price in the future.

Excluding forward currency contracts used for currency hedging purposes.

The derivative assets/liabilities shown in the balance sheet are the unrealised gains/losses arising from the revaluation to fair value of futures contracts held in the Balanced Risk Allocation Share Portfolio, as shown on page 26.

11.        Debtors

Debtors are amounts due to the Company, such as monies due from brokers for investments sold and income which has been earned (accrued) but not yet received.

12a. Other creditors

Creditors are amounts owed by the Company and include amounts due to brokers for the purchase of investments and amounts owed to suppliers, such as the Manager and auditor.

(1) Performance fee accrued of £531,000 on the UK Equity Share Portfolio was waived by the Manager and written-back as a benefit towards the costs of the business combination with Invesco Income Growth Trust plc.

12b. Bank facility and overdraft

At the year end the Company had a £40 million (2020: £20 million) committed 364 day multicurrency revolving credit facility (‘bank facility’), which is due for renewal on 26 April 2022. The facility renewal was originally scheduled for 14 May 2021, but was brought forward to 27 April 2021 as part of the business combination of the UK Equity Share Portfolio with Invesco Income Growth Trust plc. In addition, an overdraft facility for the purpose of short term settlement is also available. Both facilities are with The Bank of New York Mellon. The interest payable on the credit facility is based on the Adjusted Reference Rate (principally SONIA, SOFR and €STR respectively in respect of loans drawn in GBP, USD and Euro) plus a margin for amounts drawn. In addition, there is a 0.15% commitment fee on the facility amount not utilised.

Under the bank facility’s covenants, the Company’s total indebtedness must not exceed 30% of total assets (excluding any Balanced Risk Allocation Portfolio assets) and the total assets must not be less than £120 million (2020: £60 million). The Company has complied with the loan facility covenants throughout the year.

13.   Share Capital and Reserves

Share capital represents the total number of shares in issue, including treasury shares.

All shares have a nominal value of 1 pence.

(a)   Movements in Share Capital during the Year

Issued and fully paid:

The total cost of share buy backs was £28,704,000 (2020: £9,986,000). As part of the ***conversion*** process 457,600 (2020: 614,700) deferred shares of 1p each were created and subsequently cancelled during the year. No deferred shares were in issue at the start or end of the year.

No ordinary shares were issued from treasury during the year (2020: nil).

(b)   Movements in Share Capital after the Year End

Since the year end, UK Equity and Managed Liquidity Portfolios bought back 4,860,000 and 63,000 shares respectively to be held in treasury.

(c)   Voting Rights

Rights attaching to the Shares are described in the Directors’ Report on page 54.

(d)   Deferred Shares

The Deferred shares do not carry any rights to participate in the Company’s profits, do not entitle the holder to any repayment of capital on a return of assets (except for the sum of 1p) and do not carry any right to receive notice of or attend or vote at any general meeting of the Company. Any Deferred shares that arise as a result of conversions of Shares are cancelled in the same reporting period.

(e)   Future Convertibility of the Shares

Shares are convertible at the option of the holder into any other class of Share. Further ***conversion*** details are given on page 2 and in the Shareholder Information on page 108.

(f)    Issue of Shares pursuant to a business combination with Invesco Income Growth Trust plc

On 26 April 2021, 66,628,879 ordinary shares of par value of 1p per share in the UK Equity Share Portfolio were issued to the shareholders of Invesco Income Growth Trust plc, in lieu of their investment in that company. The net assets acquired for these shares was as follows:

14.   Reserves

This note explains the different reserves attributable to shareholders. The aggregate of the reserves and share capital (see previous note) make up total shareholders’ funds.

The share premium comprises the net proceeds received by the Company following the issue of new shares, after deduction of the nominal amount of 1 penny and any applicable costs. The special reserve arose from the cancellation of the share premium account, in January 2007, and is available as distributable profits to be used for all purposes under the Companies Act 2006, including buy back of shares and payment of dividends. The capital redemption reserve arises from the nominal value of shares bought back and cancelled; this and the share premium are non-distributable.

Capital investment gains and losses are shown in note 9(b), and form part of the capital reserve. The revenue reserve shows the net revenue retained after payments of any dividends. The capital and revenue reserves are distributable.

15.   Net Asset Value per Share

The total net assets (total assets less total liabilities) attributable to a share class are often termed shareholders’ funds and are converted into net asset value per share by dividing by the number of shares in issue.

The net asset value per Share and the net assets attributable at the year end were as follows:

Net asset value per Share is based on net assets at the year end and on the number of Shares in issue (excluding Treasury Shares) for each Share class at the year end as shown in note 13(a).

16.   Financial Instruments

This note summarises the risks deriving from the financial instruments that comprise the Company’s assets and liabilities.

The Company’s financial instruments comprise the following:

•    investments in equities, fixed interest securities and liquidity funds which are held in accordance with the Company’s investment objectives and the investment objectives of the four Portfolios;

•    short-term debtors, creditors and cash arising directly from operations;

•    short-term forward foreign currency and futures contracts; and

•    bank facility and short-term overdrafts, used to finance operations.

The financial instruments held in each of the four investment portfolios are shown on pages 15, 22, 28 and 32.

The accounting policies in note 1 include criteria for the recognition and the basis of measurement applied for these financial instruments. Note 1 also includes the basis on which income and expenses arising from financial assets and liabilities are recognised and measured.

The Company’s principal risks and uncertainties are outlined in the Strategic Report on pages 44 to 46. This note expands on risk areas in relation to the Company’s financial instruments. The Portfolios are managed in accordance with the Company’s investment policies and objectives, which are set out on pages 39 to 41. The management process is subject to risk controls, which the Audit Committee reviews on behalf of the Board, as described on page 60.

The principal risks that an investment company faces in its portfolio management activities are set out below:

Market risk– arising from fluctuations in the fair value or future cash flows of a financial instrument because of changes in market prices. Market risk comprises three types of risk: currency risk, interest rate risk and other price risk:

Currency risk– arising from fluctuations in the fair value or future cash flows of a financial instrument because of changes in foreign exchange rates;

Interest rate risk– arising from fluctuations in the fair value or future cash flows of a financial instrument because of changes in market interest rates; and

Other price risk– arising from fluctuations in the fair value or future cash flows of a financial instrument for reasons other than changes in foreign exchange rates or market interest rates, whether those changes are caused by factors specific to the individual financial instrument or its issuer, or factors affecting all similar financial instruments traded in the market.

Liquidity risk– arising from any difficulty in meeting obligations associated with financial liabilities.

Credit risk incorporating counterparty risk– arising from financial loss for a company where the other party to a financial instrument fails to discharge an obligation.

Risk Management Policies and Procedures

As an investment trust the Company invests in equities and other investments for the long-term in accordance with its investment policies so as to meet its investment objectives. In pursuing its objectives, the Company is exposed to a variety of risks that could result in a reduction in the Company’s net assets or a reduction of the profits available for dividends. The risks applicable to the Company and the Directors’ policies for managing these risks follow. These have not changed from those applying in the previous year.

The Directors have delegated to the Manager the responsibility for the day-to-day investment activities of the Company as more fully described in the Directors’ Report.

The main risk that the Company faces arising from its financial instruments is market risk – this risk is reviewed in detail below. Since the Company mainly invests in quoted investments and derivative instruments traded on recognised exchanges, liquidity risk and credit risk are significantly mitigated.

16.1           Market Risk

Market risk arises from changes in the fair value or future cash flows of a financial instrument because of movements in market prices. Market risk comprises three types of risk: currency risk (16.1.1), interest rate risk (16.1.2) and other price risk (16.1.3).

The Company’s portfolio managers assess the individual investment portfolio exposures when making each investment decision for their Portfolios, and monitor the overall level of market risk on the whole of their investment portfolio on an ongoing basis. The Board meets at least quarterly to assess risk and review investment performance for the four Portfolios and the Company, as disclosed in the Board Responsibilities section of the Directors’ Report on page 51. Borrowings can be used by the UK Equity and Global Equity Income Portfolios, which will increase the Company’s exposure to market risk and volatility. The borrowing limits for these Portfolios are 25% and 20% of attributable net assets, respectively.

          16.1.1   Currency Risk

A majority of the Global Equity Income Portfolio, derivative instruments in the Balanced Risk Allocation Portfolio and a small proportion of the UK Equity Portfolio consist of assets, liabilities and income denominated in currencies other than sterling. As a result, movements in exchange rates will affect the sterling value of those items.

Management of the currency risk

The portfolio managers monitor the separate Portfolios’ exposure to foreign currencies on a daily basis and report to the Board on a regular basis. Forward foreign currency contracts can be used to limit the Company’s exposure to anticipated future changes in exchange rates and to achieve portfolio characteristics that assist the Company in meeting its investment objectives in line with its investment policies. All contracts are limited to currencies and amounts commensurate with the exposure to those currencies. No such contracts were in place at the current or preceding year end. Income denominated in foreign currencies is converted to sterling on receipt. The Company does not use financial instruments to mitigate the currency exposure in the period between the time that income is accrued and its receipt.

Foreign Currency Exposure

The fair value or amortised cost of the Company’s monetary items that have foreign currency exposure at 31 May are shown below. Where the Company’s equity investments (which are not monetary items) are priced in a foreign currency they have been included separately in the analysis in order to show the overall level of exposure.

UK Equity Portfolio:

Global Equity Income Portfolio:

Year ended 31 May 2020

Balanced Risk Allocation Portfolio:

\* Debtors includes collateral pledged for futures contracts.

Foreign Currency sensitivity

The preceding exposure analysis is based on the Company’s monetary foreign currency financial instruments held at each balance sheet date and takes account of forward foreign exchange contracts, if used, that offset the effects of changes in currency exchange rates.

The effect of strengthening or weakening of sterling against other currencies to which the Company is exposed is calculated by reference to the volatility of exchange rates during the year using the standard deviation of currency fluctuations against the mean, giving the following exchange rate fluctuations:

The tables that follow illustrate the exchange rate sensitivity of revenue and capital returns arising from the Company’s financial non-sterling assets and liabilities for the year for the UK Equity, Global Equity Income and Balanced Risk Allocation Portfolios using the exchange rate fluctuations shown above.

If sterling had strengthened against other currencies by the exchange rate fluctuations shown in the table above, this would have had the following after tax effect:

UK Equity Portfolio:

Global Equity Income Portfolio:

Balanced Risk Allocation Portfolio:

If sterling had weakened by the same amounts, the effect would have been the converse.

16.1.2   Interest Rate Risk

Interest rate movements may affect:

•           the fair value of the investments in fixed interest rate securities;

•           the level of income receivable on cash deposits; and

•           the interest payable on ***variable*** rate borrowings.

Management of interest rate risk

The possible effects on fair value and cash flows that could arise as a result of changes in interest rates are taken into account as part of the portfolio management and borrowings processes of the portfolio managers. The Board reviews on a regular basis the investment portfolio and borrowings. This encompasses the valuation of fixed-interest and floating rate securities and gearing levels.

When the Company has cash balances, they are held in ***variable*** rate bank accounts yielding rates of interest dependent on the base rate of the custodian or deposit taker. The Company has a £40 million (2020: £20 million), 364 day multicurrency revolving credit facility which is due for renewal on 26 April 2022. The Company uses the facility when required at levels approved and monitored by the Board.

Interest rate exposure

The Company also has available an uncommitted overdraft facility for settlement purposes and interest is dependent on the base rate determined by the custodian.

At 31 May the exposure of financial assets and financial liabilities to interest rate risk is shown by reference to:

•           floating interest rates (giving cash flow interest rate risk) – when the interest rate is due to be reset; and

•           fixed interest rates (giving fair value interest rate risk) – when the financial instrument is due for repayment.

The following table sets out the financial assets and financial liabilities exposure at the year end:

(1) Comprises holdings in Invesco Liquidity Funds plc – Sterling and additionally, for 2020, PIMCO Sterling Short Maturity Source UCITS ETF.

     The income on the iShares - Sterling Ultrashort Bond UCITS ETF, PIMCO Sterling Short Maturity Source UCITS ETF and Invesco Liquidity Funds plc – Sterling investments are affected by interbank lending rates; the principal amount should normally remain stable regardless of interest rate movements.

Interest rate sensitivity

At the maximum possible borrowing level of £40 million (2020: £20 million), the maximum effect over one year of a 0.5% movement in interest rates would be a £200,000 (2020: £100,000) movement in the Company’s income and net assets.

The effect of a 1% movement in the interest rates on investments held at fair value through profit and loss would result in a £12,000 (2020: £12,000) maximum movement in the Company’s income statement and net assets.

The above exposure and sensitivity analysis are not representative of the year as a whole, since the level of exposure changes frequently throughout the year.

Other price risks (i.e. changes in market prices other than those arising from interest rate risk or currency risk) may affect the value of the equity investments, but it is the role of the portfolio managers to manage the Portfolios to achieve the best returns they can.

16.1.3   Other Price Risk

Management of other price risk

The Directors monitor the market price risks inherent in the investment portfolios by meeting regularly to review performance.

The Company’s investment portfolios are the product of the Manager’s investment processes and the application of the Portfolios’ investment policies. Their value will move according to the performance of the shares held within them. However, the Portfolios do not replicate their respective benchmarks or the markets in which the Portfolios invest, so their performance may not correlate with them.

Notwithstanding the issue of correlation, if the fixed asset value of an investment portfolio moved by 10% at the balance sheet date, the profit after tax and net assets for the year would increase/decrease by the following amounts:

16.2           Liquidity Risk

Management of liquidity risk

Liquidity risk is mitigated by the investments held by the Company’s four portfolios being diversified and the majority being readily realisable securities which can be sold to meet funding commitments. If required, the Company’s borrowing facilities provide additional long-term and short-term flexibility.

The Directors’ policy is that in normal market conditions short-term borrowings be used to manage short term liabilities and working capital requirements rather than realising investments.

Liquidity risk

The contractual maturities of financial liabilities at the year end, based on the earliest date on which payment can be required, are as follows:

16.3           Credit Risk

Credit risk is that the failure of the counterparty in a transaction to discharge its obligations under that transaction could result in the Company suffering a loss.

This risk is managed as follows:

•    investment transactions are carried out with a selection of brokers, approved by the Manager and settled on a delivery versus payment basis. Brokers’ credit ratings are regularly reviewed by the Manager, so as to minimise the risk of default to the Company;

•    the derivative financial instruments are all exchange traded and the exchange guarantees their settlement;

•    the risk of counterparty exposure due to failed trades causing a loss to the Company is mitigated by the daily review of failed trade reports and the use of daily stock and cash reconciliations. Only approved counterparties are used;

•    the Company’s ability to operate in the short-term may be adversely affected if the Company’s Manager, other outsource service providers, or their delegates suffer insolvency or other financial difficulties. The Board reviews annual controls reports from major service providers;

•    where an investment is made in a bond, corporate or otherwise, the credit rating of the issuer is taken into account so as to minimise the risk to the Company of default; and

•         cash balances are limited to a maximum of £5 million for each of the UK Equity and Global Equity Income Portfolios and £2.5m for each of the Balanced Risk Allocation and Managed Liquidity Portfolios, with any one deposit taker (other than cash collateral on derivative instruments). Only deposit takers approved by the Manager are being used. Cash held at brokers includes any cash collateral on futures contracts and during the year only one futures clearing broker, Merrill Lynch, was used.

The following table sets out the maximum credit risk exposure at the year end:

(1)      Invesco Liquidity Funds plc, money market fund.

(2)      Cash collateral pledged for futures contracts of £187,000 is included in debtors (2020: £244,000).

17.        Fair Values of Financial Assets and Financial Liabilities

‘Fair value’ in accounting terms is the amount at which an asset can be bought or sold in a transaction between willing parties, i.e. a market-based, independent measure of value. This note sets out the fair value hierarchy comprising three ‘levels’ and the aggregate amount of investments in each level.

The financial assets and financial liabilities are either carried in the balance sheet at their fair value (investments and derivative instruments), or the balance sheet amount is a reasonable approximation of fair value.

FRS 102 as amended for fair value hierarchy disclosures sets out three fair value levels. These are:

Level 1 –     fair value based on quoted prices in active markets for identical assets.

Level 2 –     fair values based on valuation techniques using observable inputs other than quoted prices within level 1.

Level 3 –     fair values based on valuation techniques using inputs that are not based on observable market ***data***.

Categorisation within the hierarchy is determined on the basis of the lowest level input that is significant to the fair value measurement of each relevant asset/liability.

The valuation techniques used by the Company are explained in the accounting policies note. The majority of the Company’s investments are quoted equity investments and Treasury bills which are deemed to be Level 1. Level 2 comprises all other quoted fixed income investments, derivative instruments and liquidity funds held in the Balanced Risk Allocation and Managed Liquidity Portfolios. Level 3 investments comprise any unquoted securities and the remaining hedge fund investments of the Balanced Risk Allocation Portfolio.

18.        Capital Management

This note is designed to set out the Company’s objectives, policies and processes for managing its capital. The capital is funded from monies invested in the Company by shareholders (both initial investment and any retained amounts) and any borrowings by the Company.

The Company’s total capital employed at 31 May 2021 was £250,956,000 (2020: £117,449,000) comprising borrowings of £20,392,000 (2020: £9,780,000) and equity share capital and other reserves of £230,564,000 (2020: £107,669,000).

The Company’s total capital employed is managed to achieve the Company’s investment objective and policy as set out on pages 30 to 40, including that borrowings may be used to raise equity exposure up to a maximum of 25% of net assets. At the balance sheet date, maximum gross gearing was 17.3% (2020: 18.6%). The Company’s policies and processes for managing capital are unchanged from the preceding year.

The main risks to the Company’s investments are shown in the Directors’ Report under the ‘Principal Risks and Uncertainties’ section on pages 44 to 46. These also explain that the Company has borrowing facilities which can be used in accordance with each Portfolio’s investment objectivity and policy and that this will amplify the effect on equity of changes in the value of each applicable portfolio.

The Board can also manage the capital structure directly since it has taken the powers, which it is seeking to renew, to issue and buy back shares and it also determines dividend payments.

The Company is subject to externally imposed capital requirements with respect to the obligation and ability to pay dividends by Corporation Tax Act 2010 and by the Companies Act 2006, respectively, and with respect to the availability of the overdraft facility, by the terms imposed by the lender. The Board regularly monitors, and has complied with, the externally imposed capital requirements. This is unchanged from the prior year.

Borrowings comprise any drawings on the credit and/or overdraft facilities, details of which are given in note 12.

19.        Contingencies, guarantees and financial commitments

Any liabilities the Company is committed to honour but which are dependent on a future circumstance or event occurring would be disclosed in this note if any existed.

There were no contingencies, guarantees or financial commitments of the Company at the year end (2020: £nil).

20.        Related party transactions and transactions with the Manager

A related party is a company or individual who has direct or indirect control or who has significant influence over the Company. Under accounting standards, the Manager is not a related party.

Under UK GAAP, the Company has identified the Directors as related parties. The Directors’ remuneration and interests have been disclosed on page 62 with additional disclosure in note 4. No other related parties have been identified.

Details of the Manager’s services and fees are disclosed in the Director’s Report on pages 53 and 54 and note 3.

21.        Post Balance Sheet Events

Any significant events that occurred after the Company’s financial year end but before the signing of the balance sheet will be shown here.

There are no significant events after the end of the reporting period requiring disclosure.

The financial information set out above does not constitute the Company’s statutory accounts for the year ended 31 May 2021.  The financial information for 2020 is derived from the statutory accounts for the year ended 31 May 2020, which have been delivered to the Registrar of Companies.  The auditor has reported on the 2020 accounts; the audit report was unqualified, did not include a reference to any matters to which the auditor drew attention by way of emphasis without qualifying the report and did not contain a statement under section 498 of the Companies Act 2006.  The statutory accounts for the year ended 31 May 2021 have been finalised and audited but have not yet been delivered to the Registrar of Companies.

The audited annual financial report will be available to shareholders, and will be delivered to the Registrar of Companies, shortly.  Copies may be obtained during normal business hours from the Company’s Registered Office, from its correspondence address, 43-45 Portman Square, London W1H 6LY, and via the web pages of all of the Share classes on the Manager’s website at[*http://www.invesco.co.uk/investmenttrusts*](http://www.invesco.co.uk/investmenttrusts).

The Annual General Meeting will be held on 5 October 2021 at 11.30am at 43-45 Portman Square, London W1H 6LY.

By order of the Board

Invesco Asset Management Limited

29 July 2021

Contacts:

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Will Ellis            020 3753 1000

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Notice of Annual General Meeting

THIS Notice of Annual General Meeting IS IMPORTANT AND REQUIRES YOUR IMMEDIATE ATTENTION. If you are in any doubt as to what action to take, you should consult your stockbroker, solicitor, accountant or other appropriate independent professional adviser authorised under the Financial Services and Markets Act 2000. If you have sold or otherwise transferred all your Shares in Invesco Select Trust plc, please forward this document and the accompanying Form of Proxy to the person through whom the sale or transfer was effected, for transmission to the purchaser or transferee.

NOTICE IS GIVEN that the Annual General Meeting (AGM) of Invesco Select Trust plc will be held at 43-45 Portman Square, London W1H 6LY at 11.30am on 5 October 2021 for the following purposes:

Ordinary Business of the Company

1.         To receive the Annual Financial Report for the year ended 31 May 2021.

2.         To approve the Directors’ Remuneration Policy.

3.         To approve the Annual Statement and Report on Remuneration.

4.         To re-elect Craig Cleland as a Director of the Company.

5.         To re-elect Victoria Muir as a Director of the Company.

6.         To elect Davina Curling as a Director of the Company.

7.         To elect Mark Dampier as a Director of the Company.

8.         To elect Tim Woodhead as a Director of the Company.

9.         To re-appoint Grant Thornton UK LLP as Auditor to the Company and authorise the Audit Committee to determine the Auditor’s remuneration.

Ordinary Business of the UK Equity Share Class

Only holders of UK Equity Shares may vote on this resolution, which will be proposed as an Ordinary Resolution:

10.        To approve the UK Equity Share Class Portfolio dividend payment policy as set out on page 41 of the 2021 annual financial report.

Ordinary Business of the Global Equity Income Share Class

Only holders of Global Equity Income Shares may vote on this resolution, which will be proposed as an Ordinary Resolution:

11.        To approve the Global Equity Income Share Class Portfolio dividend payment policy as set out on page 42 of the 2021 annual financial report.

Special Business of the Company

To consider and, if thought fit, to pass the following resolutions which will be proposed as an Ordinary Resolutions:

12.        That:

the Directors be and they are hereby generally and unconditionally authorised, for the purpose of section 551 of the Companies Act 2006 as amended from time to time prior to the date of passing this resolution (‘2006 Act’) to exercise all the powers of the Company to allot relevant securities (as defined in sections 551(3) and (6) of the 2006 Act) up to an aggregate nominal amount equal to £1,000,000 of UK Equity Shares, £1,000,000 of Global Equity Income Shares, £1,000,000 of Balanced Risk Allocation Shares and £1,000,000 of Managed Liquidity Shares, provided that this authority shall expire at the conclusion of the next AGM of the Company or the date falling 15 months after the passing of this resolution, whichever is the earlier, but so that such authority shall allow the Company to make offers or agreements before the expiry of this authority which would or might require relevant securities to be allotted after such expiry and the Directors may allot relevant securities in pursuance of such offers or agreements as if the power conferred hereby had not expired.

To consider and, if thought fit, to pass the following resolutions which will be proposed as Special Resolutions:

13.        That:

the Directors be and they are hereby empowered, in accordance with sections 570 and 573 of the Companies Act 2006 as amended from time to time prior to the date of the passing of this resolution (‘2006 Act’) to allot Shares in each class (UK Equity, Global Equity Income, Balanced Risk Allocation and Managed Liquidity) for cash, either pursuant to the authority given by resolution 12 or (if such allotment constitutes the sale of relevant Shares which, immediately before the sale, were held by the Company as treasury shares) otherwise, as if section 561 of the 2006 Act did not apply to any such allotment, provided that this power shall be limited:

(a)   to the allotment of Shares in connection with a rights issue in favour of all holders of a class of Share where the Shares attributable respectively to the interests of all holders of Shares of such class are either proportionate (as nearly as may be) to the respective numbers of relevant Shares held by them or are otherwise allotted in accordance with the rights attaching to such Shares (subject in either case to such exclusions or other arrangements as the Directors may deem necessary or expedient in relation to fractional entitlements or legal or practical problems under the laws of, or the requirements of, any regulatory body or any stock exchange in any territory or otherwise);

(b)   to the allotment (otherwise than pursuant to a rights issue) of equity securities up to an aggregate nominal amount of £82,285 of UK Equity Shares, £24,661 of Global Equity Income Shares, £4,180 of Balanced Risk Allocation Shares and £1,434 of Managed Liquidity Shares; and

(c)   to the allotment of equity securities at a price of not less than the net asset value per Share as close as practicable to the allotment or sale

and this power shall expire at the conclusion of the next AGM of the Company or the date 15 months after the passing of this resolution, whichever is the earlier, but so that this power shall allow the Company to make offers or agreements before the expiry of this power which would or might require equity securities to be allotted after such expiry as if the power conferred by this resolution had not expired; and so that words and expressions defined in or for the purposes of Part 17 of the 2006 Act shall bear the same meanings in this resolution.

14.        That:

the Company be generally and subject as hereinafter appears unconditionally authorised in accordance with section 701 of the Companies Act 2006 as amended from time to time prior to the date of passing this resolution (‘2006 Act’) to make market purchases (within the meaning of section 693(4) of the 2006 Act) of its issued Shares in each Share class (UK Equity, Global Equity Income, Balanced Risk Allocation and Managed Liquidity).

PROVIDED ALWAYS THAT:

(i)    the maximum number of Shares hereby authorised to be purchased shall be 14.99% of each class of the Company’s share capital as at the date of the AGM;

(ii)    the minimum price which may be paid for a Share shall be 1p;

(iii)   the maximum price which may be paid for a Share in each Share class must not be more than the higher of: (a) 5% above the average of the mid-market values of the Shares for the five business days before the purchase is made; and (b) the higher of the price of the last independent trade in the Shares and the highest then current independent bid for the Shares on the London Stock Exchange;

(iv)   any purchase of Shares will be made in the market for cash at prices below the prevailing net asset value per Share (as determined by the Directors);

(v)   the authority hereby conferred shall expire at the conclusion of the next AGM of the Company or, if earlier, on the expiry of 15 months from the passing of this resolution unless the authority is renewed at any other general meeting prior to such time; and

(vi)   the Company may make a contract to purchase Shares under the authority hereby conferred prior to the expiry of such authority which will be executed wholly or partly after the expiration of such authority and may make a purchase of Shares pursuant to any such contract.

15.        That:

the period of notice required for general meetings of the Company (other than Annual General Meetings) shall be not less than 14 days.

16         That :

     The Articles of Association as produced to the meeting and initialled by the Chairman for the purpose of identification (the ‘Articles’) be adopted as the Articles of Association of the Company in substitution for, and to the exclusion of, the existing Articles of Association.

All Resolutions are explained further in the Directors’ Report on pages 55 to 56.

Dated 5 August 2021

By order of the Board

Invesco Asset Management Limited

Company Secretary

**Load-Date:** August 6, 2021

**End of Document**



[***Federal Register: Endangered and Threatened Wildlife and Plants; Threatened Species Status With Section 4(d) Rule for Western Fanshell and “Ouachita” Fanshell and Designation of Critical Habitat Pages 12338 - 12384 [FR DOC #2022-02994]***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:64XS-XNS1-JDG9-Y3NK-00000-00&context=1516831)

Impact News Service

March 5, 2022 Saturday

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**Length:** 36890 words

**Body**

Washington: Office of the Federal Register has issued the following notice: Department of the Interior-----------------------------------------------------------------------Fish and Wildlife Service-----------------------------------------------------------------------50 CFR Part 17Endangered and Threatened Wildlife and Plants; Threatened Species Status With Section 4(d) Rule for Western Fanshell and ``Ouachita'' Fanshell and Designation of Critical Habitat; Proposed RuleFederal Register / Vol. 87 , No. 42 / Thursday, March 3, 2022 / Proposed Rules[[Page 12338]]-----------------------------------------------------------------------DEPARTMENT OF THE INTERIORFish and Wildlife Service50 CFR Part 17[Docket No. FWS-R3-ES-2021-0061; FF09E21000 FXES1111090FEDR 223]RIN 1018-BE79Endangered and Threatened Wildlife and Plants; Threatened Species Status With Section 4(d) Rule for Western Fanshell and ``Ouachita'' Fanshell and Designation of Critical HabitatAGENCY: Fish and Wildlife Service, Interior.ACTION: Proposed rule.-----------------------------------------------------------------------SUMMARY: We, the U.S Fish and Wildlife Service (Service), propose to list the western fanshell (Cyprogenia aberti), a freshwater mussel species from Arkansas, Kansas, Missouri, and Oklahoma, and the ``Ouachita'' fanshell (Cyprogenia cf. aberti), a freshwater mussel species from Arkansas and Louisiana, as threatened species and to designate critical habitat for these species under the Endangered Species Act of 1973, as amended (Act). This document also proposes a rule issued under section 4(d) of the Act (4(d) rule) for these mussel species and serves as our 12-month finding on a petition to list the western fanshell. The proposed critical habitat designation for the western fanshell totals approximately 360 river miles (579 kilometers), all of which are occupied by the species, in Arkansas, Kansas, and Missouri, and the proposed critical habitat designation for the ``Ouachita'' fanshell totals approximately 294 river miles (474 kilometers), all of which are occupied by the species, in Arkansas. We also announce the availability of a draft economic analysis (DEA) of the proposed designation of critical habitat for the western fanshell and ``Ouachita'' fanshell. If we finalize this rule as proposed, it would add these species to the List of Endangered and Threatened Wildlife and extend the Act's protections to these species and their designated critical habitats.DATES: We will accept comments received or postmarked on or before May 2, 2022. Comments submitted electronically using the Federal eRulemaking Portal (see ADDRESSES, below) must be received by 11:59 p.m Eastern Time on the closing date. We must receive requests for a public hearing, in writing, at the address shown in FOR FURTHER INFORMATION CONTACT by April 18, 2022.ADDRESSES: Written comments: You may submit comments by one of the following methods: (1) Electronically: Go to the Federal eRulemaking Portal: [*http://www.regulations.gov*](http://www.regulations.gov). In the Search box, enter FWS-R3-ES-2021-0061, which is the docket number for this rulemaking. Then, click on the Search button. On the resulting page, in the Search panel on the left side of the screen, under the Document Type heading, check the Proposed Rule box to locate this document. You may submit a comment by clicking on ``Comment.'' (2) By hard copy: Submit by U.S mail to: Public Comments Processing, Attn: FWS-R3-ES-2021-0061, U.S Fish and Wildlife Service, MS: PRB/3W, 5275 Leesburg Pike, Falls Church, VA 22041-3803. We request that you send comments only by the methods described above. We will post all comments on [*http://www.regulations.gov*](http://www.regulations.gov). This generally means that we will post any personal information you provide us (see Information Requested, below, for more information). Availability of supporting materials: For the critical habitat designation, the coordinates or plot points or both from which the maps are generated are included in the decision file and are available at [*https://www.fws.gov/midwest*](https://www.fws.gov/midwest)/ for western fanshell and [*https://www.fws.gov/southeast*](https://www.fws.gov/southeast)/ for ``Ouachita'' fanshell, at [*http://www.regulations.gov*](http://www.regulations.gov) under Docket No. FWS-R3-ES-2021-0061, and at the Missouri and Arkansas Ecological Services Field Offices (see FOR FURTHER INFORMATION CONTACT). Any additional tools or supporting information that we may develop for the critical habitat designation will also be available at the Service websites and field offices set out above or at [*http://www.regulations.gov.FOR*](http://www.regulations.gov.FOR) FURTHER INFORMATION CONTACT: For information about the western fanshell, contact Karen Herrington, Field Supervisor, U.S Fish and Wildlife Service, Missouri Ecological Services Field Office, 101 Park DeVille Drive, Suite A, Columbia, MO 65203-0057; telephone 573-234-2132. For information about the ``Ouachita'' fanshell, contact Melvin Tobin, Field Supervisor, U.S Fish and Wildlife Service, Arkansas Ecological Services Field Office, 110 South Amity, Suite 300, Conway, AR 72032-8975; telephone 501-513-4473. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Relay Service at 800-877-8339.SUPPLEMENTARY INFORMATION:Executive Summary Why we need to publish a rule. Under the Act, if we determine that a species is an endangered or threatened species throughout all or a significant portion of its range, we are required to promptly publish a proposal in the Federal Register and make a determination on our proposal within 1 year. To the maximum extent prudent and determinable, we must designate critical habitat for any species that we determine to be an endangered or threatened species under the Act. Listing a species as an endangered or threatened species and designation of critical habitat can only be completed by issuing a rule. What this document does. We propose to list the western fanshell and ``Ouachita'' fanshell as threatened species with a rule issued under section 4(d) of the Act, and we propose the designation of critical habitat for these two species. The basis for our action. Under the Act, we may determine that a species is an endangered or threatened species because of any of five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. We have determined that water quality degradation, altered flow, landscape changes, and habitat fragmentation, all of which are exacerbated by the effects of climate change, are the primary threats affecting the western fanshell and ``Ouachita'' fanshell. Section 4(a)(3) of the Act requires the Secretary of the Interior (Secretary) to designate critical habitat concurrent with listing to the maximum extent prudent and determinable. Section 3(5)(A) of the Act defines critical habitat as (i) the specific areas within the geographical area occupied by the species, at the time it is listed, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protections; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination by the Secretary that such areas are essential for the conservation of the species. Section 4(b)(2) of the Act states that the Secretary must make the designation on the basis of the best scientific ***data*** available and after taking into[[Page 12339]]consideration the economic impact, the impact on national security, and any other relevant impacts of specifying any particular area as critical habitat.Information Requested We intend that any final action resulting from this proposed rule will be based on the best scientific and commercial ***data*** available and be as accurate and as effective as possible. Therefore, we request comments or information from other governmental agencies, Native American Tribes, the scientific community, industry, or any other interested parties concerning this proposed rule. We particularly seek comments concerning: (1) The species' biology, range, and population trends, including: (a) Biological or ecological requirements of the species, including habitat requirements for feeding, breeding, and sheltering; (b) Genetics and taxonomy; (c) Historical and current range, including distribution patterns; (d) Historical and current population levels, and current and projected trends; and (e) Past and ongoing conservation measures for the species, its habitat, or both. (2) Factors that may affect the continued existence of these species, which may include habitat modification or destruction, overutilization, disease, predation, the inadequacy of existing regulatory mechanisms, or other natural or manmade factors. (3) Biological, commercial trade, or other relevant ***data*** concerning any threats (or lack thereof) to these species and existing regulations that may be addressing those threats. (4) Additional information concerning the historical and current status, range, distribution, and population size of these species, including the locations of any additional populations of these species. (5) Information on regulations that are necessary and advisable to provide for the conservation of western fanshell and ``Ouachita'' fanshell and that the Service can consider in developing a 4(d) rule for these species. In particular, we seek information concerning the extent to which we should include any of the Act's section 9 prohibitions in the 4(d) rule or whether we should consider any additional exceptions from the prohibitions in the 4(d) rule. In addition, we request comments on whether we should include an exception from permitting requirements for individuals conducting presence/absence surveys, studies to document habitat use, population monitoring, and evaluations of potential impacts to the fanshells, provided the individual holds a valid scientific ***collecting*** permit for mussels from the appropriate State agency. (6) The reasons why we should or should not designate habitat as ``critical habitat'' under section 4 of the Act (16 U.S.C 1531 et seq.), including information to inform the following factors that the regulations identify as reasons why designation of critical habitat may be not prudent: (a) The species is threatened by taking or other human activity and identification of critical habitat can be expected to increase the degree of such threat to the species; (b) The present or threatened destruction, modification, or curtailment of a species' habitat or range is not a threat to the species, or threats to the species' habitat stem solely from causes that cannot be addressed through management actions resulting from consultations under section 7(a)(2) of the Act; (c) Areas within the jurisdiction of the United States provide no more than negligible conservation value, if any, for a species occurring primarily outside the jurisdiction of the United States; or (d) No areas meet the definition of critical habitat. (7) Specific information on: (a) The amount and distribution of western fanshell and ``Ouachita'' fanshell habitat; (b) What areas, that were occupied at the time of listing and that contain the physical or biological features essential to the conservation of these species, should be included in the designation and why; (c) Any additional areas occurring within the range of the species that should be included in the designation because they (1) are occupied at the time of listing and contain the physical or biological features that are essential to the conservation of the species and that may require special management considerations, or (2) are unoccupied at the time of listing and are essential for the conservation of the species; (d) Special management considerations or protection that may be needed in critical habitat areas we are proposing, including managing for the potential effects of climate change; and (e) What areas not occupied at the time of listing are essential for the conservation of these species. We particularly seek comments: (i) Regarding whether occupied areas are adequate for the conservation of these species; (ii) Providing specific information regarding whether or not unoccupied areas would, with reasonable certainty, contribute to the conservation of these species and contain at least one physical or biological feature essential to the conservation of these species; and (iii) Explaining whether or not unoccupied areas fall within the definition of ``habitat'' at 50 CFR 424.02 and why. (8) Land use designations and current or planned activities in the subject areas and their possible impacts on proposed critical habitat. (9) Any probable economic, national security, or other relevant impacts of designating any area that may be included in the final designation, and the related benefits of including or excluding specific areas. (10) Information on the extent to which the description of probable economic impacts in the draft economic analysis is a reasonable estimate of the likely economic impacts, the description of the environmental impacts in the draft environmental assessment is complete and accurate, and any additional information regarding probable economic impacts that we should consider. (11) Whether any specific areas we are proposing for critical habitat designation should be considered for exclusion under section 4(b)(2) of the Act, and whether the benefits of potentially excluding any specific area outweigh the benefits of including that area under section 4(b)(2) of the Act. If you think we should exclude any additional areas, please provide credible information regarding the existence of a meaningful economic or other relevant impact supporting a benefit of exclusion. (12) Whether we could improve or modify our approach to designating critical habitat in any way to provide for greater public participation and understanding, or to better accommodate public concerns and comments. Please include sufficient information with your submission (such as scientific journal articles or other publications) to allow us to verify any scientific or commercial information you include. Please note that submissions merely stating support for, or opposition to, the action under consideration without providing supporting information, although noted, will not be considered in making a determination, as section 4(b)(1)(A) of the Act directs that determinations as to whether any species is an endangered or a threatened species must be made ``solely on the[[Page 12340]]basis of the best scientific and commercial ***data*** available.'' You may submit your comments and materials concerning this proposed rule by one of the methods listed in ADDRESSES. We request that you send comments only by the methods described in ADDRESSES. If you submit information via [*http://www.regulations.gov*](http://www.regulations.gov), your entire submission--including any personal identifying information--will be posted on the website. If your submission is made via a hardcopy that includes personal identifying information, you may request at the top of your document that we withhold this information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on [*http://www.regulations.gov*](http://www.regulations.gov). Comments and materials we receive, as well as supporting documentation we used in preparing this proposed rule, will be available for public inspection on [*http://www.regulations.gov*](http://www.regulations.gov). Because we will consider all comments and information we receive during the comment period, our final determinations may differ from this proposal. Based on the new information we receive (and any comments on that new information), we may conclude that the western fanshell or ``Ouachita'' fanshell is endangered instead of threatened, or we may conclude that either species does not warrant listing as either an endangered species or a threatened species. For critical habitat, our final designation may not include all areas proposed, may include some additional areas that meet the definition of critical habitat, and may exclude some areas if we find the benefits of exclusion outweigh the benefits of inclusion. In addition, we may change the parameters of the prohibitions or the exceptions to those prohibitions in the 4(d) rule if we conclude it is appropriate in light of comments and new information we receive. For example, we may expand the prohibitions to include prohibiting additional activities if we conclude that those additional activities are not compatible with conservation of the species. Conversely, we may establish additional exceptions to the prohibitions in the final rule if we conclude that the activities would facilitate or are compatible with the conservation and recovery of the species.Public Hearing Section 4(b)(5) of the Act provides for a public hearing on this proposal, if requested. Requests must be received by the date specified in DATES. Such requests must be sent to the address shown in FOR FURTHER INFORMATION CONTACT. We will schedule a public hearing on this proposal, if requested, and announce the date, time, and place of the hearing, as well as how to obtain reasonable accommodations, in the Federal Register and local newspapers at least 15 days before the hearing. For the immediate future, we will provide these public hearings using webinars that will be announced on the Service's website, in addition to the Federal Register. The use of these virtual public hearings is consistent with our regulations at 50 CFR 424.16(c)(3).Previous Federal Actions We identified the western fanshell as a ``Category 2'' candidate in our May 22, 1984, Review of Invertebrate Wildlife for Listing as Endangered or Threatened Species (49 FR 21664). Category 2 candidates were defined as species for which we had information that proposed listing was possibly appropriate, but conclusive ***data*** on biological vulnerability and threats were not available to support a proposed rule at the time. The species remained so designated in subsequent candidate notices of review (CNORs) (54 FR 554, January 6, 1989; 56 FR 58804, November 21, 1991; 59 FR 58982, November 15, 1994). In the February 28, 1996, CNOR (61 FR 7596), we discontinued the designation of Category 2 species as candidates; therefore, the western fanshell was no longer a candidate species. On April 20, 2010, we received a petition from the Center for Biological Diversity (CBD), Alabama Rivers Alliance, Clinch Coalition, Dogwood Alliance, Gulf Restoration Network, Tennessee Forests Council, and West Virginia Highlands Conservancy, to list 404 aquatic, riparian, and wetland species, including the western fanshell, from the southeastern United States as endangered or threatened species and to designate critical habitat concurrent with listing under the Act. On September 27, 2011, we published a 90-day finding in the Federal Register (76 FR 59836), concluding that the petition presented substantial information that indicated listing the western fanshell may be warranted. Since that time, the ``Ouachita'' fanshell has been determined to be a separate species from western fanshell (Williams et al. 2017, p. 47; see discussion of taxonomy below); therefore, we conducted a discretionary status review for the ``Ouachita'' fanshell concurrent with our status review for the western fanshell.Supporting Documents A species status assessment (SSA) team prepared an SSA report for the western fanshell and ``Ouachita'' fanshell. The SSA team was composed of Service biologists, in consultation with other species experts. The SSA report represents a compilation of the best scientific and commercial ***data*** available concerning the status of these species, including the impacts of past, present, and future factors (both negative and beneficial) affecting these species. In accordance with our joint policy on peer review published in the Federal Register on July 1, 1994 (59 FR 34270), and our August 22, 2016, memorandum updating and clarifying the role of peer review of listing actions under the Act, we sought the expert opinions of five appropriate specialists regarding the SSA report. We received two responses. We also sent the SSA report to eight Federal and State partners with expertise in aquatic ecology and freshwater mussel biology, taxonomy, and conservation. We received reviews from a Federal biologist and a State biologist.I. Proposed Listing DeterminationBackground The western fanshell (Cyprogenia aberti) is a freshwater mussel in the Unionidae family. Adults are a dull tan with a distinctive ray pattern from bands of tiny pigment flecks. The shell is thick, compressed to moderately inflated, and round to triangular (up to 3 inches (76 millimeters)), with a wrinkled or rough appearance (Conrad 1850, p. 10; McMurray et al. 2012, p. 30; Oesch 1995, pp. 143-144; Roe 2004, pp. 4-5). Recent molecular analysis of Cyprogenia identified the fanshell from the Ouachita River basin in Arkansas and Louisiana as an independent evolutionary lineage (Chong et al. 2016, pp. 2445-2449). There is confusion regarding what name is available for the Ouachita River drainage fanshell, but the distinctiveness of this species was recognized in the most recent list of freshwater mussels of the United States and Canada (Williams et al. 2017, p. 47). The Arkansas Wildlife Action Plan refers to the species as the ``Ouachita'' fanshell (C. cf. aberti) (Arkansas Game and Fish Commission 2015, p. 974). Based on this information, we find the ``Ouachita'' fanshell is a listable entity under the Act, and we follow this naming convention until a specific epithet can be designated. The western fanshell is currently found in the Lower Mississippi-St. Francis, Neosho-Verdigris, and Upper[[Page 12341]]White River basins, within the States of Arkansas, Kansas, Missouri, and Oklahoma (Service 2020, pp. 21-28; see Figure 1, below). It is considered extirpated from the Lower Arkansas basin. The ``Ouachita'' fanshell currently occurs in the Lower Red-Ouachita basin in Arkansas and historically in Louisiana (Service 2020, pp. 29-31; see Figure 2, below).BILLING CODE 4333-15-P[GRAPHIC] [TIFF OMITTED] TP03MR22.001[[Page 12342]][GRAPHIC] [TIFF OMITTED] TP03MR22.002BILLING CODE 4333-15-C Both species are typically found in large creeks and rivers with good water quality, moderate to swift current, and gravel-sand substrates, but specific information on microhabitat requirements is lacking. Like all mussels, these two species of fanshell are omnivores that primarily filter-feed on a wide variety of microscopic particulate matter suspended in the water column, including phytoplankton, zooplankton, bacteria, detritus, and dissolved organic matter (Haag 2012, p. 26). As with most freshwater mussels,[[Page 12343]]the fanshell mussels have a unique life cycle that relies on fish hosts for successful reproduction (Barnhart et al. 2008, pp. 371-373; Vaughn and Taylor 1999, p. 913; Barnhart 1997, p. 12). Thorough reviews of the taxonomy, life history, and ecology of the western fanshell and ``Ouachita'' fanshell are presented in detail in the SSA report (Service 2020, pp. 9-12).Regulatory and Analytical FrameworkRegulatory Framework Section 4 of the Act (16 U.S.C 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species is an endangered species or a threatened species. The Act defines an ``endangered species'' as a species that is in danger of extinction throughout all or a significant portion of its range, and a ``threatened species'' as a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether any species is an endangered species or a threatened species because of any of the following factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence. These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species' continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects. We use the term ``threat'' to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term ``threat'' includes actions or conditions that have a direct impact on individuals (direct impacts), as well as those that affect individuals through alteration of their habitat or required resources (stressors). The term ``threat'' may encompass--either together or separately--the source of the action or condition or the action or condition itself. However, the mere identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an ``endangered species'' or a ``threatened species.'' In determining whether a species meets either definition, we must evaluate all identified threats by considering the expected response by the species, and the effects of the threats--in light of those actions and conditions that will ameliorate the threats--on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species, such as any existing regulatory mechanisms or conservation efforts. The Secretary determines whether the species meets the definition of an ``endangered species'' or a ``threatened species'' only after conducting this cumulative analysis and describing the expected effect on the species now and in the foreseeable future. The Act does not define the term ``foreseeable future,'' which appears in the statutory definition of ``threatened species.'' Our implementing regulations at 50 CFR 424.11(d) set forth a framework for evaluating the foreseeable future on a case-by-case basis. The term ``foreseeable future'' extends only so far into the future as the Service can reasonably determine that both the future threats and the species' responses to those threats are likely. In other words, the foreseeable future is the period of time in which we can make reliable predictions. ``Reliable'' does not mean ``certain''; it means sufficient to provide a reasonable degree of confidence in the prediction. Thus, a prediction is reliable if it is reasonable to depend on it when making decisions. It is not always possible or necessary to define foreseeable future as a particular number of years. Analysis of the foreseeable future uses the best scientific and commercial ***data*** available and should consider the timeframes applicable to the relevant threats and to the species' likely responses to those threats in view of its life-history characteristics. ***Data*** that are typically relevant to assessing the species' biological response include species-specific factors such as lifespan, reproductive rates or productivity, certain behaviors, and other demographic factors.Analytical Framework The SSA report documents the results of our comprehensive biological review of the best scientific and commercial ***data*** regarding the status of these species, including an assessment of the potential threats to these species. The SSA report does not represent a decision by the Service on whether these species should be proposed for listing as an endangered or threatened species under the Act. However, it does provide the scientific basis that informs our regulatory decisions, which involve the further application of standards within the Act and its implementing regulations and policies. The following is a summary of the key results and conclusions from the SSA report; the full SSA report can be found at Docket No. FWS-R3-ES-2021-0061 on [*http://www.regulations.gov*](http://www.regulations.gov) and at [*https://www.fws.gov/midwest*](https://www.fws.gov/midwest)/ and [*https://www.fws.gov/southeast/*](https://www.fws.gov/southeast/). To assess the western fanshell's and ``Ouachita'' fanshell's viability, we used the three conservation biology principles of resiliency, redundancy, and representation (Shaffer and Stein 2000, pp. 306-310). Briefly, resiliency supports the ability of the species to withstand environmental and demographic stochasticity (for example, wet or dry, warm or cold years), redundancy supports the ability of the species to withstand catastrophic events (for example, droughts, large pollution events), and representation supports the ability of the species to adapt over time to long-term changes in the environment (for example, climate changes). In general, the more resilient and redundant a species is and the more representation it has, the more likely it is to sustain populations over time, even under changing environmental conditions. Using these principles, we identified the species' ecological requirements for survival and reproduction at the individual, population, and species levels and described the beneficial and risk factors influencing the species' viability. The SSA process can be categorized into three sequential stages. During the first stage, we evaluated each individual species' life-history needs. The next stage involved an assessment of the historical and current condition of the species' demographics and habitat characteristics, including an explanation of how the species arrived at its current condition. The final stage of the SSA involved making predictions about the species' responses to positive and negative environmental and anthropogenic influences. Throughout all of these stages, we used the best available information to characterize viability as the ability of a species to sustain populations in the wild over time. We use this information to inform our regulatory decision.[[Page 12344]]Summary of Biological Status and Threats In this discussion, we review the biological condition of the two species and their resources, and the threats that influence both species' current and future condition, to assess each species' overall viability and the risks to that viability.Species Needs Fanshell mussels feed primarily on a wide variety of microscopic particulate matter, including phytoplankton, zooplankton, bacteria, detritus, and dissolved organic matter (Haag 2012, p. 26). Juveniles likely pedal feed in the sediment, whereas adults filter-feed from the water column. As with most freshwater mussels, both fanshell mussels rely on a host fish for reproduction. The female mussel holds the fertilized eggs internally as they develop into larvae. Once mature, the larvae are released as glochidia, which attach on the gills, head, or fins of fishes (Barnhart et al. 2008, pp. 371-373; Vaughn and Taylor 1999, p. 913). Glochidia encyst (enclose in a cyst-like structure) on the host's tissue and draw nutrients from the fish. The glochidia for the fanshell mussels remain encysted for about a month until transformation to the juvenile stage, at which point they release from the fish and drop to the substrate (Barnhart 1997, p. 12). Glochidia die if they fail to find a host fish, attach to the wrong species of host fish, attach to a fish that has developed immunity from prior infestations, or attach to the wrong location on a host fish (Bogan 1993, p. 599; Neves 1991, p. 254). Logperch (Percina caprodes) is a suitable fish host for both fanshell species in all river basins (Eckert 2003, pp. 18-19). Slenderhead darter (Percina phoxocephala) and orangebelly darter (Etheostoma radiosum) are suitable hosts for ``Ouachita'' fanshell (Eckert 2003, p. 46), while slenderhead darter, fantail darter (Etheostoma flabellare), rainbow darter (Etheostoma caeruleum), and orangebelly darter are suitable hosts for western fanshell, but only for their respective sympatric fanshell mussel population (Eckert 2003, p. 33). In other words, glochidia had greater success transforming on darters from the same stream as the mussel. For example, a higher percentage of glochidia from Ouachita River transformed on orangebelly darters from Ouachita River than on orangebelly darters from Verdigris River (Eckert 2003, p. 11). We assessed the best available information to identify the physical and biological needs to support individual fitness at all life stages for the western fanshell and ``Ouachita'' fanshell. Full descriptions of all needs are available in chapter 2 of the SSA report (Service 2020, pp. 9-15). Based upon the best available scientific and commercial information, the resource needs for both species are characterized as: Stable river channels and banks (for example, stable riffles, sometimes with runs, and mid-channel island habitats that provide flow refuges), consisting of mixed sand, gravel, and cobble substrates with low to moderate amounts of fine sediment and attached filamentous algae; A hydrologic flow regime (the severity, frequency, duration, and seasonality of discharge over time) that maintains the benthic habitats where the species are found and the river connectivity with the floodplain; Habitat connectivity (that is, a lack of barriers for passage of host fish, which are necessary for dispersal of mussels); Water and sediment quality, such as (but not limited to) dissolved oxygen above 3 parts per million (ppm), ammonia generally below 1.0 ppm total ammonia-nitrogen, temperatures generally below 80 degrees Fahrenheit ([deg]F) (27 degrees Celsius ([deg]C)), low concentrations of metals, and an absence of excessive total suspended solids and other pollutants; The presence and abundance of fish hosts (logperch, slenderhead darter, fantail darter, rainbow darter, and orangebelly darter) necessary for recruitment of the fanshell mussels; and Appropriate food sources (phytoplankton, zooplankton, protozoans, detritus, and dissolved organic matter) in adequate supply.Threats Analysis We identified water quality degradation, altered flow, landscape changes, and habitat fragmentation, all of which are exacerbated by the effects of climate change, as the primary threats affecting the western fanshell and ``Ouachita'' fanshell (Service 2020, p. 65). We acknowledge that invasive species can have individual and, in some circumstances, population-level effects to mussels. However, the best available ***data*** do not support that invasive species are a driving force affecting the current or future conditions of these two fanshell mussels (Service 2020, pp. 62-63). The primary threats are discussed below.Water Quality Chemical contaminants are a major threat in the decline of mussel species (Cope et al. 2008, p. 451; Richter et al. 1997, p. 1081; Strayer et al. 2004, p. 436; Wang et al. 2007a, p. 2029). Chemicals enter rivers through point and nonpoint discharges, including spills, industrial and municipal effluents, and residential and ***agricultural*** runoff. These sources contribute organic compounds, heavy metals, nutrients, pesticides, and a wide variety of newly emerging contaminants, such as pharmaceuticals, to the aquatic environment. The western fanshell has been exposed to zinc and copper at concentrations that cause acute toxicity (Service 2020, p. 41) and may be exposed to toxic levels of lead in the future (Service 2020, Appendix I-D--I-E). Metals from mine water runoff (for example, Tri-State Mining District in southwest Missouri and southeast Kansas) contributed to mussel declines in Shoal Creek and Spring River in the Arkansas River basin (Angelo et al. 2007, p. 467; EcoAnalysts, Inc. 2018, p. 59). Nutrients, such as nitrogen and phosphorus, primarily occur in runoff from livestock farms, feedlots, heavily fertilized row crops and pastures (Peterjohn and Correll 1984, p. 1471), post timber management activities, and urban and suburban runoff (including residential lawns and leaking septic tanks). Sources of ammonia include ***agricultural*** wastes (animal feedlots and nitrogenous fertilizers), municipal wastewater treatment plants, and industrial waste (Augspurger et al. 2007, p. 2569), as well as precipitation and natural processes (decomposition of organic nitrogen) (Augspurger et al. 2003, p. 2569; Goudreau et al. 1993, p. 212; Hickey and Martin 1999, p. 44; Newton et al. 2003, p. 1243). As discussed above under Species Needs, both fanshell species require dissolved oxygen above 3 ppm and ammonia generally below 1.0 ppm total ammonia-nitrogen. We analyzed total ammonia nitrogen ***data*** in rivers occupied by the two fanshell mussel species, but did not find concentrations at levels expected to result in acute or chronic toxicity to mussels (Service 2020, p. 41, Appendix I-D--I-E). In addition, nutrient enrichment increases primary productivity, and the associated algae respiration depletes dissolved oxygen levels. However, available water quality ***data*** indicate that hypoxia (low dissolved oxygen) is not occurring in occupied streams and is not currently a threat to the fanshell mussels.Flow Reductions in the diversity and abundance of mussels are principally attributed to habitat alteration caused by inundation of free-flowing rivers and[[Page 12345]]streams (Neves et al. 1997, p. 60), which has occurred in portions of the fanshell mussels' ranges (for example, White, Ouachita, Caddo, and Neosho rivers). The construction of reservoirs and other impoundments permanently alters the hydrology, with deleterious effects to fish host movement and mussel dispersal. The water released from the hypolimnion (lower layers of the lake) in large reservoirs is cold and often devoid of oxygen and necessary nutrients, which adversely affects mussel survival. Cold water can stunt mussel growth and delay or hinder spawning (Vaughn and Taylor 1999, p. 917). Reservoirs, like Bull Shoals on the White River in north-central Arkansas, that release cold water from the bottom of the reservoir (in part to support nonnative rainbow trout and brown trout recreational fisheries) can affect water temperatures for many kilometers downstream. These cold releases create an extinction gradient, where freshwater mussels are absent or present in low numbers near the dam, and abundance does not rebound until some distance downstream where ambient conditions raise the water temperature to within the tolerance limits of mussels (Vaughn and Taylor 1999, pp. 915-916). In addition to low water temperature limits, freshwater mussels also have an upper water temperature threshold. As described above under Species Needs, both fanshell species require water temperatures generally below 80 [deg]F (27 [deg]C). In ``Ouachita'' fanshell occupied streams from 1990 to 2018, the percent of water temperature samples exceeding 27 [deg]C ranged from 6.9 to 15.4 percent, with maximum water temperature ranging from 30.3 [deg]C to 36.6 [deg]C. In western fanshell MUs from 1990 to 2018, the percent of water temperature samples exceeding 27 [deg]C ranged from 0 to 12.6 percent, with maximum water temperature ranging from 22.0 [deg]C to 35.8 [deg]C. Recruitment in some species of mussels is significantly related to components of spring and summer flow (Ries et al. 2016, p. 711). High velocity flows during spawning can decrease fertilization success (Ries et al. 2016, p. 712) and affect juvenile settling (Daraio et al. 2010, p. 838; Hardison and Layzer 2001, p. 77). Mussel beds may be constrained by threshold limits at both flow extremes. Under low flow conditions, mussels may require a minimum flow to transport nutrients, oxygen, and waste products. Under high flow conditions, areas with relatively low flow may provide a refuge for mussels (Steuer et al. 2008, p. 67). Fanshell mussels undoubtedly evolved in the presence of extreme hydrological conditions to some degree, including severe droughts leading to dewatering, and heavy rains leading to damaging scour events and movement of mussels and substrate, although the frequency, duration, and intensity of these events may be different from today. Streamflow and overall discharge for rivers inhabited by western and ``Ouachita'' fanshell mussels will likely decline due to climate change and projected increases in temperatures and evaporation rates, resulting in more frequent and intense droughts (LaFontaine et al. 2019, entire). Excessive sediments adversely affect riverine mussel populations requiring clean, stable streams (Brim Box and Mossa 1999, p. 99; Ellis 1936, pp. 39-40). Specific biological effects include reduced feeding and respiratory efficiency from clogged gills, disrupted metabolic processes, reduced growth rates, limited burrowing activity, physical smothering, and disrupted host fish attraction mechanisms (Ellis 1936, pp. 39-40; Hartfield and Hartfield 1996, p. 373; Marking and Bills 1979, p. 210; Vannote and Minshall 1982, pp. 4105-4106; Waters 1995, pp. 173-175). The physical effects of sediment on mussel habitat include changes in suspended and bed material load; changes in bed sediment composition associated with increased sediment production and runoff in the watershed; channel changes in form, position, and degree of stability; changes in depth or the width and depth ratio that affects light penetration and flow regime, actively aggrading (filling) or degrading (scouring) channels; and changes in channel position. These effects to habitat may dislodge, transport downstream, or leave mussels stranded (Brim Box and Mossa 1999, pp. 109-112; Kanehl and Lyons 1992, pp. 4-5; Vannote and Minshall 1982, p. 4106). The majority of sediment transport occurs during floods (Clark and Mangham 2019, pp. 6-7; Kondolf 1997, p. 533). The increase in flooding severity results in greater sediment transport, with important effects to substrate stability and benthic habitats for freshwater mussels, as well as other organisms that are dependent on stable benthic habitats (Kondolf 1997, p. 535). High base flows can incise channels, erode riverbanks, scour mussel beds, and remove substrate preferred by mussels. Over time, the physical force of these higher base flows can dislodge mussels from the sediment and permanently alter the geomorphology of rivers (Clark and Mangham 2019, pp. 6-7; Kondolf 1997, p. 533). Runoff from impervious surfaces prevalent in urban areas affects the natural hydrology of streams by increasing flood magnitude, duration, and frequency (Bressler et al. 2009, p. 292). Frequent floods in urban areas scour stream substrate and banks, thereby increasing erosion and sedimentation and altering geomorphology. Geomorphic changes, such as changes in channel width, occur with impervious areas as low as 2 to 10 percent (Booth and Jackson 1997, p. 1084; Dunne and Leopold 1978, pp. 275-277; Morisawa and LaFlure 1979, Figure 11). Initial degradation of fish communities and lower larval densities have been associated with as low as 10 percent impervious areas (Limburg and Schmidt 1990, pp. 1241-1242; Steedman 1988, pp. 498-499). Unpaved road networks also interact with streams, delivering sediment runoff and increasing water velocity entering stream channels, thereby increasing stream energy, eroding streambanks, scouring channels, and increasing flooding (Coffin 2007, pp. 397-398).Landscape Alterations Many rivers where the western fanshell and ``Ouachita'' fanshell occur are threatened by land use activities and changes (for example, increased urbanization, alteration of riparian buffers, improperly designed and maintained unpaved roads). Urbanization of a watershed can result in increased pollutant loads from stormwater runoff, altered flow, decreased bank stability, and increased water temperature. Urbanization can also indirectly increase channel erosion and downstream sedimentation by increasing the frequency and volume of channel-altering storm flows (Hammer 1972, p. 1530; Leopold 1968, entire). These effects of urbanization can lower fish species richness and density, leading to predictable changes in species composition, and these changes can accrue rapidly (less than 10 years) and are detectable at low levels (approximately 5 to 10 percent urbanization) (Walters et al. 2005, p. 1). In 2016, 80 percent of the western and ``Ouachita'' fanshell MUs had 5 percent or greater urban land use, but all were less than 10 percent (Service 2020, Appendix I-A). The amount of impervious surface and riparian forest cover influences stream hydrology and water quality (Brabec et al. 2002, pp. 505-507). Riparian forest cover intercepts and moderates the timing of runoff, buffers temperature extremes, filters pollutants in runoff, provides woody debris to stream channels that enhances aquatic[[Page 12346]]food webs, and stabilizes excessive erosion. Furthermore, the removal of riparian trees in forested watersheds has a strong influence on stream invertebrate communities (Wallace et al. 1997, entire). In 2016, forest cover ranged from 70 to 76 percent in ``Ouachita'' fanshell MUs and 12 to 77 percent in western fanshell MUs (Service 2020, Appendix I-A). ***Agricultural*** practices, such as livestock grazing and tilling on land adjacent to streams, can lead to soil erosion and subsequent runoff of fine sediments, nutrients, and pesticides (for example, Schulz and Liess 1999, p. 155). Watersheds with the most habitat converted to farmland often have the greatest levels of mussel richness decline (Poole and Downing 2004, p. 123). In 2016, ***agricultural*** land use ranged from 5 to 13 percent in ``Ouachita'' fanshell MUs and 17 to 68 percent in western fanshell MUs, and decreased in all MUs for both species from 2011 to 2016 (Service 2020, Appendix I-A). Roads adversely affect watershed integrity by intercepting, concentrating, and diverting water. Roads directly affect natural sediment and hydrologic regimes by altering stream flow, sediment loading, sediment transport and deposition, channel morphology, channel stability, substrate composition, stream temperature, water quality, and riparian condition (Lee et al. 1997, pp. 1102-1104). Hydrologic effects are sensitive to road density, with increased peak flows evident at road densities of 2 to 3 kilometers (km)/square kilometers (km\2\) (Forman and Alexander 1998, p. 223). In 2016, unpaved road density in all the western and ``Ouachita'' fanshell mussel MUs were 1.6 km/km\2\ or less.Habitat Fragmentation Hydrologic and geomorphic processes directly relate to habitat extent. The number and distribution of habitat patches and their connectivity influence species population health. Historically, the two fanshell species likely occurred throughout the river basins described in the SSA (Service 2020, pp. 21-31). Large-scale reductions in mussel diversity and abundance are largely due to habitat changes caused by impoundments (Neves et al. 1997, p. 63). The number of impoundments in ``Ouachita'' fanshell MUs ranges from 3 to 51, and in western fanshell MUs ranges from 4 to 73.Effects of Climate Change We examined information on the anticipated effects of climate change, including changes to water temperatures and precipitation patterns. In its 5th Assessment Report, the Intergovernmental Panel on Climate Change (IPCC) adopted ``representative concentration pathways'' (RCPs), which are greenhouse gas concentration trajectories, to describe potential future climate outcomes, depending on the amount of greenhouse gases that are emitted in the future (IPCC 2014, pp. 126-127). Under RCP4.5 and RCP8.5, the seasonal averages of 30 Coupled Model Intercomparison Project 5 (CMIP5) models from 1950 to 2100 indicate warming air temperatures in the Lower Mississippi River region, with a central tendency of less than 2 inches change in precipitation (Alder and Hostetler 2013, pp. 2-3). We expect changes in stream temperatures to reflect changes in air temperature, at a rate of an approximately 0.6-0.8 [deg]C increase in stream water temperature for every 1 [deg]C increase in air temperature (Morrill et al. 2005, pp. 1-2, 15). These water temperature changes will have implications for temperature-dependent water quality parameters (such as dissolved oxygen and ammonia toxicity), spawning, and physiological effects to thermally sensitive species. Future increases in the frequency and severity of both extreme drought and extreme rainfall are expected to transform many ecosystems in the Southeast, including Arkansas (Carter et al. 2018, pp. 743-808). Mussels are highly sensitive to secondary effects of drought (for example, water temperature, etc.), but their ability to withstand severe drought is highly dependent on where they occur (Haag and Warren 2008, p. 1165) and sufficient time between sequential drought events for mussel populations to recover (Vaughn et al. 2015, pp. 1297-1298). We also considered whether the threats discussed above may be exacerbated by small population size (or low condition). Although there are populations in low condition in all the basins in which the two species occur, none of the basins have seen their populations reduced to one or two populations in low condition.Regulatory MechanismsState Protections The western fanshell is listed as State endangered with designated critical habitats under the Kansas Nongame and Endangered Species Conservation Act. Under State law, any time an eligible project is proposed that will impact the species' preferred habitats within its probable range in Kansas, the project sponsor must contact the Kansas Department of Wildlife, Parks and Tourism, regarding potential permit requirements. The western fanshell and ``Ouachita'' fanshell do not receive protection under State law in any other States.Other Regulatory Mechanisms The U.S Forest Service (2005, p. 58) established a wildlife and fish habitat road density objective of less than or equal to 1.6 km/2.6 km\2\ on the Ouachita National Forest in west-central Arkansas, which includes the Ouachita Headwaters and Caddo MUs for ``Ouachita'' Fanshell. The Arkansas Unpaved Roads Program, authorized by Act 898 of the 90th General Assembly in 2005, establishes a proactive, incentive-based management program that results in utilization of best management practices on unpaved roads to minimize erosion and maintain and improve the health of priority lakes and rivers (TNC 2017, entire), including those where both fanshell mussel species occur.Current Conditions Current (and future) conditions are described using categories that estimate the overall condition (resiliency) of the western fanshell and ``Ouachita'' fanshell populations. These categories are based on an evaluation of multiple population and habitat factors (Service 2020, pp. 16-19). Given that both of the fanshells' ranges include medium to large rivers with some populations fragmented by dams and creation of navigation channels, we delineated separate populations for each watershed through which these streams flow (if there was an occurrence record for the stream in that watershed), based on the hydrologic unit code (HUC) (Seaber et al. 1987, entire; U.S Geological Survey 2018, entire) at the fourth of six levels (that is, the HUC-8 watershed), and termed these ``management units'' (MUs). MUs represent areas with one or more populations capable of dispersal and interaction. As a result, some watersheds have been combined into one management unit because of a lack of dispersal barriers and some divided into multiple management units. MUs were identified as most appropriate for assessing population-level resiliency because the stream level was determined to be too coarse of a scale to estimate the condition factors influencing resiliency (Service 2020, p. 16). We defined a MU as currently extant if it contains live or recent dead individuals observed in surveys from 2000 to the present (Service 2020, p. 21).[[Page 12347]] To evaluate the species' genetic and ecological diversity (representation) in the absence of species-specific genetic information, we considered the extent and variability of environmental conditions within the two species' geographic ranges. Based on the best available ***data***, we identified representation units at the HUC-4 watershed level, which is the second HUC level and covers a larger area than HUC-8.Western Fanshell The western fanshell's current range includes a total of 11 MUs across three HUC-4 units: Neosho-Verdigris (2 MUs), Lower Mississippi-St. Francis (3 MUs), and Upper White (6 MUs) river drainages of Arkansas, Missouri, Kansas, and Oklahoma. Historically, the western fanshell occurred in another 14 MUs and is presumed extirpated from the Lower Arkansas (HUC-4) river drainage. Of the current MUs, three (27 percent) are estimated to be highly resilient, three (27 percent) are estimated to be moderately resilient, and five (46 percent) are estimated to have low resiliency (Service 2020, pp. 36-46). The habitat conditions across the 11 extant populations are medium to high (Service 2020, p. 41).``Ouachita'' Fanshell The ``Ouachita'' fanshell currently occurs in 4 MUs within portions of the Ouachita River basin (HUC-4) in Arkansas. One population is presumed extirpated. Of the current MUs, one (25 percent) is estimated to be highly resilient, one (25 percent) is estimated to be moderately resilient, and two (50 percent) are estimated to have low resiliency (Service 2020, pp. 46-50). The habitat conditions across the 4 extant populations are medium to high (Service 2020, p. 47).Future Conditions We forecasted the western fanshell's and ``Ouachita'' fanshell's responses to plausible future scenarios of environmental conditions. The future scenarios project the threats into the future and consider the impacts those threats could have on the viability of the western fanshell and ``Ouachita'' fanshell. We apply the concepts of resiliency, redundancy, and representation to the future scenarios to describe possible future conditions of the western fanshell and ``Ouachita'' fanshell. The scenarios described in the SSA report represent only two possible future conditions for each species. Uncertainty is inherent in any projection of future condition, so we must consider plausible scenarios to make our determinations. When assessing the future, viability is not a specific state, but rather a continuous measure of the likelihood that the species will sustain populations over time. In the SSA, we considered two future scenarios. Scenario 1 assesses the species' responses to moderate increases in stressors influencing the western fanshell and ``Ouachita'' fanshell populations, although current conservation practices would remain in place. Scenario 2 assesses the species' responses to severe increases in stressors. Due to a lack of resolution of the available ***data***, we were unable to distinguish any meaningful difference between a moderate increase in stressors and a moderate decrease in stressors. As a result, we limited the future forecasts to these two scenarios, which we projected over a 40-year period. We restricted our evaluation to 40 years primarily due to limitations projecting non-modeled, extrapolated future conditions for water quality, road density, and habitat fragmentation. A full description of the future scenarios and our methods is available in the SSA report (Service 2020, pp. 64-69). Under Scenario 1, populations of both fanshell species are projected to decline in resiliency and redundancy over time as conditions moderately decline from current conditions. For western fanshell, we project five (45 percent) of the currently extant MUs to become extirpated. Of the remaining six populations, four (67 percent) would be in medium condition, and two (33 percent) in low condition, with no MUs in high condition. For ``Ouachita'' fanshell, we project two (50 percent) of the currently extant MUs to become extirpated. Of the remaining two populations, one (50 percent) would be in medium condition, and one (50 percent) in low condition, with no MUs in high condition. All of the extant HUC-4 river basins would remain occupied for both species. While our projections under Scenario 2 do not anticipate additional extirpations from those observed under Scenario 1, we expect all remaining populations of both species to be in low condition in 40 years. All extant HUC-4 river basins would remain occupied for both species. We note that, by using the SSA framework to guide our analysis of the scientific information documented in the SSA report, we have not only analyzed individual effects on the species, but we have also analyzed their potential cumulative effects. We incorporate the cumulative effects into our SSA analysis when we characterize the current and future condition of the species. To assess the current and future condition of the species, we undertake an iterative analysis that encompasses and incorporates the threats individually and then accumulates and evaluates the effects of all the factors that may be influencing the species, including threats and conservation efforts. Because the SSA framework considers not just the presence of the factors, but to what degree they collectively influence risk to the entire species, our assessment integrates the cumulative effects of the factors and replaces a standalone cumulative effects analysis.Determination of Western Fanshell and ``Ouachita'' Fanshell Status Section 4 of the Act (16 U.S.C 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species meets the definition of an ``endangered species'' or a ``threatened species.'' The Act defines ``endangered species'' as a species in danger of extinction throughout all or a significant portion of its range, and ``threatened species'' as a species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether a species meets the definition of ``endangered species'' or ``threatened species'' because of any of the following factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence.Western Fanshell--Status Throughout All of Its Range After evaluating threats to the species and assessing the cumulative effect of the threats under the Act's section 4(a)(1) factors, we determined that the western fanshell has experienced a reduction in populations/management units from historical conditions. However, the species still ranges over three of the four major drainages (HUC-4 representation units) in which it historically occurred. Eleven of 27 historical MUs are extant. Of those 11, 3 MUs are currently in high condition, 3 in medium condition, and 5 in low condition. The majority (54 percent) of the MUs are in high or medium condition. There is at least one MU in high condition in each of the 3 extant representation units. With 11 extant[[Page 12348]]MUs across three HUC-4s, the species currently retains redundancy to withstand and survive potential catastrophic events, although there is no imminent catastrophic threat. Therefore, we determined that the species is not in danger of extinction throughout all of its range. However, the following threats currently acting on the western fanshell will likely continue into the foreseeable future and decrease the condition of the species further over time: Habitat loss and degradation from siltation, water quality degradation, altered flow, landscape changes, and habitat fragmentation (Factor A). These threats are reasonably expected to be exacerbated by continued urbanization, and threats of water quality (temperature) and flow are especially exacerbated by climate change (Factor E). These threats will continue to impact the species into the foreseeable future, and the existing regulatory mechanisms (Factor D) are not adequately reducing the impact of these threats on the species. The best available ***data*** do not indicate that the western fanshell is currently impacted at the population level by overutilization for commercial, recreational, scientific, or educational purposes (Factor B) or predation or disease (Factor C), nor do the best available ***data*** indicate that the species will be impacted by these factors in the future. Given the projection of threats 40 years into the future, the number of western fanshell populations will decline with the projected loss of five MUs, reducing the species' redundancy. Across the plausible future scenarios, resiliency also declines with zero to four populations projected to be in medium condition and two to six populations in low condition. No populations are projected to be in high condition in the foreseeable future. Representation is projected to remain across the range, but the considerable loss of redundancy and resiliency makes the species likely to become in danger of extinction in the foreseeable future throughout its range. Thus, after assessing the best available information, we conclude that the western fanshell is likely to become in danger of extinction within the foreseeable future throughout all of its range.Western Fanshell--Status Throughout a Significant Portion of Its Range Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. The court in Center for Biological Diversity v. Everson, 2020 WL 437289 (D.D.C Jan. 28, 2020) (Center for Biological Diversity), vacated the aspect of the Final Policy on Interpretation of the Phrase ``Significant Portion of Its Range'' in the Endangered Species Act's Definitions of ``Endangered Species'' and ``Threatened Species'' (79 FR 37578; July 1, 2014) that provided that the Service does not undertake an analysis of significant portions of a species' range if the species warrants listing as threatened throughout all of its range. Therefore, we proceed to evaluating whether the species is endangered in a significant portion of its range--that is, whether there is any portion of the species' range for which both (1) the portion is significant; and (2) the species is in danger of extinction in that portion. Depending on the case, it might be more efficient for us to address the ``significance'' question or the ``status'' question first. We can choose to address either question first. Regardless of which question we address first, if we reach a negative answer with respect to the first question that we address, we do not need to evaluate the other question for that portion of the species' range. Following the court's holding in Center for Biological Diversity, we now consider whether there are any significant portions of the species' range where the species is in danger of extinction now (that is, endangered). In undertaking this analysis for western fanshell, we choose to address the status question first--we consider information pertaining to the geographic distribution of both the species and the threats that the species faces to identify any portions of the range where the species is endangered. For western fanshell, we considered whether the threats are geographically concentrated in any portion of the species' range at a biologically meaningful scale. We examined the following threats: Water quality degradation, altered flow, landscape changes, and habitat fragmentation, including cumulative effects. We evaluated multiple factors--including various water quality parameters, land cover ***data***, road density, and barriers--that contribute to these primary threats. These habitat factors are in a medium to high condition across the species' range. Overall, we found that threats are acting similarly within the occupied river basins across the species' range. We found no concentration of threats in any portion of the western fanshell's range at a biologically meaningful scale. Thus, there are no portions of the species' range where the species has a different status from its rangewide status. Therefore, no portion of the species' range provides a basis for determining that the species is in danger of extinction in a significant portion of its range, and we determine that the species is likely to become in danger of extinction within the foreseeable future throughout all of its range. This is consistent with the courts' holdings in Desert Survivors v. Department of the Interior, No. 16-cv-01165-JCS, 2018 WL 4053447 (N.D Cal. Aug. 24, 2018), and Center for Biological Diversity v. Jewell, 248 F. Supp. 3d, 946, 959 (D. Ariz. 2017).Western Fanshell--Determination of Status Our review of the best available scientific and commercial information indicates that the western fanshell meets the Act's definition of a threatened species. Therefore, we propose to list the western fanshell as a threatened species in accordance with sections 3(20) and 4(a)(1) of the Act.``Ouachita'' Fanshell--Status Throughout All of Its Range After evaluating threats to the species and assessing the cumulative effect of the threats under the section 4(a)(1) factors, we determined that the ``Ouachita'' fanshell has experienced a reduction in resiliency and redundancy from historical conditions. The species is extant in four MUs within one major drainage (HUC-4 representation unit). The species historically occurred in Bayou Bartholomew in Louisiana. Of the four extant MUs, one is currently in high condition, one in medium condition, and two in low condition. The species appears to be endemic to the Ouachita River basin. Although the species is known from only one representation unit, half of the extant populations are in high or medium condition. The species currently retains redundancy to withstand and survive potential catastrophic events, although there is no imminent catastrophic threat. Therefore, we determined that the species is not in danger of extinction throughout all of its range. The following threats currently acting on the ``Ouachita'' fanshell will likely continue into the foreseeable future and decrease the condition of the species further over time: Habitat loss and degradation from siltation, water quality degradation, altered flow, landscape changes, and habitat fragmentation (Factor A). These threats are reasonably expected to be exacerbated by continued urbanization, and threats of water quality (temperature) and flow are especially exacerbated by climate change (Factor E). These threats will[[Page 12349]]continue to impact the species into the foreseeable future, and the existing regulatory mechanisms (Factor D) are not adequately reducing the impact of these threats on the species. The best available ***data*** do not indicate that the ``Ouachita'' fanshell is currently impacted at the population level by overutilization for commercial, recreational, scientific, or educational purposes (Factor B) or predation or disease (Factor C), nor do the best available ***data*** indicate that the species will be impacted by these factors in the future. Given the projection of threats 40 years into the future, the number of ``Ouachita'' fanshell populations will decline with the projected loss of two MUs, reducing the species' redundancy. Resiliency also declines with three to four populations projected to be in low condition and zero to one population(s) in medium condition. No populations are projected to be in high condition in the foreseeable future. As the species occurs in only the Ouachita River basin, representation is projected to remain, but the considerable loss of redundancy and resiliency makes the species likely to become in danger of extinction in the foreseeable future throughout its range. Thus, after assessing the best available information, we conclude that the ``Ouachita'' fanshell is likely to become in danger of extinction within the foreseeable future throughout all of its range.``Ouachita'' Fanshell--Status Throughout a Significant Portion of Its Range See above, under Western Fanshell--Status Throughout a Significant Portion of Its Range, for a description of our evaluation methods and our policy application. In undertaking the analysis for the ``Ouachita'' fanshell, we choose to address the status question first--we consider information pertaining to the geographic distribution of both the species and the threats that the species faces to identify any portions of the range where the species is endangered. We examined the following threats: Water quality degradation, altered flow, landscape changes, and habitat fragmentation, including cumulative effects. We evaluated multiple factors--including various water quality parameters, land cover ***data***, road density, and barriers--that contribute to these primary threats. These habitat factors are in a medium to high condition across the species' range. Overall, we found that threats are acting similarly across the species' range. We found no concentration of threats in any portion of the ``Ouachita'' fanshell's range at a biologically meaningful scale. Thus, there are no portions of the species' range where the species has a different status from its rangewide status. Therefore, no portion of the species' range provides a basis for determining that the species is in danger of extinction in a significant portion of its range, and we determine that the species is likely to become in danger of extinction within the foreseeable future throughout all of its range. This is consistent with the courts' holdings in Desert Survivors v. Department of the Interior, No. 16-cv-01165-JCS, 2018 WL 4053447 (N.D Cal. Aug. 24, 2018), and Center for Biological Diversity v. Jewell, 248 F. Supp. 3d, 946, 959 (D. Ariz. 2017).``Ouachita'' Fanshell--Determination of Status Our review of the best available scientific and commercial information indicates that the ``Ouachita'' fanshell meets the Act's definition of a threatened species. Therefore, we propose to list the ``Ouachita'' fanshell as a threatened species in accordance with sections 3(20) and 4(a)(1) of the Act.Available Conservation Measures Conservation measures provided to species listed as endangered or threatened species under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness, and conservation by Federal, State, Tribal, and local agencies, private organizations, and individuals. The Act encourages cooperation with the States and other countries and calls for recovery actions to be carried out for listed species. The protection required by Federal agencies and the prohibitions against certain activities are discussed, in part, below. The primary purpose of the Act is the conservation of endangered and threatened species and the ecosystems upon which they depend. The ultimate goal of such conservation efforts is the recovery of these listed species, so that they no longer need the protective measures of the Act. Section 4(f) of the Act calls for the Service to develop and implement recovery plans for the conservation of endangered and threatened species. The recovery planning process involves the identification of actions that are necessary to halt or reverse the species' decline by addressing the threats to its survival and recovery. The goal of this process is to restore listed species to a point where they are secure, self-sustaining, and functioning components of their ecosystems. Recovery planning consists of preparing draft and final recovery plans, beginning with the development of a recovery outline and making it available to the public within 30 days of a final listing determination. The recovery outline guides the immediate implementation of urgent recovery actions. Revisions of the plan may be done to address continuing or new threats to the species, as new substantive information becomes available. The recovery plan also identifies recovery criteria for review of when a species may be ready for reclassification from endangered to threatened (``downlisting'') or removal from protected status (``delisting''), and as a benchmark for monitoring recovery progress. Recovery plans also establish a framework for agencies to coordinate their recovery efforts and provide estimates of the cost of implementing recovery tasks. When completed, the recovery outline, draft recovery plan, and the final recovery plan will be available on our website ([*http://www.fws.gov/endangered*](http://www.fws.gov/endangered)), or from our Arkansas Ecological Services Field Office for ``Ouachita'' fanshell or Missouri Ecological Services Field Office for western fanshell (see FOR FURTHER INFORMATION CONTACT). Implementation of recovery actions generally requires the participation of a broad range of partners, including other Federal agencies, States, Tribes, nongovernmental organizations, businesses, and private landowners. Examples of recovery actions include habitat restoration (for example, restoration of native vegetation), research, captive propagation and reintroduction, and outreach and education. The recovery of many listed species cannot be accomplished solely on Federal lands because their range may occur primarily or solely on non-Federal lands. To achieve recovery of these species requires cooperative conservation efforts on private, State, and Tribal lands. If this species is listed, funding for recovery actions will be available from a variety of sources, including Federal budgets, State programs, and cost-share grants for non-Federal landowners, the academic community, and nongovernmental organizations. In addition, pursuant to section 6 of the Act, the States of Arkansas, Kansas, Missouri, and Oklahoma would be eligible for Federal funds to implement management actions that promote the protection or recovery of the western fanshell and the States of Arkansas and[[Page 12350]]Louisiana would be eligible for Federal funds to implement management actions that promote the protection or recovery of the ``Ouachita'' fanshell. Information on our grant programs that are available to aid species recovery can be found at: [*http://www.fws.gov/grants*](http://www.fws.gov/grants). Although the western fanshell and ``Ouachita'' fanshell are only proposed for listing under the Act at this time, please let us know if you are interested in participating in conservation efforts for these species. Additionally, we invite you to submit any new information on these species whenever it becomes available and any information you may have for recovery planning purposes (see FOR FURTHER INFORMATION CONTACT). Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as an endangered or threatened species and with respect to its critical habitat, if any is designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any action that is likely to jeopardize the continued existence of a species proposed for listing or result in destruction or adverse modification of proposed critical habitat. If a species is listed subsequently, section 7(a)(2) of the Act requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of the species or destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into consultation with the Service. Federal agency actions within the species' habitat that may require conference or consultation or both as described in the preceding paragraph include, but are not limited to, activities authorized, funded, or carried out by the following agencies: (1) U.S Army Corps of Engineers (channel dredging and maintenance; dam projects including flood control, navigation, hydropower, bridge projects, stream restoration, and Clean Water Act permitting). (2) U.S Department of ***Agriculture***, including the Natural Resources Conservation Service and Farm Service Agency (technical and financial assistance for projects) and the Forest Service (aquatic habitat restoration, fire management plans, fuel reduction treatments, forest plans, mining permits). (3) U.S Department of Energy (renewable and alternative energy projects). (4) Federal Energy Regulatory Commission (interstate pipeline construction and maintenance, dam relicensing, hydrokinetics). (5) U.S Department of Transportation (highway and bridge construction and maintenance). (6) U.S Fish and Wildlife Service (issuance of section 10 permits for enhancement of survival, habitat conservation plans, and safe harbor agreements; National Wildlife Refuge planning and refuge activities; Partners for Fish and Wildlife program projects benefiting these species or other listed species; Wildlife and Sportfish Restoration program sportfish stocking). (7) Environmental Protection Agency (water quality criteria, permitting). (8) Office of Surface Mining (land resource management plans, mining permits, oil and natural gas permits, renewable energy development). It is our policy, as published in the Federal Register on July 1, 1994 (59 FR 34272), to identify to the maximum extent practicable at the time a species is listed, those activities that would or would not constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of a proposed listing on proposed and ongoing activities within the range of the species proposed for listing. The discussion below regarding protective regulations under section 4(d) of the Act complies with our policy.II. Proposed Rule Issued Under Section 4(d) of the ActBackground Section 4(d) of the Act contains two sentences. The first sentence states that the Secretary shall issue such regulations as she deems necessary and advisable to provide for the conservation of species listed as threatened. The U.S Supreme Court has noted that statutory language like ``necessary and advisable'' demonstrates a large degree of deference to the agency (see Webster v. Doe, 486 U.S 592 (1988)). Conservation is defined in the Act to mean the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Additionally, the second sentence of section 4(d) of the Act states that the Secretary may by regulation prohibit with respect to any threatened species any act prohibited under section 9(a)(1), in the case of fish or wildlife, or section 9(a)(2), in the case of plants. Thus, the combination of the two sentences of section 4(d) provides the Secretary with wide latitude of discretion to select and promulgate appropriate regulations tailored to the specific conservation needs of the threatened species. The second sentence grants particularly broad discretion to the Service when adopting the prohibitions under section 9. The courts have recognized the extent of the Secretary's discretion under this standard to develop rules that are appropriate for the conservation of a species. For example, courts have upheld rules developed under section 4(d) as a valid exercise of agency authority where they prohibited take of threatened wildlife, or include a limited taking prohibition (see Alsea Valley Alliance v. Lautenbacher, 2007 U.S Dist. Lexis 60203 (D. Or. 2007); Washington Environmental Council v. National Marine Fisheries Service, 2002 U.S Dist. Lexis 5432 (W.D Wash. 2002)). Courts have also upheld 4(d) rules that do not address all of the threats a species faces (see State of Louisiana v. Verity, 853 F.2d 322 (5th Cir. 1988)). As noted in the legislative history when the Act was initially enacted, ``once an animal is on the threatened list, the Secretary has an almost infinite number of options available to him [or her] with regard to the permitted activities for those species. He [or she] may, for example, permit taking, but not importation of such species, or he [or she] may choose to forbid both taking and importation but allow the transportation of such species'' (H.R Rep. No. 412, 93rd Cong., 1st Sess. 1973). Exercising this authority under section 4(d), we have developed a proposed rule that is designed to address the western fanshell's and ``Ouachita'' fanshell's specific threats and conservation needs. Although the statute does not require us to make a ``necessary and advisable'' finding with respect to the adoption of specific prohibitions under section 9, we find that this rule as a whole satisfies the requirement in section 4(d) of the Act to issue regulations deemed necessary and advisable to provide for the conservation of the western fanshell and ``Ouachita'' fanshell. As discussed above under Summary of Biological Status and Threats, we have concluded that the western fanshell and ``Ouachita'' fanshell are likely to become in danger of extinction within the foreseeable future primarily due to habitat loss and degradation from siltation, water and sediment quality degradation, changes to flow, and impoundments. These threats, which[[Page 12351]]are expected to be exacerbated by continued urbanization and the effects of climate change, were central to our assessment of the future viability of the western fanshell and ``Ouachita'' fanshell. The provisions of this proposed 4(d) rule would promote conservation of the western fanshell and ``Ouachita'' fanshell by encouraging management of the landscape in ways that meet both land management considerations and the conservation needs of the western fanshell and ``Ouachita'' fanshell. The provisions of this proposed rule are one of many tools that we would use to promote the conservation of the western fanshell and ``Ouachita'' fanshell. This proposed 4(d) rule would apply only if and when we make final the listing of the western fanshell and ``Ouachita'' fanshell as threatened species. Section 7(a)(2) of the Act requires Federal agencies, including the Service, to ensure that any action they fund, authorize, or carry out is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat of such species. In addition, section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any agency action which is likely to jeopardize the continued existence of any species proposed to be listed under the Act or result in the destruction or adverse modification of proposed critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency (action agency) must enter into consultation with us. Examples of actions that are subject to the section 7 consultation process are actions on State, Tribal, local, or private lands that require a Federal permit (such as a permit from the U.S Army Corps of Engineers under section 404 of the Clean Water Act (33 U.S.C 1251 et seq.) or a permit from the Service under section 10 of the Act) or that involve some other Federal action (such as funding from the Federal Highway Administration, Federal Aviation Administration, or the Federal Emergency Management Agency). Federal actions not affecting listed species or critical habitat--and actions on State, Tribal, local, or private lands that are not federally funded, authorized, or carried out by a Federal agency--do not require section 7 consultation. This obligation does not change in any way for a threatened species with a species-specific 4(d) rule. Actions that result in a determination by a Federal agency of ``not likely to adversely affect'' continue to require the Service's written concurrence and actions that are ``likely to adversely affect'' a species require formal consultation and the formulation of a biological opinion.Provisions of the Proposed 4(d) Rule This proposed 4(d) rule would provide for the conservation of the western fanshell and ``Ouachita'' fanshell by prohibiting the following activities, except as otherwise authorized or permitted: Importing or exporting; take; possession and other acts with unlawfully taken specimens; delivering, receiving, transporting, or shipping in interstate or foreign commerce in the course of commercial activity; or selling or offering for sale in interstate or foreign commerce. As discussed above under Summary of Biological Status and Threats, multiple factors are affecting the status of western fanshell and ``Ouachita'' fanshell. A range of activities have the potential to affect these species, including, for example, habitat loss and degradation from siltation, water and sediment quality degradation, changes to flow, and impoundments. These threats, which are expected to be exacerbated by continued urbanization and the effects of climate change, were central to our assessment of the future viability of western fanshell and ``Ouachita'' fanshell. Therefore, we prohibit actions resulting in the incidental take of western fanshell and ``Ouachita'' fanshell by altering or degrading the habitat. Regulating incidental take resulting from these activities would help preserve the species' remaining populations, slow their rate of decline, and decrease synergistic, negative effects from other stressors. Under the Act, ``take'' means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or ***collect***, or to attempt to engage in any such conduct. Some of these provisions have been further defined in regulation at 50 CFR 17.3 Take can result knowingly or otherwise, by direct and indirect impacts, intentionally or incidentally. The proposed 4(d) rule would also provide for the conservation of the species by allowing exceptions to actions and activities that, while they may have some minimal level of disturbance to the western fanshell and ``Ouachita'' fanshell, are not expected to negatively affect the species' conservation and recovery efforts. The proposed exceptions to these prohibitions include: (1) Channel and bank restoration projects; (2) silviculture and forest management that implements best management practices; and (3) transportation projects that avoid instream disturbance in waters occupied by the species. The first exception is for incidental take resulting from channel and bank restoration projects for creation of natural, physically stable, ecologically functioning streams, taking into consideration connectivity with floodplain and groundwater aquifers. This exception includes a requirement that bank restoration projects require planting appropriate native vegetation, including woody species appropriate for the region and habitat. We also propose language that would require surveys and relocation prior to commencement of restoration actions (and, if applicable, monitoring after relocation) for western fanshell and ``Ouachita'' fanshell that would otherwise be negatively affected by the actions. Actions related to restoration activities that would negatively affect western fanshell and ``Ouachita'' fanshell include: Individual mussels being removed, dislodged, crushed and/or killed by heavy equipment operations and rip-rap placement; removal, destruction and/or replacement of habitat; increased turbidity from streambed disturbance; and alterations to flow and turbidity from permanent (weirs) or temporary (causeways) structures needed for construction. The second exception is for incidental take resulting from silviculture and forest management activities that use State-approved best management practices to protect water and sediment quality and stream and riparian habitat. Best management practices are designed to reduce sedimentation, erosion, and bank destruction, thereby protecting instream habitat for these species. The third exception is for incidental take resulting from transportation projects that do not include activities that disturb instream habitat. Bridge designs that include spanning the stream and avoiding stream bank disturbance reduce sedimentation and erosion, thereby protecting instream habitat for these species. We reiterate that these actions and activities may have some minimal level of take of the western fanshell and ``Ouachita'' fanshell, but any such take is expected to be rare and insignificant, and is not expected to negatively impact the species' conservation and recovery efforts. Rather, we expect they would have a net beneficial effect on the species. Across the species' range, instream habitats have been degraded physically by sedimentation and by direct and indirect channel disturbance. The habitat restoration activities in the proposed 4(d) rule are intended to[[Page 12352]]improve habitat conditions for the species in the long term. We may issue permits to carry out otherwise prohibited activities, including those described above, involving threatened wildlife under certain circumstances. Regulations governing permits for threatened wildlife are codified at 50 CFR 17.32 With regard to threatened wildlife, a permit may be issued for the following purposes: For scientific purposes, to enhance the propagation or survival of the species, for economic hardship, for zoological exhibition, for educational purposes, for incidental taking, or for special purposes consistent with the purposes of the Act. The statute also contains certain exemptions from the prohibitions, which are found in sections 9 and 10 of the Act. In addition, we are considering, but have not specifically proposed in this document, an exception from permitting requirements for individuals conducting presence/absence surveys, studies to document habitat use, population monitoring, and evaluations of potential impacts to the fanshells, provided the individual holds a valid scientific ***collecting*** permit for mussels from the appropriate State agency. If we conclude that this measure would provide for the conservation of the species, we may include a provision in the final 4(d) rule. We specifically request comments on this provision we are considering. We recognize the special and unique relationship with our State natural resource agency partners in contributing to conservation of listed species. State agencies often possess scientific ***data*** and valuable expertise on the status and distribution of endangered, threatened, and candidate species of wildlife and plants. State agencies, because of their authorities and their close working relationships with local governments and landowners, are in a unique position to assist the Service in implementing all aspects of the Act. In this regard, section 6 of the Act provides that the Service shall cooperate to the maximum extent practicable with the States in carrying out programs authorized by the Act. Therefore, any qualified employee or agent of a State conservation agency that is a party to a cooperative agreement with the Service in accordance with section 6(c) of the Act, who is designated by his or her agency for such purposes, would be able to conduct activities designed to conserve the western fanshell and ``Ouachita'' fanshell that may result in otherwise prohibited take without additional authorization. Nothing in this proposed 4(d) rule would change in any way the recovery planning provisions of section 4(f) of the Act, the consultation requirements under section 7 of the Act, or the ability of the Service to enter into partnerships for the management and protection of the western fanshell and ``Ouachita'' fanshell. However, interagency cooperation may be further streamlined through planned programmatic consultations for the species between Federal agencies and the Service, where appropriate. We ask the public, particularly State agencies and other interested stakeholders that may be affected by the proposed 4(d) rule, to provide comments and suggestions regarding additional guidance and methods that the Service could provide or use, respectively, to streamline the implementation of this proposed 4(d) rule (see Information Requested, above).III. Critical HabitatBackground Critical habitat is defined in section 3 of the Act as: (1) The specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Act, on which are found those physical or biological features: (a) Essential to the conservation of the species, and (b) Which may require special management considerations or protection; and (2) Specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. Our regulations at 50 CFR 424.02 define the geographical area occupied by the species as an area that may generally be delineated around species' occurrences, as determined by the Secretary (that is, range). Such areas may include those areas used throughout all or part of the species' life cycle, even if not used on a regular basis (for example, migratory corridors, seasonal habitats, and habitats used periodically, but not solely by vagrant individuals). Additionally, our regulations at 50 CFR 424.02 define the word ``habitat,'' for the purposes of designating critical habitat only, as the abiotic and biotic setting that currently or periodically contains the resources and conditions necessary to support one or more life processes of a species. Conservation, as defined under section 3 of the Act, means to use and the use of all methods and procedures that are necessary to bring an endangered or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking. Critical habitat receives protection under section 7 of the Act through the requirement that Federal agencies ensure, in consultation with the Service, that any action they authorize, fund, or carry out is not likely to result in the destruction or adverse modification of critical habitat. The designation of critical habitat does not affect land ownership or establish a refuge, wilderness, reserve, preserve, or other conservation area. Such designation also does not allow the government or public to access private lands. Such designation does not require implementation of restoration, recovery, or enhancement measures by non-Federal landowners. Where a landowner requests Federal agency funding or authorization for an action that may affect a listed species or critical habitat, the Federal agency would be required to consult with the Service under section 7(a)(2) of the Act. However, even if the Service were to conclude that the proposed activity would result in destruction or adverse modification of the critical habitat, the Federal action agency and the landowner are not required to abandon the proposed activity, or to restore or recover the species; instead, they must implement ``reasonable and prudent alternatives'' to avoid destruction or adverse modification of critical habitat. Under the first prong of the Act's definition of critical habitat, areas within the geographical area occupied by the species at the time it was listed are included in a critical habitat designation if they contain physical or biological features (1) essential to the conservation of the species and (2) which may require special management considerations or protection. For these areas, critical habitat designations identify, to the extent known using the best scientific and commercial ***data*** available, those physical or biological features that are essential to the conservation of the species (such as space, food, cover, and protected habitat). In identifying those physical or biological features that occur in specific occupied areas, we focus on the specific[[Page 12353]]features that are essential to support the life-history needs of the species, including, but not limited to, water characteristics, soil type, geological features, prey, vegetation, symbiotic species, or other features. A feature may be a single habitat characteristic or a more complex combination of habitat characteristics. Features may include habitat characteristics that support ephemeral or dynamic habitat conditions. Features may also be expressed in terms relating to principles of conservation biology, such as patch size, distribution distances, and connectivity. Under the second prong of the Act's definition of critical habitat, we can designate critical habitat in areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. The implementing regulations at 50 CFR 424.12(b)(2) further delineate unoccupied critical habitat by setting out three specific parameters: (1) When designating critical habitat, the Secretary will first evaluate areas occupied by the species; (2) the Secretary will consider unoccupied areas to be essential only where a critical habitat designation limited to geographical areas occupied by the species would be inadequate to ensure the conservation of the species; and (3) for an unoccupied area to be considered essential, the Secretary must determine that there is a reasonable certainty both that the area will contribute to the conservation of the species and that the area contains one or more of those physical or biological features essential to the conservation of the species. Section 4 of the Act requires that we designate critical habitat on the basis of the best scientific ***data*** available. Further, our Policy on Information Standards Under the Endangered Species Act (published in the Federal Register on July 1, 1994 (59 FR 34271)), the Information Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Pub. L. 106-554; H.R 5658)), and our associated Information Quality Guidelines provide criteria, establish procedures, and provide guidance to ensure that our decisions are based on the best scientific ***data*** available. They require our biologists, to the extent consistent with the Act and with the use of the best scientific ***data*** available, to use primary and original sources of information as the basis for recommendations to designate critical habitat. When we are determining which areas should be designated as critical habitat, our primary source of information is generally the information from the SSA report and information developed during the listing process for the species. Additional information sources may include any generalized conservation strategy, criteria, or outline that may have been developed for the species; the recovery plan for the species; articles in peer-reviewed journals; conservation plans developed by States and counties; scientific status surveys and studies; biological assessments; other unpublished materials; or experts' opinions or personal knowledge. As the regulatory definition of ``habitat'' reflects (50 CFR 424.02), habitat is dynamic, and species may move from one area to another over time. We recognize that critical habitat designated at a particular point in time may not include all of the habitat areas that we may later determine are necessary for the recovery of the species. For these reasons, a critical habitat designation does not signal that habitat outside the designated area is unimportant or may not be needed for recovery of the species. Areas that are important to the conservation of the species, both inside and outside the critical habitat designation, will continue to be subject to: (1) Conservation actions implemented under section 7(a)(1) of the Act; (2) regulatory protections afforded by the requirement in section 7(a)(2) of the Act for Federal agencies to ensure their actions are not likely to jeopardize the continued existence of any endangered or threatened species; and (3) the prohibitions found in section 9 of the Act. Federally funded or permitted projects affecting listed species outside their designated critical habitat areas may still result in jeopardy findings in some cases. These protections and conservation tools will continue to contribute to recovery of these species. Similarly, critical habitat designations made on the basis of the best available information at the time of designation will not control the direction and substance of future recovery plans, habitat conservation plans (HCPs), or other species conservation planning efforts if new information available at the time of those planning efforts calls for a different outcome.Prudency Determination Section 4(a)(3) of the Act, as amended, and implementing regulations (50 CFR 424.12) require that, to the maximum extent prudent and determinable, the Secretary shall designate critical habitat at the time the species is determined to be an endangered or threatened species. Our regulations (50 CFR 424.12(a)(1)) state that the Secretary may, but is not required to, determine that a designation would not be prudent in the following circumstances: (i) The species is threatened by taking or other human activity and identification of critical habitat can be expected to increase the degree of such threat to the species; (ii) The present or threatened destruction, modification, or curtailment of a species' habitat or range is not a threat to the species, or threats to the species' habitat stem solely from causes that cannot be addressed through management actions resulting from consultations under section 7(a)(2) of the Act; (iii) Areas within the jurisdiction of the United States provide no more than negligible conservation value, if any, for a species occurring primarily outside the jurisdiction of the United States; (iv) No areas meet the definition of critical habitat; or (v) The Secretary otherwise determines that designation of critical habitat would not be prudent based on the best scientific ***data*** available. As discussed earlier in this document, there is currently no imminent threat of ***collection*** or vandalism identified under Factor B for these species, and identification and mapping of critical habitat is not expected to initiate any such threat. In our SSA and proposed listing determination for the western fanshell and ``Ouachita'' fanshell, we determined that the present or threatened destruction, modification, or curtailment of habitat or range is a threat to the western fanshell and ``Ouachita'' fanshell and that those threats can be addressed in some way by section 7(a)(2) consultation measures. These species occur wholly in the jurisdiction of the United States, and we are able to identify areas that meet the definition of critical habitat. Therefore, because none of the circumstances enumerated in our regulations at 50 CFR 424.12(a)(1) have been met and because the Secretary has not identified other circumstances for which this designation of critical habitat would be not prudent, we have determined that the designation of critical habitat is prudent for the western fanshell and ``Ouachita'' fanshell.Critical Habitat Determinability Having determined that designation is prudent, under section 4(a)(3) of the Act we must find whether critical habitat for the western fanshell and ``Ouachita'' fanshell is determinable. Our regulations at 50 CFR 424.12(a)(2) state[[Page 12354]]that critical habitat is not determinable when one or both of the following situations exist: (i) ***Data*** sufficient to perform required analyses are lacking, or (ii) The biological needs of the species are not sufficiently well known to identify any area that meets the definition of ``critical habitat.'' When critical habitat is not determinable, the Act allows the Service an additional year to publish a critical habitat designation (16 U.S.C 1533(b)(6)(C)(ii)). We reviewed the available information pertaining to the biological needs of the species and habitat characteristics where these species are located. This and other information represent the best scientific ***data*** available and led us to conclude that the designation of critical habitat is determinable for the western fanshell and ``Ouachita'' fanshell.Physical or Biological Features Essential to the Conservation of the Species In accordance with section 3(5)(A)(i) of the Act and regulations at 50 CFR 424.12(b), in determining which areas we will designate as critical habitat from within the geographical area occupied by the species at the time of listing, we consider the physical or biological features that are essential to the conservation of the species and which may require special management considerations or protection. The regulations at 50 CFR 424.02 define ``physical or biological features essential to the conservation of the species'' as the features that occur in specific areas and that are essential to support the life-history needs of the species, including, but not limited to, water characteristics, soil type, geological features, sites, prey, vegetation, symbiotic species, or other features. A feature may be a single habitat characteristic or a more complex combination of habitat characteristics. Features may include habitat characteristics that support ephemeral or dynamic habitat conditions. Features may also be expressed in terms relating to principles of conservation biology, such as patch size, distribution distances, and connectivity. For example, physical features essential to the conservation of the species might include gravel of a particular size required for spawning, alkaline soil for seed germination, protective cover for migration, or susceptibility to flooding or fire that maintains necessary early-successional habitat characteristics. Biological features might include prey species, forage grasses, specific kinds or ages of trees for roosting or nesting, symbiotic fungi, or absence of or a particular level of nonnative species consistent with conservation needs of the listed species. The features may also be combinations of habitat characteristics and may encompass the relationship between characteristics or the necessary amount of a characteristic essential to support the life history of the species. In considering whether features are essential to the conservation of the species, we may consider an appropriate quality, quantity, and spatial and temporal arrangement of habitat characteristics in the context of the life-history needs, condition, and status of the species. These characteristics include, but are not limited to, space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, or rearing (or development) of offspring; and habitats that are protected from disturbance. As described above under Summary of Biological Status and Threats, western fanshell and ``Ouachita'' fanshell occur in large creeks and rivers. Occasional or regular interaction among individuals in different river reaches not interrupted by a barrier likely occurs, but in general, interaction is strongly influenced by habitat fragmentation and distance between occupied river or stream reaches. Once released from their fish host, freshwater mussels are benthic (bottom-dwelling), generally sedentary aquatic organisms and closely associated with appropriate habitat patches within a river or stream. We derive the specific physical or biological features essential for the western fanshell and ``Ouachita'' fanshell from studies of these species' (or appropriate surrogate species') habitat, ecology, and life history. The primary habitat elements that influence resiliency of the western fanshell and ``Ouachita'' fanshell include water quality, water quantity, substrate, habitat connectivity, and the presence of host fish species to ensure recruitment. These features are also described above as species needs under Summary of Biological Status and Threats, and a full description is available in the SSA report; the individuals' needs are summarized below in Table 1. Table 1--Requirements for Life Stages of Western Fanshell and ``Ouachita'' Fanshell---------------------------------------------------------------------------------------------------------------- Life stage Resource needs--habitat requirements References----------------------------------------------------------------------------------------------------------------All Life Stages....................... Water Quality: Naturally clean, high Allen et al. 2007, pp. 80-85; quality water with little or no harmful Augspurger et al. 2003, p. pollutants (that is, pollutants occur 2569; Bringolf et al. 2007a, below tolerance limits of mussels, fish p. 2094; 2007b, p. 2086; Cope hosts, prey). The values below are et al. 2008, p. 455; Fuller based on the best available science and 1974, pp. 240-246; Gillis et assume mussels respond to average al. 2008, pp. 140-141; Gray values of a constituent over time et al. 2002, pp. 155-156; (acute or chronic exposure). Kolpin et al. 2002, pp. 1208- [rtarr8] Dissolved oxygen >3 milligrams 1210; Spooner and Vaughn per liter (mg/L). 2008, p. 311; Steingraeber et [rtarr8] Low salinity/total dissolved al. 2007, p. 297; Wang et al. solids. 2007a, 2007b, 2010, 2013, [rtarr8] Low nutrient concentrations.... entire. [rtarr8] Total ammonia nitrogen <0.3-1.0 mg/L at pH 8.0 & 25 [deg]C. [rtarr8] Nitrate <2.0 mg/L.......... [rtarr8] Nitrite <55.8 mg/L......... [rtarr8] Low concentrations of metals. [rtarr8] Cadmium <0.014 mg/L at 50 mg/L calcium carbonate (CaCO3) hardness. [rtarr8] Zinc <0.120 mg/L at 50 mg/L CaCO3 hardness. [rtarr8] Lead <0.205 mg/L at 50 mg/L CaCO3 hardness. [rtarr8] Copper <0.005 mg/L in moderately hard water. [rtarr8] Natural, unaltered ambient water temperature generally <27 [deg]C. Water Quantity: Flowing water in Galbraith and Vaughn 2009, p. sufficient quantity to support the life- 46; Allen and Vaughn 2010, p. history requirements of mussels and 390; Peterson et al. 2011, p. their fish hosts. 115; Daraio et al. 2010, p. 838.[[Page 12355]] Gamete (sperm, egg development, [rtarr8] Sexually mature males and Haag 2012, pp. 38-39; fertilization). females with appropriate water Galbraith and Vaughn 2009,Glochidia............................. temperatures for spawning, pp. 45-46; Barnhart et al. fertilization, and brooding. 2008, p. 372. [rtarr8] Presence of fish hosts (of appropriate species) with sufficient flow to allow attachment, encystment, relocation, excystment, and dispersal of glochidia..Juvenile, sub-adult, and adult (from [rtarr8] Stable substrate comprised of Allen and Vaughn 2010, pp. 384- excystment to maturity). mixed sand, gravel and cobble, and 385; Haag 2012, pp. 26-42; appropriate for burrowing, pedal Eckert 2003, pp. 18-19, 33. feeding, and survival. [rtarr8] Appropriate food sources (phytoplankton, zooplankton, protozoans, detritus, dissolved organic matter) in adequate supply.. [rtarr8] Presence and abundance of fish hosts available for recruitment..----------------------------------------------------------------------------------------------------------------Summary of Essential Physical or Biological Features We derive the specific physical or biological features essential to the conservation of the western fanshell and ``Ouachita'' fanshell from studies of the species' habitat, ecology, and life history as described below. Additional information can be found in chapter 2 of the SSA report (Service 2020, pp. 9-15), which is available on [*http://www.regulations.gov*](http://www.regulations.gov) under Docket No. FWS-R3-ES-2021-0061. We have determined that the following physical or biological features are essential to the conservation of the western fanshell and ``Ouachita'' fanshell: (1) Adequate flows, or a hydrologic flow regime (magnitude, timing, frequency, duration, rate of change, and overall seasonality of discharge over time), necessary to maintain benthic habitats where the species are found and to maintain stream connectivity, specifically providing for the exchange of nutrients and sediment for maintenance of the mussels' and fish hosts' habitat and food availability, maintenance of spawning habitat for native host fishes, and the ability for newly transformed juveniles to settle and become established in their habitats. Adequate flows ensure delivery of oxygen, enable reproduction, deliver food to filter-feeding mussels, and reduce contaminants and fine sediments from interstitial spaces. (2) Suitable substrates and connected instream habitats, characterized by geomorphically stable stream channels and banks (that is, channels that maintain lateral dimensions, longitudinal profiles, and sinuosity patterns over time without an aggrading or degrading bed elevation) with habitats that support a diversity of freshwater mussel and native fish (such as stable riffle-run-pool habitats that provide flow refuges consisting of silt-free gravel and coarse sand substrates). (3) Water and sediment quality necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages, including, but not limited to: Dissolved oxygen (generally above 3 parts per million (ppm)) and water temperature (generally below 80 degrees Fahrenheit ([deg]F) (27 degrees Celsius ([deg]C)). Additionally, water and sediment should be low in ammonia (generally below 1.0 ppm total ammonia-nitrogen) and heavy metals, and lack excessive total suspended solids and other pollutants. (4) The presence and abundance of fish hosts necessary for recruitment of the western fanshell and ``Ouachita'' fanshell, including logperch (Percina caprodes), rainbow darter (Etheostoma caeruleum), slenderhead darter (Percina phoxocephala), fantail darter (Etheostoma flabellare), or orangebelly darter (Etheostoma radiosum).Special Management Considerations or Protection When designating critical habitat, we assess whether the specific areas within the geographical area occupied by the species at the time of listing contain features essential to the conservation of the species and which may require special management considerations or protection. The features essential to the conservation of the western fanshell and ``Ouachita'' fanshell may require special management considerations or protections to reduce the following threats: (1) Alteration of the natural flow regime (modifying the natural hydrograph and seasonal flows), including water withdrawals, resulting in flow reduction and available water quantity; (2) urbanization of the landscape, including (but not limited to) land ***conversion*** for urban and commercial use, infrastructure (pipelines, roads, bridges, utilities), and urban water uses (resource extraction activities, water supply reservoirs, wastewater treatment, etc.); (3) significant alteration of water quality and nutrient pollution from a variety of activities, such as industrial and municipal effluents, mining, and ***agricultural*** activities; (4) land use activities that remove large areas of forested wetlands and riparian systems; (5) dam construction and culvert and pipe installation that create barriers to movement for the western fanshell and ``Ouachita'' fanshell, or their host fishes; (6) changes and shifts in seasonal precipitation patterns as a result of climate change; and (7) other watershed and floodplain disturbances that release sediments, pollutants, or nutrients into the water. Management activities that could ameliorate these threats include, but are not limited to: Use of best management practices designed to reduce sedimentation, erosion, and bank destruction; protection of riparian corridors and woody vegetation; moderation of surface and ground water withdrawals to maintain natural flow regimes; improved stormwater management; and reduction of other watershed and floodplain disturbances that release sediments, pollutants, or nutrients into the water. In summary, we find that the occupied areas we are proposing to designate as critical habitat contain the physical or biological features that are essential to the conservation of the species and which may require special management considerations or protection. Special management considerations or protection may be required of the Federal action agency to eliminate, or to reduce to negligible levels, the threats affecting the physical and biological features of each unit.Criteria Used To Identify Critical Habitat As required by section 4(b)(2) of the Act, we use the best scientific ***data*** available to designate critical habitat. In accordance with the Act and our implementing regulations at 50 CFR 424.12(b), we review available information pertaining to the habitat requirements of the species and identify specific areas within the geographical[[Page 12356]]area occupied by the species at the time of listing and any specific areas outside the geographical area occupied by the species to be considered for designation as critical habitat. We anticipate that recovery will require conserving the genetic diversity of extant populations across the HUC-4 watersheds within the species' current range and maintaining and, where necessary, improving habitat and habitat connectivity to ensure the long-term viability of western fanshell and ``Ouachita'' fanshell. We have determined that the currently occupied MUs of western fanshell and ``Ouachita'' fanshell would maintain each species' resiliency, redundancy, and representation and are sufficient to conserve these two species. Therefore, we are not currently proposing to designate any areas outside the geographical area occupied by the species.Methodology Used for Selection of Proposed Units First, we included current populations with high or medium resiliency. These populations show recruitment or varied age class structure and could be used for recovery actions to augment other populations through propagation activities or direct translocations within their basins. We defined a population as ``current'' if it contains live or recent dead individuals observed in surveys from 2000 to the present (Service 2020, p. 21). Second, we evaluated spatial representation and redundancy across the species' ranges, to include last remaining population(s) in major river basins. Third, we examined the overall contribution of populations in low condition and threats to those populations. We considered adjacency and connectivity to high and medium populations, as well as isolated populations with potentially important genetic or adaptive traits, and did not include populations that have potentially low likelihood of recovery due to low abundance and limited distribution or populations currently under high levels of threats. Sources of ***data*** for this proposed critical habitat designation include information from State agencies throughout the species' ranges and numerous survey reports on streams throughout the species' ranges (Service 2020, entire). We have also reviewed available information that pertains to the habitat requirements of these species. Sources of information on habitat requirements include studies conducted at occupied sites and published in peer-reviewed articles, agency reports, and ***data*** ***collected*** during monitoring efforts (Service 2020, entire). In summary, for areas within the geographic area occupied by these species at the time of listing, we delineated critical habitat unit boundaries using a precise set of criteria. Specifically, we identified river and stream reaches with observations from 2000 to present. We determined it is reasonable to find these areas occupied, given the ***variable*** ***data*** associated with timing and frequency of mussel surveys conducted throughout the species' ranges and available State heritage databases, and information supports the likelihood of both species' continued presence in these areas within this timeframe. Specific habitat areas were delineated, based on Natural Heritage Element Occurrences, published reports, and unpublished survey ***data*** provided by States. These areas provide habitat for western fanshell and ``Ouachita'' fanshell populations and are large enough to be self-sustaining over time, despite fluctuations in local conditions. The areas within the proposed units represent continuous river and stream reaches of free-flowing habitat patches capable of sustaining host fishes and allowing for seasonal transport of glochidia, which are essential for reproduction and dispersal of western fanshell and ``Ouachita'' fanshell. We consider portions of the following rivers and streams to be occupied by these species at the time of proposed listing, and appropriate for critical habitat designation: (1) Western fanshell--Black River, Fall River, Middle Fork Little Red River, St. Francis River, South Fork Spring River, Spring River, Strawberry River, and Verdigris River. (2) ``Ouachita'' fanshell--Little Missouri River, Ouachita River, and Saline River. When determining proposed critical habitat boundaries, we made every effort to avoid inclusion of developed areas, such as lands covered by buildings, pavement, and other structures because such lands lack physical or biological features necessary for the western fanshell and ``Ouachita'' fanshell. The scale of the maps we prepared under the parameters for publication within the Code of Federal Regulations may not reflect the exclusion of such developed lands. Any such lands inadvertently left inside critical habitat boundaries shown on the maps of this proposed rule have been excluded by text in the proposed rule and are not proposed for designation as critical habitat. Therefore, if the critical habitat is finalized as proposed, a Federal action involving these lands would not trigger section 7 consultation with respect to critical habitat and the requirement of no adverse modification unless the specific action would affect the physical or biological features in the adjacent critical habitat. We propose to designate as critical habitat lands that we have determined are occupied at the time of listing (that is, currently occupied) and that contain one or more of the physical or biological features that are essential to support life-history processes of the species. We are proposing to designate as critical habitat nine units for the western fanshell and four units for the ``Ouachita'' fanshell based on one or more of the physical or biological features being present to support the western fanshell's or ``Ouachita'' fanshell's life-history processes. Some units contain all of the identified physical or biological features and support multiple life-history processes. Some units contain only some of the physical or biological features necessary to support the western fanshell's and ``Ouachita'' fanshell's particular use of that habitat. The proposed critical habitat designation is defined by the map or maps, as modified by any accompanying regulatory text, presented at the end of this document under Proposed Regulation Promulgation. We include more detailed information on the boundaries of the critical habitat designation in the preamble of this document. We will make the coordinates or plot points or both on which each map is based available to the public on [*http://www.regulations.gov*](http://www.regulations.gov) at Docket No. FWS-R3-ES-2021-0061 and on our internet sites [*https://www.fws.gov/midwest*](https://www.fws.gov/midwest)/ for western fanshell and [*https://www.fws.gov/southeast*](https://www.fws.gov/southeast)/ for ``Ouachita'' fanshell.Proposed Critical Habitat Designation We are proposing to designate approximately 360 river miles (river mi) (579 kilometers (km)) in nine units as critical habitat for western fanshell and approximately 294 river mi (474 km) in four units for ``Ouachita'' fanshell. The critical habitat areas we describe below constitute our current best assessment of areas that meet the definition of critical habitat for western fanshell and ``Ouachita'' fanshell. All units are occupied by their respective species. The nine areas we propose as critical habitat for western fanshell are: (1) Upper Black River, (2) Lower Black/Strawberry River, (3) Fall River, (4)[[Page 12357]]Middle Fork Little Red River, (5) St. Francis River, (6) South Fork Spring River, (7) Spring River (AR), (8) Spring River (MO/KS), and (9) Verdigris River. The four areas we propose as critical habitat for ``Ouachita'' fanshell are: (1) Little Missouri River, (2) Ouachita Headwaters, (3) Ouachita River, and (4) Saline River. Tables 2 and 3 show the proposed critical habitat units and the approximate area of each unit. Table 2--Proposed Critical Habitat Units for Western Fanshell [Area estimates reflect all land within critical habitat unit boundaries.]------------------------------------------------------------------------ Adjacent riparian land River miles Critical habitat unit ownership by type (kilometers)------------------------------------------------------------------------WF 1. Upper Black River......... Public (Federal, 13.7 (22) State). Private............... 51 (82.1)WF 2. Lower Black/Strawberry Public (State)........ 10.9 (17.5) River. Private............... 100.4 (161.6)WF 3. Fall River................ Private............... 45.5 (73.2)WF 4. Middle Fork Little Red Public (Federal)...... 3.5 (5.6) River. Private............... 30.6 (49.2)WF 5. St. Francis River......... Public (Federal, 12.6 (20.2) State). Private............... 36.7 (59.1)WF 6. South Fork Spring River... Private............... 13.4 (21.6)WF 7. Spring River (AR)......... Private............... 14.2 (22.9)WF 8. Spring River (MO/KS)...... Public (State)........ 1.0 (1.6) Private............... 14.0 (22.5)WF 9. Verdigris River........... Private............... 12.4 (20) --------------- Totals...................... Public................ 41.7 (67.1) --------------- Private............... 318.2 (512.1) Total.............. 359.9 (579.2)------------------------------------------------------------------------Note: Area sizes may not sum due to rounding. Table 3--Proposed Critical Habitat Units for ``Ouachita'' Fanshell [Area estimates reflect all land within critical habitat unit boundaries.]------------------------------------------------------------------------ Adjacent riparian land River miles Critical habitat unit ownership by type (kilometers)------------------------------------------------------------------------OF 1. Little Missouri River..... Private............... 22.9 (36.9)OF 2. Ouachita Headwaters....... Public (Federal)...... 2.8 (4.5) Private............... 29.9 (48.1)OF 3. Ouachita River............ Private............... 53.5 (86.1)OF 4. Saline River.............. Public (State)........ 0.5 (0.8) Private............... 184.8 (297.4) --------------- Totals...................... Public................ 3.3 (5.3) Private............... 291.1 (468.5) --------------- Total.............. 294.4 (473.8)------------------------------------------------------------------------Note: Area sizes may not sum due to rounding. We present brief descriptions of all units, and reasons why they meet the definition of critical habitat for the western fanshell or ``Ouachita'' fanshell, below.WF 1: Upper Black River Unit WF 1 consists of 64.7 river mi (104.1 km) of Black River in Butler and Wayne Counties, Missouri, from Clearwater Dam southwest of Piedmont, Wayne County, extending downstream to Butler County Road 658 crossing southeast of Poplar Bluff, Butler County, and includes the river channel up to the ordinary high water mark. Riparian lands that border the unit include approximately 51 river mi (82.1 km; 79 percent) in private ownership and 13.7 river mi (22 km; 21 percent) in public (Federal or State) ownership. Approximately 2.7 miles of the public ownership in this unit are State lands associated with Missouri Department of Conservation's (MDC) Bradley A. Hammer Memorial Conservation Area, Dan River Access, Hilliard Access, and Stephen J. Sun Conservation Area. Eleven miles are Federal land associated with the U.S Forest Service's (USFS) Mark Twain National Forest and U.S Army Corps of Engineers (USACE) Clearwater Recreation Area. General land use within the adjacent riparian areas of this unit includes forest, ***agriculture***, several State-managed game lands, the town of Mill Spring, and city of Poplar Bluff. Clearwater Dam is operated by the USACE. Unit WF 1 is occupied by the species and contains all of the physical or biological features essential to the conservation of the species. There is no overlap with any designated critical habitat for other listed species. Threats identified within the unit include degradation of habitat and water quality from impoundments, channelization, and point and nonpoint source water pollution, including siltation and pollution associated with ***agriculture***, development, and wastewater treatment plants. Special management considerations or protection measures to reduce or alleviate the threats may include reducing water quality degradation and[[Page 12358]]habitat loss associated with ***agriculture***, development, and wastewater treatment plants (see Special Management Considerations or Protection, above).WF 2: Lower Black/Strawberry River Unit WF 2 consists of 111.3 river mi (179.1 km) of Black River and Strawberry River in Independence, Jackson, Lawrence, and Sharp Counties in Arkansas and includes the river channel up to the ordinary high water mark. Black River makes up 54.6 river mi (87.9 km) from the mouth of Spring River northeast of Black Rock, extending downstream to the mouth of Strawberry River northeast of Dowdy, Independence County, Arkansas. Strawberry River makes up 56.7 river mi (91.2 km) from the mouth of Lave Creek north of Evening Shade, Sharp County, extending downstream to the confluence with Black River northeast of Dowdy, Independence County, Arkansas. Riparian lands that border the unit include approximately 100.4 river mi (161.6 km; 90 percent) in private ownership and 10.9 river mi (17.5 km; 10 percent) in public (State) ownership. The public land ownership in this unit is associated with Arkansas Game and Fish Commission's Shirey Bay Rainey Brake Wildlife Management Area on Black River. The Nature Conservancy's Strawberry River Preserve and Ranch on Strawberry River is also in this unit. General land use within this unit includes forest, ***agriculture***, State-managed game lands, the town of Powhatan, and city of Black Rock. Unit WF 2 is occupied by the species and contains one or more of the physical or biological features essential to the species' conservation. There is overlap of 70.3 river mi (113.1 km) of this unit with designated critical habitat for rabbitsfoot (Quadrula cylindrica cylindrica) (see 50 CFR 17.95(f) and 80 FR 24692, April 30, 2015). Threats identified within the unit include degradation of habitat and water quality from impoundments, channelization, and point and nonpoint source water pollution, including siltation and pollution associated with ***agriculture***, development, unpaved roads, and wastewater treatment plants. Special management considerations or protection measures to reduce or alleviate the threats may include reducing water quality degradation and habitat loss associated with ***agriculture***, development, and wastewater treatment plants (see Special Management Considerations or Protection, above).WF 3: Fall River Unit WF 3 consists of 45.5 river mi (73.2 km) of Fall River in Greenwood and Wilson Counties, Kansas, from the Greenwood County Road 33/Merchants Avenue crossing at Fall River, Greenwood County, extending downstream to the U.S Route 400 crossing west of Neodesha, Wilson County, and includes the river channel up to the ordinary high water mark. Approximately 100 percent of the riparian lands that border the unit are in private ownership. General land use within the adjacent riparian areas of this unit includes forest, ***agriculture***, and the city of Fall River. Unit WF 3 is occupied by the species and contains one or more of the physical or biological features essential to the species' conservation. There is overlap of 45.5 river mi (73.2 km) of this unit with designated critical habitat for Neosho mucket (Lampsilis rafinesqueana) (see 50 CFR 17.95(f) and 80 FR 24692, April 30, 2015). Threats identified within the unit include degradation of habitat and water quality from impoundments and point and nonpoint source water pollution, including siltation and pollution associated with ***agriculture***, development, unpaved roads, and wastewater treatment plants. Special management considerations or protection measures to reduce or alleviate the threats may include reducing water quality degradation and habitat loss associated with ***agriculture***, development, and wastewater treatment plants (see Special Management Considerations or Protection, above).WF 4: Middle Fork Little Red River Unit WF 4 consists of 34.1 river mi (54.8 km) of Middle Fork Little Red River in Cleburne, Stone, and Van Buren Counties, Arkansas, from the mouth of Linn Creek east of Dennard, Van Buren County, extending downstream to the mouth of Wild Goose Creek north of Fairfield Bay, Cleburne and Van Buren Counties, and includes the river channel up to the ordinary high water mark. Riparian lands that border the unit include approximately 30.6 river mi (49.2 km; 90 percent) in private ownership and 3.5 river mi (5.6 km; 10 percent) in public (Federal) ownership. All of the public land ownership in this unit is Federal land associated with the USACE's Greers Ferry Recreation Area. General land use within the adjacent riparian areas of this unit includes forest, pasture, the town of Shirley, and the city of Fairfield Bay. Unit WF 4 is occupied by the species and contains one or more of the physical or biological features essential to the species' conservation. There is overlap of 34.1 river mi (54.9 km) of this unit with designated critical habitat for yellowcheek darter (Etheostoma moorei) (see 50 CFR 17.95(e) and 77 FR 63604, October 16, 2012) and rabbitsfoot (see 50 CFR 17.95(f) and 80 FR 24692, April 30, 2015). Threats identified within the unit include degradation of habitat and water quality from impoundments and point and nonpoint source water pollution, including siltation and pollution associated with ***agriculture***, development, unpaved roads, and wastewater treatment plants. Special management considerations or protection measures to reduce or alleviate the threats may include reducing water quality degradation and habitat loss associated with ***agriculture***, development, and wastewater treatment plants (see Special Management Considerations or Protection, above).WF 5: St. Francis River Unit WF 5 consists of 49.3 river mi (79.3 km) of St. Francis River in Madison and Wayne Counties, Missouri, extending from the mouth of Wachita Creek west of Fredericktown, Madison County, downstream to the mouth of Big Creek northwest of Silva, Wayne County, and includes the river channel up to the ordinary high water mark. Riparian lands that border the unit include approximately 36.7 river mi (59.1 km; 74 percent) in private ownership and 12.6 river mi (20.2 km; 26 percent) in public (Federal or State) ownership. Approximately 2.4 river mi of the public ownership in this unit are State lands associated with MDC's Coldwater Conservation Area, Mill Stream Gardens, and Roselle Access. Ten miles are Federal land associated with the USFS's Mark Twain National Forest. General land use within the adjacent riparian areas of this unit is predominantly forest and pasture with isolated occurrences of developed areas. Unit WF 5 is occupied by the species and contains one or more of the physical or biological features essential to the species' conservation. There is overlap of 49.3 river mi (79.3 km) of this unit with designated critical habitat for rabbitsfoot (see 50 CFR 17.95(f) and 80 FR 24692, April 30, 2015). Threats identified within the unit include degradation of habitat and water quality from impoundments and point and nonpoint source water pollution, including siltation and pollution associated with development, unpaved roads, and wastewater treatment plants. Special management considerations or protection measures to reduce or alleviate the threats may include reducing water quality degradation and habitat loss associated with ***agriculture***, development, and wastewater treatment[[Page 12359]]plants (see Special Management Considerations or Protection, above).WF 6: South Fork Spring River Unit WF 6 consists of 13.4 river mi (21.6 km) of South Fork Spring River in Fulton County, Arkansas, from the mouth of Camp Creek east of Salem, Fulton County, extending downstream to the Arkansas Highway 289 crossing northwest of Cherokee Village, Fulton and Sharp Counties, and includes the river channel up to the ordinary high water mark. Approximately 100 percent of the riparian lands that border the unit are in private ownership. General land use within the adjacent riparian areas of this unit is predominantly forest, ***agriculture***, and pasture with isolated occurrences of developed areas. Unit WF 6 is occupied by the species and contains one or more of the physical or biological features essential to the species' conservation. There is no overlap with any designated critical habitat for other listed species. Threats identified within the unit include degradation of habitat and water quality from point and nonpoint source water pollution, including siltation and pollution associated with ***agriculture***, development, unpaved roads, and wastewater treatment plants. Special management considerations or protection measures to reduce or alleviate the threats may include reducing water quality degradation and habitat loss associated with ***agriculture***, development, and wastewater treatment plants (see Special Management Considerations or Protection, above).WF 7: Spring River (AR) Unit WF 7 consists of 14.2 river mi (22.9 km) of Spring River in Lawrence and Randolph Counties, Arkansas, from the mouth of Wells Creek at Ravenden, extending downstream to the mouth of Stennitt Creek southeast of Imboden, Lawrence County, and includes the river channel up to the ordinary high water mark. Approximately 100 percent of the riparian lands that border the unit are in private ownership. General land use within the adjacent riparian areas of this unit includes forest, ***agriculture***, pasture, and the towns of Imboden and Ravenden. Unit WF 7 is occupied by the species and contains one or more of the physical or biological features essential to the species' conservation. There is overlap of 14.2 river mi (22.9 km) of this unit with designated critical habitat for rabbitsfoot (see 50 CFR 17.95(f) and 80 FR 24692, April 30, 2015). Threats identified within the unit include degradation of habitat and water quality from point and nonpoint source water pollution, including siltation and pollution associated with ***agriculture***, development, unpaved roads, and wastewater treatment plants. Special management considerations or protection measures to reduce or alleviate the threats may include reducing water quality degradation and habitat loss associated with ***agriculture***, development, and wastewater treatment plants (see Special Management Considerations or Protection, above).WF 8: Spring River (MO/KS) Unit WF 8 consists of 15 river mi (24.1 km) of Spring River in Jasper County, Missouri, and Cherokee County, Kansas, from the mouth of North Fork Spring River east of Asbury, Jasper County, Missouri, extending downstream through Cherokee County, Kansas, to the mouth of Center Creek west of Carl Junction, Jasper County, Missouri, and includes the river channel up to the ordinary high water mark. Riparian lands that border the unit include approximately 14.0 river mi (22.5 km; 94 percent) in private ownership and 1.0 river mi (1.6 km; 6 percent) in public (State) ownership. The public ownership of this unit is State land associated with the Kansas Department of Wildlife, Parks and Tourism's Spring River Wildlife Area. General land use within the adjacent riparian areas of this unit is predominantly forest, ***agriculture***, pasture, and State-managed lands with isolated occurrences of developed areas. Unit WF 8 is occupied by the species and contains one or more of the physical or biological features essential to the species' conservation. There is overlap of 15 river mi (24.1 km) of this unit with designated critical habitat for Neosho mucket and rabbitsfoot (see 50 CFR 17.95(f) and 80 FR 24692, April 30, 2015). Threats identified within the unit include degradation of habitat and water quality from point and nonpoint source water pollution, including siltation and pollution associated with ***agriculture***, development, unpaved roads, wastewater treatment plants, and historical heavy metal mining. Special management considerations or protection measures to reduce or alleviate the threats may include reducing water quality degradation and habitat loss associated with ***agriculture***, development, wastewater treatment plants, and heavy metal contamination (see Special Management Considerations or Protection, above).WF 9: Verdigris River Unit WF 9 consists of 12.4 river mi (20 km) of Verdigris River in Montgomery and Wilson Counties, Kansas, from the mouth of Fall River south of Neodesha, Wilson County, extending downstream to the mouth of Choteau Creek northeast of Independence, Montgomery County, and includes the river channel up to the ordinary high water mark. Approximately 100 percent of the riparian lands that border the unit are in private ownership. General land use within the adjacent riparian areas of this unit is predominantly forest and ***agriculture*** with isolated occurrences of developed areas. Unit WF 9 is occupied by the species and contains one or more of the physical or biological features essential to the species' conservation. There is overlap of 12.4 river mi (20 km) of this unit with designated critical habitat for Neosho mucket (see 50 CFR 17.95(f) and 80 FR 24692, April 30, 2015). Threats identified within the unit include degradation of habitat and water quality from point and nonpoint source water pollution, including siltation and pollution associated with ***agriculture***, development, unpaved roads, and wastewater treatment plants. Special management considerations or protection measures to reduce or alleviate the threats may include reducing water quality degradation and habitat loss associated with ***agriculture***, development, and wastewater treatment plants (see Special Management Considerations or Protection, above).OF 1: Little Missouri River Unit OF 1 consists of 22.9 river mi (36.9 km) of Little Missouri River in Clark, Nevada, and Ouachita Counties, Arkansas, from the mouth of Garland Creek northeast of Prescott, Nevada County, downstream to the mouth of Horse Branch north of Red Hill, Ouachita County, and includes the river channel up to the ordinary high water mark. Approximately 100 percent of the riparian lands that border the unit are in private ownership. General land use within the adjacent riparian areas of this unit includes forest and ***agriculture***. Unit OF 1 is occupied by the species and contains one or more of the physical or biological features essential to the species' conservation. There is no overlap with any designated critical habitat for other listed species. Threats identified within the unit include dams, impoundments, and point and nonpoint source water pollution, including siltation and pollution associated with a variety of land uses. Special management considerations or protection measures to reduce or alleviate the threats may include reducing water quality degradation and habitat loss and[[Page 12360]]fragmentation (see Special Management Considerations or Protection, above).OF 2: Ouachita Headwaters Unit OF 2 consists of 32.7 river mi (52.6 km) of Ouachita River in Montgomery and Polk Counties, Arkansas, from the County Road 67 crossing south of Cherry Hill, Polk County, downstream to the U.S Route 270 crossing southeast of Pencil Bluff, Montgomery County, and includes the river channel up to the ordinary high water mark. Riparian lands that border the unit include approximately 29.9 river mi (48.1 km; 91 percent) in private ownership and 2.8 river mi (4.5 km; 9 percent) in public (Federal) ownership. The public ownership in this unit is Federal land associated with USFS's Ouachita National Forest. General land use within the adjacent riparian areas of this unit includes forest and ***agriculture***. Unit OF 2 is occupied by the species and contains one or more of the physical or biological features essential to the species' conservation. There is no overlap with any designated critical habitat for other listed species. Threats identified within the unit include impoundments and point and nonpoint source water pollution, including siltation and pollution associated with a variety of land uses. Special management considerations or protection measures to reduce or alleviate the threats may include reducing water quality degradation and habitat loss and fragmentation (see Special Management Considerations or Protection, above).OF 3: Ouachita River Unit OF 3 consists of 53.5 river mi (86.1 km) of Ouachita River in Clark, Dallas, and Ouachita Counties, Arkansas, from the mouth of L'Eau Frais Creek southeast of Arkadelphia, Clark County, downstream to the mouth of Ecore Fabre Bayou north of Camden, Ouachita County, and includes the river channel up to the ordinary high water mark. Approximately 100 percent of the riparian lands that border the unit are in private ownership. There is a Wetlands Reserve Program easement within the unit. General land use within the adjacent riparian areas of this unit includes forest, ***agriculture***, and pasture. Unit OF 3 is occupied by the species and contains one or more of the physical or biological features essential to the species' conservation. There is overlap of 22.8 river mi (36.7 km) of this unit with designated critical habitat for rabbitsfoot (see 50 CFR 17.95(f) and 80 FR 24692, April 30, 2015). Threats identified within the unit include dams, impoundments, and point and nonpoint source water pollution, including siltation and pollution associated with a variety of land uses. Special management considerations or protection measures to reduce or alleviate the threats may include reducing water quality degradation and habitat loss and fragmentation (see Special Management Considerations or Protection, above).OF 4: Saline River Unit OF 4 consists of 185.3 river mi (298.2 km) of Saline River in Ashley, Bradley, Cleveland, Dallas, Drew, Grant, and Saline Counties, Arkansas, from the mouth of North Fork Saline River north of Benton, Saline County, downstream to the mouth of Mill Creek north of Stillions, Ashley County, and includes the river channel up to the ordinary high water mark. Approximately 100 percent of the riparian lands that border the unit are in private ownership and less than 1 percent is in public ownership. The public ownership in this unit is State-owned land associated with Jenkins Ferry State Park. General land use within the adjacent riparian areas of this unit includes forest, ***agriculture***, pasture, the town of Tull, and the city of Benton. Unit OF 4 is occupied by the species and contains one or more of the physical or biological features essential to the species' conservation. There is overlap of 185.3 river mi (298.2 km) of this unit with designated critical habitat for the rabbitsfoot (see 50 CFR 17.95(f) and 80 FR 24692, April 30, 2015). Threats identified within the unit include dams, impoundments, mining, development, and point and nonpoint source water pollution, including siltation and pollution associated with development in the headwaters and a variety of other land uses. Special management considerations or protection measures to reduce or alleviate the threats may include reducing water quality degradation and habitat loss and fragmentation (see Special Management Considerations or Protection, above).Effects of Critical Habitat DesignationSection 7 Consultation Section 7(a)(2) of the Act requires Federal agencies, including the Service, to ensure that any action they fund, authorize, or carry out is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat of such species. In addition, section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any agency action that is likely to jeopardize the continued existence of any species proposed to be listed under the Act or result in the destruction or adverse modification of proposed critical habitat. We published a final rule revising the definition of destruction or adverse modification on August 27, 2019 (84 FR 44976). Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency (action agency) must enter into consultation with us. Examples of actions that are subject to the section 7 consultation process are actions on State, Tribal, local, or private lands that require a Federal permit (such as a permit from the U.S Army Corps of Engineers under section 404 of the Clean Water Act (33 U.S.C 1251 et seq.) or a permit from the Service under section 10 of the Act) or that involve some other Federal action (such as funding from the Federal Highway Administration, Federal Aviation Administration, or the Federal Emergency Management Agency). Federal actions not affecting listed species or critical habitat--and actions on State, Tribal, local, or private lands that are not federally funded, authorized, or carried out by a Federal agency--do not require section 7 consultation. Compliance with the requirements of section 7(a)(2) is documented through our issuance of: (1) A concurrence letter for Federal actions that may affect, but are not likely to adversely affect, listed species or critical habitat; or (2) A biological opinion for Federal actions that may affect, and are likely to adversely affect, listed species or critical habitat. When we issue a biological opinion concluding that a project is likely to jeopardize the continued existence of a listed species and/or destroy or adversely modify critical habitat, we provide reasonable and prudent alternatives to the project, if any are identifiable, that would avoid the likelihood of jeopardy and/or destruction or adverse modification of critical habitat. We define ``reasonable and prudent alternatives'' (at 50 CFR 402.02) as alternative actions identified during consultation that: (1) Can be implemented in a manner consistent with the intended purpose of the action,[[Page 12361]] (2) Can be implemented consistent with the scope of the Federal agency's legal authority and jurisdiction, (3) Are economically and technologically feasible, and (4) Would, in the Service Director's opinion, avoid the likelihood of jeopardizing the continued existence of the listed species and/or avoid the likelihood of destroying or adversely modifying critical habitat. Reasonable and prudent alternatives can vary from slight project modifications to extensive redesign or relocation of the project. Costs associated with implementing a reasonable and prudent alternative are similarly ***variable***. Regulations at 50 CFR 402.16 set forth requirements for Federal agencies to reinitiate formal consultation on previously reviewed actions. These requirements apply when the Federal agency has retained discretionary involvement or control over the action (or the agency's discretionary involvement or control is authorized by law) and, subsequent to the previous consultation: (1) If the amount or extent of taking specified in the incidental take statement is exceeded; (2) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or (4) if a new species is listed or critical habitat designated that may be affected by the identified action. In such situations, Federal agencies sometimes may need to request reinitiation of consultation with us, but the regulations also specify some exceptions to the requirement to reinitiate consultation on specific land management plans after subsequently listing a new species or designating new critical habitat. See the regulations for a description of those exceptions.Application of the ``Destruction or Adverse Modification'' Standard The key factor related to the destruction or adverse modification determination is whether implementation of the proposed Federal action directly or indirectly alters the designated critical habitat in a way that appreciably diminishes the value of the critical habitat as a whole for the conservation of the listed species. As discussed above, the role of critical habitat is to support physical or biological features essential to the conservation of a listed species and provide for the conservation of the species. Section 4(b)(8) of the Act requires us to briefly evaluate and describe, in any proposed or final regulation that designates critical habitat, activities involving a Federal action that may violate section 7(a)(2) of the Act by destroying or adversely modifying such habitat, or that may be affected by such designation. Activities that the Service may, during a consultation under section 7(a)(2) of the Act, consider likely to destroy or adversely modify critical habitat include, but are not limited to, actions that would: (1) Alter the geomorphology of the species' stream and river habitats (for example, instream excavation or dredging, impoundment, channelization, sand and gravel mining, clearing riparian vegetation, and discharge of fill materials); (2) significantly alter the existing flow regime where these species occur (for example, impoundment, urban development, water diversion, water withdrawal, water draw-down, and hydropower generation); (3) significantly alter water chemistry or water quality (for example, hydropower discharges, or the release of chemicals, biological pollutants, or heated effluents into surface water or connected groundwater at a point source or by dispersed release (nonpoint source)); and (4) significantly alter stream bed material composition and quality by increasing sediment deposition or filamentous algal growth (for example, construction projects, gravel and sand mining, oil and gas development, coal mining, livestock grazing, irresponsible logging practices, and other watershed and floodplain disturbances that release sediments or nutrients into the water).ExemptionsApplication of Section 4(a)(3) of the Act Section 4(a)(3)(B)(i) of the Act (16 U.S.C 1533(a)(3)(B)(i)) provides that the Secretary shall not designate as critical habitat any lands or other geographical areas owned or controlled by the Department of Defense (DoD), or designated for its use, that are subject to an integrated natural resources management plan (INRMP) prepared under section 101 of the Sikes Act (16 U.S.C 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation. No DoD lands with a completed INRMP are within the proposed critical habitat designation.Consideration of Impacts Under Section 4(b)(2) of the Act Section 4(b)(2) of the Act states that the Secretary shall designate and make revisions to critical habitat on the basis of the best available scientific ***data*** after taking into consideration the economic impact, national security impact, and any other relevant impact of specifying any particular area as critical habitat. The Secretary may exclude an area from designated critical habitat based on economic impacts, impacts on national security, or any other relevant impacts. In considering whether to exclude a particular area from the designation, we identify the benefits of including the area in the designation, identify the benefits of excluding the area from the designation, and evaluate whether the benefits of exclusion outweigh the benefits of inclusion. If the analysis indicates that the benefits of exclusion outweigh the benefits of inclusion, the Secretary may exercise discretion to exclude the area only if such exclusion would not result in the extinction of the species. In making the determination to exclude a particular area, the statute on its face, as well as the legislative history, are clear that the Secretary has broad discretion regarding which factor(s) to use and how much weight to give to any factor. We describe below the process that we undertook for taking into consideration each category of impacts and our analyses of the relevant impacts.Consideration of Economic Impacts Section 4(b)(2) of the Act and its implementing regulations require that we consider the economic impact that may result from a designation of critical habitat. To assess the probable economic impacts of a designation, we must first evaluate specific land uses or activities and projects that may occur in the area of the critical habitat. We then must evaluate the impacts that a specific critical habitat designation may have on restricting or modifying specific land uses or activities for the benefit of the species and its habitat within the areas proposed. We then identify which conservation efforts may be the result of the species being listed under the Act versus those attributed solely to the designation of critical habitat for this particular species. The probable economic impact of a proposed critical habitat designation is analyzed by comparing scenarios both ``with critical habitat'' and ``without critical habitat.'' The ``without critical habitat'' scenario represents the baseline for the analysis, which includes the existing[[Page 12362]]regulatory and socio-economic burden imposed on landowners, managers, or other resource users potentially affected by the designation of critical habitat (for example, under the Federal listing as well as other Federal, State, and local regulations). Therefore, the baseline represents the costs of all efforts attributable to the listing of the species under the Act (that is, conservation of the species and its habitat incurred regardless of whether critical habitat is designated). The ``with critical habitat'' scenario describes the incremental impacts associated specifically with the designation of critical habitat for the species. The incremental conservation efforts and associated impacts would not be expected without the designation of critical habitat for the species. In other words, the incremental costs are those attributable solely to the designation of critical habitat, above and beyond the baseline costs. These are the costs we use when evaluating the benefits of inclusion and exclusion of particular areas from the final designation of critical habitat should we choose to conduct a discretionary 4(b)(2) exclusion analysis. For this particular designation, we developed an incremental effects memorandum (IEM) considering the probable incremental economic impacts that may result from this proposed designation of critical habitat. The information contained in our IEM was then used to develop a screening analysis of the probable effects of the designation of critical habitat for the western fanshell and ``Ouachita'' fanshell (Industrial Economics, Inc. 2021, entire). We began by conducting a screening analysis of the proposed designation of critical habitat in order to focus our analysis on the key factors that are likely to result in incremental economic impacts. The purpose of the screening analysis is to filter out particular geographic areas of critical habitat that are already subject to such protections and are, therefore, unlikely to incur incremental economic impacts. In particular, the screening analysis considers baseline costs (that is, absent critical habitat designation) and includes any probable incremental economic impacts where land and water use may already be subject to conservation plans, land management plans, best management practices, or regulations that protect the habitat area as a result of the Federal listing status of the species. Ultimately, the screening analysis allows us to focus our analysis on evaluating the specific areas or sectors that may incur probable incremental economic impacts as a result of the designation. If the proposed critical habitat designation contains any unoccupied units, the screening analysis assesses whether those units require additional management or conservation efforts that may incur incremental economic impacts. This screening analysis combined with the information contained in our IEM constitute what we consider to be our draft economic analysis (DEA) of the proposed critical habitat designations for the western fanshell and ``Ouachita'' fanshell; our DEA is summarized in the narrative below. Executive Orders (E.O.s) 12866 and 13563 direct Federal agencies to assess the costs and benefits of available regulatory alternatives in quantitative (to the extent feasible) and qualitative terms. Consistent with the E.O regulatory analysis requirements, our effects analysis under the Act may take into consideration impacts to both directly and indirectly affected entities, where practicable and reasonable. If sufficient ***data*** are available, we assess to the extent practicable the probable impacts to both directly and indirectly affected entities. As part of our screening analysis, we considered the types of economic activities that are likely to occur within the areas likely affected by the critical habitat designation. In our evaluation of the probable incremental economic impacts that may result from the proposed designation of critical habitat for the western fanshell and ``Ouachita'' fanshell, first we identified, in the IEM dated February 1, 2021, probable incremental economic impacts associated with the following categories of activities: Instream excavation or dredging; impoundments; channelization; sand and gravel mining; clearing riparian vegetation; discharge of fill materials; urban development; water diversion; water withdrawal; water draw-down; hydropower generation and discharges; release of chemicals, biological pollutants, or heated effluents into surface water or connected ground water at a point source or by dispersed release (nonpoint); construction projects; oil and gas development; coal mining; livestock grazing; timber harvest; and other watershed or floodplain disturbances that release sediments or nutrients into the water. We considered each industry or category individually. Additionally, we considered whether their activities have any Federal involvement. Critical habitat designation generally will not affect activities that do not have any Federal involvement; under the Act, designation of critical habitat affects only activities conducted, funded, permitted, or authorized by Federal agencies. If we list these species, in areas where the western fanshell or ``Ouachita'' fanshell are present, Federal agencies would be required to consult with the Service under section 7 of the Act on activities they fund, permit, or implement that may affect the species. If, when we list these species, we also finalize this proposed critical habitat designation, consultations would include an evaluation of measures to avoid the destruction or adverse modification of critical habitat. In our IEM, we attempted to clarify the distinction between the effects that would result from the species being listed and those attributable to the critical habitat designation (that is, difference between the jeopardy and adverse modification standards) for the western fanshell's and ``Ouachita'' fanshell's critical habitat. Because the designation of critical habitat for western fanshell and ``Ouachita'' fanshell is proposed concurrently with the listing, it has been our experience that it is more difficult to discern which conservation efforts are attributable to the species being listed and those which would result solely from the designation of critical habitat. However, the following specific circumstances in this case help to inform our evaluation: (1) The essential physical or biological features identified for critical habitat are the same features essential for the life requisites of the species, and (2) any actions that would result in sufficient harm or harassment to constitute jeopardy to the western fanshell or ``Ouachita'' fanshell would also likely adversely affect the essential physical or biological features of critical habitat. The IEM outlines our rationale concerning this limited distinction between baseline conservation efforts and incremental impacts of the designation of critical habitat for this species. This evaluation of the incremental effects has been used as the basis to evaluate the probable incremental economic impacts of this proposed designation of critical habitat. The proposed critical habitat designation for the western fanshell includes nine units, all of which are occupied by the species. Ownership of riparian lands adjacent to the proposed units includes 318.2 river mi (512.1 km; 88 percent) in private ownership and 41.7 river mi (67.1 km; 12 percent) in public (Federal or State) ownership. The proposed critical habitat designation for the ``Ouachita'' fanshell includes four units, all of which are occupied by the species. Ownership of riparian lands[[Page 12363]]adjacent to the proposed units includes 291.1 river mi (468.5 km; 99 percent) in private ownership and 3.3 river mi (5.3 km; 1 percent) in public (Federal or State) ownership. Total incremental costs of critical habitat designation for the western fanshell and ``Ouachita'' fanshell are not expected to exceed $79,000 (2021 dollars) per year. The costs are reflective of: (1) All proposed units are considered occupied, (2) project modifications requested to avoid adverse modification are likely to be the same as those recommended to avoid jeopardy in occupied habitat for these species, and (3) the proposed designations receive baseline protection from the presence of critical habitat for co-occurring listed mussel species with similar habitat needs in 60 percent of the proposed western fanshell critical habitat and in 71 percent of the proposed ``Ouachita'' fanshell critical habitat. Because consultation would be required as a result of the listing of the western fanshell and ``Ouachita'' fanshell and is already required in some of these areas as a result of the presence of other listed species and critical habitats, the economic costs of the critical habitat designation would likely be primarily limited to additional administrative efforts to consider adverse modification for these two species in section 7 consultations. Based on the consultation history regarding historical projects and activities overlapping the proposed critical habitat area for the western fanshell, the number of future consultations, including technical assistance efforts, is likely to be no more than 23 per year across all nine units. Based on the consultation history regarding historical projects and activities overlapping the proposed critical habitat area for the ``Ouachita'' fanshell, the number of future consultations, including technical assistance efforts, is likely to be no more than 15 per year across all four units. Overall, transportation and utilities activities are expected to result in the largest portion of consultations for both the western and ``Ouachita'' fanshells and, therefore, incur the highest costs. The geographic distribution of future section 7 consultations and associated costs are likely to be most heavily concentrated in western fanshell proposed Unit 2 and ``Ouachita'' fanshell proposed Unit 4. However, even assuming consultation activity increases substantially, incremental administrative costs are still likely to remain well under $100 million per year. We are soliciting ***data*** and comments from the public on the DEA discussed above, as well as on all aspects of this proposed rule and our required determinations. During the development of a final designation, we will consider the information presented in the DEA and any additional information on economic impacts we receive during the public comment period to determine whether any specific areas should be excluded from the final critical habitat designation under authority of section 4(b)(2) and our implementing regulations at 50 CFR 17.90 If we receive credible information regarding the existence of a meaningful economic or other relevant impact supporting a benefit of exclusion, we will conduct an exclusion analysis for the relevant area or areas. We may also exercise the discretion to evaluate any other particular areas for possible exclusion. Furthermore, when we conduct an exclusion analysis based on impacts identified by experts in, or sources with firsthand knowledge about, impacts that are outside the scope of the Service's expertise, we will give weight to those impacts consistent with the expert or firsthand information unless we have rebutting information. We may exclude an area from critical habitat if we determine that the benefits of excluding the area outweigh the benefits of including the area, provided the exclusion will not result in the extinction of either species.Consideration of National Security Impacts Section 4(a)(3)(B)(i) of the Act may not cover all DoD lands or areas that pose potential national-security concerns (for example, a DoD installation that is in the process of revising its INRMP for a newly listed species or a species previously not covered). If a particular area is not covered under section 4(a)(3)(B)(i), then national-security or homeland-security concerns are not a factor in the process of determining what areas meet the definition of ``critical habitat.'' However, the Service must still consider impacts on national security, including homeland security, on those lands or areas not covered by section 4(a)(3)(B)(i), because section 4(b)(2) requires the Service to consider those impacts whenever it designates critical habitat. Accordingly, if DoD, Department of Homeland Security (DHS), or another Federal agency has requested exclusion based on an assertion of national-security or homeland-security concerns, or we have otherwise identified national-security or homeland-security impacts from designating particular areas as critical habitat, we generally have reason to consider excluding those areas. However, we cannot automatically exclude requested areas. When DoD, DHS, or another Federal agency requests exclusion from critical habitat on the basis of national-security or homeland-security impacts, we must conduct an exclusion analysis if the Federal requester provides credible information, including a reasonably specific justification of an incremental impact on national security that would result from the designation of that specific area as critical habitat. That justification could include demonstration of probable impacts, such as impacts to ongoing border-security patrols and surveillance activities, or a delay in training or facility construction, as a result of compliance with section 7(a)(2) of the Act. If the agency requesting the exclusion does not provide us with a reasonably specific justification, we will contact the agency to recommend that it provide a specific justification or clarification of its concerns relative to the probable incremental impact that could result from the designation. If we conduct an exclusion analysis because the agency provides a reasonably specific justification or because we decide to exercise the discretion to conduct an exclusion analysis, we will defer to the expert judgment of DoD, DHS, or another Federal agency as to: (1) Whether activities on its lands or waters, or its activities on other lands or waters, have national-security or homeland-security implications; (2) the importance of those implications; and (3) the degree to which the cited implications would be adversely affected in the absence of an exclusion. In that circumstance, in conducting a discretionary section 4(b)(2) exclusion analysis, we will give great weight to national-security and homeland-security concerns in analyzing the benefits of exclusion. Under section 4(b)(2) of the Act, we also consider whether a national-security or homeland-security impact might exist on lands not owned or managed by DoD or DHS. In preparing this proposal, we have determined that the lands within the proposed designation of critical habitat for western fanshell and ``Ouachita'' fanshell are not owned or managed by the DoD or DHS. Therefore, we anticipate no impact on national security. However, if through the public comment period we receive credible information regarding impacts on national security or homeland security from designating particular areas as critical habitat, then as part of[[Page 12364]]developing the final designation of critical habitat, we will conduct a discretionary exclusion analysis to determine whether to exclude those areas under authority of section 4(b)(2) and our implementing regulations at 50 CFR 17.90 Consideration of Other Relevant Impacts Under section 4(b)(2) of the Act, we consider any other relevant impacts, in addition to economic impacts and impacts on national security discussed above. Other relevant impacts may include, but are not limited to, impacts to Tribes, States, local governments, public health and safety, community interests, the environment (such as increased risk of wildfire or pest and invasive species management), Federal lands, and conservation plans, agreements, or partnerships. To identify other relevant impacts that may affect the exclusion analysis, we consider a number of factors, including whether there are permitted conservation plans covering the species in the area--such as HCPs, safe harbor agreements (SHAs), or candidate conservation agreements with assurances (CCAAs)--or whether there are non-permitted conservation agreements and partnerships that may be impaired by designation of, or exclusion from, critical habitat. In addition, we look at whether Tribal conservation plans or partnerships, Tribal resources, or government-to-government relationships of the United States with Tribal entities may be affected by the designation. We also consider any State, local, public-health, community-interest, environmental, or social impacts that might occur because of the designation. We have not identified any areas to consider for exclusion from critical habitat based on other relevant impacts. However, during the development of a final designation, we will consider all information currently available or received during the public comment period. If we receive credible information regarding the existence of a meaningful impact supporting a benefit of excluding any areas, we will undertake an exclusion analysis and determine whether those areas should be excluded from the final critical habitat designation under the authority of section 4(b)(2) and our implementing regulations at 50 CFR 17.90 We may also exercise the discretion to undertake exclusion analyses for other areas as well, and we will describe all of our exclusion analyses as part of a final critical habitat determination.Summary of Exclusions Considered Under 4(b)(2) of the Act At this time, we are not considering any exclusions from the proposed designation based on economic impacts, national security impacts, or other relevant impacts--such as partnerships, management, or protection afforded by cooperative management efforts--under section 4(b)(2) of the Act. In preparing this proposal, we have determined that no HCPs or other management plans for western fanshell or ``Ouachita'' fanshell currently exist, and the proposed designation does not include any Tribal lands or trust resources. Therefore, we anticipate no impact on Tribal lands, partnerships, or HCPs from this proposed critical habitat designation and thus, as described above, we are not considering excluding any particular areas on the basis of the presence of conservation agreements or impacts to trust resources. During the development of a final designation, we will consider any additional information received through the public comment period regarding other relevant impacts to determine whether any specific areas should be excluded from the final critical habitat designation under authority of section 4(b)(2) and our implementing regulations at 50 CFR 17.90 Required DeterminationsClarity of the Rule We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must: (1) Be logically organized; (2) Use the active voice to address readers directly; (3) Use clear language rather than jargon; (4) Be divided into short sections and sentences; and (5) Use lists and tables wherever possible. If you feel that we have not met these requirements, send us comments by one of the methods listed in ADDRESSES. To better help us revise the rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that are unclearly written, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.Regulatory Planning and Review (Executive Orders 12866 and 13563) Executive Order 12866 provides that the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget will review all significant rules. OIRA has determined that this rule is not significant. Executive Order 13563 reaffirms the principles of E.O 12866 while calling for improvements in the nation's regulatory system to promote predictability, to reduce uncertainty, and to use the best, most innovative, and least burdensome tools for achieving regulatory ends. The executive order directs agencies to consider regulatory approaches that reduce burdens and maintain flexibility and freedom of choice for the public where these approaches are relevant, feasible, and consistent with regulatory objectives. E.O 13563 emphasizes further that regulations must be based on the best available science and that the rulemaking process must allow for public participation and an open exchange of ideas. We have developed this proposed rule in a manner consistent with these requirements.Regulatory Flexibility Act (5 U.S.C 601 et seq.) Under the Regulatory Flexibility Act (RFA; 5 U.S.C 601 et seq.), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA; 5 U.S.C 801 et seq.), whenever an agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effects of the rule on small entities (that is, small businesses, small organizations, and small government jurisdictions). However, no regulatory flexibility analysis is required if the head of the agency certifies the rule will not have a significant economic impact on a substantial number of small entities. The SBREFA amended the RFA to require Federal agencies to provide a certification statement of the factual basis for certifying that the rule will not have a significant economic impact on a substantial number of small entities. According to the Small Business Administration, small entities include small organizations such as independent nonprofit organizations; small governmental jurisdictions, including school boards and city and town governments that serve fewer than 50,000 residents; and small businesses (13 CFR 121.201). Small businesses include manufacturing and mining concerns with fewer than 500 employees, wholesale trade entities with fewer than 100 employees, retail and service businesses with less than $5 million in annual sales, general and heavy construction businesses with less[[Page 12365]]than $27.5 million in annual business, special trade contractors doing less than $11.5 million in annual business, and ***agricultural*** businesses with annual sales less than $750,000. To determine whether potential economic impacts to these small entities are significant, we considered the types of activities that might trigger regulatory impacts under this designation as well as types of project modifications that may result. In general, the term ``significant economic impact'' is meant to apply to a typical small business firm's business operations. Under the RFA, as amended, and as understood in light of recent court decisions, Federal agencies are required to evaluate the potential incremental impacts of rulemaking on those entities directly regulated by the rulemaking itself; in other words, the RFA does not require agencies to evaluate the potential impacts to indirectly regulated entities. The regulatory mechanism through which critical habitat protections are realized is section 7 of the Act, which requires Federal agencies, in consultation with the Service, to ensure that any action authorized, funded, or carried out by the agency is not likely to destroy or adversely modify critical habitat. Therefore, under section 7, only Federal action agencies are directly subject to the specific regulatory requirement (avoiding destruction and adverse modification) imposed by critical habitat designation. Consequently, it is our position that only Federal action agencies would be directly regulated if we adopt the proposed critical habitat designations. The RFA does not require evaluation of the potential impacts to entities not directly regulated. Moreover, Federal agencies are not small entities. Therefore, because no small entities would be directly regulated by this rulemaking, the Service certifies that, if made final as proposed, the proposed critical habitat designations will not have a significant economic impact on a substantial number of small entities. In summary, we have considered whether the proposed designations would result in a significant economic impact on a substantial number of small entities. For the above reasons and based on currently available information, we certify that, if made final, the proposed critical habitat designations would not have a significant economic impact on a substantial number of small business entities. Therefore, an initial regulatory flexibility analysis is not required.Energy Supply, Distribution, or Use--Executive Order 13211 Executive Order 13211 (Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use) requires agencies to prepare Statements of Energy Effects when undertaking certain actions. Facilities that provide energy supply, distribution, or use occur within some units of the proposed critical habitat designations (for example, dams, pipelines) and may potentially be affected. We determined that consultations, technical assistance, and requests for species lists may be necessary in some instances. In our economic analysis, we did not find that this proposed critical habitat designation would significantly affect energy supplies, distribution, or use. Therefore, this action is not a significant energy action, and no Statement of Energy Effects is required.Unfunded Mandates Reform Act (2 U.S.C 1501 et seq.) In accordance with the Unfunded Mandates Reform Act (2 U.S.C 1501 et seq.), we make the following finding: (1) This proposed rule would not produce a Federal mandate. In general, a Federal mandate is a provision in legislation, statute, or regulation that would impose an enforceable duty upon State, local, or Tribal governments, or the private sector, and includes both ``Federal intergovernmental mandates'' and ``Federal private sector mandates.'' These terms are defined in 2 U.S.C 658(5)-(7). ``Federal intergovernmental mandate'' includes a regulation that ``would impose an enforceable duty upon State, local, or Tribal governments'' with two exceptions. It excludes ``a condition of Federal assistance.'' It also excludes ``a duty arising from participation in a voluntary Federal program,'' unless the regulation ``relates to a then-existing Federal program under which $500,000,000 or more is provided annually to State, local, and Tribal governments under entitlement authority,'' if the provision would ``increase the stringency of conditions of assistance'' or ``place caps upon, or otherwise decrease, the Federal Government's responsibility to provide funding,'' and the State, local, or Tribal governments ``lack authority'' to adjust accordingly. At the time of enactment, these entitlement programs were: Medicaid; Aid to Families with Dependent Children work programs; Child Nutrition; Food Stamps; Social Services Block Grants; Vocational Rehabilitation State Grants; Foster Care, Adoption Assistance, and Independent Living; Family Support Welfare Services; and Child Support Enforcement. ``Federal private sector mandate'' includes a regulation that ``would impose an enforceable duty upon the private sector, except (i) a condition of Federal assistance or (ii) a duty arising from participation in a voluntary Federal program.'' The designation of critical habitat does not impose a legally binding duty on non-Federal Government entities or private parties. Under the Act, the only regulatory effect is that Federal agencies must ensure that their actions do not destroy or adversely modify critical habitat under section 7. While non-Federal entities that receive Federal funding, assistance, or permits, or that otherwise require approval or authorization from a Federal agency for an action, may be indirectly impacted by the designation of critical habitat, the legally binding duty to avoid destruction or adverse modification of critical habitat rests squarely on the Federal agency. Furthermore, to the extent that non-Federal entities are indirectly impacted because they receive Federal assistance or participate in a voluntary Federal aid program, the Unfunded Mandates Reform Act would not apply, nor would critical habitat shift the costs of the large entitlement programs listed above onto State governments. (2) We do not believe that this rule would significantly or uniquely affect small governments because it will not produce a Federal mandate of $100 million or greater in any year, that is, it is not a ``significant regulatory action'' under the Unfunded Mandates Reform Act. The designation of critical habitat imposes no obligations on State or local governments and, as such, a Small Government Agency Plan is not required.Takings--Executive Order 12630 In accordance with E.O 12630 (Government Actions and Interference with Constitutionally Protected Private Property Rights), we have analyzed the potential takings implications of designating critical habitat for western fanshell and ``Ouachita'' fanshell in a takings implications assessment. The Act does not authorize the Service to regulate private actions on private lands or confiscate private property as a result of critical habitat designation. Designation of critical habitat does not affect land ownership, or establish any closures, or restrictions on use of or access to the designated areas. Furthermore, the designation of critical habitat does not affect landowner actions that do not require Federal[[Page 12366]]funding or permits, nor does it preclude development of habitat conservation programs or issuance of incidental take permits to permit actions that do require Federal funding or permits to go forward. However, Federal agencies are prohibited from carrying out, funding, or authorizing actions that would destroy or adversely modify critical habitat. A takings implications assessment has been completed for the proposed designation of critical habitat for western fanshell and ``Ouachita'' fanshell, and it concludes that, if adopted, these designations of critical habitat would not pose significant takings implications for lands within or affected by the designations.Federalism--Executive Order 13132 In accordance with E.O 13132 (Federalism), this proposed rule does not have significant Federalism effects. A federalism summary impact statement is not required. In keeping with Department of the Interior and Department of Commerce policy, we requested information from, and coordinated development of these proposed critical habitat designations with, appropriate State resource agencies. From a federalism perspective, the designation of critical habitat directly affects only the responsibilities of Federal agencies. The Act imposes no other duties with respect to critical habitat, either for States and local governments, or for anyone else. As a result, the proposed rule does not have substantial direct effects either on the States, or on the relationship between the national government and the States, or on the distribution of powers and responsibilities among the various levels of government. The proposed designations may have some benefit to these governments because the areas that contain the features essential to the conservation of the species are more clearly defined, and the physical or biological features of the habitat necessary for the conservation of the species are specifically identified. This information does not alter where and what federally sponsored activities may occur. However, it may assist State and local governments in long-range planning because they no longer have to wait for case-by-case section 7 consultations to occur. Where State and local governments require approval or authorization from a Federal agency for actions that may affect critical habitat, consultation under section 7(a)(2) of the Act would be required. While non-Federal entities that receive Federal funding, assistance, or permits, or that otherwise require approval or authorization from a Federal agency for an action, may be indirectly impacted by the designation of critical habitat, the legally binding duty to avoid destruction or adverse modification of critical habitat rests squarely on the Federal agency.Civil Justice Reform--Executive Order 12988 In accordance with Executive Order 12988 (Civil Justice Reform), the Office of the Solicitor has determined that the rule would not unduly burden the judicial system and that it meets the requirements of sections 3(a) and 3(b)(2) of the Order. We have proposed designating critical habitat in accordance with the provisions of the Act. To assist the public in understanding the habitat needs of the species, this proposed rule identifies the physical or biological features essential to the conservation of the species. The proposed areas of designated critical habitat are presented on maps, and the proposed rule provides several options for the interested public to obtain more detailed location information, if desired.Paperwork Reduction Act of 1995 (44 U.S.C 3501 et seq.) This rule does not contain information ***collection*** requirements, and a submission to the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (44 U.S.C 3501 et seq.) is not required. We may not conduct or sponsor and you are not required to respond to a ***collection*** of information unless it displays a currently valid OMB control number.National Environmental Policy Act (42 U.S.C 4321 et seq.) It is our position that, outside the jurisdiction of the U.S Court of Appeals for the Tenth Circuit, we do not need to prepare environmental analyses pursuant to the National Environmental Policy Act (NEPA; 42 U.S.C 4321 et seq.) in connection with regulations adopted pursuant to section 4(a) of the Act. We published a notice outlining our reasons for this determination in the Federal Register on October 25, 1983 (48 FR 49244). This position was upheld by the U.S Court of Appeals for the Ninth Circuit (Douglas County v. Babbitt, 48 F.3d 1495 (9th Cir. 1995), cert. denied 516 U.S 1042 (1996)). However, when the range of the species includes States within the Tenth Circuit, such as that of the western fanshell, under the Tenth Circuit ruling in Catron County Board of Commissioners v. U.S Fish and Wildlife Service, 75 F.3d 1429 (10th Cir. 1996), we undertake a NEPA analysis for critical habitat designation. We invite the public to comment on the extent to which this proposed regulation may have a significant impact on the human environment, or fall within one of the categorical exclusions for actions that have no individual or cumulative effect on the quality of the human environment. We will complete our analysis, in compliance with NEPA, before finalizing this proposed rule.Government-to-Government Relationship With Tribes In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we readily acknowledge our responsibilities to work directly with Tribes in developing programs for healthy ecosystems, to acknowledge that Tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to Tribes. We have determined that no Tribal lands fall within the boundaries of the proposed critical habitat for the western fanshell and ``Ouachita'' fanshell, so no Tribal lands would be affected by the proposed designation.References Cited A complete list of references cited in this rulemaking is available on the internet at [*http://www.regulations.gov*](http://www.regulations.gov) and upon request from the Missouri Ecological Services Field Office for western fanshell and the Arkansas Ecological Services Field Office for ``Ouachita'' fanshell (see FOR FURTHER INFORMATION CONTACT).Authors The primary authors of this proposed rule are the staff members of the Fish and Wildlife Service's Species Assessment Team and the Missouri and Arkansas Ecological Services Field Offices.List of Subjects in 50 CFR Part 17 Endangered and threatened species, Exports, Imports, Reporting and[[Page 12367]]recordkeeping requirements, Transportation.Proposed Regulation Promulgation Accordingly, we propose to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:PART 17--ENDANGERED AND THREATENED WILDLIFE AND PLANTS01. The authority citation for part 17 continues to read as follows: Authority: 16 U.S.C 1361-1407; 1531-1544; and 4201-4245, unless otherwise noted.02. Amend Sec. 17.11(h) by adding entries for ``Fanshell, `Ouachita''' and ``Fanshell, western'' to the List of Endangered and Threatened Wildlife in alphabetical order under CLAMS to read as follows:Sec. 17.11 Endangered and threatened wildlife.\* \* \* \* \* (h) \* \* \*---------------------------------------------------------------------------------------------------------------- Listing citations and Common name Scientific name Where listed Status applicable rules---------------------------------------------------------------------------------------------------------------- \* \* \* \* \* \* \* CLAMS \* \* \* \* \* \* \*Fanshell, ``Ouachita''.......... Cyprogenia cf. Wherever found.... T [Federal Register aberti. citation when published as a final rule]; 50 CFR 17.45(e); \4d\ 50 CFR 17.95(f).\CH\Fanshell, western............... Cyprogenia aberti. Wherever found.... T [Federal Register citation when published as a final rule]; 50 CFR 17.45(e); \4d\ 50 CFR 17.95(f).\CH\ \* \* \* \* \* \* \*----------------------------------------------------------------------------------------------------------------03. Add Sec. 17.45 to read as follows:Sec. 17.45 Special rules--snails and clams. (a)-(d) [Reserved] (e) ``Ouachita'' fanshell (Cyprogenia cf. aberti) and western fanshell (Cyprogenia aberti). (1) Prohibitions. The following prohibitions that apply to endangered wildlife also apply to the ``Ouachita'' fanshell and western fanshell. Except as provided under paragraph (e)(2) of this section and Sec. Sec. 17.4 and 17.5, it is unlawful for any person subject to the jurisdiction of the United States to commit, to attempt to commit, to solicit another to commit, or cause to be committed, any of the following acts in regard to this species: (i) Import or export, as set forth at Sec. 17.21(b) for endangered wildlife. (ii) Take, as set forth at Sec. 17.21(c)(1) for endangered wildlife. (iii) Possession and other acts with unlawfully taken specimens, as set forth at Sec. 17.21(d)(1) for endangered wildlife. (iv) Interstate or foreign commerce in the course of commercial activity, as set forth at Sec. 17.21(e) for endangered wildlife. (v) Sale or offer for sale, as set forth at Sec. 17.21(f) for endangered wildlife. (2) Exceptions from prohibitions. In regard to this species, you may: (i) Conduct activities as authorized by a permit under Sec. 17.32 (ii) Take, as set forth at Sec. 17.21(c)(2) through (c)(4) for endangered wildlife. (iii) Take, as set forth at Sec. 17.31(b). (iv) Take incidental to an otherwise lawful activity caused by: (A) Channel and bank restoration projects for creation of natural, physically stable, ecologically functioning streams, taking into consideration connectivity with floodplain and groundwater aquifers. These projects can be accomplished using a variety of methods, but the desired outcome is a natural channel with low shear stress (force of water moving against the channel); bank heights that enable reconnection to the floodplain; connection of surface and groundwater systems, resulting in perennial flows in the channel; riffles and pools comprised of existing soil, rock, and wood instead of large imported materials; low compaction of soils within adjacent riparian areas; and inclusion of riparian wetlands. For bank stabilization projects that use bioengineering methods to replace preexisting, bare, eroding stream banks with vegetated, stable stream banks, thereby reducing bank erosion and instream sedimentation and improving habitat conditions for the species, stream banks may be stabilized using native species live stakes (live, vegetative cuttings inserted or tamped into the ground in a manner that allows the stake to take root and grow), native species live fascines (live branch cuttings, usually willows, bound together into long, cigar-shaped bundles), or native species brush layering (cuttings or branches of easily rooted tree species layered between successive lifts of soil fill). Bank restoration projects require planting appropriate native vegetation, including woody species appropriate for the region and habitat. These projects will not include the sole use of quarried rock (rip-rap) or the use of rock baskets or gabion structures. To qualify under this exception, restoration projects must include the following: (1) Surveys to determine presence of ``Ouachita'' fanshell and western fanshell prior to the commencement of restoration actions; (2) If either mussel is present, coordination with the Service's local Ecological Services field office for relocation of ``Ouachita'' fanshell and western fanshell mussels to suitable habitat outside of the project footprint prior to project implementation; and (3) If relocation of mussels occurs, monitoring of relocated mussels post-implementation of restoration activities. (B) Silviculture practices and forest management activities that use State-approved best management practices to protect water and sediment quality and stream and riparian habitat. (C) Transportation projects that avoid or do not include instream disturbance in waters occupied by the species. (v) Possess and engage in other acts with unlawfully taken wildlife, as set forth at Sec. 17.21(d)(2) for endangered wildlife.04. Amend Sec. 17.95(f) by adding entries for `` `Ouachita' Fanshell (Cyprogenia cf. aberti)'' and ``Western Fanshell (Cyprogenia aberti)'' immediately following the entry for ``Appalachian Elktoe (Alasmidonta raveneliana)'', to read as follows:[[Page 12368]]Sec. 17.95 Critical habitat--fish and wildlife.\* \* \* \* \* (f) Clams and Snails.\* \* \* \* \*``Ouachita'' Fanshell (Cyprogenia cf. aberti) (1) Critical habitat units are depicted for Ashley, Bradley, Clark, Cleveland, Dallas, Drew, Grant, Montgomery, Nevada, Ouachita, Polk, and Saline Counties, Arkansas, on the maps in this entry. (2) Within these areas, the physical or biological features essential to the conservation of ``Ouachita'' fanshell consist of the following components: (i) Adequate flows, or a hydrologic flow regime (magnitude, timing, frequency, duration, rate of change, and overall seasonality of discharge over time), necessary to maintain benthic habitats where the species is found and to maintain stream connectivity, specifically providing for the exchange of nutrients and sediment for maintenance of the mussel's and fish hosts' habitat and food availability, maintenance of spawning habitat for native host fishes, and the ability for newly transformed juveniles to settle and become established in their habitats. Adequate flows ensure delivery of oxygen, enable reproduction, deliver food to filter-feeding mussels, and reduce contaminants and fine sediments from interstitial spaces. (ii) Suitable substrates and connected instream habitats, characterized by geomorphically stable stream channels and banks (that is, channels that maintain lateral dimensions, longitudinal profiles, and sinuosity patterns over time without an aggrading or degrading bed elevation) with habitats that support a diversity of freshwater mussel and native fish (such as stable riffle-run-pool habitats that provide flow refuges consisting of silt-free gravel and coarse sand substrates). (iii) Water and sediment quality necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages, including, but not limited to: Dissolved oxygen (generally above 3 parts per million (ppm)) and water temperature (generally below 80 degrees Fahrenheit ([deg]F) (27 degrees Celsius ([deg]C)). Additionally, water and sediment should be low in ammonia (generally below 1.0 ppm total ammonia-nitrogen) and heavy metals, and lack excessive total suspended solids and other pollutants. (iv) The presence and abundance of fish hosts necessary for recruitment of the ``Ouachita'' fanshell, including logperch (Percina caprodes), slenderhead darter (Percina phoxocephala), or orangebelly darter (Etheostoma radiosum). (3) Critical habitat does not include manmade structures (such as buildings, aqueducts, runways, roads, and other paved areas) and the land on which they are located existing within the legal boundaries on the effective date of the rule. (4) ***Data*** layers defining map units were created by overlaying Natural Heritage Element Occurrence ***data*** and U.S Geological Survey hydrologic ***data*** for stream reaches using ESRI ArcGIS mapping software. Critical habitat unit upstream and downstream limits were delineated at the nearest road crossing or stream confluence of each occupied reach. ***Data*** layers defining map units were created with U.S Geological Survey National Hydrography Dataset (NHD) Medium Flowline ***data***. ArcGIS was also used to calculate river kilometers and river miles from the NHD dataset, and it was used to determine longitude and latitude coordinates in decimal degrees. The projection used in mapping and calculating distances and locations within the units was EPSG:4269-NAD83 Geographic. Natural Heritage program and State mussel database species presence ***data*** from Arkansas were used to select specific river and stream segments for inclusion in the critical habitat layer. The maps in this entry, as modified by any accompanying regulatory text, establish the boundaries of the critical habitat designation. The coordinates or plot points or both on which each map is based are available to the public at the Service's internet site at [*https://www.fws.gov/southeast/*](https://www.fws.gov/southeast/), at [*http://www.regulations.gov*](http://www.regulations.gov) at Docket No. FWS-R3-ES-2021-0061, and at the field office responsible for this designation. You may obtain field office location information by contacting one of the Service regional offices, the addresses of which are listed at 50 CFR 2.2 (5) Note: Index map follows:BILLING CODE 4333-15-P[[Page 12369]][GRAPHIC] [TIFF OMITTED] TP03MR22.003 (6) Unit OF 1: Little Missouri River; Clark, Nevada, and Ouachita Counties, Arkansas. (i) Unit OF 1 consists of 22.9 river miles (mi) (36.9 kilometers (km)) of Little Missouri River in Clark, Nevada, and Ouachita Counties, Arkansas, from the mouth of Garland Creek northeast of Prescott, Nevada County, downstream to the mouth of Horse Branch north of Red Hill, Ouachita County, and includes the river channel up to the ordinary high water mark. Approximately 100 percent of the riparian lands that border the unit are in private ownership. (ii) Map of Unit OF 1 follows:[[Page 12370]][GRAPHIC] [TIFF OMITTED] TP03MR22.004 (7) Unit OF 2: Ouachita Headwaters; Montgomery and Polk Counties, Arkansas. (i) Unit OF 2 consists of 32.7 river mi (52.6 km) of Ouachita River in Montgomery and Polk Counties, Arkansas, from the County Road 67 crossing south of Cherry Hill, Polk County, downstream to the U.S Route 270 crossing southeast of Pencil Bluff, Montgomery County, and includes the river channel up to the ordinary high water mark. Riparian lands that border the unit include approximately 29.9 river mi (48.1 km; 91 percent) in private ownership and 2.8 river mi (4.5 km; 9 percent) in public (Federal) ownership. The public ownership in this unit is Federal land associated with the U.S Forest Service's Ouachita National Forest. (ii) Map of Unit OF 2 follows:[[Page 12371]][GRAPHIC] [TIFF OMITTED] TP03MR22.005 (8) Unit OF 3: Ouachita River; Clark, Dallas, and Ouachita Counties, Arkansas. (i) Unit OF 3 consists of 53.5 river mi (86.1 km) of Ouachita River in Clark, Dallas, and Ouachita Counties, Arkansas, from the mouth of L'Eau Frais Creek southeast of Arkadelphia, Clark County, downstream to the mouth of Ecore Fabre Bayou north of Camden, Ouachita County, and includes the river channel up to the ordinary high water mark. Approximately 100 percent of the riparian lands that border the unit are in private ownership. There is a Wetlands Reserve Program easement within the unit. (ii) Map of Unit OF 3 follows:[[Page 12372]][GRAPHIC] [TIFF OMITTED] TP03MR22.006 (9) Unit OF 4: Saline River; Ashley, Bradley, Cleveland, Dallas, Drew, Grant, and Saline Counties, Arkansas. (i) Unit OF 4 consists of 185.3 river mi (298.2 km) of Saline River in Ashley, Bradley, Cleveland, Dallas, Drew, Grant, and Saline Counties, Arkansas, from the mouth of North Fork Saline River north of Benton, Saline County, downstream to the mouth of Mill Creek north of Stillions, Ashley County, and includes the river channel up to the ordinary high water mark. Approximately 100 percent of the riparian lands that border the unit are in private ownership and less than 1 percent is in public ownership. The public ownership in this unit is State-owned land associated with Jenkins Ferry State Park. (ii) Map of Unit OF 4 follows:[[Page 12373]][GRAPHIC] [TIFF OMITTED] TP03MR22.007Western Fanshell (Cyprogenia aberti) (1) Critical habitat units are depicted for Cleburne, Fulton, Independence, Jackson, Lawrence, Randolph, Sharp, Stone, and Van Buren Counties, Arkansas; Cherokee, Greenwood, Montgomery, and Wilson Counties, Kansas; and Butler, Jasper, Madison, and Wayne Counties, Missouri, on the maps in this entry. (2) Within these areas, the physical or biological features essential to the conservation of western fanshell consist of the following components: (i) Adequate flows, or a hydrologic flow regime (magnitude, timing, frequency, duration, rate of change, and overall seasonality of discharge over time), necessary to maintain benthic habitats where the species is found and to maintain stream connectivity, specifically providing for the exchange of nutrients and sediment for maintenance of the mussel's and fish hosts' habitat and food availability, maintenance of spawning habitat for native host fishes, and the ability for newly transformed juveniles to settle[[Page 12374]]and become established in their habitats. Adequate flows ensure delivery of oxygen, enable reproduction, deliver food to filter-feeding mussels, and reduce contaminants and fine sediments from interstitial spaces. (ii) Suitable substrates and connected instream habitats, characterized by geomorphically stable stream channels and banks (that is, channels that maintain lateral dimensions, longitudinal profiles, and sinuosity patterns over time without an aggrading or degrading bed elevation) with habitats that support a diversity of freshwater mussel and native fish (such as stable riffle-run-pool habitats that provide flow refuges consisting of silt-free gravel and coarse sand substrates). (iii) Water and sediment quality necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages, including, but not limited to: dissolved oxygen (generally above 3 parts per million (ppm)) and water temperature (generally below 80 degrees Fahrenheit ([deg]F) (27 degrees Celsius ([deg]C)). Additionally, water and sediment should be low in ammonia (generally below 1.0 ppm total ammonia-nitrogen) and heavy metals, and lack excessive total suspended solids and other pollutants. (iv) The presence and abundance of fish hosts necessary for recruitment of the western fanshell, including logperch (Percina caprodes), rainbow darter (Etheostoma caeruleum), slenderhead darter (Percina phoxocephala), fantail darter (Etheostoma flabellare), or orangebelly darter (Etheostoma radiosum). (3) Critical habitat does not include manmade structures (such as buildings, aqueducts, runways, roads, and other paved areas) and the land on which they are located existing within the legal boundaries on the effective date of the rule. (4) ***Data*** layers defining map units were created by overlaying Natural Heritage Element Occurrence ***data*** and U.S Geological Survey hydrologic ***data*** for stream reaches using ESRI ArcGIS mapping software. Critical habitat unit upstream and downstream limits were delineated at the nearest road crossing or stream confluence of each occupied reach. ***Data*** layers defining map units were created with U.S Geological Survey National Hydrography Dataset (NHD) Medium Flowline ***data***. ArcGIS was also used to calculate river kilometers and river miles from the NHD dataset, and it was used to determine longitude and latitude coordinates in decimal degrees. The projection used in mapping and calculating distances and locations within the units was EPSG:4269-NAD83 Geographic. Natural Heritage program and State mussel database species presence ***data*** from Arkansas, Kansas, and Missouri were used to select specific river and stream segments for inclusion in the critical habitat layer. The maps in this entry, as modified by any accompanying regulatory text, establish the boundaries of the critical habitat designation. The coordinates or plot points or both on which each map is based are available to the public at the Service's internet site at [*https://www.fws.gov/midwest/*](https://www.fws.gov/midwest/), at [*http://www.regulations.gov*](http://www.regulations.gov) at Docket No. FWS-R3-ES-2021-0061, and at the field office responsible for this designation. You may obtain field office location information by contacting one of the Service regional offices, the addresses of which are listed at 50 CFR 2.2 (5) Note: Index map follows:[[Page 12375]][GRAPHIC] [TIFF OMITTED] TP03MR22.008 (6) Unit WF 1: Upper Black River; Butler and Wayne Counties, Missouri. (i) Unit WF 1 consists of 64.7 river miles (mi) (104.1 kilometers (km)) of Black River in Butler and Wayne Counties, Missouri, from Clearwater Dam southwest of Piedmont, Wayne County, extending downstream to Butler County Road 658 crossing southeast of Poplar Bluff, Butler County, and includes the river channel up to the ordinary high water mark. Riparian lands that border the unit include approximately 51 river mi (82.1 km; 79 percent) in private ownership and 13.7 river mi (22 km; 21 percent) in public (Federal or State) ownership. Approximately 2.7 miles of the public ownership in this unit are State lands associated with Missouri Department of Conservation's (MDC) Bradley A. Hammer Memorial Conservation Area, Dan River Access, Hilliard Access, and Stephen J. Sun Conservation Area. Eleven miles are Federal land associated with the U.S Forest Service's (USFS) Mark Twain National Forest and U.S [[Page 12376]]Army Corps of Engineers (USACE) Clearwater Recreation Area. (ii) Map of Unit WF 1 follows: [GRAPHIC] [TIFF OMITTED] TP03MR22.009 (7) Unit WF 2: Lower Black/Strawberry River; Independence, Jackson, Lawrence, and Sharp Counties, Arkansas. (i) Unit WF 2 consists of 111.3 river mi (179.1 km) of Black River and Strawberry River in Independence, Jackson, Lawrence, and Sharp Counties in Arkansas, and includes the river channel up to the ordinary high water mark. Black River makes up 54.6 river mi (87.9 km) from the mouth of Spring River northeast of Black Rock, extending downstream to the mouth of Strawberry River northeast of Dowdy, Independence County. Strawberry River makes up 56.7 river mi (91.2 km) from the mouth of Lave Creek north of[[Page 12377]]Evening Shade, Sharp County, extending downstream to the confluence with Black River northeast of Dowdy, Independence County. Riparian lands that border the unit include approximately 100.4 river mi (161.6 km; 90 percent) in private ownership and 10.9 river mi (17.5 km; 10 percent) in public (State) ownership. The public land ownership in this unit is associated with Arkansas Game and Fish Commission's Shirey Bay Rainey Brake Wildlife Management Area on Black River. The Nature Conservancy's Strawberry River Preserve and Ranch on Strawberry River is also in this unit. (ii) Map of Unit WF 2 follows: [GRAPHIC] [TIFF OMITTED] TP03MR22.010 (8) Unit WF 3: Fall River; Greenwood and Wilson Counties, Kansas. (i) Unit WF 3 consists of 45.5 river mi (73.2 km) of Fall River in Greenwood and Wilson Counties, Kansas, from the Greenwood County Road 33/Merchants[[Page 12378]]Avenue crossing at Fall River, Greenwood County, extending downstream to the U.S Route 400 crossing west of Neodesha, Wilson County, and includes the river channel up to the ordinary high water mark. Approximately 100 percent of the riparian lands that border the unit are in private ownership. (ii) Map of Unit WF 3 follows: [GRAPHIC] [TIFF OMITTED] TP03MR22.011 (9) Unit WF 4: Middle Fork Little Red River; Cleburne, Stone, and Van Buren Counties, Arkansas. (i) Unit WF 4 consists of 34.1 river mi (54.8 km) of the Middle Fork Little Red River in Cleburne, Stone, and Van Buren Counties, Arkansas, from the mouth of Linn Creek east of Dennard, Van Buren County, extending downstream to the mouth of Wild Goose Creek north of Fairfield Bay, Cleburne[[Page 12379]]and Van Buren counties, and includes the river channel up to the ordinary high water mark. Riparian lands that border the unit include approximately 30.6 river mi (49.2 km; 90 percent) in private ownership and 3.5 river mi (5.6 km; 10 percent) in public (Federal) ownership. All of the public land ownership in this unit is Federal land associated with the USACE's Greers Ferry Recreation Area. (ii) Map of Unit WF 4 follows: [GRAPHIC] [TIFF OMITTED] TP03MR22.012 (10) Unit WF 5: St. Francis River; Madison and Wayne Counties, Missouri. (i) Unit WF 5 consists of 49.3 river mi (79.3 km) of St. Francis River in Madison and Wayne Counties, Missouri, extending from the mouth of Wachita Creek west of Fredericktown, Madison County, downstream to the mouth of Big Creek northwest of Silva, Wayne County, and includes the river channel up to the ordinary high water mark. Riparian lands that border the unit[[Page 12380]]include approximately 36.7 river mi (59.1 km; 74 percent) in private ownership and 12.6 river mi (20.2 km; 26 percent) in public (Federal or State) ownership. Approximately 2.4 river mi of the public ownership in this unit are State lands associated with MDC's Coldwater Conservation Area, Mill Stream Gardens, and Roselle Access. Ten miles are Federal land associated with the USFS's Mark Twain National Forest. (ii) Map of Unit WF 5 follows: [GRAPHIC] [TIFF OMITTED] TP03MR22.013 (11) Unit WF 6: South Fork Spring River; Fulton County, Arkansas. (i) Unit WF 6 consists of 13.4 river mi (21.6 km) of South Fork Spring River in Fulton County, Arkansas, from the mouth of Camp Creek east of Salem, Fulton County, extending downstream to the Arkansas Highway 289 crossing[[Page 12381]]northwest of Cherokee Village, Fulton and Sharp Counties, and includes the river channel up to the ordinary high water mark. Approximately 100 percent of the riparian lands that border the unit are in private ownership. (ii) Map of Unit WF 6 follows: [GRAPHIC] [TIFF OMITTED] TP03MR22.014 (12) Unit WF 7: Spring River (AR); Lawrence and Randolph Counties, Arkansas. (i) Unit WF 7 consists of 14.2 river mi (22.9 km) of Spring River in Lawrence and Randolph Counties, Arkansas, from the mouth of Wells Creek at Ravenden, extending downstream to the mouth of Stennitt Creek southeast of Imboden, Lawrence County, and includes the river channel up to the ordinary high water mark. Approximately 100 percent of the riparian lands that border the unit are in private ownership. (ii) Map of Unit WF 7 follows:[[Page 12382]][GRAPHIC] [TIFF OMITTED] TP03MR22.015 (13) Unit WF 8: Spring River (MO/KS); Jasper County, Missouri, and Cherokee County, Kansas. (i) Unit WF 8 consists of 15 river mi (24.1 km) of Spring River in Jasper County, Missouri, and Cherokee County, Kansas, from the mouth of North Fork Spring River east of Asbury, Jasper County, Missouri, extending downstream through Cherokee County, Kansas, to the mouth of Center Creek west of Carl Junction, Jasper County, Missouri, and includes the river channel up to the ordinary high water mark. Riparian lands that border the unit include approximately 14.0 river mi (22.5 km; 94 percent) in private ownership and 1.0 river mi (1.6 km; 6 percent) in public (State) ownership. The public ownership of this unit is State land associated with the Kansas Department of Wildlife, Parks and Tourism's Spring River Wildlife Area. (ii) Map of Unit WF 8 follows:[[Page 12383]][GRAPHIC] [TIFF OMITTED] TP03MR22.016 (14) Unit WF 9: Verdigris River; Montgomery and Wilson Counties, Kansas. (i) Unit WF 9 consists of 12.4 river mi (20 km) of Verdigris River in Montgomery and Wilson Counties, Kansas, from the mouth of Fall River south of Neodesha, Wilson County, extending downstream to the mouth of Choteau Creek northeast of Independence, Montgomery County, and includes the river channel up to the ordinary high water mark. Approximately 100 percent of the riparian lands that border the unit are in private ownership. (ii) Map of Unit WF 9 follows:[[Page 12384]][GRAPHIC] [TIFF OMITTED] TP03MR22.017\* \* \* \* \*Martha Williams,Principal Deputy Director, Exercising the Delegated Authority of the Director, U.S Fish and Wildlife Service.[FR Doc. 2022-02994 Filed 3-2-22; 8:45 am]BILLING CODE 4333-15-C

**Load-Date:** March 6, 2022

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[***Federal Register: Endangered and Threatened Wildlife and Plants; Threatened Species Status for Streaked Horned Lark With Section 4(d) Rule Pages 21783 - 21812 [FR DOC #2022-07920]***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:657B-0HX1-JDG9-Y3V2-00000-00&context=1516831)

Impact News Service

April 13, 2022 Wednesday

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**Length:** 31583 words

**Body**

Washington: Office of the Federal Register has issued the following notice:DEPARTMENT OF THE INTERIORFish and Wildlife Service50 CFR Part 17[Docket No. FWS-R1-ES-2020-0153; FF09E21000 FXES1111090FEDR 223]RIN 1018-BE76Endangered and Threatened Wildlife and Plants; Threatened Species Status for Streaked Horned Lark With Section 4(d) RuleAGENCY: Fish and Wildlife Service, Interior.ACTION: Final rule.-----------------------------------------------------------------------SUMMARY: We, the U.S Fish and Wildlife Service (Service), affirm the listing of the streaked horned lark (Eremophila alpestris strigata), a bird subspecies from Washington and Oregon, as a threatened species under the Endangered Species Act of 1973, as amended (Act). We also revise the rule issued under section 4(d) of the Act (``4(d) rule'') for this bird. This final rule maintains this species as a threatened species on the List of Endangered and Threatened Wildlife and continues to extend the protections of the Act to the species.DATES: This rule is effective May 13, 2022.ADDRESSES: This final rule is available on the internet at [*https://www.regulations.gov*](https://www.regulations.gov) under Docket No. FWS-R1-ES-2020-0153 and at [*https://www.fws.gov/oregonfwo/*](https://www.fws.gov/oregonfwo/). Comments and materials we received, as well as supporting documentation we used in preparing this rule, are available for public inspection at [*https://www.regulations.gov*](https://www.regulations.gov) under Docket No. FWS-R1-ES-2020-0153.FOR FURTHER INFORMATION CONTACT: Paul Henson, State Supervisor, U.S Fish and Wildlife Service, Oregon Fish and Wildlife Office, 2600 SE 98th Avenue, Suite 100, Portland, OR 97266; telephone 503-231-6179. Individuals in the United States who are deaf, deafblind, hard of hearing, or have a speech disability may dial 711 (TTY, TDD, or TeleBraille) to access telecommunications relay services. Individuals outside the United States should use the relay services offered within their country to make international calls to the point-of-contact in the United States.SUPPLEMENTARY INFORMATION:Executive Summary Why we need to publish a rule. On February 28, 2018, the Center for Biological Diversity filed suit against the Department of the Interior and the Service on the 2013 listing and 4(d) rules for the streaked horned lark (78 FR 61452; October 3, 2013). The plaintiff challenged the adequacy of our significant portion of the range analysis, and the 4(d) rule's exception to the take prohibition for ***agricultural*** activities in the Willamette Valley. The court did not vacate the rules but remanded them to us for reconsideration. On April 13, 2021, we published a proposed rule (86 FR 19186) that reflected an updated assessment of the status of the subspecies and proposed revisions to the current 4(d) rule. Under the Act, we are required to make a final determination on our proposal within 1 year. What this document does. With this final rule, we affirm the listing of the streaked horned lark as a threatened species, and we revise the 4(d) rule for the species. The basis for our action. Under the Act, we may determine that a species is an endangered or threatened species because of any of five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. We have determined that the streaked horned lark faces threats from the ongoing loss and degradation of suitable habitat (Factor A), as well as land management activities and related effects, and recreation (Factor E), combined with the synergistic effects of small population size and climate change (Factor E), such that it is likely to become an endangered species within the foreseeable future. Peer review and public comment. The purpose of peer review is to ensure that our listing determinations and 4(d) rules are based on scientifically sound ***data***, assumptions, and analyses. The Service prepared the Species Status Assessment for the Streaked Horned Lark (SSA report) (U.S Fish and Wildlife Service 2021a, entire) and sought peer review on the report in accordance with our joint policy on peer review published in[[Page 21784]]the Federal Register on July 1, 1994 (59 FR 34270), and our August 22, 2016, memorandum updating and clarifying the role of peer review of listing actions under the Act. We solicited expert opinions of five appropriate specialists with expertise in ornithology and streaked horned lark biology and habitat, and we received three responses. These peer reviewers generally concurred with our methods and conclusions, and provided additional information, clarifications, and suggestions to improve the SSA report. Additionally, we sent the SSA report to six agency partners for review and received responses from three partners. We also considered all comments and information we received from the public during the comment period for the April 13, 2021, proposed rule (86 FR 19186).Previous Federal Actions On October 3, 2013, we published in the Federal Register (78 FR 61452) a final rule listing the streaked horned lark as a threatened species under the Act; that rule was accompanied by a 4(d) rule to except certain activities from the take prohibitions of the Act and our regulations in order to provide for the conservation of the streaked horned lark. In addition, on October 3, 2013, we published in the Federal Register (78 FR 61506) a final rule designating critical habitat for the streaked horned lark in Washington and Oregon. On February 28, 2018, the Center for Biological Diversity filed suit against the Department of the Interior and the Service on the listing and 4(d) rules for the streaked horned lark. The court did not vacate the rules but remanded the rules to us for reconsideration and ordered us to submit a revised proposed listing determination to the Federal Register no later than March 31, 2021. To facilitate consideration of new information, the Service conducted a new species status assessment (SSA) analysis informed by our SSA framework (Service 2016a, entire). On April 13, 2021, we published a proposed rule (86 FR 19186) that reflected an updated assessment of the status of the subspecies (including an updated analysis of any significant portions of the range) based on the SSA report, and proposed revisions to the current 4(d) rule.Supporting Documents A team of Service biologists, in consultation with other species experts, prepared the SSA report for the streaked horned lark (U.S Fish and Wildlife Service 2021a, entire). The SSA report represents a compilation of the best scientific and commercial ***data*** available concerning the status of the species, including the impacts of past, present, and future factors (both negative and beneficial) affecting the species. This final rule is based on the scientific information compiled in the SSA report.Summary of Changes From the Proposed Rule In preparing this final rule, we reviewed and fully considered comments from the public on the April 13, 2021, proposed rule (86 FR 19186). We made many small, nonsubstantive clarifications and corrections throughout the SSA report and this rule, including under Summary of Biological Status and Threats, below, in order to ensure better consistency, clarify some information, and update or add new references. We considered whether this additional information altered our analysis of the magnitude or severity of threats facing the species. We updated the SSA report (to version 2.0) and the final rule based on comments and additional information provided as follows: (a) We include updated survey information provided to the Service and other reports of additional occurrences we received. (b) We use an updated definition of suitable habitat throughout the final rule; wherein suitable habitat is defined as early seral stage communities with low-statured vegetation and substantive amounts of bare ground or sparsely vegetated conditions. (c) We update Table 3 in the SSA and present an updated Table 1 in this final rule. (d) We omit the proposed rule's Figure 1 from this final rule and instead present a new Table 3 where mean number of pairs are detected across all sites per region. Subsequent tables are renumbered to remain in sequence. (e) We add text to the exception of take in the 4(d) rule for habitat restoration activities (Sec. 17.41(a)(2)(iv)(E)) to clarify that the Service will determine whether these activities are consistent with this final rule on a case-by-case basis. (f) We update the numbers reporting acreage of ***agriculture*** in the Willamette Valley, and specifically the amount of land used in production of grass seed. We conclude that the information we received during the comment period for the proposed rule did not change our previous analysis of the magnitude or severity of threats facing the species or our determination that streaked horned lark is a threatened species.Summary of Comments and Recommendations In our April 13, 2021, proposed rule (86 FR 19186), we requested that all interested parties submit written comments on the proposal by June 14, 2021. We also contacted appropriate Federal and State agencies, scientific experts and organizations, and other interested parties and invited them to comment on the proposed rule. Newspaper notices inviting general public comment were published in The Oregonian on April 18, 2021, The News Tribune on April 19, 2021, and The Olympian on April 19, 2021. We did not receive any requests for a public hearing. All substantive information provided during the comment period either has been incorporated directly into the final rule or is addressed below.Peer Reviewer Comments In accordance with our joint policy on peer review published in the Federal Register on July 1, 1994 (59 FR 34270), and our August 22, 2016, memorandum updating and clarifying the role of peer review of listing actions under the Act, we sought the expert opinions of five appropriate specialists regarding the 2021 SSA report. The peer reviewers have expertise that includes familiarity with streaked horned lark and its habitat, biological needs, and threats. We received responses from three specialists, which informed the SSA report and our April 13, 2021, proposed rule. The purpose of peer review is to ensure that our listing determinations and 4(d) rules are based on scientifically sound ***data***, conclusions, and analyses. We reviewed all peer review comments we received from the specialists for substantive issues and new information regarding streaked horned lark and incorporated into the final SSA report (Service 2021a) as appropriate.Public Comments We received seven submissions during the comment period for the proposed rule. We reviewed all submissions for substantive comments and new information regarding the proposed rule. Four submissions included substantive comments or new information concerning the April 13, 2021, proposed rule and the SSA report (Service 2021a). Updated information received was incorporated into the final SSA report and our final rule as appropriate. Below, we provide a summary of the substantive comments raised in the public submissions we received; however, comments outside the scope of the proposed rule, and those without supporting information,[[Page 21785]]did not warrant an explicit response and, thus, are not presented here. Identical or similar comments have been consolidated. (1) Comment: Several commenters argued that the subspecies should be listed as endangered in all or a significant portion of the range due to small population sizes, ongoing loss of habitat, and lack of protection across most of its range. Response: The streaked horned lark has been listed since 2013 and since that time the Service has been coordinating with partners to implement recovery actions throughout the range. The subspecies continues to be affected by a variety of stressors including ***agriculture***, airport management, military operations, dredged material placement, and recreation. Despite the ongoing influence of stressors, the subspecies is not currently in danger of extinction, because the species retains multiple populations in high and moderate condition across all representative regions and those populations occur in a variety of habitat types. While the subspecies has shown ***variable*** abundance across the range, both from location-to-location and year-to-year, each representative region has at least 8 redundant populations. Negative influence factors on the subspecies have not fluctuated much for the last 20 years and are not of a scope or magnitude such that the subspecies is currently in danger of extinction. As noted in the Background and Summary of Biological Status and Threats sections, abundance of larks across the Willamette Valley appears relatively high, but many of these local populations cannot be surveyed due to lack of access. Although the current abundance of local populations along the Pacific Coast is lower than other areas, it has been low for many years, and we see no apparent declining trend in this regional population based on survey ***data*** from 2013 to 2019. Recent detections of birds at Clatsop Spit, as well as sites with restored habitat on private lands in the Willamette Valley, indicate that individuals can move between sites, and there are a few instances of detections at previously unoccupied locations, but recolonization appears low and difficult to predict. (2) Comment: One commenter stated we should have coordinated with outside entities to quantify our assessment of streaked horned larks and evaluate specific threats or issues. Response: The streaked horned lark has been listed since 2013, with recovery actions coordinated by the Streaked Horned Lark Recovery Working Group (Working Group). The Streaked Horned Lark Recovery Working Group consists of several entities outside of the Service, including state biologists from both Oregon and Washington as well as species experts from American Bird Conservancy, Oregon State University, Center for Natural Lands, and other private individuals. Species status assessments (SSAs) are typically led by Service biologists and can include biologists from other agencies (state, Tribes and Federal). However, regardless of membership on an SSA core team, we call upon species experts and technical experts from other agencies to help us fill information gaps or check our analytical approach and did so with the streaked horned lark SSA. We drafted the SSA internally in response to the litigation remand and provided the draft SSA report for peer and partner review to a variety of people for external coordination, including the members of the Working Group. We took their comments into consideration when finalizing the SSA report and drafting the April 13, 2021, proposed rule. We also sent notice of the availability of the proposed rule to the members of the Working Group and took their comments into consideration when finalizing the rule. The 60-day public comment period on the April 13, 2021, proposed rule (86 FR 19186) provided interested parties an opportunity to comment and provide information on the proposed rule. (3) Comment: We received comments stating the analysis of the current resiliency, redundancy, and representation of streaked horned lark in the SSA report, which provided the basis for the reaffirmed status determination for the subspecies, is not in alignment with population targets in the draft recovery plan. Response: Recovery plans provide important guidance to the Service, States, Tribes, and other partners on methods of enhancing conservation and minimizing threats to listed species, as well as criteria against which to measure progress towards recovery, but they are not regulatory documents and cannot substitute for the determinations and promulgation of regulations required under section 4(a)(1) of the Act. For this status determination, we analyzed the best available scientific and commercial ***data*** through the SSA framework to inform current and projected future resiliency of regional populations, and redundancy and representation of the subspecies. The SSA framework is currently the standard approach the Service is using for status assessments, and it may not always be in perfect alignment with a previously developed recovery plan. Recovery plans identify metrics that describe what recovery of the species may look like; the SSA is used to analyze the current status of the species and project future conditions under a suite of plausible scenarios to support management decisions. The streaked horned lark draft recovery plan is supported by two supplementary documents: A Species Biological Report, which served as the basis for the SSA; and a Recovery Implementation Strategy, which details specific near-term activities identified in the draft recovery plan (U.S Fish and Wildlife Service. 2019b, entire). For the streaked horned lark SSA, we incorporated information from the draft recovery plan into our analysis when appropriate and consistent with the SSA framework and, in response to peer review on the SSA, we revised our demographic metrics for current condition to be more in line with population targets in the draft recovery plan. As described under Determination of Streaked Horned Lark's Status, below, our review of the best available scientific and commercial information (which we analyzed in the SSA process) indicates that the streaked horned lark meets the Act's definition of a threatened species. (4) Comment: We received several comments stating the methods of analysis used for interpreting changes in local and regional populations were flawed due to variability in survey efforts (both between years and between regions) and noting a lack of statistical analysis incorporated into our SSA and proposed rule. One commenter recommended we account for this variability in assessing population status and reference results presented in Keren and Pearson (2019). Another commenter stated that trends were based on ***data*** where conservation actions are implemented or land management activities are regulated through the section 7 consultation process and that this basis skews any apparent increase in population status over time toward the positive (which is not representative of the majority of the population that occurs on lands in the Willamette Valley, where no regulations protect the species from potential threats). Response: We incorporated information from Keren and Pearson (2019) where appropriate in the SSA report and in this final rule, and in our discussion of variability in survey efforts (both between years and between regions) in both documents. In this rule, to incorporate the best available science,[[Page 21786]]we update Table 1 to show corrected population estimates, add Tables 2 and 3 to show mean number of pairs detected across all sites per region, and include additional information on our characterization of trends to reflect the variability in survey effort between regions and the uncertainty regarding trends (see additional explanation as population estimates as a function of survey effort in Tables 1-3). If information relating to the status of the species on private lands in the Willamette Valley becomes available after publication of this final rule, we will take that information into consideration and can reassess status at that time. (5) Comment: One commenter stated that the process for evaluating connectivity between local populations and habitat conditions needs to be better described in the SSA report to account for how these metrics were evaluated with regards to the current condition. Response: In the SSA report and this final rule, we revised our description of the metrics used to evaluate current condition, including connectivity of local populations during the breeding season and between years based on evidence from color-banded individuals, as well as general habitat conditions at sites in the Willamette Valley where lark populations are monitored regularly and where land management activities maintain suitable habitat. Our assessment and conclusions regarding connectivity were based on seasonal and intra-annual observations of larks moving between sites (within a breeding season, based on color-banded or tagged birds, and observations of birds returning to alternate breeding sites relative to where they were banded) (see Figure 1 for additional information). (6) Comment: We received comments stating that the availability of suitable habitat in the Willamette Valley may not be the primary driver of the subspecies' status and distribution, as evidenced by the abundance of suitable habitat where larks are not detected. Response: In response to this comment, we clarified our definition of suitable habitat throughout this final rule as early seral stage communities with low-statured vegetation and substantive amounts of bare ground or sparsely vegetated conditions. This definition is consistent with that of suitable habitat in the draft recovery plan, the SSA, and scientific literature describing preferred habitats used by larks. We further acknowledge that there are other factors (in addition to the availability of suitable habitat) that drive the status of larks in the Willamette Valley. These include vegetation succession, land usage, crop ***conversion***, the timing and method of equipment operation, the loss of natural disturbance processes, and any other habitat perturbations during the breeding season. We updated the SSA to clarify that the primary driver of the subspecies' status and distribution is a combination of habitat availability and disturbance activities during the breeding season. (7) Comment: One commenter stated we need to better describe how the benefits of land management activities used to replicate or mimic suitable habitat conditions in the Willamette Valley outweigh the potential risks to breeding streaked horned larks. Response: Early spring conditions in recently established grass seed fields in the Willamette Valley attract streaked horned lark by providing suitable habitat (i.e , the areas between rows of grass that contain very little or no vegetation) for breeding. Streaked horned lark adults, nestling, and eggs can be negatively affected by mowing of these fields. Although streaked horned lark breeding can extend until late summer, that time period covers additional nest attempts, and the peak of breeding (first nest attempts) occurs in late May to mid-June before peak mowing (which typically occurs from mid-June to mid-July) in the Willamette Valley. Additional nesting attempts can occur from late June into August and may occur whether the first nest attempt failed or was successful (Pearson and Hopey 2004, p. 11). See also this discussion in the Summary of Biological Status and Threats section below. (8) Comment: One commenter stated that although ***agricultural*** practices maintain habitat for larks, the industry is declining, and replacement crops are not suitable for larks. They note that if suitable crop types are declining, it would be logically consistent that lark populations would decline based on loss of habitat, but the proposed rule describes the current condition for the Willamette Valley population as increasing. Response: As noted in our response to Comment (6), above, we acknowledge that there are drivers of population status other than grass seed production. In this rule, we present updated population survey numbers for the Willamette Valley population; however, there was variability in survey efforts and corresponding variability in mean number of birds detected during surveys across all regions. The increases at some local sites are balanced by fluctuations in lark detections during surveys and variability in survey effort across all years. (9) Comment: One commenter stated that the timing of ***agricultural*** activities in the Willamette Valley is mischaracterized in the SSA report and the potential effects to nesting larks are greater than portrayed in the SSA report. Response: Larks arrive on breeding sites in February (Pearson et al. 2016, p. 5), and the occupancy survey window extends from mid-April to mid-July. The nesting season (i.e clutch initiation to fledging) for streaked horned larks begins in mid-April and ends in late August, with peaks in May and June (Pearson and Hopey 2004, p. 11; Moore 2011, p. 32; Wolf 2011, p. 5; Wolf and Anderson, 2014, p. 19). Harvest of grass seed usually commences in late June after the typical first nest attempt. While peak breeding occurs early in the summer, streaked horned larks can nest until August, and can re-nest throughout the summer, so they have multiple chances to breed even if a first nest attempt fails. Second and third breeding attempts typically occur during or after harvest practices have occurred. Nest success in general is highly ***variable***. While there is potential for streaked horned lark nesting success to be impacted by grass seed harvest activities, the best available information does not indicate that those harvest activities are negatively affecting the current resiliency of streaked horned lark populations. (10) Comment: One commenter stated that prairie restoration in the Willamette Valley does not substantially contribute to long-term conservation of streaked horned larks in the Willamette Valley. The commenter stated that because birds that breed in these locations are displaced from nearby sites and nests, they are at risk of lethal effects from land management activities, such as mowing or pesticide application, that are used to maintain vegetation at the restoration site. Another commenter said restoration success is likely based on soil structure (in general, glacial outwash in Puget Lowlands compared to fertile organic soil in Willamette Valley) and the likelihood of plant growth occurring following restoration. Response: Larks at restoration sites throughout the subspecies' range are potentially affected by mowing and other land management activities similar to excepted activities at airports and in ***agricultural*** fields, but the results of prairie restoration in Willamette Valley indicate that restoration sites may provide short-term benefits to larks. Activities associated with streaked horned lark habitat restoration (e.g ,[[Page 21787]]removing nonnative plants and planting native plants, creating open areas, and maintaining sparse vegetation through vegetation removal or suppression via controlled burns) would be very beneficial to the subspecies; any adverse effects to the subspecies from these activities would likely be only short-term or temporary, especially with respect to harassment or disturbance of individual larks. In the long term, the risk of adverse effects to both individuals and populations is expected to be mitigated, as these types of land management activities will likely benefit the subspecies by helping to preserve and enhance the habitat of existing local populations over time. (11) Comment: We received several comments stating that the success of most existing conservation efforts results from section 7 consultation with Federal agencies, leaving streaked horned lark on private lands mostly unprotected. We received other comments stating that private landowners should receive protection via safe harbor agreements or other programs to incentivize them to promote conservation for the species. Response: It is well documented that listed species benefit from a higher level of protection on Federal lands when compared to privately owned lands, due in part to the requirement for section 7 consultation under the Act and other Federal programs. In contrast, protections for listed species on non-Federal lands rely more on section 9 take prohibitions and voluntary or discretionary conservation measures. Since we listed the streaked horned lark as threatened under the Act in 2013, numerous conservation measures resulting from section 7 consultation under the Act in the range of the streaked horned lark have helped reduce the effects of threats on the subspecies. Conservation of listed species in many parts of the United States is dependent upon working partnerships with a wide variety of entities, including the voluntary cooperation of non-Federal landowners. Building partnerships and promoting cooperation of landowners are essential to understanding the status of species on non-Federal lands and may be necessary to implement recovery actions such as reintroducing listed species, habitat restoration, and habitat protection. We encourage any landowners with a listed species such as streaked horned lark present on their property and who want to help conserve the species or think they carry out activities that may negatively impact that listed species to work with the Service to promote conservation. We promote these private sector efforts through the Department of the Interior's cooperative conservation philosophy (see [*https://www.fws.gov/services*](https://www.fws.gov/services) for more information). Once a species is listed, for private or other non-Federal property owners we offer voluntary safe harbor agreements that can contribute to the recovery of species, habitat conservation plans that allow activities (e.g , grazing) to proceed while minimizing effects to species, funding through the Partners for Fish and Wildlife Program to help promote conservation actions, and grants to the States under section 6 of the Act. We recently completed a Safe Harbor Agreement with a private landowner in the Willamette Valley to create and maintain habitat conditions that support larks and increase the distribution and abundance of larks in this region (U.S Fish and Wildlife Service 2021b, entire). (12) Comment: We received several comments stating that despite the joint effort to evaluate voluntary lark conservation in the Willamette Valley (funded by the USDA's Natural Resources Conservation Service, the Service, the American Bird Conservancy, and other partners), there was no incentive for ***agricultural*** producers (who are excepted under the 4(d) rule) to engage with the Federal government for conservation, even when financial incentives were available. One commenter stated that the assumption that the proposed 4(d) rule provides an incentive to landowners that results in creation or maintenance of habitat is erroneous and suggests producers do not make decisions based on market economics. Response: We determined that the specific provisions in the 4(d) rule adequately protect streaked horned lark while facilitating the conservation and management of the species where individuals currently occur and may occur in the future. There are a variety of factors that understandably drive the type of crop that ***agricultural*** producers choose to grow and why they might change to a different crop over time. On farms where larks utilize crops such as perennial rye grass seed after the first few years of planting, the 4(d) is intended to remove possible disincentive to farmers to continue growing this crop--and not change the crop to something that will exclude use by larks or to keep it longer in non-suitable habitat status. Section 4(d) of the Act states that the Secretary shall issue such regulations as she deems necessary and advisable to provide for conservation of species listed as threatened. Section 4(d) of the Act provides the Secretary with broad discretion to select and promulgate appropriate regulations tailored to the specific conservation needs of the threatened species. As described below under II. Final Rule Issued Under Section 4(d) of the Act, the provisions of our 4(d) rule will promote conservation of the streaked horned lark by encouraging management of the landscape in ways that can meet both land management considerations and the conservation needs of the streaked horned lark. The prohibitions identified in the 4(d) rule, however, are considered necessary and advisable for the conservation of the streaked horned lark (see next comment and response). (13) Comment: Several commenters stated that the proposed 4(d) rule leaves the streaked horned lark unprotected, and that existing regulations are insufficient to protect extant populations. One commenter stated that our rationale assumes that regulating ***agricultural*** practices would result in producers changing their practices or crops to avoid said regulations, but that the rise of the grass seed industry occurred in the same timeframe that larks began to decline. The commenter described the Willamette Valley as an ecological sink, where birds are attracted to habitat conditions, but management activities compromise reproductive success and survival. Commenters also note that the 4(d) rule excepts the ***agricultural*** industry as a whole, in spite of known effects on mortality, disturbance, and habitat alteration (shift in crop types based on market demands), for reasons other than conservation of the species, leaving the majority of the population in unregulated land use circumstances. Response: With the loss of historical habitats during the last century, alternative breeding and wintering sites, including active ***agricultural*** lands, have become critical for the continued survival and recovery of the streaked horned lark. The largest area of potential habitat for streaked horned larks is the ***agricultural*** land base in the Willamette Valley. Larks are attracted to the wide, open landscape context and low vegetation structure in ***agricultural*** fields, especially in grass seed fields, probably because those working landscapes resemble the historical habitats formerly used by the subspecies when the historical disturbances associated with floods and fires maintained a mosaic of suitable habitats. In any year, some portion of the 920,000 ac (372,311 ha) of ***agricultural*** lands in the Willamette Valley will contain patches of suitable streaked horned lark habitat, but the geographic location of those areas may[[Page 21788]]not be consistent from year to year, nor can we predict their occurrence due to ***variable*** ***agricultural*** practices (crop rotation, fallow fields, etc.), and we cannot predict the changing and dynamic locations of those areas. While ***agricultural*** activities also have the potential to harm or kill individual streaked horned larks or destroy their nests, maintenance of extensive ***agricultural*** lands (primarily grass seed farms) in the Willamette Valley is crucial to maintaining the population of streaked horned larks in the valley and aiding in the recovery of the subspecies in Oregon, and our revised 4(d) rule provides landowners some incentive to continue operating and maintaining their lands in a manner that is consistent with current operations which provide habitats that the birds currently rely on. As discussed in the response to Comment 12, we acknowledge that there are a number of reasons why a landowner may change their practices or convert their crop to a different commodity, however, and our revised 4(d) rule will promote conservation of the streaked horned lark in that it recognizes and supports management of the landscape in ways that meet both land management considerations and the conservation needs of the streaked horned lark. Currently in the Willamette Valley, there are approximately 360,000 ac (145,000 ha) of grass seed fields in production. In any year, some portion of these lands will have suitable streaked horned lark habitat, but the geographic location of those areas may not be consistent from year to year, nor can we predict their occurrence due to ***variable*** ***agricultural*** practices (crop rotation, fallow fields, etc.), and we cannot predict the changing and dynamic locations of those areas. Maintenance of extensive ***agricultural*** lands (primarily grass seed farms) is crucial to maintaining the population of streaked horned larks. The beneficial effects to the subspecies from maintaining these ***agricultural*** activities outweighs the negative effects from injuries to particular individual larks from these same activities. The exception for incidental take for certain ***agricultural*** activities on non-Federal lands in the revised 4(d) rule applies to the entire range of the subspecies, to encourage management actions that would facilitate the use of areas other than civilian and military airports by streaked horned larks within the range of the subspecies in Oregon and Washington. Because landowners are free to allow vegetation growth that results in the ***conversion*** of lands into habitats unsuitable for the streaked horned lark, conservation of the species will benefit from the support of ***agricultural*** practices that result in the creation and maintenance of habitat that is suitable for the subspecies. Excepting routine ***agricultural*** activities on non-Federal lands throughout the range of the streaked horned lark from the prohibition on take will provide an overall benefit to the subspecies by maintaining suitable habitat. (14) Comment: One commenter disagreed with our rationale for including restoration in the proposed 4(d) exceptions, stating the potentially lethal effects to larks resulting from restoration activities such as mowing, spraying pesticides, and tilling compromise the overall justification for excepting these activities. They also state that inclusion of prairie restoration in the proposed 4(d) rule eliminates opportunities for partnerships to address impacts with successful tools (nest protection). Response: We acknowledge that the effects from habitat restoration activities (mowing, spraying, tilling, etc.) on larks are similar to the effects of disturbance mechanisms that occur at airports (mowing) and on ***agricultural*** fields (mowing, tilling, harvesting, etc.), which maintain habitat for larks through semi-regular disturbance. However, we continue to support restoration of native habitats throughout the subspecies' range because these sites may provide additional temporary habitat for larks. Furthermore, while there are potential effects to larks from habitat management activities on restoration sites, if these activities were discontinued, plant growth and vegetation succession would occur, which would result in habitats no longer supporting the low-stature vegetation with areas of bare ground or sparsely vegetated ground that larks prefer. In parallel to our excepting of routine ***agricultural*** activities, excepting habitat restoration actions (that may include adverse effects to lark in the short-term), will provide an overall benefit by maintaining and/or adding to suitable habitat for the subspecies. While the loss of individuals is never welcome, the continuation of land management activities that create replacement habitat is very important for conservation of the subspecies, and the benefits to the subspecies as a whole appear to outweigh the associated cost of the loss of individuals. (15) Comment: Two commenters expressed concern that the 4(d) rule precludes actions necessary for the lark's survival and recovery, namely nest protection for the brief incubation period for larks nesting on privately owned ***agricultural*** land. The commenters did not provide suggestions for how such a nest protection program may be designed or administered on those private lands other than referencing application of section 9 take prohibitions. They did reference positive nest conservation efforts for the lark at Joint Base Lewis McChord (JBLM) in Washington, and for the western snowy plover (Charadrius alexandrinus nivosus) as examples of what they believe should be implemented in Oregon's private ***agricultural*** lands. Response: Some amount of nest mortality may occur as a consequence of excepted ***agricultural*** activities. The Service is sensitive to this concern and has taken reasonable steps to minimize the risk to nesting streaked horned larks while also supporting these same activities that maintain habitat the subspecies depends on for nesting. The commenters cite to lark nest protection on Federal lands at JBLM and to nest protection buffers applied for western snowy plover on Federal and state lands in Oregon, calling for similar protections for lark nests on private ***agricultural*** lands in Oregon. However, there are significant problems with this recommendation that serve to underscore and highlight the reasonable justifications for the 4(d) exceptions. First, the examples cited by the commenters involve conservation occurring completely on public lands: U.S Department of Defense lands at JBLM for lark conservation and, for the snowy plover, lands owned by the U.S Forest Service, Bureau of Land Management, and the Oregon Parks and Recreation Department. The requirements and opportunities for conservation on these Federal and state lands are significantly different than those for privately owned lands. Under the Act, the Federal agencies have a section 7 obligation to provide for the conservation of the streaked horned lark and western snowy plover. Likewise, on State Park lands, conservation of listed species is an explicit component of the State's land management goals, and the State voluntarily sought and received a section 10 permit from the Service for western snowy plover conservation on their park lands. These examples stand in sharp contrast to the conservation measures that are legally required of private landowners under the Act. The commenters' use of these examples does not recognize the important distinction between landownership and associated conservation obligations. Secondly, the commenters' recommendation that we locate, identify, buffer, and protect streaked[[Page 21789]]horned lark nests on private ***agricultural*** lands presents several problems. The recommendation presupposes that we know where nests are across this vast landscape, or that we have a reliable mechanism for locating and accessing them. Unfortunately, we have very little detailed information about where streaked horned larks are nesting within this expansive ***agricultural*** private landscape of grass seed farms in the Willamette Valley (approximately 360,000 ac (145,000 ha)). As explained earlier, nesting sites shift over time and space, and larks are likely only using a very small subset of these areas in any given year, making nest site prediction and detection difficult. In addition, we do not have legal access to the majority of this privately owned landscape to survey and locate nests; this greatly limits our ability to identify and determine if and where any lark nests may be impacted. In the Willamette Valley, other than surveying for larks along the gravel margins of public roads or other public access points, we are reliant on private landowners to voluntarily share information about the presence of larks on their land as it becomes available to them. It is well documented in the scientific literature that most private landowners will not voluntarily share such information if they are concerned about adverse regulatory impacts to their economic livelihood, cultural practices, and private property rights (Raymond and Olive 2008, p. 485; Brook et al. 2003, pp. 1644-47; Mir and Dick 2012, entire). This dynamic makes conserving species on private lands one of the most difficult challenges of implementing the Act, both in Oregon and across the country (see, e.g , Epanchin-Niell and Boyd 2020, p. 410). Therefore, under this very specific set of circumstances regarding private ***agricultural*** lands (and in contrast to the commenters' examples regarding western snowy plovers and streaked horned larks on public lands), the tradeoffs contained in this section 4(d) rule represent the best conservation approach to a very difficult situation.I. Final Listing DeterminationBackground A thorough review of the taxonomy, life history, and ecology of the streaked horned lark is presented in the SSA report (U.S Fish and Wildlife Service 2021a, pp. 4-19). The streaked horned lark, a small songbird endemic to the Pacific Northwest, is one of 42 subspecies of horned lark worldwide and one of five breeding subspecies of horned larks in Washington and Oregon (Beason 1995, p. 2). Adults are pale brown, but shades of brown vary geographically among the subspecies. The male's face has a yellow wash in most subspecies. Adults have a black bib, black whisker marks, black ``horns'' (feather tufts that can be raised or lowered), and black tail feathers with white margins (Beason 1995, p. 2). Adults feed mainly on grass and forb seeds, but feed insects to their young (Beason 1995, p. 6). At coastal sites, streaked horned larks forage in the wrack line (the area where kelp, seagrass, shells, etc. are deposited at high tide) and in intertidal habitats (Pearson and Altman 2005, p. 8), and streaked horned larks in the Willamette Valley eat seeds of introduced weedy grasses and forbs, focusing on the seed source that is most abundant (Moore 2008a, p. 9). Streaked horned larks historically selected habitat in relatively flat, open areas that were maintained by flooding, fire, and sediment transport dynamics. The interruption of these historical processes due to flood control dams, fire suppression, and reduction of sediment transport by dams resulted in a steep decline in the extent of historical habitat available for the lark. Currently, streaked horned larks are found in open areas free from visual obstructions like grasslands, prairies, wetlands, beaches, dunes, and modified or temporarily disturbed habitats such as ***agricultural*** or grass seed fields, airports, dredged material placement sites, and gravel roads. Streaked horned larks need relatively flat landscapes with sparse vegetation, preferring habitats with an average of 17 percent bare ground for foraging and 31 percent of bare ground for nesting (Altman 1999, p. 18). Typically, preferred habitats contain short vegetation, contain forbs and grasses that are less than 13 inches (in) (33 centimeters (cm)) in height, and have few or no trees or shrubs (Altman 1999, p. 18; Pearson and Hopey 2005, p. 27). The large, open areas used by populations of larks are regularly disturbed via burning, mowing, herbicide application, crop rotation, dredging material placement, and/or other anthropogenic regimes. Habitat characteristics of ***agricultural*** lands used by streaked horned larks include: (1) Bare or sparsely vegetated areas within or adjacent to grass seed fields, pastures, or fallow fields; (2) recently planted (0 to 3 years) conifer farms with extensive bare ground; and (3) wetland mudflats or ``drown outs'' (i.e , washed out and poorly performing areas within grass seed or row crop fields). Currently, there are approximately 420,000 acres (ac) (169,968 hectares (ha)) of grass seed fields and 500,000 ac (202,343 ha) of other ***agriculture*** in Oregon. Of the 420,000 ac, approximately 360,000 ac (145,000 ha) are located in the Willamette Valley (Oregon Seed Council 2018, p. 1). In any year, some portion of these areas will have suitable streaked horned lark habitat, but the geographic location of those areas may not be consistent from year to year due to ***variable*** ***agricultural*** practices (fallow fields, crop rotation, etc.), and we cannot predict the changing and dynamic locations of those areas. Horned larks form breeding pairs in the spring (Beason 1995, p. 11), and territory size is ***variable***. Territory size can range from 1.5 to 2.5 ac (0.61 to 1.0 ha) (Altman 1999, p. 11), and varies widely between sites and across years. For example, for 16 pairs of larks, territories ranged in size from 4.0 to 20.6 ac (1.6 to 8.3 ha) (Wolf et al. 2017, p. 12). Territories overlap substantially, and represent the semi-colonial breeding behavior of the species, where breeding territories are adjacent to other pairs at the same site but nests are not in extremely close proximity (Wolf et al. 2017, p. 12). The nesting season (i.e , clutch initiation to fledging) for streaked horned larks begins in mid-April and ends in late August, with peaks in May and early June (Pearson and Hopey 2004, p. 11; Moore 2011, p. 32; Wolf 2011, p. 5; Wolf and Anderson, 2014, p. 19). After the first nesting attempt in April, streaked horned larks will often re-nest in late June or early July (Pearson and Hopey 2004, p. 11). Nests are positioned adjacent to vegetation or other structural elements and are lined with soft vegetation (Pearson and Hopey 2005, p. 23; Moore and Kotaich 2010, p. 18). Streaked horned lark nesting success (i.e , the proportion of nests that result in at least one fledged chick) is highly ***variable***, which is consistent with other ground-nesting passerines (Best 1978, pp. 16-20; Johnson and Temple 1990, p. 6). The average minimum viable population (MVP) for the groups Aves and Passerines has been identified as 5,269 and 6,415 individuals, respectively. This number was determined using methodology described in a meta-analysis of multiple taxa (birds, fish, mammals, reptiles and amphibians, plants, insects, and marine invertebrates) (Anderson 2015, p. 2). Although we do not know what the historical abundance was for streaked horned lark rangewide (historical abundance estimates throughout the lark's range are largely anecdotal in nature), based on the MVPs for similar species, it was most likely larger than the current abundance. The draft[[Page 21790]]recovery plan for streaked horned lark (U.S Fish and Wildlife Service 2019, entire) has a rangewide population goal of 5,725 individuals. The most recent rangewide population estimate for streaked horned larks is 1,170 to 1,610 individuals. This estimate is based on ***data*** compiled from multiple survey efforts, plus extrapolation to areas of potential suitable habitat not surveyed (e.g , inaccessible private lands), particularly in the Willamette Valley (Altman 2011, p. 213). The streaked horned lark currently occurs in local populations (defined here as scattered breeding sites or areas of habitat to which individuals return each year) in three regions across the range: The South Puget Lowlands in Washington, the Pacific Coast and Lower Columbia River in Washington and Oregon, and the Willamette Valley in Oregon.BILLING CODE 4333-15-P[GRAPHIC] [TIFF OMITTED] TR13AP22.003[[Page 21791]]BILLING CODE 4333-15-C Regional abundance estimates based on survey ***data*** from local populations between 2013 and 2019 are provided in Table 1. Based on 2013 to 2019 survey ***data*** from regularly monitored sites across the range of the subspecies, the number, distribution, and size of streaked horned lark local populations appear to have increased since our publication of the final rule in 2013. Table 1--Regional Summaries of Breeding Pairs, With Number of Local Populations, Based on Records From 2013 to 2019-------------------------------------------------------------------------------------------------------------------------------------------------------- Regional population (with number of local populations) 2013 2014 2015 2016 2017 2018 2019--------------------------------------------------------------------------------------------------------------------------------------------------------South Puget Lowlands (8)..................................... 75-76 97-101 119 129 139 130 121-127Pacific Coast and Lower Columbia River (24).................. 81 89 77 85 77 86 97Pacific Coast (5)............................................ 10 12 11 9 13 13 10Lower Columbia River (19).................................... 71 77 66 76 64 73 87Willamette Valley (10)....................................... 96 23 109 127 92 133 165 ------------------------------------------------------------------------------------------ Rangewide total.......................................... 252-253 \* 209-213 305 341 308 349 383-389--------------------------------------------------------------------------------------------------------------------------------------------------------\* Several of the locations were not surveyed in 2014; other sites have no ***data*** available. We acknowledge there is a high degree of variability in annual survey efforts in the three regions and the resulting number of birds detected at each local population in any given year. Some local populations are regularly monitored and abundance estimates are regularly provided; other populations are irregularly monitored and survey efforts are infrequent. To account for this variability, we calculated the number of sites surveyed for each year per region (see Table 2). Table 2--Annual Survey Effort for Regional Populations Between 2013 and 2019---------------------------------------------------------------------------------------------------------------- Number of sites surveyed per year Regional population ----------------------------------------------------------------------------------- 2013 2014 2015 2016 2017 2018 2019----------------------------------------------------------------------------------------------------------------South Puget Lowlands........ 6 8 8 7 7 8 7Pacific Coast and Lower 16 23 24 20 20 22 21 Columbia River.............Willamette Valley........... 2 1 9 7 9 11 9---------------------------------------------------------------------------------------------------------------- As shown in Table 2, there is annual variability in the level of effort in which surveys are conducted in a region each year. For example, survey efforts in the Willamette Valley ranged between 1 survey at the Corvallis Airport in 2014 to 11 surveys at 5 airports, 3 refuges, and 3 private sites in 2018. In addition, there is a high degree of annual variability in survey effort that occurs among the regional populations relative to the number of local populations in each region. Of particular interest is the survey effort that occurs in the Willamette Valley compared to the other two regions. The Willamette Valley is believed to support the majority of the rangewide population, and yet there are relatively few surveys conducted, and we believe the number of birds detected are a fraction of the number residing in this region. Conversely, in the South Puget Lowlands and Pacific Coast and Lower Columbia River regions, we believe the number of local populations surveyed detect the majority of the birds occupying these regions. To assess for relative change in regional populations over time, we calculated the mean number of pairs that were detected across all local sites in a region per year relative to survey effort (see Table 3). Similar to the variability in survey effort, there is variability in the mean number of birds detected in each region, as well as between regions in all years. For example, 96 pairs were detected at two local sites in the Willamette Valley in 2013, resulting in a mean estimate of 48 pairs per site (see Tables 1 and 3). Comparatively, 92 pairs were detected at 9 local sites in the Willamette Valley in 2017 (see Tables 1 and 2). These results show a high degree of annual variability within a region due to level of survey effort and between regions due to number of sites surveyed. Table 3--Mean Number of Pairs Detected Across All Sites per Region---------------------------------------------------------------------------------------------------------------- Year and mean number of pairs detected Regional population ----------------------------------------------------------------------------------- 2013 2014 2015 2016 2017 2018 2019----------------------------------------------------------------------------------------------------------------South Puget Lowlands........ 12.5 12.1 14.5 17.7 20.3 15.1 17.3Pacific Coast and Lower 4.4 3.4 2.8 3.8 3.2 3.3 4.1 Columbia River.............Willamette Valley........... 48.0 26.0 12.1 18.1 10.2 12.1 18.3---------------------------------------------------------------------------------------------------------------- There is also high variability in the mean number of birds detected between regions and years. For example, more surveys were conducted in the Pacific Coast and Lower Columbia River region than the South Puget Lowlands and Willamette Valley combined, but the total number of pairs detected in the Pacific Coast and Lower Columbia River region was much lower in all years. The consistent and high degree of survey effort in this region is due, in part, to[[Page 21792]]regular monitoring by the U.S Army Corps of Engineers (Corps) at all sites used for dredged material placement along the Columbia River. The coastal sites are not regularly monitored and surveys frequently result in no detections. The majority of the birds detected in the Pacific Coast and Lower Columbia River region are found on only a few sites along the Columbia River. Many of remaining sites in the Pacific Coast and Lower Columbia River region support less than 5 pairs. As a result, the high level of survey effort in this region has not corresponded with an increased number of birds detected. In reviewing the annual variability in survey efforts for each region across all years and the high degree of variability in mean abundance estimates within and between regions, we acknowledge there are no clear trends to indicate if the current regional and rangewide population is increasing or decreasing. The South Puget Lowlands region consists of eight local populations at three municipal airports and five sites at Joint Base Lewis McChord (JBLM). Since the streaked horned lark was listed in 2013, the five local populations at JBLM have increased in size and two of the municipal airport populations have experienced declining trends (Keren and Pearson 2019, p. 4). Recent analysis indicates a declining female population at the Olympia and Shelton airports, resulting in declining abundance trends at these local populations (Keren and Pearson 2019, p. 3). Despite these declines, the overall regional population has stabilized to some degree based on increases of the local populations at JBLM which are likely the result of conservation measures implemented as part of section 7 consultations. The Pacific Coast and Lower Columbia River region currently consists of 24 local populations, including the new population recently detected at Clatsop Spit in Oregon. The region currently appears stable (Keren and Pearson 2019, p. 3), although local population surveys are inconsistent and do not occur at each site every year. Two of the sites on the coast of Washington (Oyhut Spit and Johns River) have no positive records since the 2013 listing and appear to be extirpated. There are few historical records of lark detections on the Washington and Oregon coast and those records indicate larks were only considered uncommon summer residents and never reported to occur in large numbers (Altman 2011, p. 200-202). Although the current abundance of local populations on the Pacific Coast is low compared to other areas, it has been low for many years. The physical size of the coastal sites is relatively small compared to the sites for other local populations (and therefore naturally limits the number of breeding pairs), and there is no consistent trend in this area based on survey ***data*** between 2013 and 2019. Despite recent observations of individual larks at Clatsop Spit (i.e , not breeding pairs), the number, distribution, and size of local breeding populations along the Pacific Coast appears to have remained relatively constant. The Willamette Valley regional population was previously estimated at 900 to 1,300 individuals, based on ***data*** compiled and extrapolated from multiple survey efforts between 2008 and 2010 (Altman 2011, p. 213), including estimates from the many known occupied but inaccessible sites on private lands in the region. The ***data*** used for the 2011 analysis is based on detections during roadside point counts in 2008 which detected 168 individuals, and surveys are occupied sites in 2009 and 2010 which detected approximately 250 breeding pairs at seven sites (Altman 2011, p. 213). Surveys from the 10 regularly monitored, accessible, occupied sites in the Willamette Valley counted 165 breeding pairs in 2019. These monitored sites include four municipal airports, three National Wildlife Refuges, two natural areas, and one survey on private land. One historical site for a local population in this region (Salem Municipal Airport) has had no positive records since 2013, and appears to be extirpated. As discussed above, there is a high degree of variability in abundance estimates based on total survey effort in a given year, which is inconsistent from year to year and site to site (see Table 2). The Willamette Valley regional population appears to be well distributed and stable, but the limited surveys of accessible sites may not accurately reflect the trend in the whole region. Streaked horned larks appear to be more abundant in the southern end of the valley where there is more suitable habitat. Across the range of the subspecies, the number and distribution of local populations throughout the range have increased since 2013. The number of breeding pairs detected at regularly monitored sites increased from 252-253 in 2013, to 383-389 in 2019, including increases at JBLM and at two additional sites in the Lower Columbia River area (Clatsop Spit and Howard Island) and two additional sites in the Willamette Valley (Herbert Farms and Coyote Creek). As discussed above, there is variability in survey efforts and corresponding variability in mean number of birds detected during surveys across all regions between 2013 and 2019. In addition, we have evidence of local population variability with some local populations increasing and others decreasing, as well as regional analysis that shows some declines in the Puget Lowlands and the Willamette Valley. Due to this variability and because a rangewide population estimate has not been reanalyzed since 2011, we are unable to state conclusively that the rangewide population has increased. However, we have regularly monitored several sites throughout the range since 2013 and while there is variability in the abundance of local populations, we believe that is no evidence to support that there are precipitous declines across any of the regions or across the range as a whole. The North American Breeding Bird Survey (BBS) analyzes regional ***data*** to provide a trend for rangewide breeding populations. In contrast to the ***data*** from site-specific surveys for the streaked horned lark from 2013-2019, the most recent BBS analysis for the region encompassing streaked horned larks indicates a 6.52 percent decline for the subspecies between 2005 and 2015 (95 percent confidence interval: -12.66 to -2.26 percent) (Sauer et al. 2017, p. 3). The streaked horned lark was listed as a threatened species under the Act in 2013, only 2 years before the last ***data*** set that was included in the most recent BBS analysis. When a species is listed and recovery actions begin, it may still be many years before the abundance recovers to the point where the species demonstrates a rangewide increasing population trend. Recovery actions require funding, staff, and time to implement. Documenting the subsequent species response to those actions takes additional time.Regulatory and Analytical FrameworkRegulatory Framework Section 4 of the Act (16 U.S.C 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species is an ``endangered species'' or a ``threatened species.'' The Act defines an ``endangered species'' as a species that is in danger of extinction throughout all or a significant portion of its range, and a ``threatened species'' as a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether any species is an ``endangered species'' or a ``threatened[[Page 21793]]species'' because of any of the following factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence. These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species' continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects. We use the term ``threat'' to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term ``threat'' includes actions or conditions that have a direct impact on individuals (direct impacts), as well as those that affect individuals through alteration of their habitat or required resources (stressors). The term ``threat'' may encompass--either together or separately--the source of the action or condition or the action or condition itself. However, the mere identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an ``endangered species'' or a ``threatened species.'' In determining whether a species meets either definition, we must evaluate all identified threats by considering the expected response by the species, and the effects of the threats--in light of those actions and conditions that will ameliorate the threats--on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effects of all of the threats on the species as a whole. We also consider the cumulative effects of the threats in light of those actions and conditions that will have positive effects on the species, such as any existing regulatory mechanisms or conservation efforts. The Secretary determines whether the species meets the definition of an ``endangered species'' or a ``threatened species'' only after conducting this cumulative analysis and describing the expected effect on the species now and in the foreseeable future. The Act does not define the term ``foreseeable future,'' which appears in the statutory definition of ``threatened species.'' Our implementing regulations at 50 CFR 424.11(d) set forth a framework for evaluating the foreseeable future on a case-by-case basis. The term ``foreseeable future'' extends only so far into the future as the Service can reasonably determine that both the future threats and the species' responses to those threats are likely. In other words, the foreseeable future is the period of time in which we can make reliable predictions. ``Reliable'' does not mean ``certain''; it means sufficient to provide a reasonable degree of confidence in the prediction. Thus, a prediction is reliable if it is reasonable to depend on it when making decisions. It is not always possible or necessary to define foreseeable future as a particular number of years. Analysis of the foreseeable future uses the best scientific and commercial ***data*** available and should consider the timeframes applicable to the relevant threats and to the species' likely responses to those threats in view of its life-history characteristics. ***Data*** that are typically relevant to assessing the species' biological response include species-specific factors such as lifespan, reproductive rates or productivity, certain behaviors, and other demographic factors.Analytical Framework The SSA report documents the results of our comprehensive biological review of the best scientific and commercial ***data*** regarding the status of the species, including an assessment of the potential threats to the species. The SSA report does not represent a decision by the Service on whether the species should be proposed for listing as an endangered or threatened species under the Act. It does, however, provide the scientific basis that informs our regulatory decisions, which involve the further application of standards within the Act and its implementing regulations and policies. The following is a summary of the key results and conclusions from the SSA report; the full SSA report can be found at Docket No. FWS-R1-ES-2020-0153 on [*https://www.regulations.gov*](https://www.regulations.gov). To assess streaked horned lark viability, we used the three conservation biology principles of resiliency, redundancy, and representation (Shaffer and Stein 2000, pp. 306-310). Briefly, resiliency supports the ability of the species to withstand environmental and demographic stochasticity (for example, wet or dry, warm or cold years), redundancy supports the ability of the species to withstand catastrophic events (for example, droughts, large pollution events), and representation supports the ability of the species to adapt over time to long-term changes in the environment (for example, climate changes). In general, the more resilient and redundant a species is and the more representation it has, the more likely it is to sustain populations over time, even under changing environmental conditions. Using these principles, we identified the species' ecological requirements for survival and reproduction at the individual, population, and species levels, and described the beneficial and risk factors influencing the species' viability. The SSA process can be categorized into three sequential stages. During the first stage, we evaluated the individual species' life-history needs. The next stage involved an assessment of the historical and current condition of the species' demographics and habitat characteristics, including an explanation of how the species arrived at its current condition. The final stage of the SSA involved making predictions about the species' responses to positive and negative environmental and anthropogenic influences in the future. Throughout all of these stages, we used the best available information to characterize viability as the ability of a species to sustain populations in the wild over time. We use this information to inform our regulatory decision.Summary of Biological Status and Threats In this discussion, we review the biological condition of the species and its resources, and the threats that influence the species' current and future condition, in order to assess the species' overall viability and the risks to that viability.Factors Influencing the Species In our October 3, 2013, listing rule (78 FR 61452), we found that the streaked horned lark was a threatened species due to loss and degradation of habitat from development, fire suppression, and invasive (native and nonnative) plants; dredge spoil deposition timing and placement on Columbia River islands; incompatibly timed burning and mowing regimes; activities associated with military training; ***conversion*** of large grass seed production fields to incompatible ***agricultural*** commodities; predation; small population effects; activities associated with airports; and recreation.[[Page 21794]]Stressors Considered but Determined Not To Be Influencing Condition In our SSA, we carefully analyzed these previously identified threats, as well as additional potential threats and conservation measures, to determine if they operate at a scope and magnitude as to influence the condition, or resiliency, of populations rather than only some individuals (U.S Fish and Wildlife Service 2021a, pp. 19-38). Based on our assessment, disease and pesticides do not rise to the level of affecting the condition of local or regional populations. Although the 2013 listing rule stated that predation was likely to be a significant and ongoing threat to the subspecies (particularly in the South Puget Lowlands region), our SSA did not find evidence of effects to the subspecies from predation beyond effects to individuals in any local population (U.S Fish and Wildlife Service 2021a, p. 20). Predation (typically by coyotes and corvids) does occur and primarily influences eggs, nestling, and juvenile survival; however, we did not find that it occurred at a level beyond regular life-history dynamics. We acknowledge, however, that predation combined with the effects of small population size may reduce the resiliency of some local populations, as noted below under ``Synergistic Effects.'' In 2013, a predator control program under the Wildlife Services Predator Damage Management Program of the Animal and Plant Health Inspection Service, U.S Department of ***Agriculture*** (USDA), was initiated at Leadbetter Point and Midway Beach on the Washington coast (U.S Fish and Wildlife Service 2011). ***Data*** show that western snowy plovers have shown improved nesting success since the program was implemented; however, monitoring ***data*** for streaked horned larks are inconclusive, and we cannot reliably determine if predator control has improved nesting success for larks at these sites.Stressors Influencing Current and Future Condition The primary driver of the status of streaked horned lark has been the scarcity of large, open spaces with very early seral stage plant communities with low-statured vegetation and substantive amounts of bare or sparsely vegetated ground. Historically, habitat was created and maintained by natural ecological processes of flooding, fire, and coastal sediment transport dynamics, as well as prairies maintained by Native American burning. The loss of regular disturbance regimes that created these open spaces impacted the abundance and distribution of historical streaked horned lark populations. Although this loss of historical disturbance led to displacement of lark into less suitable alternative habitat and subsequent population declines, it is not considered a significant influence on the condition of current populations because the impact occurred decades ago and is not ongoing. Furthermore, our current and future condition analyses take into consideration the quality of habitat, so the condition ranking of any populations that were displaced into lower quality habitat due to loss of historical disturbance is reflective of that displacement. The primary factors currently influencing the condition of streaked horned lark populations are the ongoing loss and ***conversion*** of suitable habitat, land management activities and related effects, and recreation. Since we listed the streaked horned lark as threatened under the Act in 2013, multiple entities have implemented a series of regulatory and voluntary conservation measures (section 7 consultations due to the listing of the subspecies under the Act) to offset negative impacts to larks and lark habitat, reducing the overall impact of stressors influencing local populations. We discuss these primary influence factors and associated conservation actions below.Ongoing Loss and ***Conversion*** of Suitable Habitat Following Euro-American settlement of the Pacific Northwest in the mid-19th century, fire was actively suppressed on grasslands in the Willamette Valley, allowing encroachment by woody vegetation into prairie habitat and oak woodlands (Franklin and Dyrness 1973, p. 122; Boyd 1986, entire; Kruckeberg 1991, p. 286; Agee 1993, p. 360; Altman et al. 2001, p. 262). Native and nonnative species that have encroached on these habitats throughout the lark's range include native Douglas fir (Pseudotsuga menziesii), nonnative Scotch broom (Cytisus scoparius), and nonnative grasses such as tall oatgrass (Arrhenatherum elatius) and false brome (Brachypodium sylvaticum) (Dunn and Ewing 1997, p. v; Tveten and Fonda 1999, p. 146). This expansion of woody vegetation and nonnative plant species, including noxious weeds, has reduced the quantity and quality and overall suitability of prairie habitats for larks (Tveten and Fonda 1999, p. 155; Pearson and Hopey 2005, pp. 2, 27). On JBLM alone, over 16,000 ac (6,600 ha) of prairie has been converted to Douglas fir forest since the mid-19th century (Foster and Shaff 2003, p. 284). Trees and/or other woody vegetation infiltrate open areas with formerly low vegetation and long sight lines preferred by streaked horned larks. The introduction of Eurasian beachgrass (Ammophila arenaria) and American beachgrass (Ammophila breviligulata) in the late 1800s, currently found in high and increasing densities in most of coastal Washington and Oregon, has dramatically altered the structure of dunes on the coast (Wiedemann and Pickart 1996, p. 289). Beachgrass creates areas of dense vegetation unsuitable for larks (MacLaren 2000, p. 5). The spread of beachgrass has reduced the available nesting habitat for streaked horned larks in Washington at Damon Point and at Grays Harbor and Leadbetter Point on Willapa National Wildlife Refuge (NWR) (Washington Department of Fish and Wildlife 1995, p. 19; Stinson 2005, p. 65; U.S Fish and Wildlife Service 2011, p. 4-2). On the Oregon coast, the low abundance of streaked horned lark is attributed to the invasion of exotic beachgrasses and resultant dune stabilization (Gilligan et al. 1994, p. 205). Without management (mechanical and chemical) to maintain the open landscape at sites like these, invasive beachgrasses will continue to influence current and future local populations of streaked horned larks and reduce suitability of these habitats, particularly in the Pacific Coast and Lower Columbia River regions. Habitat restoration work on Leadbetter Point by the Service's Willapa NWR has successfully reduced the cover of encroaching beachgrasses into streaked horned lark habitat. In 2007, the area of open habitat measured 84 ac (34 ha). However, after mechanical and chemical treatment to clear beachgrass (mostly American beachgrass), including spreading oyster shells across 45 ac (18 ha), there is now 121 ac (50 ha) of sparsely vegetated habitat available, increasing the extent of open habitat (Pearson et al. 2009b, p. 23). The main target of the Leadbetter Point restoration project was the federally listed western snowy plover, but the restoration actions also benefited streaked horned larks. Before the restoration project, this area had just 2 streaked horned lark territories (Stinson 2005, p. 63); after the project, an estimated 7 to 10 territories were located in and adjacent to the restoration area (Pearson in litt. 2012b). Human activity has converted native prairie and grassland habitats to residential and commercial development, reducing habitat availability for streaked horned larks throughout their range. About 96 percent of the Willamette Valley is[[Page 21795]]privately owned, and it is home to almost three-fourths of Oregon's human population, which is anticipated to nearly double in the next 50 years (Oregon Department of Fish and Wildlife 2016, p. 17). The Willamette Valley provides about half of the State's ***agricultural*** sales and is the location of 16 of the top 17 private-sector employers (manufacturing, technology, forestry, ***agriculture***, and other services). In the South Puget Lowlands, prairie habitat continues to be lost, particularly via the removal of native vegetation and the excavation and ***conversion*** to non-habitat surfaces in the process of residential development (i.e , buildings, pavement, residential development, and other infrastructure) (Stinson 2005, p. 70; Watts et al. 2007, p. 736). The region also contains glacial outwash soils and deep layers of gravels underlying the prairies that are valuable for use in construction and road building. Industrial development has also reduced habitat available to breeding and wintering streaked horned larks. Rivergate Industrial Park, owned by the Port of Portland, is a large industrial site in north Portland near the Columbia River that was developed on a dredge disposal site. Rivergate has long been an important breeding site for streaked horned larks and a wintering site for large flocks of mixed lark subspecies. In 1990, the field used by streaked horned larks at Rivergate measured more than 650 ac (260 ha) of open sandy habitat (Dillon in litt. 2012). In the years since, the Port of Portland has constructed numerous industrial buildings on the site, subsequently reducing habitat availability for larks and likely displacing all breeding and wintering larks from the area (Port of Portland 2019, entire). As part of the section 10(a)(1)(B) permit associated with the development of a habitat conservation plan (HCP) under the Act, the Port of Portland mitigated for the loss of streaked horned lark habitat by securing a long-term easement on a 32-ac (13-ha) parcel at Sandy Island. Sandy Island is an occupied breeding site on the Columbia River about 30 miles (mi) (50 kilometers (km)) north of the Rivergate industrial site and is designated as critical habitat for the streaked horned lark (Port of Portland 2017, p. 4). The Port's 30-year commitment to manage the site and protect breeding streaked horned larks helps to offset impacts to the regional population from the loss of available habitat at the Rivergate site. Roughly half of all the ***agricultural*** land in Oregon, approximately 360,000 ac (145,000 ha), is devoted to grass seed production in the Willamette Valley (Oregon Seed Council 2018, p. 1). Grasslands, both native prairies and grass seed fields, are important habitats for streaked horned larks in the Willamette Valley, as they are used as both breeding and wintering habitat (Altman 1999, p. 18; Moore and Kotaich 2010, p. 11; Myers and Kreager 2010, p. 9). Demand for grass seed and the overall acreage of grass seed harvested in Oregon has declined since 2005 (Oregon State University 2005 and 2019, entire). In 2019, approximately 364,355 ac (147,450 ha) were planted for forage and turf grass seed crops in the Willamette Valley compared to approximately 484,080 ac (195,900 ha) in 2005 (Oregon State University 2005 and 2019, entire). The reduction in grass seed production has resulted in growers switching to other commodities, such as wheat, stock for nurseries and greenhouses, grapes, blueberries, and hazelnuts (U.S Department of ***Agriculture*** National ***Agricultural*** Statistics Service 2009, p. 3; Oregon Department of ***Agriculture*** 2011, p. 1; U.S Department of ***Agriculture*** National ***Agricultural*** Statistics Service 2017, pp. 34, 55, 101). These other crop types do not have the low-statured vegetation and bare ground preferred by the streaked horned lark. The continued decline of the grass seed industry in the Willamette Valley due to the ***variable*** economics of ***agricultural*** markets will likely result in a continued ***conversion*** from grass seed fields to other ***agricultural*** types, and fewer acres of suitable habitat for streaked horned larks. Across the range, the ***conversion*** of streaked horned lark habitat into ***agricultural***, industrial, residential, or urban development will continue to influence current and future streaked horned lark local or regional populations to some degree throughout the range of the species, although the Pacific Coast is less affected than other areas.Land Management Activities and Related Effects Streaked horned larks evolved in a landscape of ephemeral habitat with regular historical disturbance regimes that maintained the large, open spaces with very early seral stage plant communities with low-statured vegetation and substantive amounts of bare or sparsely vegetated ground relied upon by the subspecies. Human activity led to the stabilization of these historical disturbance regimes, as well as the unintentional creation of ``replacement'' habitat for streaked horned larks that mimics their preferred large, open spaces. Replacement habitat occurs in a variety of settings across the range of the streaked horned lark, including ***agricultural*** fields, at airports, and on dredge spoil islands. Open habitat is maintained in these areas by way of frequent human disturbance, including burning, mowing, cropping, chemical treatments (herbicide and pesticide application), or placement of dredged materials (Altman 1999, p. 19). Without regular large-scale, human-caused disturbance, the quantity of suitable habitat available to larks would decrease rapidly. These land management activities are key to providing and maintaining habitat for the streaked horned lark; without replacement habitat, the status of the subspecies would likely be much worse. However, when these same activities are conducted during the most active breeding season (mid-April to mid-June) for streaked horned larks, they have the potential to result in destruction of nests, crushing of eggs or nestlings, or flushing of fledglings or adults (Pearson and Hopey 2005, p. 17; Stinson 2005, p. 72). During the nesting seasons from 2002 to 2004, monitoring at Gray Army Airfield, McChord Airfield, and Olympia Airport in the South Puget Lowlands region documented nest failure at 8 percent of nests due to mowing over nests, forcing young to fledge early (Pearson and Hopey 2005, p. 18). Additionally, although dredge deposits can mimic sandy beach habitat typically used by larks, they have also been documented to destroy breeding sites and active nests when deposition occurs during the nesting season (Pearson in litt. 2012a; Pearson et al. 2008a, p. 21; MacLaren 2000, p. 3; Pearson and Altman 2005, p. 10). In 2013 and 2014, the U.S Army Corps of Engineers collaborated with the Service and initiated a strategic multi-year dredging program for the lower Columbia River. The placement of dredge spoils was coordinated to minimize impacts to streaked horned larks by prioritizing placement of material on unsuitable lark habitat during the breeding season and where placement on suitable lark habitat was necessary it occurred outside of the breeding season. Over time, the placement of dredged materials reinitiated habitat succession and the development of suitable lark habitat, supporting long-term availability of suitable lark habitat throughout the lower Columbia River with minimal impacts to larks. In the Willamette Valley, some habitats in ***agricultural*** areas are consistently maintained and therefore available throughout the year (e.g , on the margins of gravel roads), while other patches of suitable habitat shift as areas[[Page 21796]]such as large fields are mowed, harvested, sprayed, or burned. In 2017, the Willamette Valley NWR entered into a 4-year programmatic section 7 consultation with the Service for its farming and pesticide use program (U.S Fish and Wildlife Service 2016b, entire). This programmatic consultation documents the National Wildlife Refuge System's commitment to adapting its farming activities to improve the status of the streaked horned lark on the William L. Finley, Ankeny, and Baskett Slough units of the Willamette Valley NWR complex. Conservation measures include ensuring that farming activities minimize disturbance to larks, and that pesticides used in ***agricultural*** fields have a low risk of adverse effects to larks and their food sources.Vegetation Management Activities at Airports Airports implement hazardous wildlife management programs that include vegetation management around roads and runways, to discourage the presence of wildlife near the runways and thereby promote human safety for flights. Streaked horned lark are very attracted to the wide, open spaces created by vegetation management, and several airports in the range are now sites for local populations of the subspecies. In the South Puget Lowlands, the streaked horned lark might have been extirpated if not for mowing at airports to maintain large areas of short grass (Stinson 2005, p. 70). Five of the eight streaked horned lark nesting sites in the South Puget Lowlands are located on or adjacent to airports and military airfields (Rogers 2000, p. 37; Pearson and Hopey 2005, p. 15). At least five breeding sites are found at airports in the Willamette Valley, including the largest known local population at Corvallis Municipal Airport (Moore 2008b, pp. 14-17). The Corvallis Municipal Airport implements some conservation measures to reduce impacts to larks during airshow and other events at the airport, as well as conservation measures associated with construction activities as described and implemented as part of a programmatic section 7 consultation with the Federal Aviation Administration (U.S Fish and Wildlife Service 2020, entire). The Port of Olympia's Updated Master Plan includes recommendations to minimize impacts to larks at the Olympia airport by avoiding mowing during the breeding season; however, mowing still occurs during the breeding season (Port of Olympia/Olympia Regional Airport 2013, pp. 10-11) and the local population at the airport has fluctuated (both increased and decreased) in surveys from 2013 to 2019 (Wolf et al. 2020, p. 16). The overall count of 30 breeding pairs in 2013 at the Port decreased to 21 pairs in 2018, but then increased to 27 pairs in 2019. In 2017, the JBLM finalized a programmatic section 7 consultation with the Service that covered multiple activities affecting streaked horned lark, including mowing (U.S Fish and Wildlife Service 2017, entire), which is allowed during the breeding season only under emergency circumstances (Wolf et al. 2017, p. 34). The programmatic consultation also covered military training activities, requiring JBLM to schedule training events as late in the breeding season as possible and restricting the use of vehicles or structures within active nest buffers during these events (U.S Fish and Wildlife Service 2017, p. 26). As part of the consultation, the JBLM proposed to carry out new conservation measures that have resulted in a significant reduction in adverse effects to larks from mowing and military training activities, as well as additional activities to restore prairie habitats. Additional conservation measures implemented as part of the consultation include an intensive monitoring and research program which informs long-term management goals for the base. As a result of this consultation, the breeding population of larks on JBLM increased from fewer than 100 pairs when the streaked horned lark was listed in 2013 (Wolf and Anderson 2014, p. 12), to over 120 pairs in 2019 (Wolf et al. 2020, p. 6). Similar conservation measures are not implemented at the municipal airports in the Puget Lowlands region or at the airports in the Willamette Valley region to reduce effects to streaked horned larks from operations and maintenance activities, including mowing.Aircraft Strikes Individual larks in these local populations near runways are at increased risk of aircraft strikes and collisions. Horned lark strikes are frequently reported at military and civilian airports throughout the country, but because of the bird's small size, few strikes result in significant damage to aircraft (Dolbeer et al. 2011, p. 48; Air Force Safety Center 2012, p. 2). Juvenile males seem to be struck most often, perhaps because they are trying to establish new territories in unoccupied but risky areas on runway margins (Wolf et al. 2017, p. 31). With respect to streaked horned larks in particular, in the 5-year period from 2013 to 2017, McChord Airfield had seven confirmed strikes, and Gray Army Airfield recorded one confirmed streaked horned lark strike (Wolf in litt. 2018). Since January 2017, 16 adults have been killed by strikes on JBLM, including 10 adults and 2 juveniles killed by strikes at McChord Airfield in 2020 (Wolf in litt. 2020). The increased number of strikes in 2020 were a direct result of construction activities that redirected aircraft traffic to the northern half of the runway where lark density is highest and lark abundance was relatively high; this led to a higher than normal mortality rate from aircraft strikes. Aside from the 12 strikes in 2020, JBLM recorded a total of 12 strikes in the 7 years between 2013 and 2019, for a rate of 1.7 strikes per year. While aircraft strikes do occur in several local populations at airports throughout the range of the species (particularly in the South Puget Lowlands), the rate appears relatively low and the vegetation management conducted by these airports also maintains replacement habitat that supports breeding pairs (Pearson et al. 2008a, p. 13; Camfield et al. 2011, p. 10; FAA 2020, entire).Dredge Material Deposition on the Columbia River The streaked horned lark uses islands in the Lower Columbia River for both breeding and wintering habitat. The river channel is regularly dredged by the U.S Army Corps of Engineers (Corps), and dredge deposits can both benefit and harm streaked horned larks, depending on the location and timing of deposition. In 2014, the Corps entered into a programmatic section 7 consultation with the Service for the Corps' navigation channel dredging and dredge materials placement program in the Lower Columbia River (U.S Fish and Wildlife Service 2014, entire). In this consultation, the Corps committed to planning for the placement of dredge material to minimize adverse effects to the lark on the Corps' network of placement sites and to maintain enough habitat in suitable condition to maintain the current regional population of breeding larks and allow for additional population growth. The 5-year program has been successful; from 2014 to 2019, numbers in the Lower Columbia River increased from an estimate of 77 pairs to 87 pairs, with the increases occurring at dredge deposition sites (Center for Natural Lands Management 2019, pp. 3-4). The original 5-year consultation was extended through 2022. The Corps is currently working on a 20-year dredge material management plan, which will build on the success of the previous consultation.[[Page 21797]]Military Training and Associated Activities Military training activities at the 13th Division Prairie at JBLM, including bombardment with explosive ordnance and hot downdraft from aircraft, as well as civilian events, have caused nest failure and abandonment at JBLM's Gray Army and McChord Airfields (Stinson 2005, pp. 71-72). JBLM is also used for helicopter operations (paratrooper practices, touch-and-go landings, and load drop and retrievals) and troop training activities. Artillery training, off-road use of vehicles, and troop maneuvers at the 13th and 91st Division Prairies have been conducted in areas used by streaked horned larks during the nesting season, contributing to nest failure and low nest success. In addition to military training activities, McChord Airfield hosts an international military training event known as the Air Mobility Rodeo, which is held in odd-numbered years. In even-numbered years, McChord Airfield hosts a public air show known as the Air Expo; this event incorporates simulated bombing and fire-bombing, including explosives and pyrotechnics launched from an area adjacent to one of JBLM's most densely populated streaked horned lark nesting sites. The Expo and Rodeo can affect the streaked horned lark through disturbance from aircraft; temporary infrastructure; and spectator-related nest abandonment, nest failure, and adverse effects to fledglings (Pearson et al. 2005, p. 18; Stinson 2005, p. 27).Recreation Recreation at coastal sites can cause the degradation of streaked horned lark habitat, as well as disturbance to adults and juveniles, and direct mortality to eggs, nestlings, and fledglings. Activities such as the annual spring razor clam digs, dog walking, beachcombing, off-road vehicle use, camping, fishing, and horseback riding in coastal habitats may directly or indirectly increase predation (primarily by corvids), resulting in nest abandonment and nest failure for streaked horned larks (Pearson and Hopey 2005, pp. 19, 26, 29). Streaked horned larks nest in the same areas as western snowy plovers along the Washington coast, and it is highly likely that recreation has caused nest failures for larks at sites that have documented nest failure for plovers; both species are ground nesters and, therefore, similarly at risk of effects of recreation. During western snowy plover surveys conducted between 2006 and 2010 at coastal sites in Washington, human-caused nest failures of between 1 and 2 nests per year were reported in 4 of the 5 years (2 in both 2006 and 2008, 1 in both 2009 and 2010) (Pearson et al. 2007, p. 16; Pearson et al. 2008b, p. 17; Pearson et al. 2009a, p. 18; Pearson et al. 2010, p. 16), and one of 16 monitored nests at Midway Beach on the Washington coast was crushed by a horse in 2004 (Pearson and Hopey 2005, pp. 18-19). In 2002, JBLM began restricting recreational activity at the 13th Division Prairie to protect lark nesting sites; JBLM prohibited model airplane flying, dog walking, and vehicle traffic in the area used by streaked horned larks (Pearson and Hopey 2005, p. 29). JBLM continues to restrict recreational activities during the lark breeding season at the 13th Division Prairie, although enforcement, especially on weekends, is intermittent (Wolf et al. 2016, p. 43). In addition, the 2017 programmatic section 7 consultation JBLM entered into with the Service (U.S Fish and Wildlife Service 2017, entire) included numerous positive conservation measures for the streaked horned lark, including prairie habitat restoration, monitoring and research program, and limits on military activities as well as recreational activities.Summary of Threats Table 4, below, summarizes the scope and magnitude of factors influencing the viability of streaked horned lark.BILLING CODE 4333-15-P[[Page 21798]][GRAPHIC] [TIFF OMITTED] TR13AP22.004BILLING CODE 4333-15-CClimate Change The effects of climate change have already been observed in the Pacific Northwest. Temperatures have risen 1.5 to 2 degrees Fahrenheit ([deg]F) (0.83 to 1.1 degrees Celsius ([deg]C)) over the past century, and the past three decades have been warmer than any other historical period (Frankson et al. 2017a, p. 1; Frankson et al. 2017b, p. 1). Climate change is widely expected to affect wildlife and their habitats in the Pacific Northwest by increasing summer temperatures, reducing soil moisture, increasing wildfires, reducing mountain snowpack, and causing more extreme weather events (Bachelet et al. 2011, p. 414). Climate change may increase the frequency and severity of stochastic weather events, which may have severe negative effects on small local populations throughout the range of the streaked horned lark. During the breeding season, small local populations of larks are distributed across the range; in the winter, however, streaked horned larks congregate mainly in the Willamette Valley and on islands in the Lower Columbia River. Such concentration exposes the wintering populations to potentially disastrous stochastic events such as ice storms or flooding, which could kill individuals, destroy limited habitat and food availability, or skew sex ratios. Severe winter weather could potentially impact one or more regional populations when birds congregate as larger flocks (Pearson and Altman 2005, p. 13). Despite the climate projections for the region, the effects of climate change specific to prairie ecosystems are not anticipated to decrease the resiliency of regional streaked horned lark populations in the South Puget Lowlands, Lower Columbia River, and Willamette Valley regions. The grasslands and prairies of Washington and Oregon span a wide geographic and climatic range, encompassing a rich variety of soil types, vegetation cover, elevations, and weather patterns. The rich diversity of all of these factors will likely provide substantial buffering to streaked horned lark habitat from the effects of changing weather and climate (Bachelet et al. 2011, p. 412). It is[[Page 21799]]possible that increased summer droughts may affect less drought-tolerant trees and other forest species adjacent to prairies, possibly resulting in prairie expansion that could benefit the streaked horned lark (Bachelet et al. 2011, p. 417). Prairie and grassland ecosystems are well adapted to warm and dry conditions--periodic soil drought and future increases in temperature and drought for the region ``are unlikely to disadvantage (and may benefit) these systems'' (Washington Department of Fish and Wildlife 2015, pp. 5-31). The outlook for streaked horned larks along the Pacific Coast is less encouraging due to the effects of climate change. Sea-level rise, increased coastal erosion, and more severe weather events will cause significant effects to lark habitats on the coast. Projected sea-level rise could increase erosion or landward shift of dunes; similarly, increased severe weather events with greater wave and wind action from storms could magnify disturbance of dune habitats (Washington Department of Fish and Wildlife 2015, pp. 5-31) and imperil nesting larks. Given these stressors, we expect that climate change may limit the resiliency of some local populations on the coast primarily by amplifying the negative effects from habitat loss due to the spread of invasive species, such as Eurasian beachgrass, where not managed. A conservation measure that may help reduce effects from climate change in one area of the coast in the range of the streaked horned lark is the Shoalwater Bay Shoreline Erosion Control Project (U.S Fish and Wildlife Service 2018, entire), which is a long-term commitment by the Corps and the Shoalwater Bay Tribe to protect the reservation from coastal erosion. It has created and is maintaining habitat for both western snowy plovers and streaked horned larks, and provides secure nesting area on the coast for both species.Small Population Size Most species' populations fluctuate naturally, responding to various factors such as weather events, disease, and predation. These factors have a relatively minor impact on a species with large, stable local populations and a wide and continuous distribution. However, populations that are small, isolated by habitat loss or fragmentation, or impacted by other factors are more vulnerable to extirpation by natural, randomly occurring events (such as predation or stochastic weather events), and to genetic effects that plague small populations, collectively known as small population effects (Purvis et al. 2000, p. 3). These effects can include genetic drift, founder effects (over time, an increasing percentage of the population inheriting a narrow range of traits), and genetic bottlenecks leading to increasingly lower genetic diversity, with consequent negative effects on adaptive capacity and reproductive success (Keller and Waller 2002, p. 235). Various effects of small population size, including low reproductive success, loss of genetic diversity, and male skewed sex-ratio, have been noted in the range of the streaked horned lark, particularly at some local populations in the South Puget Lowlands region and the Lower Columbia River (Anderson 2010, p. 15; Camfield et al. 2010, p. 277; Drovetski et al. 2005, p. 881; Keren and Pearson 2019, Figures 1 and 2; Drovetski et al. 2005, p. 881; Wolf et al. 2017, p. 27). Any local population of streaked horned larks with very low abundance that does not interbreed with other local populations will be at more risk in the future due to small population effects.Current Condition To maintain adequate resiliency, populations of streaked horned larks need large open spaces with suitable habitat structure--specifically, low-stature vegetation and scattered patches of bare ground--and an appropriate disturbance regime sufficient to maintain habitat and support increased numbers of breeding birds. The size of populations with high resiliency varies among regions, depending on the extent and quality of available habitat. Needs of the streaked horned lark in relation to degree of estimated population resiliency are summarized below in Table 4; to evaluate current condition, we assigned each condition category a number as shown. Table 5--Matrix for Evaluating Current Condition of the Streaked Horned Lark---------------------------------------------------------------------------------------------------------------- ----------------------------------------------------------------------------------------------------------------Demographic and habitat High condition [larr]---------------------------------------------------------- parameters ------------------------------------------[rarr] Low condition----------------------------------------------------------------------------------------------------------------Abundance: South Puget Lowlands........ Regular surveys Regular surveys Regular surveys Extirpated: Larks detect >=20 detect 10-20 detect <=10 no longer occupy breeding pairs breeding pairs breeding pairs site or region (3). (2). (1). (0). Pacific Coast and Lower Regular surveys Regular surveys Regular surveys Columbia River. detect >=15 detect 7-15 detect <=7 breeding pairs on breeding pairs on breeding pairs on coast (3). coast (2). coast (1). Regular surveys Regular surveys Regular surveys detect >=20 detect 10-20 detect <=10 breeding pairs on breeding pairs on breeding pairs on river (3). river (2). river (1). Willamette Valley........... Regular surveys Regular surveys Regular surveys detect >=25 detect 15-25 detect <=15 breeding pairs breeding pairs breeding pairs (3). (2). (1).----------------------------------------------------------------------------------------------------------------Population Trend................ Increasing Stable populations Declining or insufficient ***data*** to population trend (1). assess trends (0). (2).----------------------------------------------------------------------------------------------------------------Connectivity.................... Movement between local populations/ regions (1). No movement between local populations/ regions (0).----------------------------------------------------------------------------------------------------------------Habitat......................... Large, open areas Open areas with Small patches of Extirpated: with low-stature low-stature suitable grasses Habitat to grasses, 17 grasses, some surrounded by support larks no percent bare shrubs and trees dense vegetation longer exists at ground (3). (2). and trees (1). a site (0).[[Page 21800]] Beneficial Disturbance Regime... Regular Semi-regular Infrequent Extirpated: disturbance disturbance, disturbance, Disturbance does occurs to habitat is habitat may be not occur to maintain habitat available but not temporarily maintain habitat for nesting, no ideal for unavailable; high for larks; high adverse effects nesting, some adverse effects adverse effects during breeding adverse effects during breeding during breeding season (3). during breeding season (1). season (0). season (2).---------------------------------------------------------------------------------------------------------------- Parameters that are in high condition support adequate population resiliency, whereas parameters that are in low condition reduce resiliency and increase the risk from stochastic events. Each of the five parameters were given equal weight, and the resulting resiliency scores were averaged to come up with an overall condition score for each local population unit as follows: High (>=1.7), Moderate (1.6 to 1.1), Low (1.0 to 0.2), and Extirpated (<=0.1). The overall condition score thresholds were based on the difference between the highest and lowest possible actual scores (2.4 and 0.2, respectively) for extant populations. If survey ***data*** showed a site had no detections of streaked horned larks, then the entire site is categorized as extirpated, regardless of the condition category assigned to the habitat or disturbance factors (e.g , Oyhut Spit and Johns River Island in the Pacific Coast region). The resulting current condition rankings of extant local population resiliency varied between high to low condition. Some local populations ranked high (those that scored 1.7 or greater) as a result of abundant populations and high-quality habitat; other populations ranked lower (those that scored 1.0 or less) in part because of a combination of low abundance, declining population trends between 2013 and 2019, poor quality habitat, and effects of land management activities. The current range is a reduction compared to the historical range, where larks were detected on coastal and shoreline habitats as far north as British Columbia and the San Juan Islands in northwest Washington and in prairie habitats as far south as the Umpqua and Rogue Valleys in southwest Oregon. While the overall number of occupied sites represent a reduction from its historical range, of the 42 extant local populations across the three representational regions, there are 8 in high condition, 15 in moderate condition, and 19 in low condition (Table 6). Three sites that were occupied in years prior to the 2013 listing are currently considered extirpated.BILLING CODE 4333-15-P[[Page 21801]][GRAPHIC] [TIFF OMITTED] TR13AP22.005BILLING CODE 4333-15-C In general, the local populations with low condition have low abundance that has declined since 2013 and occur in locations that have less habitat[[Page 21802]]availability and therefore limited capacity to support high numbers of birds. In addition, certain land management activities at these locations, such as construction and development or sand-borrow activities on the Columbia River, would not support long-term resiliency even if population abundance stabilized and increased. Use of these sites is opportunistic based on habitat availability, and most of these sites are not anticipated to meaningfully contribute to subspecies viability or support high numbers of birds. The South Puget Lowlands region has an overall increasing population trend (based on the 2013-2019 survey ***data***). The region contains four local populations with high condition, one local population with moderate condition, and three local populations with low condition. Those local populations with low condition have small, declining populations and occur in areas where management activities have negative impacts on adult and juvenile birds, currently limiting resiliency. The populations at the JBLM airfields and 13th Division increased between 2013 and 2019, and movement between sites and habitat quality in these areas supports high resiliency. The Shelton Airport has a declining population trend. The Olympia Airport has good connectivity, and its condition is moderate, but the condition of the Shelton and Tacoma airports are low due to loss of habitat and/or size limitations. The Pacific Coast and Lower Columbia River region has an overall stable population trend (based on the 2013-2019 survey ***data***). It has 2 local populations in high condition (including Sandy Island, which is managed for the conservation of streaked horned lark), 9 local populations in moderate condition, 13 local populations with low condition, and 2 locations that have no breeding pairs and are assumed extirpated (Oyhut Spit and Johns River Island). While Leadbetter Point is managed to improve habitat quality for larks and reduce corvid predation, the local population has fluctuated in the last several years (between 6 in some years and 11 in other years) and abundance is inconsistent from year to year with no clear trend toward either an increasing or decreasing population that is demonstrated by the ***data***. With more ***data*** from more survey years, as well as a more recent metapopulation analysis, we may be able to know more about the general trend of the ***data*** over time. A number of coastal sites and several Columbia River sites have low resiliency due to low abundance, small patches of high-quality habitat that currently limit potential abundance, limited connectivity, and/or management activities that are not optimal for successful breeding. While the Pacific Coast area currently has low numbers of breeding pairs, recent detections at Clatsop Spit (a previously unoccupied site) indicate the species could recolonize areas with suitable habitat. Streaked horned larks, however, have not recolonized new sites in the South Puget Lowlands despite 20 years of prairie restoration and intensive monitoring, suggesting recolonization is site-specific and difficult to predict. The number of breeding pairs in the Willamette Valley region appears to have increased for 10 local populations (based on the 2013-2019 survey ***data***), and the region supports two local populations in high condition, five in moderate condition, and three in low condition. One historical location at Salem Airport had no breeding pairs in surveys from 2013-2019 and is assumed extirpated. The three sites with low resiliency are municipal airports where abundance has declined since 2013, or where survey effort is inconsistent and abundance estimates are ***variable*** between years. The survey results reported in Table 1, above, may represent a small portion of the total number of streaked horned larks in the Willamette Valley due to lack of access on private lands, and there is no information to infer the condition of these potential populations. Overall, we consider the streaked horned lark to have moderate-to-low redundancy based on few highly resilient populations throughout the range, low incidence of movement between local populations, and fewer incidences of movement between regions. The current redundancy of larks is characterized by 42 local populations across the range of the subspecies, of which 8 are considered to have high resiliency (4 in the South Puget Lowlands, 2 in the Pacific Coast and Lower Columbia River, and 2 in the Willamette Valley region). The draft recovery plan for streaked horned lark (U.S Fish and Wildlife Service 2019, entire) provides a preliminary description of potential adequate redundancy and representation for the subspecies. The plan recommends that 38 resilient sites be managed for long-term conservation: 8 sites in the South Puget Lowlands; 3 sites along the Pacific Coast and 6 sites in the Lower Columbia River; and 21 sites in the Willamette Valley. The rangewide distribution of 42 local populations confers some measure of protection against catastrophic events, particularly in the Willamette Valley, where relatively large numbers of birds move about in response to changing habitat conditions. Recent detections of birds at sites previously unoccupied (i.e , Clatsop Spit) suggest individuals are actively moving between sites, adapting to new areas, and potentially recolonizing areas with suitable habitat. However, incidences of movement and colonization of new areas occurs infrequently, reducing overall redundancy for larks. The streaked horned lark has been extirpated from the northernmost extent of its historical range in the northern Georgia Basin and north Puget Lowlands and from the Rogue and Umpqua Valleys in the south. These losses from the northernmost (i.e , cooler and wetter) and southernmost (i.e , warmer and drier) extremes of the lark's known historical range demonstrate a substantial loss of ecological diversity. Within their current range, larks are found on native prairies; military and civilian airfields; coastal beaches, dunes, and sandy islands; restored native prairies; ***agricultural*** areas; road margins; and industrial sites. Occupied sites differ markedly within and among regions, which suggest that larks experience a broad range of ecological diversity. The South Puget Lowlands and Willamette Valley regional populations occur mainly in prairie, wetland, airport and road margins, and ***agricultural*** habitats; the Pacific Coast and Lower Columbia River regional population occurs primarily on coastal dune, shorelines, and sandy islands in the Columbia River. There are at least two local populations with high resiliency in each region, suggesting relatively good representation across the habitats within the species current range. Additional local populations in high and moderate condition throughout the range would benefit the overall level of redundancy and representation for the subspecies.Future Condition The main factors influencing the future viability of the streaked horned lark include ongoing and sustained habitat loss, continued land management activities and related effects, recreation, and the synergistic effects of climate change and small population size. When we assessed the future condition of the local populations in response to projected land use changes and climate conditions, we used the same habitat and population metrics that we applied in our current condition assessment. We forecasted the condition of local populations over time under three scenarios and used this[[Page 21803]]information to forecast the viability of the streaked horned lark over the next 30 years. We chose 30 years because it is within the range of the available hydrological and climate change model forecasts, encompasses approximately five generations of streaked horned lark, and represents a biologically meaningful timeframe (time period long enough to encompass multiple generations so that species' responses can be predicted). We evaluated land use trends by looking at ***data*** on the quantity and type of ***agricultural*** crops in production throughout Oregon every 5 years from the USDA's National ***Agricultural*** Statistics Service. In Oregon, where larks largely occur on private ***agricultural*** lands, we evaluated trends in land use and crop type over the past 20 years to inform future trends (U.S Department of ***Agriculture*** National ***Agricultural*** Statistics Service 2007 and 2017b, Tables 26, and 31-34). Specifically, we used these ***data*** to evaluate trends in the overall quantity of grass and other seed farms, and we compared the changes to trends in the quantity of crop types that do not provide suitable habitat for larks, such as hazelnut orchards, blueberry farms, and wine grapes for viticulture. To assess effects to the streaked horned lark from climate change, we relied on projections to mid-century from the U.S Geological Survey, Land Change Science Program National Climate Change Viewer (Alder and Hostetler 2013, entire). The Coupled Model Intercomparison Project 5 provides a range of variability in climate projections for the time period 2025 to 2049. We used the combined range of the projection from two model scenarios, representative concentration pathways (RCP) 4.5 and RCP 8.5, to evaluate a range of potential future conditions. RCP 4.5 predicts that greenhouse gas emissions stabilize by the end of the century; RCP 8.5 predicts emissions continue to rise unchecked through the end of the century. For this analysis, we evaluated possible future conditions using these climate scenarios and the resulting impacts on species and habitat through the year 2050. Climate change is not expected to decrease the resiliency of any local populations in the prairie ecosystem because prairie and grassland ecosystems are well adapted to warm and dry conditions like the periodic soil drought and future increases in temperature and drought forecasted for those areas. Despite the projected changes affecting wildlife in the Pacific Northwest overall, the effects of climate change specific to prairie ecosystems are not anticipated to decrease the resiliency of regional populations in the South Puget Lowlands, Pacific Coast and Lower Columbia River, and Willamette Valley regions. The grasslands and prairies of Washington and Oregon span a wide geographic and climatic range, encompassing a rich variety of soil types, vegetation cover, elevations, and weather patterns. This heterogeneity will likely buffer the effects of changing weather and climate (Bachelet et al. 2011, p. 412). It is possible that increased summer droughts may affect less drought-tolerant trees and other forest species adjacent to prairies, possibly resulting in prairie expansion (Bachelet et al. 2011, p. 417). Prairie and grassland ecosystems are well-adapted to warm and dry conditions and periodic soil drought, and future increases in temperature and drought for the region, ``are unlikely to disadvantage (and may benefit) these systems'' (Washington Department of Fish and Wildlife 2015, p. 5-31). With respect to coastal populations, the current primary threat to habitat for the subspecies is the spread of invasive beachgrass, particularly Eurasian beachgrass, because it anchors dune habitats and thereby prevents natural, dynamic processes that form suitable habitat for the lark from occurring. The cumulative impact of projected sea-level rise, increased coastal erosion, and more severe weather events will limit the potential creation of suitable habitat in the remaining natural areas not affected by beachgrass. These synergistic threats may limit the resiliency of some local populations on the coast. The degree to which some factors affecting larks will change in the future is uncertain. For this reason, we forecasted what the streaked horned lark may experience in terms of resiliency, redundancy, and representation under three plausible future scenarios over the next 30 years: Scenario 1--Status Quo: The adverse effects of habitat loss, climate change, and management activities and related effects at existing sites are consistent with current levels (including current levels of conservation); recreation increases, and act on current population sizes. Scenario 2--Improved Conditions: The adverse effects of habitat loss and climate change are reduced compared to current conditions; management actions continue at existing sites with additional conservation measures implemented to protect larks, including conservation of additional sites; recreation increases, and act on larger populations with reduced impact to overall population status. Scenario 3--Degraded Conditions: The adverse effects of habitat loss and climate change are increased; management activities continue at existing sites with no additional or reduced voluntary or regulatory conservation measures due to funding restrictions; recreation increases, and acts on smaller population sizes with increased impact to overall population status. Based on the increase in abundance we have seen as a result of conservation measures for streaked horned lark (particularly at JBLM and on the Columbia River), we project that under Scenario 2/Improved Conditions populations would be larger, and, therefore, the overall combined impacts from both recreation and improved management activities and related effects would be limited. Under Scenario 3/Degraded Conditions however, populations would be smaller, and, therefore, the overall combined impacts from both recreation and management activities and related effects would increase. Changes in the number and size of extant populations in response to assumed habitat conditions and changes in management activities at individual sites would result in changes to redundancy and representation for the subspecies. Under the status quo scenario, one population in the South Puget Lowlands drops from high to moderate condition, four local populations in the Pacific Coast and Lower Columbia River region drop from moderate to low condition, and all five moderate populations in the Willamette Valley drop to low condition. Even though the rate of change of the influence factors was not different than current levels under this scenario, the synergistic effects of small population size would amplify the effect of negative influence factors in some local populations over time. Under this scenario, the subspecies would continue to occupy roughly an equal number of habitat types and distribution of 42 local populations across the range, but some small, isolated populations may be at risk of eventual extirpation without intentional habitat management or conservation measures. Under the improved conditions scenario, careful management and conservation actions are implemented to increase the quantity, quality, and distribution of suitable habitats for streaked horned larks. One local population in the South Puget Lowlands and three in the Pacific Coast and Lower Columbia River region improve from moderate to high condition, and one population in each of the South Puget[[Page 21804]]Lowlands and Willamette Valley regions move from low to moderate. As local populations become more resilient under this scenario, the species' ability to move between sites in response to changing environmental conditions and re-establish breeding populations would increase overall redundancy, buffering against adverse effects of catastrophic events. With respect to ecological representation, it is unlikely that birds would occupy new or different habitat types relative to current patterns of occupancy in the Pacific Coast and Lower Columbia River region under this scenario, due to the limited availability of alternative habitats that provide the structural habitat features preferred by larks. In the South Puget Lowlands and Willamette Valley regions, the number of local populations in high condition would increase; however, it is unlikely that larks would disperse into the north Puget Lowlands region, or south into the Umpqua and Rogue Valley areas without substantial recovery efforts to support habitat development in these areas. Under the degraded conditions scenario, further habitat loss and increased instability would lead to reduced condition in many local populations with only one local population remaining in high condition in the range of the subspecies (Rice Island). Eighteen local populations would decrease in condition across the range of the streaked horned lark, leaving 10 moderate condition and 30 low condition populations distributed across the three regions. Under this scenario, Shelton Airport would become extirpated, reducing redundancy. Many other local populations would decrease in resiliency and be at higher risk of extirpation, putting the subspecies at risk of further reduction in redundancy. If local populations become less resilient, larks would be less able to move between sites in response to changing environmental conditions or re-establish local populations following a catastrophic event. Furthermore, the loss of local populations would decrease the species' representation and overall ability to adapt to changing environmental conditions. Because the streaked horned lark is dependent on land management activities that create and maintain suitable replacement habitat throughout the species' range, the future viability of the species relies upon the continuation of these actions. The synergistic effects of both small population size and the effects of climate change will likely amplify the negative effects of influence factors and reduce resiliency of some local populations, particularly along the Pacific Coast, the South Puget Lowlands, and the Lower Columbia River. We note that, by using the SSA framework to guide our analysis of the scientific information documented in the SSA report, we have not only analyzed individual effects on the species, but we have also analyzed their potential cumulative effects. We incorporate the cumulative effects into our SSA analysis when we characterize the current and future condition of the species. To assess the current and future condition of the species, we undertake an iterative analysis that encompasses and incorporates the threats individually and then accumulates and evaluates the effects of all the factors that may be influencing the species, including threats and conservation efforts. Because the SSA framework considers not just the presence of the factors, but to what degree they collectively influence risk to the entire species, our assessment integrates the cumulative effects of the factors and replaces a standalone cumulative effects analysis. We considered all potential influence factors resulting from habitat fragmentation degradation and loss; land management activities and related effects; recreation; and aircraft strikes. We analyzed their level of effect in the various regional populations as noted in Table 4. The small size of these local populations may amplify the effects of stressors influencing individuals, but small population size does not influence populations on its own. The impact of the stressors summarized in Table 4 and the conservation measures implemented to minimize or mitigate impacts to larks and lark habitat is factored into our resiliency, redundancy, and representation (3R) assessment of populations for our current condition analysis. We anticipate habitat loss, changes in land use and ***agricultural*** practices, recreation on the Pacific Coast and Lower Columbia River, and aircraft strikes will continue to influence the condition of the streaked horned lark in the future to a degree that may affect the resiliency of populations. The projected future impact of these stressors is factored into the 3R assessment of populations in our future condition analysis.Determination of Streaked Horned Lark's Status Section 4 of the Act (16 U.S.C 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species meets the definition of an endangered species or a threatened species. The Act defines ``endangered species'' as a species in danger of extinction throughout all or a significant portion of its range, and ``threatened species'' as a species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether a species meets the definition of ``endangered species'' or ``threatened species'' because of any of the following five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence.Status Throughout All of Its Range We evaluated threats to the streaked horned lark and assessed the cumulative effects of the threats under the Act's section 4(a)(1) factors. The primary driver of the status of streaked horned lark has been the scarcity of large, open spaces with very early seral stage plant communities with low-statured vegetation and substantive amounts of bare or sparsely vegetated ground. Historically, these open spaces were primarily created by natural disturbance regimes such as seasonal flooding of river systems, but the construction of dams and subsequent flood control negatively impacted creation of this open space habitat and thereby the abundance and distribution of historical lark populations. The loss of streaked horned lark habitat due to large-scale water management occurred decades ago and is not ongoing. The best available information indicates that overutilization (Factor B), predation or disease (Factor C), pesticides (Factor E), or loss of historical disturbance regimes (Factor A) are not current or imminent threats to the viability of the subspecies. The streaked horned lark has been affected through loss of preferred habitats (Factor A) as a result of successional changes in plant species composition and encroachment of woody vegetation; invasion of beach grasses; ***conversion*** of suitable habitat into unsuitable habitat through changes in land use; and changes in ***agricultural*** practices from crops that mimic preferred habitats (i.e , grass seed farms) to crops that diminish habitat suitability (i.e , hazelnut orchards and blueberry farms). The streaked horned lark is also affected by land management activities and related effects (Factor A), as well as other human activities (Factor E), including ***agricultural*** activities, airport[[Page 21805]]management activities and related airstrikes, military training and related activities, the placement of dredged materials, and recreation. Despite the ongoing influence of these factors, the subspecies is not currently in danger of extinction, because the species retains multiple populations in high and moderate condition across all representative regions, those populations occur in a variety of habitat types, and no threat at its existing or imminent level could plausibly change that state of affairs. Each representative region has at least 8 redundant populations. Survey ***data*** from some regularly monitored sites across the range of the subspecies show an increase from 252-253 breeding pairs in 2013 at the time of listing to 383-389 breeding pairs in 2019. The subspecies has shown relative stability for the last 7 years based on survey ***data*** from known populations, with 42 populations across the range. Of the 42 populations, 23 are considered to be in high or moderate condition. The Pacific Coast and Lower Columbia River and the Willamette Valley region each have two populations that are in high condition; the South Puget Lowlands has four populations in high condition. Across the range, 15 local populations are considered in moderate condition. Negative influence factors on the subspecies have not fluctuated much for the last 20 years and are not of a scope or magnitude, either currently or imminently, such that the subspecies is currently in danger of extinction. Local populations in South Puget Lowlands and Lower Columbia River populations have benefited from conservation efforts implemented as part of section 7 consultations under the Act. Abundance of larks across the Willamette Valley appears relatively high, but many of these local populations cannot be surveyed due to lack of access. Although the current abundance of local populations along the Pacific Coast is lower than other areas, it has been low for many years, and we see no apparent declining trend in this regional population based on survey ***data*** from 2013 to 2019. Recent detections of birds at Clatsop Spit, as well as sites with restored habitat on private lands in the Willamette Valley, indicate that individuals can move between sites, and there are a few instances of detections at previously unoccupied locations, but recolonization appears very low and difficult to predict. In the foreseeable future, however, there is potential for a decline in resiliency of local populations across the range. The loss of preferred habitat will continue from plant succession and encroachment of woody vegetation, invasion of beach grasses, changes in land use, and changes in beneficial ***agricultural*** practices. The regular large-scale, human-caused disturbance (burning, mowing, cropping, chemical treatments, or placement of dredged materials) that now creates and maintains replacement habitat for the streaked horned lark will continue, as will the related effects of these activities that can negatively impact individual larks (nest destruction, mortality, disturbance, and aircraft strikes). Recreation will also continue. Any negative effects from these factors will likely be amplified in some local populations due to the synergistic effects related to small population size and the increased effects of climate change in the range over the next 30 years, particularly along the Pacific Coast, the South Puget Lowlands, and the Lower Columbia River. As climate change and small population size increase in influence, the realized benefit of these replacement habitats to the subspecies may decrease. Additionally, any future changes in the maintenance of these landscapes will affect the resiliency of larks in the area. ***Agriculture*** remains the primary influence on land use in the Willamette Valley, and the resilience of larks in that area is tied to practices that can change given market demands. This uncertainty regarding future land use and anthropogenic effects to habitat increases the potential risk of extinction in the foreseeable future. Numerous conservation measures resulting from section 7 consultation under the Act in the range of the streaked horned lark have helped reduce effects of threats on the subspecies, but the continued effects of habitat loss (Factor A), land management activities and related effects, and recreation, in combination with small population size and the effects of climate change (Factor E), are expected to continue to affect the viability of the subspecies over the next 30 years. Thus, after assessing the best available information, we conclude that the streaked horned lark is not currently in danger of extinction but is likely to become in danger of extinction within the foreseeable future throughout all of its range.Status Throughout a Significant Portion of Its Range Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. The court in Center for Biological Diversity v. Everson, 2020 WL 437289 (D.D.C Jan. 28, 2020) (Center for Biological Diversity), vacated the aspect of the Final Policy on Interpretation of the Phrase ``Significant Portion of Its Range'' in the Endangered Species Act's Definitions of ``Endangered Species'' and ``Threatened Species'' (Final Policy; 79 FR 37578, July 1, 2014) that provided that the Service does not undertake an analysis of significant portions of a species' range if the species warrants listing as threatened throughout all of its range. Therefore, we proceed to evaluating whether the species is endangered in a significant portion of its range--that is, whether there is any portion of the species' range for which both (1) the portion is significant and (2) the species is in danger of extinction in that portion. Depending on the case, it might be more efficient for us to address the ``significance'' question or the ``status'' question first. We can choose to address either question first. Regardless of which question we address first, if we reach a negative answer with respect to the first question that we address, we do not need to evaluate the other question for that portion of the species' range. Following the court's holding in Center for Biological Diversity, we now consider whether there are any significant portions of the species' range where the species is in danger of extinction now (i.e , endangered). In undertaking this analysis for the streaked horned lark, we choose to address the status question first--we consider information pertaining to the geographic distribution of both the species and the threats that the species faces to identify any portions of the range where the species is endangered. The statutory difference between an endangered species and a threatened species is the time horizon in which the species becomes in danger of extinction; an endangered species is in danger of extinction now while a threatened species is not in danger of extinction now but is likely to become so in the foreseeable future. Thus, for streaked horned larks, we considered whether the threats are geographically concentrated in any portion of the species' range such that the threats presently affect enough individuals in an area to influence the resiliency of a population. We examined the following influence factors: Loss of preferred habitats as a result of successional changes in plant species composition and encroachment of woody vegetation; invasion of beach grasses; ***conversion*** of suitable habitat into unsuitable habitat through changes[[Page 21806]]in land use; changes in ***agricultural*** practices from crops that mimic preferred habitats to crops that diminish habitat suitability; land management activities and related effects, including airport management activities, military training, and the placement of dredged materials; recreation; and, the cumulative effects associated with climate change and small population size. While the influence of these factors varies somewhat across the range, there is no portion of the range where there is currently a concentration of threats relative to other areas in the range. The available information does not indicate that the effects of climate change, such as sea level rise, are currently decreasing the resiliency of streaked horned lark populations. In the future, the synergistic effects of climate change and small population size are likely to compound the negative effects of dune stabilization from beach grass invasion. This will likely limit the availability and distribution of habitat for streaked horned larks along the Pacific Coast, which could influence the resiliency of these local populations over the next 30 years such that they may be at risk of future extirpation. We have similar concerns that the synergistic effects of climate change and small populations size will also influence the future resiliency of local populations in the Columbia River and South Puget Lowlands. Overall, potential future reductions in resiliency of local populations across the range of the subspecies will limit redundancy and representation, and therefore could affect the future viability of the streaked horned lark. Although the current abundance of local populations along the Pacific Coast is low compared to other areas, it has been low for many years. The size of those coastal sites is relatively small compared to other local populations and therefore naturally limits the number of breeding pairs, and we see no apparent declining trend in this regional population based on survey ***data*** between 2013 and 2019. Based on our review of the best available information, the population in the Pacific Coast region is not currently at risk of extirpation. As noted above, these populations are at risk of extirpation in the future. The concentrated wintering populations of streaked horned lark in the Willamette Valley and on islands in the Columbia River could be exposed to stochastic events such as ice storms or severe flooding that could kill individuals, destroy limited habitat and food availability, or skew sex ratios. Severe winter weather could potentially impact one or more regional populations when birds congregate as larger flocks. However, available information does not indicate that winter storms are currently a threat that decreases the resiliency of streaked horned lark populations in these regions, and climate change projections specific to prairie ecosystems do not indicate a greater future threat from winter storms to streaked horned lark populations in these regions. The time horizon for the species' response to these ongoing and synergistic threats is not more immediate in any portions of the species' range. Because there are no portions of the species' range where the species has a different status from its rangewide status, no portion of the species' range provides a basis for determining that the species is in danger of extinction in a significant portion of its range. Therefore, we determine that the streaked horned lark is not in danger of extinction now in any portion of its range, but that the species is likely to become in danger of extinction within the foreseeable future throughout all of its range. This does not conflict with the courts' holdings in Desert Survivors v. U.S Department of the Interior, 321 F. Supp. 3d 1011, 1070-74 (N.D Cal. 2018), and Center for Biological Diversity v. Jewell, 248 F. Supp. 3d 946, 959 (D. Ariz. 2017), because, in reaching this conclusion, we did not need to consider whether any portions are significant and, therefore, did not apply the aspects of the Final Policy's definition of ``significant'' that those court decisions held were invalid.Determination of Status Our review of the best available scientific and commercial information indicates that the streaked horned lark meets the definition of a threatened species. Therefore, we affirm the current listing of the streaked horned lark as a threatened species in accordance with sections 3(20) and 4(a)(1) of the Act.Available Conservation Measures Conservation measures provided to species listed as endangered or threatened species under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness, and conservation by Federal, State, Tribal, and local agencies, private organizations, and individuals. The Act encourages cooperation with the States and other countries and calls for recovery actions to be carried out for listed species. The protection required by Federal agencies and the prohibitions against certain activities are discussed, in part, below. The primary purpose of the Act is the conservation of endangered and threatened species and the ecosystems upon which they depend. The ultimate goal of such conservation efforts is the recovery of these listed species, so that they no longer need the protective measures of the Act. Section 4(f) of the Act calls for the Service to develop and implement recovery plans for the conservation of endangered and threatened species. The recovery planning process involves the identification of actions that are necessary to halt or reverse the species' decline by addressing the threats to its survival and recovery. The goal of this process is to restore listed species to a point where they are secure, self-sustaining, and functioning components of their ecosystems. Recovery planning consists of preparing draft and final recovery plans, beginning with the development of a recovery outline and making it available to the public within 30 days of a final listing determination. The recovery outline guides the immediate implementation of urgent recovery actions and describes the process to be used to develop a recovery plan. Revisions of the plan may be done to address continuing or new threats to the species, as new substantive information becomes available. The recovery plan also identifies recovery criteria for review of when a species may be ready for reclassification from endangered to threatened (``downlisting'') or removal from protected status (``delisting''), and methods for monitoring recovery progress. Recovery plans also establish a framework for agencies to coordinate their recovery efforts and provide estimates of the cost of implementing recovery tasks. Recovery teams (composed of species experts, Federal and State agencies, nongovernmental organizations, and stakeholders) are often established to develop recovery plans. A notice announcing availability of the draft recovery plan for streaked horned lark was published in the Federal Register on October 30, 2019 (84 FR 58170); the draft plan is available on our website ([*https://www.fws.gov/endangered*](https://www.fws.gov/endangered)), or from our Oregon Fish and Wildlife Office (see FOR FURTHER INFORMATION CONTACT). Implementation of recovery actions generally requires the participation of a broad range of partners, including other Federal agencies, States, Tribes, nongovernmental organizations, businesses, and private landowners. Examples of recovery actions include habitat restoration (e.g , restoration of[[Page 21807]]native vegetation), research, captive propagation and reintroduction, and outreach and education. The recovery of many listed species cannot be accomplished solely on Federal lands because their range may occur primarily or solely on non-Federal lands. To achieve recovery of these species requires cooperative conservation efforts on private, State, and Tribal lands. Funding for recovery actions is available from a variety of sources, including Federal and State funding, including cost-share grants for non-Federal landowners, the academic community, and nongovernmental organizations. In addition, pursuant to section 6 of the Act, the States of Oregon and Washington are eligible for Federal funds to implement management actions that promote the protection or recovery of the streaked horned lark. Information on our grant programs that are available to aid species recovery can be found at: [*https://www.fws.gov/grants*](https://www.fws.gov/grants). Please let us know if you are interested in participating in recovery efforts for this species. Additionally, we invite you to submit any new information on this species whenever it becomes available and any information you may have for recovery planning purposes (see FOR FURTHER INFORMATION CONTACT). Section 7(a)(2) of the Act requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as an endangered or threatened species and with respect to its critical habitat, if any is designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(2) of the Act requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of the species or destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into consultation with the Service. Federal agency actions within the streaked horned lark's habitat that may require consultation include management and any other landscape-altering activities on Federal lands administered by the Service; issuance of section 404 Clean Water Act (33 U.S.C 1251 et seq.) permits by the Corps; and road construction by the Federal Highway Administration in cooperation with the Service at Baskett Slough NWR. It is our policy, as published in the Federal Register on July 1, 1994 (59 FR 34272), to identify to the maximum extent practicable at the time a species is listed, those activities that would or would not constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of a listing on proposed and ongoing activities within the range of the species. The discussion below regarding protective regulations under section 4(d) of the Act complies with our policy.II. Final Rule Issued Under Section 4(d) of the ActBackground Section 4(d) of the Act contains two sentences. The first sentence states that the Secretary shall issue such regulations as she deems necessary and advisable to provide for the conservation of species listed as threatened. The U.S Supreme Court has noted that statutory language like ``necessary and advisable'' demonstrates a large degree of deference to the agency (see Webster v. Doe, 486 U.S 592 (1988)). Conservation is defined in the Act to mean the use of all methods and procedures which are necessary to bring any endangered or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Additionally, the second sentence of section 4(d) of the Act states that the Secretary may by regulation prohibit with respect to any threatened species any act prohibited under section 9(a)(1), in the case of fish or wildlife, or section 9(a)(2), in the case of plants. Thus, the combination of the two sentences of section 4(d) provides the Secretary with a wide latitude of discretion to select and promulgate appropriate regulations tailored to the specific conservation needs of a threatened species. The second sentence grants particularly broad discretion to the Secretary when adopting some or all of the prohibitions under section 9 for any particular threatened species. The courts have recognized the extent of the Secretary's discretion under this standard to develop rules that are appropriate for the conservation of a species. For example, courts have upheld rules developed under section 4(d) as a valid exercise of agency authority where they prohibited take of threatened wildlife, or included a limited taking prohibition (see Alsea Valley Alliance v. Lautenbacher, 2007 U.S Dist. Lexis 60203 (D. Or. 2007); Washington Environmental Council v. National Marine Fisheries Service, 2002 U.S Dist. Lexis 5432 (W.D Wash. 2002)). Courts have also upheld 4(d) rules that do not address all of the threats that a species faces (see State of Louisiana v. Verity, 853 F.2d 322 (5th Cir. 1988)). As noted in the legislative history when the Act was initially enacted, ``once an animal is on the threatened list, the Secretary has an almost infinite number of options available to [her] with regard to the permitted activities for those species. [She] may, for example, permit taking, but not importation of such species, or [she] may choose to forbid both taking and importation but allow the transportation of such species'' (H.R Rep. No. 412, 93rd Cong., 1st Sess. 1973). On October 3, 2013, we issued a rule under the authority of section 4(d) of the Act to provide for the conservation of the streaked horned lark (78 FR 61452) (see 50 CFR 17.41(a)). That rule applies all of the prohibitions of section 9 of the Act to the streaked horned lark, with the following exceptions for incidental take: (1) Certain activities on airports on non-Federal lands; (2) certain ***agricultural*** activities on non-Federal land in the range of the subspecies in Oregon and (3) certain noxious weed control activities on non-Federal lands. The provisions of this revised 4(d) rule will promote conservation of the streaked horned lark by encouraging management of the landscape in ways that meet the conservation needs of the subspecies. The provisions of this revised 4(d) rule are one of many tools that we will use to promote the conservation of the streaked horned lark. For these reasons, we find the revised 4(d) rule as a whole is necessary and advisable to provide for conservation of the streaked horned lark.Provisions of the Revised 4(d) Rule The provisions of the revised 4(d) rule for the streaked horned lark are discussed in more detail below, but we note here that the substantive differences between the current 4(d) rule for the streaked horned lark at 50 CFR 17.41(a) and this revised 4(d) rule are limited to the following: The exception for incidental take for certain ***agricultural*** activities on non-Federal lands applies throughout the range of the subspecies in Oregon and Washington, rather than only the Willamette Valley of Oregon; and the inclusion of an additional exception to the take prohibition for incidental take associated with habitat restoration activities that benefit streaked horned lark. The primary driver of the status of streaked horned lark has been the scarcity of large, open spaces with very early seral stage plant communities with low-statured vegetation and substantive amounts of bare or sparsely vegetated[[Page 21808]]ground. Such areas occur sporadically within the larger ***agricultural*** landscape, depending on local soil and topographic conditions. Therefore, this revised 4(d) rule is designed to support the continuation of activities taking place in the range of the subspecies that lead to these features, and to encourage the development of these features in new areas in the range of the subspecies in the future. The revised 4(d) rule provides for the conservation of the streaked horned lark by prohibiting take, except as otherwise authorized, permitted, or incidental to the following activities: Wildlife hazard management at airports and accidental strikes by aircraft, normal ***agricultural*** practices in Oregon and Washington, noxious weed control on non-Federal lands, and habitat restoration activities beneficial to streaked horned lark. All take not included in those exceptions (for example, take of lark that is intentional and not incidental to the excepted activities, remains prohibited) will continue to be prohibited in order to support existing populations of the streaked horned lark. Some management actions taken at airports are generally beneficial to streaked horned larks and have led to the creation of replacement habitat the subspecies relies upon. Streaked horned larks breed successfully and maintain populations at airports in the South Puget Sound and Willamette Valley. Airports maintain safe conditions for aviation, in part by routinely implementing programs to minimize the presence of hazardous wildlife on airfields. These activities unintentionally create suitable habitat for streaked horned larks. Activities involved in wildlife hazard management at airports that benefit streaked horned lark include hazing of hazardous wildlife (geese and other large birds and mammals) and modification and management of forage, water, and shelter to be less attractive to these hazardous wildlife, including vegetation management to maintain desired grass height on or adjacent to airports through mowing, discing, herbicide use, or burning. As with other land management activities, vegetation management during the nesting season has the potential to destroy streaked horned lark nests and young. However, despite concerns over potential adverse effects of vegetation management during the breeding season at airports, this activity is very important to the maintenance of the low-statured vegetation required by nesting and wintering larks in the area. We believe that the beneficial effects of these actions outweigh the negative effects that occur from these actions during the nesting season. Therefore, excepting hazardous wildlife management from the Act's prohibitions of take, when conducted by airport staff or employees contracted by the airport to perform hazardous wildlife management activities, furthers the conservation of the subspecies by helping to prevent the spread of those noxious weeds that may render existing habitat unsuitable for the streaked horned lark. The listing of the streaked horned lark imposes a requirement on airport managers where the subspecies occurs to consider the effects of their management activities on this subspecies when actions are funded or approved by the Federal Aviation Administration. Excepting hazardous wildlife management and accidental aircraft strikes from prohibitions on take eliminates the incentive for airports to reduce or eliminate replacement habitat that supports populations of streaked horned larks from the airfields, and therefore provides for the conservation of the species by allowing current beneficial management activities to continue. Accidental aircraft strikes are an unavoidable consequence of the vegetation management that also maintains habitat that supports breeding pairs. While aircraft strikes do occur in several local populations at airports throughout the range of the species (particularly in the South Puget Lowlands), the rate appears relatively low. Additionally, the potential take of streaked horned lark associated with the routine management, repair, and maintenance of roads and runways is minimal. Therefore, in order to support activities involved in wildlife hazard management that maintain habitat features beneficial to streaked horned lark, incidental take associated with wildlife hazard management activities, as well as aircraft strikes and routine maintenance of existing roads and runways at airports, is excepted from the prohibition on take. We recommend that airport operators follow the guidance provided in Federal Aviation Administration advisory circular 150/5200-33C, ``Hazardous Wildlife Attractants on or near Airports'' (FAA 2020, entire), and all other applicable related guidance. In Oregon's Willamette Valley, large expanses of burned prairie or the scour plains of the Willamette and Columbia Rivers likely provided suitable habitat for streaked horned larks in the past. With the loss of these historical habitats during the last century, alternative breeding and wintering sites, including active ***agricultural*** lands, have become critical for the continued survival and recovery of the streaked horned lark. One of the largest areas of potential habitat for streaked horned larks is the ***agricultural*** land base in the Willamette Valley. Larks are attracted to the wide, open landscapes and low vegetation structure in ***agricultural*** fields, especially in grass seed fields, probably because those working landscapes resemble the historical habitats formerly used by the subspecies when the historical disturbances associated with floods and fires maintained a mosaic of suitable habitats. Habitat characteristics of ***agricultural*** lands used by streaked horned larks include: (1) Bare or sparsely vegetated areas within or adjacent to grass seed fields, pastures, or fallow fields; (2) recently planted (0 to 3 years) conifer farms with extensive bare ground; and (3) wetland mudflats or ``drown outs'' (i.e , washed out and poorly performing areas within grass seed or row crop fields). Currently in the Willamette Valley, there are approximately 360,000 ac (145,000 ha) of grass seed fields in production. In any year, some portion of these lands will have suitable streaked horned lark habitat, but the geographic location of those areas is not consistent from year to year, nor can we predict their occurrence due to ***variable*** ***agricultural*** practices (crop rotation, fallow fields, etc.), and we cannot predict the changing and dynamic locations of those areas. These conditions make conservation of streaked horned larks a significant challenge on these large, intensively managed and privately owned ***agricultural*** landscapes. On the one hand, ***agricultural*** activities can harm or kill individual streaked horned larks or destroy their nests in some localized fields. However, maintenance and continued farming of these private ***agricultural*** lands (primarily grass seed farms) in the Willamette Valley creates and provides suitable habitat conditions throughout the Valley, and is therefore crucial to maintaining the overall population of streaked horned larks in the Valley and aiding in the recovery of the subspecies in Oregon. Streaked horned lark conservation in the Willamette Valley is challenging due to these conflicting factors: (1) Enabling and supporting the ongoing ***agricultural*** practices that maintain favorable habitat conditions on private lands; and, (2) minimizing the potential for impacting some nesting birds when these farming practices (e.g , grass seed harvest) occur on those lands. Achieving net conservation of listed species on privately-owned working lands (i.e , farmland, rangeland, tree[[Page 21809]]farms, etc.) is one of the most difficult challenges in implementation of the Act (Baur et al. 2009, p. 3; Ciuzio et al. 2013, entire; Henson et al. 2018, p. 863). Under certain circumstances and for highly visible species, the prohibitions of the Act under section 9 can discourage local impacts to listed species where individuals of such species are known to occur, and harmful activities can be effectively investigated and addressed. However, using the regulatory functions of section 9 of the Act to achieve effective conservation on private lands is often limited due to a variety of reasons, such as the following: The species is not currently known to be present in otherwise suitable or historic habitat; access to such lands is restricted by the landowner; restoration or maintenance of a species' habitat requires the voluntary support or participation of the landowner; and conservation measures may conflict with a landowner's traditional economic use of their land. As a result, listed species are often viewed as a legal or economic liability by landowners, resulting in disincentives to conservation on these lands (Raymond and Olive 2008, p. 485; Brook et al. 2003, pp. 1644-47; Mir and Dick 2012, entire). This problem is especially acute where public lands are lacking and the species is dependent on private lands for its conservation (Eichenwald et al., p. 443), as is largely the case for the streaked horned lark. These factors are part of the conservation challenge for this subspecies in the Willamette Valley, and we find that the beneficial effects from maintaining these ***agricultural*** practices to facilitate suitable habitat outweigh the negative effects from injuries to individual birds from these same activities. Although we are unaware of any current breeding populations of streaked horned larks on ***agricultural*** lands in Washington, use of these habitats by streaked horned larks would aid in recovery of the subspecies in Washington as in Oregon and is therefore encouraged. The exception for incidental take for certain ***agricultural*** activities on non-Federal lands in the revised 4(d) rule applies to the entire range of the subspecies, to encourage management actions that would facilitate the use of areas other than civilian and military airports by streaked horned larks within the range of the subspecies in Oregon and Washington. Because landowners are free to allow vegetation growth that results in the ***conversion*** of lands into habitats unsuitable for the streaked horned lark, conservation of the species will benefit from the support of ***agricultural*** practices that result in the creation and maintenance of habitat that is suitable for the subspecies. In general, private landowners, out of concern for being subjected to regulation associated with the Act, may alter land management practices or restrict conservation activities to discourage attracting listed species to their lands (Brook et al. 2003, pp 1644-1648; Mir and Dick 2012, p. 192; Cuizio et al. 2013, p. 271). In case of the streaked horned lark, given the importance of human-created habitat through ordinary ***agricultural*** management activities, this risk aversion would be detrimental to the conservation of the species. With this revised 4(d) rule, we remove the negative incentive for private landowners in Oregon to discontinue activities resulting in suitable habitat for larks based on such concerns, and we provide positive incentives for them to voluntarily report and conserve species on their property. Additionally, the rule reduces the liability concerns of private landowners in Washington who may be considering the implementation of ***agricultural*** practices that result in the creation and maintenance of habitat that is suitable for the lark, something we seek to encourage. The primary crop type that results in habitat features preferred by lark is grass seed, and the typical harvest (combining) period for grass seed fields occurs in late June or early July, after the most active part of the breeding season for larks is done. Because the timing of ground disturbance for grass seed farms is after the primary part of the nesting season is over, it does not put the reproductive success of the subspecies at great risk, and the benefits of encouraging the continuation of the inadvertent creation of lark habitat through normal grass seed farming practices outweigh the benefit of restricting the timing of this exception to take. Excepting routine ***agricultural*** activities on non-Federal lands throughout the range of the streaked horned lark from the prohibition on take will provide an overall benefit to the subspecies by maintaining suitable habitat and removing incentives to decrease that suitable habitat to avoid liability under the Act. This exception to the prohibition on take for ***agricultural*** activities is rangewide in Oregon and Washington, and we find that the definition of ``normal farming practices'' in both the 2013 4(d) rule and this revised 4(d) rule is consistent with relevant Oregon and Washington State laws (Oregon Revised Statutes (ORS), chapter 30, section 30.930, and Revised Code of Washington (RCW), title 7, chapter 7.48, section 7.48.310, respectively). Streaked horned larks nest, forage, and winter on extensive areas of bare ground with low-statured vegetation. These areas include native prairies, coastal dunes, fallow and active ***agricultural*** fields, wetland mudflats, sparsely vegetated edges of grass fields, recently planted conifer farms with extensive bare ground, moderately to heavily grazed pastures, gravel roads or gravel shoulders of lightly traveled roads, airports, and dredge deposition sites in the Lower Columbia River. The suppression and loss of ecological disturbance regimes such as fire and flooding across vast portions of the landscape have resulted in altered vegetation structure and facilitated invasion by nonnative grasses and woody vegetation, including noxious weeds, rendering habitat unsuitable for streaked horned larks. By their nature, noxious weeds grow aggressively and multiply quickly, negatively affecting all types of habitats, including those used by larks. Some species of noxious weeds spread across long distances through wind, water, and animals, as well as via humans and vehicles, thereby affecting habitats far away from the source plants. Because noxious weed control maintains the low-statured vegetation and the open landscape that streaked horned lark relies upon, this activity is essential to the retention of suitable nesting, wintering, and foraging habitat. As with other land management activities, noxious weed control during the nesting season has the potential to destroy streaked horned lark nests and young. On the other hand, streaked horned larks can benefit from weeds, as they eat the seeds of weedy forbs and grasses. However, the benefit provided to nesting and wintering larks from the eradication (or removal) of noxious weeds wherever they may occur outweighs any potential benefit from weeds or concerns over timing of control. Therefore, excepting the routine mechanical or chemical management of noxious weeds from the prohibition of take furthers the conservation of the subspecies by helping to prevent the spread of those noxious weeds that may render habitat unsuitable for the streaked horned lark. It also encourages landowners to manage their lands in ways that meet their property management needs and also help to prevent degradation or loss of suitable habitat for the streaked horned lark. Noxious weed control targets those species included on County, State, and Federal noxious weed lists (see the[[Page 21810]]Federal list at [*https://www.aphis.usda.gov/plant\_health/plant\_pest\_info/weeds/downloads/weedlist.pdf;*](https://www.aphis.usda.gov/plant_health/plant_pest_info/weeds/downloads/weedlist.pdf;) Washington State counties each have a noxious weed control website, and selected Oregon State counties maintain noxious weed lists). Finally, activities associated with streaked horned lark habitat restoration (e.g , removing nonnative plants and planting native plants, creating open areas, and maintaining sparse vegetation through vegetation removal or suppression via controlled burns) will be very beneficial to the subspecies; any adverse effects to the subspecies from these activities will likely be only short-term or temporary, especially with respect to harassment or disturbance of individual lark. In the long term, the risk of adverse effects to both individuals and populations is expected to be mitigated as these types of activities will likely benefit the subspecies by helping to preserve and enhance the habitat of existing local populations over time. Reasonable care for habitat management may include, but will not be limited to, procuring and implementing technical assistance from a qualified biologist on habitat management activities, and best efforts to minimize streaked horned lark exposure to hazards (e.g , predation, habituation to feeding, entanglement, etc.). Therefore, we include in the 4(d) rule an exception to the prohibition on take for any habitat restoration actions that would create or enhance streaked horned lark habitat, provided that reasonable care is taken to minimize such take. We acknowledge that all of these activities excepted from incidental take in this rule have the potential to result in destruction of nests, crushing of eggs or nestlings, or flushing of fledglings or adults when conducted during the active breeding season for streaked horned larks. The 2013 listing rule (78 FR 61452; October 3, 2013) included dredge spoil deposition timing and placement on Columbia River islands; incompatibly timed burning and mowing regimes; activities associated with military training; and activities associated with airports as threats to the subspecies. Despite these threats noted at the time of listing, the Service determined that timing restrictions on these activities were not appropriate, stating in the rule: ``Our purpose in promulgating a special rule to exempt take associated with activities that inadvertently create habitat for the streaked horned lark is to allow landowners to continue those activities without additional regulation. We believe that imposing a timing restriction would likely reduce the utility of the special rule for land managers, and could have the unintended side effect of causing landowners to discontinue their habitat creation activities'' (78 FR 61452, October 3, 2013, p. 78 FR 61464). No timing restrictions were included in the 4(d) rule in 2013, and these land management activities have continued across the range since 2013. Survey ***data*** from regularly monitored sites throughout the range of the subspecies now show an increase from 252-253 breeding pairs in 2013, to 383-389 breeding pairs in 2019, despite the lack of timing restrictions on land management activities. While the loss of individuals is never welcome, the continuation of land management activities that create replacement habitat is very important to the conservation of the subspecies, and the benefits to the subspecies as a whole appear to outweigh the associated cost of the loss of individuals. This revised 4(d) rule provides for the conservation of the subspecies by including provisions that support the continuation of land management activities that create replacement habitat. As discussed above under Summary of Biological Status and Threats, multiple factors are affecting the status of the streaked horned lark. A range of activities have the potential to affect the streaked horned lark, including the management of hazardous wildlife at airports and associated airstrikes, routine ***agricultural*** activities, and the routine removal or other management of noxious weeds. Prohibiting take of streaked horned lark rangewide under section 9 of the Act will help preserve the subspecies' remaining populations, slow their rate of decline, and allow for the maintenance of suitable habitat for the species. However, these same activities also benefit streaked horned lark through the creation of the very habitat features (large open spaces with very early seral stage plant communities with low-statured vegetation and substantive amounts of bare or sparsely vegetated ground) that streaked horned larks prefer; without these replacement habitats throughout the range, the status of the subspecies would likely be much worse. Therefore, while we are extending the take prohibition for the streaked horned lark, we are excepting from this prohibition take that is incidental to the management of hazardous wildlife at airports, accidental airstrikes by aircraft, routine ***agricultural*** activities, the routine removal or other management of noxious weeds, and habitat restoration activities for streaked horned lark. As discussed above, we believe that that these exceptions will provide for the conservation of the species by supporting the maintenance and creation of habitat features that the streaked horned lark relies upon. The Service is fully aware of, and sensitive to, the potential for some individual birds to be harmed in the application of these land management practices. We encourage land managers who, in the course of carrying out these excepted activities, observe streaked horned larks nesting in the area of activity to temporarily suspend operations in those areas and to contact the local Service field office or their local State fish and wildlife agency for technical assistance. Possible measures that land managers and the agencies could then consider include temporarily avoiding these areas until fledging has occurred, hazing birds away from active farm or airport safety areas to avoid direct mortality, and seeking direct participation in Federal or state conservation reserve-type incentive programs to manage newly identified areas for longer term lark conservation. When considering all reasonable measures and likely outcomes, we believe this approach will result in the best net conservation benefit for the subspecies. As discussed above, the vast majority of these lands are privately owned. Supporting landowners' ongoing activities that create or maintain lark habitat, while also encouraging the voluntary conservation of the species on these private lands, is likely to result in more net positive conservation outcomes at the population level when compared to an approach that does not include this section 4(d) take exception. An approach that relies primarily on section 9 take prohibitions and enforcement, for the reasons cited earlier and documented in the scientific literature regarding conservation of species on private lands, would likely result in the following: The loss of suitable habitat on ***agricultural*** lands; an increase in landowners actively managing their lands to not attract streaked horned larks; and, an overall reluctance of private landowners to report lark occurrence or support lark conservation. Therefore, we believe the 4(d) rule best promotes the recovery of the species when compared to all alternative approaches. These approaches are becoming increasingly necessary when attempting to conserve species on private lands (Epanchin-Neill and Boyd 2020, p. 415). Under the Act, ``take'' means to harass, harm, pursue, hunt, shoot,[[Page 21811]]wound, kill, trap, capture, or ***collect***, or to attempt to engage in any such conduct. Some of these provisions have been further defined in regulations at 50 CFR 17.3 Take can result knowingly or otherwise, by direct and indirect impacts, intentionally or incidentally. Regulating take will help preserve the species' remaining populations, slow their rate of decline, and decrease synergistic, negative effects from other threats. We may issue permits to carry out otherwise prohibited activities involving threatened wildlife under certain circumstances. Regulations governing permits for threatened species are codified at 50 CFR 17.32 With regard to threatened wildlife, we may issue a permit for the following purposes: For scientific purposes, to enhance propagation or survival, for economic hardship, for zoological exhibition, for educational purposes, for incidental taking, or for special purposes consistent with the purposes of the Act. There are also certain statutory exemptions from the prohibitions, which are found in sections 9 and 10 of the Act. We recognize the special and unique relationship with our State natural resource agency partners in contributing to conservation of listed species. State agencies often possess scientific ***data*** and valuable expertise on the status and distribution of endangered, threatened, and candidate species of wildlife and plants. State agencies, because of their authorities and their close working relationships with local governments and landowners, are in a unique position to assist the Service in implementing all aspects of the Act. In this regard, section 6 of the Act provides that the Service shall cooperate to the maximum extent practicable with the States in carrying out programs authorized by the Act. Therefore, any qualified employee or agent of a State conservation agency that is a party to a cooperative agreement with the Service in accordance with section 6(c) of the Act, who is designated by his or her agency for such purposes, will be able to conduct activities designed to conserve streaked horned lark that may result in otherwise prohibited take without additional authorization. As a subspecies of the horned lark (Eremophila alpestris), the streaked horned lark is protected by the Migratory Bird Treaty Act (MBTA; 16 U.S.C 703 et seq.). The MBTA makes it unlawful, at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess, offer for sale, sell, offer to barter, barter, offer to purchase, purchase, deliver for shipment, ship, export, import, cause to be shipped, exported, or imported, deliver for transportation, transport or cause to be transported, carry or cause to be carried, or receive for shipment, transportation, carriage, or export, any migratory bird, or any part, nest, or egg of any such bird included in the terms of four specific conventions between the United States and certain foreign countries (16 U.S.C 703). See 50 CFR 10.13 for the list of migratory birds protected by the MBTA. Like the previous 4(d) rule for the subspecies, this revised 4(d) rule adopts existing requirements under the MBTA as appropriate regulatory provisions for the streaked horned lark. Accordingly, under the revised 4(d) rule, take is not prohibited if the activity is authorized or exempted under the MBTA, such as activities under a migratory bird rehabilitation permit necessary to aid a sick, injured, or orphaned bird. Thus, if a permit is issued for activities resulting in take of streaked horned larks under the MBTA, it will not be necessary to have an additional permit under the Act. Nothing in this revised 4(d) rule will change in any way the recovery planning provisions of section 4(f) of the Act, the consultation requirements under section 7 of the Act, or the ability of the Service to enter into partnerships for the management and protection of the streaked horned lark. However, interagency cooperation may be further streamlined through planned programmatic consultations for the species between Federal agencies and the Service, where appropriate.III. Required DeterminationsNational Environmental Policy Act (42 U.S.C 4321 et seq.) It is our position that, outside the jurisdiction of the U.S Court of Appeals for the Tenth Circuit, we do not need to prepare environmental analyses pursuant to the National Environmental Policy Act (42 U.S.C 4321 et seq.) in connection with regulations adopted pursuant to section 4(a) of the Act. We published a notice outlining our reasons for this determination in the Federal Register on October 25, 1983 (48 FR 49244). This position was upheld by the U.S Court of Appeals for the Ninth Circuit (Douglas County v. Babbitt, 48 F.3d 1495 (9th Cir. 1995), cert. denied 516 U.S 1042 (1996)).Government-to-Government Relationship With Tribes In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we readily acknowledge our responsibilities to work directly with Tribes in developing programs for healthy ecosystems, to acknowledge that Tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to Tribes. We do not expect any effects on Tribes as a result of the promulgation of this rule.References Cited A complete list of references cited in this rule is available on the internet at [*http://www.regulations.gov*](http://www.regulations.gov) and upon request from the Oregon Fish and Wildlife Office (see FOR FURTHER INFORMATION CONTACT).Authors The primary authors of this rule are the staff members of the Service's Species Assessment Team and the Oregon Fish and Wildlife Office.List of Subjects in 50 CFR Part 17 Endangered and threatened species, Exports, Imports, Plants, Reporting and recordkeeping requirements, Transportation, Wildlife.Regulation Promulgation Accordingly, we amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:PART 17--ENDANGERED AND THREATENED WILDLIFE AND PLANTS01. The authority citation for part 17 continues to read as follows: Authority: 16 U.S.C 1361-1407; 1531-1544; and 4201-4245, unless otherwise noted.02. Amend Sec. 17.41 by revising paragraph (a) to read as follows:Sec. 17.41 Special rules--birds. (a) Streaked horned lark (Eremophila alpestris strigata). (1) Prohibitions. The following prohibitions that apply to endangered wildlife also apply to streaked horned[[Page 21812]]lark. Except as provided under paragraph (a)(2) of this section and Sec. Sec. 17.4 and 17.5, it is unlawful for any person subject to the jurisdiction of the United States to commit, to attempt to commit, to solicit another to commit, or cause to be committed, any of the following acts in regard to this species: (i) Import or export, as set forth at Sec. 17.21(b) for endangered wildlife. (ii) Take, as set forth at Sec. 17.21(c)(1) for endangered wildlife. (iii) Possession and other acts with unlawfully taken specimens, as set forth at Sec. 17.21(d)(1) for endangered wildlife. (iv) Interstate or foreign commerce in the course of commercial activity, as set forth at Sec. 17.21(e) for endangered wildlife. (v) Sale or offer for sale, as set forth at Sec. 17.21(f) for endangered wildlife. (2) Exceptions from prohibitions. In regard to this species, you may: (i) Conduct activities as authorized by a permit under Sec. 17.32 (ii) Take, as set forth at Sec. 17.21(c)(2) through (4) for endangered wildlife, and (c)(6) and (7) for endangered migratory birds. (iii) Take, as set forth at Sec. 17.31(b). (iv) Take incidental to an otherwise lawful activity caused by: (A) The management of hazardous wildlife at airport facilities by airport staff or employees contracted by the airport to perform hazardous wildlife management activities. Hazardous wildlife is defined by the Federal Aviation Administration as species of wildlife, including feral animals and domesticated animals not under control, that are associated with aircraft strike problems, are capable of causing structural damage to airport facilities, or act as attractants to other wildlife that pose a strike hazard. Routine management activities include, but are not limited to, the following: (1) Hazing of hazardous wildlife; (2) Habitat modification and management of sources of forage, water, and shelter to reduce the attractiveness of the area around the airport for hazardous wildlife. This exception for habitat modification and management includes control and management of vegetation (grass, weeds, shrubs, and trees) through mowing, discing, herbicide application, or burning; and (3) Routine management, repair, and maintenance of roads and runways (does not include upgrades or construction of new roads or runways). (B) Accidental aircraft strikes at airports on non-Federal lands. (C) ***Agricultural*** (farming) practices implemented on farms in accordance with State laws on non-Federal lands in Washington and Oregon. (1) For the purposes of this rule, farm means any facility, including land, buildings, watercourses and appurtenances, used in the commercial production of crops, nursery stock, livestock, poultry, livestock products, poultry products, vermiculture products, or the propagation and raising of nursery stock. (2) For the purposes of this rule, an ***agricultural*** (farming) practice means a mode of operation on a farm that is or may be used on a farm of a similar nature; is a generally accepted, reasonable, and prudent method for the operation of the farm to obtain a profit in money; is or may become a generally accepted, reasonable, and prudent method in conjunction with farm use; complies with applicable State laws; and is done in a reasonable and prudent manner. Common ***agricultural*** (farming) practices include, but are not limited to, the following activities: (i) Planting, harvesting, rotation, mowing, tilling, discing, burning, and herbicide application to crops; (ii) Normal transportation activities, and repair and maintenance of unimproved farm roads (this exception does not include improvement or construction of new roads) and graveled margins of rural roads; (iii) Livestock grazing according to normally acceptable and established levels; (iv) Hazing of geese or predators; and (v) Maintenance of irrigation and drainage systems. (D) Removal or other management of noxious weeds. Routine removal or other management of noxious weeds are limited to the following, and must be conducted in such a way that impacts to non-target plants are avoided to the maximum extent practicable: (1) Mowing; (2) Herbicide and fungicide application; (3) Fumigation; and (4) Burning. (E) Habitat restoration actions. Habitat restoration and enhancement activities for the conservation of streaked horned lark may include activities consistent with formal approved conservation plans or strategies, such as Federal, Tribal, or State plans that include streaked horned lark conservation prescriptions or compliance, which the Service has determined (on a case-by-case basis) would be consistent with this rule. (v) Possess and engage in other acts with unlawfully taken wildlife, as set forth at Sec. 17.21(d)(2) through (d)(4).\* \* \* \* \*Martha Williams,Director, U.S Fish and Wildlife Service.[FR Doc. 2022-07920 Filed 4-12-22; 8:45 am]BILLING CODE 4333-15-P

**Load-Date:** April 15, 2022

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[***Federal Register: Endangered and Threatened Wildlife and Plants; Foothill Yellow-Legged Frog; Threatened Status With Section 4(d) Rule for Two Distinct Population Segments and Endangered Status for Two Distinct Population Segments Pages 73914 - 73945 [FR DOC #2021-27512]***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:64DN-YWG1-JDG9-Y4DM-00000-00&context=1516831)

Impact News Service

December 28, 2021 Tuesday

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**Length:** 35115 words

**Body**

Washington: Office of the Federal Register has issued the following notice:Department of the Interior-----------------------------------------------------------------------Fish and Wildlife Service-----------------------------------------------------------------------50 CFR Part 17Endangered and Threatened Wildlife and Plants; Foothill Yellow-Legged Frog; Threatened Status With Section 4(d) Rule for Two Distinct Population Segments and Endangered Status for Two Distinct Population Segments; Proposed RuleFederal Register / Vol. 86 , No. 246 / Tuesday, December 28, 2021 / Proposed Rules[[Page 73914]]-----------------------------------------------------------------------DEPARTMENT OF THE INTERIORFish and Wildlife Service50 CFR Part 17[Docket No. FWS-R8-ES-2021-0108; FF09E21000 FXES1111090FEDR 223]RIN 1018-BE90Endangered and Threatened Wildlife and Plants; Foothill Yellow-Legged Frog; Threatened Status With Section 4(d) Rule for Two Distinct Population Segments and Endangered Status for Two Distinct Population SegmentsAGENCY: Fish and Wildlife Service, Interior.ACTION: Proposed rule.-----------------------------------------------------------------------SUMMARY: We, the U.S Fish and Wildlife Service (Service), propose to list four of six distinct population segments (DPSs) of the foothill yellow-legged frog (Rana boylii), a stream dwelling amphibian from Oregon and California, under the Endangered Species Act of 1973 (Act), as amended. This determination also serves as our 12-month finding on a petition to list the foothill yellow-legged frog. After a review of the best scientific and commercial information available, we find that listing the South Sierra and South Coast DPSs as endangered and the North Feather and Central Coast DPSs as threatened is warranted. Accordingly, we propose to list these four DPSs under the Act, with the South Sierra and South Coast DPSs listed as endangered species, and the North Feather and Central Coast DPSs listed as threatened species. Our proposal to list the North Feather and Central Coast DPSs as threatened species also includes a rule issued under section 4(d) of the Act for each of these two DPSs. If we finalize this proposed rule for these four DPSs, we will then add them to the List of Endangered and Threatened Wildlife and extend the Act's protections to them. We have determined that designation of critical habitat for these four DPSs is not determinable at this time. We have also determined that the North Coast DPS (in Oregon and northern California) and the North Sierra DPS (in Yuba, Sierra, Nevada, and Placer Counties, California) of the foothill yellow-legged frog do not warrant listing at this time.DATES: We will accept comments received or postmarked on or before February 28, 2022. Comments submitted electronically using the Federal eRulemaking Portal (see ADDRESSES, below) must be received by 11:59 p.m Eastern Time on the closing date. We must receive requests for a public hearing, in writing, at the address shown in FOR FURTHER INFORMATION CONTACT by February 11, 2022.ADDRESSES: You may submit comments by one of the following methods: (1) Electronically: Go to the Federal eRulemaking Portal: [*http://www.regulations.gov*](http://www.regulations.gov). In the Search box, enter the docket number or RIN for this rulemaking (presented above in the document headings). For best results, do not copy and paste either number; instead, type the docket number or RIN into the Search box using hyphens. Then, click on the Search button. On the resulting page, in the Search panel on the left side of the screen, under the Document Type heading, check the Proposed Rule box to locate this document. You may submit a comment by clicking on ``Comment.'' (2) By hard copy: Submit by U.S mail to: Public Comments Processing, Attn: FWS-R8-ES-2021-0108, U.S Fish and Wildlife Service, MS: PRB/3W, 5275 Leesburg Pike, Falls Church, VA 22041-3803. We request that you send comments only by the methods described above. We will post all comments on [*http://www.regulations.gov*](http://www.regulations.gov). This generally means that we will post any personal information you provide us (see Information Requested, below, for more information).FOR FURTHER INFORMATION CONTACT: Michael Fris, Field Supervisor, U.S Fish and Wildlife Service, Sacramento Fish and Wildlife Office, 2800 Cottage Way, Sacramento, CA 95825; telephone 916-414-6700. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Relay Service at 800-877-8339.SUPPLEMENTARY INFORMATION:Executive Summary Why we need to publish a rule. Under the Act, a species warrants listing if it meets the definition of an endangered species (in danger of extinction throughout all or a significant portion of its range) or a threatened species (likely to become endangered in the foreseeable future throughout all or a significant portion of its range). If we determine that a species warrants listing, we must list the species promptly and designate the species' critical habitat to the maximum extent prudent and determinable. We have determined that the South Sierra and South Coast DPSs meet the definition of an endangered species and the North Feather and Central Coast DPSs meet the definition of threatened species; therefore, we are proposing to list them as such. We have determined that designation of critical habitat for these four DPSs is not determinable at this time. We have determined that listing the North Coast and North Sierra DPSs is not warranted at this time. Both listing a species as an endangered or threatened species and designating critical habitat can be completed only by issuing a rule through the Administrative Procedure Act rulemaking process. What this document does. We propose to list two DPSs as endangered species (South Sierra and South Coast DPSs) and two DPSs as threatened species (North Feather and Central Coast DPSs) under the Act. We also propose a rule under section 4(d) of the Act for each of those DPSs we are proposing to list as threatened species. The basis for our action. Under the Act, we may determine that a species is an endangered or threatened species because of any of five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. We have determined that the following threats are driving the status of the foothill yellow-legged frog: Altered hydrology (largely attributable to dams, water diversions, channel modifications), nonnative species, and the effects of climate change (exacerbating drought, high-severity wildfire, extreme flood conditions). Other threats currently impacting the species include disease and parasites, ***agriculture*** (including pesticide drift), mining, urbanization (including development and roads) and recreation. Section 4(a)(3) of the Act requires the Secretary of the Interior (Secretary) to designate critical habitat concurrent with listing to the maximum extent prudent and determinable. Due to a court-ordered settlement agreement for completing our 12-month finding for the species, we have not been able to obtain the necessary economic information needed to develop a proposed critical habitat designation for the foothill yellow-legged frog. Therefore, we find that designation of critical habitat for this species is currently not determinable. Once we obtain the necessary economic information, we will propose a critical habitat designation for the species.Information Requested We intend that any final action resulting from this proposed rule will be[[Page 73915]]based on the best scientific and commercial ***data*** available and be as accurate and as effective as possible. Therefore, we request comments or information from other governmental agencies, Native American Tribes, the scientific community, industry, or any other interested parties concerning this proposed rule. We particularly seek comments concerning: (1) The species' biology, range, and population trends, including: (a) Biological or ecological requirements of the species, including habitat requirements for feeding, breeding, and sheltering; (b) Genetics and taxonomy; (c) Historical and current range, including distribution patterns, and the locations of any additional populations of this species; (d) Historical and current population levels, and current and projected population trends; and (e) Past and ongoing conservation measures for the species and its habitat and their effectiveness. (2) Factors that may affect the continued existence of the species, which may include habitat modification or destruction, overutilization, disease, predation, the inadequacy of existing regulatory mechanisms, or other natural or manmade factors. (3) Biological, commercial trade, or other relevant ***data*** concerning any threats (or lack thereof) to this species and existing regulations that may be addressing those threats. (4) Information on regulations that are necessary and advisable to provide for the conservation of the foothill yellow-legged frog and that the Service can consider in developing a 4(d) rule for the species. In particular, we seek information concerning the extent to which we should include any of the Act's section 9 prohibitions in the 4(d) rule or whether we should consider any additional exceptions from the prohibitions in the 4(d) rule. (5) The reasons why we should or should not designate habitat as ``critical habitat'' under section 4 of the Act (16 U.S.C 1531 et seq.), including information to inform the following factors that the regulations identify as reasons why designation of critical habitat may be not prudent: (a) The species is threatened by taking or other human activity and identification of critical habitat can be expected to increase the degree of such threat to the species; (b) The present or threatened destruction, modification, or curtailment of a species' habitat or range is not a threat to the species, or threats to the species' habitat stem solely from causes that cannot be addressed through management actions resulting from consultations under section 7(a)(2) of the Act; (c) Areas within the jurisdiction of the United States provide no more than negligible conservation value, if any, for a species occurring primarily outside the jurisdiction of the United States; or (d) No areas meet the definition of critical habitat. (6) Specific information on: (a) The amount and distribution of foothill yellow-legged frog habitat; and (b) What areas, which are either (i) occupied at the time of listing and that contain the physical or biological features essential to the conservation of the species and which may require special management considerations or protection; or (ii) unoccupied at the time of listing and are essential for the conservation of the species, and would, with reasonable certainty, contribute to the conservation of the species. Please include sufficient information with your submission (such as scientific journal articles or other publications) to allow us to verify any scientific or commercial information you include. Please note that submissions merely stating support for, or opposition to, the action under consideration without providing supporting information, although noted, will not be considered in making a determination, as section 4(b)(1)(A) of the Act directs that determinations as to whether any species is an endangered or a threatened species must be made ``solely on the basis of the best scientific and commercial ***data*** available.'' You may submit your comments and materials concerning this proposed rule by one of the methods listed in ADDRESSES. We request that you send comments only by the methods described in ADDRESSES. If you submit information via [*http://www.regulations.gov*](http://www.regulations.gov), your entire submission--including any personal identifying information--will be posted on the website. If your submission is made via a hardcopy that includes personal identifying information, you may request at the top of your document that we withhold this information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on [*https://www.regulations.gov*](https://www.regulations.gov). Comments and materials we receive, as well as supporting documentation we used in preparing this proposed rule, will be available for public inspection on [*https://www.regulations.gov*](https://www.regulations.gov). Because we will consider all comments and information we receive during the comment period, our final determinations may differ from this proposal. Based on the new information we receive (and any comments on that new information), we may conclude that the appropriate listing status for any of the four DPSs is different than our determinations identified in this proposal, including the possibility that one or more of the DPSs may not warrant listing as either endangered or threatened. In addition, we may change the parameters of the prohibitions or the exceptions to those prohibitions in the 4(d) rule if we conclude it is appropriate in light of comments and new information we receive. For example, we may expand the prohibitions to include prohibiting additional activities if we conclude that those additional activities are not compatible with conservation of the species. Conversely, we may establish additional exceptions to the prohibitions in the final rule if we conclude that the activities would facilitate or are compatible with the conservation and recovery of the species.Public Hearing Section 4(b)(5) of the Act (16 U.S.C 1531 et seq.) provides for a public hearing on this proposal, if requested. Requests must be received by the date specified in DATES. Such requests must be sent to the address shown in FOR FURTHER INFORMATION CONTACT. We will schedule a public hearing on this proposal, if requested, and announce the date, time, and place of the hearing, as well as how to obtain reasonable accommodations, in the Federal Register and local newspapers at least 15 days before the hearing. For the immediate future, we will provide these public hearings using webinars that will be announced on the Service's website, in addition to the Federal Register. The use of these virtual public hearings is consistent with our regulations at 50 CFR 424.16(c)(3).Previous Federal Actions On July 11, 2012, we received a petition from the Center for Biological Diversity to list 53 species of reptiles and amphibians, including the foothill yellow-legged frog, as endangered or threatened under the Act. On July 1, 2015, we published our finding that the petition presented substantial scientific or commercial information indicating that listing the foothill yellow-legged frog may be warranted based on impacts to the species' habitat (Factor A) and other natural or humanmade factors (Factor E) (80 FR 37568). On August 30, 2016, we entered into a settlement agreement with the Center[[Page 73916]]for Biological Diversity to complete our 12-month finding on the foothill yellow-legged frog by September 30, 2020. We subsequently requested and received an extension of our deadline to submit the 12-month finding on the species to the Federal Register by December 15, 2021. This document fulfills our obligation under the settlement agreement to complete a 12-month finding on the foothill yellow-legged frog.Supporting Documents A species status assessment (SSA) team prepared an SSA report for the foothill yellow-legged frog (Service 2021, entire). The SSA team was composed of Service biologists, in consultation with other species experts. The SSA report represents a compilation of the best scientific and commercial ***data*** available concerning the status of the species, including the impacts of past, present, and future factors (both negative and beneficial) affecting the species. In accordance with our joint policy on peer review published in the Federal Register on July 1, 1994 (59 FR 34270), and our August 22, 2016, memorandum updating and clarifying the role of peer review of listing actions under the Act, we sought and received the expert opinions of three appropriate specialists regarding the SSA. We also sent the SSA report to numerous Federal, State, Tribal, and private partners and stakeholders, including scientists with expertise in foothill yellow-legged frog ecology, river ecology, amphibian genetics, population modeling, and public land management, for review. We received comments from 12 of these partners including representatives from the U.S Department of ***Agriculture***'s U.S Forest Service (Forest Service), U.S Geological Survey (USGS), Bureau of Land Management (BLM), National Park Service, Oregon Department of Fish and Wildlife (ODFW), California Department of Forestry and Fire Protection (CalFire), and researchers from the University of California at Los Angeles. We did not receive comments from any Tribal entities. Comments and feedback from partners and peer reviewers were incorporated into the SSA report as appropriate and have informed this proposed rule. A copy of the SSA report can be found on [*www.regulations.gov*](http://www.regulations.gov) at Docket No. FWS-R8-ES-2021-0108.I. Proposed Listing DeterminationBackground Below is a brief description of the foothill yellow-legged frog, its habitat, distribution, and taxonomy; for a thorough discussion of the ecology and life history of the species, please see the SSA report (Service 2021, Chapter 2, pp. 14-33). The foothill yellow-legged frog is a small- to medium-sized stream-dwelling frog with fully webbed feet and rough pebbly skin. Coloring of the species is highly ***variable*** but is usually light and dark mottled gray, olive, or brown, with ***variable*** amounts of brick red. The foothill yellow-legged frog is a stream-obligate species. Stream habitat for the species is highly ***variable*** and keyed on flow regimes. The historical range of the foothill yellow-legged frog extended from the Willamette River drainage in Oregon south through the Sierra Nevada Mountains to the Transverse Range, and down along the California Coast Range to at least the Upper San Gabriel River in Los Angeles County, California. The current distribution of the foothill yellow-legged frog generally follows the historical distribution of the species except with range contractions in the southern and, to a lesser extent, northern parts of the species' range.Taxonomy The foothill yellow-legged frog currently retains its classification as Rana boylii, ascribed in 1854 by S. F. Baird (Baird 1854, p. 62; Frost 2019, unpaginated). Prior to1955, the foothill yellow-legged frog was part of a grouping of two Ranid subtaxa that occurred in Oregon and California. The two subtaxa were subsequently revised as two separate individual taxa in 1955 and identified as Rana boylii (foothill yellow-legged frog) and Rana muscosa (mountain yellow-legged frog) (Zweifel 1955, pp. 210, 273). The foothill yellow-legged frog is now the only entity classified as Rana boylii (Zweifel 1968, pp. 71.1-71.2).Genetic Information Subsequent to receipt of the petition to list the foothill yellow-legged frog as a singular species, investigations into genetic differences among populations of the foothill yellow-legged frog have delineated the species into six currently identified genetic clades (Peek 2018, entire). A clade is a group of organisms that includes a common biological ancestor and all the lineal descendants. Two rangewide assessments of foothill yellow-legged frog genomic datasets revealed that the species is extremely differentiated following biogeographical boundaries (McCartney-Melstad et al. 2018, p. 112; Peek 2018, p. 76). The foothill yellow-legged frog has deeper population structure (stratification or separation between populations) than that observed in any other anuran (i.e , frogs, toads, and tree frogs) with similar ***data*** (McCartney-Melstad et al. 2018, p. 112). The California Department of Fish and Wildlife (CDFW) in their recent status determination classified the foothill yellow-legged frog as having six unique, genetic clades (i.e , lineages) (CDFW 2019b, pp. 4, 13). Additional information regarding the genetic clades can be found in the SSA report (Service 2021, pp. 19-21). The six separate genetic clades are identified as the North Coast, North Feather, North Sierra, South Sierra, Central Coast, and South Coast clades in our analysis.Distinct Population Segment Evaluation Under the Act, the term species includes any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature (16 U.S.C 1532(16)). To guide the implementation of the distinct population segment (DPS) provisions of the Act, we and the National Marine Fisheries Service (National Oceanic and Atmospheric Administration--Fisheries), published the Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act (DPS Policy) in the Federal Register on February 7, 1996 (61 FR 4722). Under our DPS Policy, we use two elements to assess whether a population segment under consideration for listing may be recognized as a DPS: (1) The population segment's discreteness from the remainder of the species to which it belongs, and (2) the significance of the population segment to the species to which it belongs. If we determine that a population segment being considered for listing is a DPS, then the population segment's conservation status is evaluated based on the five listing factors established by the Act to determine if listing it as either endangered or threatened is warranted. Under the Act, we have the authority to consider for listing any species, subspecies, or, for vertebrates, any DPS of these taxa if there is sufficient information to indicate that such action may be warranted. Based on the information available regarding potential discreteness and significance for the species, we determined it was appropriate to review the status of the foothill yellow-legged frog by first conducting a DPS analysis for the species.Discreteness Under our DPS Policy, a population segment of a vertebrate taxon may be considered discrete if it satisfies either of the following conditions: (1) It is markedly separated from other[[Page 73917]]populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation; or (2) it is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act. For the foothill yellow-legged frog, we examined recent genetic information and distribution of the species' populations as our means of determining discreteness for potential DPSs. There is substantial evidence that the foothill yellow-legged frog is biogeographically divided into multiple clades with little or no gene flow between the clades. Earlier studies provided strong evidence that there are deep genetic divisions in this taxon (Dever 2007, pp. 168-173; Lind et al. 2011, pp. 269-284; Peek 2010, entire). Subsequent, more in-depth and larger-scale genetic studies (McCartney-Melstead et al. 2018, entire; Peek 2018, entire) confirmed the certainty and depth of the phylogenetic (evolutionary history) structural divisions of the foothill yellow-legged frog using population genomics (comparison of DNA sequences of populations). The results of the first study (McCartney-Melstead et al. 2018, entire), which used several different analytical approaches, all supported extremely differentiated clades in a spatially cohesive pattern, and identified five reciprocally monophyletic clades (where each clade shares more-recent common ancestors from one clade than it shares with any other clade) associated with five different geographic regions (identified herein as the North Coast, Central Coast, South Coast, North Sierra, and South Sierra clades) (McCartney-Melstead et al. 2018, p. 112). The second genomic study (Peek 2018, entire) provided additional geographic and genetic resolution to clade divisions by examining genetic samples from 1,103 individual foothill yellow-legged frogs across the extant range of the species and provided greater coverage of localities in the northern Sierra Nevada range (Peek 2018, pp. 52-53). Like the earlier study, multiple analytical methods were used to quantify genetic structure. The study largely confirmed the five clades described by previous research (McCartney-Melstead et al. 2018, entire), but also identified another discrete group between the North Sierra and North Coast clade that is identified herein as the North Feather clade (Peek 2018, pp. 63-64). The extensive genomic ***data*** available for this species, which are both more reliable and more informative than morphological ***data***, demonstrate discrete patterns of biogeographical discontinuity across the taxon's range. Some of the geographical boundaries that delineate the foothill yellow-legged frog clades are fairly certain because of clear physical barriers, such as the separation between the Sierra Nevada and Coastal clades due to the Central Valley of California, the San Francisco Bay between the North Coast and the Central Coast clades, or the separation of the Central Coast and South Coast clades due to the Salinas Valley. However, physical separation between clades in the Sierra Nevada and separation of the Sierra Nevada clades from the North Coast clade were not as physically apparent and were informed by continuous sampling efforts in neighboring watersheds between clades. Where continuous landscape-level sampling was unavailable, the clade boundaries were estimated or inferred. Information is currently lacking for the precise boundary separating the North Coast clade and the North Feather clade, and the Central Coast clade from the South Coast clade. Therefore, we relied upon the genetic information for assessment of discreteness in this DPS analysis. Meeting the first condition for discreteness, there are six statistically-supported discrete genetic entities (Central Coast, South Coast, South Sierra, North Sierra, North Feather, and North Coast) within the range of the foothill yellow-legged frog (see figure below). Two rangewide assessments of foothill yellow-legged frog genomic datasets revealed that this taxon is extremely differentiated by biogeographical boundaries (McCartney-Melstead et al. 2018, p. 112; Peek 2018, p. 76). All six entities, or clades, are markedly separate from each other, as evidenced by quantitative measures of genetic discontinuity, and at least five of the clades are monophyletic groups (McCartney-Melstead et al. 2018, p. 116). As a result, we have determined that the foothill yellow-legged frog is comprised of six discrete entities (North Coast, Central Coast, South Coast, North Feather, North Sierra, and South Sierra) meeting the condition of discreteness under our DPS policy.BILLING CODE 4333-15-P[[Page 73918]][GRAPHIC] [TIFF OMITTED] TP28DE21.019BILLING CODE 4333-15-CSignificance Under our DPS Policy, once we have determined that a population segment is discrete, we consider its biological and ecological significance to the larger taxon to which it belongs. This consideration may include, but is not limited to: (1) Evidence of the persistence of the discrete population segment in an ecological setting that is unusual or unique for the taxon, (2)[[Page 73919]]evidence that loss of the population segment would result in a significant gap in the range of the taxon, (3) evidence that the population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historical range, or (4) evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics. We evaluated each discrete population segment to see if it met the conditions of significance under our DPS policy, and we have determined that the six entities are significant to the foothill yellow-legged frog. The support for significance of the six DPSs is based, in part, upon evidence that loss of any of these population segments would result in a significant gap in the range of the taxon. The loss of either the Central Coast or South Coast DPS would result in a substantial change in the overall range and distribution of the taxon. The loss of the South Coast DPS would shift the taxon's southwestern range boundary northward by approximately 150-200 kilometers (km) (93-125 miles (mi)). The loss of the Central Coast DPS would leave an extensive separation of approximately 300 km (186 mi) and be a significant gap in the species' range. The loss of the South Sierra DPS would result in a considerable contraction of the taxon's range, making the species' range shift approximately 180 km (112 mi) west and 340 km (211 mi) north. The loss of the North Coast DPS would result in the loss of more than half of the taxon's current range. The North Sierra and North Feather DPSs occupy much smaller areas than the other DPSs. However, based on the current range of each of these DPSs, the loss of either would result in a 50-75 km (31-47 mi) gap in the range of the taxon. Due to the species' limited dispersal ability from occupied stream habitats, this gap would effectively prevent any potential future gene flow between the DPSs remaining on either side of the gap. The support for significance of the six DPSs is also based upon evidence that each discrete population segment differs markedly from all the others in its genetic characteristics. The loss of any of the six DPSs would result in the loss of a discrete genetic clade. The DPSs that are most genetically divergent, and thus contribute most to the overall adaptive capacity of this taxon, are the Central Coast, South Coast, and South Sierra DPSs (Peek 2018, p. 77). The North Feather and North Sierra DPSs likely have unique adaptive potential in the face of climate change because of their admixture history (interbreeding of isolated populations) and intermediacy to the South Sierra and North Coast DPSs. The North Coast DPS is also genetically valuable to the taxon because it contains the greatest genetic diversity and is the only DPS that shows a trajectory of increasing genetic diversity (Peek 2018, p. 74).Distinct Population Segment Conclusion Our DPS Policy directs us to evaluate whether populations of a species are separate from each other to the degree they qualify as discrete segments and whether those segments are significant to the remainder of the species to which it belongs. Based on an analysis of the best available scientific and commercial ***data***, we conclude that the North Coast, North Feather, North Sierra, South Sierra, Central Coast, and South Coast clades of the foothill yellow-legged frog's range are each discrete due to their marked genetic separation. Furthermore, we conclude that each of the six clades of the foothill yellow-legged frog's range is significant, based on evidence that a loss of any of the population segments would result in a significant gap in the range of the taxon and on evidence that the discrete population segments differ markedly from other populations of the species in their genetic characteristics. Therefore, we conclude that the six clades within the foothill yellow-legged frog's range are both discrete and significant under our DPS Policy and are, therefore, uniquely listable entities under the Act. Based on our DPS Policy (61 FR 4722; February 7, 1996), if a population segment of a vertebrate species is both discrete and significant relative to the taxon as a whole (i.e , it is a distinct population segment), its evaluation for endangered or threatened status will be based on the Act's definition of those terms and a review of the factors enumerated in section 4(a) of the Act. Having found that each of the six clades of the foothill yellow-legged frog's range meet the definition of a distinct population segment, we then evaluated the status of the six clades of the foothill yellow-legged frog to determine whether any met the definition of an endangered or threatened species under the Act. The figure below identifies the areas within the foothill yellow-legged frog's historical range encompassed by the six DPSs for the foothill yellow-legged frog.Description of Foothill Yellow-Legged Frog Distinct Population Segments Below is a general description of environmental and ecological conditions for each DPS. North Coast DPS: The North Coast DPS includes the range of the foothill yellow-legged frog in northern California and central and southwestern Oregon. This DPS occupies parts of the Cascade Range, Klamath Mountains, central and southwest Oregon (including the Willamette Valley), northern California Coast Range north of San Francisco Bay, and a portion of the Sierra Nevada Mountains and foothills to the borders of Plumas and Butte Counties, California. This DPS covers the largest geographic area and has the greatest amount of genetic diversity of the species, suggesting that habitat conditions allow for populations within the DPS to be interconnected (McCartney-Melstad et al. 2018, p. 121; Peek 2018, p. 76). In Oregon, the area has the greatest precipitation and coolest temperatures within the species' range (PRISM Climate Group 2012, 30-year climate dataset, entire; Service 2021, table 3, p. 36). In California, the DPS is cooler and wetter on average than the DPSs to the south but is about equal to that of the North Sierra DPS (PRISM Climate Group 2012, 30-year climate dataset, entire; Service 2021, table 3, p. 36). The DPS also contains the most Level IV ecoregions (finest down-scaled ecosystems boundaries based on biotic and abiotic factors as defined by Omerick and Griffith 2014, entire), as well as several ecoregions that are not found anywhere else in the foothill yellow-legged frog's range, suggesting that the environmental conditions for habitat within this DPS are ***variable*** and not likely to be subject to rangewide environmental influences. North Feather DPS: The North Feather DPS is located primarily in Plumas and Butte Counties, California. This DPS occupies the transition zone between the northern Sierra Nevada, Southern Cascades Foothills, and Tuscan Flows ecoregions. The DPS averages cooler and wetter conditions than the DPSs to the south (PRISM Climate Group 2012, 30-year climate dataset, entire; Service 2021, table 3, p. 36). The North Feather DPS differs from the surrounding watersheds outside the areas in terms of geology and aspect (Peek et al. 2019, p. 4638), and is the only known area where the foothill yellow-legged frog and the endangered Sierra Nevada yellow-legged frog (Rana sierrae) currently coexist (Peek et al. 2019, p. 4637). North Sierra DPS: The North Sierra DPS is located primarily in Yuba, Sierra, Nevada, and Placer Counties, California. This DPS occupies the transition zone between the northern and central ecoregions of the Sierra Nevada Range. This transition zone is characterized by a southward decrease in annual[[Page 73920]]precipitation, decrease in Douglas and white firs (Pseudotsuga menziesii and Abies concolor), increase in ponderosa pine (Pinus ponderosa), and geological shift from metamorphic rocks to volcanic and granitic rocks (Environmental Protection Agency Level IV Ecoregions, Griffith et al. (2016, entire)). Like the North Feather DPS, the North Sierra DPS receives notably more precipitation than the South Sierra DPS; however, the mean annual temperature in the North Sierra DPS is more similar to that of the South Sierra DPS than that of the North Feather DPS (PRISM Climate Group 2012, 30-year climate dataset, entire; Service 2021, table 3, p. 36). South Sierra DPS: The South Sierra DPS extends from the South Fork American River sub-basin to the transition zone between the Sierra Nevada and the Tehachapi Mountains that border the south end of the California Central Valley. This DPS largely includes ecoregions that are unique to the southern and central Sierra Nevada Range (Environmental Protection Agency Level IV Ecoregions, Griffith et al. (2016, entire)). The South Sierra DPS also shares an ecoregion transition zone with the North Sierra DPS. In terms of average precipitation and temperature, the South Sierra DPS is fairly dry and warm, but it falls intermediately among the northern DPSs and the DPSs south of San Francisco Bay (PRISM Climate Group 2012, 30-year climate dataset, entire; Service 2021, table 3, p. 36). Central Coast DPS: The Central Coast DPS extends south from the San Francisco Bay through the Diablo Range and Coast Range (Santa Cruz Mountains and Gabilan Mountains) east of the Salinas Valley, California. On average, the Central Coast DPS receives the least amount of annual precipitation of all the DPSs (PRISM Climate Group 2012, 30-year climate dataset, entire; Service 2021, table 3, p. 36). The DPS contains several unique ecoregions associated with the Diablo and Coast Ranges. Although the mountain ranges of the Central Coast DPS are geologically unique and separated from those of the South Coast DPS by the Salinas Valley, there are several attributes such as overall elevation, elevation grade, and some vegetation types (Environmental Protection Agency Level IV Ecoregions, Griffith et al. (2016, entire)) which they share in common with the South Coast DPS mountain ranges. Climatic and habitat conditions of the DPS are drier than all other DPSs except for the South Coast DPS, which has conditions similar to the Central Coast DPS, being warm and dry and containing waterways similar in size and hydrological properties (PRISM Climate Group 2012, 30-year climate dataset, entire; Service 2021, table 3, p. 36). South Coast DPS: The South Coast DPS extends along the coastal Santa Lucia Range and the Sierra Madre Mountains in California. Ecoregions that are unique to the South Coast DPS include those associated with the Santa Lucia Range, Western Transverse Range, and Southern California Lower Montane Shrub and Woodland (Environmental Protection Agency Level IV Ecoregions, Griffith et al. (2016, entire)). As stated above, the streams and rivers in the South Coast DPS share similarities to many waterways in the Central Coast DPS. Waterways in the South Coast and Central Coast DPSs tend to have flashier flows, more ephemeral channels, and a higher degree of intermittency because of the region's more ***variable***, and lower amount of, precipitation (Storer 1925, pp. 257-258; Gonsolin 2010, p. 54; Adams et al. 2017b, p. 10227). The South Coast and Central Coast DPSs receive the least amount of annual precipitation and average the warmest temperatures within the species' range (PRISM Climate Group 2012, 30-year climate dataset, entire; Service 2021, table 3, p. 36).Regulatory and Analytical FrameworkRegulatory Framework Section 4 of the Act (16 U.S.C 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species is an endangered species or a threatened species. The Act defines an endangered species as a species that is in danger of extinction throughout all or a significant portion of its range, and a threatened species as a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether any species is an endangered species or a threatened species because of any of the following factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence. These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species' continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects. We use the term ``threat'' to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term ``threat'' includes actions or conditions that have a direct impact on individuals (direct impacts), as well as those that affect individuals through alteration of their habitat or required resources (stressors). The term ``threat'' may encompass--either together or separately--the source of the action or condition or the action or condition itself. However, the mere identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an ``endangered species'' or a ``threatened species.'' In determining whether a species meets either definition, we must evaluate all identified threats by considering the expected response by the species, and the effects of the threats--in light of those actions and conditions that will ameliorate the threats--on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species, such as any existing regulatory mechanisms or conservation efforts. The Secretary determines whether the species meets the definition of an endangered species or a threatened species only after conducting this cumulative analysis and describing the expected effect on the species now and in the foreseeable future. The Act does not define the term ``foreseeable future,'' which appears in the statutory definition of ``threatened species.'' Our implementing regulations at 50 CFR 424.11(d) set forth a framework for evaluating the foreseeable future on a case-by-case basis. The term ``foreseeable future'' extends only so far into the future as the Service can reasonably determine that both the future threats and the species' responses to those threats are likely. In other words, the foreseeable future is the period of time in which we can make reliable predictions. ``Reliable'' does not mean ``certain''; it means sufficient to provide a reasonable degree of confidence in the prediction. Thus, a[[Page 73921]]prediction is reliable if it is reasonable to depend on it when making decisions. It is not always possible or necessary to define foreseeable future as a particular number of years. Analysis of the foreseeable future uses the best scientific and commercial ***data*** available and should consider the timeframes applicable to the relevant threats and to the species' likely responses to those threats in view of its life-history characteristics. ***Data*** that are typically relevant to assessing the species' biological response include species-specific factors such as lifespan, reproductive rates or productivity, certain behaviors, and other demographic factors. For information regarding the foreseeable future for the foothill yellow-legged frog, see Current and Future Condition Analysis, below.Analytical Framework The SSA report documents the results of our comprehensive biological review of the best scientific and commercial ***data*** regarding the status of the species, including an assessment of the potential threats to the species. The SSA report does not represent a decision by the Service on whether the species should be proposed for listing as an endangered or threatened species under the Act. However, it does provide the scientific basis that informs our regulatory decisions, which involve the further application of standards within the Act and its implementing regulations and policies. The following is a summary of the key results and conclusions from the SSA report; the full SSA report can be found at Docket FWS-R8-ES-2021-0108 on [*http://www.regulations.gov*](http://www.regulations.gov) and from the Sacramento Fish and Wildlife Office (see FOR FURTHER INFORMATION CONTACT). Our review of the foothill yellow-legged frog has determined that it is made up of six DPSs; therefore, we assessed the biological viability and regulatory status of each DPS separately. Because the North Coast DPS of the foothill yellow-legged frog occurs in Oregon and California, we split the North Coast DPS into a California and an Oregon analysis unit due to varying levels of information and to better understand if any management actions or habitat conditions may differ between the two areas (Service 2021, Chapter 3, pp. 35-36). We later combine the two analysis units to determine the status of the North Coast DPS as a whole. When we discuss general biological or other information regarding the species as a whole we use the term species. When we discuss information pertaining to one of the six DPSs we use the term DPS. To assess the biological viability of each DPS of the foothill yellow-legged frog, we used the three conservation biology principles of resiliency, redundancy, and representation (Shaffer and Stein 2000, pp. 306-310). Briefly, resiliency supports the ability of the DPS to withstand environmental and demographic stochasticity (for example, wet or dry, warm or cold years), redundancy supports the ability of the DPS to withstand catastrophic events (for example, droughts, large pollution events), and representation supports the ability of the DPS to adapt over time to long-term changes in the environment (for example, climate changes). In general, the more resilient and redundant a DPS is and the more representation it has, the more likely it is to sustain populations over time, even under changing environmental conditions. Using these principles, we identified each DPS's ecological requirements for survival and reproduction at the individual, population, and DPS levels, and described the beneficial and risk factors influencing the DPS's viability. The SSA process can be categorized into three sequential stages. During the first stage, we evaluated the individual species' life-history needs. The next stage involved an assessment of the historical and current condition of the species' demographics and habitat characteristics, including an explanation of how the species arrived at its current condition. The final stage of the SSA involved making predictions about the species' responses to positive and negative environmental and anthropogenic influences. Throughout all of these stages, we used the best available information to characterize viability as the ability of a species to sustain populations in the wild over time. We use this information to inform our regulatory decision. In our development of the SSA and analysis of information, we divided our analysis into separate analysis units due to the varying degree of information throughout the species' range and other factors. The analysis units coincide with those areas we are considering as DPSs for the species except for the North Coast DPS which has been split into two analysis units. In California, the analysis units match those considered in the CDFW's evaluation for their status review and listing under the California Endangered Species Act.Summary of Biological Status and Threats In this discussion, we review the biological condition of each DPS and its resources, and the threats that influence each DPS's current and future condition, in order to assess each DPS's overall viability and the risks to that viability. We note that, by using the SSA framework to guide our analysis of the scientific information documented in the SSA report, we have not only analyzed individual effects on each DPS, but we have also analyzed their potential cumulative effects. We incorporate the cumulative effects into our SSA analysis when we characterize the current and future condition of each DPS. To assess the current and future condition of each DPS, we undertake an iterative analysis that encompasses and incorporates the threats individually and then accumulates and evaluates the effects of all the factors that may be influencing each DPS, including threats and conservation efforts. Because the SSA framework considers not just the presence of the factors, but to what degree they collectively influence risk to the entire DPS, our assessment integrates the cumulative effects of the factors and replaces a standalone cumulative effects analysis.Species NeedsStream Habitat The foothill yellow-legged frog is a stream-obligate species and is primarily observed in or along the edges of streams (Zweifel 1955, p. 221; Kupferberg 1996a, p. 1339). Most foothill yellow-legged frogs breed along mainstem water channels and overwinter along smaller tributaries of the mainstem channel (Kupferberg 1996a, p. 1339; GANDA 2008, p. 20). Habitat within the stream includes rocky substrate mostly free of sediments with interstitial spaces to allow for predator avoidance. Stream morphology is a strong predictor of breeding habitat because it creates the microhabitat conditions required for successful oviposition (i.e , egg-laying), hatching, growth, and metamorphosis. Foothill yellow-legged frogs that overwinter along tributaries often congregate at the same breeding locations along the mainstem each year (Kupferberg 1996a, p. 1334; Wheeler and Welsh 2008, p. 128). During the nonbreeding season, the smaller tributaries, some of which may only flow during the wet winter season, provide refuge while the larger breeding channels may experience overbank flooding and high flows (Kupferberg 1996a, p. 1339). Habitat elements that provide both refuge from winter peak flows and adequate moisture for foothill yellow-legged frogs include pools, springs, seeps, submerged root wads, undercut banks,[[Page 73922]]and large boulders or debris at high-water lines (van Wagner 1996, pp. 74-75, 111; Rombough 2006b, p. 159). The streams occupied by foothill yellow-legged frogs occur in a wide variety of vegetation types including valley-foothill hardwood, valley-foothill hardwood-conifer, valley-foothill riparian, ponderosa pine, mixed conifer, mixed chaparral, and wet meadow (Hayes et al. 2016, p. 5). The extensive range of habitat types used by the foothill yellow-legged frog demonstrates the species' non-specificity in regard to vegetation type and macroclimate of the species' terrestrial habitat component. While habitat conditions can be vastly different among these stream sizes, and across the species' geographic range, only a narrow range of abiotic conditions are tolerated by early life stages (i.e , eggs, tadpoles, and metamorphs) (Kupferberg 1996a, p. 1336; Bondi et al. 2013, p. 101; Lind et al. 2016, p. 263; Catenazzi and Kupferberg 2018, pp. 1044-1045). The abiotic conditions that directly influence the success of early life stages are those associated with stream velocity, water depth, water temperature, and streambed substrate. Foothill yellow-legged frogs also require stream flow regimes to have or mimic natural flow patterns which includes high winter flows with a slowly diminishing hydrograph with increasing water temperature and decreasing flows into the spring and summer. Higher winter flows can maintain and or increase breeding habitat by widening and diversifying channel morphology, improving rocky substrate conditions, and increasing sunlight (Lind et al. 1996, pp. 64-65; Lind et al. 2016, p. 269; Power et al. 2016, p. 719). The reduction in flows and increasing water temperatures are also cues to initiate breeding. As a result, foothill yellow-legged frogs rely on natural, predictable changes during the hydrological cycle to optimize early life-stage growth and survival (Kupferberg 1996a, p. 1332; Bondi et al. 2013, p. 100).Food Resources During their lifecycle foothill yellow-legged frogs feed on a variety of plant and animals. During early development food sources include algae, diatoms, and detritus that are scraped from submerged rocks and vegetation (Ashton et al. 1997, p. 7; Fellers 2005, p. 535). Juvenile and adult foothill yellow-legged frogs prey upon many types of aquatic and terrestrial invertebrates including snails, moths, flies, water striders, beetles, grasshoppers, hornets, and ants (Nussbaum et al. 1983, p. 165).Migration/Dispersal Routes and Connectivity Adult foothill yellow-legged frogs primarily use waterway corridors to migrate or disperse (Bourque 2008, p. 70) and make their movements over multiple days (GANDA 2008, p. 22). While most foothill yellow-legged frogs are found in, or very close to, water, juveniles and an adult have also been observed moving through upland areas outside of riparian corridors. The habitat characteristics needed by foothill yellow-legged frogs for migration and dispersal are largely the same as they are for upland and tributary habitat. However, movement routes do not need to be moist for extended periods. Routes need to connect breeding areas and overwintering habitat without exposing frogs to large physical barriers (e.g , roads, development, reservoirs) or high risk of predation. These migration and dispersal routes provide for metapopulation connectivity and allows for ease of mobility (for post-metamorphic frogs) within a metapopulation and between different metapopulations. Both breeding/rearing and overwintering sites need to be distributed across the metapopulation area. Foothill yellow-legged frog occupancy (i.e , presence of breeding adults in a given area) must also be well distributed, such that dispersers are able to repopulate extirpated areas of the metapopulation. A resilient foothill yellow-legged frog metapopulation should have a network of quality breeding/rearing sites (often on or near the mainstem channel) and overwintering sites (often on tributaries of the mainstem) that are connected by habitat suitable for migration and dispersal (Section 4.9 Migration and Dispersal Routes). An in-depth discussion of habitat and population elements required for the foothill yellow-legged frog is in the SSA report (Service 2021, Chapter 4 and Chapter 5).Threats Influencing Current and Future Condition Following are summary evaluations of the threats analyzed in the SSA report for the foothill yellow-legged frog. The discussion focuses on general threats impacting all DPSs, with some anecdotal evidence regarding threats operating in particular DPSs. The specific threats associated with each DPS are identified in the status discussion for each DPS below and in the SSA report (Service 2021, Chapter 7, pp. 73-122). Those threats having the greatest impacts on the species or its habitat include: Altered stream hydrology and flow regimes (Factor A) associated with dams, surface water diversions, and channel modifications and their impact on the species and its habitat; predation and resource competition from nonnative species (Factor C and Factor E, respectively), such as American bullfrogs (Lithobates catesbeianus), smallmouth bass (Micropterus dolomieu), and crayfish species (Pacifastacus spp.); disease (Factor C); habitat degradation, loss, and fragmentation associated with wildfire (Factor A); the effects of climate change, including increased temperatures, drying and drought, and extreme flood events (Factor E); habitat modification and altered hydrology as a result of conservation efforts for salmonid species (colder water temperatures, timing and intensity of water flows) (Factor E); habitat loss, degradation, and fragmentation (Factor A), and direct negative effects to individuals (Factor E) from other anthropogenic activities such as ***agriculture***, mining, urbanization, roads, and recreation. Within our threat discussion, we also evaluate existing regulatory mechanisms (Factor D) and ongoing conservation measures that may ameliorate threat impacts on the species. Livestock grazing and timber harvest were discussed as potential threats and potential beneficial influences in the recent status assessment for the foothill yellow-legged frog in California (CDFW 2019b, pp. 64-65, 67). These activities were also considered in the conservation assessment developed by the Forest Service and BLM as part of their sensitive species program for the species in Oregon (Olson and Davis 2009, pp. 18-20). While there is potential for harm to the species (e.g , when grazing and timber practices cause excessive erosion and sedimentation into streams), there are also potential positive benefits to foothill yellow-legged frog habitat from these practices (Olson and Davis 2009, pp. 18-20; CDFW 2019b, pp. 64-65, 67). We captured and evaluated the potential negative impacts associated with grazing and timber harvest (e.g , water impoundments for cattle, erosion, logging roads) in our assessment of altered hydrology, sedimentation, and roads. For full descriptions of all threats and how they impact the species, please see the SSA report (Service 2021, pp. 72-121).Altered Stream Hydrology and Flow Regimes Foothill yellow-legged frog ecology and habitat needs are closely tied to the natural hydrological cycle of the streams[[Page 73923]]they inhabit. Foothill yellow-legged frog breeding and recruitment are dependent upon specific stream morphologies and upon predictable hydrological patterns that are synchronized with other climatic cues for foothill yellow-frog populations to be successful (Kupferberg 1996a, p. 1337). Strong stream flow events typical during winter under natural flow regimes help maintain and create foothill yellow-legged frog breeding habitat by widening and diversifying channel morphology, improving rocky substrate conditions, removing sediment, and increasing sunlight by limiting vegetation encroachment (Lind et al. 1996, pp. 64-65; Lind et al. 2016, p. 269; Power et al. 2016, p. 719; GANDA 2018, pp. 37-38). Dams, water management, and other waterway modifications alter the hydrology, timing, temperature, and morphology of foothill yellow-legged frog stream habitat (Service 2021, pp. 74-79). Alterations to flow regimes also occur for hydropeaking (for energy production) and recreational activities, such as spring and summer releases for whitewater boating (Kupferberg et al. 2012, p. 518) (see ``Recreation,'' below). These pulse flows are generally much greater in frequency and intensity as compared to other flow fluctuations and, during spring and summer, can detrimentally affect early life stages of foothill yellow-legged frog during breeding and rearing season (Greimel et al. 2018, p. 92, Kupferburg et al. 2009c, Kupferburg et al., 2011b, p.144). Therefore, alterations of stream hydrology and flows can have a large influence on foothill yellow-legged frog distribution and metapopulation dynamics (Hayes et al. 2016, pp. 24-25; Service 2021, figure 21, p. 25). The effects of altered streams also impede foothill yellow-legged frog dispersal and metapopulation connectivity, which can prevent recolonization of extirpated areas and cause genetic bottlenecks (Peek 2010, p. 44; Peek 2012, p. 15). Genetic comparisons among subpopulations demonstrated that gene flow is decreased in regulated river systems, even when the amount of regulation is low (Peek 2012, p. 15; Peek et al. 2021, p. 14). Many population declines across the foothill yellow-legged frog's range have been attributed to the altered flow regimes and habitat fragmentation associated with water storage and hydropower dams (Kupferberg et al. 2009c, p. ix). Where populations of foothill yellow-legged frogs persist in these areas, breeding population densities were more than five times smaller below dams than in free-flowing rivers (based on breeding populations in the North Coast DPS, North Feather DPS, and Central Coast DPS) (Kupferberg et al. 2012, p. 520). Dams and impoundments, as well as historical use of splash dams (temporary wooden dams created to facilitate transport of logs downstream) in the North Coast DPS in Oregon, have also presumably caused extirpations of the species and altered stream characteristics in some locations (Miller 2010, pp. 14, 61-63, 70-71, table 2.9; Linnell and Davis 2021, not paginated, figures 6 and 7). Altered flow regimes and water diversions (as well as several anthropogenic activities, such as mining, ***agriculture***, overgrazing, timber harvest, and poorly constructed roads), as described in greater detail below, can cause or increase sedimentation in breeding habitat for the foothill yellow-legged frog (Moyle and Randall 1998, pp. 1324-1325). Increased sedimentation can increase turbidity, impact algae and other food resources or impede foothill yellow-legged frog egg mass attachment to substrate (Cordone and Kelley 1961, pp. 191-192; Ashton et al. 1997, p. 13). Fine sediments can also fill interstitial spaces between rocks, which provide shelter from high velocity flows, cover from predators, and sources of aquatic invertebrate prey (Harvey and Lisle 1998, pp. 12-14; Olson and Davis 2009, p. 11; Kupferberg et al. 2011b, pp. 147-149).Predation Foothill yellow-legged frogs can be negatively affected by several native and nonnative animal species. The American bullfrog, native and nonnative fish, and nonnative crayfish have all been linked to impacting populations of foothill yellow-legged frogs (Olson and Davis 2009, pp. 17-18; Hayes et al. 2016, pp. 49-51). The following discussion provides details on how these predatory species affect the foothill yellow-legged frog at various life stages through predation and competition. American bullfrogs: American bullfrogs are considered a threat to all six DPSs. Bullfrogs affect foothill yellow-legged frog populations in several ways because they are simultaneously competitors, predators, and disease vectors, and they impact life stages from tadpoles to adults (see figure 23 in the SSA report, Service 2021, p. 80). Bullfrogs impact foothill yellow-legged frogs by direct predation (Crayon 1998, p. 232; Hothem et al. 2009, pp. 279-280) and indirectly by reducing survival. In one experiment, the presence of bullfrog tadpoles reduced foothill yellow-legged frog tadpole survival by 48 percent and mass at metamorphosis by 24 percent (Kupferberg 1997a, p. 1736). Additionally, the algal and macroinvertebrate assemblages available to foothill yellow-legged frogs were significantly reduced due to the presence of bullfrog tadpoles (Kupferberg 1996b, p. 2; Kupferberg 1997a, p. 1736), which would negatively affect food sources for foothill yellow-legged frog tadpoles, juveniles, and adults. The spread of bullfrogs is facilitated by altered hydrology, land-use change, drought, and increasing water temperatures (Moyle 1973, p. 21; Fuller et al. 2011, pp. 210-211; Adams et al. 2017a, p. 13). Regulatory mechanisms to manage importation and distribution of bullfrogs are currently ineffective due to an inability to adequately enforce regulations (CDFW 2014, pp. 11-12). Fish: Fish such as smallmouth bass, green sunfish (Lepomis cyanellus), mosquitofish (Gambusia affinis), and trout (Oncorhynchus, Salmo, and Salvelinus spp.) are predators of foothill yellow-legged frogs and may also potentially compete with them for invertebrate food resources (Hayes et al. 2016, p. 51). However, of these fish, smallmouth bass are the greatest threat to foothill yellow-legged frogs. Adult smallmouth bass consume amphibian tadpoles (Kiesecker and Blaustein 1998, pp. 776-787), as well as foothill yellow-legged frog tadpoles and adults (Rombough 2006a, unpaginated; Paoletti et al. 2011, p. 166). Smallmouth bass have been identified as a potential cause of foothill yellow-legged frog declines and extirpations in Oregon (Rombough 2006a, unpaginated; Olson and Davis 2009, pp. 13, 17). The distribution of smallmouth bass in California includes the entire South Coast DPS and lower elevation areas of the South Sierra, North Sierra, and North Feather DPSs. Areas in the foothill yellow-legged frog's range in the Salinas, Santa Clara, Central, and Sacramento Valleys are also within the range of the smallmouth bass. For the North Coast DPS, smallmouth bass occupy the Russian River, Trinity, and Eel River drainages (Conservation Biology Institute 2011, entire). In Oregon, smallmouth bass can be found in the entire range of the North Coast DPS except the extreme southeastern portion near the Klamath basin (Carey et al. 2011, p. 306). Nonnative crayfish: Several nonnative crayfish species prey upon early life stages of foothill yellow-legged frog. While the signal crayfish (Pacifastacus leniusculus) is native to part of the[[Page 73924]]North Coast DPS (i.e , Oregon and northwestern corner of California), it has been introduced into several areas within the coast ranges of northern California and the Sierra Nevada (Wiseman et al. 2005, p. 162; Pintor et al. 2009, p. 582; CDFW 2019b, p. 56). In both the native and introduced range of the signal crayfish, the species preys upon foothill yellow-legged frog egg masses, and likely contributes to dislodging egg masses from substrate, potentially allowing them to be transported to unsuitable habitat (Rombough and Hayes 2005, p. 163; Wiseman et al. 2005, p. 162). Signal crayfish are prey upon foothill yellow-legged frog tadpoles in laboratory settings (Kerby and Sih 2015, p. 266), and observations of tail injuries in wild tadpoles suggest crayfish predation also occurs in the wild (Rombough and Hayes 2005, p. 163; Wiseman et al. 2005, p. 162).Disease Foothill yellow-legged frogs can be negatively affected by amphibian chytrid fungus (Batrachochytrium dendrobatidis (Bd)), parasitic copepods, and Saprolegnia fungus (see figure 24 in the SSA report, Service 2021, p. 83). Bd is implicated in the declines or presumed extinctions of hundreds of amphibian species (Scheele et al. 2019, p. 1). The spread of Bd in the range of the foothill yellow-legged frog is presumably linked to increased human use of habitat and the introduction of nonnative bullfrogs, which are Bd reservoir hosts (Huss et al. 2013, p. 341; Adams et al. 2017b, pp. 10225-10226; Yap et al. 2018, pp. 1-2; Byrne et al. 2019, p. 20386). The southern California precipitation regime (i.e , alternation of extreme droughts and floods) may increase the likelihood of disease outbreaks by causing favorable habitat conditions for bullfrogs, warmer water temperatures, and increased stress on foothill yellow-legged frogs (Adams et al. 2017b, p. 10228). Bullfrog presence is a positive predictor of Bd prevalence and load in foothill yellow-legged frogs (Adams et al. 2017a, p, 1). The Bd pathogen has been documented within all DPSs (Yap et al. 2018, p. 5, figure 1), and evidence of Bd prevalence suggests that Bd played a role in the precipitous decline of the foothill yellow-legged frog in southern California. Bd has been implicated in the decline of the foothill yellow-legged frog in both the Central Coast DPS and South Coast DPS (Adams et al. 2017b, p. 10224). Bd may also have sublethal effects on foothill yellow-legged frogs. Foothill yellow-legged frogs that tested positive for Bd had lower body mass to length ratios, although the frogs showed no other signs of infection (Lowe 2009, pp. 180-181). Tadpole susceptibility experiments with other western anurans documented species-specific effects of Bd exposure such as tadpole lethargy (motionless at bottom of tank), disorientation, weak response to prodding, and increased incidence of tadpole mouthpart deformities (Blaustein et al. 2005, pp. 1464-1466). Parasitism of foothill yellow-legged frogs by the Eurasian copepod, Lernaea cyprinacea, is linked to malformations in tadpole and juvenile foothill yellow-legged frogs (Kupferberg et al. 2009a, p. 529). In addition to malformations, this parasite likely has other sublethal effects on foothill yellow-legged frogs, such as stunted growth (Kupferberg et al. 2009a, p. 529). Although direct foothill yellow-legged frog mortality from this parasite has not been documented in the wild, copepod parasitism may be responsible for mortality of tadpoles in captivity (Kupferberg 2019, entire; Oakland Zoo 2019, p. 1; Rousser 2019, entire). The changes predicted by climate change models (i.e , increased summer water temperatures and decreased daily discharge) may promote outbreaks of this parasite throughout the foothill yellow-legged frog's range (Kupferberg et al. 2009a, p. 529). The water fungus (Saprolegnia sp.) causes egg mortality in amphibians of the Pacific Northwest (Blaustein et al. 1994, p. 251). Fungal infections of foothill yellow-legged frog egg masses, potentially from Saprolegnia but not confirmed, have been observed in the mainstem Trinity River (North Coast DPS) (Ashton et al. 1997, pp. 13-14), in approximately 25 percent of egg masses during a study in the South Fork Eel River (North Coast DPS) (Kupferberg 1996a, p. 1337), and in 14 percent of egg masses during 2002 and nearly 50 percent of egg masses during 2003 in the Cresta reach of the North Fork Feather River (North Feather DPS) (GANDA 2004, p. 55). While fungal infections are not a major source of mortality for foothill yellow-legged frogs, this threat has had a strong effect in other amphibian populations (Blaustein et al. 1994, pp. 251-253).Habitat Loss, Degradation, and Fragmentation Habitat loss, degradation, and fragmentation occurs throughout the species' range and is attributed to numerous factors including ***agricultural*** activities, mining, urbanization, roads, recreation, and wildfire. ***Agriculture***/Pesticides: ***Agriculture*** is a source of threats to the foothill yellow-legged frog because of ***agriculture***'s role in habitat degradation, the contribution of pesticides and pollutants to the environment, and its role as a driver of other threats such as altered hydrology and spread of nonnative species (see figure 26 in the SSA report, Service 2021, p. 88). ***Agricultural*** land uses have been linked to declines in foothill yellow-legged frog populations due to the impacts described above (Davidson et al. 2002, p. 1597; Lind 2005, pp. 19, 51, 62, table 2.2; CDFW 2019, p. 58). Foothill yellow-legged frog presence is negatively associated with ***agriculture*** within 5 km (3.1 mi) (Olson and Davis 2009, pp. 15, 22; Linnell and Davis 2021, not paginated, figures 6 and 7). The proximity of foothill yellow-legged frog habitat downwind of the San Joaquin Valley (greatest use of airborne pesticides) suggests that foothill yellow-legged frog declines in the South Sierra unit may be linked to ***agricultural*** pesticide use (Davidson et al. 2002, p. 1594; Davidson 2004, pp. 1900-1901; Bradford et al. 2011, p. 690). Water samples from low elevations in the Sierra Nevada have had concentrations of pesticides that were within the lethal range for foothill yellow-legged frogs (Bradford et al. 2011, p. 690). Foothill yellow-legged frog tadpoles are especially vulnerable to pesticides, especially if pesticide exposure occurs in the presence of other threats, such as competition or predation (Davidson et al. 2007, entire; Sparling and Fellers 2007, entire; Sparling and Fellers 2009, entire; Kerby and Sih 2015, entire). Impacts from pesticides include reduced body size, slower development rate, and increased time to metamorphosis as well as decreased development of natural anti-microbial skin peptides (presumably a defense against the disease, chytridiomycosis) (Davidson et al. 2007, p. 1774; Sparling and Fellers 2009, pp. 1698, 1701; Kerby and Sih 2015, pp. 255, 260). Trespass Cannabis Cultivation: Trespass cannabis cultivation (illegally establishing largescale cannabis farms) occurs throughout the species' range, but the North Coast (California), Central Coast, and South Coast DPSs may be most at risk from this threat (CDFW 2019b, pp. 61-62). These unregulated activities impact the foothill yellow-legged frog by destroying or degrading habitat, increasing water diversion, increasing sedimentation, and introducing pesticides and other chemicals that reduce water quality and impact the species (Bauer et al. 2015, entire). Mining Activities: Mining activities, including aggregate, hard-rock, and suction-dredge mining, are sources of[[Page 73925]]threats to the foothill yellow-legged frog habitat because of their role in habitat destruction and degradation, pollution, and expansion of nonnative species (Hayes et al. 2016, pp. 52-54; Service 2021, figure 29, p. 94). Hydraulic mining, although outlawed, has had and continues to have long-lasting legacy effects and is still affecting aquatic ecosystems in California, with the North Feather DPS and North Sierra DPS being the most impacted (Hayes et al. 2016, pp. 52-54; CDFW 2019b, pp. 57-58). The immediate and legacy effects and extent of mining practices are outlined in Table 8 of the SSA report (Service 2021, table 8, pp. 92-93), and include habitat destruction and alteration, sedimentation, changes in stream morphology, decreased stream heterogeneity, creation of ponded habitat (that supports nonnative species), decreased water quality, and contamination. A moratorium of suction-dredging in streams has currently been put in place for California. However, the State is currently developing new guidance and permitting processes for potentially reinitiating suction-dredging activities (State Water Resources Control Board 2020, entire). Oregon has restricted suction-dredging in the foothill yellow-legged frog's range (National Genomics Center for Wildlife and Fish Conservation 2021, entire). Urbanization: Urbanization (development and roads) can affect foothill yellow-legged frogs and their habitat through direct mortality and from habitat destruction, degradation, and fragmentation. Urbanization can also contribute to increased occurrence of pesticides and pollutants being introduced to the environment and increases in other threats such as altered hydrology, introduction and spread of nonnative species, and assist in disease transmission (see figure 30 in the SSA report, Service 2021, p. 95). ***Conversion*** or alteration of natural habitats for urban land uses has been linked to declines in foothill yellow-legged frog populations (Davidson et al. 2002, p. 1597; Lind 2005, pp. 19, 51, 62, table 2.2). Foothill yellow-legged frog presence is negatively associated with cities and road density (Davidson et al. 2002, p. 1594; Olson and Davis 2009, p. 22). Increases in urbanization and roads have been reportedly associated with foothill yellow-legged frog extirpations in the South Coast DPS, possibly by facilitating the spread of Bd and nonnative species (Adams et al. 2017b, p. 10227). Recreational Activities: Some recreational activities can affect foothill yellow-legged frogs in a variety of ways, depending on the region and type of recreation. Impacts from recreation can be localized, such as trampling or dislodging of egg masses, while others are greater in extent or contribute to other threats. These greater threats include off-highway vehicle use causing habitat degradation and increased sedimentation (Olson and Davis 2009, p. 23), nonnative sportfish stocking of smallmouth bass (see Predation) (ODFW 2009, pp. 8, 11; CDFW 2019a, entire), and altered hydrology due to whitewater boating (Borisenko and Hayes 1999, pp. 18, 28; Kupferberg et al. 2012, p. 518). Some dam operations include planned, short pulse flows during the spring and summer to specifically provide recreation opportunities for whitewater boaters (Kupferberg et al. 2012, p. 518). As with other impacts associated with water management, the timing of these strong unseasonal flows has coincided with the foothill yellow-legged frog breeding and rearing season, leading to negative population-level impacts in the North Feather DPS (Kupferberg et al. 2012, pp. 518, 520-521, figure 3b). Wildfire: Wildfire is a natural phenomenon throughout the range of the foothill yellow-legged frog, and its occurrence and severity are positively influenced by urbanization, roads, recreation, and the effects of climate change. The effects on foothill yellow-legged frogs from wildfire and its suppression are not well understood and have not been directly studied (Hayes et al. 2016, p. 35, table 6; CDFW 2019b, p. 71). The impacts of wildfire are also a function of the severity and intensity of the wildfire, which can be extremely ***variable*** across the landscape depending on topography and vegetation. Anecdotally, foothill yellow-legged frog populations have survived low- to moderate-severity wildfires (Lind et al. 2003, p. 27; CDFW 2019b, p. 71), and it is suspected that low-severity fires do not have adverse effects on the foothill yellow-legged frog (Olson and Davis 2009, p. 24). In fact, wildfires may benefit habitat quality by decreasing canopy cover and increasing habitat heterogeneity (Pilliod et al. 2003, pp. 171, 173; Olson and Davis 2009, p. 24). Direct mortality from scorching is unlikely, given the species' aquatic nature and the sightings of foothill yellow-legged frogs immediately after wildfires (CDFW 2019b, p. 71). In contrast, high-severity wildfires can greatly alter water and habitat quality, remove all vegetative canopy, and reduce habitat heterogeneity by burning vegetative and woody debris that foothill yellow-legged frogs use for shelter. Short- and long-term effects of severe wildfires include potentially harmful changes in water chemistry and increased erosion and sedimentation from flooding (CDFW 2019b, pp. 71-72), which can destroy or degrade breeding habitat and interstitial spaces. Furthermore, the use of fire retardants and suppressants during wildland firefighting can affect amphibians by harming water quality and by direct toxicity to amphibians and their food sources (Pilliod et al. 2003, pp. 174-175; Service 2018, pp. 42-44). See the SSA report for additional information regarding trends and impacts of wildfire (Service 2021, section 7.9, pp. 100-109).Effects of Climate Change The effects of climate change are already having statewide impacts in California and Oregon (Bedsworth et al. 2018, p. 13; Mote et al. 2019, p. ii, summary). Overall trends in climate conditions across the foothill yellow-legged frog's range include increasing temperatures, greater proportion of precipitation falling as rain instead of snow, earlier snowmelt (influencing streamflow), and increased frequency, duration, and severity of extreme events such as droughts, heat waves, wildfires, and floods (OCCRI 2019, pp. 5-7, tables 2 and 3; Public Policy Institute of California 2020, not paginated). A rangewide study of occupancy found that foothill yellow-legged frog presence is negatively related to the frequency of dry years and to precipitation variability, suggesting that the species may already be declining due to the effects from climate change (Lind 2005, p. 20). Projected increases in temperature are likely to affect foothill yellow-legged frogs differently in different parts of the range. Warming temperatures are likely to have some positive effects in areas where stream temperatures are typically colder, allowing for greater foothill yellow-legged frog population growth rates and early life stage survival (Kupferberg et al. 2011a, p. 72; Rose et al. 2020, p. 41). However, researchers observed an unexpected die-off (unknown cause) of late-stage tadpoles that coincided with maximum daily temperatures exceeding 25 degrees Celsius ([deg]C) (77 degrees Fahrenheit ([deg]F)) (Kupferberg et al. 2011a, pp. 14, 58; Catenazzi and Kupferberg 2018, pp. 43-44, figure 2). Temperatures greater than the preferred thermal range may also have lethal or sublethal effects on tadpoles and metamorphs from parasites (Kupferberg et al. 2009a, p. 529; Kupferberg et al. 2011a, p. 15). There may be additional negative consequences to rising stream[[Page 73926]]temperatures, even where temperatures are currently cold. Increasing temperatures may facilitate colonization by nonnative species (Fuller et al. 2011, pp. 210-211; Kiernan et al. 2012, pp. 1480-1481). Bd prevalence in bullfrogs was also found to be greater when water temperature was warmer than 17 [deg]C (63 [deg]F) (Adams et al. 2017a, pp. 12-13). In California, a 25 to 100 percent increase in the frequency of extreme dry-to-wet precipitation events (such as that of the 2012-2016 drought followed by the extremely wet winter of 2016-2017) is projected during the 21st century (Swain et al. 2018, p. 427). This information indicates that the threats of drought and extreme flood events may increase by 25 to 100 percent in California. Increased frequency of extreme heat events, drought, and extreme precipitation and floods events are also projected to increase in Oregon (OCCRI 2019, pp. 5, 6, 13-14, tables 2 and 3). In order to assess future conditions, including future climatic conditions for the foothill yellow-legged frog, we developed a population viability analysis (PVA) (Rose et al. 2020, entire) that used climate and habitat change information consistent with current emission estimates such as those identified as Representative Concentration Pathway (RCP) 4.5 and RCP 8.5 (see Population Viability Analysis, below). The projected changes in temperature, precipitation, and climate variability may exacerbate the effects of other threats on the foothill yellow-legged frog (Service 2021, figure 46, p. 11). The potential interactions (between climate change effects and other threats) that can negatively affect the foothill yellow-legged frog include: An increased risk to human safety from flooding and increased risk of water shortages may necessitate more hydrological alterations (e.g , dams, surface-water diversions, changes to water releases, and channel modifications). While the effect of climate change is only projected to increase surface water stress by up to 5 percent in the Oregon portion of the North Coast DPS's range by mid-century, projected increases range from 5 to 30 percent in California watersheds (Averyt et al. 2013, p. 7, figure 7). In California, climate-induced surface water stress is projected to increase the most in the South Sierra DPS and the least in the North Coast DPS (Averyt et al. 2013, p. 7, figure 7). Increased frequency of drought, decreased spring/summer streamflow, and warmer water temperature may benefit nonnative predators and competitors such as bullfrogs and nonnative fish (Brown and Ford 2002, pp. 332, 338-340, figure 3; Fuller et al. 2011, pp. 210-211; Adams et al. 2017a, p. 13). Increased summer water temperatures and/or decreased daily stream discharge and other increases in climate variability are expected to increase copepod parasitism in foothill yellow-legged frogs (Kupferberg et al. 2009a, p. 529) or exacerbate the effects of disease outbreaks (Raffel et al. 2013, p. 147; Adams et al. 2017b, p. 10228). Observed and projected trends toward warmer and drier wildfire seasons in the western United States are likely to continue the trend toward higher-severity wildfires and larger burn areas (Parks and Abatzoglou 2020, pp. 1, 5-6). This would result in additional loss, degradation, fragmentation, and alteration of habitat, and secondary impacts from increased sedimentation and flooding for the foothill yellow-legged frog across its range.Competing Conservation Interests Many of the conservation activities that support native salmonid fishes (e.g , natural flow management, prevention of sedimentation) have positive influences on foothill yellow-legged frog habitat, connectivity, and juvenile and adult survival (Service 2021, section 7.12, figure 45, p. 113). However, some measures that are taken to improve habitat for cold-water salmonid fishes reduce habitat quality for the foothill yellow-legged frog by decreasing stream temperature and increasing tree canopy cover over streams. One of the management techniques used to support salmonid recruitment is to release high volumes of cold water from dams in the spring (to trigger spawning runs or to flush smolts out to the ocean) (Kupferberg 1996a, p. 1342; Kiernan et al. 2012, p. 1474). The timing of such flow events can negatively affect foothill yellow-legged frog breeding and recruitment (Kupferberg 1996a, pp. 1336-1337, 1342).Current and Future Condition Analysis In our analysis of the current and future condition, we assessed resiliency for each DPS of the foothill yellow-legged frog by evaluating the health and number of metapopulations for each DPS. A healthy metapopulation is defined in terms of its abundance, level of reproduction and recruitment, juvenile and adult survival, and connectivity between populations. To assess the current representation for the foothill yellow-legged frog, we considered the current diversity of ecological conditions and the genetic makeup of each DPS as a proxy for the DPS's adaptive capacity. Redundancy for the foothill yellow-legged frog was measured by the quantity and spatial distribution of resilient metapopulations across each DPS's range. Generally speaking, the greater the number of healthy metapopulations that are distributed (and connected) across the landscape, the greater the DPS's ability to withstand catastrophic events and, thus, the greater the DPS's overall viability.Population Structure Foothill yellow-legged frog distributions and movements across the species' range and within each DPS exhibit the characteristics of metapopulations (Lind 2005, p. 49; Kupferberg et al. 2009b, p. 132). A metapopulation consists of a network of spatially separated population units, or subpopulations, that interact at some level. Subpopulations are subject to periodic extirpation from demographic or environmental stochasticity, but then are naturally repopulated via colonization from nearby subpopulations. Numerous metapopulations may occur within a single stream reach or watershed depending on whether the subpopulations are interacting with each other. Each DPS is made up of numerous metapopulations. In our analysis for determining the range of each DPS, we considered this metapopulation structure when determining whether certain populations or segments interacted with each other and helped define boundaries for the DPSs, especially where some other natural or manmade barrier was not evident.Historical Distribution The historical distribution, as identified once the species was established as a single taxon of the foothill yellow-legged frog (Zweifel 1955, pp. 210, 273), extended from west of the crest of the Cascade Mountains in the Willamette River drainage to the coast in Oregon, south through the Coast Range to Los Angeles County, California, and down the Sierra Nevada foothills and mountains to 5,000 feet (1,524 meters) (CDFW 2019, pp. 7-8; Service 2021, p. 16, Figure 2). Isolated populations or individuals had been identified in the Sacramento (at Sutter Buttes) and Central Valleys (Mokelumne River drainage) of California and in Baja California Norte, Mexico (San Pedro Martir), but these locations were either isolated individuals or have not been found again (Loomis 1965, pp. 78-79; Stebbins 2003, pp. 231-233, 479). Based on our knowledge of foothill yellow-[[Page 73927]]legged frog genetic divergence at much smaller spatial scales of isolation (McCartney-Melstad et al. 2018, p. 121; Peek 2018, p. 76), the distant Mexico population once identified as foothill yellow-legged frog, now considered extirpated, most likely was a different taxon. In Oregon, past impacts from timber operations resulting in stream alteration have reduced the historical range of the species in the Willamette Valley and in the southeast portion (portions of Jackson County) of the State (Olson and Davis 2009, p. 9-11). In California, the historical range has also been reduced most likely from hydrological alteration of habitat associated with water management (Lind 2005, pp. 65, 68, figures 2.1 and 2.4).Current Distribution, Occupancy, Abundance, and Population Trends The current distribution of the foothill yellow-legged frog generally follows the historical distribution of the species except with range contractions in the southern and, to a lesser extent, northern parts of the species' range as discussed above. Within areas currently occupied, foothill yellow-legged frog distribution is currently in a declining trend in several parts of the species' range with the species having disappeared from more than half of its historically-occupied locations (Lind 2005, pp. 38, 61, table 2.1). Some areas in Oregon, especially in the northern and northwestern portion of the species' range, have shown declines; however, recent survey efforts have identified additional populations of the species in some of these areas (National Genomics Center for Wildlife and Fish Conservation 2021, entire). There has not been any rangewide occupancy or population abundance survey effort for the species, and some areas are more heavily surveyed than others. Because of this variation in the available ***data***, we use presence in stream segments as an indicator of occupancy and spatial connectivity of populations. In our review of occupancy, distribution, and abundance, we used information from the California Natural Diversity Database (CNDDB 2020, foothill yellow-legged frog information) and other survey information obtained from Federal and other academic and private resource entities throughout the species' range. The factors we analyzed to determine the condition of a population are (1) spatial and temporal trends in occupancy and reports of population abundance where available, (2) connectivity and isolation among occupied areas, (3) modeled risk of population decline that incorporates demographic and environmental information, and (4) status of threats and their effects (see chapter 8 of the SSA report, Service 2021, pp. 122-166). Foothill yellow-legged frog occupancy varies widely among the DPSs, with generally greater occupancy in the northern half of the range. The North Sierra DPS has the greatest proportion of presumed occupied stream segments (relative to the number of potential stream segments), followed by the North Coast (in California) and North Feather DPSs. Proportions of presumed occupied stream segments were much lower in the rest of the DPSs with the South Coast DPS having the lowest proportion of presumed occupied segments, followed by the South Sierra DPS (see table 10 in the SSA report, Service 2021, p. 125). Based on historical and current occurrence ***data*** (Element Occurrences) for California (CDFW 2020, entire), 67-70 percent of all known occurrence locations are presumed to be occupied by the foothill yellow-legged frog in the North Coast DPS (in California), North Feather DPS, and North Sierra DPS (Service 2021, Table 10, p. 125). In contrast, less than 45 percent of known occurrence locations are presumed occupied in the South Sierra DPS, Central Coast DPS, and South Coast DPS (Service 2021, Table 10, p. 125). Based on patterns of current occupancy by decade of most recent detections (Service 2021, figures 47-53, pp. 127-139), occupied area appears to be declining in parts of each of the DPSs but less so in the northern California and southern Oregon portions of the taxon's range (North Coast DPS). There are large regions in both the northern part of the range (northern Oregon) (North Coast DPS in Oregon) and in the southern half of the species' range (South Sierra DPS, Central Coast DPS, and South Coast DPS) that have not had any reported observations of foothill yellow-legged frogs for two or more decades. Foothill yellow-legged frogs are mostly extirpated in the South Coast DPS and currently occur only in two streams. Table 1 below identifies the percentage of occurrence records considered occupied (2000-2020) in California. Comparable Element Occurrence ***data*** are not available for the North Coast Oregon analysis unit. For our analysis of Oregon, we looked to other sources of information on occurrences (Service 2021, pp. 127-144).Table 1--Percentage of Extant Occurrence Records (CDFW 2020) by Analysis Unit------------------------------------------------------------------------ Analysis unit 2000-2020 (percent)------------------------------------------------------------------------North Coast, Oregon...................... Not Available.North Coast, California.................. 67.North Feather............................ 70.North Sierra............................. 70.South Sierra............................. 43.Central Coast............................ 42.South Coast.............................. 8.------------------------------------------------------------------------Population Viability Analysis In addition to our assessments of occupancy, abundance, and trends, using occurrence information, we worked with USGS researchers to complete a rangewide population viability analysis (PVA) for the foothill yellow-legged frog (Rose et al. 2020, entire). We used the information from the PVA to inform both the species' current condition (Service 2021, chapter 8, pp. 122-166) and potential future condition (Service 2021, chapter 9, pp. 167-193). The methods and information used for developing the models used in the PVA are described in section 8.4 of the SSA report (Service 2021, pp. 146-152). The results of the PVA focus on identifying patterns in risk attributed to areas having a greater than or equal to 50 percent decline within and between analysis units and characterize this as the `risk of decline.' The `risk of decline' results from the PVA reflect many of the geographical patterns that we described above for occupancy ***data*** (Service 2021, section 8.2, pp. 123-139). A summary of the PVA results for the current condition of foothill yellow-legged frog populations within the boundaries of the DPSs combined with our analysis of occupancy information is discussed below. The North Sierra DPS has both the lowest average relative risk of decline and the greatest proportion of presumed occupied stream segments (relative to stream segments that have the potential to be occupied). The North Feather DPS has a medium-high average relative risk of decline and an intermediate proportion of occupied stream segments (relative to potential stream segments). Within the North Coast DPS, stream segments in northern California and southwestern Oregon have lower risks of decline, compared to streams near the San Francisco Bay area and the northern and eastern extents of the species' range in Oregon. The southern analysis units (Central Coast DPS, South Coast DPS, and South Sierra DPS) exhibit the strongest patterns of declining occupancy, with all stream segments[[Page 73928]]within each DPS having either a medium or high relative risk of decline. Chapter 9 of the SSA report (Service 2021, pp. 167-193) discusses the potential change in magnitude and extent of threats and the species' response to those threats into the future. We have determined that the effects of climate change and its impact on increasing temperatures, changes to precipitation and hydrology, and influence on wildfire and drought, as well as the continued regulated flows from managed streams, will drive threats on the species and affect its status into the future. The timeframe of our analysis for these threats is approximately 40 years. This period represents our best understanding of the projected future environmental conditions related to threats associated with climate change that would impact the species (increasing temperatures, greater proportion of precipitation falling as rain instead of snow, earlier snowmelt (influencing streamflow), and increased frequency, duration, and severity of extreme events such as droughts, heat waves, wildfires, and floods). The 40-year timeframe was also used in our PVA as part of its analysis on determining risk for the species into the future (Rose et al. 2020, entire). Although we possess climate and habitat change projections that go out beyond 40 years, there is greater uncertainty between these model projections in the latter half of the 21st century and how the effects of the modeled changes will affect the species' response when projected past 40 years. Accordingly, we determined that the foreseeable future extends only 40 years for the purpose of this analysis and we rely upon projections out to approximately 2060 for predicting changes in the species' conditions. This timeframe allows us to be more confident in assessing the impact of climate and habitat changes on the species. Therefore, based on the available climate and modeling projections and information we have on the species, we have determined 2060 as the foreseeable future timeframe for the foothill yellow-legged frog. Our assessment of future condition interprets the effects that the future changes to threats would potentially have on foothill yellow-legged frog resiliency, representation, and redundancy. In order to accomplish our review, three plausible future scenarios were considered and each DPS's future resiliency, redundancy, and representation under each scenario was assessed. As discussed above, we used information from a PVA (Rose et al. 2020, pp. 22-27) to assist us in determining the potential condition of foothill yellow-frog populations into the future. Although there are an infinite number of possible future scenarios, the chosen scenarios (i.e , lower change scenario, mean change scenario, and higher change scenario) reflect a range of reasonable scenarios based on the current understanding of climate change models, threats, and foothill yellow-legged frog ecology. The environmental conditions in each future scenario are plausible in that they are not meant to represent the lowest and highest projections of what is possible. Rather, the lower change and higher change scenarios are at the lower and upper ends of confidence intervals from climate change projections, land cover models, and stream temperature models (Rose et al. 2020, pp. 22-23). Environmental conditions for the three future scenarios are based on published studies that used ensembles of global climate models (Isaak et al. 2017, p. 9188; Swain et al. 2018, p. 427; Sleeter et al. 2019, p. 3336). For the projections of spatially explicit covariates (i.e , land cover and stream temperature), downscaled regional climate model ***data*** were used (Isaak et al. 2017, p. 9186; Sleeter et al. 2019, p. 3339). The information from these studies reflects the best scientific and commercial information available for projections of land cover (Sleeter et al. 2019; Sleeter and Kreitler 2020, unpublished ***data***), stream temperature (Isaak et al. 2017), and climate variability (Swain et al. 2018) within the range of the foothill yellow-legged frog. Descriptions of each scenario and the anticipated effects of each scenario on resiliency, representation, and redundancy for each foothill yellow-legged frog DPS is in the SSA report (Service 2021, Table 17, sections 9.3-9.5, pp. 171, 174-193) and is summarized below.Resiliency Resiliency is having sufficiently robust populations for the species to withstand stochastic events (i.e , events arising from random factors). For the foothill yellow-legged frog, we determined that resiliency is a function of metapopulation health and the distribution and connectivity among metapopulations and subpopulations. To determine if foothill yellow-legged frog populations were resilient, we first assessed spatial and temporal trends in occupancy and abundance. We then assessed structural and functional connectivity among occupied areas. We also evaluated results from a study that modeled the risk of >=50 percent decline in occupied stream segments using demographic and environmental information. Finally, we related our results to information from scientific literature, reports, and species experts. Table 2 below summarizes the current condition and future conditions of resiliency for each of the foothill yellow-legged frog DPSs. In the SSA report and the table below, we split the North Coast DPS into a California and an Oregon analysis unit. These two analysis units are later combined for determination of the status of this DPS as a whole. The current condition column reflects the current resiliency of the analysis unit. The current resiliency of each DPS was characterized as having an intact, reduced, substantially reduced, or extensively reduced condition. Under each future scenario, we assessed how the following resiliency measures would change from current condition: (1) Occupancy and abundance, (2) connectivity, (3) modeled risk of population decline, and (4) status of threats. Because changes to environmental conditions under the future scenarios were reflected by environmental covariates in the PVA (see Service 2021, section 9.2 (Scenarios); Table 17), we were able to forecast the magnitudes of changes in resiliency by comparing the modeled risk of decline (Rose et al. 2020, entire) under current conditions to modeled risk under the three future scenarios. The lower, mean, and higher change scenario columns represent any changes from each DPS's current resiliency. For this analysis, ``functional extirpation'' is defined as such extensive reduction in condition that extirpation of the entire unit is likely to eventually occur as remnant populations experience normal environmental and demographic fluctuations. For additional detail on current and future conditions of the DPSs, see the SSA report (Service 2021, chapters 8 and 9, pp. 122-193).[[Page 73929]] Table 2--Resiliency of the Seven Foothill Yellow-Legged Frog Analysis Units---------------------------------------------------------------------------------------------------------------- Lower change Mean change Higher change Analysis unit Current condition scenario scenario scenario----------------------------------------------------------------------------------------------------------------North Coast DPS (Oregon)...... Intact Resiliency.. Slightly reduced Slightly reduced Markedly reduced from current. from current. from current.North Coast DPS (California).. Intact Resiliency.. Slightly reduced Markedly reduced Greatly reduced from current. from current. from current. Risk of functional extirpation.North Feather DPS............. Reduced Resiliency. No change.......... Markedly reduced Greatly reduced from current. from current. Risk of Risk of functional functional extirpation. extirpation or extirpation.North Sierra DPS.............. Intact Resiliency.. Slightly reduced Markedly reduced Greatly reduced from current. from current. from current.South Sierra DPS.............. Substantially Slightly reduced Markedly reduced Greatly reduced Reduced Resiliency. from current. from current. from current. Risk of Risk of functional functional extirpation or extirpation or extirpation. extirpation.Central Coast DPS............. Substantially Slightly reduced Markedly reduced Greatly reduced Reduced Resiliency. from current. from current. from current. Risk of Risk of functional functional extirpation or extirpation or extirpation. extirpation.South Coast DPS............... Extensively Reduced Slightly reduced Markedly reduced Greatly reduced Resiliency. from current. Risk from current. from current. of extirpation. Risk of Risk of extirpation. extirpation.----------------------------------------------------------------------------------------------------------------Representation Representation describes the ability of a species to adapt to changing environmental conditions. This includes both near-term and long-term changes in its physical (e.g , climate conditions, habitat conditions, habitat structure, etc.) and biological (e.g , pathogens, competitors, predators, etc.) environments. This ability of a species to adapt to these changes is often referred to as ``adaptive capacity.'' To assess the current condition of representation for the foothill yellow-legged frog, we considered the current diversity of ecological conditions and of genetic material throughout the range of the species. There are considerable ranges of ecological conditions under which foothill yellow-legged frogs occur. As discussed in the SSA Report (Service 2021, Section 2.7 and CHAPTER 3), there are substantial differences in latitude, elevation, precipitation, average temperature, and vegetative community across the species' range. Parts of the foothill yellow-legged frog range also differ in terms of species composition and in hydrology (rain-fed versus snow-fed systems). Exemplary of these different ecological conditions, foothill yellow-legged frog tadpoles from snow-fed Sierra Nevada populations have higher intrinsic growth rates than tadpoles from rain-fed coastal populations, likely due to their constraint to a shorter rearing season in the Sierra Nevada (Catenazzi and Kupferberg 2017, pp. 1255, 1260-1261). As described in the SSA report (Service 2021, Section 2.6), two rangewide assessments of foothill yellow-legged frog genomic datasets revealed that this taxon is extremely differentiated following biogeographical boundaries (McCartney-Melstad et al. 2018, p. 112; Peek 2018, p. 76). The clades that are most genetically divergent (i.e , South Sierra, Central Coast, and South Coast clades), and thus could contribute most to the overall adaptive capacity of this taxon (McCartney-Melstad et al. 2018, p. 120; Peek 2018, p. 77), are also the clades with the lowest levels of population resiliency. The South Sierra and Central Coast clades have substantially reduced resiliency and the South Coast clade has extensively reduced resiliency (SSA Report (Service 2021, Section 8.5)). The reduced resiliency in these clades, means that the foothill yellow-legged frog is especially vulnerable to loss of this genetic diversity. The Central Coast and South Coast clades are the most genetically divergent, indicating that a significant amount of the taxon's overall genetic diversity would be lost if either clade were extirpated. The Central Coast and South Coast clades are also ecologically unique because they have lower annual precipitation and higher mean annual temperatures than elsewhere in the range of the species (PRISM Climate Group 2012, 30-year climate dataset; Table 3) and the region hosts the highest freshwater endemism of anywhere in the species' California range (Howard et al. 2013, p. 5). While not as at risk of extirpation, the northern Sierra clades (i.e , North Feather and North Sierra clades) might also have unique adaptive potential in the face of climate change because of their admixture history and intermediacy to the South Sierra and North Coast clades (McCartney-Melstad et al. 2018, p. 121). The genetic clade that is comprised of the two North Coast units is also genetically valuable to the foothill yellow-legged frog because it contains the greatest genetic diversity and is the only part of the range that shows a trajectory of increasing genetic diversity (McCartney-Melstad et al. 2018, pp. 120-121; Peek 2018, p. 74). The North Coast clade also potentially provides connectivity and a large latitudinal gradient for responding to the effects of climate change. While the foothill yellow-legged frog clearly has a range of genetically divergent populations, it has likely already lost a lot of diversity due to large extirpations in the southern analysis units. The species is also at risk of further losses amidst trends toward decreasing occupancy and decreasing connectivity. The foothill yellow-legged frog is exhibiting an overall trend of decreasing genetic diversity in spite of the trend of increasing genetic diversity in the North Coast clade (McCartney-Melstad et al. 2018, pp. 120-121; Peek 2018, p. 74). The trend of decreasing genetic diversity in the foothill yellow-legged frog may be leading to losses in adaptive capacity (i.e , ability to adapt to change). Loss of adaptive capacity lowers the species' viability because the decrease in ability to adapt to change increases extinction risk in the face of future changes. For foothill yellow-legged frog conservation, McCartney-Melstad et al. (2018, p. 122) strongly recommended that each of the major genetic groups be managed as independent recovery units. Peek (2018, p. 77) also recommended that conservation actions should prioritize protecting foothill yellow-legged frogs in the Central Coast, South Coast, and South Sierra clades because they are simultaneously the most distinct, divergent, and at-risk populations.Redundancy Redundancy describes the ability of a species to withstand catastrophic events. To assess redundancy for each analysis unit, we considered the (1) quantity of occupied stream segments (proxy for subpopulations) (SSA Report (Service 2021,Table 10)), (2) spatial distribution of occupied stream[[Page 73930]]segments (SSA Report (Service 2021, Figure 55)), and (3) population level factors such as connectivity, relative risk of decline, and level of threats. These factors were assessed in terms of their potential influence on the ability of foothill yellow-legged frog metapopulations to survive and recover after a plausible catastrophic event. For example, isolation of occupied stream segments or lack of functional connectivity in an analysis unit, could prevent recolonization of extirpated areas after a massive die-off or temporary habitat destruction. At the analysis unit scale of redundancy, long-term viability after a catastrophic event would likely be possible in the North Coast clade (North Coast California and North Coast Oregon units) and might be possible in the North Sierra clade. In the North Coast clade, there are large numbers of occupied streams and there are numerous occupied stream segments that both are in the low risk of decline category and are distributed widely across the geographical area (SSA Report (Service 2021, Figure 55)). Furthermore, resiliency is intact in both of the two analysis units that comprise this clade. Resiliency is also intact in the North Sierra clade because there are numerous occupied stream segments that both are in the low risk of decline category and are distributed widely across the geographical area (SSA Report (Service 2021, Figure 55)). However, the North Sierra clade has less redundancy than the North Coast clade because the North Sierra clade is small in size and has poor functional connectivity, which could prevent recolonization after catastrophic events. The North Feather DPS occupies a relatively small area and several streams or occurrences have been extirpated from past impacts (eastern portion of range, southwestern area near Lake Oroville, and some occurrences in northern Butte County) (CDFW 2020, dataset, entire; Service 2021, figure 49, p. 131). The North Feather DPS also has the highest average relative risk of population decline with only 16 (15 percent) of the 109 analyzed stream segments in the low risk category and 34 stream segments (31 percent) in the high risk category. Overall abundance of foothill yellow-legged frogs for the North Feather DPS is largely unknown, but egg mass densities are very low in the two regulated stream reaches that have long-term monitoring (Rose et al. 2020, pp. 63-64, table 1). For example, sections of the Cresta reach of the North Feather River that historically had relatively high numbers of foothill yellow-legged frog egg masses did not have egg masses or were extremely reduced for several years (2006-2017) (CDFW 2019, p. 31; Dillingham 2019, p. 7). As a result, redundancy is limited in the North Feather DPS. The North Feather DPS is not only the smallest clade, but its occupied stream segments are not well-distributed over the geographical area (SSA Report (Service 2021, Figure 55)). The extant North Feather populations occupy an area small enough that a large catastrophic event, such as a high-severity wildfire or drought, could result in functional extirpation. Furthermore, the North Feather DPS has reduced resiliency because of poor occupancy and relatively high risk of population decline. Redundancy is poor in the South Sierra and Central Coast clades. Both the South Sierra and Central Coast clades have substantially reduced resiliency because of poor occupancy, poor connectivity, relatively high risk of decline, and substantial threats. A single catastrophic event would be unlikely to extirpate the entirety of either unit, but the patchy distribution of occurrences (SSA Report (Service 2021, Figure 55)) and limited connectivity would make it extremely unlikely that extirpated areas would be recolonized naturally. Redundancy within the South Coast clade is nearly zero. Not only is the resiliency in this clade extensively reduced, but there are only two known populations (SSA Report (Service 2021, Section 8.2)) in the South Coast clade. These two populations (comprised of seven stream segments) are also very close in proximity (SSA Report (Service 2021, Figure 55)). These streams are located close to one another, but the foothill yellow-legged frog populations within them appear to have lost genetic connectivity. Although the stream flows are not regulated by dams, the risk of population decline continues to be medium or high under current conditions due to the combination of threats identified above altering habitat and impacting the DPS. Furthermore, the close proximity of the stream segments to each other makes the South Coast DPS especially vulnerable to extirpation from a single catastrophic event.Overall Current and Future Condition As discussed above, we used the information from the PVA to inform both the species' current condition (Service 2021, chapter 8, pp. 122-166) and potential future condition (Service 2021, chapter 9, pp. 167-193). The PVA assessed how the following measures would change from current condition: (1) Occupancy and abundance, (2) connectivity, (3) modeled risk of population decline, and (4) status of threats under each future scenario. Because changes to environmental conditions under the future scenarios were reflected by environmental covariates in the PVA (see Service 2021, section 9.2 (Scenarios); Table 17), we were able to forecast the magnitudes of changes in resiliency by comparing the modeled risk of decline (Rose et al. 2020, entire) under current conditions to modeled risk under the three future scenarios. The results of the analysis showed that the average risk of population decline for each analysis unit increased under the three future scenarios (Rose et al. 2020, p. 39). Under current conditions and all future scenarios, the average relative risk of decline was highest in the South Sierra and Central Coast units and was lowest in the North Coast Oregon, North Coast California, and North Sierra units (Table 3 below and Service 2021, Tables 18 and 19). Under the lower change scenario, decreases in resiliency, compared to current conditions, were small in most analysis units. However, decreases in resiliency were more dramatic under the mean and higher change scenarios. These dramatic declines in resiliency put several analysis units at risk of unit-wide extirpation or functional extirpation (i.e , such extensive reduction in condition that extirpation of the entire unit is likely to eventually occur as remnant populations experience normal environmental and demographic fluctuations) under the mean and higher change scenarios (SSA Report (Service 2021, Table 19)). One of the analysis units (South Coast unit) is at risk of unit-wide extirpation under all three of the future scenarios.[[Page 73931]] Table 3--Relative Risk of Decline Summary for Current Condition and Three Future Scenarios---------------------------------------------------------------------------------------------------------------- Risk of decline ------------------------------------------------------------------------------- Analysis unit Lower change Mean change Higher change Current condition scenario scenario scenario----------------------------------------------------------------------------------------------------------------North Coast Oregon.............. Low............... Medium............ Medium............ Medium.North Coast California.......... Medium............ Medium............ Medium............ Medium.North Feather................... Medium............ Medium............ High.............. High.North Sierra.................... Low............... Low............... Medium............ Medium.South Sierra.................... Medium............ High.............. High.............. High.Central Coast................... Medium............ Medium............ High.............. High.South Coast..................... Medium............ Medium............ Medium............ High.----------------------------------------------------------------------------------------------------------------Conservation Efforts and Regulatory Mechanisms Several initiatives and conservation efforts are in place and being implemented for foothill yellow-legged frog conservation including measures for rearing (headstarting), nonnative species removal, development of reintroduction feasibility studies, and habitat conservation planning for the species (Service 2021, table 9, pp. 117-120). Headstarting (hatching eggs and rearing into releasable frogs) has been started on the North Feather River. The program has just been started and the extent from headstarting is limited to a portion of the range of the North Feather DPS. Also benefitting the species (through regulatory protection) is the decision by the California Fish and Game Commission to list five foothill yellow-legged frog genetic clades (referred to as analysis units in this document) under the California Endangered Species Act. In February 2020, the California Fish and Game Commission adopted the findings of the CDFW to list the South Coast, Central Coast, and South Sierra clades as endangered and list the North Feather and North Sierra clades as threatened under the California Endangered Species Act (Commission 2020, p. 1). Another regulatory benefit that applies to breeding and rearing habitat is the 2009 moratorium on suction-dredge mining in California. However, benefits to the foothill yellow-legged frog from the moratorium have not been studied, and permitting processes are in development so that the moratorium may be lifted (State Water Resources Control Board 2020, entire). The foothill yellow-legged frog is listed as a sensitive species by the BLM and the Forest Service under their Sensitive Species program. These agencies define sensitive species as those species that require special management consideration to promote their conservation and reduce the likelihood and need for future listing under the Act. Any actions conducted by the Forest Service or BLM would need to take into consideration impacts to sensitive species and, if possible, implement best management practices to limit impacts to the species or its habitat. In addition, the species in northern portions of California and the species' range in Oregon on National Forest or BLM lands currently receive protection through conservation measures and best management practices under the Northwest Forest Plan's Survey and Manage program (USDA-USDOI 2001, entire). These measures reduce or eliminate impacts to habitat for the foothill yellow-legged frog and areas occupied by the species during road construction and maintenance activities as well as any vegetation management actions which assist in the reduction of threats associated with wildfire on BLM and Forest Service lands. The Federal Energy Regulatory Commission (FERC) issues licenses for the operation of nonfederal hydropower projects. Within the range of the foothill yellow-legged frog, numerous hydropower projects require FERC licensing to operate. Part of the licensing process includes consideration of recommendations for the protection of fish and wildlife. Some FERC license requirements have included measures to help protect and conserve foothill yellow-legged frogs including actions such as ***collection*** of ***data***, implementation of modified flow regimes to mimic more natural conditions, and other standard best management practices. Two joint Federal and State habitat conservation plans (HCPs) and California State natural community conservation plans (NCCPs) (Santa Clara Valley HCP/NCCP and East Contra Costa HCP/NCCP) have been approved and implemented for the foothill yellow-legged frog as a covered species and assist in local population and habitat conservation (Jones & Stokes 2006, entire; ICF International 2012, entire). Both HCP/NCCPs are in the northern portion of the Central Coast DPS's range. Another Federal HCP has been issued to the Humboldt Redwood (formerly Pacific Lumber) Company. The Humboldt Redwood Company (HRC) HCP covers areas within the range of the North Coast DPS in Humboldt County and includes adaptive management strategies designed to maintain viability in populations of foothill yellow-legged frogs and other covered aquatic herpetofauna (HRC 2015, entire). Due to the limited nature of existing conservation efforts and no rangewide planning or coordination, the current conservation efforts are localized. In addition, several ongoing efforts are preliminary steps to on-the-ground conservation (e.g , feasibility research) and other efforts have not had enough time to verify long-term success (e.g , population headstarting) or determine if and how the condition of a foothill yellow-legged frog population may have improved (e.g , bullfrog removal) (Service 2021, section 7.15, pp. 116-121). Therefore, large scale conservation efforts are not known to be currently outweighing any of the threats described above at the species or DPS level, but may reduce some effects at the individual or smaller localized population level.Determination of Status for the Foothill Yellow-Legged Frog Section 4 of the Act (16 U.S.C 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species meets the definition of an ``endangered species'' or a ``threatened species.'' The Act defines an ``endangered species'' as a species in danger of extinction throughout all or a significant portion of its range, and a threatened species as a species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether a species meets the definition of an ``endangered species'' or a ``threatened species'' because of any of the following factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B)[[Page 73932]]overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. In determining potential future threats facing the six DPSs, we evaluated various future conditions based on projections of changes in threats. Our timeframe for review looked out approximately 40 years based on the effects of climate change and information developed for the PVA. This was our timeframe for our threats analysis of future conditions for the six DPS to determine if they were likely to become endangered within the foreseeable future (i.e , if they meet the Act's definition of ``threatened species'') throughout their ranges.Status of the South Sierra DPS and the South Coast DPS of the Foothill Yellow-Legged Frog Throughout All of Their Ranges We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to the South Sierra and South Coast DPSs of the foothill yellow-legged frog and their habitat. Below we summarize our assessment of status of the South Sierra DPS and South Coast DPS under the Act. South Sierra DPS: Threats are numerous and severe for the South Sierra DPS and include altered hydrology (Factor A), ***agriculture*** (including airborne pesticide drift) (Factor A), illegal cannabis cultivation (Factor A), predation by nonnative species (Factor C), disease and parasites (Factor C), mining (Factor A), urbanization (including development and roads (Factor A), recreation (Factor E), severe wildfire (Factor A), drought (Factor E), extreme flooding (Factor E), the effects of climate change (e.g , increased temperatures, variability in precipitation events, increased drought frequency) (Factor E), and inadequacy of regulatory mechanisms (Factor D). After evaluating threats to the DPS and assessing the cumulative effect of the threats under the Act's section 4(a)(1) factors, we conclude that under current conditions, resiliency, redundancy and representation are substantially reduced due to existing range contractions and the DPS's extensive extirpations and patchy distribution within and between stream segments. Both structural and functional connectivity are also poor in the South Sierra DPS. While exact abundances are largely unknown, populations within the DPS are relatively small and isolated and are impacted by numerous threats that are of such extent and magnitude that they are making the South Sierra DPS currently more susceptible to loss from stochastic or catastrophic events. The South Sierra DPS also has a high average risk of decline with no stream segments in lower risk categories under current conditions. As a result, we find that the magnitude and imminence of threats facing the South Sierra DPS of the foothill yellow-legged frog place the DPS in danger of extinction now, and therefore a threatened status is not appropriate. Thus, after assessing the best scientific and commercial information available, we determine that the South Sierra DPS of the foothill yellow-legged frog is in danger of extinction throughout all of its range. South Coast DPS: There are numerous, severe threats to the South Coast DPS of the foothill yellow-legged frog including altered hydrology (Factor A), drought (Factor E), nonnative species (Factor C), disease and parasites (Factor C), urbanization (including development roads) (Factor A), and recreation (Factor E), illegal cannabis cultivation (Factor A), extreme floods (Factor E), severe wildfire (Factor A), the effects of climate change (e.g , increased temperatures, precipitation variability, increased drought frequency and duration) (Factor E), and inadequacy of regulatory mechanisms (Factor D). After evaluating threats to the DPS and assessing the cumulative effect of the threats under the Act's section 4(a)(1) factors, we conclude that under current conditions, resiliency, redundancy, and representation are poor for the South Coast DPS. Foothill yellow-legged frogs are mostly extirpated in this DPS and currently occur only in two streams. These streams are located close to one another, but the foothill yellow-legged frog populations within them appear to have lost genetic connectivity. Although the stream flows are not regulated by dams, the risk of population decline continues to be medium or high under current conditions due to the combination of threats identified above altering habitat and impacting the DPS. Furthermore, the close proximity of the stream segments to each other makes the South Coast DPS especially vulnerable to extirpation from a single catastrophic event. Like the other DPSs within the southern portion of the species' range, the area associated with the South Coast DPS is subject to reduced precipitation and drying, which (1) shortens the hydroperiod and negatively affects habitat elements that are hydrology-dependent; (2) limits recruitment, survival, and connectivity; and (3) exacerbates the effects of other threats, such as predation and wildfire. In addition, the current occupancy within the DPS is extremely low and the threats acting on the DPS are of such extent and magnitude to currently cause significant declines. As a result, we find that the magnitude and imminence of threats facing the South Coast DPS of the foothill yellow-legged frog place the DPS in danger of extinction now, and therefore a threatened status is not appropriate. Thus, after assessing the best scientific and commercial information available, we determine that currently the South Coast DPS of the foothill yellow-legged frog is in danger of extinction throughout all of its range.Status of the South Sierra DPS and South Coast DPS Throughout a Significant Portion of Their Ranges Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. We have determined that the South Sierra DPS and the South Coast DPS of the foothill yellow-legged frog are in danger of extinction throughout all of their ranges, and accordingly we did not undertake an analysis of any significant portion of the range for these two DPSs. Because both DPSs warrant listing as endangered throughout all of their ranges, our determination does not conflict with the decision in Center for Biological Diversity v. Everson, 2020 WL 437289 (D. DC 2020), in which the court vacated the aspect of the Final Policy on Interpretation of the Phrase ``Significant Portion of its Range'' in the Endangered Species Act's Definitions of ``Endangered Species'' and ``Threatened Species'' (79 FR 37578; July 1, 2014) that provided the Service does not undertake an analysis of significant portions of a species' range if the species warrants listing as threatened throughout all of its range.Determination of Status for the South Sierra DPS and South Coast DPS Our review of the best available scientific and commercial information indicates that the South Sierra DPS and the South Coast DPS meet the Act's definition of endangered species. Therefore, we propose to list the South Sierra DPS and the South Coast DPS as endangered species in accordance with sections 3(6) and 4(a)(1) of the Act.[[Page 73933]]Status of the North Feather DPS and Central Coast DPS of the Foothill Yellow-Legged Frog Throughout All of Their Ranges We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to the North Feather and Central Coast DPSs of the foothill yellow-legged frog and their habitat. Below we summarize our assessment of status of the North Feather DPS and Central Coast DPS under the Act. North Feather DPS: Numerous threats are currently acting on the North Feather DPS. The North Feather DPS is within the most hydrologically altered part of the foothill yellow-legged frog's range (Factor A) and potentially is among the most impacted by the latent effects from historical mining (Hayes et al. 2016, pp. 53-54) (Factor A). Other threats to the DPS include nonnative species (bullfrogs and crayfish) (Factor C), impacts to habitat (***agriculture***, urbanization, severe wildfire) (Factor A), recreation (Factor E), the effects of climate change (Factor E), and inadequacy of regulatory mechanisms (Factor D). After evaluating threats to the DPS and assessing the cumulative effect of the threats under the Act's section 4(a)(1) factors, we conclude that under current conditions, resiliency, redundancy, and representation for the North Feather DPS are reduced. The North Feather DPS occupies a relatively small area and several streams or occurrences have been extirpated from past impacts (eastern portion of range, southwestern area near Lake Oroville, and some occurrences in northern Butte County) (CDFW 2020, dataset, entire; Service 2021, figure 49, p. 131). The North Feather DPS also has the highest average relative risk of population decline with only 16 (15 percent) of the 109 analyzed stream segments in the low risk category and 34 stream segments (31 percent) in the high risk category. Overall abundance of foothill yellow-legged frogs for the North Feather DPS is largely unknown, but egg mass densities are very low in the two regulated stream reaches that have long-term monitoring (Rose et al. 2020, pp. 63-64, table 1). For example, sections of the Cresta reach of the North Feather River that historically had relatively high numbers of foothill yellow-legged frog egg masses did not have egg masses or were extremely reduced for several years (2006-2017) (CDFW 2019, p. 31; Dillingham 2019, p. 7). Under current conditions, resiliency in the North Feather DPS is reduced, largely because of the DPS's occupation of a small geographic area, range contraction, the relatively high risk of the DPS's decline, and the area's high degree of hydrological alteration. However, the North Feather DPS still currently contains a relatively high proportion of occurrence records with 42 percent of all known occurrences being from the 2010-2020 timeframe (Service 2021, table 10, figure 49, pp. 125, 131). As a result, occupancy for the North Feather DPS is good, based on a majority of records being within the 2000-2020 timeframe, but abundance is low where there has been population monitoring. Current redundancy is limited in the North Feather clade. The North Feather DPS not only occupies the smallest area, but its occupied stream segments are not well-distributed over the geographical area it occupies. Current representation of the DPS is most likely reduced due to past loss of populations. In 2001, the FERC issued an order to the licensee responsible for flow regulation on the Cresta and Poe reaches of the North Feather River (Rock Creek-Cresta Hydroelectric Project (FERC Project No. 1962) Pacific Gas and Electric Company (PG&E)). The order required PG&E to develop a plan to ensure recreational and pulse flow releases did not negatively impact the foothill yellow-legged frog. The order also required the establishment of an Ecological Resources Committee (ERC) to evaluate effects of flows and provide adaptive management strategies if flows had a negative impact on the foothill yellow-legged frog populations within the two reaches. In 2006, flow releases for recreational boating were discontinued on the Cresta reach due to possible impacts from flows resulting in low foothill yellow-legged egg masses that year. In 2009 and again in 2014, modified flow programs were implemented to mimic natural flow regimes by reducing flows in spring and summer (April through the foothill yellow-legged frog's breeding season) (GANDA 2018, pp. 1-2). We expect these measures to continue due to the establishment of the ERC on monitoring impacts to foothill yellow-legged frog populations on the two reaches. As a result, there are some signs of improved abundance since 2018, in the Cresta reach of the North Feather River following the above described modifications of the regulated flow regime to more natural conditions. Additional conservation efforts have been implemented to improve abundance of the North Feather DPS including in-situ and ex-situ rearing of foothill yellow-legged frogs for reintroduction (GANDA 2018, pp. 1-3, 13, table 2; Dillingham 2019, pp. 7-9; Rose et al. 2020, pp. 63-64, 76, table 1, figure 4). The Forest Service has noted habitat improvements in breeding areas of the Cresta reach and expects abundances and breeding activity to continue to increase in response to conservation efforts associated with in-situ and ex-situ rearing efforts (Dillingham 2019, pp. 7-9). In addition, the environmental condition of streams in the range of the North Feather DPS exhibit colder stream temperatures. These cooler water temperatures, although not currently preferable for the foothill yellow-legged frog, may help to provide climatic resiliency during periods of hot weather that may increase stream temperatures and may extend breeding and rearing timeframes. In addition, the existing conservation efforts to improve populations and regulatory measures to benefit habitat conditions as described above currently document improvements to the DPS's overall current condition. After evaluating threats to the species and assessing the cumulative effect of the threats under the section 4(a)(1) factors, we have determined that despite the current condition of the DPS being reduced, the population and habitat factors used to determine the resiliency, representation, and redundancy for the DPS have not been reduced to such a degree to consider the North Feather DPS currently in danger of extinction throughout its range. However, threat conditions in the future are likely to substantially impact populations of the North Feather DPS. Because of the current cold stream temperatures, future climatic conditions that may increase stream temperatures may potentially benefit many of the North Feather DPS populations; however, the negative effects of increases in streamflow variability due to climate change (i.e , drought/flood events, snow/rain events) and residual environmental stochasticity likely outweigh the benefit of any warmer stream temperatures. Increased water demand and anticipated additional regulation to an already highly regulated hydrologic condition of the DPSs habitat will further limit the DPS's capability to maintain adequate population sizes to support the DPS's metapopulation structure. Nonnative species (bullfrogs and crayfish) will continue to impact the DPS and their impacts may increase as temperatures warm, allowing for spread of warm water species such as bullfrogs and smallmouth bass. Trends indicate that the amount of area severely burned annually by wildfires has been[[Page 73934]]growing sharply in the range of the North Feather DPS (Service 2021, figures 38 and 39, pp. 105-106) and negative consequences from wildfire-related sedimentation to foothill yellow-legged frog reproduction have been documented in this DPS (Service 2021, pp. 86-87). The populations of the North Feather DPS occupy an area small enough that a large catastrophic event, such as a severe wildfire or prolonged drought, could result in a severe reduction in population size and extent for the DPS. Future resiliency for the North Feather DPS will be markedly reduced as a result of these increases in threats and increases in the synergistic effects of threat interactions. Thus, the projected increases in average relative risk of decline under future conditions under the mean change scenario are likely to decrease occupancy, abundance, and connectivity, with resiliency being markedly reduced from the DPS's current condition, putting the North Feather DPS at risk of functional extirpation or extirpation within 40 years. As a result of the DPS having a large percentage (42 percent) of recently occupied occurrences (2010-2020) within the occupied stream segments, and implementation of conservation measures to reduce the effects of altered stream hydrology and provide for an increase in populations, we have determined that the current condition of the DPS, although reduced, still exhibits sufficient resiliency, redundancy, and representation and would provide for, at a minimum, pockets of favorable conditions that allow the North Feather DPS to currently sustain its existing populations. However, future impacts from the threats facing the DPS are likely to cause declines in the DPS's population size and distribution. Thus, after assessing the best available information, we conclude that the North Feather DPS of the foothill yellow-legged frog is not currently in danger of extinction but is likely to become in danger of extinction within the foreseeable future throughout all of its range. Central Coast DPS: Numerous threats are currently acting on the Central Coast DPS including altered hydrology (Factor A), disease (Factor C), drought (Factor A), nonnative bullfrogs (Factor C), impacts to habitat (urbanization (including development and roads), ***agriculture***, trespass cannabis cultivation, extreme floods, and wildfire) (Factor A), recreation (Factor E), the effects of climate change (Factor E), and inadequacy of regulatory mechanisms (Factor D). Human land use and population (urban development) in the northern portions of the DPS's range are high, and the proportion of forest and shrub cover across the DPS's range is low, with large areas being made up of lower elevation open oak woodlands or foothill grassland habitats. Seasonal precipitation within the range of the Central Coast DPS is extremely ***variable*** year-to-year, making stream habitat for the Central Coast DPS subject to drying. This, in turn, shortens the breeding season; negatively affects habitat elements that are hydrology-dependent; limits recruitment, survival, and connectivity; and exacerbates the effects of other threats (e.g , wildfire, drought, nonnative predators, disease, and the effects of climate change). However, this variability has also resulted in the Central Coast area of California (including the area occupied by the Central Coast DPS) containing a high number of freshwater species that have evolved adaptations to their environment (Howard et al. 2013, p. 5). Below we summarize the resiliency, redundancy, and representation of the Central Coast DPS. The Central Coast DPS has undergone historical range contraction in portions of its northern (Contra Costa, Alameda, San Mateo, and northern Santa Cruz Counties) and central (southern Santa Clara and northern San Benito Counties) regions. Currently, two clusters of stream segments have had recent (2000-2020) detections of the species, one cluster in the southern part and one cluster in the northern part of the DPS's range (Service 2021, figure 52, p. 137). Population size and abundance for the Central Coast DPS have been historically, and continue to be, small, with those populations in unregulated streams being larger and more productive (Service 2021, pp. 136-137 (8.2 Central Coast)). The southern cluster appears to have functional and genetic connectivity (McCartney-Melstad et al. 2018, p. 117, figure 3), which assists in maintaining the cluster's metapopulation integrity. The southern cluster also has fewer human-caused threats (urbanization, high-level recreation) due to its distance away from highly human-populated areas and its location on public lands (BLM's Clear Creek Management Area (CCMA)). Populations within the CCMA in San Benito and Fresno Counties are being monitored and managed by BLM, and currently appear to be self-sustaining (BLM 2014, pp. 4-77, 99-100). The northern cluster is proximate to highly urbanized areas of the south San Francisco Bay area and San Jose, California. The northern cluster also exhibits some genetic differentiation among subpopulations, indicating a lack of functional connectivity (McCartney-Melstad et al. 2018, p. 117, figure 3). However, two HCP/NCCPs (East Contra Costa and Santa Clara Valley) (Jones & Stokes 2006, entire; ICF Jones & Stokes 2009, entire) that identify the foothill yellow-legged frog as a covered species have been approved and implemented. These plans assist in ameliorating the current threats acting on the northern populations of the Central Coast DPS and help conserve the DPS and its habitat within their jurisdictional boundaries. Current resiliency of the Central Coast DPS is substantially reduced due to past impacts limiting connectivity between populations and existing populations having smaller population abundance and breeding (Rose et al. 2020, p. 63, table 1). The average risk of population decline for the Central Coast DPS is considered high and numerous threats are currently acting on the DPS (altered hydrology, drought, nonnative species, disease, and urbanization). The current overall redundancy for the Central Coast DPS is considered adequate to maintain the existing populations of the DPS. This is because the Central Coast DPS has numerous occupied stream segments that are spatially distributed across the DPS's range, and those stream segments exhibit ***variable*** environmental conditions providing for, at a minimum, refugia for the population. As a result of this distribution, the likelihood that a single catastrophic event would impact a significant proportion of the Central Coast DPS's populations to the point of extirpation or functional extirpation is extremely small. Current representation for the Central Coast DPS is considered sufficient to maintain its adaptive capacity. The Central Coast DPS has evolved in an area with high climatic variability and is most likely adapted to environmental changes. The Central Coast DPS is also one of the most genetically divergent for the foothill yellow-legged frog, indicating that the DPS still contains a significant amount of the taxon's overall genetic diversity. In the future, the average risk of decline for the existing populations is expected to increase by 14 percent and the number of populations at high risk of decline are expected to increase by 69 percent, under the mean change scenario. These changes are a result of increases in threats such as climate-induced demand for surface waters that is projected to increase by 5 to 20 percent (from 1900-1970 levels) by mid-century (2050) (Averyt et al. 2013, p. 7, figure 7). Future increases in severe wildfires are expected. Despite wildfire trends in the Central Coast DPS being[[Page 73935]]stable between 1950 and 2018 (Service 2021, Figure 38), recent events such as the fires in 2020 in the San Mateo-Santa Cruz Unit (CZU) (35,009 hectares (ha) (86,509 acres (ac)) (Santa Cruz and San Mateo Counties) and Santa Clara Unit (SCU) (160,508 ha (396,624 ac)) (Santa Clara, Alameda, Stanislaus Counties) Lightning Complex are examples of expected increasing trends in wildfire activity in the future (CALFIRE 2021, entire). Under the lower change scenario, the Central Coast DPS's resiliency would be slightly reduced. Under the mean change scenario, resiliency would be markedly reduced from current condition due to reductions in population numbers and distribution (reduction in redundancy). This reduction in resiliency under the mean change scenario would put the Central Coast DPS at risk of functional extirpation or extirpation in 40 years. After evaluating threats to the Central Coast DPS and assessing the cumulative effect of the threats under the Act's section 4(a)(1) factors, we find that the Central Coast DPS of the foothill yellow-legged frog currently sustains numerous populations and contains habitat distributed throughout the DPS's range (redundancy). These widely distributed populations provide for the genetic and ecological representation for the DPS across its range. Therefore, the current resiliency, redundancy, and representation are sufficient to prevent the current threats acting on the Central Coast DPS from causing it to be in danger of extinction anywhere within its range. Thus, the Central Coast DPS of the foothill yellow-legged frog is not currently in danger of extinction throughout its range, and therefore, the Central Coast DPS does not meet the Act's definition of endangered. However, based on our projections of future occupancy (which are currently low and show poor connectivity), modeled risk of decline assessments from the PVA, and the existing and increased threats in the future on the DPS from increasing water demand, increases in wildfire frequency and intensity due to climate change conditions will further impact abundance and connectivity of populations and cause the DPS's habitat to become increasingly less able to support foothill yellow-legged frog populations into the future. Thus, after assessing the best available information, we conclude that the Central Coast DPS of the foothill yellow-legged frog is likely to become in danger of extinction within the foreseeable future throughout all of its range.Status of the North Feather DPS and Central Coast DPS of the Foothill Yellow-Legged Frog Throughout a Significant Portion of Their Ranges Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. The court in Center for Biological Diversity v. Everson, 2020 WL 437289 (D.D.C Jan. 28, 2020) (Center for Biological Diversity), vacated the aspect of the Final Policy on Interpretation of the Phrase ``Significant Portion of Its Range'' in the Endangered Species Act's Definitions of ``Endangered Species'' and ``Threatened Species'' (79 FR 37578; July 1, 2014) that provided that the Service does not undertake an analysis of significant portions of a species' range if the species warrants listing as threatened throughout all of its range. Therefore, we proceed to evaluating whether the North Feather DPS or Central Coast DPS is endangered in a significant portion of its range--that is, whether there is any portion of either DPSs' range for which both (1) the portion is significant; and (2) the species is in danger of extinction in that portion. Depending on the case, it might be more efficient for us to address the ``significance'' question or the ``status'' question first. We can choose to address either question first. Regardless of which question we address first, if we reach a negative answer with respect to the first question that we address, we do not need to evaluate the other question for that portion of either DPS's range. Following the court's holding in Center for Biological Diversity, we now consider whether there are any significant portions of the species' range where either DPS is in danger of extinction now (i.e , endangered). In undertaking this analysis for the North Feather DPS and Central Coast DPS, we choose to address the status question first--we consider information pertaining to the geographic distribution of both the species and the threats that the two DPSs face to identify any portions of either DPS's range where either is endangered. For North Feather DPS and Central Coast DPS, we considered whether the threats are geographically concentrated in any portion of the DPS's ranges at a biologically meaningful scale. We examined the following threats for the North Feather DPS: Altered stream hydrology, latent effects from historical mining, nonnative species, impacts to the DPS's habitat (***agriculture***, urbanization, wildfire), recreation, and the effects of climate change, including cumulative effects. For the Central Coast DPS, we examined: Altered stream hydrology, disease, drought, nonnative species, impacts to habitat (urbanization (including roads and recreation), ***agriculture***, trespass cannabis cultivation, extreme floods, and wildfire), and the effects of climate change, including cumulative effects. The major driving forces of altered stream hydrology, wildfire, disease, nonnative species, and the effects of climate change are occurring throughout each DPS at similar levels and we did not find a concentration of any of these threats in any portion of either the North Feather or Central Coast DPS's range at a biologically meaningful scale. Thus, there are no portions of the North Feather DPS's or Central Coast DPS's range where the threats facing the species are concentrated to a degree where the species in that portion would have a different status from its overall DPS status. Therefore, no portion of the North Feather DPS's or Central Coast DPS's range provides a basis for determining that the North Feather DPS or Central Coast DPS is in danger of extinction in a significant portion of its range. We determine that the two DPSs are likely to become in danger of extinction within the foreseeable future throughout all of their ranges. This does not conflict with the courts' holdings in Desert Survivors v. U.S Department of the Interior, 321 F. Supp. 3d 1011, 1070-74 (N.D Cal. 2018), and Center for Biological Diversity v. Jewell, 248 F. Supp. 3d 946, 959 (D. Ariz. 2017) because, in reaching this conclusion, we did not need to consider whether any portions are significant and therefore did not apply the aspects of the Final Policy's definition of ``significant'' that those court decisions held were invalid.Determination of Status for the North Feather DPS and Central Coast DPS of the Foothill Yellow-Legged Frog Our review of the best scientific and commercial information available indicates that the North Feather DPS and Central Coast DPS of the foothill yellow-legged frog are likely to become endangered species within the foreseeable future throughout their ranges and thus meet the Act's definition of threatened species. Therefore, we propose to list the North Feather DPS and Central Coast DPS of the foothill yellow-legged frog as threatened species in accordance with sections 3(20) and 4(a)(1) of the Act.[[Page 73936]]Status of the North Coast DPS and North Sierra DPS of the Foothill Yellow-Legged Frog Throughout All of Their Ranges We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to the North Coast DPS and the North Sierra DPS of the foothill yellow-legged frog and its habitat. Below we summarize our assessment of status of the North Coast DPS and the North Sierra DPS under the Act. In the SSA report, we provided information regarding the current and future conditions of the North Coast DPS in Oregon and California as separate analysis units. To be consistent, we describe the conditions of the Oregon and California portions of the DPS separately below, but we combine these analyses and present the DPS as one entity for our determination of overall status under the Act. North Coast DPS (Oregon): The major threats that are affecting the foothill yellow-legged frog in the North Coast DPS in Oregon include altered hydrology (Factor A), nonnative species (Factor C), ***agriculture*** (including water diversion and fluctuation caused by irrigation) (Factor A), mining (Factor A), urbanization (including development and roads) (Factor A), and recreation (Factor E). Current conditions of the North Coast DPS in Oregon include legacy impacts from historical habitat loss and alteration of habitat and resulting range contraction. The current extent of the DPS's range in Oregon has been fragmented and the populations remaining have lost some connectivity, with smaller populations sometimes being isolated. Evidence of this isolation has been supported by genetic research that found the DPS in Oregon subdivided into three genetic groups based on locality (McCartney-Melstad et al. 2018, p. 117, figure 3). Abundance information also appears to indicate the fragmented populations are lower in abundance than past abundance estimates (Borisenko and Hayes 1999, pp. 20-21; Olson and Davis 2009, p. 26). Although occupancy and connectivity are poor for the DPS in Oregon as a whole, there appear to be some strongholds for the foothill yellow-legged frog (Service 2021, figure 55, p. 151). The areas in the central and southwestern portions of the DPS in Oregon appear to be most stable with numerous occupied stream segments that are both close together and at a relatively low risk of decline. According to the PVA, the average relative risk of population decline in the North Coast DPS in Oregon is the second-lowest across all DPSs. In addition, the majority of stream segments in this unit are in the low relative risk of decline category. This is partly because most stream segments in Oregon do not have regulated flows which are associated with dams. In addition, conservation efforts such as rangewide conservation planning and habitat connectivity prioritization are focusing management on the North Coast DPS in Oregon (Service 2021, table 9, pp. 117-120). Although habitat impacts resulting from present-day threats are currently negatively affecting the North Coast DPS in Oregon, the DPS in Oregon still has a sufficient degree of resiliency, redundancy, and representation, due to the lessened magnitude and extent of threats acting on the DPS, such that we do not consider these present-day effects to place the species in danger of extinction. North Coast DPS-California: Altered stream hydrology (Factor A) is among the most impactful threats to the North Coast DPS in California. Other major threats that likely have or are contributing to localized declines in the DPS in California include nonnative species (Factor C), habitat impacts from ***agriculture***, mining, and urbanization (including development and roads) (Factor A), and recreation (Factor E). Trespass cannabis cultivation (Factor A) is also an extensive threat in the North Coast DPS in California (CDFW 2019b, pp. 97-98). Illegal water diversions and pesticides for illegal cannabis are reportedly linked to local declines of foothill yellow-legged frogs in the Eel River and South Fork Trinity River (Service 2019, p. 33). Despite several documented local extirpations, the North Coast DPS in California contains the most abundant foothill yellow-legged frog populations and the majority (1,443 of 2,425 for the species) of stream segments that have had recent (2000-2020) detections of the species (Service 2021, Table 10, Figure 48). Stream segments with recent detections also have good connectivity and are distributed over a large area. The North Coast DPS in California also contains a large number of stream segments (382) in the low risk of decline category. In addition, conservation efforts such as rangewide conservation planning and other regulatory measures to manage streams to benefit the North Coast DPS are currently being implemented in California (Service 2021, table 9, pp. 117-120). Although habitat impacts resulting from present-day threats are currently negatively affecting the North Coast DPS in California, the DPS in California still has a sufficient degree of resiliency, redundancy, and representation, due to the health and number of populations and magnitude and extent of threats acting on the DPS, such that we do not consider these present-day effects to place the DPS in danger of extinction. After assessing the best scientific and commercial information available, and based on the information on the North Coast DPS's overall current condition above, we have determined that the North Coast DPS (in California and Oregon) of the foothill yellow-legged frog is not currently in danger of extinction throughout all of its range. Below, we review the North Coast DPS's future condition and status. Future Condition of the North Coast DPS: Over the next 40 years (our timeframe of foreseeable future), the projected increases in risk of decline and the increasing risk of serious threats indicate that the resiliency of the North Coast DPS will decrease in the future (Service 2021, table 19, pp. 180-181). This decline is expected to be largely related to the altered stream hydrology (in California) in the mainstem river systems and threats associated with severe wildfire events exacerbated by changes in climatic conditions. However, the North Coast DPS in Oregon has the lowest risk of decline under the mean and higher change scenarios and has the second-lowest risk of decline under the lower change scenario. In addition, the percent forest and shrub cover for the entire DPS is projected to change very little by 2060 (less than 0.3 percent of total area under the mean change scenario) in the North Coast DPS overall (California and Oregon ***data*** summarized together) (Sleeter and Kreitler 2020, unpublished ***data***). This would result in a relatively stable upland habitat conditions for the DPS over this timeframe. This DPS overall is also likely to be more resilient to projected changes in climate ***variables*** (i.e , stream temperature and annual streamflow). For example, projected increases in stream temperature could increase population growth rates in those streams that tend to be cooler than in the rest of the species' range. In addition, although resiliency for the North Coast DPS will be reduced, the reduction will not be significantly different from current condition. This is mostly because the North Coast DPS has a large number of occupied stream segments, contains populations with high abundances, is distributed relatively uniformly across a large geographic area, and has good connectivity between populations, making it able to withstand the anticipated variation and increase of[[Page 73937]]stochastic events. Regulatory mechanisms such as the Forest Service's and BLM's Sensitive Species Program and habitat management programs under the Northwest Forest Plan which provides for species management and habitat protection for activities on their lands will continue to be implemented for a large portion of the DPS. As a result, the North Coast DPS's resiliency would most likely be only slightly reduced from the threats it will face in the foreseeable future over the next 40 years due to its heightened current condition. Therefore, due to the DPS's current and projected high occupancy level, its abundance, connectivity, and distribution of populations within the DPS as well as implementation of measures to reduce threats, we have determined that the North Coast DPS will continue to have a sufficient degree of resiliency, redundancy, and representation such that we do not anticipate the future threats to limit the DPS's ability to maintain populations in the wild. After review of the threats identified above and cumulative effects facing the North Coast DPS, as well as existing conservation measures, we conclude that threats have likely impacted individuals or localized populations of the North Coast DPS. However, the magnitude and extent of these impacts into the future will not significantly impact the resiliency, representation, or redundancy for the DPS or result in a decline in the overall distribution or general demographic condition of the DPS such that it is likely to become in danger of extinction in the foreseeable future throughout the DPS's range. North Sierra DPS: The major threats that likely have or are contributing to declines of the foothill yellow-legged frog in the North Sierra DPS include altered stream hydrology (Factor A), nonnative species (Factor C), habitat impacts (***agriculture***, mining, urbanization (including development and roads) (Factor A) and recreation (Factor E), and the effects of climate change (Factor E). The North Sierra DPS is in the most hydrologically altered part of the foothill yellow-legged frog's range and contains a high density of hydropower dams (CDFW 2019b, p. 97). While the North Sierra DPS has a high proportion of forest and shrub cover (86 percent), it may be affected by ***agricultural*** activities (vineyards) adjacent to habitat in the foothill portions of the northern Central Valley (Service 2021, supplementary figure 1, p. 224). The northern Sierra Nevada (North Feather and North Sierra DPSs) is also suspected to be the most impacted from the latent effects from historical mining (Hayes et al. 2016, pp. 53-54). Despite the threats acting on the North Sierra DPS, its populations have the lowest risk of decline across the DPS's range due to it having a large proportion of occupied streams containing populations that are both robust and stable. The majority (65 percent) of the DPS's 278 analyzed stream segments are currently in the low relative risk category. The North Sierra DPS is made up of a dense network of occupied stream segments that are distributed across the range of the DPS. There are few documented extirpations of occurrences in the North Sierra DPS. As a result, the resiliency, redundancy, and representation across the DPS are considered sufficient to reduce the impact of threats and currently maintain populations in the wild. In the future, the North Sierra DPS is expected to decline due to alterations associated with regulated water flows. However, these declines are not expected to impact the North Sierra DPS to such a degree that populations would be significantly impacted. The PVA determined that the North Coast DPS would have the lowest risk of decline under the lower change scenario and the second-lowest risk of decline under the mean and higher change scenarios. As a result, we expect resiliency, redundancy, and representation across the DPS to remain sufficient for the DPS to maintain populations in the wild into the foreseeable future. We have reviewed the current threats identified above and cumulative effects facing the North Coast and North Sierra DPSs, and evaluated the condition of the resiliency, representation, and redundancy for each of the DPSs. Based on the favorable conditions currently measured by the resiliency, redundancy and representation across the DPSs, the threats acting on the two DPSs are not of such magnitude, extent, and imminence that they are causing the two DPSs to be in danger of extinction now throughout their ranges. The future threats acting on and driving the status of the two DPSs include altered hydrology (either through stream flows or past stream alterations) and the effects of climate change, which may result in increased hydrological changes or severity of habitat loss from wildfire impacts. We anticipate that, although the risk of decline will increase due to the threats acting on the two DPSs into the future, the two DPSs' resiliency, representation, and redundancy are projected to sufficiently reduce the effect of future impacts to such a degree that populations of both DPSs would be able maintain viability into the future. Thus, after assessing the best scientific and commercial information available, we conclude that the North Coast DPS (in northern California and Oregon) and the North Sierra DPS (located primarily in Yuba, Sierra, Nevada, and Placer Counties, California) are not currently in danger of extinction and not likely to become in danger of extinction within the foreseeable future throughout their respective ranges.Status of the North Coast DPS and North Sierra DPS of the Foothill Yellow-Legged Frog Throughout a Significant Portion of Their Range Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. Having determined that the North Coast DPS and North Sierra DPS are not in danger of extinction or likely to become so in the foreseeable future throughout all of their respective ranges, we now consider whether either may be in danger of extinction or likely to become so in the foreseeable future in a significant portion of their respective ranges--that is, whether there is any portion of the DPSs' ranges for which it is true that both (1) the portion is significant; and (2) the DPS is in danger of extinction now or likely to become so in the foreseeable future in that portion. Depending on the case, it might be more efficient for us to address the ``significance'' question or the ``status'' question first. We can choose to address either question first. Regardless of which question we address first, if we reach a negative answer with respect to the first question that we address, we do not need to evaluate the other question for that portion of the DPS's range. In undertaking this analysis for the North Coast DPS and North Sierra DPS, we choose to address the status question first--we consider information pertaining to the geographic distribution of both the DPSs and the threats that the DPSs face to identify any portions of the range where the DPSs are endangered or threatened. For the North Coast DPS and North Sierra DPS, we considered whether the threats are geographically concentrated in any portion of the DPSs' ranges at a biologically meaningful scale. We examined the following threats: Hydrological alteration of streams (Factor A), latent effects from historical mining (Factor A), predation from nonnative species (bullfrogs and crayfish) (Factor C), other impacts to[[Page 73938]]habitat (***agriculture***, urbanization, severe wildfire) (Factor A), recreation (Factor E), and the effects of climate change (Factor E), including cumulative effects. In our analysis, we did not find any portion of either the North Coast DPS's range or the North Sierra DPS's range where the threats identified above are currently acting at a biologically meaningful scale such that any portion of the DPSs' ranges may be endangered, or where threats are likely to act on either DPS into the future such that any portion may be threatened. Occupied stream segments are distributed throughout each of the DPSs, and connectivity in the majority of each DPS is considered to be good except within the Oregon portion of the North Coast DPS. However, the Oregon portion also has fewer regulated streams, and populations, although small, are in a low risk of decline both now and into the future. Therefore, no portion of the two DPSs' ranges provides a basis for determining that either DPS is in danger of extinction now or likely to become so in the foreseeable future in a significant portion of its range, and we find that the DPSs are not in danger of extinction now or likely to become so in the foreseeable future in any significant portion of their ranges. This does not conflict with the courts' holdings in Desert Survivors v. U.S Department of the Interior, 321 F. Supp. 3d 1011, 1070-74 (N.D Cal. 2018), and Center for Biological Diversity v. Jewell, 248 F. Supp. 3d 946, 959 (D. Ariz. 2017) because, in reaching this conclusion, we did not need to consider whether any portions are significant and therefore did not apply the aspects of the Final Policy's definition of ``significant'' that those court decisions held were invalid.Determination of Status of the North Coast DPS and North Sierra DPS of the Foothill Yellow-Legged Frog Our review of the best scientific and commercial information available indicates that the North Coast DPS and North Sierra DPS of the foothill yellow-legged frog do not meet the Act's definition of an endangered species or a threatened species in accordance with sections 3(6) and 3(20) of the Act. Therefore, we find that listing the North Coast DPS and North Sierra DPS of the foothill yellow-legged frog under the Act is not warranted at this time.Available Conservation Measures Conservation measures provided to species listed as endangered or threatened species under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness, and conservation by Federal, State, Tribal, and local agencies, private organizations, and individuals. The Act encourages cooperation with the States and other countries and calls for recovery actions to be carried out for listed species. The protection required by Federal agencies and the prohibitions against certain activities are discussed, in part, below. The primary purpose of the Act is the conservation of endangered and threatened species and the ecosystems upon which they depend. The ultimate goal of such conservation efforts is the recovery of these listed species, so that they no longer need the protective measures of the Act. Section 4(f) of the Act calls for the Service to develop and implement recovery plans for the conservation of endangered and threatened species. The recovery planning process involves the identification of actions that are necessary to halt or reverse the species' decline by addressing the threats to its survival and recovery. The goal of this process is to restore listed species to a point where they are secure, self-sustaining, and functioning components of their ecosystems. Recovery planning consists of preparing draft and final recovery plans, beginning with the development of a recovery outline and making it available to the public within 30 days of a final listing determination. The recovery outline guides the immediate implementation of urgent recovery actions and describes the process to be used to develop a recovery plan. Revisions of the plan may be done to address continuing or new threats to the species, as new substantive information becomes available. The recovery plan also identifies recovery criteria for review of when a species may be ready for reclassification from endangered to threatened (``downlisting'') or removal from protected status (``delisting''), and methods for monitoring recovery progress. Recovery plans also establish a framework for agencies to coordinate their recovery efforts and provide estimates of the cost of implementing recovery tasks. Recovery teams (composed of species experts, Federal and State agencies, nongovernmental organizations, and stakeholders) are often established to develop recovery plans. When completed, the recovery outline, draft recovery plan, and the final recovery plan will be available on our website ([*http://www.fws.gov/endangered*](http://www.fws.gov/endangered)), or from our Sacramento Fish and Wildlife Office (see FOR FURTHER INFORMATION CONTACT). Implementation of recovery actions generally requires the participation of a broad range of partners, including other Federal agencies, States, Tribes, nongovernmental organizations, businesses, and private landowners. Examples of recovery actions include habitat restoration (e.g , restoration of native vegetation), research, captive propagation and reintroduction, and outreach and education. The recovery of many listed species cannot be accomplished solely on Federal lands because their range may occur primarily or solely on non-Federal lands. To achieve recovery of these species requires cooperative conservation efforts on private, State, and Tribal lands. If any of the DPSs identified above are listed, funding for recovery actions will be available from a variety of sources, including Federal budgets, State programs, and cost-share grants for non-Federal landowners, the academic community, and nongovernmental organizations. In addition, pursuant to section 6 of the Act, the State of California would be eligible for Federal funds to implement management actions that promote the protection or recovery of the DPSs. Information on our grant programs that are available to aid species recovery can be found at: [*https://www.fws.gov/grants*](https://www.fws.gov/grants). Although the four DPSs are only proposed for listing under the Act at this time, please let us know if you are interested in participating in recovery efforts for this species. Additionally, we invite you to submit any new information on this species whenever it becomes available and any information you may have for recovery planning purposes (see FOR FURTHER INFORMATION CONTACT). Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as an endangered or threatened species and with respect to its critical habitat, if any is designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any action that is likely to jeopardize the continued existence of a species proposed for listing or result in destruction or adverse modification of proposed critical habitat. If a species is listed subsequently, section 7(a)(2) of the Act requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of the species or destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its[[Page 73939]]critical habitat, the responsible Federal agency must enter into consultation with the Service. Examples of Federal agency actions within the species' habitat within the DPSs that may require conference or consultation or both, as described in the preceding paragraph, include but are not limited to management and any other landscape-altering activities on Federal lands administered by the U.S Fish and Wildlife Service, Forest Service, BLM, and National Park Service; issuance of section 404 Clean Water Act (33 U.S.C 1251 et seq.) permits by the U.S Army Corps of Engineers; construction and maintenance of roads, bridges, or highways by the Federal Highway Administration; water management and conveyance activities by the Bureau of Reclamation; and licensing for hydropower and safety of dams by the FERC.South Sierra DPS and South Coast DPS--Proposed Endangered Status The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to endangered wildlife. The prohibitions of section 9(a)(1) of the Act, codified at 50 CFR 17.21, make it illegal for any person subject to the jurisdiction of the United States to take (which includes harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or ***collect***; or to attempt any of these) endangered wildlife within the United States or on the high seas. In addition, it is unlawful to import; export; deliver, receive, carry, transport, or ship in interstate or foreign commerce in the course of commercial activity; or sell or offer for sale in interstate or foreign commerce any species listed as an endangered species. It is also illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. Certain exceptions apply to employees of the Service, the National Marine Fisheries Service, other Federal land management agencies, and State conservation agencies. We may issue permits to carry out otherwise prohibited activities involving endangered wildlife under certain circumstances. Regulations governing permits are codified at 50 CFR 17.22 With regard to endangered wildlife, a permit may be issued for the following purposes: For scientific purposes, to enhance the propagation or survival of the species, and for incidental take in connection with otherwise lawful activities. The statute also contains certain exemptions from the prohibitions, which are found in sections 9 and 10 of the Act. It is our policy, as published in the Federal Register on July 1, 1994 (59 FR 34272), to identify to the maximum extent practicable at the time a species is listed, those activities that would or would not constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of a proposed listing on proposed and ongoing activities within the range of the species proposed for listing. Because activities being implemented in the range of the species are ***variable*** and have ***variable*** impacts depending on the nature of the project, we are unable at this time to identify any specific activities within the range of the species that would not constitute a violation of section 9, as effects of any actions on the species are fact-pattern specific. However, actions whose effects do not extend into foothill yellow-legged frog habitat are unlikely to result in section 9 violations. Based on the best available information, the following activities may result in a violation of section 9 of the Act if they are not authorized in accordance with applicable law; this list is not comprehensive: Activities that the Service believes could potentially harm the foothill yellow-legged frog and result in ``take'' include, but are not limited to: (1) Unauthorized handling or ***collecting*** of the species; (2) Destruction/alteration of the species' habitat by discharge of fill material, draining, ditching, tiling, pond construction, stream channelization or diversion, or diversion or alteration of surface or ground water flow; (3) Inappropriate livestock grazing that results in direct or indirect destruction of riparian habitat; (4) Pesticide applications in violation of label restrictions; (5) Introduction of nonnative species that compete with or prey upon foothill yellow-legged frogs, such as the introduction of nonnative bullfrogs or nonnative fish; and (6) Modification of the channel or water flow of any stream or removal or destruction of vegetation or stream substrate in any body of water in which the foothill yellow-legged frog is known to occur. Questions regarding whether specific activities would constitute a violation of section 9 of the Act should be directed to the Sacramento Fish and Wildlife Office (see FOR FURTHER INFORMATION CONTACT).North Feather DPS and Central Coast DPS--Proposed Threatened Status It is our policy, as published in the Federal Register on July 1, 1994 (59 FR 34272), to identify to the maximum extent practicable at the time a species is listed, those activities that would or would not constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of a proposed listing on proposed and ongoing activities within the range of the species proposed for listing. The discussion below regarding protective regulations under section 4(d) of the Act for the proposed threatened North Feather DPS and Central Coast DPS complies with our policy.II. Proposed Rule Issued Under Section 4(d) of the Act for the North Feather DPS and the Central Coast DPS of the Foothill Yellow-Legged FrogBackground Section 4(d) of the Act contains two sentences. The first sentence states that the Secretary shall issue such regulations as she deems necessary and advisable to provide for the conservation of species listed as threatened. The U.S Supreme Court has noted that statutory language like ``necessary and advisable'' demonstrates a large degree of deference to the agency (see Webster v. Doe, 486 U.S 592 (1988)). Conservation is defined in the Act to mean the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Additionally, the second sentence of section 4(d) of the Act states that the Secretary may by regulation prohibit with respect to any threatened species any act prohibited under section 9(a)(1), in the case of fish or wildlife, or section 9(a)(2), in the case of plants. Thus, the combination of the two sentences of section 4(d) provides the Secretary with wide latitude of discretion to select and promulgate appropriate regulations tailored to the specific conservation needs of the threatened species. The second sentence grants particularly broad discretion to the Service when adopting the prohibitions under section 9. The courts have recognized the extent of the Secretary's discretion under this standard to develop rules that are appropriate for the conservation of a species. For example, courts have upheld rules developed under section 4(d) as a valid exercise of agency authority where they prohibited take of threatened wildlife, or include a limited taking prohibition (see Alsea Valley[[Page 73940]]Alliance v. Lautenbacher, 2007 U.S Dist. Lexis 60203 (D. Or. 2007); Washington Environmental Council v. National Marine Fisheries Service, 2002 U.S Dist. Lexis 5432 (W.D Wash. 2002)). Courts have also upheld 4(d) rules that do not address all of the threats a species faces (see State of Louisiana v. Verity, 853 F.2d 322 (5th Cir. 1988)). As noted in the legislative history of the Act, ``once an animal is on the threatened list, the Secretary has an almost infinite number of options available to him [or her] with regard to the permitted activities for those species. He [or she] may, for example, permit taking, but not importation of such species, or he [or she] may choose to forbid both taking and importation but allow the transportation of such species'' (H.R Rep. No. 412, 93rd Cong., 1st Sess. 1973). Exercising this authority under section 4(d), we have developed proposed rules that are designed to address the conservation needs of the North Feather DPS and Central Coast DPS of the foothill yellow-legged frog. Although the statute does not require us to make a ``necessary and advisable'' finding with respect to the adoption of specific prohibitions under section 9, we find that these rules as a whole satisfy the requirement in section 4(d) of the Act to issue regulations deemed necessary and advisable to provide for the conservation of the North Feather DPS and Central Coast DPS of the foothill yellow-legged frog. As discussed above under Summary of Biological Status and Threats, we have concluded that the North Feather DPS and Central Coast DPS of the foothill yellow-legged frog are likely to become in danger of extinction within the foreseeable future throughout their respective ranges primarily due to threats associated with altered stream hydrology, nonnative species, impacts to habitat (***agriculture***, mining, urbanization, roads, recreation), disease, drought, extreme floods, high-severity wildfire, and the exacerbation of threats from the effects of climate change. The provisions of this proposed 4(d) rule would promote conservation of the North Feather DPS and Central Coast DPS of the foothill yellow-legged frog by encouraging management of the species' stream habitat and landscape in ways that meet both resource management considerations and the conservation needs of the species. The provisions of this proposed rule are one of many tools that we would use to promote the conservation of the North Feather DPS and Central Coast DPS of the foothill yellow-legged frog. This proposed 4(d) rule would apply only if and when we make final the listing of the North Feather DPS and Central Coast DPS of the foothill yellow-legged frog as threatened species. Section 7(a)(2) of the Act requires Federal agencies, including the Service, to ensure that any action they fund, authorize, or carry out is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat of such species. In addition, section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any agency action which is likely to jeopardize the continued existence of any species proposed to be listed under the Act or result in the destruction or adverse modification of proposed critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency (action agency) must enter into consultation with the Service. Examples of actions that are subject to the section 7 consultation process are actions on State, Tribal, local, or private lands that require a Federal permit (such as a permit from the U.S Army Corps of Engineers under section 404 of the Clean Water Act, a license from the Federal Energy Regulatory Commission under the Federal Power Act, or a permit from the Service under section 10 of the Act) or that involve some other Federal action (such as funding from the Federal Highway Administration, Federal Aviation Administration, or the Federal Emergency Management Agency). Federal actions not affecting listed species or critical habitat--and actions on State, Tribal, local, or private lands that are not federally funded, authorized, or carried out by a Federal agency--do not require section 7 consultation. This obligation does not change in any way for a threatened species with a species-specific 4(d) rule. Actions that result in a determination by a Federal agency of ``not likely to adversely affect'' continue to require the Service's written concurrence and actions that are ``likely to adversely affect'' a species require formal consultation and the formulation of a biological opinion.Provisions of the Proposed 4(d) Rule for the North Feather DPS and the Central Coast DPS of the Foothill Yellow-Legged Frog This proposed 4(d) rule would provide for the conservation of the North Feather DPS and Central Coast DPS of the foothill yellow-legged frog by prohibiting the following activities, except as otherwise authorized or permitted: Import or export; take; possession and other acts with unlawfully taken specimens; delivery, receipt, transportation, or shipment in interstate or foreign commerce in the course of commercial activity; or sale or offer for sale in interstate or foreign commerce. These prohibitions mirror those prohibitions afforded to endangered species under section 9(a)(1) of the Act. In addition to the prohibited activities identified above, we also provide standard and other exceptions to those prohibitions for certain activities as described below. We note that the long-term viability of the North Feather DPS and Central Coast DPS of the foothill yellow-legged frog, as with many wildlife species, is intimately tied to the condition of their habitat. As described in our analysis of the species' status, one of the major threats to the North Feather DPS and Central Coast DPS of the foothill yellow-legged frog's continued viability is habitat loss, degradation, and fragmentation resulting from past or current anthropogenic impacts or from catastrophic wildfires. The potential for an increase in frequency and severity of catastrophic wildfires from the effects of climate change subsequently increases the risk to the species posed by this threat. An additional threat is the occurrence of nonnative species that may predate upon and compete for resources with the foothill yellow-legged frog. We have determined that actions taken by forest management entities in the range of the North Feather DPS and Central Coast DPS of the foothill yellow-legged frog for the purpose of reducing the risk or severity of catastrophic wildfires and protecting stream habitat, even if these actions may result in some short-term or low level of localized negative effect to North Feather DPS and/or Central Coast DPS of the foothill yellow-legged frog, will further the goal of reducing the likelihood of either DPS becoming endangered, and will also likely contribute to their conservation and long-term viability. This includes measures approved by the Service, to conduct wildfire prevention activities, non-emergency suppression activities, and other silviculture best management practices that are in accordance with an established forest or fuels management plan and that include measures that minimize impacts to the species and its habitat. In addition, habitat restoration efforts that specifically provide for the habitat needs of the North Feather DPS and Central Coast DPS of the foothill yellow-legged frog as approved by the Service[[Page 73941]]and include measures that minimize impacts to the species and its habitat are appropriate for an exception. These activities would most likely have some limited short-term impacts but overall would provide for conservation of the two DPSs. Habitat restoration efforts focused on other species (e.g , salmonid species) are not included in this exception without written approval from the Service. Removal and restoration of trespass cannabis cultivation sites as approved by the Service are excepted from prohibitions. These activities would benefit the foothill yellow-legged frog, especially in the Central Coast DPS area. Trespass cannabis cultivation sites cause several issues for the foothill yellow-legged frog including water diversion, pollution, sedimentation, and introduction of pesticides and fertilizers to streams occupied by the foothill yellow-legged frog. When these sites are found, they often require reclamation (waste cleanup and removal of fertilizers, pesticides, and debris) and restoration to precultivation conditions. Cleanup of these sites may involve activities that may cause localized, short-term disturbance to the North Feather DPS and Central Coast DPS of the foothill yellow-legged frog. However, the removal of pesticides and other chemicals that can affect the North Feather DPS or Central Coast DPS of the foothill yellow-legged frog and the surrounding environment is encouraged. Removal and restoration of trespass cannabis cultivation sites is expected to have long-term benefits for resiliency of the North Feather DPS and Central Coast DPS. Nonnative species removal would significantly increase the viability of the foothill yellow-legged frog. As discussed above, bullfrogs, nonnative fish, and nonnative crayfish contribute to foothill yellow-legged frog predation and increase competition for resources. Bullfrogs also are vectors for disease that affects the foothill yellow-legged frog. Actions with the primary or secondary purpose of removing nonnative animal species that compete with, predate upon, or degrade the habitat of the foothill yellow-legged frog that are conducted in unoccupied habitat and approved by the Service are provided as an exception. Large-scale actions that disrupt habitat or are conducted in occupied stream segments would need additional approval from the Service. Under the Act, ``take'' means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or ***collect***, or to attempt to engage in any such conduct. Some of these provisions have been further defined in regulations at 50 CFR 17.3 Take can result knowingly or otherwise, by direct and indirect impacts, intentionally or incidentally. Regulating take would help preserve the species' remaining populations, slow their rate of decline, and decrease synergistic, negative effects from other ongoing or future threats. We may issue permits to carry out otherwise prohibited activities, including those described above, involving threatened wildlife under certain circumstances. Regulations governing permits are codified at 50 CFR 17.32 With regard to threatened wildlife, a permit may be issued for the following purposes: For scientific purposes, to enhance propagation or survival, for economic hardship, for zoological exhibition, for educational purposes, for incidental taking, or for special purposes consistent with the purposes of the Act. The statute also contains certain exemptions from the prohibitions, which are found in sections 9 and 10 of the Act and are included as standard exceptions in the proposed 4(d) rule. We recognize the special and unique relationship with our State natural resource agency partners in contributing to conservation of listed species. State agencies often possess scientific ***data*** and valuable expertise on the status and distribution of endangered, threatened, and candidate species of wildlife and plants. State agencies, because of their authorities and their close working relationships with local governments and landowners, are in a unique position to assist the Service in implementing all aspects of the Act. In this regard, section 6 of the Act provides that the Service shall cooperate to the maximum extent practicable with the States in carrying out programs authorized by the Act. Therefore, any qualified employee or agent of a State conservation agency that is a party to a cooperative agreement with the Service in accordance with section 6(c) of the Act, who is designated by his or her agency for such purposes, would be able to conduct activities designed to conserve the foothill yellow-legged frog, that may result in otherwise prohibited take, without additional authorization. Nothing in this proposed 4(d) rule would change in any way the recovery planning provisions of section 4(f) of the Act, the consultation requirements under section 7 of the Act, or the ability of the Service to enter into partnerships for the management and protection of the foothill yellow-legged frog. However, interagency cooperation may be further streamlined through planned programmatic consultations for the species between Federal agencies and the Service, where appropriate. We ask the public, particularly State agencies and other interested stakeholders that may be affected by the proposed 4(d) rule, to provide comments and suggestions regarding additional guidance and methods that the Service could provide or use, respectively, to streamline the implementation of this proposed 4(d) rule (see Information Requested, above).III. Critical HabitatBackground Critical habitat is defined in section 3 of the Act as: (1) The specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of this Act, on which are found those physical or biological features (a) Essential to the conservation of the species, and (b) Which may require special management considerations or protection; and (2) Specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.Prudency Determination Section 4(a)(3) of the Act, as amended, and implementing regulations (50 CFR 424.12) require that, to the maximum extent prudent and determinable, the Secretary shall designate critical habitat at the time the species is determined to be an endangered or threatened species. Our regulations (50 CFR 424.12(a)(1)) state that the Secretary may, but is not required to, determine that a designation would not be prudent in the following circumstances: (i) The species is threatened by taking or other human activity and identification of critical habitat can be expected to increase the degree of such threat to the species; (ii) The present or threatened destruction, modification, or curtailment of a species' habitat or range is not a threat to the species, or threats to the species' habitat stem solely from causes that cannot be addressed through management actions resulting from consultations under section 7(a)(2) of the Act; (iii) Areas within the jurisdiction of the United States provide no more than negligible conservation value, if any, for a species occurring primarily outside the jurisdiction of the United States;[[Page 73942]] (iv) No areas meet the definition of critical habitat; or (v) The Secretary otherwise determines that designation of critical habitat would not be prudent based on the best scientific ***data*** available. As discussed earlier in this document, we did not identify an imminent threat of ***collection*** or vandalism identified under Factor B for this species, and identification and mapping of critical habitat is not expected to initiate any such threat. In our SSA report and this proposed listing determination for the four DPSs of the foothill yellow-legged frog, we determined that the present or threatened destruction, modification, or curtailment of habitat or range (Factor A) is a threat to the four DPSs and that the Factor A threats in some way can be addressed by the Act's section 7(a)(2) consultation measures. The four DPSs occur wholly in the jurisdiction of the United States, and we are able to identify areas that meet the definition of critical habitat. Therefore, because none of the circumstances enumerated in our regulations at 50 CFR 424.12(a)(1) have been met and because the Secretary has not identified other circumstances for which this designation of critical habitat would be not prudent, we have determined that the designation of critical habitat is prudent for the four DPSs of the foothill yellow-legged frog.Critical Habitat Determinability Having determined that designation is prudent, under section 4(a)(3) of the Act we must find whether critical habitat for the four DPSs of the foothill yellow-legged frog is determinable. Our regulations at 50 CFR 424.12(a)(2) state that critical habitat is not determinable when one or both of the following situations exist: (i) ***Data*** sufficient to perform required analyses are lacking, or (ii) The biological needs of the species are not sufficiently well known to identify any area that meets the definition of ``critical habitat.'' When critical habitat is not determinable, the Act allows the Service an additional year to publish a critical habitat designation (16 U.S.C 1533(b)(6)(C)(ii)). We reviewed the available information pertaining to the biological needs of the four DPSs of the foothill yellow-legged frog and habitat characteristics where the four DPSs are located. A careful assessment of the economic impacts that may occur due to a critical habitat designation is still ongoing, and we are in the process of working with the State and other partners in acquiring the complex information needed to perform that assessment. Therefore, due to the current lack of ***data*** sufficient to perform required analyses, we conclude that the designation of critical habitat for the four DPSs of the foothill yellow-legged frog is not determinable at this time. The Act allows the Service an additional year to publish a critical habitat designation that is not determinable at the time of listing (16 U.S.C 1533(b)(6)(C)(ii)).Required DeterminationsClarity of the Rule We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must: (1) Be logically organized; (2) Use the active voice to address readers directly; (3) Use clear language rather than jargon; (4) Be divided into short sections and sentences; and (5) Use lists and tables wherever possible. If you feel that we have not met these requirements, send us comments by one of the methods listed in ADDRESSES. To better help us revise the rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that are unclearly written, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.National Environmental Policy Act (42 U.S.C 4321 et seq.) We have determined that environmental assessments and environmental impact statements, as defined under the authority of the National Environmental Policy Act (NEPA; 42 U.S.C 4321 et seq.), need not be prepared in connection with regulations adopted pursuant to section 4(a) of the Act. We published a notice outlining our reasons for this determination in the Federal Register on October 25, 1983 (48 FR 49244).Government-to-Government Relationship With Tribes In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we readily acknowledge our responsibilities to work directly with Tribes in developing programs for healthy ecosystems, to acknowledge that Tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to Tribes. We solicited information from all of the Tribes within the entire range of the foothill-yellow-legged frog to inform the development of the SSA report, and we notified Tribes of our upcoming proposed listing determination. We also provided these Tribes the opportunity to review a draft of the SSA report and provide input prior to making our proposed determination on the status of the foothill yellow-legged frog, but we did not receive any responses. We will continue to coordinate with Tribal entities throughout the listing process for the foothill yellow-legged frog.References Cited A complete list of references cited in this rulemaking is available on the internet at [*http://www.regulations.gov*](http://www.regulations.gov) and upon request from the Sacramento Fish and Wildlife Office (see FOR FURTHER INFORMATION CONTACT).Authors The primary authors of this proposed rule are the staff members of the Fish and Wildlife Service's Species Assessment Team and Field Office staff within the range of the species in California and Oregon.List of Subjects in 50 CFR Part 17 Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.Proposed Regulation Promulgation Accordingly, we propose to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:PART 17--ENDANGERED AND THREATENED WILDLIFE AND PLANTS01. The authority citation for part 17 continues to read as follows: Authority: 16 U.S.C 1361-1407; 1531-1544; and 4201-4245, unless otherwise noted.02. Amend Sec. 17.11(h) by adding entries for ``Frog, foothill yellow-legged[[Page 73943]][Central Coast DPS]'', ``Frog, foothill yellow-legged [North Feather DPS]'', ``Frog, foothill yellow-legged [South Coast DPS]'', and ``Frog, foothill yellow-legged [South Sierra DPS]'' to the List of Endangered and Threatened Wildlife in alphabetical order under AMPHIBIANS to read as follows:Sec. 17.11 Endangered and threatened wildlife.\* \* \* \* \* (h) \* \* \*---------------------------------------------------------------------------------------------------------------- Listing citations Common name Scientific name Where listed Status and applicable rules---------------------------------------------------------------------------------------------------------------- \* \* \* \* \* \* \* Amphibians \* \* \* \* \* \* \*Frog, foothill yellow-legged Rana boylii........ California (All T [Federal Register [Central Coast DPS]. foothill yellow- citation when legged frogs in published as a the Central Coast final rule]; 50 Range south of San CFR 17.43(g).\4d\ Francisco Bay to San Benito and Fresno Counties).Frog, foothill yellow-legged Rana boylii........ California (All T [Federal Register [North Feather DPS]. foothill yellow- citation when legged frogs in published as a the North Feather final rule]; 50 River watershed CFR 17.43(g).\4d\ largely in Plumas and Butte Counties).Frog, foothill yellow-legged Rana boylii........ California (All E [Federal Register [South Coast DPS]. foothill yellow- citation when legged frogs in published as a the Coast Range final rule]. from Coastal Monterey County south to Los Angeles County).Frog, foothill yellow-legged Rana boylii........ California (All E [Federal Register [South Sierra DPS]. foothill yellow- citation when legged frogs in published as a the Sierra Nevada final rule]. Mountains south of the American River sub-basin south to the Transverse Range in Kern County). \* \* \* \* \* \* \*----------------------------------------------------------------------------------------------------------------03. Amend Sec. 17.43 by adding a paragraph (g) to read as set forth below:Sec. 17.43 Special rules--amphibians\* \* \* \* \* (g) Foothill yellow-legged frog (Rana boylii), Central Coast Distinct Population Segment (DPS) and North Feather DPS. (1) Location. The Central Coast DPS and North Feather DPS of the foothill yellow-legged frog are shown on the map that follows:BILLING CODE 4333-15-P[[Page 73944]][GRAPHIC] [TIFF OMITTED] TP28DE21.020 (2) Prohibitions. The following prohibitions that apply to endangered wildlife also apply to the Central Coast DPS and North Feather DPS of the foothill yellow-legged frog. Except as provided under paragraph (g)(3) of this section and Sec. Sec. 17.4 and 17.5, it is unlawful for any person subject to the jurisdiction of the United States to commit, to attempt to commit, to solicit another to commit, or cause to be committed, any of the following acts in regard to this species: (i) Import or export, as set forth at Sec. 17.21(b) for endangered wildlife. (ii) Take, as set forth at Sec. 17.21(c)(1) for endangered wildlife. (iii) Possession and other acts with unlawfully taken specimens, as set forth at Sec. 17.21(d)(1) for endangered wildlife. (iv) Interstate or foreign commerce in the course of commercial activity, as set forth at Sec. 17.21(e) for endangered wildlife. (v) Sale or offer for sale, as set forth at Sec. 17.21(f) for endangered wildlife. (3) Exceptions from prohibitions. In regard to the Central Coast DPS and North Feather DPS of the foothill yellow-legged frog, you may: (i) Conduct activities as authorized by a permit under Sec. 17.32 (ii) Take, as set forth at Sec. 17.21(c)(2) through (c)(4) for endangered wildlife. (iii) Take as set forth at Sec. 17.31(b). (iv) Take incidental to an otherwise lawful activity caused by: (A) Forest management activities as approved by the Service for the purposes of reducing the risk or severity of catastrophic wildfire, which include fuels reduction activities, non-emergency firebreak establishment or maintenance, and other non-emergency wildfire prevention and suppression activities that are in accordance with an established forest or fuels management plan and that include measures that minimize impacts to the species and its stream habitat.[[Page 73945]] (B) Habitat restoration efforts as approved by the Service that are specifically designed to provide for the conservation of the foothill yellow-legged frog's habitat needs and include measures that minimize impacts to the species and its habitat as approved by the Service. Habitat restoration efforts for other species that may not share habitat requirements (e.g , salmonid species) are not included in this exception unless approved by the Service. (C) Efforts as approved by the Service to remove and clean up trespass cannabis cultivation sites and related water diversion infrastructure and restore areas to precultivation conditions. (D) Removal or eradication of nonnative animal species including, but not limited to, American bullfrogs, smallmouth bass, and nonnative crayfish species occurring within stream reaches unoccupied by the foothill yellow-legged frog within the range of the Central Coast DPS or North Feather DPS as approved by the Service. (v) Possess and engage in other acts with unlawfully taken wildlife, as set forth at Sec. 17.21(d)(2) for endangered wildlife.Martha Williams,Principal Deputy Director, Exercising the Delegated Authority of the Director, U.S Fish and Wildlife Service.[FR Doc. 2021-27512 Filed 12-27-21; 8:45 am]BILLING CODE 4333-15-C

**Load-Date:** December 29, 2021

**End of Document**



[***Pensana Plc - Interim results for the 6 months ended 31 Dec 2021***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:653X-6Y91-JB72-154D-00000-00&context=1516831)

PR Newswire UK Disclose

March 30, 2022 Wednesday 2:00 AM EST

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**Length:** 8584 words

**Dateline:** London, March 29

**Body**

PR Newswire

Pensana Plc

(“Pensana”, “the Company” or “the Group”)

Interim results for the six months ended 31 December 2021

Pensana Plc, building the world’s first independent, sustainable rare earth magnet metal supply chain, announces its unaudited results for the six months ended 31 December 2021.

Half Year Highlights

Initiation of geotechnical drilling and trenching at both the Saltend and Longonjo sites ahead of main construction activityAppointment of highly experienced natural resources financier Steven Sharpe as Non-Executive Director of the CompanyTotal comprehensive loss for the period of $4,235,572 (31 December 2020: $1,717,491)

Post period end

Front-End Engineering Design (“FEED”) for both Saltend and Longonjo completed and value engineering ongoingApproaches received from major European and US electric vehicle and wind turbine OEMS to secure magnet metal supply chainMemorandum of Understanding executed with key Asian trading house for 50% of Saltend’s productionFinancing well advanced, including potential support from the UK government’s UK Export Finance and the Automotive Transformation FundSuccessful institutional equity placing of £10 million with M&G, one of the UK's largest and long-standing fund managersIncreasing engagement with UK and US generalist institutional investors following M&G’s 5% direct investment and the appointment of Head of Investor Relations and Communications

Comment from Paul Atherley, Chairman:

"We have seen six months of considerable progress for the Company as we look to establish an independent and sustainable magnet metal rare earth production facility at Saltend in the UK to meet the burgeoning demand from the electric vehicle and offshore wind sectors. Both the Saltend and Longonjo projects have been brought to FEED status, with financing and offtake discussions being well advanced."

CEO’s Review

COVID-19

Whilst Covid-19’s grip on the world continued to be felt over this six-month review period to 31 December 2021 (the “Period”) the team, alongside our key technical advisors progressed unabated on the key workstreams of FEED, geotechnical drilling and pilot plant test work on the Saltend and Longonjo projects. Operational readiness programmes saw the work packages for Saltend and Longonjo delineated to high levels of accuracy and the Group’s management team strengthened with key appointments to the Board and our business development team in Japan and Europe. M&G’s £10 million equity investment which completed post period end  was a further significant institutional endorsement towards the Company’s strategy of becoming the world’s first major new rare earth mine in over a decade and the critical rare earth processing hub for the UK.  The strategic relevance of these projects has been highlighted by ongoing engagement with several EV makers, OEMs, large industrials and potential downstream partners.

Rare earth supply continues to take centre stage

Pensana's Saltend Chemical processing facility is at the forefront of efforts to break the UK's dependence on China for supplies of rare earths, critical elements used in the manufacture of permanent magnets, which are used in green technologies such as EVs and wind turbines. China produces more than 98% of the world’s magnets and is preparing to tighten its grip on the market by combining three of its huge state enterprises to form China Rare Earth Group that will control 70% of China's output. Following recent comments by MP Alexander Stafford, Chair of the APPG on ESG, vice-chair of the APPG on Hydrogen, and vice-chair of the APPG for Critical Minerals that "China's dominance of rare earth metals has left Britain strategically vulnerable", politicians in Europe and the US are supporting efforts to diversify supply chains. Recent events in Europe have further highlighted the significance of ensuring diversification away from the world’s traditional reliance on fossil fuels, and we believe Pensana will directly benefit from supportive UK Government policies by building the facility within the Humber Freeport.

Saltend rare earth processing hub (“Saltend”)

Pensana is establishing Saltend in the Humber Freeport zone and alongside the Wood Group, have designed the facility to be easily adapted to cater for a range of rare earth feedstocks. This is an attractive alternative to mining houses who may otherwise be limited to selling their products to China. In addition to our plans to process Longonjo’s feedstock material, discussions have advanced with third parties over the Period for the additional supply of sustainably sourced rare earth carbonates.

Importantly for many miners around the world who are looking to access the European and US supply chains, it is becoming increasingly clear that the planned EU and potential UK carbon border taxation means that it is no longer acceptable for manufacturers to source material extracted or processed unsustainably. Once in production, Pensana will look to expand production capacity when additional feedstock becomes available.

Project delivery

FEED for each of Saltend and Longonjo completed post-Period end. A comprehensive value engineering and optimisation programme is well advanced and is expected to be reported next month and is expected to result in further reduction in capital costs.

Working alongside Wood Group’s Perth, Reading and Johannesburg offices, Paradigm Project Management (PPM), a specialist Africa centric project management and engineering company, and Professional Cost Consultants (PCC), with offices in South Africa and the UK, the estimated capex has been reduced from US$525 million to US$494 million (Saltend: US$195 million and Longonjo: US$299 million).

Worldwide supply chain constraints and inflationary pressures brought about by Covid-19 and the recent Ukraine-Russia conflict, which could have impacted both Saltend and Longonjo projects, have been largely mitigated by this detailed optimisation and value engineering processes.

Specific workstreams involving capital and operation cost savings currently underway include:

Spent acid regeneration to maximise the recycling efficiency of the sulphuric acid plant integrated with off-gas from the calcining of concentrate at Longonjo, which is an important aspect of the process and constitutes a significant reduction of the carbon footprint through reduced reagent consumptionPiloting on a more cost-effective flotation concentrate calcining process offered as a vendor alternative post FEED, which would enable a significantly shorter lead time for fabrication and ease of installation at LongonjoOptimisation of Saltend’s civil & earthworks for load bearing structures undertaken alongside the completion of detailed geotechnical investigation, which will shorten the construction period and allow for future affordable expansion into downstream activities associated with magnet metal production, magnet recycling and processing of HREOPiloting of process simplification opportunities discovered in the MRES precipitation circuit in Longonjo

Corporate

Board and key company appointments

As previously announced in September 2021, highly experienced natural resources financier Steven Sharpe was appointed as Non-Executive Director of the Company. Steve’s experience in the finance space alongside his intimate knowledge of the rare earth industry has proven invaluable to date. As we move towards main financing, Steve’s experience and guidance will be a key component in the team progressing this workstream.

The Company has also appointed experienced ESG professional Danny McNeice as Sustainability Manager. He will provide technical and strategic guidance to the business to embed ESG throughout because of his local Yorkshire experiences in the Drax fold and their carbon footprint mitigation activities.

A key market for the Company is Japan, and Pensana is pleased to announce the appointment of experienced marketing executive Junji Kitaguchi as the Company’s marketing representative. Junji has extensive experience of business development and directed power, environmental and infrastructure-related businesses as General Manager of Mitsubishi Corporation Europe & Africa. He most recently operated as a senior advisor within Mitsubishi corporation creating a joint venture with a major European utility company.

Angola

At a macroeconomic level, Angola’s economy continues to de-risk. Their handling of the Covid pandemic has been commendable and with a Fiscal Surplus on the back of oil prices and a Debt to GDP ratio falling from 135% to 95% in 2021, it was not surprising to see Moody’s upgrade Angola’s credit rating to B3 with a stable outlook.  Anglo American, De Beers, Rio Tinto and others are now re-investing in the country.

Pensana will host a UK Department of International Trade trip to Angola at the end of this month. The visit includes delegates from several major mining houses and UK Export Finance. As part of the trade summit, the delegation will be visiting the Longonjo site, traveling via the recently upgraded US$2 billion Benguela railway line, which provides a direct link from Longonjo to the Port of Lobito.

These are extremely positive developments for Angola and a true reflection of their ongoing ambitions to place the country on a strong growth trajectory with specific focus on critical technology minerals, ***agriculture*** and tourism sectors.

Exploration

Good progress was made in advancing exploration activities on Longonjo’s neighbouring Coola License despite Covid 19 travel restrictions preventing international geological consultants from entering Angola during a large part of 2021.

Soil samples ***collected*** over the Coola carbonatite complex in 2020 were re-assayed for scandium (Sc) and fluorine (F). Scandium in the soils is highly anomalous with most values >80 ppm. This is significant as, although scandium is not an uncommon element, exceptional values of over 200 ppm occur at Coola. Late-stage hydrothermal fluorite veining occurs in fenite to the southwest of the ring dyke over an area of roughly 30 000 m2. The fluorite occurs in breccias as discrete coarse purple grains and irregular veins varying from a few mm to over 20 cm of pure purple fluorite. Fluorine in re-assayed soils over the known fluorite occurrence reached values as high as 21% F. An outcrop sample of a fluorite vein proved to be of very high-grade material (> 97% CaF2).

The primary focus of exploration during the second half of 2021 was on the Coola carbonatite following up the rare earth element, scandium and fluorite mineralisation. The carbonatite complex at Coola was mapped in detail and soil and rock chip sampling completed over the ring dyke to ascertain the nature, degree, and extent of rare earth element and scandium mineralisation. In addition, infill soil sampling and rock chip sampling was completed over the area of fluorite mineralisation and an augering programme of the soil covered central diatreme was successful in sampling the underlying saprolite. Detailed mineralogical work has also commenced on a selection of Coola rock types.

A total of 750 individual samples were taken and dispatched to Nagrom in Australia for analysis. Seven selected rock samples were sent for mineralogical studies. Analytical results and mineralogical studies are expected to be completed by late Q1 2022. Assay results received from the soil sampling programme at Monte Verde alkaline complex identified an area of roughly 5 km2 of > 0.5% TREO (max 2.0%) corresponding with mapped outcrops of carbonatite breccia in which up to 1% TREO was encountered. The REE mineralisation is accompanied by highly elevated levels of phosphorous, barium, iron, tantalum, manganese, niobium and strontium.

At the Sulima alkaline complex, extensive trenching was identified from satellite imagery corresponding with a well-defined radiometric anomaly. Fieldwork confirmed the presence of five one to seven metre deep, NE-SW trenches of roughly 90 m length and 500 m apart, excavated over a strike of 2200 m. Material in and around the trenches comprises predominantly secondary iron and manganese oxides and hydroxides. Handheld XRF analysis of material from the trenches indicated elevated iron, manganese, titanium, chromium, zinc and barite. Rock chip samples from various trenches and outcrops in the area were taken and have been submitted for whole rock geochemistry. Various other geophysical anomalies identified within the Coola License remain to be followed up with stream sediment sampling, mapping and rock chip sampling.

Environmental, Social and Governance

Progress continues to be made towards ensuring Pensana upholds the highest standards of ESG throughout. The ESG Committee, under the Chair of non-executive director, Baroness Northover, continued to refine the Committee’s terms of reference to oversee effectiveness of our framework, policies and systems for ESG management and integration across the Group. To demonstrate this, Pensana became a signatory to the United National Global Compact, a partner of the Taskforce for Climate-related Financial Disclosure (TCFD) and a launch partner of theOh Yes! Net Zerocampaign to promote net zero and climate action across the Humber region. These actions underline the Company’s commitment to transparency and further efforts have included testing the robustness of the Group’s strategy under future climate scenarios.

Pensana remains focused on climate risk. In addition to becoming a partner of the TCFD, a comprehensive transitional climate risk and opportunity assessment was completed over the period, including testing the business strategy against external climate models. HCV Africa have been instructed to carry out a physical climate risk assessment for Longonjo and have included a specialist climate hydrologist in their team to ensure any future climate impacts on water supply are assessed.

At the Longonjo site, the Environment and Social Impact Assessment (ESIA) has almost completed under the leadership of independent experts HCV Africa and Groupo Simples. These independent organisations have ensured adherence to the International Finance Corporation (IFC) Environmental and Social Performance Standards has been achieved. The ESIA will provide a framework against which Pensana will manage and monitor its ESG performance at Longonjo.  Once completed, this document will be submitted to the Angolan government for mutual agreement.

As part of the resettlement action plan (RAP), mapping of all land in the affected area has been completed. As a result, minor changes have been made to the project boundary to minimise impact on the local communities. This has been a key area of focus for the team, and we are pleased to report, there will be zero displacement of the local community from their physical residences.

Agreement with Equinor to recycle end-of-life wind turbine nacelles using innovative Hydrogen process

In January, it was announced that Pensana had signed a cooperation agreement with leading energy provider, Equinor, to form a working group to share technical and commercial information to develop a low energy method for recycling of end-of-life magnets at Saltend. The partnership with Equinor supports Pensana’s commitment to the circular economy as it looks to recycle an addressable annual market of 4,000 tonnes of end-of-life permanent magnets.

Recycling permanent magnets utilising hydrogen not as fuel, but as a reductant, whilst benefitting from the decarbonised power supply within Saltend, offers a clean alternative using 88% less energy than virgin magnet manufacture and aligns with Pensana's continued efforts to produce a sustainable supply chain for these critical materials. Equinor has submitted plans for its ‘Hydrogen to Humber (H2H) Saltend’ hydrogen production facility into phase two of the Government’s Cluster Sequencing Process. The facility will be supported by the potential supply of hydrogen to Pensana and other regional hydrogen users, which could be a world first and a catalyst for the Humber to achieve net zero.

Conflict in Ukraine

Russia’s invasion of Ukraine has added increased concerns to an already constrained global supply chain and rising inflationary pressures. The Group has no direct exposure to the region, nor do we anticipate sourcing any equipment or materials from the area, however we continue to monitor the situation in the context of the contagion effect it is having on Europe and the global economy.  The Board has agreed to incorporate specific measures around procurement, the awarding of contracts and any associated workstreams involving external third-party service providers so as to ensure the Group is in no way exposed to countries on the sanctions list.

Operating and Financial Review

During the period the consolidated entity incurred a comprehensive loss for the period of $4,235,572 (31 December 2020: $1,717,491).

Administration expenses increased to $3,670,738 (31 December 2020: $2,010,316) as a result of increases in PR fees, consultancy fees and increased employee costs due to an increase in staff members driven by a ramp-up to construction at Longonjo and Saltend.

The foreign currency exchange loss decreased from $621,652 to $410, 204 for the six months ended 31 December 2021. These losses arise from the settlement of invoices in currencies other than the functional currencies (USD, GBP, AUD), as well as the translation of balances denominated in currencies such as the pound, Australian dollar, etc. to the US dollar rate where the balances are held in currencies other than the functional currency of the relevant company and reflect the movements in these currencies during the respective periods.

Group net assets decreased in the period to $31,968,192 from $36,168,634. This was primarily driven by a decrease in cash and cash equivalents of $12,251,234, as well as a decrease in trade and other receivables of $3,449,092.  These decreases were partially offset by an increase in property, plant and equipment of $11,216,164.  The loss of $4,080,914 incurred during the period further contributed to the decrease in net assets.

The decrease in cash was due to cash spent on the Longonjo and Saltend projects of $11,407,614. Similarly, the increase in property, plant and equipment was the result of the capitalisation to the Longonjo Project development asset of $7,677,072, as well as the capitalization of assets under construction at the Saltend facility of $3,555,777.

The decrease in trade and other receivables was due to the receipt of funds following the equity raise in FY21.

The Group experienced net cash outflows from operating activities of $4,204,325 (31 December 2020: $1,971,930).

Net cash outflows from operating activities increased due to an increase in operating losses.  Net cash outflows from investing activities of $11,407,586 increased from cash outflows of $3,172,186 at 31 December 2020 due to cash spent on the additions to the Longonjo and Saltend projects as noted above.  The decrease in the cash inflows from financing activities from $8,576,685 for the six months ended 31 December 2020 to $3,360,677 for the six months ended31 December 2021 was due to the decrease in the proceeds from the issuance of equity.

The Directors have prepared a cash flow forecast for the period ended 30 June 2023. The forecast indicates that whilst the Group has sufficient funding to meet its corporate and general operating costs, the Group will require additional funding over the next twelve months to meet its committed and planned exploration and development expenditure related to the Saltend and Longonjo Projects. Please refer note 3 to the financial statements for more detail on the going concern statement.

Accordingly, the Directors have resolved to undertake certain mitigating actions including actively engaging with institutional investors and financing institutions in the United Kingdom and Europe to discuss opportunities around potential future financing in anticipation of key project investment milestones as part of the business plan being reached and the associated funding requirements attached thereto. Such additional funding will be required to meet the Group’s committed and planned development expenditure across the forthcoming year.

The ability of the Group to continue as a going concern is dependent on securing such additional funding given its forecast expenditure above. These conditions indicate a material uncertainty which may cast significant doubt as to the Group’s ability to continue as a going concern and therefore it may be unable to realise its assets and discharge its liabilities in the normal course of business.

Principal Business Risks

The Group is exposed to a number of risks and uncertainties which could have a material impact on its long-term development, and performance and management of these risks is an integral part of the management of the Group. An overview of the key risks which could affect the Group’s operational and financial performance was included in the Company’s 2021 Annual Report, which can be accessed at[*http://www.pensana.co.uk*](http://www.pensana.co.uk). These may impact the Group over the medium to long term; however, the following key risks have been identified which may impact the Group over the short term.

Financing and liquidity

The Company is of the opinion that the Group has sufficient cash to meet its day to day corporate and operational working capital requirements and currently committed exploration and development expenditure, however post announcement of FEED and final investment decision expected by Q3 FY 2022, the Group will furthermore need to raise additional capital based on the forecasted exploration and development expenditures costs related to rollout of the Longonjo and Saltend projects and the Coola exploration. The Group has no history of NdPr oxide production at its planned Saltend facility nor mineral production at the Longonjo Project and accordingly has no revenues from operations and negative cash flows and will require additional future capital in the short term to continue its exploration activities and to commence development of the Saltend and Longonjo Project.

COVID-19 pandemic and Ukraine-Russia conflict

The outbreak of the COVID-19 pandemic has had an impact on the Group’s businesses. The government lockdown in Angola led to a temporary suspension of work at the Longonjo Project albeit that work has now resumed. Further escalation of the COVID-19 pandemic, and the implementation of any additional government-regulated restrictions which delays the Group in carrying out its business activities at the Longonjo and Saltend Projects (such as preparatory works) ultimately delays the Group’s ability to reach production and start to generate cash and so could have a material adverse impact on the Group’s operations and financial results. Additionally, the recent Ukraine-Russia conflict has created increased uncertainty and volatility in debt and equity markets alongside increased inflationary pressures, supply chain constraints and increased FX volatility which may make the requisite funding for the Longonjo and Saltend Projects more difficult to secure or affect the terms available.

Mr. Tim George

Chief Executive Officer

29 March 2022

INDEPENDENT REVIEW REPORT TOPENSANA PLC

Conclusion

Based on our review, nothing has come to our attention that causes us to believe that the condensed set of financial statements in the half-yearly financial report for the six months ended 31 December 2021 is not prepared, in all material respects, in accordance with UK adopted International Accounting Standard 34 and the Disclosure Guidance and Transparency Rules of the United Kingdom’s Financial Conduct Authority.

We have been engaged by the company to review the condensed set of financial statements in the half-yearly financial report for the six months ended 31 December 2021 which comprises the condensed consolidated statement of comprehensive income, condensed consolidated statement of financial position, condensed consolidated statement of changes in equity, the condensed consolidated statement of cash flows and the related notes.

Basis for conclusion

We conducted our review in accordance with International Standard on Review Engagements (UK) 2410, “Review of Interim Financial Information Performed by the Independent Auditor of the Entity” (“ISRE (UK) 2410”). A review of interim financial information consists of making enquiries, primarily of persons responsible for financial and accounting matters, and applying analytical and other review procedures. A review is substantially less in scope than an audit conducted in accordance with International Standards on Auditing (UK) and consequently does not enable us to obtain assurance that we would become aware of all significant matters that might be identified in an audit. Accordingly, we do not express an audit opinion.

As disclosed in note 3, the annual financial statements of the group are prepared in accordance with UK adopted International Financial Reporting Standards (IFRSs). The condensed set of financial statements included in this half-yearly financial report has been prepared in accordance with UK adopted International Accounting Standard 34, “Interim Financial Reporting”.

Material uncertainty related to Going Concern

We draw attention to note 3 to the half-yearly financial report concerning the Group’s ability to continue as a going concern. The matters explained in note 3 indicate that the Group will require additional funding to meet its planned expenditures, that the required capital has not been secured at the date of this report and the availability of such funding is not guaranteed. As stated in note 3, these conditions indicate the existence of a material uncertainty which may cast significant doubt over the Group’s ability to continue as a going concern. Our opinion is not modified in respect of this matter.

Based on our review procedures, which are less extensive than those performed in an audit as described in the Basis for conclusion section of this report, nothing has come to our attention to suggest that the directors have inappropriately adopted the going concern basis of accounting.

This conclusion is based on the review procedures performed in accordance with ISRE (UK) 2410, however future events or conditions may cause the group to cease to continue as a going concern.

Responsibilities of directors

The directors are responsible for preparing the half-yearly financial report in accordance with the Disclosure Guidance and Transparency Rules of the United Kingdom’s Financial Conduct Authority.

In preparing the half-yearly financial report, the directors are responsible for assessing the company’s ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless the directors either intend to liquidate the company or to cease operations, or have no realistic alternative but to do so.

Auditor’s responsibilities for the review of the financial information

In reviewing the half-yearly report, we are responsible for expressing to the Company a conclusion on the condensed set of financial statement in the half-yearly financial report. Our conclusions, including our conclusions in the Material Uncertainty related to Going Concern section, are based on procedures that are less extensive than audit procedures, as described in the Basis for Conclusion paragraph of this report.

Use of our report

Our report has been prepared in accordance with the terms of our engagement to assist the Company in meeting the requirements of the Disclosure Guidance and Transparency Rules of the United Kingdom’s Financial Conduct Authority and for no other purpose.  No person is entitled to rely on this report unless such a person is a person entitled to rely upon this report by virtue of and for the purpose of our terms of engagement or has been expressly authorised to do so by our prior written consent.  Save as above, we do not accept responsibility for this report to any other person or for any other purpose and we hereby expressly disclaim any and all such liability.

BDO LLP

Chartered Accountants

London, UK

29 March 2022

BDO LLP is a limited liability partnership registered in England and Wales (with registered number OC305127).

Condensed consolidated Statement of Comprehensive Income

for the six months ended 31 December 2021

Notes to the interim financial statements are included on pages 13 to 23.

Condensed consolidated Statement of Financial Position

as at 31 December 2021

Notes to the interim financial statements are included on pages 13 to 23.

Condensed consolidated Statement of Changes in Equity for the six months ended 31 December 2021

Notes to the interim financial statements are included on pages 13 to 23.

Condensed consolidated Statement of Cash Flows

for the six months ended 31 December 2021

Notes to the interim financial statements are included on pages 13 to 23.

Notes to the financial statements

1.  General information

The consolidated financial statements present the financial information of Pensana Plc and its subsidiary (collectively, the Group) for the six months ended 31 December 2021 in United States dollars (USD or $). Pensana Plc (the Company or the parent) is a public company limited by shares listed on the Main Market of the London Stock Exchange and incorporated in England & Wales on 13 September 2019. The registered office is located at 100 Pall Mall, St James, London, United Kingdom, SW1Y 5NQ.

The Company is focussed on the establishment of an integrated rare earth processing facility in the UK with a view to creating the world’s first sustainable magnet metal supply chain.

In early 2020, Pensana Metals Ltd re-domiciled the group to the United Kingdom pursuant to a scheme of arrangement in which Pensana Metals Ltd became a wholly owned subsidiary of Pensana Plc. Prior to the transaction the Company was incorporated on 13 September 2019 and was a wholly owned subsidiary of Pensana Metals Ltd.

The Board of Pensana Plc resolved to restructure the group to remove redundant holding companies and streamline the group structure. As part of this restructuring process the shares in the wholly owned subsidiaries, Sable Minerals GmbH and Sable Rare Earths GmbH were acquired directly by Pensana Rare Earths Plc and it is anticipated that additional dormant entities in Tanzania and Australia will be liquidated during the next 6 months.

2.  New accounting standards and interpretations

(a)  Changes in accounting policies and disclosures

From 1 July 2021, the Group has adopted the following Standards and Interpretations, mandatory for annual periods beginning on 1 July 2021.

The application of these standards have not had a material impact on the financial statements.

(b)  Accounting standards and interpretations issued but not yet effective:

The Group has elected not to early adopt the following revised and amended standards.

Management has reviewed and considered these new standards and interpretations and none of these are expected to have a material effect on the reported results or financial position of the Group.

3.  Significant accounting policies and Going Concern

Basis of preparation

The interim results, which are unaudited, have been prepared in accordance with the requirements of International Accounting Standard 34. This condensed interim report does not include all the notes of the type normally included in an annual financial report. This condensed report is to be read in conjunction with the Annual Report for the year ended 30 June 2021, and any public announcements made by the Group during the interim reporting period. The comparative financial information for the year ended 30 June 2021 in this interim report does not constitute statutory accounts for that year. The statutory accounts for 30 June 2021 have been delivered to the Registrar of Companies.

The auditors' report on those accounts was unqualified but drew attention to a material uncertainty in relation to going concern. It did not contain a statement under 498(2) or 498(3) of the Companies Act 2006.  The financial report for the six months ended 31 December 2021 was prepared in accordance with the annual financial statements of the group are prepared in accordance with UK adopted International Financial Reporting Standards (IFRSs).

The accounting policies applied in this condensed interim report are consistent with the polices applied in the annual financial report for the year ended 30 June 2021 unless otherwise noted.

As disclosed in the 30 June 2021 Annual Report the Company was incorporated on 13 September 2019 as a wholly owned subsidiary of Pensana Metals Ltd. The Company subsequently acquired 100% of the share capital of Pensana Metals and its subsidiary companies for the effective issuance of 152,973,315 shares to the shareholders of Pensana Metals Ltd further to the scheme of arrangement approved on 22 January 2020 and completed on 5 February 2020.

The shares issued to the former shareholders of Pensana Metals Ltd comprised the 50,000,000 shares with a nominal value of £0.001 per share subscribed on incorporation of the Company by Pensana Metals Ltd which were transferred to CHESS Depositary Nominees Pty Ltd (a subsidiary of the ASX) for use in the scheme of arrangement and 102,973,314 shares with a nominal value of £0.001 per share additionally issued by the Company to CHESS Depositary Nominees Pty Ltd for use in the scheme of arrangement. CHESS Depositary Nominees Ltd subsequently issued CHESS Depositary Instruments in proportion to the interests the former shareholders of Pensana Metals held in that company for trading on the ASX with 152,973,315 CHESS Depositary Instruments issued for trading. The transaction represented a group reconstruction and common control transaction.

The accounting for common control transactions is scoped out of IFRS 3 and, accordingly the Group has developed an accounting policy with reference to methods applied in alternative GAAPs (Generally Accepted Accounting Principles). Consequently, the consolidated financial statements are presented as if the Company has always been the holding Company for the Group and the Group has elected to apply merger accounting principles. Under this policy, the Company and its subsidiaries are treated as if they had always been a Group.

The results are included from the date the subsidiaries joined the Group and the comparatives reflect the results of the Company and its subsidiaries. No fair value adjustments occur as a result of the transaction and the assets and liabilities are incorporated at their predecessor carrying values.

The consolidated financial statements are presented in United States Dollars (US$) rounded to the nearest dollar.

The policies have been consistently applied to all the years presented, unless otherwise stated.

Going Concern

The consolidated financial statements have been prepared on a going concern basis with the Directors of the opinion that the Group can meet its obligations as and when they fall due.

At 31 December 2021 the Group has a net asset position of $31,968,192 (30 June 2021: $36,168,634) including cash and cash equivalents of $4,552,862 (30 June 2021: $16,787,591), had incurred a loss after income tax of $4,080,914 (Six months ended 31 December 2021: $2,631,745) and experienced cumulative net cash outflows from operating and investing activities of $15,440,748 (Six months ended 31 December 2020: $5,144,116).

The Directors have prepared a cashflow forecast for a period of at least twelve months from the date of this report. In assessing the going concern basis of preparation, the Directors have given consideration to the principal risks and uncertainties facing the business, including specific consideration of the impact of COVID-19 in terms of the availability of funding and progression of the Longonjo NdPr Project in Angola and the Saltend Project in the UK.

Similarly, the Directors have also considered the impact of the Russia-Ukraine war as it relates to costs and the potential volatility in debt and equity markets.  Conversely, the demand for clean energy rises at such times, sparking increases in prices of rare earth metals.

The forecasts demonstrate that the Group has sufficient cash to meet its day to day corporate and operational working capital requirements and currently committed exploration and development expenditure, however post announcement of FEED and final investment decision expected by Q3 FY 2022, the Group will furthermore need to raise additional capital based on the forecasted exploration and development expenditures costs related to rollout of the Longonjo and Saltend projects and the Coola exploration.

The Directors have therefore considered mitigating actions and are confident of being able to raise the required capital through either debt or equity financing (or combination thereof) during the 12-month period and have engaged ABG Sundal Collier (ABGSC), a leading Nordic investment bank headquartered in Oslo, Norway, to progress the debt financing. Furthermore, the Company’s expression of interest in the UK Government’s up to £1bn Automotive Transformation Fund (“ATF”) has been received positively by the programme board. The application for grant or other forms of financial support is currently under Government review, however the Company does not have any indication on the timing of any potential award.

Despite the ongoing engagements, the directors note that the required capital has not been secured at the date of this report and the availability of such funding is not guaranteed. These circumstances indicate the existence of a material uncertainty which may cast significant doubt about the Group’s ability to continue as a going concern and therefore it may be unable to realise its assets and discharge its liabilities in the normal course of business.  The financial statements do not include the adjustments that would result if the Group was unable to continue as a going concern.

Critical accounting judgements and key sources of estimation uncertainty

In applying the Group’s accounting policies management continually evaluates judgements, estimates and assumptions based on experience and other factors, including expectations of future events that may have an impact on the Group. All judgments, estimates and assumptions made are believed to be reasonable based on the most current set of circumstances available to management. Actual results may differ from the judgements, estimates and assumptions.

Significant judgements, estimates and assumptions made by management in the preparation of these financial statements are outlined below:

(i)     Significant accounting judgements

Impairment of assessment of development assets (note 9), the impairment of assessment of exploration and evaluation expenditure (note 9), as well as the impairment of assessment of assets under construction (note 9)

The ultimate recovery of the value of the Group’s development assets and assets under construction as at 31 December 2021, as well as the ultimate recovery of the value of the Group’s exploration and evaluation assets as at 31 December 2021 and 31 December 2020, are dependent on the successful development and commercial exploitation, or alternatively, sale, of the Longonjo Project, as well as the successful development and commercial exploitation of the Saltend facility.

31 December 2021

Judgment was exercised in assessing the extent to which impairment indicators existed at 31 December 2021 in respect of the Longonjo Project and associated balances, as well as the Saltend project.  In forming this assessment, internal and external factors were evaluated.  Management determined that no impairment indicators existed having considered the Company’s market capitalisation relative to the Group’s net asset value, the progression of the Longonjo Project and associated Competent Person’s Report, financial Life of Mine Plan, studies and Bankable Feasibility Study equivalent assessments.  The underlying financial Life of Mine Plan involves estimates regarding commodity prices, production and reserves, operating costs and capital development together with discount rates.

31 December 2020

Management considered whether there are indicators as to whether the asset carrying values for exploration and evaluation assets exceed their recoverable amounts. This consideration included assessment of the following:

expiration of the period for which the entity has the right to explore in the specific area of interest with no plans for renewal;whether substantive expenditure on further exploration for and evaluation of mineral resources in the specific area is neither budgeted nor planned;exploration for and evaluation activities have not led to the discovery of commercially viable quantities of mineral resources and the entity has decided to discontinue such activities in the specific area; andwhether sufficient ***data*** exists to indicate that, although a development in the specific area is likely to proceed, the carrying amount of the exploration and evaluation asset is unlikely to be recovered in full from successful development or by sale.

Management judgement is required to determine whether the expenditures which are capitalised as exploration and evaluation assets will be recovered by future exploitation or sale or whether they should be impaired. In assessing this, management determines the possibility of finding recoverable ore reserves related to a particular area of interest, which is a subject to significant uncertainties. Many of the factors, judgements and ***variables*** involved in measuring resources are beyond the Group’s control and may prove to be incorrect over time. Subsequent changes in resources could impact the carrying value of exploration and evaluation assets.

Based on the information the Company has on the above, it was concluded by management that no impairment indicator existed at 31 December 2020 for the exploration and evaluation assets.  In forming this assessment, the Directors exercised judgement and considered the results of ongoing exploration work, the significant increase in demand for NdPr and associated pricing, the implied valuations provided by the equity placings in the period, the progression in the Business Plan towards project start up and the resource statement.

Recoverability of equity receivable (note 8)

Management’s judgement is required to determine whether the outstanding equity receivable at period end is recoverable. Management is comfortable that the structured repayment plan, that includes secured collateralisation in excess of the outstanding receivable adequately covers the outstanding receivable and that no further provision thereon is required.  Refer to note 8 for further details.

(ii)    Significant accounting estimates and assumptions

Share-based payment transactions (note 15).

The Group measures the cost of equity-settled transactions with directors and others by reference to the fair value of the equity instruments at the date at which they are granted. The fair value is determined using a Binomial model and requires estimates for inputs such as share price volatility. The share-based payments arrangements are expensed on a straight-line basis over the vesting period, based on the Group’s estimate of shares that will eventually vest. At each reporting date, vesting assumptions are reviewed to ensure they reflect current expectations and immediately recognises any impact of the revision to original estimates. Judgment is required as to the likelihood of the vesting conditions being met, such as project milestones being achieved if fully vested share options are not exercised and expire then the accumulated expense in respect of these is reclassified to accumulated losses.

4.  Operating Segments

Description of segments

The Group has identified its operating segments based on the internal reports that are used by the chief operating decision makers in assessing performance and determining the allocation of resources.

The Group has identified that it has two operating segments being related to the activities in Angola and Saltend (UK), on the basis that the assets in Tanzania were fully impaired at 30 June 2021.  The unallocated relates to operations in Australia and Portugal.

2021

2020

Non-current assets consist mainly of development assets and assets under construction.  Additions and depreciation to non-current assets are disclosed in note 9.

5.  Other Expenses

Foreign currency exchange gains/losses:

Foreign exchange loss of $410,204 (2020: $621,652 loss) comprises realised foreign exchange movements on retranslation of monetary balances and unrealised foreign exchange movements on intercompany loans which are considered repayable in the foreseeable future.

6.  Income Taxes

No Liability to corporation tax arose in ordinary activities for the half year ending 31 December 2021 or 31 December 2020.

The tax assessed for the year the standard rate of tax in the UK of 19% (2020: 19%).

Tax rate reconciliation:

7.  Cash and Cash Equivalents

8.  Trade and Other Receivables

Of the other debtors as at 31 December 2021, $1,350,834 related to payment pending as part of the equity raise completed on 25 June 2021. Management are comfortable that the structured repayment plan, that includes secured collateralisation in excess of the outstanding receivable adequately covers the outstanding receivable and that no further provision thereon is required.

9.  Property, plant and equipment

Assets under construction relate to Saltend

10. Exploration and Evaluation Expenditure

The above amounts represent capitalised costs of exploration carried forward as an asset in accordance with the accounting policies set out in the annual report. The ultimate recoupment of the exploration and evaluation expenditure in respect to the areas of interest carried forward is dependent upon the discovery of commercially viable reserves and the successful development and exploitation of the respective areas or alternatively the sale of the underlying areas of interest for at least their carrying value.

11.  Trade and Other Payables

12.  Issued Capital

Placements during 2021 and 2020:

On 1 July 2020 the Company issued 16,508,633 fully paid ordinary shares to the Angolan Sovereign Wealth fund (“ASF”). This was the balance of the shares to be allotted out of a total of 25,808,633 fully paid ordinary shares that formed part of their second equity placing in the Company of $ 5million as announced on 11 June 2020.

On 11 August 2020, the Company announced the ***conversion*** of 500,000 zero cost performance rights into fully paid ordinary shares on Listing on the London Stock Exchange.

On 11 August 2020, the Company issued 821,157 fully paid ordinary shares to third party service providers at a price of A$0.33 per share, for a total of $0.2 million.

On 25 September 2020 the Group raised an additional $8.6 million (net of share issuance costs) via the placing of 13,500,000 fully paid ordinary shares with the ASF.

On 4 January 2021, the Company issued 550,000 fully paid ordinary shares (of which 250,000 were related to share options, and 300,000 to third party service providers at a price of £0.50 per share, for a total of $0.2 million.

On 25 June 2021, the Group raised circa $21.1 million (net of share issuance costs) via the placing of 12,500,000 fully paid ordinary shares to long term shareholders, the ASF and Chairman Paul Atherley.

On 6 July 2021 7,108,037 shares related to share awards were issued to executive management.

Share options on issue

During the period, 500,000 options expired. As at 31 December 2021, there are 1,500,000 shares under option.

Performance rights on issue

There are no performance rights outstanding as at period end.

13.  Commitments for Expenditure

The Group has certain obligations to perform exploration work and expend minimum amounts of money on mineral exploration tenements.

No provision has been made in the accounts for minimum expenditure requirements in respect of tenements.

Exploration Commitments

Commitments for payments under exploration permits and mineral leases in existence at the reporting date but not recognised as liabilities payable are as follows:

14.  Contingent Liabilities and Contingent Assets

The Directors are not aware of any other contingent liabilities or contingent assets that are likely to have a material effect on the results of the Group as disclosed in these financial statements.

15.  Share-based Payments

Half year ended 31 December 2021

During the period, 7,108,037 shares were issued.  These related to the vesting of executive share awards. In addition 750,000, of the outstanding 2,250,000 legacy awards vested during the Period and amount of $16,179 was charged to the statement of comprehensive income.

Half year ended 31 December 2020

During the prior period, no performance rights were issued. $350,797 was charged to the statement of comprehensive income in respect of existing performance rights. As at 31 December 2020 there were 10,358,037 performance rights on issue.  During the prior period, 500,000 performance rights were converted to ordinary shares on the successful listing on the London Stock Exchange.

During the prior period, no options were issued. No amount was charged to the statement of comprehensive income in respect of existing options. As at 31 December 2020 there are were no options on issue.

Reconciliation of options outstanding

The following reconciles outstanding share options provided as share-based payments at the beginning and end of the financial period:

16.  Loss per share

Basic loss per share

The net loss and weighted average number of ordinary shares used in the calculation of basic loss per share are as follows:

1,500,000 options (31 December 2020: nil) and nil performance rights (31 December 2020: 10,358,037) have not been included in the diluted earnings per share, as they were anti-dilutive in the current and prior period.

17.  Related party transactions

Transactions with Key Management Personnel and Related Parties

No reportable related party transactions occurred during the period under review.

18.  Notes to the Consolidated Statement of Cashflows

Reconciliation of loss for the period to net cash flows from operating activities

19.  Subsequent events

Post period end the Group completed a £10 million Placement to M&G Investment Management (“M&G) by way of a placement of 12,345,680 new ordinary shares of £0.001 each in the capital of the Company at a price of 81 pence per share.  Following the admission of the ordinary shares to trading M&G had an interest in approximately 5% of the Company’s enlarged issued share capital.

No other matters or circumstances have arisen since 31 December 2021 that have significantly affected, or may significantly affect:

 The Group’s operations in future financial years; or The results of those operations in future financial years; or The Group’s state of affairs in future financial years.

RESPONSIBILITY STATEMENT

We confirm that to the best of our knowledge: a. the Condensed Financial Statements have been prepared in accordance with IAS 34 Interim Financial Reporting and give a true and fair view of the assets, liabilities, financial position and profit of the Group; and a. the Interim Management Report includes a fair review of the information required by FCA’s Disclosure and Transparency Rules (DTR 4.2.7 R and 4.2.8 R).

By order of the Board

Mr Paul Atherley

29 March 2022

**Load-Date:** March 30, 2022

**End of Document**



[***Federal Register: Endangered and Threatened Wildlife and Plants; Endangered Species for Prostrate Milkweed and Designation of Critical Habitat Pages 8509 - 8543 [FR DOC #2022-02544]***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:64SY-P891-F0YC-N2H0-00000-00&context=1516831)

Impact News Service

February 15, 2022 Tuesday

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**Length:** 27141 words

**Body**

Washington: Office of the Federal Register has issued the following notice:DEPARTMENT OF THE INTERIORFish and Wildlife Service50 CFR Part 17[Docket No. FWS-R2-ES-2021-0041; FF09E21000; FXES1111090FEDR 223]RIN 1018-BE65Endangered and Threatened Wildlife and Plants; Endangered Species for Prostrate Milkweed and Designation of Critical HabitatAGENCY: Fish and Wildlife Service, Interior.[[Page 8510]]ACTION: Proposed rule.-----------------------------------------------------------------------SUMMARY: We, the U.S Fish and Wildlife Service (Service), propose to list the prostrate milkweed (Asclepias prostrata), a plant species from Texas, as an endangered species and designate critical habitat under the Endangered Species Act of 1973, as amended (Act). This determination also serves as our 12-month finding on a petition to list the prostrate milkweed. After a review of the best available scientific and commercial information, we find that listing the species is warranted. Accordingly, we propose to list the prostrate milkweed as an endangered species. If we finalize this rule as proposed, it would add this species to the List of Endangered and Threatened Plants and extend the Act's protections to the species. We also propose to designate critical habitat for the prostrate milkweed under the Act. In total, approximately 691.3 acres (279.8 hectares) in Starr and Zapata Counties, Texas, fall within the boundaries of the proposed critical habitat designation. We also announce the availability of a draft economic analysis of the proposed designation of critical habitat for prostrate milkweed.DATES: We will accept comments received or postmarked on or before April 18, 2022. Comments submitted electronically using the Federal eRulemaking Portal (see ADDRESSES, below) must be received by 11:59 p.m Eastern Time on the closing date. We must receive requests for a public hearing, in writing, at the address shown in FOR FURTHER INFORMATION CONTACT by April 1, 2022.ADDRESSES: You may submit comments by one of the following methods: (1) Electronically: Go to the Federal eRulemaking Portal: [*https://www.regulations.gov*](https://www.regulations.gov). In the Search box, enter the docket number or RIN for this rulemaking (presented above in the document headings). For best results, do not copy and paste either number; instead, type the docket number or RIN into the Search box using hyphens. Then, click on the Search button. On the resulting page, in the panel on the left side of the screen, under the Document Type heading, check the Proposed Rule box to locate this document. You may submit a comment by clicking on ``Comment.'' (2) By hard copy: Submit by U.S mail to: Public Comments Processing, Attn: FWS-R2-ES-2021-0041, U.S Fish and Wildlife Service, MS: PRB/3W, 5275 Leesburg Pike, Falls Church, VA 22041-3803. We request that you send comments only by the methods described above. We will post all comments on [*https://www.regulations.gov*](https://www.regulations.gov). This generally means that we will post any personal information you provide us (see Information Requested, below, for more information). Availability of supporting materials: The species status assessment report and the draft economic analysis are available at [*https://www.regulations.gov*](https://www.regulations.gov) under Docket No. FWS-R2-ES-2021-0041. For the critical habitat designation, the coordinates or plot points or both from which the maps are generated are included in the decision file and are available at [*https://www.fws.gov/southwest/es/TexasCoastal/*](https://www.fws.gov/southwest/es/TexasCoastal/), at [*https://www.regulations.gov*](https://www.regulations.gov) under Docket No. FWS-R2-ES-2021-0041, and at the Texas Coastal Ecological Services Field Office (see FOR FURTHER INFORMATION CONTACT). Any additional tools or supporting information that we may develop for the critical habitat designation will also be available at the Service website and field office set out above and may also be included in this preamble and/or at [*https://www.regulations.gov.FOR*](https://www.regulations.gov.FOR) FURTHER INFORMATION CONTACT: Chuck Ardizzone, Field Supervisor, Texas Coastal Ecological Services Field Office, 17629 El Camino Real, Suite 211, Houston, TX 77058; telephone 281-286-8282. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Relay Service at 800-877-8339.SUPPLEMENTARY INFORMATION:Executive Summary Why we need to publish a rule. Under the Act, if we determine that a species warrants listing, we are required to promptly publish a proposal in the Federal Register, unless doing so is precluded by higher-priority actions and expeditious progress is being made to add and remove qualified species to or from the List of Endangered and Threatened Wildlife and Plants. The Service will make a determination on our proposal within 1 year. If there is substantial disagreement regarding the sufficiency and accuracy of the available ***data*** relevant to the proposed listing, we may extend the final determination for not more than six months. To the maximum extent prudent and determinable, we must designate critical habitat for any species that we determine to be an endangered or threatened species under the Act. Listing a species as an endangered or threatened species and designation of critical habitat can only be completed by issuing a rule. What this document does. We propose to list the prostrate milkweed as an endangered species under the Act, and we propose the designation of critical habitat for the species. The basis for our action. Under the Act, we may determine that a species is an endangered or threatened species because of any of five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. We have determined that competition from introduced invasive grass; habitat loss and degradations from root-plowing and ***conversion*** of native vegetation to improved buffelgrass pasture; habitat loss from right of way (ROW) construction and maintenance from energy development and road and utility construction; habitat loss from border security development and enforcement activities (Factor A); and the demographic and genetic consequences of small population sizes (Factor E) are threats to the prostrate milkweed. Section 4(a)(3) of the Act requires the Secretary of the Interior (Secretary) to designate critical habitat concurrent with listing to the maximum extent prudent and determinable. Section 3(5)(A) of the Act defines critical habitat as: (i) The specific areas within the geographical area occupied by the species, at the time it is listed, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protections; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination by the Secretary that such areas are essential for the conservation of the species. Section 4(b)(2) of the Act states that the Secretary must make the designation on the basis of the best scientific ***data*** available and after taking into consideration the economic impact, the impact on national security, and any other relevant impacts of specifying any particular area as critical habitat.Information Requested We intend that any final action resulting from this proposed rule will be based on the best scientific and commercial ***data*** available and be as accurate and as effective as possible. Therefore, we request comments or information from other governmental[[Page 8511]]agencies, Native American Tribes, the scientific community, industry, or any other interested parties concerning this proposed rule. We particularly seek comments concerning: (1) The species' biology, range, and population trends, including: (a) Biological or ecological requirements of the species, including habitat requirements for feeding, breeding, and sheltering; (b) Genetics and taxonomy; (c) Historical and current range, including distribution patterns; (d) Historical and current population levels, and current and projected trends; and (e) Past and ongoing conservation measures for the species, its habitat, or both. (2) Factors that may affect the continued existence of the species, which may include habitat modification or destruction, overutilization, disease, predation, the inadequacy of existing regulatory mechanisms, or other natural or manmade factors. (3) Biological, commercial trade, or other relevant ***data*** concerning any threats (or lack thereof) to this species and existing regulations that may be addressing those threats. (4) Additional information concerning the historical and current status, range, distribution, and population size of this species, including the locations of any additional populations of this species. (5) The reasons why we should or should not designate habitat as ``critical habitat'' under section 4 of the Act (16 U.S.C 1531 et seq.), including information to inform the following factors that the regulations identify as reasons why designation of critical habitat may be not prudent: (a) The species is threatened by taking or other human activity and identification of critical habitat can be expected to increase the degree of such threat to the species; (b) The present or threatened destruction, modification, or curtailment of a species' habitat or range is not a threat to the species, or threats to the species' habitat stem solely from causes that cannot be addressed through management actions resulting from consultations under section 7(a)(2) of the Act; (c) Areas within the jurisdiction of the United States provide no more than negligible conservation value, if any, for a species occurring primarily outside the jurisdiction of the United States; or (d) No areas meet the definition of critical habitat. (6) Specific information on: (a) The amount and distribution of prostrate milkweed habitat; (b) What areas, that are occupied at the time of listing and that contain the physical or biological features essential to the conservation of the species, should be included in the designation and why; (c) Any additional areas occurring within the range of the species, including Starr and Zapata Counties, Texas, that should be included in the designation because they (1) are occupied at the time of listing and contain the physical or biological features that are essential to the conservation of the species and that may require special management considerations, or (2) are unoccupied at the time of listing and are essential for the conservation of the species; (d) Special management considerations or protection that may be needed in critical habitat areas we are proposing, including managing for the potential effects of climate change; and (e) What areas not occupied at the time of listing are essential for the conservation of the species. We particularly seek comments: (i) Regarding whether occupied areas are adequate for the conservation of the species; (ii) Providing specific information regarding whether or not unoccupied areas would, with reasonable certainty, contribute to the conservation of the species and contain at least one physical or biological feature essential to the conservation of the species; and (iii) Explaining whether or not unoccupied areas fall within the definition of ``habitat'' at 50 CFR 424.02 and why. (7) Land use designations and current or planned activities in the subject areas and their possible impacts on proposed critical habitat. (8) Any probable economic, national security, or other relevant impacts of designating any area that may be included in the final designation, and the related benefits of including or excluding specific areas. (9) Information on the extent to which the description of probable economic impacts in the draft economic analysis is a reasonable estimate of the likely economic impacts and any additional information regarding probable economic impacts that we should consider. (10) Whether any specific areas we are proposing for critical habitat designation should be considered for exclusion under section 4(b)(2) of the Act, and whether the benefits of potentially excluding any specific area outweigh the benefits of including that area under section 4(b)(2) of the Act, in particular for the critical habitat units on privately owned lands. If you think we should exclude any additional areas, please provide credible information regarding the existence of a meaningful economic or other relevant impact supporting a benefit of exclusion. (11) Whether we could improve or modify our approach to designating critical habitat in any way to provide for greater public participation and understanding, or to better accommodate public concerns and comments. Please include sufficient information with your submission (such as scientific journal articles or other publications) to allow us to verify any scientific or commercial information you include. Please note that submissions merely stating support for, or opposition to, the action under consideration without providing supporting information, although noted, will not be considered in making a determination, as section 4(b)(1)(A) of the Act directs that determinations as to whether any species is an endangered or a threatened species must be made ``solely on the basis of the best scientific and commercial ***data*** available.'' You may submit your comments and materials concerning this proposed rule by one of the methods listed in ADDRESSES. We request that you send comments only by the methods described in ADDRESSES. If you submit information via [*https://www.regulations.gov*](https://www.regulations.gov), your entire submission--including any personal identifying information--will be posted on the website. If your submission is made via a hardcopy that includes personal identifying information, you may request at the top of your document that we withhold this information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on [*https://www.regulations.gov*](https://www.regulations.gov). Comments and materials we receive, as well as supporting documentation we used in preparing this proposed rule, will be available for public inspection on [*https://www.regulations.gov*](https://www.regulations.gov). Because we will consider all comments and information we receive during the comment period, our final determinations may differ from this proposal. Based on the new information we receive (and any comments on that new information), we may conclude that the species is threatened instead of endangered, or we may conclude that the species does not warrant listing as either an endangered species or a threatened species. For critical habitat, our final designation may not include all areas proposed, may include some additional areas that meet the definition[[Page 8512]]of critical habitat, and may exclude some areas if we find the benefits of exclusion outweigh the benefits of inclusion.Public Hearing Section 4(b)(5) of the Act provides for a public hearing on this proposal, if requested. Requests must be received by the date specified in DATES. Such requests must be sent to the address shown in FOR FURTHER INFORMATION CONTACT. We will schedule a public hearing on this proposal, if requested, and announce the date, time, and place of the hearing, as well as how to obtain reasonable accommodations, in the Federal Register and local newspapers at least 15 days before the hearing. For the immediate future, we will provide these public hearings using webinars that will be announced on the Service's website, in addition to the Federal Register. The use of these virtual public hearings is consistent with our regulations at 50 CFR 424.16(c)(3).Previous Federal Actions On June 25, 2007, we received a petition, dated June 18, 2007, from Forest Guardians (now WildEarth Guardians) that included the prostrate milkweed. On December 16, 2009, we published a 90-day finding (74 FR 66866) that the petition presented substantial information that prostrate milkweed may be warranted for listing. At that time, we initiated a status review of the species.Supporting Documents A species status assessment (SSA) team prepared an SSA report for the prostrate milkweed. The SSA team was composed of Service biologists, in consultation with other species experts. The SSA report represents a compilation of the best scientific and commercial ***data*** available concerning the status of the species, including the impacts of past, present, and future factors (both negative and beneficial) affecting the species. In accordance with our joint policy on peer review published in the Federal Register on July 1, 1994 (59 FR 34270), and our August 22, 2016, memorandum updating and clarifying the role of peer review of listing actions under the Act, we sought the expert opinions of six appropriate specialists regarding the SSA report. The Service received two responses. The Service also sent the SSA report to one partner, a botanist from the Texas Parks and Wildlife Department, and received a review from this partner.I. Proposed Listing DeterminationBackground A thorough review of the taxonomy, life history, and ecology of the prostrate milkweed (Asclepias prostrata) is presented in the SSA report (Service 2020, entire). Prostrate milkweed is an herbaceous, flowering plant in the Apocynaceae (dogbane) family. It is native to Texas, USA, and Tamaulipas and eastern Nuevo Le[oacute]n, Mexico. Prostrate milkweed is a perennial species with cream, yellow, greenish, or pinkish flowers (Blackwell 1964, p. 178). This species is distinctive in its prostrate habit; the leaves and stems sprawl outward along the surface of the ground. It is found in open spaces with full sun, and with little to no competition from surrounding plants (Poole and Janssen 1997, p. 117). It occurs in a subtropical, semiarid climate in sparsely vegetated habitats, including grasslands, savannas, and open areas of the Tamaulipan shrubland ecological region, on level or gently sloping uplands (Singhurst et al. 2015, p. 25; Carr 2011, pp. 37-38; Damude and Poole 1990, p. 13; Strong and Williamson 2015, p. 36). Prostrate milkweed occurs primarily in deep, loose, sandy soils formed over sandstone or indurated caliche (hardened soil layer cemented by calcium and magnesium carbonates) (Carr 2011, pp. 37-38; Strong and Williamson 2015, p. 36). Like all milkweeds, prostrate milkweed flowers have a unique and complex structure and pollination system. Pollinators are attracted to the copious nectar produced deep within the flower. To reach the nectar, insects of a particular size are forced against the flower's central stalk in such a way that pollinia, which are sack-like structures full of pollen grains, adhere to their legs. When the insect visits another flower of the same species, the pollinia are often wedged against the stigma (the receptive female structure) and detach, thus delivering a large load of pollen and effecting fertilization. The closely-related zizotes milkweed, Asclepias oenotheroides, is effectively pollinated by very large wasps called tarantula hawks (species of Pepsis and Hemipepsis), and it is likely that these wasps and large bees also pollinate prostrate milkweed. Due to their relatively large size and the abundance of nectar produced by the flowers, these pollinators are able to fly relatively large distances between nectar sources (Gathman and Tscharntke 2002, entire; Greenleaf et al. 2007, entire). Hence, it is likely that prostrate milkweed can reproduce even when individuals are widely distributed at very low densities, due to the uniquely effective pollination system, large nectar reward, and large forage range of its pollinators. Fertilized flowers of prostrate milkweed produce capsules with about 100 seeds each. The seeds have long, silky, white hairs and are dispersed by wind (Damude and Poole 1990, pp. 4-5; Richardson and King 2011, p. 76). Seed production of milkweeds is often resource limited (La Rosa and Conner 2017, p. 151); resources for prostrate milkweed include rainfall, pollinators, and open, sparsely vegetated habitat. Prostrate milkweed remains as tubers, up to 12 inches (in) (30 centimeters (cm)) underground that are dormant during long droughts. New stems are stimulated to emerge from the soil by infrequent, heavy rainfall, and set seed following wildfire or, historically, a passing herd of bison has cleared competing grasses and forbs, and the deluges of tropical storms briefly replenish moisture. The species exists where competition from other plants is periodically reduced by wildfire or grazing. These life-history traits allow the species to rebound after periods of inhospitable conditions, and well-managed livestock grazing, which simulates the effects of bison, and rangeland management, including brush thinning and prescribed burning, can return an unsuitable area to conditions more suitable for prostrate milkweed. As a result, sufficiently resilient prostrate milkweed populations may be maintained on well-managed rangelands. Livestock grazing is the primary economic use of privately-owned land throughout the range of prostrate milkweed in Texas and northeast Mexico, although the management regime of these rangelands is unknown. This adaptation also enables prostrate milkweed to occur along mowed road rights-of-way (ROWs) and in rangelands where soils are intact. Therefore, while there may be prostrate milkweed populations on these rangelands, we do not have evidence that they are present, nor do we have information that the grazing is managed in such a way as to promote resilient populations. However, it is unlikely to remain where soils are disturbed by plowing, bulldozing, or road grading because this destroys the tubers, preventing any plant regrowth. In the United States, prostrate milkweed occurs in south Texas from northwest Zapata County to the vicinity of Roma, in Starr County. All known U.S populations are within 8 miles of the Rio Grande (Strong and Williamson 2015, pp. 34-35). In Mexico, known locations for this species occur in[[Page 8513]]isolated pockets widely scattered in northern Tamaulipas and eastern Nuevo Le[oacute]n, many over 100 miles (mi) (160 kilometers (km)) from the Rio Grande (Strong and Williamson 2015, p. 35). The historical range of prostrate milkweed is unknown; therefore, it is presumed to be approximately the same as the current range in southern Texas and northern Mexico. However, the distribution of populations throughout this range may have been more abundant in the past.Regulatory and Analytical FrameworkRegulatory Framework Section 4 of the Act (16 U.S.C 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species is an endangered species or a threatened species. The Act defines an endangered species as a species that is ``in danger of extinction throughout all or a significant portion of its range,'' and a threatened species as a species that is ``likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' The Act requires that we determine whether any species is an endangered species or a threatened species because of any of the following factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence. These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species' continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects. We use the term ``threat'' to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term ``threat'' includes actions or conditions that have a direct impact on individuals (direct impacts), as well as those that affect individuals through alteration of their habitat or required resources (stressors). The term ``threat'' may encompass--either together or separately--the source of the action or condition or the action or condition itself. However, the mere identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an ``endangered species'' or a ``threatened species.'' In determining whether a species meets either definition, we must evaluate all identified threats by considering the expected response by the species, and the effects of the threats--in light of those actions and conditions that will ameliorate the threats--on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species, such as any existing regulatory mechanisms or conservation efforts. The Secretary determines whether the species meets the definition of an ``endangered species'' or a ``threatened species'' only after conducting this cumulative analysis and describing the expected effect on the species now and in the foreseeable future. The Act does not define the term ``foreseeable future,'' which appears in the statutory definition of ``threatened species.'' Our implementing regulations at 50 CFR 424.11(d) set forth a framework for evaluating the foreseeable future on a case-by-case basis. The term ``foreseeable future'' extends only so far into the future as the Service can reasonably determine that both the future threats and the species' responses to those threats are likely. In other words, the foreseeable future is the period of time in which we can make reliable predictions. ``Reliable'' does not mean ``certain''; it means sufficient to provide a reasonable degree of confidence in the prediction. Thus, a prediction is reliable if it is reasonable to depend on it when making decisions. It is not always possible or necessary to define foreseeable future as a particular number of years. Analysis of the foreseeable future uses the best scientific and commercial ***data*** available and should consider the timeframes applicable to the relevant threats and to the species' likely responses to those threats in view of its life-history characteristics. ***Data*** that are typically relevant to assessing the species' biological response include species-specific factors such as lifespan, reproductive rates or productivity, certain behaviors, and other demographic factors.Analytical Framework The SSA report documents the results of our comprehensive biological review of the best scientific and commercial ***data*** regarding the status of the species, including an assessment of the potential threats to the species. The SSA report does not represent a decision by the Service on whether the species should be proposed for listing as an endangered or threatened species under the Act. However, it does provide the scientific basis that informs our regulatory decisions, which involve the further application of standards within the Act and its implementing regulations and policies. The following is a summary of the key results and conclusions from the SSA report; the full SSA report can be found at Docket FWS-R2-ES-2021-0041 on [*https://www.regulations.gov*](https://www.regulations.gov) and at [*https://www.fws.gov/southwest/es/TexasCoastal/*](https://www.fws.gov/southwest/es/TexasCoastal/). To assess prostrate milkweed viability, we used the three conservation biology principles of resiliency, redundancy, and representation (Shaffer and Stein 2000, pp. 306-310). Briefly, resiliency supports the ability of the species to withstand environmental and demographic stochasticity (for example, wet or dry, warm or cold years), redundancy supports the ability of the species to withstand catastrophic events (for example, droughts, large pollution events), and representation supports the ability of the species to adapt over time to long-term changes in the environment (for example, climate changes). In general, the more resilient and redundant a species is and the more representation it has, the more likely it is to sustain populations over time, even under changing environmental conditions. Using these principles, we identified the species' ecological requirements for survival and reproduction at the individual, population, and species levels, and described the beneficial and risk factors influencing the species' viability. The SSA process can be categorized into three sequential stages. During the first stage, we evaluated the individual species' life-history needs. The next stage involved an assessment of the historical and current condition of the species' demographics and habitat characteristics, including an explanation of how the species arrived at its current condition. The final stage of the SSA involved making predictions about the species' responses to positive and negative environmental and anthropogenic influences. Throughout all of these stages, we used the best available information to characterize viability as the ability of a species to[[Page 8514]]sustain populations in the wild over time. We use this information to inform our regulatory decision.Summary of Biological Status and Threats In this discussion, we review the biological condition of the species and its resources, and the threats that influence the species' current and future condition, in order to assess the species' overall viability and the risks to that viability. For the prostrate milkweed to maintain viability, its populations or some portion thereof must have sufficient resiliency, redundancy, and representation. Several factors influence the resiliency of prostrate milkweed populations, including abundance and recruitment rate, in addition to elements of the species' habitat that determine whether prostrate milkweed populations can grow. These resiliency factors and habitat elements are discussed in detail in the SSA report and summarized here.Species Needs Abundance--Prostrate milkweed abundance is difficult to assess due to its ability to remain dormant for multiple years until the necessary environmental conditions occur. Individual plants may emerge only a few times per decade, and not all plants will emerge at the same time (Price 2005, pers. comm.; Best 2017, pers. comm.). Therefore, we considered populations to be extant if plants have been observed within the past 40 years (Hammerson et al. 2008, entire; Strong 2020, pers. comm.) and with available habitat (i.e , not paved over) or with restorable habitat (i.e , nonnative grass could be removed). Populations of prostrate milkweed must be large enough to have a high probability of enduring random demographic and environmental variation. For example, species or populations may be classified as vulnerable when the probability of persisting 100 years is less than 90 percent (Mace and Lande 1991, p. 151). This metric of population resilience, called minimum viable population (MVP), refers to the smallest population size that has a high probability of surviving over a specified period of time. Calculations of MVP require ***data*** that are not currently available for prostrate milkweed. As a practical alternative, we estimated the likely MVP range of prostrate milkweed by comparing it to species with similar life-history traits for which MVPs have been calculated (Pavlik 1996, p. 137). This method estimates a highly resilient population of prostrate milkweed has 1,600 or more adult individuals (Service 2020, p. 38). Determinations of MVP usually consider the effective population size, rather than total number of individuals (Pavlik 1996, entire); 10 genetically identical individuals (for example, clones or ramets) would have an effective population size of one. Because prostrate milkweed is likely self-incompatible and does not appear to form clonal colonies, the effective population size is likely to be nearly the same as the total population size. Recruitment Rate--A stable or increasing population requires recruitment rates that equal or exceed mortality rates (Service 2020, p. 38). All stages of recruitment, from flowering and seed production to germination and establishment, occur when the soil has available moisture. The porous soils of prostrate milkweed habitat dry quickly after a single heavy thunderstorm. Based on observations of other perennial forbs in this ecosystem, recruitment probably occurs during periods of extended rainfall, meaning multiple rain events over a period of several weeks (Service 2020, p. 38). These events are rare in this semiarid region. Consequently, we expect that successful recruitment may occur only once or a few times per decade. Similarly, most mortality probably occurs during years of extended drought. Hence, both recruitment and mortality would have strong pulses and observed population sizes would vary widely from year to year, leading to potentially spurious interpretations of demographic trends (Service 2020, p. 38). Populations of prostrate milkweed require habitats that also support healthy populations of large native bees and wasps (Service 2020, p. 38). Native bees in turn require a diversity and abundance of native forb and shrub species that provide pollen and nectar. Tarantula hawks (Pepsis spp. and Hemipepsis spp.) may also be important pollinators of prostrate milkweed; tarantula hawks require healthy populations of their prey species, tarantulas (Best 2020, pers. comm.). Prostrate milkweed populations require competition from grasses and forbs to be periodically reduced (Service 2020, p. 38). This requirement, which has been observed in other milkweed species, may be an adaptation to wildfire (Baum and Sharber 2012, pp. 968-971). Although mowing or livestock grazing can also reduce competition, it is likely that prostrate milkweed is adapted to grasslands that were sustained by periodic wildfires (Service 2020, p. 39). Canopy Cover--Canopy cover refers to shade from trees, shrubs, prickly pear cactuses, or tall (>1 meter (m)) grass. Resilient prostrate milkweed populations need an open canopy with little or no herbaceous cover (Service 2020, p. 3). Therefore, the species may occur in areas that mimic historical wildfire or grazing, such as along mowed road rights-of-way (Service 2020, p. 3). Ground Cover--Ground cover refers to vegetation growing at the herbaceous layer (approximately <1 m) that would compete with prostrate milkweed plants for resources. Resilient prostrate milkweed populations need an open canopy with little or no herbaceous cover, so there is little competition with other plants (Service 2020, p. 3).Risk Factors for Prostrate Milkweed We reviewed the potential risk factors (i.e , threats, stressors) that may affect prostrate milkweed now and in the future. In this proposed rule, we will discuss only those factors in detail that could meaningfully impact the status of the species. Those risks that are not known to have effects on prostrate milkweed populations, such as quarrying/mining, hybridization, pollinator decline, and climate change, are not discussed here but are evaluated in the SSA report. The primary risk factors (i.e , threats) affecting the status of prostrate milkweed are: (1) Competition from introduced invasive grasses (Factor A from the Act); (2) habitat loss from root-plowing and ***conversion*** of native vegetation to pasture (Factor A); (3) habitat loss from ROW construction and maintenance from energy development and road and utility construction (Factor A); (4) habitat loss from border security development and enforcement activities (Factor A); and (5) the demographic and genetic consequences of small population sizes and population fragmentation (Factor E).Competition From Nonnative Invasive Grasses Nonnative invasive grass species displace native plants by competing for water, nutrients, and light, and their dense root systems prevent germination of native plant seeds (Texas Invasives 2019, unpaginated). Buffelgrass (Pennisetum ciliare) is a perennial bunchgrass introduced from Africa that is now one of the most abundant introduced grasses in south Texas, and the most prevalent invasive grass within the range of prostrate milkweed. Since the 1950s, Federal and State land management agencies have promoted buffelgrass as a forage grass in south[[Page 8515]]Texas (Smith 2010, p. 113). Buffelgrass is very well-adapted to the hot, semi-arid climate of south Texas due to its drought resistance and ability to aggressively establish in heavily grazed landscapes (Smith 2010, p. 113). Buffelgrass continues to be planted in areas affected by drought and overgrazing to stabilize soils and to increase rangeland productivity. Buffelgrass often creates homogeneous monocultures by out-competing native plants for essential resources (Lyons et al. 2013, p. 8), and it produces phytotoxins in the soil that inhibit the growth of neighboring native plants (Vo 2013, unpaginated). Furthermore, prescribed burning used for brush control promotes buffelgrass forage production in south Texas (Hamilton and Scifres 1982, p. 11). Most prostrate milkweed plants have been observed where buffelgrass is absent or at low densities (Eason 2019, pers. comm.; Strong 2019, pers. comm.). On national wildlife refuge lands, prostrate milkweed was found in areas where native grass was still dominant, but not where buffelgrass or woody vegetation was present in dense stands (Best 2005, p. 3). The unpaved ROWs on private lands in south Texas for oil and gas wells, wind farms, service roads, pipelines, and powerlines could benefit prostrate milkweed through the periodic mowing of road margins. However, disturbed soils along ROWs are rapidly colonized by buffelgrass. The Texas Natural Diversity Database (TXNDD) lists invasive species, primarily buffelgrass, as a pervasive threat of extreme severity to prostrate milkweed. The TXNDD defines a pervasive threat as one that affects all or most (71-100 percent) of a species' populations, occurrences, or extent. An extreme level of severity is one that is likely to destroy or eliminate occurrences or habitat or reduce population sizes by 71-100 percent (TXNDD 2016). It is likely that buffelgrass has negatively impacted all Texas populations (TXNDD 2019-2020, entire; Eason 2019, pers. comm.; Kieschnick 2019, pers. comm.; Santore 2019, unpaginated). Competition from buffelgrass is the greatest threat to prostrate milkweed.Root-Plowing and ***Conversion*** of Native Grassland and Savanna Root-plowing is a brush control method that uses powerful tracked vehicles to excavate the roots of woody plants with heavy steel subsoil rippers that dig several feet into the ground. The dead trees and shrubs are then burned, and the root-plowed soils are planted with buffelgrass for livestock grazing. Root-plowing and ***conversion*** to buffelgrass pasture is a widely conducted practice in south Texas and northeast Mexico, occurring in much of the potential habitat of prostrate milkweed. Extensive areas of recently root-plowed lands can be identified in aerial photographs. These practices have been and are still subsidized by the United States Department of ***Agriculture*** (USDA) Natural Resources Conservation Service and its precursor, the USDA Soil Conservation Service. Root-plowing temporarily reduces the encroachment of woody plants into the grassland component of former savannas. The ***conversion*** of native habitats to improved pastures dominated by buffelgrass or other introduced grasses greatly reduces the abundance and diversity of most native grass and forb species (Woodin et al. 2010, p. 1). Very few, if any, prostrate milkweed plants survive following root-plowing and buffelgrass planting. This is likely due to the excavation and desiccation of most tubers during root-plowing; subsequently, the few remaining individuals decline due to competition from dense buffelgrass cover. Conversely, prostrate milkweed occurs in well-managed rangelands, provided that the soil was not previously root-plowed or otherwise disturbed (Service 2020, p. 53). Most milkweed species are unpalatable to cattle, and often increase in abundance on grazed lands. Livestock, including cattle, sheep, and horses, graze preferentially on grasses and forbs (broad-leaved herbaceous plants), including buffelgrass, and non-toxic herbaceous plants, and therefore reduce competition with prostrate milkweed from these plants (Service 2020, p. 41). In addition to grazing, livestock may also reduce competition with prostrate milkweed by trampling herbaceous plants (Service 2020, p. 41). Because prostrate milkweed is often observed in the wheel ruts of dirt roads, it appears to be unusually tolerant of trampling; thus, the effect of livestock trampling is minimal (Service 2020, pp. 41-42). Periodic livestock grazing reduces competition from native and introduced grasses. In South Texas, over-grazed rangelands typically become invaded by woody plants, reducing the habitat suitability for prostrate milkweed. Hence, management practices that promote sustainable grazing of native grasses are beneficial to prostrate milkweed (Service 2020, p. 41).Road and ROW Construction and Maintenance Oil and gas exploration and wind energy development are occurring at a rapid pace in Starr and Zapata Counties. Seismic exploration and the construction of roads and caliche pads for oil and gas wells and wind turbines can destroy plants and their habitats within the construction footprint (Reemts et al. 2014, pp. 123 and 125; Leslie 2016, p. 49). Additionally, graded service roads and other permanent structures may indirectly affect the hydrology of surrounding habitats by diverting and channeling water through drainage culverts. Invasive buffelgrass quickly colonizes disturbed roadsides, then invades adjacent habitats. Heavy vehicle traffic during oil and gas well drilling and wind farm construction may increase the frequency of road maintenance, such as grading or widening (Pe[ntilde]a 2019, pers. comm.). Grading or blading a caliche road involves scraping the road's surface with a large heavy blade to remove ruts and roadside vegetation. Increased frequency of road maintenance that removes above-ground portions of plants could reduce or eliminate prostrate milkweed flower and fruit production. Conversely, grading or blading of caliche roads conducted during the milkweed's dormant periods may benefit the species by temporarily reducing competition from grasses and forbs (TXNDD 2019, p. 11). TXNDD (2019) ranks road expansion as a pervasive threat (affects all or most (71-100 percent) of a species' populations, occurrences, or extent) of extreme severity to prostrate milkweed. All or parts of nine prostrate milkweed occurrences are in the margins of improved highway ROWs. All of these highway ROW populations have declined since they were first observed, likely due to the frequency of soil disturbance and invasive grass competition (Service 2020, p. 40). In addition, from 2010 to 2012, Texas Department of Transportation (TxDOT) widened segments of U.S Highway 83 that affected at least three known prostrate milkweed sites: Arroyo del Tigre Grande, Mission Mier a Visita, and Arroyo Roma (Strong and Williamson 2015, p. 51; Paradise 2019, pers. comm.). TxDOT has also scheduled additional road widening or construction at five known prostrate milkweed populations: Arroyo del Tigre Grande, Arroyo del Tigre Chiquito, Arroyo de los Mudos, Mission Mier a Visita, and Arroyo Roma (TxDOT 2019, unpaginated). U.S Customs and Border Protection (CBP) has scheduled road[[Page 8516]]improvements at the prostrate milkweed population site located in the Arroyo Morteros tract of the Lower Rio Grande Valley National Wildlife Refuge (NWR) (Vallejo 2019, pers. comm.). In contrast, all or parts of three prostrate milkweed occurrences are in the margins of unpaved rural roads. These relatively stable populations have persisted in narrow strips of native vegetation between the gravel or caliche roadbeds and the fence lines of adjacent private properties. The soils in these narrow, naturally vegetated strips have never been excavated, and they have relatively little buffelgrass cover. The installation of natural gas pipelines and fiber-optic cables has removed prostrate milkweed plants in the Dolores and Arroyo del Tigre Chiquito populations in the past (Damunde and Poole 1990, p. 32; Boydston 1993, unpaginated; Campos 1993, unpaginated). In 1995, Southwestern Bell installed a fiber-optic cable in the Highway 83 ROW, 2.6 miles south of the Webb-Zapata County line, which removed at least 100 individuals at the Dolores population (Service 1995, p. 1). In 1993, prior to the fiber-optic cable installation, this population was estimated to have 100 to 200 individuals (TXNDD 2019, entire) and was the largest known population of prostrate milkweed. In summary, prostrate milkweed faces risks from ROWs and road construction and maintenance associated with oil and gas activities, wind energy development, and utility and pipeline corridor construction.Border Security Development and Enforcement Activities All known Texas populations of prostrate milkweed are within 9 miles (14.5 km) of the Texas-Mexico border. To address border security concerns, additional border barrier construction was proposed in the Rio Grande Valley, including the Arroyo Morteros tract of the Lower Rio Grande Valley NWR. Should border wall construction occur, and depending on the alignment, construction could remove prostrate milkweed plants that occur within the construction footprint. Additionally, CBP plans to improve roads across this tract (Vallejo 2019, pers. comm.) and may also install new drag strips along existing roads. Drag strips are 13- to 16-foot (ft) (4- to 5-m) -wide swaths cleared of all vegetation and regularly scraped to keep the soil surface loose, in order to detect recent foot traffic. Due to the high gypsum content, soils in this area are extremely vulnerable to gully erosion. Hence, the unvegetated, continually disturbed drag strips may exacerbate soil erosion and impact a much wider area. TXNDD ranks drag strip construction within prostrate milkweed populations as a small threat (defined as a threat that affects 1-10 percent of the total population or occurrences or extent) with an extreme level of severity (likely to destroy or eliminate occurrences or habitat, or reduce population by 71-100 percent) (TXNDD 2016). Consequently, the construction of border barriers, roads, and drag strips are potential threats of high magnitude to prostrate milkweed populations, depending on their alignment, design, and proximity to populations and local topography. Native plant populations are legally protected on NWRs and, if listed under the Act, have additional legal protections from federally funded or regulated actions. However, a provision of the REAL ID Act of 2005 gives the Secretary of Homeland Security authority to waive other Federal laws, including the Endangered Species Act, in order to expedite construction of border barriers. Therefore, border barrier construction on private and public lands is exempt from consultation with the Service under section 7 of the Act. During the previous phase of border barrier construction, beginning in 2007, the Department of Homeland Security (DHS) and the Service coordinated to establish best management practices for the federally listed plants and animals in the project impact area (DHS 2008); nevertheless, these best management practices did not address prostrate milkweed.Small Population Sizes and Population Fragmentation Small, isolated populations are more vulnerable to catastrophic losses caused by random fluctuations in recruitment (demographic stochasticity) or variations in rainfall or other environmental factors (environmental stochasticity) (Service 2016, p. 20). Small, reproductively isolated populations are susceptible to the loss of genetic diversity, to genetic drift, and to inbreeding (Barrett and Kohn 1991, pp. 3-30). Due to the small size and isolation of prostrate milkweed populations, several may already suffer from genetic bottlenecks, genetic drift, inbreeding, and loss of allelic diversity. In addition to population size, it is likely that population density and connectivity also influence population viability (Service 2020, p. 51). Prostrate milkweed is very likely to be an obligate outcrosser (fertilization between different individuals), as are most other Asclepias species, which requires that genetically compatible individuals be clustered within the forage range of the native pollinators for reproduction to occur (Service 2020, p. 51). While the specific pollinators of this species have not been revealed, they are likely to be large bees or wasps, and the forage range could be up to several kilometers. If this is the case, viable populations of prostrate milkweed could be dispersed at very low densities over relatively large areas, provided that they lie within fairly contiguous habitats that are traversed by pollinating insects. Thus, the small, isolated clusters of prostrate milkweed that have been documented, principally along public roads that slice through large expanses of potential habitat on private lands, may represent only tiny fractions of larger, highly dispersed populations (Service 2020, p. 51). Based strictly on the available scientific ***data***, the documented populations of prostrate milkweed are all far below the estimated MVP level and may be affected by the demographic and genetic consequences of small population sizes and by fragmentation of populations.Summary Our analysis of the past, current, and future influences on the needs of prostrate milkweed for long-term viability revealed several threats that pose a risk to current and future viability: Competition from introduced invasive grass (buffelgrass); root-plowing of rangelands; development of new oil and gas wells, wind energy farms, roads, pipelines, and utility corridors; development of new border barriers and drag strips; and the demographic and genetic consequences of small population sizes and population fragmentation. Conversely, well-managed livestock grazing of rangeland is compatible with management of prostrate milkweed habitat and may actually benefit this species.Species Condition The current condition of prostrate milkweed takes into account the current status and risks to its populations. In the SSA report, for each population, we developed and assigned condition categories for two demographic factors and two habitat factors that are important for viability of prostrate milkweed. The condition scores for each factor were then used to estimate the probability of persistence over the next 30 years. Populations were rated high, moderate, or low when that probability is greater than 90 percent, between 60 and 90 percent, or between 10 and 60 percent, respectively. Functionally[[Page 8517]]extirpated populations are not expected to persist over 30 years or are already extirpated. There are 24 populations of prostrate milkweed remaining in Starr and Zapata Counties, Texas, and in Tamaulipas and eastern Nuevo Le[oacute]n, Mexico (see Table 1, below). The species range extends more than 200 miles (320 kilometers) from northwest to southeast. In Texas, one population, Dolores, is somewhat isolated in northern Zapata County, with the nearest known population approximately 25 miles (40 km) away. In Mexico, eight known populations are located in isolated pockets widely scattered in Tamaulipas and eastern Nuevo Le[oacute]n. However, botanists have only surveyed a small proportion of the species' range. Furthermore, the species remains dormant and undetectable except for short periods of time after infrequent, heavy rainfall. Consequently, although the species is certainly rare, its actual abundance is difficult to determine. It is likely that, historically, populations occurred between these areas, connecting the populations in Texas and Mexico. Because they are widely separated, natural gene flow or reestablishment following disturbance is very unlikely between the 24 known populations. Based upon our analysis of current conditions of these 24 extant populations, none are in high condition, 5 are in moderate condition, and 19 are in low condition. Table 1--Summary of Current Condition for Prostrate Milkweed------------------------------------------------------------------------ Population name Current condition------------------------------------------------------------------------Dolores.................................. Low.14493.................................... Low.14491.................................... Low.Arroyo del Tigre Grande.................. Moderate.Arroyo del Tigre Chiquito................ Low.FM 2098.................................. Low.Falcon................................... Low.Los Alvaros.............................. Moderate.Arroyo Morteros Tract.................... Moderate.Los Arrieros Loop........................ Low.Arroyo de los Mudos...................... Low.Mission Mier a Visita.................... Low.San Juli[aacute]n Road................... Moderate.FM 3167.................................. Moderate.Arroyo Roma.............................. Low.Arroyo Ramirez Tract..................... Low.Rancho La Coma........................... Low.Road to Guerrero Viejo................... Low.Carboneras............................... Low.Punta de Alambre......................... Low.Intersection of 101-180.................. Low.Rio El Cat[aacute]n...................... Low.Rancho Loreto North...................... Low.Rancho Loreto South...................... Low.------------------------------------------------------------------------ The two demographic factors used to analyze resiliency of prostrate milkweed populations are abundance and recruitment rate. Related to abundance, a highly resilient population of prostrate milkweed has 1,600 or more adult individuals, a moderately resilient population has from 800 to 1,600 mature individuals, and a population with less than 800 mature individuals has low resilience (Service 2020, p. 38). Prostrate milkweed populations have high resiliency if the recruitment rate is greater than or equal to 25 percent of individuals producing viable seeds per year. Moderately resilient populations have recruitment rates of between 15 and 24 percent per year, and populations with low resiliency have recruitment rates of less than 15 percent per year (Service 2020, p. 57). The two habitat factors used to analyze resiliency of prostrate milkweed populations were canopy cover and ground cover. Highly resilient populations have less than 30 percent canopy cover and have all bare ground or are sparsely vegetated with mostly native grass and/or forbs. Moderately resilient populations have between 30 and 60 percent canopy cover and are sparsely vegetated with a mixture of native and nonnative grasses and/or forbs. Minimally resilient populations have between 61 and 100 percent canopy cover and a dense ground cover of native or introduced grasses and forbs and little or no bare ground (Service 2020, p. 57). Redundancy is low for this species due to low numbers of populations in moderate to high condition for resiliency, making prostrate milkweed populations vulnerable to extirpations from catastrophic events. Because buffelgrass invasion is prevalent in this area, ecological diversity among the known populations is limited. Further, the populations are isolated and widespread across the range, and therefore gene flow among the populations is limited. As a consequence of these current conditions, the viability of the prostrate milkweed now primarily depends on maintaining and restoring the remaining isolated populations and potentially discovering or reintroducing new populations where feasible. As part of the SSA, we also developed three plausible future scenarios to capture the range of uncertainties regarding future threats and the projected responses by the prostrate milkweed. Our scenarios included a continuing conditions scenario, which incorporated the current risk factors continuing on the same trajectory that they are on now. We also evaluated a conservation scenario and a scenario with increased stressors. Because we determined that the current condition of the prostrate milkweed is consistent with an endangered species (see Determination of Species Status, below), we are not presenting the results of the future scenarios in this proposed rule. Please refer to the SSA report (Service 2020) for the full analysis of future scenarios. We note that, by using the SSA framework to guide our analysis of the scientific information documented in the SSA report, we have not only analyzed individual effects on the species, but we have also analyzed their potential cumulative effects. We incorporate the cumulative effects into our SSA analysis when we characterize the current and future condition of the species. To assess the current and future condition of the species, we undertake an iterative analysis that encompasses and incorporates the threats individually and then accumulates and evaluates the effects of all the factors that may be influencing the species, including threats and conservation efforts. Because the SSA framework considers not just the presence of the factors, but to what degree they collectively influence risk to the entire species, our assessment integrates the cumulative effects of the factors and replaces a standalone cumulative effects analysis.Determination of Prostrate Milkweed Status Section 4 of the Act (16 U.S.C 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species meets the definition of an endangered species or a threatened species. The Act defines endangered species as a species ``in danger of extinction throughout all or a significant portion of its range,'' and threatened species as a species ``likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' The Act requires that we determine whether a species meets the definition of endangered species or threatened species because of any of the following factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence.Status Throughout All of Its Range After evaluating threats to the species and assessing the cumulative effect of[[Page 8518]]the threats under the section 4(a)(1) factors, we found that, of the 24 known prostrate milkweed populations remaining, 19 are small and isolated and are low resiliency, and five have moderate resiliency and connection to other populations, and none have high resiliency. Several factors pose a threat to prostrate milkweed, including competition from introduced invasive grass; habitat loss and degradations from root-plowing and ***conversion*** of native vegetation to improved buffelgrass pasture; habitat loss from ROW construction and maintenance from energy development and road and utility construction; habitat loss from border security development and enforcement activities (Factor A from the Act); and the demographic and genetic consequences of small population sizes (Factor E). All the aforementioned threats are currently affecting the known populations of prostrate milkweed. Buffelgrass has already negatively impacted all of the Texas populations (TXNDD 2019-2020, entire; Eason 2019, pers. comm.; Kieschnick 2019, pers. comm.; Santore 2019, unpaginated) and will continue to do so in the future. Habitat loss and degradation from root-plowing and ***conversion*** of native vegetation to improved buffelgrass pasture has also already been occurring for many years (Service 2020, p. 40). Habitat loss from ROW construction and maintenance from energy development and road and utility construction has already been observed from oil and gas development occurring in Zapata County. As of November 2019, no wind turbines, oil or gas well pads, pipelines, or energy service roads have been constructed directly within known prostrate milkweed populations. However, some Starr County prostrate milkweed populations are less than 2.0 km (1.2 mi) from existing wind turbines (Service 2020, pp. 42-43), and a few wind energy farms are expected to be constructed in the future, which could lead to additional habitat loss. Habitat loss from border security development and enforcement activities has occurred in recent years and is expected to continue into the future. And, finally, the demographic and genetic consequences of small population sizes is a current threat to the prostrate milkweed. This situation is not expected to change into the future. In addition to the current threats, redundancy and representation are also limited. There are twenty-four known populations that are distributed widely across its range, and the majority of those populations are currently in low condition. Should a catastrophic event occur, the populations are vulnerable to extirpation because they are small and isolated from each other. The small, reproductively isolated populations are also susceptible to the loss of genetic diversity, genetic drift, and inbreeding due to random fluctuations in recruitment (demographic stochasticity) or variations in rainfall or other environmental factors (environmental stochasticity). Because of the overall species' current resiliency, redundancy, and representation, prostrate milkweed is currently in danger of extinction throughout all of its range. We do not find the species meets the definition of a threatened species because the species has already shown low levels in current resiliency, redundancy, and representation due to the threats mentioned above. Thus, after assessing the best available information, we determine that prostrate milkweed is in danger of extinction throughout all of its range.Status Throughout a Significant Portion of Its Range Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. We have determined that the prostrate milkweed is in danger of extinction throughout all of its range and accordingly did not undertake an analysis of any significant portion of its range. Because the prostrate milkweed warrants listing as endangered throughout all of its range, our determination is consistent with the decision in Center for Biological Diversity v. Everson, 2020 WL 437289 (D.D.C Jan. 28, 2020), in which the court vacated the aspect of the Final Policy on Interpretation of the Phrase ``Significant Portion of Its Range'' in the Endangered Species Act's Definitions of ``Endangered Species'' and ``Threatened Species'' (79 FR 37578; July 1, 2014) that provided the Service does not undertake an analysis of significant portions of a species' range if the species warrants listing as threatened throughout all of its range.Determination of Status Our review of the best available scientific and commercial information indicates that the prostrate milkweed meets the definition of an endangered species. Therefore, we propose to list the prostrate milkweed as an endangered species in accordance with sections 3(20) and 4(a)(1) of the Act.Available Conservation Measures Conservation measures provided to species listed as endangered or threatened species under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness, and conservation by Federal, State, Tribal, and local agencies, private organizations, and individuals. The Act encourages cooperation with the States and other countries and calls for recovery actions to be carried out for listed species. The protection required by Federal agencies and the prohibitions against certain activities are discussed, in part, below. The primary purpose of the Act is the conservation of endangered and threatened species and the ecosystems upon which they depend. The ultimate goal of such conservation efforts is the recovery of these listed species, so that they no longer need the protective measures of the Act. Section 4(f) of the Act calls for the Service to develop and implement recovery plans for the conservation of endangered and threatened species. The recovery planning process involves the identification of actions that are necessary to halt or reverse the species' decline by addressing the threats to its survival and recovery. The goal of this process is to restore listed species to a point where they are secure, self-sustaining, and functioning components of their ecosystems. Recovery planning consists of preparing draft and final recovery plans, beginning with the development of a recovery outline and making it available to the public within 30 days of a final listing determination. The recovery outline guides the immediate implementation of urgent recovery actions and describes the process to be used to develop a recovery plan. Revisions of the plan may be done to address continuing or new threats to the species, as new substantive information becomes available. The recovery plan also identifies recovery criteria for review of when a species may be ready for reclassification from endangered to threatened (``downlisting'') or removal from protected status (``delisting''), and methods for monitoring recovery progress. Recovery plans also establish a framework for agencies to coordinate their recovery efforts and provide estimates of the cost of implementing recovery tasks. Recovery teams (composed of species experts, Federal and State agencies, nongovernmental organizations, and stakeholders) are often established to develop recovery[[Page 8519]]plans. When completed, the recovery outline, draft recovery plan, and the final recovery plan will be available on our website ([*https://www.fws.gov/endangered*](https://www.fws.gov/endangered)), or from our Texas Coastal Ecological Services Field Office (see FOR FURTHER INFORMATION CONTACT). Implementation of recovery actions generally requires the participation of a broad range of partners, including other Federal agencies, States, Tribes, nongovernmental organizations, businesses, and private landowners. Examples of recovery actions include habitat restoration (e.g , restoration of native vegetation), research, captive propagation and reintroduction, and outreach and education. The recovery of many listed species cannot be accomplished solely on Federal lands because their range may occur primarily or solely on non-Federal lands. To achieve recovery of these species requires cooperative conservation efforts on private, State, and Tribal lands. If this species is listed, funding for recovery actions will be available from a variety of sources, including Federal budgets, State programs, and cost-share grants for non-Federal landowners, the academic community, and nongovernmental organizations. In addition, pursuant to section 6 of the Act, the State of Texas would be eligible for Federal funds to implement management actions that promote the protection or recovery of the prostrate milkweed. Information on our grant programs that are available to aid species recovery can be found at: [*https://www.fws.gov/grants*](https://www.fws.gov/grants). Although the prostrate milkweed is only proposed for listing under the Act at this time, please let us know if you are interested in participating in recovery efforts for this species. Additionally, we invite you to submit any new information on this species whenever it becomes available and any information you may have for recovery planning purposes (see FOR FURTHER INFORMATION CONTACT). Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as an endangered or threatened species and with respect to its critical habitat, if any is designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any action that is likely to jeopardize the continued existence of a species proposed for listing or result in destruction or adverse modification of proposed critical habitat. If a species is listed subsequently, section 7(a)(2) of the Act requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of the species or destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into consultation with the Service. Federal agency actions within the species' habitat that may require conference or consultation or both as described in the preceding paragraph include management and any other landscape-altering activities on Federal lands administered by the U.S Fish and Wildlife Service. The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to endangered plants. The prohibitions of section 9(a)(2) of the Act, codified at 50 CFR 17.61, make it illegal for any person subject to the jurisdiction of the United States to: Import or export; remove and reduce to possession from areas under Federal jurisdiction; maliciously damage or destroy on any such area; remove, cut, dig up, or damage or destroy on any other area in knowing violation of any law or regulation of any State or in the course of any violation of a State criminal trespass law; deliver, receive, carry, transport, or ship in interstate or foreign commerce, by any means whatsoever and in the course of a commercial activity; or sell or offer for sale in interstate or foreign commerce an endangered plant. Certain exceptions apply to employees of the Service, the National Marine Fisheries Service, other Federal land management agencies, and State conservation agencies. We may issue permits to carry out otherwise prohibited activities involving endangered plants under certain circumstances. Regulations governing permits are codified at 50 CFR 17.62 With regard to endangered plants, a permit may be issued for scientific purposes or for enhancing the propagation or survival of the species. The statute also contains certain exemptions from the prohibitions, which are found in sections 9 and 10 of the Act. It is our policy, as published in the Federal Register on July 1, 1994 (59 FR 34272), to identify to the maximum extent practicable at the time a species is listed, those activities that would or would not constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of a proposed listing on proposed and ongoing activities within the range of the species proposed for listing. Based on the best available information, the following actions are unlikely to result in a violation of section 9, if these activities are carried out in accordance with existing regulations and permit requirements; this list is not comprehensive: (1) Normal ***agricultural*** and silvicultural practices, including herbicide and pesticide use, that are carried out in accordance with any existing regulations, permit and label requirements, and best management practices; and (2) Normal residential landscaping activities on non-Federal lands; and (3) Recreational use with minimal ground disturbance. Based on the best available information, the following activities may potentially result in a violation of section 9 of the Act if they are not authorized in accordance with applicable law; this list is not comprehensive: (1) Unauthorized handling, removing, trampling, or ***collecting*** of prostrate milkweed on Federal land; and (2) Removing, cutting, digging up, or damaging or destroying prostrate milkweed in knowing violation of any law or regulation of the State of Texas or in the course of any violation of a State criminal trespass law.II. Critical HabitatBackground Critical habitat is defined in section 3 of the Act as: (1) The specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (a) Essential to the conservation of the species, and (b) Which may require special management considerations or protection; and (2) Specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. Our regulations at 50 CFR 424.02 define the geographical area occupied by the species as an area that may generally be delineated around species' occurrences, as determined by the Secretary (i.e , range). Such areas may include those areas used throughout all or part of the species' life cycle, even if not used on a regular basis (e.g , migratory corridors, seasonal habitats, and habitats used periodically, but not solely by vagrant individuals).[[Page 8520]]Additionally, our regulations at 50 CFR 424.02 define the word ``habitat'' as, for the purposes of designating critical habitat only, ``the abiotic and biotic setting that currently or periodically contains the resources and conditions necessary to support one or more life processes of a species.'' Conservation, as defined under section 3 of the Act, means to use and the use of all methods and procedures that are necessary to bring an endangered or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking. Critical habitat receives protection under section 7 of the Act through the requirement that Federal agencies ensure, in consultation with the Service, that any action they authorize, fund, or carry out is not likely to result in the destruction or adverse modification of critical habitat. The designation of critical habitat does not affect land ownership or establish a refuge, wilderness, reserve, preserve, or other conservation area. Designation also does not allow the government or public to access private lands, nor does designation require implementation of restoration, recovery, or enhancement measures by non-Federal landowners. Where a landowner requests Federal agency funding or authorization for an action that may affect a listed species or critical habitat, the Federal agency would be required to consult with the Service under section 7(a)(2) of the Act. However, even if the Service were to conclude that the proposed activity would result in destruction or adverse modification of the critical habitat, the Federal action agency and the landowner are not required to abandon the proposed activity, or to restore or recover the species; instead, they must implement ``reasonable and prudent alternatives'' to avoid destruction or adverse modification of critical habitat. Under the first prong of the Act's definition of critical habitat, areas within the geographical area occupied by the species at the time it was listed are included in a critical habitat designation if they contain physical or biological features (1) which are essential to the conservation of the species and (2) which may require special management considerations or protection. For these areas, critical habitat designations identify, to the extent known using the best scientific and commercial ***data*** available, those physical or biological features that are essential to the conservation of the species (such as space, food, cover, and protected habitat). In identifying those physical or biological features that occur in specific occupied areas, we focus on the specific features that are essential to support the life-history needs of the species, including, but not limited to, water characteristics, soil type, geological features, prey, vegetation, symbiotic species, or other features. A feature may be a single habitat characteristic or a more complex combination of habitat characteristics. Features may include habitat characteristics that support ephemeral or dynamic habitat conditions. Features may also be expressed in terms relating to principles of conservation biology, such as patch size, distribution distances, and connectivity. Under the second prong of the Act's definition of critical habitat, we can designate critical habitat in areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. The implementing regulations at 50 CFR 424.12(b)(2) further delineate unoccupied critical habitat by setting out three specific parameters: (1) When designating critical habitat, the Secretary will first evaluate areas occupied by the species; (2) the Secretary will only consider unoccupied areas to be essential where a critical habitat designation limited to geographical areas occupied by the species would be inadequate to ensure the conservation of the species; and (3) for an unoccupied area to be considered essential, the Secretary must determine that there is a reasonable certainty both that the area will contribute to the conservation of the species and that the area contains one or more of those physical or biological features essential to the conservation of the species. Section 4 of the Act requires that we designate critical habitat on the basis of the best scientific ***data*** available. Further, our Policy on Information Standards Under the Endangered Species Act (published in the Federal Register on July 1, 1994 (59 FR 34271)), the Information Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Pub. L. 106-554; H.R 5658)), and our associated Information Quality Guidelines provide criteria, establish procedures, and provide guidance to ensure that our decisions are based on the best scientific ***data*** available. They require our biologists, to the extent consistent with the Act and with the use of the best scientific ***data*** available, to use primary and original sources of information as the basis for recommendations to designate critical habitat. When we are determining which areas should be designated as critical habitat, our primary source of information is generally the information from the SSA report and information developed during the listing process for the species. Additional information sources may include any generalized conservation strategy, criteria, or outline that may have been developed for the species; the recovery plan for the species; articles in peer-reviewed journals; conservation plans developed by States and counties; scientific status surveys and studies; biological assessments; other unpublished materials; or experts' opinions or personal knowledge. As the regulatory definition of ``habitat'' reflects (50 CFR 424.02), habitat is dynamic, and species may move from one area to another over time. We recognize that critical habitat designated at a particular point in time may not include all of the habitat areas that we may later determine are necessary for the recovery of the species. For these reasons, a critical habitat designation does not signal that habitat outside the designated area is unimportant or may not be needed for recovery of the species. Areas that are important to the conservation of the species, both inside and outside the critical habitat designation, will continue to be subject to: (1) Conservation actions implemented under section 7(a)(1) of the Act; (2) regulatory protections afforded by the requirement in section 7(a)(2) of the Act for Federal agencies to ensure their actions are not likely to jeopardize the continued existence of any endangered or threatened species; and (3) the prohibitions found in section 9 of the Act. Federally funded or permitted projects affecting listed species outside their designated critical habitat areas may still result in jeopardy findings in some cases. These protections and conservation tools will continue to contribute to recovery of the species. Similarly, critical habitat designations made on the basis of the best available information at the time of designation will not control the direction and substance of future recovery plans, habitat conservation plans (HCPs), or other species conservation planning[[Page 8521]]efforts if new information available at the time of those planning efforts calls for a different outcome.Prudency Determination Section 4(a)(3) of the Act, as amended, and implementing regulations (50 CFR 424.12) require that, to the maximum extent prudent and determinable, the Secretary shall designate critical habitat at the time the species is determined to be an endangered or threatened species. Our regulations (50 CFR 424.12(a)(1)) state that the Secretary may, but is not required to, determine that a designation would not be prudent in the following circumstances: (i) The species is threatened by taking or other human activity and identification of critical habitat can be expected to increase the degree of such threat to the species; (ii) The present or threatened destruction, modification, or curtailment of a species' habitat or range is not a threat to the species, or threats to the species' habitat stem solely from causes that cannot be addressed through management actions resulting from consultations under section 7(a)(2) of the Act; (iii) Areas within the jurisdiction of the United States provide no more than negligible conservation value, if any, for a species occurring primarily outside the jurisdiction of the United States; (iv) No areas meet the definition of critical habitat; or (v) The Secretary otherwise determines that designation of critical habitat would not be prudent based on the best scientific ***data*** available. As discussed earlier in this document, there is currently no imminent threat of ***collection*** or vandalism identified under Factor B for this species, and identification and mapping of critical habitat is not expected to initiate any such threat. In our SSA and proposed listing determination for prostrate milkweed, we determined that the present or threatened destruction, modification, or curtailment of habitat or range is a threat to prostrate milkweed and that those threats in some way can be addressed by section 7(a)(2) consultation measures. We are able to identify areas that meet the definition of critical habitat where the species occurs in the United States. Therefore, because none of the circumstances enumerated in our regulations at 50 CFR 424.12(a)(1) have been met and because the Secretary has not identified other circumstances for which this designation of critical habitat would not be prudent, we have determined that the designation of critical habitat is prudent for prostrate milkweed.Critical Habitat Determinability Having determined that designation is prudent, under section 4(a)(3) of the Act we must find whether critical habitat for the prostrate milkweed is determinable. Our regulations at 50 CFR 424.12(a)(2) state that critical habitat is not determinable when one or both of the following situations exist: (i) ***Data*** sufficient to perform required analyses are lacking, or (ii) The biological needs of the species are not sufficiently well known to identify any area that meets the definition of ``critical habitat.'' When critical habitat is not determinable, the Act allows the Service an additional year to publish a critical habitat designation (16 U.S.C 1533(b)(6)(C)(ii)). We reviewed the available information pertaining to the biological needs of the species and habitat characteristics where this species is located. This and other information represent the best scientific ***data*** available and led us to conclude that the designation of critical habitat is determinable for the prostrate milkweed.Physical or Biological Features Essential to the Conservation of the Species In accordance with section 3(5)(A)(i) of the Act and regulations at 50 CFR 424.12(b), in determining which areas we will designate as critical habitat from within the geographical area occupied by the species at the time of listing, we consider the physical or biological features (PBFs) that are essential to the conservation of the species and that may require special management considerations or protection. The regulations at 50 CFR 424.02 define ``physical or biological features essential to the conservation of the species'' as the features that occur in specific areas and that are essential to support the life-history needs of the species, including, but not limited to, water characteristics, soil type, geological features, sites, prey, vegetation, symbiotic species, or other features. A feature may be a single habitat characteristic or a more complex combination of habitat characteristics. Features may include habitat characteristics that support ephemeral or dynamic habitat conditions. Features may also be expressed in terms relating to principles of conservation biology, such as patch size, distribution distances, and connectivity. For example, physical features essential to the conservation of the species might include gravel of a particular size required for spawning, alkaline soil for seed germination, protective cover for migration, or susceptibility to flooding or fire that maintains necessary early-successional habitat characteristics. Biological features might include prey species, forage grasses, specific kinds or ages of trees for roosting or nesting, symbiotic fungi, or a particular level of nonnative species consistent with conservation needs of the listed species. The features may also be combinations of habitat characteristics and may encompass the relationship between characteristics or the necessary amount of a characteristic essential to support the life history of the species. In considering whether features are essential to the conservation of the species, we may consider an appropriate quality, quantity, and spatial and temporal arrangement of habitat characteristics in the context of the life-history needs, condition, and status of the species. These characteristics include, but are not limited to, space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, or rearing (or development) of offspring; and habitats that are protected from disturbance.Geological Substrate and Soils Prostrate milkweed grows in well-drained sandy soils of the Tamaulipan shrubland region of south Texas and northeast Mexico (Service 2020, pp. 22-26). In Starr and Zapata Counties, Texas, the soils of documented sites overlie Eocene and Oligocene sandstones and clays of the Laredo, Yegua, and Jackson geological formations (Stoeser et al. 2005). In some occupied sites, a stratum of indurated caliche may also be present; in south Texas, caliche refers to soil strata of precipitated calcium carbonate formed during the early Pliocene (Spearing 1998, pp. 258, 398; Baskin and Hulbert, Jr. 2008, p. 93). Soil types of these occupied sites include deep eolian Hebbronville sands, Copita fine sandy loam, Brennan fine sandy loam, eroded Maverick soils, Catarina clay, and Zapata soils (USDA 1972; USDA 2011). Elevated levels of gypsum are present at some sites. The climate of the Tamaulipan shrubland region is subtropical and semi-arid. Much of the region's precipitation occurs during infrequent periods of heavy rainfall that interrupt prolonged spells of very hot, dry weather. Rainfall readily infiltrates into the well-drained sandy soils of prostrate milkweed habitats, but moisture does[[Page 8522]]not persist long in these soils. Many occupied sites have underlying strata of sandstone; these barriers to root growth limit the establishment of trees and taller shrubs. The growth of many plant species is also limited by high soil gypsum concentrations in some occupied sites. The rapid drying of soil, impenetrable rock strata, and high gypsum are all factors that reduce competition from woody plants, grasses, and other herbaceous plants. Prostrate milkweed forms tubers underground that are able to persist in a dormant condition for one to several years. The species responds very quickly to rainfall; the tubers sprout new stems that emerge, flower, and set seed in a matter of weeks, and the plants store carbohydrates, minerals, and water in tubers. Then the above-ground portions die back during hot, dry weather. Prostrate milkweed does not occur in areas of higher rainfall or where moisture persists longer in deeper silty or clayey soils. The species does not persist when occupied sites develop a dense shrub overstory or dense cover of grasses. We conclude that prostrate milkweed is endemic to sites where it escapes competition from other plants through its unique adaptation to ephemeral soil moisture, prolonged drought, and tolerance of high gypsum concentrations. Therefore, well-drained sandy soil overlying sandstone or indurated caliche strata is an essential physical feature of prostrate milkweed critical habitats. A high soil gypsum concentration contributes to the habitat suitability of some sites by reducing competition, and is an essential physical feature.Ecological Community Within the Tamaulipan shrubland ecological region, prostrate milkweed inhabits arid subtropical grasslands and shrub savannas. It requires an open canopy, where there is little or no shade from trees and shrubs, and relatively little competition from grasses and herbaceous plants; the estimated combined cover of woody plants, grasses, and herbaceous plants at a site in Zapata County was less than 30 percent (Damude and Poole 1990, p. 16). It is likely that naturally occurring wildfires, in the past, maintained the relatively open structure of these plant communities (Scifres and Hamilton 1993, pp. 8-21). We have observed an increased abundance of other Texas species of Asclepias, including antelope horns (A. asperula), Emory's milkweed (A. emoryi), zizotes milkweed (A. oenotheroides), and wand milkweed (A. viridiflora), during the first few years after sites have burned; this fire-following effect has been described for green milkweed (A. viridis) (Baum and Sharber 2012, entire). Prostrate milkweed, like other milkweeds, may also be stimulated to grow and flower after wildfires have reduced competition. Most Asclepias species require outcrossing for effective fertilization of flowers. All Asclepias species have highly specialized pollination mechanisms that require animal pollinators to carry pollen from one individual to another. Although the effective pollinators of prostrate milkweed have not been determined, these are likely to include large bees and wasps. For example, the closely related zizotes milkweed is effectively pollinated by very large wasps called tarantula hawks (Pepsis spp. and Hemipepsis spp.) (Service 2020, pp. 17, 35-36). Therefore, prostrate milkweed habitats must also support populations of large bees and wasps that, in turn, require abundant, diverse sources of pollen and nectar. Much like milkweeds, many pollen and nectar plants are fire followers that are most abundant in sites that burn periodically, but decline when fires are infrequent. Buffelgrass is an African grass that is widely planted in south Texas for livestock forage. Buffelgrass is highly invasive, and frequently displaces native grasses and herbaceous plants (Best 2009, pp. 310-311), including prostrate milkweed (Service 2020, pp. 39-40) and the pollen and nectar plants needed to support pollinator populations. The majority of prostrate milkweed plants have been observed in disturbed soils where buffelgrass is absent or at low densities (Eason 2019, pers. comm.; Strong 2019, pers. comm.). Prostrate milkweed requires an open canopy with less than 30 percent cover of native and nonnative grasses and herbaceous plants combined (Damude and Poole 1990, p. 16); so, assuming nonnative buffelgrass is more prevalent, we estimate that 20 percent or less cover of buffelgrass is at a low enough density for prostrate milkweed to survive. Therefore, prostrated milkweed habitats must also have less than 20 percent cover of buffelgrass for prostrate milkweed to have access to sufficient resources such as sunlight. In summary, the essential biological features of prostrate milkweed critical habitats are: (1) Open savannas and grasslands of the Tamaulipan shrubland ecological region; (2) vegetation composition that includes abundant, diverse pollen and nectar plants and healthy populations of native bee and wasp species; and (3) less than 20 percent cover of buffelgrass. Periodic prescribed burning may be necessary to maintain the open structure and diverse composition of the species' habitats.Summary of Essential Physical or Biological Features Additional information can be found in the SSA report (Service 2020, available on [*https://www.regulations.gov*](https://www.regulations.gov) under Docket No. FWS-R2-ES-2021-0041). We have determined that the following physical or biological features are essential to the conservation of prostrate milkweed: (1) Well-drained sandy soil overlying strata of sandstone or indurated caliche; (2) High soil gypsum concentration; (3) Open savannas and grasslands of the Tamaulipan shrubland ecological region; (4) Vegetation composition that includes abundant, diverse pollen and nectar plants and healthy populations of native bee and wasp species; and (5) Less than 20 percent cover of buffelgrass.Special Management Considerations or Protection When designating critical habitat, we assess whether the specific areas within the geographical area occupied by the species at the time of listing contain features that are essential to the conservation of the species and which may require special management considerations or protection. The features essential to the conservation of this species may require special management considerations or protection to reduce the following threats: Nonnative invasive grass; root-plowing and ***conversion*** of native vegetation to buffelgrass pasture; ROW construction and maintenance from energy development and road and utility construction; border security development and law enforcement activities; and small population sizes. Management activities that could ameliorate these threats include, but are not limited to: Prescribed burning, grazing, and/or brush thinning; nonnative invasive grass control; protection from activities that disturb the soil; and propagation and reintroduction of plants in restorable areas. In summary, we find that the occupied areas we are proposing to designate as critical habitat contain the PBFs that are essential to the conservation of the species and that may require special management considerations or protection. Special management considerations or protection may be required of the Federal action agency to eliminate, or to[[Page 8523]]reduce to negligible levels, the threats affecting the PBFs of each unit.Criteria Used To Identify Critical Habitat As required by section 4(b)(2) of the Act, we use the best scientific ***data*** available to designate critical habitat. In accordance with the Act and our implementing regulations at 50 CFR 424.12(b), we review available information pertaining to the habitat requirements of the species and identify specific areas within the geographical area occupied by the species at the time of listing and any specific areas outside the geographical area occupied by the species to be considered for designation as critical habitat. We are not currently proposing to designate any areas outside the geographical area occupied by the species because we have not identified any unoccupied areas that meet the definition of critical habitat. While prostrate milkweed needs additional populations to reduce the likelihood of extinction in the future, we are not able to identify additional locations that may have a reasonable certainty of contributing to conservation at this time due to limited access to privately owned lands and information regarding lands that would be good candidates for introductions in the species' range. In summary, for areas within the geographic area occupied by the species at the time of listing, we delineated critical habitat unit boundaries using the following criteria. First, using ArcGIS software, we identified potential habitats in Starr and Zapata Counties that have the essential features of geology and soils described above. The geographic information we obtained about the known populations exists as: (1) Vegetation surveys of entire tracts of land; (2) Element Occurrence (EO) polygons represented in the TXNDD; or (3) points and lines represented in the TXNDD. We then adapted methods to delineate critical habitats for each type of geographic information. We delineated all of the potential habitats that occur at the Arroyo Ramirez tract and the Arroyo Morteros tract of the Lower Rio Grande Valley NWR as proposed critical habitat (Units 2 and 5). The Lower Rio Grande Valley NWR comprises several disconnected land parcels, rather than one big land area, and these parcels are referred to as ``tracts.'' The two tracts that are included in proposed Units 2 and 5 are isolated areas of refuge land. These NWR tracts are managed for the conservation of native plants and animals, and we have conducted plant surveys and have extensive knowledge of habitat suitability of these tracts. Similarly, we delineated all of the potential habitats that occur at a private ranch (Unit 6) that is managed for wildlife and plant conservation as proposed critical habitat. The landowner has granted access for plant surveys and vegetation studies to researchers from the Texas Parks and Wildlife Department, academic institutions, and the Service. Two of the known populations are represented as polygons in the TXNDD located in the ROWs of unpaved county roads in Starr County. We have no information about the land uses or habitat suitability of areas outside these polygons. We delineated all of the potential habitats that occur within these polygons (Units 4 and 7) as proposed critical habitat. Three of the known populations are represented as one or more points or lines in the TXNDD located on privately owned land. We have no information about the land uses or habitat suitability of areas outside the points and lines. Because critical habitats must be areas, not points or lines, we delineated all areas of potential habitat within a buffer of 50 m (164 ft) from these points and lines as proposed critical habitat units; we chose the 50-m distance because the TXNDD also used a 50-m buffer for most of these features to account for estimated geographic precision. To complete the delineations of critical habitat areas, we overlaid each critical habitat area described above on Digital Ortho-Quarter Quad aerial photographs to identify and exclude any portions of sites that consisted of unvegetated road beds that are frequently driven and are maintained by road grading, as well as structures and other developed areas that did not contain the geological and soil substrates and vegetative cover that are essential physical and biological features. We did not include one historical observation that has only approximate location ***data*** and cannot be mapped. We also did not include any of the populations reported in the U.S Highway 83 ROW, all of which have declined since they were first reported. For example, part of EO 3 (Dolores) along U.S 83 had about 200 individuals in 1988; four surveys conducted from 2009 to 2017 found from 0 to 3 individuals. The degree and frequency of soil disturbance in the ROWs of improved highways has caused almost complete replacement of the native plant community with introduced species, such as buffelgrass. Hence, the essential physical and biological features are no longer present along this improved highway ROW. For the same reasons, we did not include one site in the road bed of a Starr County park where the species was last observed in 1995. The scale of the maps we prepared under the parameters for publication within the Code of Federal Regulations may not reflect the exclusion of such developed lands. Any such lands inadvertently left inside critical habitat boundaries shown on the maps of this proposed rule have been excluded by text in the proposed rule and are not proposed for designation as critical habitat. Therefore, if the critical habitat is finalized as proposed, a Federal action involving these lands would not trigger section 7 consultation with respect to critical habitat and the requirement of no adverse modification unless the specific action would affect the physical or biological features in the adjacent critical habitat. We propose to designate as critical habitat lands that we have determined are occupied at the time of listing (i.e , currently occupied) and that contain one or more of the physical or biological features that are essential to support life-history processes of the species. Units are proposed for designation based on one or more of the physical or biological features being present to support prostrate milkweed's life-history processes. Some units contain all of the identified physical or biological features and support multiple life-history processes. Some units contain only some of the physical or biological features necessary to support the prostrate milkweed's particular use of that habitat. The proposed critical habitat designation is defined by the map or maps, as modified by any accompanying regulatory text, presented at the end of this document under Proposed Regulation Promulgation. We include more detailed information on the boundaries of the critical habitat designation in the preamble of this document. We will make the coordinates or plot points or both on which each map is based available to the public on [*https://www.regulations.gov*](https://www.regulations.gov) at Docket No. FWS-R2-ES-2021-0041 and on our internet site [*https://www.fws.gov/southwest/es/TexasCoastal/.Proposed*](https://www.fws.gov/southwest/es/TexasCoastal/.Proposed) Critical Habitat Designation We are proposing eight units as critical habitat for prostrate milkweed. The critical habitat areas we describe below constitute our current best assessment of areas that meet the definition of critical habitat for prostrate milkweed. The eight areas we propose as critical habitat units are all TXNDD EOs: Unit 1 (EO 3), Unit 2 (EO 10), Unit[[Page 8524]]3 (EO 11), Unit 4 (EO 12), Unit 5 (EO 15), Unit 6 (EO 16), Unit 7 (EO 17), and Unit 8 (EO 22). Table 2 shows the proposed critical habitat units and the approximate area of each unit. All units are occupied. Table 2--Proposed Critical Habitat Units for Prostrate Milkweed [Area estimates reflect all land within critical habitat unit boundaries]---------------------------------------------------------------------------------------------------------------- Size of unit Critical habitat unit Land ownership by type in acres Occupied? (hectares)----------------------------------------------------------------------------------------------------------------1 (EO 3)................................ County Road ROW and 10.51 (4.25) Yes. Private.2 (EO 10)............................... Federal--Service.......... 105.43 (42.67) Yes.3 (EO 11)............................... Private................... 4.0 (1.62) Yes.4 (EO 12)............................... County Road ROW........... 4.2 (1.7) Yes.5 (EO 15)............................... Federal--Service.......... 62.49 (25.29) Yes.6 (EO 16)............................... County Road ROW and 484.32 (196.0) Yes. Private.7 (EO 17)............................... County Road ROW and 19.35 (7.83) Yes. Private.8 (EO 22)............................... Private................... 1.04 (0.42) Yes. ----------------------------------------------------------------------- Total............................... .......................... 691.3 (279.8)----------------------------------------------------------------------------------------------------------------Note: Area sizes may not sum due to rounding. We present brief descriptions of all units, and reasons why they meet the definition of critical habitat for prostrate milkweed below.Unit 1: EO 3 Unit 1 consists of six areas, totaling 10.51 ac (4.25 ha), east of highway 83 in northwest Zapata County. This unit is on private land and unpaved county road ROWs. The unit is occupied by the species and contains one or more of the PBFs essential to the conservation of prostrate milkweed. Although we have no recent information on threats that affect this unit, we conclude that this unit is affected by invasive nonnative grass (buffelgrass) and road maintenance operations. Therefore, special management considerations may be required to reduce invasion of nonnative species and impacts from ROW maintenance.Unit 2: EO 10 Unit 2 consists of 105.43 ac (42.67 ha) in the 699.4-acre Arroyo Ramirez tract of Lower Rio Grande Valley NWR. This unit is in southwestern Starr County adjacent to the Rio Grande on the U.S -Mexico border. The entire unit is on land owned and managed by the Service. The unit is occupied by the species and contains one or more of the PBFs essential to the conservation of prostrate milkweed. This unit could be directly impacted by border barrier construction and security operations (i.e , drag strips), or indirectly impacted by channeling of runoff along the barrier during heavy rainfall, in addition to invasion of buffelgrass. Therefore, special management may be required to mitigate impacts from border security operations and nonnative grass.Unit 3: EO 11 Unit 3 consists of three areas, totaling 4.0 ac (1.62 ha), on private land in southwestern Starr County. The unit is occupied by the species and contains one or more of the PBFs essential to the conservation of prostrate milkweed. We have no recent information on threats that affect this unit.Unit 4: EO 12 Unit 4 consists of 4.2 ac (1.7 ha) along an unpaved county road ROW in southwestern Starr County. This ROW supports a narrow strip of diverse native vegetation that has likely not been plowed, bulldozed, or graded. The unit is occupied by the species and contains one or more of the PBFs essential to the conservation of prostrate milkweed. This unit is affected by invasive nonnative grass (buffelgrass) and maintenance and operation of the county road. Therefore, special management may be required to reduce invasion of nonnative species.Unit 5: EO 15 Unit 5 consists of 62.49 ac (25.29 ha) in the 90.8-acre Arroyo Morteros tract of the Lower Rio Grande Valley NWR. This unit is in southwestern Starr County adjacent to the Rio Grande on the U.S -Mexico border. The entire unit is on land owned and managed by the Service. The unit is occupied by the species and contains one or more of the PBFs essential to the conservation of prostrate milkweed. This unit could be directly impacted by border barrier construction and security operations (i.e , drag strips), or indirectly impacted by channeling of runoff along the barrier during heavy rainfall, in addition to invasion of buffelgrass. Therefore, special management may be required to mitigate impacts from border security operations and nonnative grass.Unit 6: EO 16 Unit 6 consists of 484.32 ac (196.0 ha) entirely on the 488.5-acre private Martinez Ranch and along a county road ROW. This unit is in southern Starr County. The owner of the Martinez Ranch is a willing conservation partner in managing the property's native plants and wildlife. The unit is occupied by the species and contains one or more of the PBFs essential to the conservation of prostrate milkweed. This unit is affected by invasive nonnative grass (buffelgrass). Therefore, special management may be required to reduce invasion of nonnative species.Unit 7: EO 17 Unit 7 consists of 19.35 ac (7.83 ha) along both sides of an unpaved county road ROW and adjacent private land in western Starr County. This ROW supports a narrow strip of diverse native vegetation that has likely not been plowed, bulldozed, or graded. The unit is occupied by the species and contains one or more of the PBFs essential to the conservation of prostrate milkweed. This unit is affected by invasive nonnative grass (buffelgrass) and maintenance and operation of the county road. Therefore, special management may be required to reduce invasion of nonnative species.Unit 8: EO 22 Unit 8 consists of 1.04 ac (0.42 ha) on private land in central Zapata County. The unit is occupied by the species and contains one or more of the PBFs essential to the conservation of prostrate milkweed. Although we have no recent information about threats that affect this unit, we estimate that this unit is[[Page 8525]]affected by invasive nonnative grass (buffelgrass) and development and maintenance of oil and gas wells and utility corridors. Therefore, special management may be required to reduce invasion of nonnative species and impacts from ROW construction and maintenance from energy development and road and utility construction.Effects of Critical Habitat DesignationSection 7 Consultation Section 7(a)(2) of the Act requires Federal agencies, including the Service, to ensure that any action they fund, authorize, or carry out is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat of such species. In addition, section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any agency action that is likely to jeopardize the continued existence of any species proposed to be listed under the Act or result in the destruction or adverse modification of proposed critical habitat. We published a final rule revising the definition of destruction or adverse modification on August 27, 2019 (84 FR 44976). Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency (action agency) must enter into consultation with us. Examples of actions that are subject to the section 7 consultation process are actions on State, Tribal, local, or private lands that require a Federal permit (such as a permit from the U.S Army Corps of Engineers under section 404 of the Clean Water Act (33 U.S.C 1251 et seq.) or a permit from the Service under section 10 of the Act) or that involve some other Federal action (such as funding from the Federal Highway Administration, Federal Aviation Administration, or the Federal Emergency Management Agency). Federal actions not affecting listed species or critical habitat--and actions on State, Tribal, local, or private lands that are not federally funded, authorized, or carried out by a Federal agency--do not require section 7 consultation. Compliance with the requirements of section 7(a)(2) is documented through our issuance of: (1) A concurrence letter for Federal actions that may affect, but are not likely to adversely affect, listed species or critical habitat; or (2) A biological opinion for Federal actions that may affect, and are likely to adversely affect, listed species or critical habitat. When we issue a biological opinion concluding that a project is likely to jeopardize the continued existence of a listed species and/or destroy or adversely modify critical habitat, we provide reasonable and prudent alternatives to the project, if any are identifiable, that would avoid the likelihood of jeopardy and/or destruction or adverse modification of critical habitat. We define ``reasonable and prudent alternatives'' (at 50 CFR 402.02) as alternative actions identified during consultation that: (1) Can be implemented in a manner consistent with the intended purpose of the action, (2) Can be implemented consistent with the scope of the Federal agency's legal authority and jurisdiction, (3) Are economically and technologically feasible, and (4) Would, in the Service Director's opinion, avoid the likelihood of jeopardizing the continued existence of the listed species and/or avoid the likelihood of destroying or adversely modifying critical habitat. Reasonable and prudent alternatives can vary from slight project modifications to extensive redesign or relocation of the project. Costs associated with implementing a reasonable and prudent alternative are similarly ***variable***. Regulations at 50 CFR 402.16 set forth requirements for Federal agencies to reinitiate formal consultation on previously reviewed actions. These requirements apply when the Federal agency has retained discretionary involvement or control over the action (or the agency's discretionary involvement or control is authorized by law) and, if subsequent to the previous consultation: (1) If the amount or extent of taking specified in the incidental take statement is exceeded; (2) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or (4) if a new species is listed or critical habitat designated that may be affected by the identified action. In such situations, Federal agencies sometimes may need to request reinitiation of consultation with us, but the regulations also specify some exceptions to the requirement to reinitiate consultation on specific land management plans after subsequently listing a new species or designating new critical habitat. See the regulations for a description of those exceptions.Application of the ``Destruction or Adverse Modification'' Standard The key factor related to the destruction or adverse modification determination is whether implementation of the proposed Federal action directly or indirectly alters the designated critical habitat in a way that appreciably diminishes the value of the critical habitat as a whole for the conservation of the listed species. As discussed above, the role of critical habitat is to support physical or biological features essential to the conservation of a listed species and provide for the conservation of the species. Section 4(b)(8) of the Act requires us to briefly evaluate and describe, in any proposed or final regulation that designates critical habitat, activities involving a Federal action that may violate section 7(a)(2) of the Act by destroying or adversely modifying such habitat, or that may be affected by such designation. Activities that the Service may, during a consultation under section 7(a)(2) of the Act, be considered likely to destroy or adversely modify critical habitat include, but are not limited to: (1) Actions that would degrade or destroy native plant communities. Such activities could include, but are not limited to, road building, land clearing for oil and gas exploration or other purposes, introducing and encouraging the spread of nonnative species (i.e , buffelgrass), and border security operations. However, above-ground cutting or thinning of woody plants and prescribed burning are recommended management practices for conservation of prostrate milkweed and other native grasses and forbs, and would not destroy or adversely modify critical habitats. (2) Actions that would mechanically disturb the soil structure. Such activities could include, but are not limited to, bulldozing, root-plowing, ripping, excavating, or other mechanical operations that penetrate deep enough into the soil to cut or remove the tubers of prostrate milkweed. (3) Actions that would increase competition from woody plants or introduced grasses. Such activities could include, but are not limited to, intentional planting of introduced grass species, such as buffelgrass, bermudagrass (Cynodon dactylon), or[[Page 8526]]Old World bluestems (introduced species of Dichanthium and Bothriochloa).ExemptionsApplication of Section 4(a)(3) of the Act Section 4(a)(3)(B)(i) of the Act (16 U.S.C 1533(a)(3)(B)(i)) provides that the Secretary shall not designate as critical habitat any lands or other geographical areas owned or controlled by the Department of Defense (DoD), or designated for its use, that are subject to an integrated natural resources management plan (INRMP) prepared under section 101 of the Sikes Act (16 U.S.C 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation. No DoD lands with a completed INRMP are within the proposed critical habitat designation.Consideration of Impacts Under Section 4(b)(2) of the Act Section 4(b)(2) of the Act states that the Secretary shall designate and make revisions to critical habitat on the basis of the best available scientific ***data*** after taking into consideration the economic impact, national security impact, and any other relevant impact of specifying any particular area as critical habitat. The Secretary may exclude an area from critical habitat if she determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless she determines, based on the best scientific ***data*** available, that the failure to designate such area as critical habitat will result in the extinction of the species. In making the determination to exclude a particular area, the statute on its face, as well as the legislative history, are clear that the Secretary has broad discretion regarding which factor(s) to use and how much weight to give to any factor. Under section 4(b)(2) of the Act, we may exclude an area from designated critical habitat based on economic impacts, impacts on national security, or any other relevant impacts. In considering whether to exclude a particular area from the designation, we identify the benefits of including the area in the designation, identify the benefits of excluding the area from the designation, and evaluate whether the benefits of exclusion outweigh the benefits of inclusion. If the analysis indicates that the benefits of exclusion outweigh the benefits of inclusion, the Secretary may exercise discretion to exclude the area only if such exclusion would not result in the extinction of the species. We describe below the process that we undertook for taking into consideration each category of impacts and our analyses of the relevant impacts.Consideration of Economic Impacts Section 4(b)(2) of the Act and its implementing regulations require that we consider the economic impact that may result from a designation of critical habitat. To assess the probable economic impacts of a designation, we must first evaluate specific land uses or activities and projects that may occur in the area of the critical habitat. We then must evaluate the impacts that a specific critical habitat designation may have on restricting or modifying specific land uses or activities for the benefit of the species and its habitat within the areas proposed. We then identify which conservation efforts may be the result of the species being listed under the Act versus those attributed solely to the designation of critical habitat for this particular species. The probable economic impact of a proposed critical habitat designation is analyzed by comparing scenarios both ``with critical habitat'' and ``without critical habitat.'' The ``without critical habitat'' scenario represents the baseline for the analysis, which includes the existing regulatory and socio-economic burden imposed on landowners, managers, or other resource users potentially affected by the designation of critical habitat (e.g , under the Federal listing as well as other Federal, State, and local regulations). Therefore, the baseline represents the costs of all efforts attributable to the listing of the species under the Act (i.e , conservation of the species and its habitat incurred regardless of whether critical habitat is designated). The ``with critical habitat'' scenario describes the incremental impacts associated specifically with the designation of critical habitat for the species. The incremental conservation efforts and associated impacts would not be expected without the designation of critical habitat for the species. In other words, the incremental costs are those attributable solely to the designation of critical habitat, above and beyond the baseline costs. These are the costs we use when evaluating the benefits of inclusion and exclusion of particular areas from the final designation of critical habitat should we choose to conduct a discretionary 4(b)(2) exclusion analysis. For this particular designation, we developed an incremental effects memorandum (IEM) considering the probable incremental economic impacts that may result from this proposed designation of critical habitat. The information contained in our IEM was then used to develop a screening analysis of the probable effects of the designation of critical habitat for the prostrate milkweed (Industrial Economics, Inc. (IEc) 2021, entire). We began by conducting a screening analysis of the proposed designation of critical habitat in order to focus our analysis on the key factors that are likely to result in incremental economic impacts. The purpose of the screening analysis is to filter out particular geographic areas of critical habitat that are already subject to such protections and are, therefore, unlikely to incur incremental economic impacts. In particular, the screening analysis considers baseline costs (i.e , absent critical habitat designation) and includes any probable incremental economic impacts where land and water use may be subject to conservation plans, land management plans, best management practices, or regulations that protect the habitat area as a result of the Federal listing status of the species. Ultimately, the screening analysis allows us to focus our analysis on evaluating the specific areas or sectors that may incur probable incremental economic impacts as a result of the designation. If the proposed critical habitat designation contains any unoccupied units, the screening analysis assesses whether those units require additional management or conservation efforts that may incur incremental economic impacts. This screening analysis combined with the information contained in our IEM constitute what we consider to be our draft economic analysis (DEA) of the proposed critical habitat designation for the prostrate milkweed; our DEA is summarized in the narrative below. Executive Orders (E.O.s) 12866 and 13563 direct Federal agencies to assess the costs and benefits of available regulatory alternatives in quantitative (to the extent feasible) and qualitative terms. Consistent with the E.O regulatory analysis requirements, our effects analysis under the Act may take into consideration impacts to both directly and indirectly affected entities, where practicable and reasonable. If sufficient ***data*** are available, we assess to the extent practicable the probable impacts to both directly and indirectly affected entities. As part of our screening analysis, we considered the types of economic activities that are likely to occur within the areas likely affected by the critical habitat designation. In our evaluation of the probable incremental economic impacts[[Page 8527]]that may result from the proposed designation of critical habitat for the prostrate milkweed, first we identified, in the IEM dated March 11, 2021, probable incremental economic impacts associated with the following categories of activities: (1) Construction of a new highway; and (2) potential future border wall construction. We considered each industry or category individually. Additionally, we considered whether their activities have any Federal involvement. Critical habitat designation generally will not affect activities that do not have any Federal involvement; under the Act, designation of critical habitat only affects activities conducted, funded, permitted, or authorized by Federal agencies. If we list the species, in areas where the prostrate milkweed is present, Federal agencies would be required to consult with the Service under section 7 of the Act on activities they fund, permit, or implement that may affect the species. If, when we list the species, we also finalize this proposed critical habitat designation, our consultations would include an evaluation of measures to avoid the destruction or adverse modification of critical habitat. In our IEM, we attempted to clarify the distinction between the effects that would result from the species being listed and those attributable to the critical habitat designation (i.e , difference between the jeopardy and adverse modification standards) for the prostrate milkweed's critical habitat. Because the designation of critical habitat for prostrate milkweed was proposed concurrently with the listing, it has been our experience that it is more difficult to discern which conservation efforts are attributable to the species being listed and those which will result solely from the designation of critical habitat. However, the following specific circumstances in this case help to inform our evaluation: (1) The essential physical or biological features identified for critical habitat are the same features essential for the life requisites of the species, and (2) any actions that would result in sufficient harm or harassment to constitute jeopardy to the prostrate milkweed would also likely adversely affect the essential physical or biological features of critical habitat. The IEM outlines our rationale concerning this limited distinction between baseline conservation efforts and incremental impacts of the designation of critical habitat for this species. This evaluation of the incremental effects has been used as the basis to evaluate the probable incremental economic impacts of this proposed designation of critical habitat. The proposed critical habitat designation for the prostrate milkweed includes eight units totaling 691.3 ac (279.8 ha). All units are considered occupied by the prostrate milkweed and contain the physical and biological features essential to the conservation of the species. We are not proposing to designate any units of unoccupied habitat. Approximately 24 percent of the proposed designation is located on Federal land, 4 percent is on county-owned ROWs, and 71 percent is on private land. In these areas, any actions that may affect the species or its habitat would also affect designated critical habitat, and it is unlikely that any additional conservation efforts would be recommended to address the adverse modification standard over and above those recommended as necessary to avoid jeopardizing the continued existence of prostrate milkweed. Therefore, the potential incremental economic effects of the critical habitat designation are expected to be limited to administrative costs. While this additional analysis will require time and resources by both the Federal action agency and the Service, it is believed that, in most circumstances, these costs would predominantly be administrative in nature and would not be significant. Nearly all (97 percent) of the proposed critical habitat overlaps designated critical habitat for the endangered Zapata bladderpod (Physaria thamnophila). Proposed critical habitat also overlaps with designated critical habitat for the endangered ashy dogweed (Thymophylla tephroleuca) and star cactus (Astrophytum asterias). Because of the overall small size of the proposed critical habitat, there would likely only be a few consultations, with minor conservation efforts that would likely result in relatively low probable economic impacts. It is likely that the majority of costs would occur on two of the eight proposed critical habitat units, which are on Federal land (both are owned by the Service). Any potential future border wall construction has been paused at this time. The probable incremental economic impacts of the prostrate milkweed critical habitat designation are expected to be limited to additional administrative effort as well as minor costs of conservation efforts resulting from a small number of future section 7 consultations. This is due to the fact that all of the proposed critical habitat areas are considered to be occupied by the species, and incremental economic impacts of critical habitat designation, other than administrative costs, are unlikely. The entities most likely to incur incremental costs are parties to section 7 consultations, including Federal action agencies and, in some cases, third parties, most frequently State agencies or municipalities. Activities we expect would be subject to consultations that may involve private entities as third parties are residential and commercial development that may occur on private lands. However, based on coordination efforts with State and local agencies, the cost to private entities within these sectors is expected to be relatively minor. We would expect no more than 1 formal consultation, 10 information consultations, and 17 technical assistance efforts to occur annually over the next year in proposed critical habitat areas for the prostrate milkweed, with annual costs to the Service and action agencies of less than $37,800. Thus, the annual administrative burden is unlikely to reach $100 million, which is the threshold for a significant regulatory action under E.O 12866. We are soliciting ***data*** and comments from the public on the DEA discussed above, as well as on all aspects of this proposed rule and our required determinations. During the development of a final designation, we will consider the information presented in the DEA and any additional information on economic impacts we receive during the public comment period to determine whether any specific areas should be excluded from the final critical habitat designation under authority of section 4(b)(2) and our implementing regulations at 50 CFR 17.90 If we receive credible information regarding the existence of a meaningful economic or other relevant impact supporting a benefit of exclusion, we will conduct an exclusion analysis for the relevant area or areas. We may also exercise the discretion to evaluate any other particular areas for possible exclusion. Furthermore, when we conduct an exclusion analysis based on impacts identified by experts in, or sources with firsthand knowledge about, impacts that are outside the scope of the Service's expertise, we will give weight to those impacts consistent with the expert or firsthand information unless we have rebutting information. We may exclude an area from critical habitat if we determine that the benefits of excluding the area outweigh the benefits of including the area, provided the exclusion will not result in the extinction of this species.[[Page 8528]]Consideration of National Security Impacts Section 4(a)(3)(B)(i) of the Act may not cover all DoD lands or areas that pose potential national-security concerns (e.g , a DoD installation that is in the process of revising its INRMP for a newly listed species or a species previously not covered). If a particular area is not covered under section 4(a)(3)(B)(i), then national-security or homeland-security concerns are not a factor in the process of determining what areas meet the definition of ``critical habitat.'' However, the Service must still consider impacts on national security, including homeland security, on those lands or areas not covered by section 4(a)(3)(B)(i), because section 4(b)(2) requires the Service to consider those impacts whenever it designates critical habitat. Accordingly, if DoD, Department of Homeland Security (DHS), or another Federal agency has requested exclusion based on an assertion of national-security or homeland-security concerns, or we have otherwise identified national-security or homeland-security impacts from designating particular areas as critical habitat, we generally have reason to consider excluding those areas. However, we cannot automatically exclude requested areas. When DoD, DHS, or another Federal agency requests exclusion from critical habitat on the basis of national-security or homeland-security impacts, we must conduct an exclusion analysis if the Federal requester provides credible information, including a reasonably specific justification of an incremental impact on national security that would result from the designation of that specific area as critical habitat. That justification could include demonstration of probable impacts, such as impacts to ongoing border-security patrols and surveillance activities, or a delay in training or facility construction, as a result of compliance with section 7(a)(2) of the Act. If the agency requesting the exclusion does not provide us with a reasonably specific justification, we will contact the agency to recommend that it provide a specific justification or clarification of its concerns relative to the probable incremental impact that could result from the designation. If we conduct an exclusion analysis because the agency provides a reasonably specific justification or because we decide to exercise the discretion to conduct an exclusion analysis, we will defer to the expert judgment of DoD, DHS, or another Federal agency as to: (1) Whether activities on its lands or waters, or its activities on other lands or waters, have national-security or homeland-security implications; (2) the importance of those implications; and (3) the degree to which the cited implications would be adversely affected in the absence of an exclusion. In that circumstance, in conducting a discretionary section 4(b)(2) exclusion analysis, we will give great weight to national-security and homeland-security concerns in analyzing the benefits of exclusion. Under section 4(b)(2) of the Act, we also consider whether a national-security or homeland-security impact might exist on lands owned or managed by DoD or DHS, or on any other lands. In preparing this proposal, we have determined that the lands within the proposed designation of critical habitat for prostrate milkweed are not owned or managed by DoD or DHS. Although two proposed units of critical habitat are located along the border, we do not anticipate that there will be an impact on national security or homeland security. We will work with CBP to ensure appropriate collaboration in our national security and conservation efforts. However, if through the public comment period we receive credible information regarding impacts on national security or homeland security from designating particular areas as critical habitat, then as part of developing the final designation of critical habitat, we will conduct a discretionary exclusion analysis to determine whether to exclude those areas under authority of section 4(b)(2) and our implementing regulations at 50 CFR 17.90 Consideration of Other Relevant Impacts Under section 4(b)(2) of the Act, we consider any other relevant impacts, in addition to economic impacts and impacts on national security discussed above. Other relevant impacts may include, but are not limited to, impacts to Tribes, States, local governments, public health and safety, community interests, the environment (such as increased risk of wildfire or pest and invasive species management), Federal lands, and conservation plans, agreements, or partnerships. To identify other relevant impacts that may affect the exclusion analysis, we consider a number of factors, including whether there are permitted conservation plans covering the species in the area--such as HCPs, safe harbor agreements (SHAs), or candidate conservation agreements with assurances (CCAAs)--or whether there are non-permitted conservation agreements and partnerships that may be impaired by designation of, or exclusion from, critical habitat. In addition, we look at whether Tribal conservation plans or partnerships, Tribal resources, or government-to-government relationships of the United States with Tribal entities may be affected by the designation. We also consider any State, local, public-health, community-interest, environmental, or social impacts that might occur because of the designation. We have not identified any areas to consider for exclusion from critical habitat based on other relevant impacts because areas included in the proposed critical habitat are not covered under any permitted conservation plans (i.e , SHAs), CCAAs, non-permitted conservation agreements and partnerships, Tribal conservation plans or partnerships, or have any State, local, public-health, community-interest, environmental, or social impacts. However, during the development of a final designation, we will consider all information currently available or received during the public comment period. If we receive credible information regarding the existence of a meaningful impact supporting a benefit of excluding any areas, we will undertake an exclusion analysis and determine whether those areas should be excluded from the final critical habitat designation under the authority of section 4(b)(2) and our implementing regulations at 50 CFR 17.90 We may also exercise the discretion to undertake exclusion analyses for other areas as well, and we will describe all of our exclusion analyses as part of a final critical habitat determination.Summary of Exclusions Considered Under 4(b)(2) of the Act At this time, we are not considering any exclusions from the proposed designation based on economic impacts, national security impacts, or other relevant impacts--such as partnerships, management, or protection afforded by cooperative management efforts--under section 4(b)(2) of the Act. In this proposed rule, we are seeking credible information from the public regarding the existence of a meaningful impact supporting a benefit of excluding any areas that would be used in an exclusion analysis that may result in the exclusion of areas from the final critical habitat designation. (Please see FOR FURTHER INFORMATION CONTACT for instructions on how to submit comments).[[Page 8529]]Required DeterminationsClarity of the Rule We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must: (1) Be logically organized; (2) Use the active voice to address readers directly; (3) Use clear language rather than jargon; (4) Be divided into short sections and sentences; and (5) Use lists and tables wherever possible. If you feel that we have not met these requirements, send us comments by one of the methods listed in ADDRESSES. To better help us revise the rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that are unclearly written, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.Regulatory Planning and Review (Executive Orders 12866 and 13563) Executive Order 12866 provides that the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget will review all significant rules. OIRA has determined that this rule is not significant. Executive Order 13563 reaffirms the principles of E.O 12866 while calling for improvements in the Nation's regulatory system to promote predictability, to reduce uncertainty, and to use the best, most innovative, and least burdensome tools for achieving regulatory ends. The Executive order directs agencies to consider regulatory approaches that reduce burdens and maintain flexibility and freedom of choice for the public where these approaches are relevant, feasible, and consistent with regulatory objectives. E.O 13563 emphasizes further that regulations must be based on the best available science and that the rulemaking process must allow for public participation and an open exchange of ideas. We have developed this proposed rule in a manner consistent with these requirements.Regulatory Flexibility Act (5 U.S.C 601 et seq.) Under the Regulatory Flexibility Act (RFA; 5 U.S.C 601 et seq.), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA; 5 U.S.C 801 et seq.), whenever an agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effects of the rule on small entities (i.e , small businesses, small organizations, and small government jurisdictions). However, no regulatory flexibility analysis is required if the head of the agency certifies the rule will not have a significant economic impact on a substantial number of small entities. The SBREFA amended the RFA to require Federal agencies to provide a certification statement of the factual basis for certifying that the rule will not have a significant economic impact on a substantial number of small entities. According to the Small Business Administration, small entities include small organizations such as independent nonprofit organizations; small governmental jurisdictions, including school boards and city and town governments that serve fewer than 50,000 residents; and small businesses (13 CFR 121.201). Small businesses include manufacturing and mining concerns with fewer than 500 employees, wholesale trade entities with fewer than 100 employees, retail and service businesses with less than $5 million in annual sales, general and heavy construction businesses with less than $27.5 million in annual business, special trade contractors doing less than $11.5 million in annual business, and ***agricultural*** businesses with annual sales less than $750,000. To determine whether potential economic impacts to these small entities are significant, we considered the types of activities that might trigger regulatory impacts under this designation as well as types of project modifications that may result. In general, the term ``significant economic impact'' is meant to apply to a typical small business firm's business operations. Under the RFA, as amended, and as understood in light of recent court decisions, Federal agencies are required to evaluate the potential incremental impacts of rulemaking on those entities directly regulated by the rulemaking itself; in other words, the RFA does not require agencies to evaluate the potential impacts to indirectly regulated entities. The regulatory mechanism through which critical habitat protections are realized is section 7 of the Act, which requires Federal agencies, in consultation with the Service, to ensure that any action authorized, funded, or carried out by the agency is not likely to destroy or adversely modify critical habitat. Therefore, under section 7, only Federal action agencies are directly subject to the specific regulatory requirement (avoiding destruction and adverse modification) imposed by critical habitat designation. Consequently, it is our position that only Federal action agencies would be directly regulated if we adopt the proposed critical habitat designation. The RFA does not require evaluation of the potential impacts to entities not directly regulated. Moreover, Federal agencies are not small entities. Therefore, because no small entities would be directly regulated by this rulemaking, the Service certifies that, if made final as proposed, the proposed critical habitat designation will not have a significant economic impact on a substantial number of small entities. In summary, we have considered whether the proposed designation would result in a significant economic impact on a substantial number of small entities. For the above reasons and based on currently available information, we certify that, if made final, the proposed critical habitat designation would not have a significant economic impact on a substantial number of small business entities. Therefore, an initial regulatory flexibility analysis is not required.Energy Supply, Distribution, or Use--Executive Order 13211 Executive Order 13211 (Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use) requires agencies to prepare Statements of Energy Effects when undertaking certain actions. In our economic analysis, we did not find that this proposed critical habitat designation would significantly affect energy supplies, distribution, or use. Therefore, this action is not a significant energy action, and no Statement of Energy Effects is required.Unfunded Mandates Reform Act (2 U.S.C 1501 et seq.) In accordance with the Unfunded Mandates Reform Act (2 U.S.C 1501 et seq.), we make the following finding: (1) This proposed rule would not produce a Federal mandate. In general, a Federal mandate is a provision in legislation, statute, or regulation that would impose an enforceable duty upon State, local, or Tribal governments, or the private sector, and includes both ``Federal intergovernmental mandates'' and ``Federal private sector mandates.'' These terms are defined in 2 U.S.C 658(5)-(7). ``Federal intergovernmental mandate'' includes a regulation that ``would impose an enforceable duty upon State, local, or Tribal governments'' with two exceptions. It[[Page 8530]]excludes ``a condition of Federal assistance.'' It also excludes ``a duty arising from participation in a voluntary Federal program,'' unless the regulation ``relates to a then-existing Federal program under which $500,000,000 or more is provided annually to State, local, and Tribal governments under entitlement authority,'' if the provision would ``increase the stringency of conditions of assistance'' or ``place caps upon, or otherwise decrease, the Federal Government's responsibility to provide funding,'' and the State, local, or Tribal governments ``lack authority'' to adjust accordingly. At the time of enactment, these entitlement programs were: Medicaid; Aid to Families with Dependent Children work programs; Child Nutrition; Food Stamps; Social Services Block Grants; Vocational Rehabilitation State Grants; Foster Care, Adoption Assistance, and Independent Living; Family Support Welfare Services; and Child Support Enforcement. ``Federal private sector mandate'' includes a regulation that ``would impose an enforceable duty upon the private sector, except (i) a condition of Federal assistance or (ii) a duty arising from participation in a voluntary Federal program.'' The designation of critical habitat does not impose a legally binding duty on non-Federal Government entities or private parties. Under the Act, the only regulatory effect is that Federal agencies must ensure that their actions do not destroy or adversely modify critical habitat under section 7. While non-Federal entities that receive Federal funding, assistance, or permits, or that otherwise require approval or authorization from a Federal agency for an action, may be indirectly impacted by the designation of critical habitat, the legally binding duty to avoid destruction or adverse modification of critical habitat rests squarely on the Federal agency. Furthermore, to the extent that non-Federal entities are indirectly impacted because they receive Federal assistance or participate in a voluntary Federal aid program, the Unfunded Mandates Reform Act would not apply, nor would critical habitat shift the costs of the large entitlement programs listed above onto State governments. (2) We do not believe that this rule would significantly or uniquely affect small governments because it will not produce a Federal mandate of $100 million or greater in any year, that is, it is not a ``significant regulatory action'' under the Unfunded Mandates Reform Act. The designation of critical habitat imposes no obligations on State or local governments. Therefore, a Small Government Agency Plan is not required.Takings--Executive Order 12630 In accordance with E.O 12630 (Government Actions and Interference with Constitutionally Protected Private Property Rights), we have analyzed the potential takings implications of designating critical habitat for prostrate milkweed in a takings implications assessment. The Act does not authorize the Service to regulate private actions on private lands or confiscate private property as a result of critical habitat designation. Designation of critical habitat does not affect land ownership, or establish any closures, or restrictions on use of or access to the designated areas. Furthermore, the designation of critical habitat does not affect landowner actions that do not require Federal funding or permits, nor does it preclude development of habitat conservation programs or issuance of incidental take permits to permit actions that do require Federal funding or permits to go forward. However, Federal agencies are prohibited from carrying out, funding, or authorizing actions that would destroy or adversely modify critical habitat. A takings implications assessment has been completed for the proposed designation of critical habitat for prostrate milkweed, and it concludes that, if adopted, this designation of critical habitat does not pose significant takings implications for lands within or affected by the designation.Federalism--Executive Order 13132 In accordance with E.O 13132 (Federalism), this proposed rule does not have significant federalism effects. A federalism summary impact statement is not required. In keeping with Department of the Interior and Department of Commerce policy, we requested information from, and coordinated development of this proposed critical habitat designation with, appropriate State resource agencies. From a federalism perspective, the designation of critical habitat directly affects only the responsibilities of Federal agencies. The Act imposes no other duties with respect to critical habitat, either for States and local governments, or for anyone else. As a result, the proposed rule does not have substantial direct effects either on the States, or on the relationship between the national government and the States, or on the distribution of powers and responsibilities among the various levels of government. The proposed designation may have some benefit to these governments because the areas that contain the features essential to the conservation of the species are more clearly defined, and the physical or biological features of the habitat necessary for the conservation of the species are specifically identified. This information does not alter where and what federally sponsored activities may occur. However, it may assist State and local governments in long-range planning because they no longer have to wait for case-by-case section 7 consultations to occur. Where State and local governments require approval or authorization from a Federal agency for actions that may affect critical habitat, consultation under section 7(a)(2) of the Act would be required. While non-Federal entities that receive Federal funding, assistance, or permits, or that otherwise require approval or authorization from a Federal agency for an action, may be indirectly impacted by the designation of critical habitat, the legally binding duty to avoid destruction or adverse modification of critical habitat rests squarely on the Federal agency.Civil Justice Reform--Executive Order 12988 In accordance with Executive Order 12988 (Civil Justice Reform), the Office of the Solicitor has determined that the rule would not unduly burden the judicial system and that it meets the requirements of sections 3(a) and 3(b)(2) of the order. We have proposed designating critical habitat in accordance with the provisions of the Act. To assist the public in understanding the habitat needs of the species, this proposed rule identifies the physical or biological features essential to the conservation of the species. The proposed areas of designated critical habitat are presented on maps, and the proposed rule provides several options for the interested public to obtain more detailed location information, if desired.Paperwork Reduction Act of 1995 (44 U.S.C 3501 et seq.) This rule does not contain information ***collection*** requirements, and a submission to the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (44 U.S.C 3501 et seq.) is not required. We may not conduct or sponsor and you are not required to respond to a ***collection*** of information unless it displays a currently valid OMB control number.National Environmental Policy Act (42 U.S.C 4321 et seq.) It is our position that, outside the jurisdiction of the U.S Court of Appeals for the Tenth Circuit, we do not need to[[Page 8531]]prepare environmental analyses pursuant to the National Environmental Policy Act (NEPA; 42 U.S.C 4321 et seq.) in connection with regulations adopted pursuant to section 4(a) of the Act. We published a notice outlining our reasons for this determination in the Federal Register on October 25, 1983 (48 FR 49244). This position was upheld by the U.S Court of Appeals for the Ninth Circuit (Douglas County v. Babbitt, 48 F.3d 1495 (9th Cir. 1995), cert. denied 516 U.S 1042 (1996)).Government-to-Government Relationship With Tribes In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we readily acknowledge our responsibilities to work directly with Tribes in developing programs for healthy ecosystems, to acknowledge that Tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to Tribes. We have determined that no Tribal lands fall within the boundaries of the proposed critical habitat for the prostrate milkweed, so no Tribal lands would be affected by the proposed designation.References Cited A complete list of references cited in this rulemaking is available on the internet at [*https://www.regulations.gov*](https://www.regulations.gov) and upon request from the Texas Coastal Ecological Services Field Office (see FOR FURTHER INFORMATION CONTACT).Authors The primary authors of this proposed rule are the staff members of the U.S Fish and Wildlife Service's Species Assessment Team and the Texas Coastal Ecological Services Field Office.List of Subjects in 50 CFR Part 17 Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.Proposed Regulation Promulgation Accordingly, we propose to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:PART 17--ENDANGERED AND THREATENED WILDLIFE AND PLANTS01. The authority citation for part 17 continues to read as follows: Authority: 16 U.S.C 1361-1407; 1531-1544; and 4201-4245, unless otherwise noted.02. Amend Sec. 17.12(h) by adding an entry for ``Asclepias prostrata'' to the List of Endangered and Threatened Plants in alphabetical order under FLOWERING PLANTS to read as follows:Sec. 17.12 Endangered and threatened plants.\* \* \* \* \* (h) \* \* \*---------------------------------------------------------------------------------------------------------------- Listing citations and Scientific name Common name Where listed Status applicable rules----------------------------------------------------------------------------------------------------------------Flowering Plants \* \* \* \* \* \* \*Asclepias prostrata............. Prostrate milkweed. Wherever found.... E [Federal Register citation when published as a final rule]; 50 CFR 17.96(a).\CH\ \* \* \* \* \* \* \*----------------------------------------------------------------------------------------------------------------03. Amend Sec. 17.96(a) by adding an entry for ``Family Apocynaceae: Asclepias prostrata (Prostrate Milkweed)'' after the entry for ``Family Apiaceae: Lomatium cookii (Cook's lomatium, Cook's desert parsley)'' to read as follows:Sec. 17.96 Critical habitat--plants. (a) \* \* \* Family Apocynaceae: Asclepias prostrata (Prostrate Milkweed) (1) Critical habitat units are depicted for Starr and Zapata Counties, Texas, on the maps in this entry. (2) Within these areas, the physical or biological features essential to the conservation of Asclepias prostrata consist of the following components: (i) Well-drained sandy soil overlying strata of sandstone or indurated caliche; (ii) High soil gypsum concentration; (iii) Open savannas and grasslands of the Tamaulipan shrubland ecological region; (iv) Vegetation composition that includes abundant, diverse pollen and nectar plants and healthy populations of native bee and wasp species; and (v) Less than 20 percent cover of Pennisetum ciliare (buffelgrass). (3) Critical habitat does not include manmade structures (such as buildings, aqueducts, runways, roads, and other paved areas) and the land on which they are located existing within the legal boundaries on [EFFECTIVE DATE OF RULE]. (4) ***Data*** layers defining map units were created using Texas Natural Diversity Database (2019-2020) survey ***data*** of the documented Asclepias prostrata locations in the United States to determine the geological formations and soil types they occupy. (i) We used the Esri ArcMap software to overlay the geographic coordinates of populations on a digitized map of Texas surface geology and a digitized soil survey map. We then clipped those areas of potential to lands that have documented populations of Asclepias prostrata. (ii) The maps in this entry, as modified by any accompanying regulatory text, establish the boundaries of the critical habitat designation. The coordinates or plot points or both on which each map is based are available to the public at the Service's internet site at [*https://www.fws.gov/southwest/es/TexasCoastal/*](https://www.fws.gov/southwest/es/TexasCoastal/), at [*https://www.regulations.gov*](https://www.regulations.gov) at Docket No. FWS-R2-ES-2021-0041, and at the field office responsible for this designation. You may obtain field office location information by contacting one of the Service regional offices, the addresses of which are listed at 50 CFR 2.2 (5) Note: Index map follows:BILLING CODE 4333-15-P[[Page 8532]][GRAPHIC] [TIFF OMITTED] TP15FE22.016 (6) Unit 1: Zapata County, Texas. (i) Unit 1 consists of 6 areas totaling 10.51 ac (4.25 ha) east of highway 83 in northwest Zapata County. This unit is on private land and a county road right of way.[[Page 8533]] (ii) Map of Unit 1 follows: [GRAPHIC] [TIFF OMITTED] TP15FE22.017 [[Page 8534]] (7) Unit 2: Starr County, Texas. (i) Unit 2 consists of 105.43 ac (42.67 ha) in the Arroyo Ramirez tract of Lower Rio Grande Valley National Wildlife Refuge. This unit is in southwestern Starr County adjacent to the Rio Grande on the U.S -Mexico border. The entire unit is on land owned and managed by the Service.[[Page 8535]] (ii) Map of Unit 2 follows: [GRAPHIC] [TIFF OMITTED] TP15FE22.018 [[Page 8536]] (8) Unit 3: Starr County, Texas. (i) Unit 3 consists of 4.0 ac (1.62 ha) along both sides of a road right of way on private land in southern Starr County. (ii) Map of Unit 3 follows:[[Page 8537]][GRAPHIC] [TIFF OMITTED] TP15FE22.019 (9) Unit 4: Starr County, Texas. (i) Unit 4 consists of 4.2 ac (1.7 ha) along the unpaved right of way of Los Arrieros Loop, a county road in southwestern Starr County.[[Page 8538]] (ii) Map of Unit 4 follows: [GRAPHIC] [TIFF OMITTED] TP15FE22.020 (10) Unit 5: Starr County, Texas. (i) Unit 5 consists of 62.49 ac (25.29 ha) in the Arroyo Morteros tract of the Lower Rio Grande Valley National Wildlife Refuge. This unit is in western Starr County adjacent to the Rio Grande on the U.S -Mexico border. The entire unit is on land owned and managed by the Service. (ii) Map of Unit 5 follows:[[Page 8539]][GRAPHIC] [TIFF OMITTED] TP15FE22.021 (11) Unit 6: Starr County, Texas. (i) Unit 6 consists of 484.32 ac (196.0 ha) entirely on privately owned land and the adjacent right of way of San[[Page 8540]]Julian Road. This unit is in western Starr County. (ii) Map of Unit 6 follows: [GRAPHIC] [TIFF OMITTED] TP15FE22.022 [[Page 8541]] (12) Unit 7: Starr County, Texas. (i) Unit 7 consists of 19.35 ac (7.83 ha) along both sides of a right of way and adjacent private land in western Starr County. (ii) Map of Unit 7 follows: [GRAPHIC] [TIFF OMITTED] TP15FE22.023 (13) Unit 8: Zapata County, Texas. (i) Unit 8 consists of 1.04 ac (0.42 ha) on private land in central Zapata County.[[Page 8542]] (ii) Map of Unit 8 follows: [GRAPHIC] [TIFF OMITTED] TP15FE22.024 [[Page 8543]]\* \* \* \* \*Martha Williams,Principal Deputy Director, Exercising the Delegated Authority of the Director, U.S Fish and Wildlife Service.[FR Doc. 2022-02544 Filed 2-14-22; 8:45 am]BILLING CODE 4333-15-C

**Load-Date:** February 16, 2022

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[***Recent developments in hazardous pollutants removal from wastewater and water reuse within a circular economy***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:671W-P2B1-JCWX-C1TT-00000-00&context=1516831)

npj Clean Water

April 2022

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**Section:** Vol. 5; No. 1; ISSN: 2059-7037

**Length:** 18988 words

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**Body**

Introduction

Industries are significant water consumers. On a global scale, they consume ~22% of the total water produced, whereas, in high-income counties, it can reach up to 60%. It is estimated that by 2050, manufacturing industries alone could increase their water usage by 400%. Aqueous discard from the use of water in various industrial steps such as cooling tower, heating by the boiler, purification, etc. may contain numerous suspended or dissolved contaminants, and these effluents are referred to as industrial wastewater. Industries such as chemical and petrochemical, paper and pulp, food processing, tannery, and other manufacturing industries constitute the primary sources of industrial wastewater. These wastewaters usually have high organic strength (1-200 g/L), non-neutral pH, different temperatures, salinity, turbidity, and high heavy metal content. Wastewater from leather manufacturing, food processing and preservation, textile processing, and petroleum refining may have high salt concentration. Wastewater composition varies depending on the chemicals used in the upstream processes and the nature of treatment it has undergone; thus classifying industrial wastewater into specific categories is challenging.

Ideally, industrial wastewater should undergo proper treatment and subsequent disposal into the environment or reuse for landscaping and housekeeping. However, the regulatory control of industrial wastewater is region-specific, with many countries are having little or no effective legal frameworks supported by regulatory institutions. According to UNESCO, 70% of industrial effluents in developing countries are dumped untreated. However, as more countries are tightening their regulatory frameworks, industries are facing challenges in meeting the stringent water discharge and reuse requirements.

Conventional treatments for removing heavy metals from wastewater include chemical precipitation, flotation, and ion exchange. However, these processes have several drawbacks, such as low removal efficiency, high energy consumption, and generation of toxic sludge, that limit their widespread application. Recently, various alternative treatment methods have been investigated to improve the quality of the treated effluent. They include adsorption using low-cost materials, membrane separation, electro-technologies, and photocatalytic processes. Adsorption and membrane separation are widely used for treating wastewater contaminated with high heavy metals concentrations. Photocatalytic methods are effective in removing organic matter and recovering metals and hence are expected to be more prevalent in the future. To the best of authors’ knowledge, no comprehensive and critical review in the literature discusses the latest innovations in the removal of hazardous pollutants from industrial wastewater. Therefore, this work is aimed at reviewing the recent advances in the removal of hazardous pollutants from industrial wastewaters. Membrane-based technologies, adsorption, Fenton-based process, advanced oxidation and photocatalytic processes, and hybrid systems are critically reviewed and discussed.

Membrane technologies

Microfiltration (MF), ultrafiltration (UF), nanofiltration (NF), and reverse osmosis (RO)

Membrane processes are increasingly being implemented for treating industrial and municipal wastewater because of their simplicity, modularity, and better energy efficiency. Based on the pore size of the employed membrane, these processes can be broadly classified into microfiltration (MF), ultrafiltration (UF),, nanofiltration (NF),, and reverse osmosis (RO). MF, UF, and NF membranes are used for the removal of contaminants with a size range of 100–1000, 5–100, and 1–5 nm, respectively. There are several recent studies reporting treatment of industrial wastewater using membrane processes. For example, RO and NF were effective in removing Cu2+ and Cd2+ from synthetic wastewater. RO achieved 98% and 99% removals for Cu2+ and Cd2+, respectively, whereas NF achieved ~90% for both Cu2+ and Cd2+. Another study reported 99.5% removal of Cu2+ and Ni2+ using RO. Galambos et al. compared the chemical oxygen demand (COD) removal efficiency of RO and NF in treating the food industry wastewater; two samples of wastewater were used in this study with an initial COD of 9500 and 1160 ppm. It was found that the permeate from RO has a COD of less than 125 mgO2 L−1 and hence can be discharged into natural waters. The study did not investigate the energy requirements associated with the treatment processes.

Polymer-supported ultrafiltration (PSU) has been investigated for treating synthetic wastewater containing heavy metals. Barakat and Schmidt added carboxyl methyl cellulose (CMC) as a water-soluble polymer for complexing the cationic forms of heavy metals such as Cu2+, Ni2+, and Cr3+ prior to filtration. The results revealed that a high pH (≥7) enhanced the formation of CMC-heavy metal complexes, precipitation and size exclusive removal of metal hydroxides. In many cases, adjusting the solution pH is found to be an important step in heavy metal rejection as high pH can induce the precipitation of heavy metal hydroxides, which can then be filtered out through UF membranes. Juang and Shiau [20] investigated the removal of Cu2+ and Zn2+ from synthetic wastewater using chitosan-enhanced membrane filtration. The presence of chitosan in the feed solution enhanced the metal removal by 6–10 times, which is attributed to the presence of the amino group in chitosan that served as a site for metal binding. Diethylaminoethyl cellulose and polyethyleneimine (PEI) are other examples of water-soluble metal-binding polymers used for heavy metal removal. Heavy metal removal can also be enhanced by the addition of minerals into the membrane reactor. For example, the addition of 10 g L−1 vermiculite at pH=8 resulted in >99% removal of Pb2+, Ni2+, Cu2+ and Zn2+. Consequently, the integrated process of sorption-UF with suitable pH adjustment (i.e. >7) can be applied as a pre-treatment stage to remove heavy metals from industrial wastewater, such as metal plating,.

Adsorbents can be used to increase the heavy metal removal efficiency in membrane processes. For instance, Malamis et al. (2010) used adsorbents such as bentonite, vermiculite, and zeolite (clinoptilolite) for removing Cu2+ from activated sludge permeate containing 317 mg L–1 Cu2+. Adsorption using 10 and 20 g L–1 bentonite or vermiculite (pH: 5.5) followed by the ultrafiltration achieved a removal efficiency from 93.8–96.8 to 99.4% of Cu2+, respectively. The ultrafiltration alone was able to remove only 59.4–78.3% of Cu2+, indicating the superior performance of adsorbent-enhanced UF systems. The addition of zeolite and bentonite reduced the fouling, whereas vermiculite did not show any antifouling properties. As a follow-up study, Katsou et al. investigated the removal of Ni2+ via a combined adsorption and UF system. In a batch UF unit with an initial Ni2+ concentration of 320 mg L–1 at a pH of 6, 65.3, and 80% removal efficiencies were obtained with 15 g L–1 each of bentonite and vermiculite respectively. Membrane processes have also been used to treat saline industrial wastewaters containing high organic content. For instance, suspended solids (SS) and colloidal COD were reduced from seafood-processing wastewater by initial concentration via a UF system, followed by recycling of proteins to be used in fish meal production. Turano et al. combined MF and centrifugation to remove up to 80% of the SS and 90% of the COD from olive oil mill effluent.

It is worth noting that although RO is the most efficient in removing heavy metals from wastewater, it is not widely applied for this purpose when compared to other membrane processes such as MF, UF or NF, as it requires high energy for operation. Also, the aerobic condition can promote the formation of metal oxides that can prematurely foul the RO membranes, necessitating frequent membrane replacements. However, if the wastewater also requires demineralization in addition to the removal of heavy metals, then RO might be a better technology to opt for.

Membrane bioreactors (MBRs)

Membrane bioreactors (MBRs) combine biological processes and membrane filtration to achieve better treated effluent quality by exploiting the dual benefits of membrane separation and activated sludge processes (ASPs). In the case of high strength industrial wastewater, operating parameters such as HRT, SRT, and MLSS should be optimized, and suitable pretreatment or neutralization should be provided to preserve the microbial community and prolong the membrane life.

Metal sorption on activated sludge takes place as follows:

Cell wall and cell membrane contain various cations like Na+, Κ+, Mg2+, and Ca2+, and these ions will be exchanged with other dissolved metals in the MBR mixed liquor.

Interaction between metals and the sorption sites on cell surface induces complexation and/or microprecipitation.

The removal of metals in MBRs depends on a variety of parameters, such as: (i) operating parameters like dissolved oxygen (DO) levels, mixed liquor SS (MLSS), and sludge retention time (SRT), (ii) physicochemical parameters such as metal type, species, and initial concentration, the type and concentration of ligands, the presence and concentration of competing cations, (iii) biochemical parameters such as the concentration and content of extracellular polymeric substances (EPS), ligands produced through bacterial activity, products from cell lysis, and bacterial species that favor metal uptake.

Aerobic MBR utilizes biological treatment with aerobic microorganisms that prosper in presence of oxygen. MBRs have been used for removing various pharmaceutical compounds with varying efficiencies. Although longer SRTs were usually associated with higher removal efficiencies, contradictory results were obtained for diclofenac and ethinylestradiol. It was concluded that antiepileptic compounds like carbamazepine were resistant to removal by MBR, whereas other compounds such as Bisphenol-A, the natural estrogens, ibuprofen, and bezafibrate were removed sufficiently. At a temperature of 10 °C, 80% removal of bisphenol-A was observed at SRT higher than 10 days. Also, the natural estrogens 17β-estradiol (E2), estrone (E1), and estriol (E3) were nearly removed completely. Similarly, the removal efficiency of more than 95% was observed for ibuprofen and bezafibrate. GE Corp. has developed an effective MBR system named Zee-Weed MBR to treat wastewaters from the pharmaceuticals industry. However, it should be noted that MBR processes, like any other biological process, is not specifically designed for removing pharmaceutical compounds. The level of biodegradation will thus depend on how recalcitrant these compounds are and whether they can be sorbed to activated sludge or remain in the liquid phase.

MBRs have been used for removing the oil, grease, and other organics from petrochemical-contaminated wastewater containing various compounds with typical 10,000–20,000 mg L–1 SS, 2000–4000 mg L–1 COD, and up to 1000 mg L–1 total Kjeldahl nitrogen (TKN). In another study, MBR reported 99.9% removal of fuel and lubricant oil at hydraulic retention time (HRT) of 13.3 h. It was observed that the quality of the treated effluent met industrial process water standards. A study conducted on a full-scale MBR plant showed a 90% removal of COD and complete removal of grease, oil, and phenolics, whereas, industrial site of Porto-Marghera has a huge petrochemical MBR plant, whose permeate is being discharged into Lagoon of Venice.

Sometimes, industrial wastewater might contain compounds that are toxic to microorganisms, which necessitates pre-treatment before biological treatment. Katsou et al. investigated a submerged MBR for treating heavy metals from a synthetic wastewater effluent. The municipal wastewater was added with 3.9–14.7 mg L–1 Pb2+, 3.4–9.1 mg L–1 Cu2+, 3.2–12.1 mg L–1 Zn2+, and 4.3–14.7 mg L–1 Ni2+ and a hollow fiber membrane with a nominal pore size of 0.04 µm was employed. The MBR was operated at an HRT of 10.3 h and SRT of 15 days. A UF pre-treatment ensured the complete removal of total suspended solids (TSS). COD removal for the municipal wastewater was 95–97%, but it decreased to 83–91% upon the addition of heavy metals into the municipal wastewater. Comparing mixed liquor volatile suspended solids (MLVSS) before and after heavy metal addition showed that there was a 13% reduction in biomass due to the inhibition. Likewise, complete nitrification was observed in the case of municipal wastewater, but the addition of metals reduced it to 22–54%.

When compared to traditional ASPs, MBR equipped with a UF membrane resulted in a 40–50% increase in the heavy metal removal efficiency. Heavy metal removal mainly depends on the SRT, pH, and MLSS. High SRTs and MLSS, usually result in better heavy metal removal efficiency. Metal ions are sorbed to the sludge particles attached to the UF membrane, which has resulted in the removal of Cu2+ (59.4–78.3%) and Ni2+ (23–50%) from industrial wastewater. A submerged MBR with a hollow fiber membrane has also been found to significantly remove Cu2+ and Cr3+ from industrial wastewater. Table illustrates the literature ***data*** on MBR performance in industrial wastewater treatment for the removal of organics and nutrients from various industrial effluents.

Literature ***data*** on MBR performance in treating several types of industrial wastewaters.

| **Type of wastewater** | **Membrane configuration and type** | **Type of reactor** | **% Removal** | **Ref.** |
| --- | --- | --- | --- | --- |
| Dairy industry wastewater | Hollow fiber, submerged | Aerobic continuously stirred tank reactor (CSTR) | COD: 97?98% |  |
| Fermentation wastewater | UF, external | Aerobic CSTR | COD: 94% |  |
| Landfill leachate | Hollow fiber, submerged | Sequencing batch reactor | COD: 40?60%NH4+-N: 100% |  |
| Kraft bleach plant effluent | UF, external | Anaerobic CSTR | COD: 61% |  |
| Textile wastewater | Hollow fibers, submerged | Aerobic CSTR | COD: 97% |  |
| Denim producing textile industry wastewater | Hollow fiber, submerged | Aerobic CSTR | COD: >95% |  |
| Cytostatic drug wastewater | External, tubular membrane | Aerobic-anoxic CSTR | Cyclophosphamide: 80%COD: 90% |  |
| Pharmaceutical wastewater | Submerged, hollow fiber | Aerobic CSTR | Cephalosporin: 81%COD: 95% |  |
| Refinery wastewater | Submerged, flat sheet | Aerobic CSTR | COD: 84% |  |
| Petrochemical industry wastewater | Submerged, flat sheet | Two-phase process: anoxic CSTR/oxic CSTR | COD: 85%-95% |  |
| Beamhouse effluent | Submerged, hollow fiber | Sequencing batch reactor | COD: 90%NH4+-N: 100% |  |
| Tannery wastewater | Submerged, hollow fiber | Two-stage process: Anoxic CSTR/oxic CSTR | COD: 79%NH4+-N: 96.5% |  |
| Municipal spiked with heavy metals | Submerged MBR, hollow fiber | Aerobic MBR | Cu: 80%; Pb: 98%; Zn: 77%; Ni: 50%COD: 83?91% |  |

There are several strategies for reducing the membrane fouling in MBRs. For instance, Deowan et al. coated a polyethersulfone (PES) UF membrane with an antifouling material and tested using synthetic textile dye wastewater. The PBM MBR module showed around 10% higher dye removal when compared to commercial membranes and better fouling-resistance due to the antimicrobial properties of polymerizable cationic surfactant acryloyloxyundecyltriethylammonium bromide (AUTEAB).

Anaerobic membrane bioreactors (AnMBRs) are used to treat industrial wastewaters characterized by high organic matter. Anaerobic processes offer great sustainability benefits as they produce little sludge due to low biomass yield and consume less energy because of the absence of aeration. Moreover, anaerobic processes generate biogas that can be used as an alternative energy source. Given the high organic loading of industrial wastewater, a comparably small amount of greenhouse gases is emitted to the atmosphere. AnMBR system allows operation at high MLSS up to 15 g L–1 and can be run at long SRT of more than 20 days, and thus refractory and recalcitrant organics can be removed with high efficiency. AnMBR can also retain specific microbial communities that can treat particular contaminants in wastewater.

AnMBR has been employed for treating different types of wastewaters—from paper and pulp, food processing, winery, textile, pharmaceutical, oil, and petrochemical industries. For instance, the food processing industry produces wastewater that is non-toxic and readily biodegradable with high organic loading rate (OLR, 1000–85,000 mg COD L–1). AnMBR achieved a COD removal of >97% with OLRs higher than 12 kg COD m–3 d–1. It was reported that 15 full-scale AnMBR plants have been operating around the world for food industry treatment.

Bioaugmentation involves supplementing the microbial community with particular microorganisms to improve biodegradation of recalcitrant molecules. The added microbes should be compatible and competitive with the existing microbial communities in the system to avoid any damaging effects. This method is more environment-friendly and affordable when compared to other extra physico-chemical processes. There are several studies on improving the degradation performance via bioaugmentation. For example, Saravanane and Sundararaman investigated the treatment of pharmaceutical wastewater with a high concentration of Cephalosporin derivative using an AnMBR with a submerged flat sheet membrane. They found an enhanced removal efficiency upon bioaugmentation. In another study, Qu et al. bio-augmented an MBR with Sphingomonas xenophaga QYY strain for treating wastewater containing anthraquinone dyes intermediates to achieve an enhanced color and COD removals. Thus, bioaugmentation or post-treatment may be needed with MBRs/AnMBRs to ensure the enhanced degradation of pollutants from industrial wastewaters.

Quorum sensing (QS) refers to the bacterial communication using chemical signals like N-acyl homoserine lactones (AHL), and subsequent regulation of gene expression in bacterial communities as a response to the population density. Several studies showed a high correlation between AHL signals and biofilm growth–. When reaches a threshold level, QS activates the transcription of specific genes and induce the secretion of exocellular enzymes, extracellular polymeric substances (EPSs), soluble microbial products (SMP), antibiotics, virulence, and bioluminescence. Quorum quenching (QQ) refers to the interference with QS via inhibiting or degrading signals, and interfering or blocking signal receptors for mitigating biofouling in MBRs,. Thus the use of antimicrobial compounds can be minimized, and the risk of developing anti-microbial resistance can be avoided. For instance, Kim et al. reduced the biofouling by exploiting the double-benefits of improved friction and QQ using porous alginate beads trapped with QQ bacteria. The increased friction between loose beads and the static membranes helped to loosen the biofilm on the membranes, whereas QQ bacteria helped reduce the formation of EPS. Another study reported an improved antifouling by encapsulating QQ bacteria on a polymer membrane layer.

In general, the use of MBRs is useful for treating industrial wastewater. However, further research is needed to optimize the process and overcome the limitations. For instance, membrane fouling due to the deposition and growth of microbes on membrane surface or pores causes a gradual increase in trans-membrane pressure (TMP) and a decline in water flux. This necessitates frequent cleaning and membrane replacements, leading to increased operation and maintenance costs,. Furthermore, the exact nature of the interactions between membrane surface and foulants cannot be easily identified. Also, most of the published research investigated the efficiency of the bench and pilot-scale systems. Limitations of pH, temperature, pressure, and some corrosive chemicals constrain the use of MBR, especially in large-scale operations. Leakage of contaminants through the membranes, due to the gradual degradation of membranes poses another challenge. Although QQ is promising in ensuring the long-term operation of MBR with minimal fouling, further work should be conducted to evaluate MBR performance with QQ bacteria in treating industrial wastewater in the pilot and full-scale. The electricity consumption of MBRs is usually higher than most of treatment processes. Due to the high membrane aeration rates required to manage fouling and clogging, MBR energy consumption was three times higher even than that of conventional activated sludge (CAS) systems combined with advanced treatment techniques. Recently, more efforts have been focusing on reducing the energy consumption associated with MBR. The electrical consumption was reported to be in the range 1.43 kWh m–3 to 4.23 kWh m–3, Energy consumption at 985 Japanese municipal WWTPs were analyzed and it was reported that CAS systems consumed between 0.3 kWh m–3 and 1.9 kWh m–3. A balanced comparison of MBR and CAS (or other) systems is only possible, however, when similar effluent quality is produced.

Adsorption and ion exchange

Adsorption refers to the transfer of gas or liquid molecules into a solid sorbent surface and holding them via physical and/or chemical intermolecular interactions. Ion exchange refers to the transfer of ions between an electrolyte and a complex or between two electrolytes solutions. In many textbooks, ion exchange is grouped under adsorption, and henceforth in this article, the term adsorption also covers the ion exchange as well. Adsorbents can be natural (e.g., charcoal, clays, minerals such as bentonite and vermiculite, zeolites, and ores) or synthetic (produced from ***agricultural*** products and wastes, industrial or urban wastes, sewage sludge, metal oxides, and polymeric adsorbents)–. The adsorption has been effective in removing dyes, and organic pollutants and metals from various industrial wastewater effluents. It is pivotal to determine the thermodynamic parameters such as standard free energy change (ΔG°), to predict the feasibility of the process. For instance, if ΔG°< 0, the process is both spontaneous and feasible and vice versa. Recently, adsorption via activated carbon (AC), low-cost industrial products, and biosorption has been investigated and are discussed below.

Adsorption on activated carbon (AC)

Activated carbon (AC) for industrial wastewater treatment is usually applied in two forms – powdered (PAC) and granular (GAC). Adsorption unit can either be used before biological treatment for removing toxic compounds or be placed after the physio-chemical treatment steps for ensuring the complete removal of micropollutants. AC can be used to remove organics such as pesticides, phenols, pharmaceuticals, organic halogens, non-biodegradable compounds, dyes, and inorganics such as Hg2+, Pb2+, Cd2+, Cu2+, and Ni2+,,. AC is also an efficient media for microbial growth, and biologically activated carbon (BAC) has been developed for the inactivation of biological pollutants within a short period. Attaching biomass to AC can remove contaminants by both adsorption and biodegradation. However, AC has some disadvantages, such as expensive thermal/chemical regeneration methods and the loss of a significant fraction of adsorbent during regeneration. Moreover, the adsorption mechanism on AC depends on various factors such as dispersive, electrostatic and chemical interactions; intrinsic properties of the solute and adsorbent and hence the interaction between the pollutants and AC is difficult to predict. Although AC has a high adsorption capacity, it can maintain it only until the adsorption sites become exhausted with pollutants. Other absorbents such as polymeric absorbents are also used when recycling of valuable chemicals is desired,.

The adsorption of phenols by commercial PAC showed that the removal efficiency increases up to an optimum dosage, beyond which the improvement was negligible. It can be observed that the GAC is usually used for removing natural organic matter, synthetic organic compounds, and heavy metals. Zhang et al. used GAC for removing algal odorants like dimethyl trisulfide and ß-cyclocitral. Adsorption isotherms were investigated for the process and found that Freundlich isotherm was fitting the best. The ΔG° for adsorption of ß-cyclocitral and dimethyl trisulfide were –4.24 and –3.61 kJ mol−1 at 298 K, respectively.

Cyanide, for instance, was found to be better removed by biologically activated GAC compared to virgin GAC. Also, biodegradable anthraquinone dyes were removed more efficiently because of the elevated substrate concentration at the granular surface found in BAC systems. Table shows a summary of the adsorptive removal of heavy metals from industrial wastewater by AC.

Adsorption by AC for industrial wastewater treatment.

| **Adsorbent** | **Adsorbate** | **Conditions** | **Results** | **Ref.** |
| --- | --- | --- | --- | --- |
| GAC (size > 2 mm) | Sr2+ | pH = 4, contact time = 8 h, initial concentration of Sr2+ = 100 mg/L, particle size = 270 µm, T = 393.15?333.15K | Activation energy =3.042 kJ/mol?Gº = ?36.61 to ?41.75 kJ/molMaximum adsorption capacity = 5.07 × 10?4 mol/g at 293.15K |  |
| GAC | Cr6+ | Wastewater obtained from tannery plant. Optimum conditions: pH = 3.62; initial concentration = 77.35 mg/L; solid-liquid ratio = 10 and T = 45 °C | Activation energy = 9.16 × 10?3 kJ/mol?Hadsº = 14.51 × 10?3 kJ/mol, ?Sadsº = 104.12 kJ/mol.K, negative Gibbs free energyAdsorption rate = 65.7% |  |
| Commercial AC | Cd2+ | pH = 6.0, contact time = 30 min, initial concentration of Cd2+ = 15 mg/L, particle size = 90 µm, T = 30 ± 1 °C | ?Hº = 19.42 kJ/mol, ?Gº = -2.77 kJ/mol, ?Sº = 94.85 J/mol.K |  |

Not only AC is an effective method to remove heavy metals, it has also been used for the removal of other pollutants. AC was used to remove crystal violet dye and had a maximum adsorption capacity of 84.11 mg/g and a removal efficiency of 85–90%.

Adsorption on natural materials

Adsorption on natural materials such as zeolites has been gaining more interest. Adsorption of metal ions on the zeolite active sites produce inner and outer-sphere complexes. The interposition of at least one water molecule between the bound ion and the functional group of the adsorbent results in the formation of outer-sphere complexes. In contrast, inner-sphere complexes will be formed when there is no interposition of water molecule(s). A coordinate bond will be formed between the heavy metals and the surface functional groups,. For example, Clinoptilolite, a type of zeolite, has shown high selectivity to Pb2+, Cd2+, Zn2+, and Cu2+. Also, it was found that polymeric materials can be used to increase the efficiency of natural clay to remove heavy metals by modifying the natural clay into a composite named clay-polymer composite. For example, clay-poly(methoxyethyl)acrylamide (PMEA) composite has been synthesized to study its capacity to adsorb Pb2+ ions. Bentonite, another type of clay has also exhibited high removal (>99%) of heavy metals removals like Cu2+, Co2+, Ni2+, Zn2+, and Pb2+ ions. The adsorption affinities of the metal species were as in the below order: Co2+>Cu2+>Ni2+ = Zn2+>Pb2+. Another study also reported the complete (100%) removal of Pb2+ from aqueous solutions using 20 g L–1 of bentonite.

Natural phosphates (NP) constitute another category of raw adsorbents. NPs are abundant, cheap, and non-hazardous to the environment, and can be used for heavy metals removal. It was reported that NP has a monolayer adsorption capacity of 26 mg g–1 for Cd2+ at a pH of 5.0. Another study reported a room temperature adsorption capacity of 200 mg Pb2+/g of rock phosphate (low-grade) when the initial aqueous Pb2+ concentration was 50 mg L–1. Adsorption of Pb2+ on PO43- followed a pseudo-first-order rate and Langmuir isotherm. Nano-hydroxyapatite (nHA) is a less-soluble, abundant and stable phosphate that has a high sorption capacity for heavy metals. It has been used in the adsorptive removal of Pb2+ and Cd2+ from polluted soils. Applying nHA can reduce water-soluble Pb2+ by 72% and Cd2+ by 90%, bioaccessible Pb2+ by 12.5–27.5% and Cd2+ by 17.7–34.6%. It was also reported that nHA had a maximum adsorption capacity of 2500 mg of Sn2+ g–1. The process was endothermic and followed Langmuir isotherm.

NPs have also been used to remove emerging and persistent organic contaminants. The adsorption of a reactive dye, Reactive Yellow 84, by hydroxyapatite (HAP) has been found to follow Langmuir isotherm with a monolayer adsorption capacity of 50.3 mg g–1 at a pH of 5.0. Adsorption of this dye is endothermic (enthalpy of adsorption is 2.2 kJ mol–1) and has a low temperature dependency. Nanocrystalline HAP has been used to remove nitrobenzene. The authors achieved a 52.4% removal with an adsorbent dosage of 5 g L–1, whereas the removal was increased up to 95% when the dosage was 25 g L–1. However, the adsorption capacity of nitrobenzene on nanocrystalline HAP is relatively low compared to adsorption on AC (100–300 mg g–1). This was attributed to the smaller surface area of nanocrystalline HAP (42.3 m2 g−1) when compared to AC (1000 m2 g–1). The effectiveness of mesoporous silica-alumina (MSA) on the removal of hydrocarbons from industrial wastewater has been investigated. The dehydroxylated silicon content is the main factor in the adsorption process. Water is adsorbed on the MSA surface by interacting with silanol groups; aromatic hydrocarbons such as benzene and toluene interact with electron-poor acid sites. However, the presence of areas rich in hydrophilic Al enclosed in an active silica matrix can create spots that can deter the efficient removal of hydrophobic hydrocarbons.

Adsorption on industrial by-products

Industrial by-products such as carbonaceous wastes, ***agricultural*** by-products, mineral-derived sources, etc. can be used as low-cost adsorbents for industrial wastewater treatment. For instance, steelmaking slag comprised of hydroxides of iron and calcium is used as a low-cost adsorbent–. Fe(OH)3 and Fe(OH)2 present in the slag provide adsorption sites for ions such as As3+, and Cr3+ whereas Ca(OH)2 increases the solution pH and enhances the heavy metal precipitation. The removal of Cd2+ by steel industry slag has also been investigated. The optimum adsorbent concentration was found to be 10 g L–1 for treating 100 mg L–1 of Cd2+ solution at pH 4.0, and the removal rate could reach up to 99.1%. The removal is attributed to the chemisorption, including chemical precipitation and coordination reactions.

Other examples of low-cost industrial by-product adsorbents are fly ashes–, waste Fe, hydrous TiO2, and other waste products which can be fine-tuned chemically to enhance pollutant removal. Fly ash can be chemically modified with NaOH and CH3(CH2)15N(Br)(CH3)3 for Cd2+ and Cu2+ removal. The mechanisms of adsorption on industrial by-products differ from one material to another. Adsorption on hydrothermally modified fly ash, for instance, is based on electrostatic attraction. Other mechanisms depend on ion exchange and the structure of surfaces. In general, using low-cost adsorbents (such as the ones obtained as by-products or from natural resources) has introduced an alternative for industrial wastewater treatment systems. The comparative advantages of low-cost adsorbents are their relatively low prices and abundance since they are natural materials or by-products from ***agricultural*** and industrial activities. Some of these adsorbents exhibit a high selectivity for specific contaminants. Required wastewater-pretreatment and fine-tuning the adsorbent materials are some limitations. Moreover, in some cases, the heavy metals in the slag may leach out and cause secondary contamination, and hence using those industrial by-products as adsorbents has to be done carefully.

Biosorption

Biosorption involves concentrating pollutants, particularly heavy metals, by binding them with inactive microbial biomass mainly via adsorption and chelations,–. Although this is attributed to the metabolism-independent binding of heavy metals to the cell walls, the actual mechanisms are yet to be understood,. Several mechanisms, such as chemisorption (ion exchange and chelation), complexation, and physical adsorption, are proposed. For example, a study on the removal mechanism of Cu2+, Ni2+, Zn2+, Pb2+ and Cr3+ by Penicillium chrysogenum attributed ion exchange as the principal removal mechanism. The uptake of Pb2+ by R. glutinis is also attributed to the transfer of ions and biomass released phosphate induced precipitation. Also, the uptake of Pb2+ by Aspergillus parasiticus cell wall takes place by ion exchange and complexation processes. Cu2+ ions are also bioadsobed by Fucus serratus by ion exchange. When Ca2+ ions are released from the surface of the biomass, a bond between Cu2+ and functional groups forms,. Also, when Ni2+ is bioadsorbed by Lathyrus sativus, dative bonds will be formed between Ni2+ and nitrogen in the ammonia functional group of the biomass species. Chelation and ion-exchange are proposed to be the two main mechanisms of chemisorption of Cu2+ by walnut and hazelnut shells. Many other biomass sources such as peanut and hazelnut shells ,, green alga, orange peel, Rhizopus sp. biomass, jackfruit, maize cob or husk, and their chemical modification or thermal ***conversion*** to AC have been used during biosorption.

Weak Van der Waals forces between the heavy metal ions and adsorbent surfaces constitute the primary removal mechanism in physisorption. An example of physical adsorption is Cd2+ adsorption by olive cake, which achieved a 66% removal at 28 °C and pH of 6. Another study on the removal of Zn2+, Pb2+, Fe2+, and Cu2+ using dried red seaweed Kappaphycus sp. also indicated the removal of metals vis physisorption. Malamis et al. (2011) applied activated sludge coupled with UF to enhance the removal of Ni2+, Cu2+, Pb2+ and Ni2+. The highest removal of Pb2+ was found at pH=4 and Zn2+, Ni2+, and Cu2+ at pH = 6. Table illustrates ***data*** obtained from the literature of several biosorption cases.

Biosorption of heavy metals by several biosorbents.

| **Biosorbent** | **Metal removed** | **Operating conditions** | | | **Maximum adsorption capacity (mg g?1)** | **Ref.** |
| --- | --- | --- | --- | --- | --- | --- |
| **pH** | **T (ºC)** | **Initial concentration (mg L?1)** |
| Australian marine alga DP95Ca | Pb2+ | 1.0 | 21 ± 2 | 0.4?4.5 | 4.1 |  |
| 2.0 | 157.3 |  |  |  |  |  |
| 3.0 | 267 |  |  |  |  |  |
| 4.0 | 304.3 |  |  |  |  |  |
| 5.0 | 320.9 |  |  |  |  |  |
| Chlorella vulgaris | Cu2+ | 4.5 | 25 | 100 | 40.0 |  |
| Cactus leaves | Cr6+ | 1.0?10.0 | 30 | 20?1000 | ? |  |
| *Chroococcus sp*. | Cr6+ | 1.0?5.0 | 26 | 5?20 | 21.4 |  |
| Acid treated Sphaerophea algae | Ni2+ | 4.0?6.0 | 33 | 50?500 | 244.9 |  |
| Activated sludge | Cd2+ | 2.0 | 25 | 10?150 | 28 |  |
| Bacillus jeotgali | Zn2+ | 4.0?7.0 | 25 | 75 | 105.2 |  |
| Pinus sylvestris | Pb2+ | 4 | 25 | 10?100 | 11.4 |  |
| Chlamydomonas reinhardtii | Hg2+ | 2.0?7.0 | 25 | 20?400 | 122.6 |  |
| Bascillus?bacterial biomass | Pb2+ | 5.0?6.0 | ? | ? | 467 |  |
| Cd2+ | 8.0 | 85.3 |  |  |  |  |
| Zn2+ | 7.5 | 418 |  |  |  |  |
| Cu2+ | 3.0 | 381 |  |  |  |  |
| Cr6+ | 2.0 | 39.9 |  |  |  |  |
| Activated sludge | Pb2+ | 4 | 25 | 320 | 40 |  |
| Ni2+ | 6 | 10 |  |  |  |  |
| Zn2+ | 6 | 10 |  |  |  |  |
| Cu2+ | 6 | 28 |  |  |  |  |

Biosorption has been reported to remove pollutants other than heavy metals. For instance, modified lemon leaf was used to remove cationic dye, and was found to have an adsorption maximum capacity of 36.10 mg g–1 and yielded 70% removal efficiency. Another example was the utilization of modified biogas residue to remove nitrate and phosphate. The maximum adsorption capacity was reported to be 64.12 mg g–1 and 34.40 mg g–1 for nitrate and phosphate, respectively.

Several modified biopolymers have been developed for heavy metal removal applications, which include natural rubber, Lyocell fiber, and chitosan-based adsorbents. Biopolymers are widely used in industries due to their availability, environmental safety, and ability to reduce heavy metals to parts per billion. Such materials do have certain drawbacks, however. For example, the biopolymer chitson in its natural form has low specific selectivity for heavy metals and low adsorption capacity for complex polluted wastewater. Nevertheless, good sorption capacity for transition metals has been demonstrated for chitosan with a high content of hydroxyl and amine groups, but little to no sorption capacity for alkaine or alkaine earth elements.

Heavy metal removal by biopolymers can be enhanced by modifying its chemical and physical properties,,. For instance, chemical and physical methods can be used on chitosan to improve its removal efficiency. Chitsoan can be modified physically by preparing the polymer in different forms. Other forms of chitosan include water-soluble and water-insoluble chitosan, such as flakes nanoparticles and beads,. Modified chitosan beads were suggested for the diffusion of various metal ions and specifically Cu2+ ions through spherical chitosan-tripolyphosphate (TPP) chelating resins, which are prepared using an in-liquid ionotropic crosslinking method. Additionally, the study of Liu et al. [149] suggests that non-porous glass beads can be used to create hybrid materials by immobilizing chitosan on their surface. Chemically modified chitosan is also beneficial for wide heavy metal sorption applications. The most highlighted modifications of chitosan are the grafting chitosan and the cross-linked chitosan. Polysaccharide-based-materials have also been developed as modified biopolymer adsorbent, which is derived from chitin, chitosan, and starch for the removal of heavy metals from wastewater.

Future research should aim at developing new and low-cost adsorption materials with high treatment efficiencies as for most adsorption processes, the cost of the adsorbent constitutes up to 70% of the total cost. Also, most of the studies focus on determining the maximum adsorption capacity of an adsorbent, which assumes a fixed-bed adsorption system. This might not be the case in industry, and more studies should aim at investigating the maximum capacity in real-life processes. The performance of fixed-bed adsorbers is different when compared to agitated batch adsorbers for instance. Another very important aspect that is often not focused on is desorption and regeneration. Since the world is more concerned with sustainability and environment nowadays, more studies should focus on adsorbents regeneration and reuse.

Advanced oxidation processes (AOPs)

Advanced oxidation processes (AOPs) are chemical treatments involving the generation of hydroxyl radicals (OH•) that can efficiently oxidize recalcitrant pollutants. OH• are characterized by their high standard oxidation potential (up to 2.80 V) and their high reaction rate in comparison to common oxidants like chlorine, oxygen, ozone, H2O2, or potassium permanganate. Hence, high rate constants can be achieved during the reaction of OH• with both inorganic and organic solutes. AOPs, in general, employ the efficacies of different oxidants to degrade hazardous pollutants by converting them from their reduced forms to their final harmless oxidized forms. This ***conversion*** mineralizes and degrades the contaminants to harmless substances for overcoming the environmental impacts due to the disposal of the primary pollutants to the aquatic ecosystem. Although these systems use different oxidants, they all tend to share the same radical production. These processes have a high potential to purify water from pollutants that are hard to be removed by biological methods. AOPs include two main stages: The formation of strong OH•/oxidants and the interaction of these radicals with the targeted pollutants to convert them to carbon and water in the best-case scenario. When two OH• interact, H2O2 is formed, as shown in below equation:

The comparative advantages of AOPs are (i) high disinfection strength: Several AOPs are used because of their great disinfection properties, and (ii) standalone destruction of organic contaminants. If methyl tert-butyl ether, for example, was removed by stripping, additional processes such as catalytic oxidation would be needed for effective treatment. However, AOPs destroy the organic contamination directly without the need for other chemical processes.

However, the generation of undesirable oxidation by-products affect AOPs. If these oxidation by-products have slow reaction rates, there would be a delay in mineralization, leading to unwanted accumulation. Also, inorganic substances are formed during some AOPs, such as bromide ***conversion*** to bromate during ozonation. These inorganic compounds interfere with AOPs and inhibit the oxidation reactions. These compounds scavenge the OH•, which are meant to remove and destroy the concerned contaminants. Therefore, there is need to address the issue of radical scavengers and the likelihood of producing unwanted intermediate derivatives from the oxidized forms of pollutants. pH influences the acid-base equilibrium involving OH• formation and the radical’s concentration.

Two critical parameters should be taken into considerations while designing and constructing an efficient AOP system. Firstly, the dosage of chemicals as it will increase the cost and may give the possibility of by-product formation. Secondly, reactor configuration and contact time, which is often determined when implementing a pilot study rather than a lab-scale, should also be considered. The quality of industrial wastewater and other operating conditions also affect the efficiency of degradation of concerned pollutants. It is known that most of the organic substances would react instantly with the introduced radicals. Turbidity also acts as an influencer to the system performance because the more turbid the industrial wastewater, the lower is the penetration of UV source to the water. Additionally, Fe2+ and Cu2+ or other heavy metals in wastewater may also cause the formation of Fe or Cu organic complexes thus results in fouling for the system. The recently employed AOPs are the Fenton-based processes, electrokinetic treatment, and degradation with metal oxides.

Fenton-based processes

Fenton processes are catalytic processes that generate hydroxyl radicals (OH•) from H2O2 upon the addition of Fe2+. OH• are produced from the oxidation of Fe2+ to Fe3+ as in below equation :

However, the Fenton process produces Fe sludge waste because Fe3+ precipitates as FeO(OH). Thus, the typical Fenton process can be improved by coupling it with electricity to have an electro-Fenton process, or with UV or solar light to have a photo-Fenton process, to reduce Fe3+ back to Fe2+ and reduce the amount of waste sludge. The UV produces more OH• by photolysis and activates photo-decarboxylation of ferric carboxylates. Table summarizes the application of Fenton treatment for the removal of various types of contaminants. Recent advances in the Fenton-based processes such as Fenton, photo-Fenton, and electro-Fenton are elaborated in the next subsections.

Operational conditions and observed results of Fenton-based oxidation to various types of wastewaters.

| **Industry** | **Wastewater characteristics** | **Operating conditions** | **Experimental results** | **Ref.** |
| --- | --- | --- | --- | --- |
| Textile | COD = 2400 mg L?1 | T = 50 °C, pH = 3, H2O2/Fe2+ = 95-290Room temperature, pH = 3, H2O2/Fe2+ = 1.2, H2O2/COD = 0.0037 (w/w). treaction = 4?6 h, Vreactor = 400 mL | COD: 95% |  |
| COD = 8100 mg L?1, BOD5/COD = 0.148, TOC = 3010 mg L?1 |  | COD: 45%, TOC: 40%, Color: 71.5% |  |  |
| Fe2+/H2O2 = 1:20-1:100treaction = 1 h | Color: 100%TOC: 74.2% |  |  |  |
| Pesticides manufacturing | Atrazine = 0.01 mM | pH = 2, H2O2/Fe2+ = 0.33?3 | atrazine = 15%-98% |  |
| Triazophos = 0.06 wt%COD = 3242 (synthetic wastewater) | pH = 4, [FeSO4.7H2O] = 2.5 g L?1, 100 mL L?1 of 30% H2O2 solution added, stirring time = 90 min | COD: 96.3% (synthetic), nitrogen: 71.2%, phosphorous: 68.5% |  |  |
| Petrochemical industry | p-nitroaniline = 0.072-0.217 mM (synthetic) | T= 20 °C, pH = 3, Vreactor = 200 mL (batch), treaction = 30 minSolar light | p-nitroaniline >98% |  |
| Phenol = 0.1 g L?1 (synthetic water) | T = 25 °C, pH = 3, Vreactor = 250 mL (batch)Fe2+/H2O2 = 0.01-0.2 mMFe sources: FeSO4.7H2O, Fe2(SO4)3.9H2O, Fe0Initial concentration of Fe catalyst = 0.5?1 mM | Phenol : 97.6 % (UV/Fe2+/H2O2)Phenol: 97.2% (UV/Fe3+/H2O2)Phenol: 84.8% (UV/Fe0/H2O2)COD: 97.5% |  |  |
| Pharmaceutical | COD = 900?7000 mg L?1 (synthetic) | pH = 3.5,H2O2/Fe2+ = 155 | COD: 45-65% |  |
| COD = 4061 mg L?1Berberine = 709 mg L?1BOD5/COD = 0.3 | pH = 3, H2O2/COD = 1.25, Fe2+/H2O2 = 0.1,Flow rate = 100 L/h (continuous), HRT = 2.5 h | COD: 35.6%Berberine: 91.4% |  |  |
| Pulp and paper | COD = 1384 mg L?1TOC = 441 mg L?1 | T = 25-70 °C, pH = 2.8H2O2/COD = 7.22 (w/w), H2O2/Fe2+ = 41Vreaction = 100 mL, treaction = 2 h[141] = 0?800 mg L?1, ([188]) = 0?10,000 mg L?1 | TOC: 91% |  |
| TOC = 110 mg L?1 | T = 23-27 °C, pH = 5, H2O2/Fe2+ = 20 | TOC: 87.5% |  |  |
| Landfill leachates | COD = 1000, and 4000 mg L?1 | pH = 2.5, H2O2/Fe2+ = 3 | COD: 89.2% and 68.2% |  |
| COD = 5700 ± 300 mg L?1, BOD5/COD = 0.88Mg2+ = 172 mg L?1 | pH = 3.5, H2O2:Fe2+ = 19.1 | COD: 66% |  |  |

FeSO4 is an adequate salt for ferrous generation, and it showed a TOC removal efficiency of 94% after 2 h. FeSO4 can be generated by adding Fe catalyst to H2SO4. Fenton process via FeSO4 was shown to be very useful and efficient in terms of oxidation and degradation of TOC. Organophosphorus pesticides removal from wastewater has been evaluated using the Fenton process under various reaction conditions at room pressure and temperature. The optimum condition was determined by several parameters such as pH, stirring time, and dosage of FeSO4 and H2O2. COD removal efficiencies for an actual triazophs wastewater treatment plant and a bench-scale experiments were 85.4% and 96.3%, respectively. Complete oxidation of phosphorus and nitrogen content was observed through which eutrophication is minimized. The efficiency of treating wastewater obtained from a synthetic fiber factory that uses acrylic polymer has also been investigated. The more H2O2 was added, the more the effectiveness of degrading the unwanted pollutants. However, an increase in the COD content of the treated effluent was observed at a concentration above 500 mg L–1 of H2O2. Also, pH levels seemed to impact the removal efficiency of color and COD. The pH was carefully selected for the removal of color since a decrease in pH (<6) led to the destabilization and aggregation of particles.

Apart from FeSO4, Fe3O4 has also been examined as a reagent that can be combined with H2O2 in a Fenton process for the degradation of phenols,. Many characteristics were taken into consideration, but the one that played a significant role was Fe2+ and Fe3+ ratio, which was determined by the chemical analysis. Fenton reaction started slow but accelerated eventually. Phenol degradation was achieved efficiently in Fe3O4 that has a higher structural content of Fe2+. The use of magnetite showed positive features such as safe levels of Fe2+ content in wastewater/water effluent, a magnetic behavior that separates the reagent easily from the treated feed, and easy absorption of UVA radiation, which enhanced the reaction.

Recently, Fenton pilot-scale experiment has been implemented to degrade synthesized C20H18NO4+. The main parameters were optimized using response surface methodology technique. Acidic industrial wastewater sample was ***collected*** from a chemical factory, and subsequently, pH was adjusted prior to the oxidation process. Values given by the statistical method were highly efficient and relatively close to the obtained experimental results. The berberine removal efficiency was found to be 35.6% at a pH of 3.5.

The photo-Fenton process has improved the TOC removal efficiency when compared with the Fenton process due to the enhancement of TOC degradation rate by photons. Photo-Fenton process at neutral pH with UV254 is a promising technique in which it degrades all pollutants in a limited time. For this process, Fe is not necessarily needed if the treated water contains at least 1.5 mg L–1 of Fe2+ or Fe3+. This technique is appropriate for large-scale systems and can be used to replace the available conventional solutions such as ozonation. However, a relatively low amount of pollutant degradation would be observed when photo-Fenton is implemented using regular sunlight.

Photo-Fenton technology has also proved to be efficient for the removal of pesticides from the water with high salinities. Additionally, photo-Fenton technology has also been reported as efficient for the removal of pesticides from the water with high salinities. Oxidation rates were much faster from the beginning when the water was more saline. For water with lower salinity, oxidation rates started to increase only after about 60 min of treatment. The effect of conductivity on the mineralization of organic content of saline water was mainly caused by interference by chloride. The photo-Fenton process has also been used for dye removal. Low levels of H2O2 in the process may result in the formation of more toxic products. In some cases, however, the pollutant may be degraded without the creation of any toxic by-products depending on the solubility of the contaminant in water. Therefore, the solubility of pollutant in water has a significant role in the photo-Fenton process. Photo-Fenton is also reported as useful for the full degradation of 4 colorants in wastewater streams from the food and cosmetics industries.

Electro-Fenton is an emerging process where H2O2 is electro-generated at the cathode made with carbon materials. This method is safe because H2O2 is produced in-situ, and the risk of handling H2O2 is reduced. It is also a faster process in degrading many pollutants because of the constant generation of Fe catalyst at the cathode. A simple illustration of the electro-Fenton mechanism is shown in Fig. . Removal of Alizarin Red has been successfully implemented recently using the electro-Fenton technique with a graphite-felt electrode where the cathode was fed with air to reproduce H2O2. Ferrous ions played the central role in the removal since the oxidant alone has a limited capability. Through this method, Alizarin Red was oxidized to a colorless acid and then to carbon dioxide. 100% color removal has also been achieved through the electro-Fenton process. By using the GAC electrode as the cathode and air in the electro-Fenton process, stability, and efficiency in removing methyl orange has been achieved. It was, however, observed that the electro-generation of H2O2 was limited at longer times due to the oxidation to oxygen at the anode, but still, the limited value is much more significant when compared to methods without air bubbling approach. It was also mentioned that oxygen did not contribute to the reduction process since the rate of increase of H2O2 generation followed a linear relationship with the imposed current for the first hour. The use of AC cathode was also studied previously in Taiwan by, where the pollutant adsorption on the cathode was measured, and the highest COD removal reached around 75%.

Electro-Fenton process.

(a) Illustration of reaction mechanism in electro-Fenton process (inspired from), and (b) The schematic of a continuous electro-Fenton process (inspired from).

Electro-Fenton process has also been applied for the degradation of surfactants by using graphite-felt cathode. The critical parameter was to apply different electrolytes in the presence of Fe catalyst. The decay kinetics of the surfactant was unaffected by its initial dosage, highly dependent on the applied current, Fe catalyst concentration, and pH; and followed a pseudo-first-order reaction. Another recent application of the graphite cathode electro-Fenton process is the removal of antibiotic residue from industrial wastewater. A highly bioactive antibiotic (tetracycline) was mineralized to carbon dioxide through this method. Meanwhile, the recent development and use of nano-enhanced carbon electrodes in the electro-Fenton process can ensure enhanced stability and pollutant degradation rate. Graphite cathodes have been compared with carbon nanotube (CNT) sponge in an electro-Fenton process. The CNT sponge was used as the cathode of the electro-Fenton process under high electrical power. The CNT sponge showed enhanced stability and a good degradation rate that was estimated to be ten times higher than the one obtained by graphite cathode. Recently, the efficiency of carbon-felt electrode has also been compared with those of alternative non-carbon materials as anode. The materials, such as boron-doped diamond (BDD), Ti with Pt coating, and Ti with TiO2 coating, were used as electrodes to remove carbamazepine from wastewater. The BDD anode showed the fastest oxidation and mineralization efficiency; and exhibited much better catalytic ability than the others. Also, the BDD anode showed a better performance in mineralizing Atrazine into C3H3N3O3 as the ultimate end product. This study compared its results with the previous experiment conducted on C8H14ClN5 removal with classical Pt anode. Although the classical Pt anode was faster in decaying Atrazine, it was slower in mineralizing it. BDD anode has the potential to produce high amounts of OH•. These formed OH• are physically adsorbed to the anode surface, which enhanced pollutant uptake. The study concluded a full removal of the insecticide at an initial pH of 2. The efficiency of the BDD anode agreed with previous results. A continuous electro-Fenton process with graphite sheet cathode and BDD anode is illustrated in Fig. .

Furthermore, Tylosin antibiotic was degraded after 15 min of applying electro-Fenton, and it followed pseudo-first-order. The degradation of Tylosin antibiotic showed a possibility to combine biological treatment with electro-Fenton because the biodegradability showed an improvement where the BOD5/COD ratio increased from zero to 0.6 after 6 h of electrolysis. After 6 h, the application of electro-Fenton alone gave more energy efficiency than the combination. It was suggested that the mineralization should be optimized by balancing the energy used in case both processes are operating together. In addition, electro-Fenton has been integrated with absorption in order to enhance the kinetics of color removal. The use of Fe-loaded AC as an absorbent, together with electro-Fenton has shown promising results in winery wastewater treatment. Fe-loaded AC implementation alone exhibited 23% color removal after 24 h. However, almost total color removal was achieved at the same time when electro-Fenton was integrated with Fe-loaded AC absorption. The adsorbent was used as a catalyst to optimize the process kinetics so that higher degradation rates can be reached. The adsorbent also showed a better physical capability than Mn and Fe alginate beads. Several conventional electro-Fenton process studies emphasized that the process can ensure a total removal or high removal efficiency at a pH of 3. However, a recent optimization study using Box-Behnken design and response surface methodology showed higher efficiency when the pH was increased up to 5. It was illustrated that if the pH was below 5, then H2O2 cannot be decomposed to the oxidant radical by Fe2+. At pH below 5, hydrogen would gain one electron, and this would lead to a reduction in the rate of reaction between the Fe2+ and H2O2. Consequently, a reduction in the degradation of pollutants would be observed. The results obtained in several recent studies on Fenton-based processes in terms of the removal of highly hazardous pollutants are shown in Table . An overview illustration of various Fenton processes is presented in Fig.

Removal of highly hazardous pollutants from real and synthetic industrial wastewater by Fenton-based processes.

| **Degradation/removal by Fenton processes** | | | | |
| --- | --- | --- | --- | --- |
| **Fenton technique** | **Pollutant(s)** | **Matrix scale** | **Kinetic results** | **Ref.** |
| Fe2+/H2O2Fe3+/H2O2 | 1,2-dichloroethane, sodium formate, sodium hydrogen carbonate, sodium carbonate sodium chloride | Lab scaleindustrial wastewater | >94% TOC removal in 120 min,initial pH = 3.5 |  |
| Photo-FentonWith magnetite instead of Fe2+ | Phenols | Lab scalesynthetic solution | ?100% TOC removal in <120 min,initial pH = 3.5 |  |
| Fenton | Triazophos pesticide | Lab scalesynthetic solution | 85.4% COD removal in 90 min, initial pH = 4 |  |
| FentonPhoto-FentonUV254 | Bezafibrate, Gemfibrozi, Simvastatin, Metformin, Carbamazepine, Gabapentin, Diclofenac, Ibuprofen, Ketoprofen, Mefenamic acid, Naproxen, Paracetamol, Primidone, Atenolol, Metoprolol, Sotalol, Azithromycin, Ciprofloxacin, Clarithromycin, Metronidazole, Norfloxacin, Ofloxacin, Sulfamethoxazole, Trimethoprim, Iopamidol, Iopromide, Benzotriazole, Methylbenzotriazole, Triclosan, Atrazin, Diuron, Isoproturon, Mecoprop, Irgarol, and Terbutryn | Lab scalemunicipal wastewater | 97% pollutant removal in 30 min,initial pH = 2.5 |  |
| FentonH2O2/Fe2+ | Acrylonitrile, vinyl acetate, oligomers, and DMAc | Lab scalefiber factory wastewater | 65.5% COD removal in 120 min,initial pH = 3 |  |
| Fenton/CoagulationH2O2/PAC/FeSO4 | Printing ink | Lab scale, printing ink wastewater | 93.4% COD removal and 100% color removal in 30 min, initial pH = 9 |  |
| Photo-FentonWith UV/ Fenton | Textile and food dyes(C.I. Vat Green 3, C.I. Reactive Black 5, C.I. Acid Orange 7, C.I. Food Yellow 3 and C.I. Food Red 17) | Lab scaledilution of dyes in freshwater | 100% degradation by Photo-Fenton to black, orange, red and yellow in 60 min |  |
| Photo-FentonWith Fe3O4 as Fe source | Phenol | Lab scalesynthetic solution | Effective degradation,initial pH = 3 |  |
| FentonH2O2/Fe2+ | Amantadine | Lab scaleindustrial amantadine wastewater | 50% of toxicity reduced in the wastewater using Fenton,initial pH = 3 |  |
| Electro-Fenton | Alizarin | Lab scalesynthetic solution | >90% COD removal in 240 min, initial pH = 3 |  |
| Electro-Fenton | Sodium dodecyl benzene sulfonate (LAS) | Lab scalesynthetic solution | Almost complete removal in 200 min, initial pH = 3 |  |
| Electro-Fenton | Tylosin (TYL) | Lab scalesynthetic solution | 96% oxidation in 360 min, initial pH = 3 |  |
| Electro-Fenton | Carbamazepine (CBZ) | Lab scalesynthetic solution | 52 and 73% of TOC and pollutant removal, respectivelyinitial pH = 3 |  |
| Electro-Fenton | Gray wastewater | Lab scalegray wastewater | 90 and 85% of COD and TSS removal, respectively in 14 min,initial pH = 4 |  |
| Electro-Fenton | Tetracycline | Lab scalesynthetic solution | Chemical degradation by photo-electro-Fenton, electro-Fenton, and UV irradiation were 98.3%, 87.7%, and 13.5%, respectively in 120 min,initial pH = 7 |  |
| Electro-Fenton | Atrazine | Lab scalesynthetic solution | TOC Removal by Electro-Fenton with BDD anode, and electro-Fenton with Pt anode were 97%, and 93%, respectively in 480 min,initial pH = 3 |  |
| Electro-Fenton | Imidacloprid | Lab scalesynthetic solution | 80% pollutant removalremoval in 120 min,initial pH = 2 |  |

Different Fenton processes.

(a) Illustration of Fenton mechanism, (b) Fenton set-up, (c) Photo-Fenton set-up, (d) Photo-Electro-Fenton device, and (e) Electro-Fenton set-up.

Electrokinetic treatment

Electrokinetic treatments such as electrocoagulation (EC), electrochemical oxidation (EO), and electroflotation (EF), electroosmosis, and electrophoresis help in the degradation of various pollutants via electrochemical mechanisms. They are specifically beneficial for the treatment of industrial wastewater, such as textile wastewater. Some of the contaminants that have been removed successfully by electrokinetic treatments include decolorizing reactive dye solutions and phenolic compounds, and heavy metals.

Electrocoagulation (EC) is an electrokinetic process that utilizes the electrical field to form aggregated particles. EC generates coagulates via the decomposition of electrodes. Ion generation occurs at the anode, while hydrogen gas is produced at the cathode, allowing electofloculation to take place since the hydrogen released helps in keeping the flocculated particles float. Colloidal solids and particles, metals, and soluble inorganic pollutants are some of the materials that EC can remove from aqueous media by neutralizing their charges using the charged polymeric metal hydroxide species. Neutralizing suspended solids charges causes the contaminates to agglomerate and then separate from the aqueous phase.

EC has been widely used for treating industrial wastewaters with metallic content. The efficiency of EC depends on the type of wastewater. For example, COD removal by EC in textile wastewater has been found to be from 40 to 70%, 96% for soluble oils, and 80% for paper waste. One of the key factors to consider when using EC for the treatment of industrial wastewater is the electrode material. The effect of three different types of electrode materials, namely Al, stainless steel, and Fe on EC’s efficiency for the removal SO42- from a refinery’s wastewater has been reported. The electrodes used in the study have the same area, contact time, and CD. It was observed that Al electrodes have the highest efficiency, in which, the sulfide reduction was 2.5 times higher than stainless steel and Fe electrodes. This is due to the reaction between Al(OH)3 and SO42- in the cell, causing sulfate salts to participate at the bottom of the cell. SO42- can also get trapped in porous precipitate and increase extraction efficiency. Additionally, the solubility of Al2(SO4)3 is less than that of ferrous sulfates (400 kg m−3 vs. 600 kg m−3). Therefore, the precipitation of Al2(SO4)3 can occur at a faster rate. The electrode with the lowest efficiency among the three materials is stainless steel, due to its resistance to corrosion. However, a high concentration of calcium or magnesium ions can increase stainless steel effectivity drastically. This demonstrates that the type of pollutant should be taken into consideration when choosing an electrode. Wang and Chou [209] reported that using Al as cathode and anode, because of its low hydrogen overvoltage, gives the highest turbidity removal and COD in the treatment of tanning wastewater. At the same time, Fe or steel can be more effective in treating the same wastewater, depending on the targeted pollutant. Another study showed that Al electrodes yield better effluent quality for leather tanning industrial wastewater treatment in comparison with other electrodes. Therefore, in general, Al pairs of electrodes might be more suitable for the removal of organic matter. In contrast, Fe electrodes might provide a higher removal of inorganic pollutants, such as Cr, Ca, and Zn. For instance, Fe electrode is not effective for COD removal, since soluble and miscible organic compounds such as glucose, isopropyl alcohol, phenol, sucrose do not react with Fe2+ and Fe3+. Only a small amount of these organic compounds can be incidentally removed by sorption on the floc. COD value might increase when compounds (usually acids) react with Fe2+ to form soluble products, which remain in the solution. Additionally, COD can be partially removed when sodium oxalate, other similar salts, and certain acids are present in the wastewater. In addition to protons, EC generates Fe ions which hydrolyze to form Fe(OH)2 and Fe(OH)3. OH− ions are not attracted to sodium ions since Fe ions are more acidic, which causes a very low percentage of CH3COO− and similar ions are removed. Acids, such as C6H8O7, C7H6O3, C4H6O6 and C2H2O4 acids, react with Fe2+ and Fe3+ to form soluble and insoluble, respectively. COD can only be effectively removed if the present organic compounds can react with Fe ions to form insoluble compounds, as exhibited by hydroxoaluminum ions. Therefore, when Al and Fe electrodes are compared, Al electrodes show higher COD removal efficiencies, especially at lower pH values. This is because Al has only one oxidation state, namely Al3+, which allows a complete reaction of the organic compound to form an insoluble compound.

EC can also be used to treat oil-in-water emulsions–. The coagulants produced in-situ cause the break-up of the emulsion by reducing the surface charge of the droplets. This causes the coalescence of oil droplets, which is then followed by separation either by settling or by dissolved air-flotation. The primary removal mechanism is bridging flocculation or the attachment of absorbing macromolecules to several droplets simultaneously,. In bridging flocculation, electrically charged sites on the surface of the droplet are attracted to species with the opposite charge. Additionally, the adsorption properties of growing metal hydroxides can be utilized for the elimination of oil (Fe and Al hydroxides). It was found that the adsorptive layers of anions and cations of growing hydroxides, in addition to its nucleus, produce positively charged particles that have high adsorption of oil droplets,. Also, destabilization by non-absorbing polymers can happen by depletion flocculation. It has been found that the instability of oil emulsions and the removal of COD can only be attained for values of pH in the range of 5–9.

The aqueous behavior of Al includes the production of polymeric hydroxoaluminum ions, monomeric hydroxoaluminum ions, and Al(OH)3 precipitates. Monomeric cationic hydroxoaluminum are the predominant species at low range of pH. When the pH is close to neutrality, aluminum hydroxides precipitates are the predominant species. The dissolution of the precipitates into monomeric anionic hydroxoaluminum occurs with an increase in pH. The inability of the monomeric Al ionic species to destabilize oil emulsions can also be attributed to their steric constraints; monomeric Al ionic species have a smaller size in comparison to the size of the droplet; thus, enabling to act over oil droplets. On the other hand, the size of hydroxide precipitates, and polymeric ions can help more than one droplet in the attraction to the coagulant species. When the electrical charge exceeds a certain threshold, de-emulsification occurs, which slightly decreases the removal efficiency. This is because the coagulant at an excess concentration reduces the efficiency, since it increases the concentration of Al(OH)3 particles, and thus decreases the chance of attracting more than one droplet on the same particle of coagulant.

EC has been used to treat industrial wastewater rich in heavy metals such as Cr6+. Hexavalent Cr removal is achieved by reducing Cr6+ to Cr3+, which then later precipitates in the form of neutral hydroxide. It was found that a higher CD corresponds to faster removal of Cr. Additionally, unlike Fe electrodes, COD removal was not affected by the presence of Cr6+ by using Al electrodes. 5 min was sufficient for the removal of 99% of Cr6+, but 10 min is required with using Al electrodes. After 60 min of EC, flecks of aggregates were observed (Fig. ). Cr6+ ions can react with Fe2+ to produce Cr3+ and Fe3+. By using Fe electrodes, the residual Cr concentration is dependent on the residual Fe concentration, because the removal of Cr ions is carried out by co-precipitation of Cr ions and Fe ions. Hence, complete precipitation of Fe ions is preferred.

Flecks of aggregates formed during electrocoagulation.

Flecks showed by scanning electron microscope (SEM) after 60 min of EC.

EC has also been used recently to treat industrial wastewater containing Mn, Cu, and Zn at concentrations of 5 mg L–1, 5 mg L–1, and 10 mg L–1, respectively, and at a pH of 6. Cu and Zn were removed entirely, and more than 95% removal of Mn was achieved. Decreasing the initial pH resulted in a decrease in removal efficiency. Also, the higher applied current was associated with higher efficiency. The use of different initial concentrations did not affect the removal of heavy metals. Another study reported a 96% arsenic (As) reduction by EC when Fe electrodes were used. Cu, Cr, Pb, and Zn removal from billet industry wastewater was also studied. Around 99% of these heavy metals were removed at pH 5, CD of 98 A m−2, and 30 min treatment time.

EC has also been utilized to extract fluoride (F−) from treated industrial wastewater, particularly that generated from steel industry. F− is additionally present in wastewater generated from semiconductor, electroplating, glass, and ceramic industries,. By using EC, F− concentration can be reduced to 0.5 mg L–1 from a concentration of 4.0–6.0 mg L−1 using optimum HRT of 5 min. Although an increase in HRT is associated with increased removal efficiency, this increase in removal efficiency is negligible after 5 min. Another study reported that increasing the number of Al plates in a reactor from one to three, increased the F− removal from around 90% to 93% at a constant potential of 30 V. However, increasing the number of plates to about 6 had a negative impact on the F− removal efficiency. This can be explained by Ohm’s law; the current and resistance are inversely proportional at a fixed voltage. It can also be observed that increasing the number of plates resulted in producing more coagulants, resulting in increased resistance, and reduced current. The CD determines the coagulant dosage and size of the bubble production, which affects the growth of flocs.

EC process has also been tested for the removal of organics from the textile industry wastewater. A study reported COD reduction from 1316 mg L–1 to 42.9 mg L–1 by using RuO2/IrO2/TaO2 and titanium electrodes. In another study, COD and turbidity removal, the effect of electrode material, cell voltage, and other parameters were investigated in textile wastewater treatment using Al and Fe electrodes. EC removes organic matters by two mechanisms. The first mechanism involves the removal of organic matters through indirect oxidation by utilizing chloride. The second mechanism is adsorptive/entrapment of organic matter, particularly colloids, and SS on metal hydroxide flocs,. Apart from the removal of organics, several studies have been conducted to investigate the extraction of color from textile wastewater. The extraction efficiency of color was found to be 95%-99% by EC using Fe and Al electrodes. The decolorization kinetics followed the first-order law. The highest color extraction efficiency was attained at neutral and slightly acidic pH values. Another study tested EC’s color removal efficiency for both synthetic and real wastewaters. It was found that the removal of color from synthetic wastewater was higher than that of real wastewater. This was due to the higher organic content in real wastewater, in addition to the complexity. Table summarizes the recent advances in industrial wastewater treatment by EC.

***Data*** obtained from literature on EC to treat industrial wastewater and water containing heavy metals.

| **Wastewater type** | **Anode/cathode material** | **Removal efficiency** | **Ref.** |
| --- | --- | --- | --- |
| Tannery wastewater | Fe | COD: 95% |  |
| BOD: 96% |  |  |  |
| Cr: 100% |  |  |  |
| TSS: 96% |  |  |  |
| Color: 98% |  |  |  |
| Chemical mechanical polishing wastewater from semiconductor fabrication | Fe+BDD | COD: 85% |  |
| Alcohol distillery wastewater | Fe | COD: 51% |  |
| Color: 95% |  |  |  |
| Dairy wastewater | Fe | COD: 70% |  |
| Turbidity: 100% |  |  |  |
| TS: 48% |  |  |  |
| Almond industry | Al/Fe | COD: 81% |  |
| TOC: 74?79% |  |  |  |
| Color: 98?100% |  |  |  |
| Paint manufacturing wastewater | Al | COD: 94% |  |
| Fe | TOC: 89% |  |  |
| Industrial wastewater containing polyvinyl alcohol (PVA) | Al/Al | PVA: 77% |  |
| Al/Fe |  |  |  |
| Fe/Al |  |  |  |
| Fe/Fe |  |  |  |
| Galvanic wastewater | AlFe | Ni: 95% |  |
| Cu: 100% |  |  |  |
| Cr: 95% |  |  |  |
| Water containing Mn, Cu, and Zn | Fe/Fe | Cu: 100% |  |
| Fe/Al | Zn: 100% |  |  |
| Al/Al | Mn: 96?99% |  |  |
| Water rich in Cd | Al/alloy | Cd: 94?98% (AC) |  |
| Cd: 92?96% (DC) |  |  |  |
| Water containing C76H52O46 | Fe | C76H52O46: 99% |  |
| Water containing Cr6+ | Al | Cr6+: 99% |  |

The specific energy consumption is directly proportional to the current and time. It was predicted that US $1.86 is required for treating 1 m3 of dye by EC process. The operating cost increases with the increase in operating time for iron and aluminum electrode, while the operating cost is double for aluminum electrode EC as compared to iron electrode EC for the same operating time. The operating cost of EC process for the treatment of industrial wastewater is minimal as compared with other process like Fenton and chemical coagulation. Furthermore, the cost of adsorption process is less compared to that of EC, where the generation of huge quantity of sludge is the major problem.

Electrochemical oxidation (EO) of pollutants in industrial wastewater can be achieved via two main mechanisms. The first is direct anodic oxidation, where oxygen or OH• in the oxide lattice MOx+1 is generated. The other mechanism is by indirect electrooxidation process in which the oxidation process is carried out via a generated mediator, such as chlorine, hypochlorite, ozone, and H2O2. Generally, the EO technique can remove a wide variety of pollutants, such as nitrogen species, microorganisms, and refractory organic matter, which are often found in industrial wastewater. Additionally, it is effective in treating non-biodegradable, toxic organic pollutants, nitrite, and nitrate, and some micro contaminants such as pharmaceuticals. Advanced technologies that are based on chemical oxidation are usually used to treat biologically recalcitrant effluents. Electrochemical reactions are additionally utilized for disinfection purposes by generating oxidizing species. High disinfection efficiency would be obtained from waters that contain chloride ions because the generation of oxidizing species would be achieved.

EO is affected by cell design, pH, electrolyte composition, CD, temperature, and electrode materials. Electrodes should be stable and should display low activity toward oxygen evolution reaction and high activity towards organic oxidation.

The most common electrochemical oxidant is chlorine, which is formed by the oxidation of chloride at the anode. The electrochemical oxidation of ammonia has also been reported, specifically that present in saline industrial wastewater. An electrochemical cell consisting of circular BDD on a stainless-steel cathode and silicon anode was used. A high level of chloride ions in wastewater increased the ammonia elimination, and the TOC removal was reached up to 90%. It was also found that the highest efficiency was associated with the lowest CD. If the chloride content in wastewater is not high enough, salt must be added to increase the treatment efficiency. The removal of dyes, solvents, and surfactants has also been achieved by EO. BDD was used as an anode and stainless steel (AISI 304) as a cathode. A complete COD removal was achieved with very high current efficiency, depending on CD and the type of anions in the wastewater. The treatment of dyes is more efficient with using chlorine, while phosphates are better suited for the extraction of aliphatic compounds.

EO has also been utilized for the disinfection and treatment of latex wastewater. The initial concentration of COD and microorganism was 3820 mg L–1 and 180 CFU mL–1, respectively. COD was reduced to a level of 78 mg L–1, while the microorganism was completely removed. This was achieved through the hydrochlorites acid produced from electrolytic reactor that utilizes graphite as an anode and stainless steel as cathode. Equations (–) illustrates the electrochemical generation of chlorine/hydrochlorite in a solution that contains chloride ions:

Nowadays, due to their high stability and efficiency, conductive-diamond anodes have been gaining more attention in the treatment of industrial wastewater containing organic pollutants. This can be justified by the fact that the anodic activity depends on the value of the overpotential of oxygen evolution. High oxygen evolution overpotential is essential to avoid undesired side reactions that reduce the current efficiency of oxidizing organics. IrO2, graphite, and Pt exhibit low values of overpotential of oxygen evolution in EO when compared to conductive-diamond anodes. This necessitates the application of a very low CD to remove pollutants effectively or the use of this anode when there is a high concentration of chlorides or metallic mediators. BDD film on titanium substrate also gives a high value of oxygen evolution overpotential. When this anode is used, oxidation can take place with a low amount of oxygen evolved when high values of current densities are present.

EO has been additionally used to remove tetrahydrofuran (THF) from rubber manufacturing wastewater. THF is a cyclic ether used as a solvent and raw material for synthesizing polymers in the industry. The wastewater has an initial THF concentration of 688 ± 140 mg L–1. THF was treated by EO by using four anodic materials, namely, BDD, RuO2, PbO2, and Pt. The CD applied was 300–1200 A m–2. The experiment resulted in a fast THF removal when BDD anode was used using sodium sulfate as an electrolyte to prevent the formation of organochloride secondary products. Also, COD removal was higher than 98% and TOC elimination higher than 95%. However, the mineralization of organic pollutants was not achieved by using RuO2 as an anode and sodium chloride as an electrolyte. The reason why sodium chloride was chosen as an electrolyte was that DSA, such as RuO2 generates chlorine when NaCl is the electrolyte. The reduced efficiency of Ti/RuO2 in NaCl electrolyte showed that the free chlorine generated is not an active oxidant for THF removal and mineralization.

EO has also been used to remove COD from vegetable tannery wastewater by using a graphite anode. The initial COD value was 9600 mg L−1, and the final value obtained was 59 mg L−1 at a CD of 34 mA cm–2 and 120 min of electrolysis. In the case of chrome tanning wastewater, Cr3+ was oxidized to Cr6+ with a ***conversion*** of 96 ± 3% at a pH of 2.5–5.5. Cr6+ was then converted to Cr2(SO4)3 for reuse in tanning operation. EO treatment of tannery wastewater has also been carried out by using Ti/Pt and Ti/Pt/Ir anodes. It was found that COD removal was not enough to meet the discharge regulations. Hence, the EO process via these electrodes cannot be used alone in the treatment of tannery wastewater. Moreover, EO has been utilized to extract organic pollutants from textile and finishing wastewater. The wastewater produced from the textile industry is challenging since it has a high pH, high temperature, intense color, high COD, and low degradability. Usually, dyeing wastewater can be treated by biological oxidation and adsorption. The effect of EO on finishing wastewater and textile dye was investigated using a stainless-steel cathode and titanium or platinum anode. The organic pollutants present in the wastewater were oxidized to water and carbon dioxide when passing through the cell. This is because of the high oxidizing ability of the chemicals generated in the cell, which include hydroxyl, chlorine, oxygen, and other oxidants. In total, 2 mL of 36% hydrochloric acid was added, and electrolysis was allowed to take place for 18 min at a current of 0.89 A cm−2. The COD/BOD ratio decreased from 2.16 to 1.52, indicating that the biodegradability of wastewater was improved. Additionally, COD removal was found to be 86%, BOD removal was 71%, and ADMI color units were reduced completely.

One comparative study that investigated energy consumption of EC and photocatalytic process for textile dye wastewater treatment has concluded that EC was more economically feasible as the energy consumption of EC process was less than 0.01 kWh m−3 per unit COD removed when compared to >100 kWh m−3 for the photocatalytic process. Photocatalytic ozonation is considered to be one of the least energy-demanding amongst AOPs technologies. It was reported that the specific energy consumption of the photocatalytic ozonation system in the decomposition of oxalic acid and dichloroacetic acid was 0.007 kWh mM–1 and 0.024 kWh mM–1, respectively. These values were less than those of catalytic ozonation (0.017 kWh/mM and 0.050 kWh mM–1) and photocatalytic oxidation (0.063 kWh mM–1 and 0.350 kWh mM–1).

EF technique is an electrokinetic phenomenon that has been used for the treatment of various types of industrial wastewater treatment–. It involves the flotation by electrically generated bubbles to separate two liquid phases or solid from liquid phases. Colloidal or finely dispersed particles in wastewater are removed by the small bubbles of O2 and H2 lifting contaminants to clarify the solution. The best recoveries could be obtained in the particle size range of 20–50 µm. The advantages of EF include simplicity, efficiency, environmental compatibility, safety, selectivity, reduction in sludge generation, minimization of added chemicals, and relatively little space requirement due to its shorter residence time. The efficiency of EF in treating wastewater rich in heavy metals was studied by preparing a solution of NiSO4.6H2O, CuSO4.5H2O, PbSO4, ZnSO4.7H2O, CdSO4.8H2O, and FeSO4.7H2O at an initial concentration of 100 mg L–1 for each salt, initial pH of 8, and conductivity of 2.7 mS cm−1 in the presence of sulfate. EF showed an average heavy metal removal efficiency of 93%, and the kinetics was found to be fast (around 15 min) except for Ni. Another study investigated the feasibility of EC/EF process for heavy metals removal such as Pb, Ba, and Zn. Up to 97% removal was achieved with stainless steel mesh electrodes. EC/EF has also been used to remove F− and CaF2 nanoparticles from semiconductor industry wastewater. Suspended matter and F− were eliminated by the combined methods. Additionally, the high turbidity removal efficiency was achieved by EF technique. Stainless steel was the cathode, and DSA titanium coated with RuO2 (Ti/RuO2) was the anode of the EF cell. The turbidity and F− removals were 97% and 73%, respectively.

EF is the most effective method for the separation of low-density SS and oil,,. Up to 99.71% oil removal from an initial concentration of 1050 mg L–1 emulsified oil has been achieved by using an EF cell with DSA anode composed of Ti/Ru0.34Ti0.66O2 and a stainless-steel cathode. EF has also been used to treat wastewater from the dairy industry, palm oil effluent using Pb dioxide-coated titanium anode, mining wastewater, and others. Moreover, EF can be a part of a hybrid process. One example of a hybrid EF process is composed of three stages: (i) adsorption by a bonding agent; (ii) wastewater filtration to separate the loaded bonding agent by two variants, i.e. crossflow MF for low-contaminated wastewater or a hybrid process combining flotation and submerged MF for highly contaminated wastewater; and (iii) bonding agent regeneration.

Photodegradation by nano-scale TiO2

Nano-TiO2 can be utilized to photocatalytically degrade the residual organic contaminants in treated effluents. Nano-TiO2 is useful for the degradation of endocrine disruptors, organic contaminants, micropollutants, and in water filtration membranes. Nano-TiO2 structure and performance would depend on the preparation method. However, certain limitations such as inefficiency under visible light illumination, post-recovery, incomplete removal of toxic byproducts (in some cases), and low mechanical strength still need to be addressed for enhanced performance. TiO2 post-treatment of secondary treated effluents from industrial wastewater treatment plants is a possible solution for the extraction of toxic organics. Nanocrystals of TiO2 possess a high surface-area-to-volume ratio, making them suitable for photocatalysis and adsorption,. This means that nano-TiO2 has a higher number of delocalized carriers on its surface, which ensures better-charged transport and efficient generation and separation of photo-generated electrons and holes. Photo-generated holes in TiO2 nanocrystals are powerful oxidants. Nanocrystals exhibit these properties because of their low dimensionality and quantum size effects. TiO2 is an n-type semiconductor with a relatively wide bandgap, and has three crystalline phases: rutile (tetragonal), brookite (orthorhombic), and anatase (tetragonal). TiO2 has become the most popular photocatalyst at the nanoscale, and a lot of energy can be saved with photocatalysis without secondary pollution through process control. The types of TiO2 nanostructures include: nanoparticles, nanotubes, nanorods, nanofibers, nanoflowers, and nanowires, in accordance with the preparation method and desired characteristics. Nano-TiO2 can be prepared through sol-gel, hydrothermal, solvothermal, anodic oxidation, hard template, and reverse microemulsion methods.

Nano-TiO2 prepared from a sol-gel method has been used for phenol degradation. Phenols possess endocrine-disrupting properties. Zeng et al. synthesized the nano-TiO2 via the sol-gel process. Titanium n-butoxide was dissolved in anhydrous ethanol to obtain the solution A. DI water, glacial CH3COOH, and C2H6O were mixed to obtain solution B. Solution A was mixed with solution B to get the sol. The sol was aged for 72 h and then dried at 100 °C and annealed. Regular sizes of anatase nano-TiO2 were obtained. The TiO2 was doped with B, Ni, and Ce for increased phenol degradation under visible light illumination. The best performance was attributed to BNiCeTiO2. In the work of Liu et al., porous TiO2 hollow aggregates were synthesized through the hydrothermal method for the photocatalytic degradation of Rhodamine B. NH4F and Ti(SO4)2 were dissolved in DI water, and then the mixture was added to a Teflon-lined autoclave. Hydrothermal synthesis was carried out at 160 °C for 6 h. It was observed that the obtained photocatalyst were more effective than the commercially available photocatalyst P25 for Rhodamine B degradation.

Nano-TiO2 has also been used for chloroform decomposition. In the work of Kang et al. (2001), C12H28O4Ti was dispersed in 1,4-butanediol under 300 °C for 50 min. The anatase powder was efficient in chloroform degradation. In chloroform decomposition under the UV-light (254 nm, 24 W m–2) with O2 bubbling (500 mL min–1), more than 95% of the chloroform was removed. Nano-TiO2 has been employed for ethylene decomposition. In the work of Praserthdam et al., titanium n-butoxide was added to toluene. The mixture was autoclaved at 300 °C for 2 h. Spherical shaped particles obtained promoted ethylene decomposition. A high amount of Ti3+ surface defect with Ti3+/OH was found in the TiO2 sample that was quenched in the air at 77K. The sample also exhibited the highest photocatalytic activity for ethylene decomposition. However, despite its versatility for photodegradation of trace pollutants in water, the use of nano-TiO2 still faces some limitations. Currently, the exploitation of readily available visible light for photodegradation via nano-TiO2 is still inefficient for large-scale treatment, as most studies on large-scale TiO2 photocatalysis have focused on the use of UV light. Secondly, there is a low adsorption capacity of nano-TiO2 for hydrophobic contaminants because TiO2 is hydrophilic. Therefore, the efficiency of removing hydrophobic contaminants through nano-TiO2 structures is low. Thirdly, there is inadequate post-recovery of TiO2 particles after treatment in water. The process of regenerating the particles after dispersion in water might be tedious and costly. Fourthly, there might be the production of toxic byproducts after the degradation of the primary contaminants by nano-TiO2. Although these byproducts might subsequently be removed by further photo-degradation, they remain in trace amounts in the final effluents in many cases. Lastly, many nano-TiO2 structures lack mechanical strength or stabilization for long-time utilization in production plants. These structures would become fractured or destabilized under continuous feed system after some time. In case of polymer membranes, there is a danger of destruction of the membrane structure by UV light or OH• and problems of high cost.

More recent progress in applications of TiO2 and other photocatalysts is captured in the reviews of Giwa and co-authors–. This progress is mainly in the aspects of artificial neural network (ANN) modeling, plasma activation, functionalization with quantum dots, and use of nanoreactors. ANN modeling has been used to predict the discoloration of maxilon blue 5G dye by catalysts including TiO2, ZnO, and TiO2–ZnO integrated with Fe. A Multilayer Perceptron neural model consisting of backpropagation algorithm was employed to assess the influence of operating conditions on the discoloration efficiency. An ANN model has also been employed for the prediction of the efficiency of a photocatalyst consisting of TiO2 and Ag/S for 2-nitrophenol degradation. The degradation efficiency of 2-nitrophenol was considered as the output ***variable*** in this model. The ability of TiO2 nanoparticles to oxidize phenol in a system integrated with photo-electro-Fenton process has been predicted via another ANN model. This model was coupled with genetic algorithm and optimum phenol removal efficiency was predicted by varying operating conditions such as phenol concentration and pH. Photocatalytic disinfection of water has been predicted using ANN modeling. Two back-propagation neural networks were employed by Lin et al. to assess the efficiency of TiO2 coupled with UV for coliform removal from wastewater. Input ***variables*** including the intensity of UV, coliform counts, color and turbidity, temperature and pH were included in the ***data*** that was used to train and evaluate the model. The model was also validated experimentally.

On the aspect of plasma activation, photocatalysts can be combined with plasmonic metals including gold and silver to enhance the transfer of incident photon energy to the photocatalysts and improve their ability to degrade organic pollutants under visible light conditions. Ag-AgI plasmonic photocatalyst has been synthesized by Hu et al. and used to degrade chlorophenolic compounds in water. The plasmonic photocatalyst exhibited better efficiency than undoped TiO2 P25 nanoparticles under visible (or simulated solar) light conditions. An azo dye, Reactive Brilliant Red, has also been removed from water by Jie et al. using plasmonic Ag/AgCl/polydopamine-TiO2 photocatalysts. The ability of the synthesized plasmonic photocatalyst to degrade Reactive Brilliant Red in water was four times higher than that of pure TiO2 nanofibers.

On the aspect of functionalization of nanostructured photocatalysts with quantum dots, nanostructured TiO2 has been functionalized with Ag2S quantum dots to improve the photocatalytic efficiency of nanostructured TiO2. Quantum dots exhibit the potential to improve the active sites on a catalyst surface, due to their small sizes, and tuning of the energy bandgap to the region required for visible-light photocatalysis. Visible light is abundant in form of natural solar light in the environment, so visible light-driven photocatalysis may be cheaper than UV or near-infra red-driven photocatalysis. The removal of methyl orange pollutant from water by TiO2/Ag2S quantum dots was reported to be 3.5 times higher than that of undoped TiO2 nanobelts under visible light irradiation. Other ways to improve the performance of photocatalysts under visible light conditions are well-documented in the work of Giwa et al. [268]. These ways involve the use of visible light-responsive nanocubes including reduced graphene oxide/mesoporous copper ferrite aerogel, porous Fe2O3 nanocube-impregnated graphene aerogel, Au/Au/Ag nanocubes/polyvinylchloride substrate, and 3D/2D In2O3 nanocube/ZnIn2S4 nanosheet. These nanocubes are preferred due to their high adsorption ability, which influences their effective application under the visible range of the solar spectrum.

It is often problematic to use photocatalysts to remove organic pollutant in saline water due to the inference of salts on the photocatalytic process. An emerging technique, which has been tested for degradation of pollutants in seawater, is the use of nanoreactors. In nanoreactors, photocatalysts are synthesized by the adsorbed-layer nanoreactor synthesis (ANS). ANS improves photocatalysis by selective adsorption. ANS and solvothermal synthesis have been employed by Wang et al. to synthesize La3+ or Yb3+- doped TiO2 for the removal of phenol from simulated saline water. Photocatalyst crystal lattice distortion and oxygen vacancies required for enhanced photocatalysis efficiency were impacted by ANS. About 90% removal of phenol was achieved. This high removal efficiency was as a result of enhanced adsorption, leading to a reduction in the adverse effect of the salt ions in the saline water. Acid fuchsine, a printing dye, has also been removed using zero-valent iron nanoparticles on polyacrylic acid/polyvinyl alcohol fiber mat. The mat was employed as the nanoreactor. The synthesized nanoreactor showed superior activity when used to decolorize dye wastewater.

Hybrid systems

Hybrid systems consist of two or more treatment methods used together to provide better energy and treatment efficiencies, and/or to overcome the challenges associated with using stand-alone technology. The subsequent sections highlight the recent developments of such hybrid systems for wastewater treatment.

Adsorption on AC/MBR

The hybrid AC/MBR system integrates biological activity, membrane separation, and adsorption on PAC or minerals for the removal of pollutants. An application of this process is the treatment of sugarcane molasses-based distillery wastewater.

The vermiculite/MBR process resulted in a combined attached and suspended growth system since biomass growth occurred both in the mixed liquor and on the surface of vermiculite. Furthermore, it resulted in the removal of 88% Cu, 85% Zn, and 60% Ni for influent metal concentrations in the range of 3-15 mg L−1, which were periodically spiked to municipal wastewater. Also, the addition of vermiculite in the bioreactor mitigated the inhibition of autotrophic and heterotrophic biomass. Another process that utilized MBR, specifically zeolite/AnMBR process, was tested for the treatment of dyeing wastewater. The zeolite addition gave a reduction in the membrane filtration resistance and improved the decolorizing rate of the system.

Combined filtration – adsorption

The integrated adsorption–filtration process has been successfully applied to remove heavy metals from industrial wastewater. The combined mineral-UF system for industrial pre-wastewater treatment at pH = 8 resulted in effective removal of Pb, Cu, Ni and Zn using vermiculite, bentonite, and zeolite as minerals. Another combined adsorption-UF process was also tested for the treatment of textile wastewater. The examined process produced an effluent with a low metal concentration that can safely and efficiently be cleared into municipal sewers. The COD removal was between 76% to 92%, and color removal ranging between 45% and 70%. This process was also applied to treat several different industrial wastewater streams from the chemical, metal plating, and textile industries. The performance of this combined process in terms of heavy metal removal varied according to the wastewater characteristics, and the type of sorbent used [24]. This adsorption-UF process was also tested for the removal of heavy metals from electroplating wastewater, which resulted in more 97% heavy metal removal at a pH greater than 8 due to combined adsorption and UF.

Combined EC-EF treatment

EC is an efficient method for the removal of suspended and colloidal particles, but ineffective to remove persistent organic compounds. On the other hand, EO is very effective in breaking down organic compounds by oxidation, but it necessitates more time than EC (30 min vs 21 h). As a result, the applicability of EO is limited. Hence, a synergistic combination of the two technologies can be used to achieve the removal of persistent organic compounds at a reasonable period. The electrooxidative mineralization of electrocoagulated wastewater reduces the treatment time. In the hybrid technology, EC removes colloids, TSS, and charged species while EO oxidizes the remaining persistent organics. In the case of EC treatment alone, there was a drastic drop in the COD for the initial 30 min of treatment, in which a restrictive value was reached and no additional increase in efficiency was observed. When EO was applied alone, the sample was totally mineralized after 21 h of treatment. About 3 hours were needed to reduce the COD to about half with EO. In the combined system, the initial feed of wastewater for EO was electrocoagulated wastewater (COD = 425 mg L−1 and pH 8). At a pH of 8, almost a complete removal of COD was achieved after 70 min of treatment. Also, the fastest rate for total mineralization by EO was found to occur at pH 8.

Photocatalytic membrane reactors

Photocatalytic membranes (PMRs) are hybrid reactors in which photocatalysis is coupled with membrane process; the catalyst can be immobilized on a membrane (i.e., photocatalytic membrane) or suspended in the mixture. Recently, nano-TiO2 has been shown to be effective for the photodegradation of contaminants in the PMRs using entrapped or suspended catalyst. The schematic of a PMR is shown in Fig. .

Photocatalytic membrane reactors.

An illustration of lab-scale PMR system operating via recirculating batch mode (inspired from).

PMRs have been employed to remove various pollutants present in industrial wastewater, such as pharmaceuticals, dyes, textile and wood processing, organics such as phenols,, and others,. The main advantages of PMRs with TiO2 immobilized on the membrane are the reduction in fouling due to the presence of TiO2, and the ability to use the membrane without recycling and regenerating the catalyst. On the other hand, some disadvantages include a lower degradation efficiency when compared to suspended TiO2 processes, a necessity to change the membrane when the catalyst’s activity is lowered, a risk of membrane damage by UV light or OH•, and inability to change the catalyst’s loading due to the fixed amount of immobilized catalyst on the membrane. A pilot-scale PMR employing UV/TiO2 photocatalysis has been applied recently to remove some of the pollutants that can be present in industrial effluents. The removal of 32 different pharmaceuticals, endocrine disrupting compounds, and estrogenic activity was evaluated. The degradation of all compounds followed pseudo-first-order kinetics. More than 70% of 29 compounds were removed while 50% of 3 compounds were removed.

Most of the applications that combine photocatalysis with pressure-driven membrane processes employ MF or UF. The application of a hybrid RO/photocatalysis system is limited since RO should not be used when the feed contains SS. Considering the above, more studies should be conducted on the possible applications of the RO/photocatalysis system. Some studies should have been carried out to find better catalysts that can enhance the catalytic effect–. Future research should be directed towards the modifications of the substrate to lower the bandgap required to activate the whole generation sites in PMRs.

Recently, a “fungal membrane bioreactor” (FMBR) using Phanerochaete chrysosporium was integrated with PMR for the treatment of textile industry wastewater. It was observed that COD abatement and color removals were 53% and 58% for photocatalytic degradation, respectively, while the values were 56% and 60% for fungal biodegradation. The hybrid process achieved total removal efficiencies of 93% and 99% for color and COD, respectively. These results suggest that using photocatalysis as a post-treatment technique to the fungal biodegradation process is more effective than applying photocatalysis as a pre-treatment technique for the advanced treatment in the textile industry wastewater.

Sonication or hydrodynamic cavitation-assisted AOP

Hot spots, highly reactive free radicals, and liquid-circulation associated turbulence, can be used for the intensification of various physical/chemical operations. Hydrodynamic cavitation ensures bubble dynamics and creates optimum operating parameters in reactor configurations. The use of this method may reduce chemical consumption, but it may be costlier. It has been shown that it is an energy-efficient method when compared with ultrasonication and high-speed homogenization. Recently, the oxidants obtained from sonication have provided positive feedback. Although the chemical process gave higher removal efficiency, the chemical-free sonication process is more environmentally friendly. For example, the use of Fe2+ increased the degradation of 1,4-dioxane by 98.1%, but 79% removal efficiency was obtained when sonication was employed for the removal of 1,4-dioxane from water.

The integration of photocatalysis and sonication has been used to achieve high removal efficiency of dye. The behavior of the hybrid method can be explained by two main reasons: (1) production of OH• from H2O2 by photocatalyst, and (2) improvement of mass transfer between the liquid and the surface of catalyst as a result of sonolysis.

Hydrodynamic cavitation has been used together with OH• for the degradation of Escherischia coli (E. Coli). A logarithmic equation based on the survived cells was used to calculate the dying-off rate of the E. Coli. It was observed that the OH• breaks the carbon bonds in the cell, therefore breaking its DNA chain and resulting in its eventual death. The disinfection property of H2O2 also decreased protein synthesis in the cell. It was observed that the intensity and efficiency of the process are highly dependent on the cavitation field, energy consumed, gas content, and the initial concentration of the microbes. This positive effect of hydrodynamic cavitation on E. Coli was also confirmed by, where it was shown that the concerned bacteria stopped dividing after only 3 min of treatment. However, further analysis showed that these bacteria did not actually die, but they were in an inactive state.

Hydrodynamic cavitation has been used to degrade volatile organic compounds such as ethylbenzene, toluene, benzene, and xylenes. The highest degradation was achieved by toluene, i.e. 21% in 240 min. The ***conversion*** rate of the pollutants was influenced by an increase in the diameter of the hydrodynamic pipe. Sonication has also been used to remove polyaromatic hydrocarbon from industrial wastewater. Low and high-molecular-weight pollutants were degraded. Meanwhile, it was observed that a rise in temperature played a significant role in improving the removal efficiency. In addition, hydrodynamic cavitation has been used recently to degrade carbamazepine. 96% degradation was achieved in only 15 min by using hydrodynamic acoustic cavitation, as compared to 27% degradation when only hydrodynamic cavitation was employed. A batch mode sonication was implemented on olive mill factory wastewater by. The main observations in this study were as follows: (1) the increase in the initial temperature affects the degradation rates, and (2) COD was not entirely removed due to an insufficient amount of formed OH•. The study also emphasized the economic impact of using sonication for the treatment of olive mill factory wastewater. The total cost of sonication was estimated to be 665 Euros m−3 yr−1. The nature and extent of pollutants removed by sonication and hydrodynamic cavitation-assisted AOPs are shown in Table .

Nature and extent of pollutants removal by sonication and hydrodynamic cavitation- assisted AOPs.

| **Technique(s)** | **Pollutant(s)** | **Matrix scale** | **Kinetic results** | **Ref.** |
| --- | --- | --- | --- | --- |
| (i) Photocatalytic oxidation (ii) Sonication, (iii) Hybrid of the former and latter | Acid Orange 52 Dye | Lab scalesynthetic solution | In sonication, the dye decomposed almost entirely in 300 min with TOC reduction by 13% in 480 min |  |
| Hydrodynamic cavitation | *E. Coli* | Lab scalesynthetic Solution | Effective in killing the bacteria but depends on several factors |  |
| Hydrodynamic cavitation | *E. Coli* | Lab scalesynthetic solution | 75% of bacteria cell stopped dividing in 3 minBacteria do not die but enters into an active but non-cluturable phase |  |
| Hydrodynamic cavitation | Benzene, toluene, ethylbenzene, and xylenes(BTEX) | Lab scalesynthetic solution | Toluene and ethylbezene degradation rate is 21% and 13% in 240 min, respectively |  |
| Sonication | Polyaromatic hydrocarbons (PAH) | Lab scalepetrochemical industrial wastewater | Total PAH removal of 97% in 150 min |  |
| Sonication | Phenols, total aromatic amines, COD | Lab scaleolive mill wastewater | Removal of COD, phenols, and total aromatic amines were achieved maximally to 68%, 78%, and 71%, respectively |  |
| Hydrodynamic cavitation | Carbamazepine | Lab scalesynthetic solution | 27% ***conversion*** of the pollutant in 15 min |  |
| Hydrodynamic cavitation | *Microcystis aeruginosa* | Lab scalesynthetic solution | Reduction of density and Chlorophyll in the cell in 10 min by 88% and 94%, respectively |  |
| Hydrodynamic cavitation | Ibuprofen | Lab scalesynthetic solution | >60% Ibuprofen degradation in 60 min, initial pH = 3 |  |

Electrically-enhanced membrane bioreactor (eMBR)

Reduction of membrane fouling and enhancing effluent’s quality is possible with using an electrically-enhanced membrane bioreactor (eMBR), a wastewater treatment technology that combines electrochemical processes, biodegradation, and membrane filtration in one system. A schematic is shown in Fig. . The electrochemical treatment works on increasing pollutants removal efficiency and controlling the mobility of foulants and their deposition on the membrane surface via electrochemical mechanisms, such as electrophoresis, electrocoagulation, and electroosmosis. Various metal species in the system are released due to electric dissociation, which can contribute to the aggregation and destabilization of collides and suspended solids through the coagulation process. The metal species characteristics depend on the pH of the media. Moreover, extracellular polymeric substances and extracellular polymeric substances can be transported to the oppositely charged electrodes, away from the membrane, via electrophoretic motion. This helps in reducing membrane fouling and the formation of biofilms.

Electrically-enhanced membrane bioreactor.

An overview of an eMBR system.

eMBR has been employed to remove organics (COD), nutrients, color, and turbidity,. Most of the conducted studies were performed at a lab-scale. Also, most of the experimental studies were limited to low-to-medium strength wastewater.

The concept of circular economy in metal recovery

Circular economy is defined as a transition in which the generation of waste is minimized while resources, material, and products are maintained in the economy for extended period and utilized as much as possible. The concept of circular economy has come into place in response to the drawbacks of the conventional ‘take-make-consume-and dispose’ model. The idea of a circular economy can be applied to wastewater treatment by metal recovery via electroplating, galvanizing, and anodizing and its utilization in various applications. For instance, aluminum ores contain ~30% alumina whereas wastewater sludge may contain up to 10–15%. Conventional metal recovery methods include physical (e.g., ion exchange by ED, membrane filtration, etc.), chemical (e.g., precipitation, electrochemical methods, etc.), and biological (e.g., biosorption, bioremediation, etc.) methods. However, these methods are energy and chemical-intensive. Biological processes, for instance, have been used intensively for heavy metals extraction. Most heavy metals are easily adsorbed onto membrane lips and proteins such as phospholipids, peptidoglycan, lipopolysaccharides, teichoic acids, and teichuronic, in addition to anionic functional groups that are present in EPS. Most of the biovolume fraction is unoccupied since it is a surface process, which limits the potential of heavy metal immobilization. Nevertheless, by some kind of chemical transformation inside the cells, fungi, and bacteria can actively bioaccumulate heavy metals. Furthermore, the biological recovery of radionuclides is primarily driven by biosorption. Uranium has been previously immobilized by using organisms such as Rhodotorula glutinis. Previous comprehensive review papers have addressed metal extraction using biological methods. One of the challenges of using biological methods for metals extraction is the relatively low concentration of metals in wastewater effluents, which necessitates a step of pre-concentration of metals by nanofiltration, electrodialysis or reverse osmosis for instance. These technologies are costly especially at large scale treatment, which is an issue that future studies should address. Membrane filtration, for example, includes MF, UF, NF, and RO, which physically retain metals while allowing water to pass through. Chemical sorbents can also be used to modify membranes to increase the removal selectively of metal ions. Polycysteine functionalized MF membranes were efficient in removing Hg and Cd. However, the main disadvantages associated with using membrane technology for heavy metal recovery are membrane fouling, high energy consumption, and the high operational cost. On the other hand, ion exchange by ED requires solid resin to exchange the metals in wastewater with other cations such as H+. The solid resins are not selective; however, they can preferentially bind ions. Additionally, although ion exchange has fast kinetics and high removal efficiency, it is not suitable for high concentrations of metal ions due to resins saturation. Another technique that is widely used for metals recovery is chemical precipitation, due to its simple operation and low capital cost. However, the challenge associated with chemical precipitation is toxic sludge generation, which requires additional processing for disposal. The recent development of bioelectrochemical technologies offers a platform for both oxidation and reduction related reactions, which provides an alternative approach for efficient metal recovery. These technologies employ microorganisms to produce chemical and electric current by utilizing the chemical energy stored in biodegradable materials. Many recent studies have discussed using bioelectrochemical technology in metal recovery from wastewater.

Concluding remarks and future perspectives

A comprehensive review of various technologies for industrial wastewater treatment has been carried out, with a particular focus on effluents with high heavy metal content. The development of technologies for industrial wastewater treatment that can remove toxic pollutants is pivotal for meeting the growing water demands and for providing water security. As can be seen from this review, the focus of most research is to develop membranes and nanomaterials for water treatment, to optimize operating conditions of existing technologies, to investigate the potential use of low-cost adsorbents, and to develop hybrid technologies for water recycle and reuse. Recent breakthroughs in membrane technologies have emerged as significant innovations for the treatment and reclamation of industrial wastewater. Membrane bioreactors and low-pressure membranes have been used for wastewater treatment; however, the biggest challenge with these technologies is their high potential of fouling, which leads to reduced efficiency and shortened membrane life. Other technical problems include the complexity and cost of residuals disposal, especially when using membrane technologies. Adsorption is another method that is recently preferred for the removal of low concentrations and non-degradable organic compounds. It has advantages over the other methods due to its simple design and low initial costs. Recently, researchers have been investigating low-cost adsorbents such as natural materials, ***agricultural*** and industrial wastes, and others. The physio-chemical treatment processes are effective and quick; however, the high chemical and operational costs associated with them as well as sludge generation limit their applications. It can also be concluded that the treatment process is strongly dependent on the characteristics of wastewater. Also, although many techniques can be employed for industrial effluent treatment, each technology has its drawbacks. Thus, the selection of the most suitable treatment method depends on some parameters such as pH, initial pollutants concentration, the types of targeted pollutants, potential environmental impacts, as well as the process economic feasibility.

Membrane-based processes offer potential performance benefits, especially when coupled with electrochemical advanced oxidation procedures such as photoelectron-catalysis, electro-Fenton and electro-catalysis, and other processes. However, membrane fouling remains a big challenge. Also, utilizing membrane biofilms for the transformation of emerging chemicals should be explored. In doing so, the microbial strains have to be carefully selected, and operating conditions have to be precisely optimized such that the growth of biofilm on the membranes does not cause an increase in trans-membrane pressure. Future studies should aim to develop genetically engineered cultures to improve microbial strains to exhibit desirable characteristics that help reduce membrane fouling. Moreover, more research should focus on developing anti-fouling membranes specifically for MBRs as there is only limited work on this aspect. Efficient membrane cleaning techniques should be developed, incorporating recent advances in biochemical- and sonication-enabled cleaning strategies. Integrating self-cleaning membranes should also be investigated. Adsorption systems should be fully integrated with the existing treatment technologies such that synergies could be tapped on in ensuring the treated water quality standards. Another area to focus on is the green regeneration techniques to increase the recyclability of adsorbents. Similarly, the selectivity of the adsorbents may be further fine-tuned to capture emerging contaminants, which are otherwise leaked through the system untreated. Similarly, in the case of advanced oxidation processes, hydrogen peroxide dosage should be optimized such that excess of them do not scavenge the free radicals in the system and reduce the overall efficiency of the pollutant degradation. The toxicity of the by-products must also be considered. The potential of coupling should be investigated to tackle the growing concerns of emerging pollutants and toxic by-products. This requires additional studies for finding the best couplings and optimizing operating conditions to maximize the capabilities of these advanced treatment technologies. Research should also focus on integrating these processes within the existing treatments plants infra-structure with minimum disruption to the plant operations.

**Acknowledgements**

We would like to acknowledge the support, guidance, and assistance provided by the library services team at Khalifa University of Science and Technology, Abu Dhabi, United Arab Emirates. This review would not have been possible without the access to the different library database and e-sources. We would also like to acknowledge the funding from Khalifa University through the Center for Membranes and Advanced Water Technology (CMAT), under grant number RC2-2018-009.

**Notes**

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**Load-Date:** May 3, 2023

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Nature Reviews Earth Environment

June 2022

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**Section:** Pg. 444-460; Vol. 3; No. 7; ISSN: 2662-138X

**Length:** 10407 words

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**Body**

Introduction

Anthropogenic wastewater production and contamination of water bodies leads to negative impacts on public health and ecosystems due to water pollution, loss of biodiversity, and contribution to the climate crisis. Approximately 1,000 km3 of anthropogenic wastewater is generated worldwide every year, nearly 30% of which is municipal wastewater and more than 60% industrial wastewater–. Although conventional wastewater treatment plants are an essential sanitation barrier, they consume ~3% of global electricity,, meaning that they have become one of the largest energy consumers and greenhouse gas (GHG) emitters. In this context, 2 of the 17 United Nations (SDGs) for 2030 (ref.) aim to reconcile water management with sustainable societal and economic development on a global scale. As such, more sustainable water treatment technologies are urgently needed.

Biochar has been shown to address multiple SDG-related challenges through its carbon storage capacity, soil improvement qualities and pollution remediation properties (Box ). The term biochar was defined in 2006 as a carbon-enriched material produced from the thermochemical treatment of biomass waste in an oxygen-limited environment,, but it is also known as , black carbon, and carbonized biomass (Box ). Owing to its easily tunable porosity and surface functionality (Box ), biochar with a fit-for-purpose design has been shown to enable water pollutant removal, nutrient recovery, urban runoff management and industrial pollution abatement, as well as aiding carbon neutrality through its carbon sequestration properties,. As such, the production and use of biochar for municipal and industrial water treatment and stormwater management would contribute to at least 11 of 17 of the United Nations SDGs (Box ). The proven benefits of biochar for carbon sequestration and soil improvement have stimulated the global biochar market (estimated to increase from 1.6 billion USD in 2020 to 3.3 billion USD by 2025,). Given the emerging applications for biochar in water treatment (9.6% of the current market share), there is still great market growth potential.

However, harsh production conditions with energy- and chemical-intensive processes could be involved in producing high-performance engineered biochar (used as adsorbents and/or catalysts),. Awareness of the potentially adverse effects of certain production (especially feedstocks and pyrolysis temperature) and application conditions is essential to avoid the risks of potential environmental toxicity and low energy efficiency. To assess the sustainability value of biochar for water pollution control, synergies with multiple SDGs should be highlighted in the course of feedstock preparation, biochar production, implementation and end-of-pipe reuse treatment across the full life cycle (Box ).

Previous biochar reviews have focused on research progress for specific topics, such as metal sorption, catalytic degradation, biochar structure, organic pollutant removal, biochar modification and potential drawbacks. However, advances in the engineered design of biochar and customization of desirable functionalities have stimulated fresh perspectives on application-oriented water treatment with different specific requirements, which make the time ripe for a review on the uses of biochar in sustainable water management.

In this Review, we discuss the emerging applications of engineered biochar for water pollution control alongside the simultaneous attainment of the different SDGs. First, we introduce the requirements for producing engineered biochar to meet the specific needs of different applications. Thereafter, we highlight the relationships between different biochar physiochemical properties and their application to various water treatment processes, such as electron transfer for industrial wastewater treatment,, sludge dewatering in municipal water treatment, and enhancement for . Finally, we emphasize the necessity of partnership between scientists, policymakers and various industry stakeholders to successfully commercialize biochar, with maximum benefits for water pollution control and carbon neutrality as an integrated sustainable solution.

Box 1 Biochar development timeline

Although the term biochar was only introduced in 2006 (ref.) (see figure), similar charred organic substances have been applied to soil for thousands of years. Returning biochar to the soil was believed to decrease carbon emissions and make biomass-derived fuel carbon-negative,. The potential capacity of biochar as a soil amendment to improve the soil quality and crop yield was unveiled in 2006–2007 (refs,). In addition to plant-based waste biomass, various other animal-derived waste biomasses, such as poultry litter (2008), sludge (2009), dairy manure (2009) and animal bone (2010), were used to produce biochar, and the potential of biochar technology for waste reduction was recognized.

The decontamination capacity of biochar for potentially toxic elements and organic pollutants in wastewater and soil was revealed in 2009,. Such water pollution control applications include sludge digestion (2015), stormwater infiltration (2015), chemo-catalytic degradation (2015), electron mediating (2015), sludge conditioning (2016), photocatalysis (2016), odour reduction (2017) and electrochemical degradation (2018). Because of these various applications, biochar was highlighted by the Intergovernmental Panel on Climate Change (IPCC) as an integrated and sustainable solution toward carbon neutrality in 2018. Future widespread use of biochar for municipal and industrial water treatment and stormwater management would contribute to at least 11 out of 17 of the United Nations Sustainable Development Goals (SDGs) (see figure).

Box 2 Biochar modification strategies

Owing to the disparity in underlying mechanisms, different biochar modification strategies should be used for various water treatment applications. Biochar modification research started in 2011 (ref.) and has since made substantial progress.

Sorption. Physical activation (steam or CO2 activation) and chemical activation (acid, alkaline treatment, mineral impregnation or oxidation) are widely used to improve the surface area, porosity and surface functionality of biochar, leading to a higher sorption performance. Some specific modification methods are also used to improve the removal capacities of target pollutants, such as Fe impregnation for As removal.

Precipitation. Increasing the alkalinity and ash content, such as phosphate, is the widely used strategy for precipitation enhancement.

Redox reaction. The addition of redox-active minerals, such as Fe-minerals or Mn-minerals, can substantially enhance the redox reactivity of formed biochar. The pyrolysis temperature is also critical for the redox reactivity of biochar because both the carbon and mineral phases undergo redox-related transformation during pyrolysis.

Chemical catalytic. Impregnation with redox-active elements is widely used to enhance the electron transfer to oxidants, aiding formation of reactive oxygen species (ROS), as the higher-valence elements cause direct oxygen transfer for the degradation of pollutants. Doping elements inside carbon structures or defect formation cause a charge variation on the biochar surface from negative to positive, aiding the combination of pollutants and oxidants, and thus enhancing the catalytic degradation process. Other potential strategies to improve the degradation capacity of biochar include the generation of persistent free radicals during metal loading or designed thermal processes, and enhancing the conductivity by forming a graphitic structure.

Electrocatalytic. Heteroatom doping, noble metal impregnation and redox-active mineral addition are used to aid reduction processes on a biochar cathode,, or the oxidation process on a biochar anode,.

Fertility enhancement. Incorporating synthetic fertilizers into biochar or charging with nutrients through sorption and co-pyrolysis, are possible choices for enhancing biochar’s nutrient availability and release kinetics, especially for biochar produced from lignocellulosic biomass with limited nutrient contents. Direct mixing and coating of organic matter on biochar can lead to high fertility. The organic coating layer acts as a sorbent for macro- and micronutrients, allowing their slow release to plant roots and microorganisms. In addition, co-composting with organic materials can produce high-value fertilizer with high nutrient contents, designated C:N ratio, rich surface functionality, increased bacterial diversity and improved homogeneity,.

Biochar production

Functionality-oriented production lays the foundation of biochar design to serve as an integrated solution for multiple interconnected SDGs. Biochar production can be realized across varying scales from large industrial down to small domestic levels, making it widely applicable to various socioeconomic situations with a simultaneous contribution to SDG7 (energy), SDG8 (economic), SDG12 (production) and SDG13 (climate),. Biochar production is accompanied by reducing the demand for landfilling and incineration of waste as well as producing renewable bioenergy in the form of pyrolytic gas and bio-oil, which can be used for electricity production, heating, chemical substitution and diesel production after upgrading treatment. Utilization of the pyrolytic gas and bio-oil can reduce fossil CO2 emission, and biochar can store the carbon to actualize SDG7.2 (increasing share of renewable bioenergy).

Diverse thermochemical strategies, including conventional (both and ), and , have been used to produce biochar. Among different methods, slow thermal pyrolysis methods have the highest economic feasibility, climate change mitigation and technological maturity, thus representing the dominant technologies for biochar production.

The nature of the feedstock, such as waste biomass, plays a critical role in the resultant biochar’s elemental composition (Fig. ). By using waste biomass only instead of purpose-grown biomass, concerns about deforestation and competition for arable land for biochar production can be eliminated. The types of feedstocks range from lignin- and cellulose-rich crop residues and wood waste, which have higher carbon contents with aliphatic and aromatic structures, to animal manure and solid waste streams such as sludge and digestate from anaerobic digestion with lower recalcitrant carbon yet higher nutrient (N, P and K) and ash contents (Ca, Mg, Fe and S), (Fig. ).

Feedstock and pyrolysis temperature determine biochar properties and applications.

a | Relationships between the selected biomass waste feedstock and the resulting element content in biochar (Box ). b | Transitions of chemical speciation with increase of pyrolysis temperature for some elements listed in panel a. c | Different chemical species determine the mechanisms of pollutant removal and the overall best biochar application. Feedstock selection and pyrolysis conditions determine the speciation of each element in biochar and thus affect its application.

Organic composition in the feedstock is the precursor of the C, H and O in the biochar that is produced, while the inorganic contents of the feedstock control the availability and speciation of nutrients and minerals in the biochar. Selecting a feedstock with suitable inherent elements or incorporating exogenous additives can produce biochar with desired components and functionalities (Box  and Fig. ). Global applications and commercialization of biochar can use a tremendous amount of biomass waste as renewable feedstock in a value-added manner and hence contribute to sustainable waste management (SDG12) and circular bioeconomy (SDG8.4).

Pyrolysis temperature is another vital controller for biochar properties (Fig. ). With increasing pyrolysis temperature, the organic phase in the feedstock undergoes dehydration, decomposition and subsequent condensation and aromatization, which result in the increase of C content and decline of H and O contents in the biochar. Owing to the loss of organic components during the pyrolysis process, the concentration of inorganic elements will increase with increasing temperature. The speciation of the organic phase and inorganic elements will also transform with the rising temperature, thus affecting their properties and applications (Fig. ). A higher pyrolysis temperature often generates an increased surface area with a more porous structure within the normal temperature range for biochar production (300–900 °C), owing to thermal condensation. The net power output and carbon stability of high-temperature biochar contributes to the negative GHG emission for SDG13, despite a higher energy input.

The success of emerging environmental applications depends on distinct biochar properties, and the design-oriented synthesis of biochar can greatly improve its technical performance, economic value and environmental merits. Suitable selection, production and modification (Box ) of biochar for various environmental applications are reviewed in the following sections.

Box 3 Speciation, transformation and application of elements in biochar

The organic composition of the feedstock offers abundant C, H and O in produced biochar, which mainly exist in the biochar carbon structure and functional groups. Surface functional groups and carbon structure are the main sorption sites of biochar during pollutant removal, and they also participate in electron transfer processes during redox reactions with pollutants. Increases in pyrolysis temperature cause the transformation of organic phases from aliphatic and amorphous to aromatic and graphitic, leading to different related performance.

Different feedstocks naturally contain different elements; examples are Si-rich rice straw and rice husk, N-rich water hyacinth, macroalgae, and solid waste, P-rich cattle manure, K-rich poultry litter and rice straw, and Fe-rich sewage sludge,. These elements are enriched in the resultant biochar. Depending on the selected feedstock, specific capacities for water treatment could be enhanced, such as Si-biochar for metal sorption,, N-biochar for redox reactions or sorption, P-biochar for metal ion precipitation, and Fe-biochar for As immobilization or redox reactions,. Speciation of these elements varies with increasing pyrolysis temperature; that is, the transformation from high to low valence states, from mineral salts to oxides or even elemental form, and from amorphous to crystal speciation during thermochemical processes, resulting in specific performance and application for different industries (Fig. ).

In addition to the inherent inorganic components, elements including Fe (ref.), Ca (ref.), Mn (ref.), P (ref.), K (ref.) and N (ref.) have been extensively studied as exogenous elements to modify the biochar for related water treatment. Mixing biomass or biochar with selected chemicals or wastes can form modified biochar with enriched elements and high performance for treating recalcitrant pollutants (Box ). Moreover, exogenous elements might substantially change the carbon speciation and properties during pyrolysis processes, owing to the interaction with organic phases, which warrants further consideration and investigation for biochar production.

Biochar-enabled wastewater treatment plants

Wastewater treatment plants consist of various physical, biological and chemical processes to degrade and remove organic matter and nutrients (N and P) and thus ensure safe water discharge back into the environment. Conventional technologies suffer from a range of drawbacks ranging from high energy and chemical consumption to inefficient removal of contaminants of emerging concern and high GHG emissions. Incorporating green, low-cost and multifunctional materials such as biochar into the processes enables us to augment the treatment efficiency and lower the carbon footprint for SDG6 and SDG13 (Fig. ).

Biochar applications in wastewater treatment.

Biochar can be incorporated into various wastewater treatment processes, including: enhancing floc formation and settleability in primary treatment and chemically enhanced primary treatment; improving activated sludge granulation and settleability, as well as mitigating membrane bioreactor fouling, in secondary treatment; serving as an adsorbent and catalyst for advanced oxidation processes (AOP) in tertiary treatment; and removing odour from wastewater. Biochar can also augment biogas generation and nutrient recovery in sludge digestion and resource recovery processes; and the sludge or digestate can be used as biochar feedstock to close the resource loop. Different grades of biochar with fit-for-purpose designs can meet the specific needs of various wastewater treatment processes.

In addition to pollutant removal, since about the late 2010s biochar has shown merit in other applications in wastewater treatment plants, such as sludge conditioning and odour reduction. In contrast to (800−2,500 USD ton−1), the use of biochar offers the primary advantages of long-term carbon sequestration across its entire life cycle (SDG13) with a lower production cost (51−381 USD ton−1), together with additional environmental benefits from and resource circulation (SDG12) as well as renewable energy co-production (SDG7).

By designing science-informed production conditions and selecting appropriate waste biomass (Box ), the tailored biochar can achieve comparable adsorption capacity to that of activated carbon, or even better performance for high-strength wastewater owing to the mesoporous structure of biochar with less pore blockage. The global market for activated carbon reached 5.4 million tons in 2021, and its largest market share is water treatment (>50%), representing a considerable market potential for deploying biochar as a substitute for activated carbon.

Biochar-enhanced sludge separation

The role of primary treatment is to remove part of the suspended solids, biochemical oxygen demand and nutrients from wastewater by sedimentation (Fig. ). Compared with conventional primary treatment, chemically enhanced primary treatment provides more effective treatment by adding metal salts (such as ferric or aluminium salts) and polymers (such as polyacrylamide) to enhance the coagulation, flocculation and sedimentation of sewage sludge by double-layer compression, charge neutralization, sweep coagulation and the bridging effect,. Nevertheless, the high water content of sludge with small and hydrophilic particles makes it challenging for subsequent sludge transportation and treatment.

Adding biochar together with coagulants could enhance the sludge dewaterability physically (better flocculation and skeleton construction) and chemically (advanced oxidation processes). Biochar modified by FeCl3 (ref.), FeCl3 with KMnO4 (ref.) or K2FeO4 (ref.) can be an effective skeleton builder for sludge cake by increasing the zeta potential and porosity. Biochar with higher hydrophobicity would be more effective in forming water drainage channels in sludge,, and this is correlated to the pyrolysis temperature. Transition-metal biochar, such as Fe-rich biochar, could activate oxidants such as H2O2 to disrupt sludge flocs, release bound water and degrade by the generation of (ROS),, thereby augmenting the sludge dewaterability.

Biochar-fostered biological treatment

Secondary treatment uses biological processes to remove contaminants from wastewater. This can be an individual process or a combination of aerobic, anoxic and anaerobic processes with different bacterial communities. In the conventional aerobic activated sludge process (Fig. ), the roles of biochar addition are similar to the primary treatment in their enhancement of sludge dewaterability and settleability. In particular, biochar has been proved to substantially enhance the digestate dewaterability through the effective removal of hydrophilic extracellular polymeric substances and promotion of hydrophobicity, which weakens the interaction energy of flocs and aids the release of bound water.

More importantly, in the anaerobic digestion process (Fig. ), biochar as a conductive material not only can accelerate the anaerobic digestion processes and improve methane production by facilitating direct interspecies electron transfer due to its redox-active properties, but also can promote the granulation of anaerobic sludge, working as an inert core to increase the anaerobic digestion efficiency by enhancing sludge retention and propionate (a rate-limiting intermediate) oxidation. Therefore, biochar can promote the syntrophic ***conversion*** of volatile fatty acids and alcohols to methane for high-efficiency bioenergy recovery and accelerate SDG7.2; the methane production rate is positively correlated to the abundance of oxygen-containing functional groups on the biochar surface. Biochar can simultaneously enhance the stability of the anaerobic digestion process through inhibitor adsorption, pH buffering, nutrient retention and bacterial cell immobilization.

Applying aerobic granular sludge technology in wastewater treatment has also become popular since the 2010s, as it has better sludge settleability and smaller physical footprint than conventional activated sludge systems,. Maintaining stable and efficient sludge granulation is one of the main challenges for the broad adoption of aerobic granular sludge. This could be addressed by the well-developed porous structure and high hydrophilicity of engineered biochar, which can aid sludge aggregation, microbial colonization and adhesion. Applying biochar as a nucleating carrier can promote sludge granulation for a successful aerobic granular sludge start-up process.

The membrane bioreactor (MBR) process is another highly efficient and compact wastewater treatment technology (Fig. ), but its widespread adoption has been hindered by membrane fouling and need for frequent maintenance,. Various forms of engineered biochar such as alkali-washed biochar and activated biochar have been reported to alleviate the fouling of an MBR by scouring the membrane surface, modifying sludge properties, adsorbing soluble extracellular polymeric substance (a membrane foulant) and improving sludge settleability. The size and dosage of biochar should be carefully designed, as large particles would require more energy for fluidization, whereas overdosing with small biochar (<0.5 mm) would result in a membrane with less permeability. The understanding of biochar’s effects on MBR fouling control over its lifespan and physical disintegration in long-term operation is still insufficient.

Biochar for effluent polishing

Different advanced treatment techniques, such as catalytic degradation, adsorption and precipitation, can be applied to remove residual contaminants in the tertiary process of wastewater treatment (Fig. ). The pollutant removal strategy is similar to that for industrial wastewater. High contents of natural organic matter from insufficiently treated wastewater might lead to biochar fouling and nullify its functionality through site competition, pore blockage and organic coating. It was found that biochar with a high fraction of large mesopores (>10 nm) experienced less competition effect from natural organic matter and afforded higher adsorption and degradation of pollutants,. Nevertheless, for chlorination, the presence of biochar might result in the formation of carcinogenic , owing to the O-containing functional groups and dissolved organic matter (DOM) from biochar. This issue could be mitigated by increasing the pyrolysis temperature to deoxygenate the biochar, with less DOM release for disinfection by-product formation.

Sludge as biochar feedstock

As a solid by-product obtained from wastewater treatment processes, the cost for sewage sludge management (Fig. ) accounts for approximately 20–60% of total operation cost. Landfilling or incineration of sludge might generate secondary pollution with less environmental sustainability. In addition to the dewatering improvement, there is much interest in direct carbonization of sludge (or sludge and biochar composites) to produce biochar adsorbent or catalyst as a strategy for fostering a circular economy and reducing the sludge treatment cost, thus alleviating the environmental burden and contributing to SDG12 (responsible production).

The properties of biochar are primarily determined by the sources of sludge (Fig. ); primary sludge is mainly solid matter separated by physical or chemically enhanced sedimentation, whereas secondary sludge is from biological processes, consisting of undigested organics and bacterial constituents such as proteins, humic substances, lipids and decay products,. Given the application of Fe-based coagulants in sludge dewatering and the high protein content (0.1–18.0 wt%) in secondary sludge, the resultant sludge could be converted into Fe-rich or N-doped biochar for advanced oxidation processes,. Moreover, compared with conventional activated sludge, aerobic granular sludge has higher carbon and microbial community contents, larger surface area, better settleability and more compact structure. Its use as biochar feedstock can thus achieve a better porous structure for contaminant adsorption,.

Unlike lignocellulosic feedstocks, sludge contains high concentrations of inorganic salts such as alkali and alkaline earth metals, resulting in high ash content and metal accumulation in biochar. The availability and stability of metals as well as the potential ecotoxicity of sludge-derived biochar should be carefully evaluated before potential application.

Odour mitigation by biochar

The unpleasant odour from wastewater treatment plants generally comes from NH3, H2S, organic sulfur compounds and volatile organic compounds; H2S can cause the corrosion of sewerage networks and shorter wastewater infrastructure service life. To ensure the occupational health and well-being of workers and surrounding residents (SDG3.9), biochar adsorption is considered as an effective end-of-pipe technology (Fig. ) for abatement of odorous gas or volatile organic compounds by adsorption and chemical decomposition.

Biochar derived from lignin-rich biomass such as wood and bamboo displays better odour removal performance than livestock manure-derived biochar, owing to the better-developed micropore structure. In addition to gaseous adsorption, Fe-impregnated biochar can eliminate H2S production by precipitation of FeS in the anaerobic digester, because dissolved H2S can be adsorbed by diffusing into micropores and binding with the biochar surface. Nevertheless, sole reliance on biochar as an odour absorbant would have a limited lifespan (from days to months) depending on gas flow rate and odour concentrations. Thus, combining biochar with biological treatment designs such as bio-trickling filters and bio-scrubbers is an alternative and practical option that deserves further investigation.

Nutrient recovery by biochar

From a holistic perspective, the operation of wastewater treatment plants has negative environmental impacts due to the consumption of electricity, chemicals and emissions of GHG. In this context, resource recovery (Fig. ) such as biogas, nutrients (N, P and K) and thermal energy is a pathway to put wastewater treatment plant design and operation on a sustainable track. There have been wide research efforts into using biochar to recover the nutrients from wastewater by adsorption, and then the N- and P-laden biochar can serve as a value-added soil amendment or even a slow-release fertilizer to improve soil fertility and structure,, which can contribute to SDG2 (zero hunger; SDG2.3 and SDG2.4) by improvement of soil health for higher crop yield and food security.

Industrial wastewater sludge such as Fe-rich sludge after Fenton reaction has shown to be a suitable feedstock to produce biochar for P precipitation and recovery. For the low-mineral feedstock, engineered biochar impregnated with metal salts can have a good adsorption capacity for anions. Moreover, applying biochar as support for MgO (ref.) in a struvite precipitation process is feasible to achieve simultaneous N and P recovery from wastewater. As some potentially toxic compounds in the wastewater would be non-selectively immobilized by biochar, the ecotoxicity of applying spent biochar as fertilizer should be carefully evaluated beforehand. Given the increasing price of commercial fertilizers and the current global food crisis, life-cycle assessment and cost-benefit analysis for engineered biochar are necessary for cost-efficient resource recovery and bio-fertilizer application.

In short, tailoring biochar properties by controlling pyrolysis conditions and feedstock types can enable the incorporation of green and multifunctional biochar in wastewater treatment processes, with the benefits of enhanced sludge settleability, boosted biological treatment performance and closed resource loops.

Biochar for industrial wastewater

Different industrial activities result in distinctive contamination characteristics in the wastewater discharge, which can affect the environment (SDG6 and SDG14) and human health (SDG3.9). Industrial wastewater typically contains high pollutant concentrations, and its composition is specific to the type of industrial treatment plant. To achieve a sustainable industrial process (SDG9.4 and SDG9.5), application-oriented biochar design is highly desirable for dealing with the concentrated chemicals. In this section, treatment strategies that use engineered biochar for its sorption and/or catalysis properties are discussed for specific industrial wastewater applications (Fig. ).

Immobilization and biochar modification strategies for different industries.

The main pollutants depend on the source of the industrial wastewater, such as mining, textile and pharmaceutical industries (top rectangles). Each main pollutant requires a different immobilization strategy from the biochar (central rectangles, including precipitation, redox, chemical catalytic, sorption, photocatalytic and electrocatalytic processes). Different biochar modification processes (bottom rectangles, Box ) can be applied during production to improve performance for the chosen application and the required immobilization strategy. Different removal strategies and biochar products are required for specific industrial wastewater based on the pollutant properties. PDS, peroxy-disulfate; PFRs, persistent free radicals; PMS, peroxy-monosulfate.

Treatment strategy

Sorption

Sorption strategy is the most widely studied strategy for using biochar to remove toxic metals and organic pollutants from the water matrix (Fig. ). High surface area, rich surface functionality and ***variable*** surface charge of biochar aid the sorption process through surface complexation, electrostatic attraction, , hydrogen bonding and pore-filling. Various pollutants in the industrial wastewater — cationic metals, anionic metalloids, phenolics, dyes and pesticides — can be removed through sorption, and its performance and detailed mechanisms are related to the preparation conditions and selected feedstocks for the biochar. Rich surface functionality in low-temperature biochar can aid in surface complexation and hydrogen bonding, while electrostatic attraction and interaction are dominant in high-temperature biochar. Because of higher pollutant concentrations in industrial wastewater, biochar modification has commonly been suggested to enhance the sorption capability (Box ).

Precipitation

The precipitation potential of biochar mainly comes from its inherent alkaline components (Fig. ). Previous research proved that precipitation could be a vital process for metal immobilization by biochar via the formation of insoluble hydroxide, carbonate, hydroxyl-carbonate and phosphate. For the precipitation process, biochar with high alkalinity, high ash content, or abundant carbonate or phosphate shows higher potential than the biochar produced from low-ash feedstock,. For instance, high-ash biochar produced from manure showed notably higher Cd immobilization capacity than low-ash sawdust biochar. As P leaching is also a crucial concern for water quality, a sustainable strategy for simultaneous metal and phosphate removal by biochar is desirable.

Redox reaction

Biochar can reversibly accept and donate electrons (up to 2 mmol g–1 biochar) owing to abundant surface functionality, making it a potential electroactive material for the redox-related remediation process, (Fig. ). Hexavalent chromium can be effectively reduced by the phenolic groups on biochar, and the trivalent chromium that is formed can be subsequently immobilized, achieving chromium decontamination. In addition, oxidative removal of trivalent arsenic and monovalent thallium can be accomplished by the oxidizing moieties on the biochar. However, the redox capacity of pristine biochar is often insufficient for addressing the demand for industrial pollutants, especially for organic pollutants, and thus modification is needed (Box ).

Chemo-catalysis

Using the electron activity of biochar to aid the generation of ROS with oxidative chemicals can also enable organic pollutant degradation (Fig. ). on the biochar surface, resulting from incomplete electron transfer and bond cleavage, are vital for activating the oxidant. Biochar can effectively trigger different oxidants,, with ROS formation to degrade pollutants.

In addition to the generation of ROS, the electron transfer capacity of biochar can promote the direct degradation of organic contaminants by oxidants; that is, the pollutants transfer the electrons to the oxidants directly through biochar. The conductivity of biochar with its conjugated graphitic structure contributes to the fast electron transfer process, and the non-uniform electron distribution caused by the or doped elements facilitates the combination with pollutants or oxidants, thus accelerating the degradation process,. Depending on the degradation mechanisms, various modification strategies could be used to promote the catalytic capability of biochar for refractory pollutants (Box ).

Electrocatalysis

Biochar-based materials can be used as electrodes based on their tunable conductivity, redox activity, porosity and surface chemistry, and their application for organic pollutant degradation has aroused increasing interest since about 2018 (Fig. ). In most cases, the pollutants were sorbed on the biochar electrode and reduced or oxidized afterwards,. For the reduction process, direct reduction by the electron from the cathode and indirect reduction by the newly formed active hydrogen atom (H\*) from H2O contribute to the pollutant removal. The electron transfer capacity and the H\* generation efficiency are vital for the electrocatalytic reduction process.

Similarly, direct oxidation and indirect oxidation by the formed ROS contributed to the electrocatalytic oxidation process,. ROS such as OH could be generated from either reduction of O2 on the cathode or oxidation of H2O on the anode, and biochar-based electrodes have shown favourable performance for both process. The electrocatalytic process with biochar electrode could be used for the simultaneous removal of coexisting pollutants by contrasting redox reactions at the anode and cathode, and it could also be applied for energy ***conversion*** by forming H2 or O2 (refs,) when only one electrode is used.

Photocatalysis

Photocatalysis is based on the generation of reactive hole (h+) and electron (e–) pairs () with the energy from visible–ultraviolet light, and the contrasting redox processes can be driven by h+ and e– (Fig. ). The photocatalytic process can achieve a complex redox-related degradation process, including direct redox reaction and indirect degradation through the formation of ROS,. As pristine biochar displays only a limited photocatalytic reactivity, it is combined with semiconductors such as TiO2 (ref.), CoFe2O4 with Ag3PO4 (ref.) and C3N4 (ref.) to prepare a biochar-based photocatalyst.

Biochar serves as the support for the semiconductors, and its porous structure enhances the sorption of pollutants. The electron transfer capacity of biochar might also assist the approach of electrons to pollutants or oxidants and inhibit the recombination of h+ and e–, thus enhancing the efficiency,. Furthermore, biochar could reduce the through the following routes. First, biochar could sensitize the semiconductor so that photocatalysis under visible light becomes energetically feasible. Second, biochar could generate mid-energy states within the original photocatalyst bandgap, by separating the one-step activation process into several steps with lower bandgaps, and thus decreasing the energy demand for the catalysis process. Third, the interfacial interaction of biochar and the photocatalyst would generate trapped electrons, such as the Ti3+ in TiO2, which could facilitate the photocatalytic process. It should also be noted that DOM from biochar exhibits considerable photoreactivity, resulting in various reactive species, that enable the environmental degradation of pollutants.

Industry-specific strategy

In this section, three specific industrial wastewater types are discussed in relation to potential pollutant removal strategies and biochar selection requirements. These are pharmaceutical wastewater with a high concentration of organic pollutants, textile wastewater with coexisting metal(loid)s and organic dyes, and mining discharge with high contents of metal(loid)s related to the resource mineralogy.

Pharmaceutical

The pharmaceutical industry (Fig. ) produces wastewater with a high chemical oxygen demand (up to 28,640 mg l–1) and comparatively low biochemical oxygen demand and low inorganic contaminants,. Using biochar as an adsorbent for organic pollutants can be part of the solution for pharmaceutical wastewater treatment. High pyrolysis temperatures with a low-ash feedstock can produce biochar with a high surface area and enriched porosity for effective adsorption of organic pollutants, and physical or chemical activation is a good choice for preparing biochar with tunable surface reactivity for sorption of organics (Box ).

In addition, using catalytic degradation with biochar can effectively remove the organic pollutants in pharmaceutical wastewater. Although such catalytic degradation will not wholly degrade the organic pollutants, it can disrupt their stable structures, increase their biodegradability and thus make subsequent bioremediation easier,. Combining biochar with semiconductors could also be a choice for pharmaceutical wastewater treatment through the photocatalytic process.

Textile

The coexisting organic dyes and potentially toxic elements in textile wastewater (Fig. ) are the main challenges for effective treatment. Biochar can be a potential solution because of its multifunctional nature. Organic dyes can be immobilized through sorption by biochar with high surface area and rich surface functionality.

Catalytic degradation with biochar can accelerate the complete degradation of dyes with the support of a chemical oxidant, electricity or a photonic process,. Meanwhile, biochar has shown simultaneous removal of metal(loid)s and organic pollutants, due to the combined strategy of mediated electron transfer, electrocatalytic and photocatalytic processes,.

Mining

Metal(loid) concentrations in mining wastewater (Fig. ) and polluted soil are highly related to the type of concentrates (ores), while high organic carbon content is also found in coal mining wastewater. Therefore, careful selection of appropriate biochar with a well-designed strategy is needed to treat wastewater from different mining industries. Cationic metals such as Cd, Pb and Zn in the mining wastewater can be immobilized by biochar through precipitation and sorption processes, and thus biochar with high alkalinity usually provides better performance.

The oxidizing capacity of biochar is needed for some metal removal, such as Ti(), owing to the higher fixation possibility of the oxidation product (Tl()) by biochar compared to Tl(). For anionic arsenic removal, modification with iron minerals was widely used to improve As immobilization for mining pollution control, and high oxidizing capacity could also aid the removal process. By contrast, anionic Cr() is less removed through adsorption, owing to electrostatic repulsion by the biochar surface, but it can be readily adsorbed by biochar after reduction to Cr(),. Given this concern, using biochar produced from plant-based biomass at a low temperature, or other modified biochar with a high reducing capacity, would present a better choice for Cr removal through redox reaction. A catalytic process for redox-driven metal immobilization has also been reported, and this could be applied to the treatment of coal mining wastewater with high pollutant contents.

In short, engineered biochar with science-based customization can effectively treat industrial wastewater through sorption, precipitation and/or catalytic reactions. Wastewater from different industries typically requires different removal strategies and engineered biochar types to target ***variable*** pollutant compositions and aquatic chemistry.

Biochar for sustainable drainage systems

The continuous increase in impervious surfaces caused by urbanization diminishes groundwater recharge and increases surface runoff, hence increasing the flood risk and treatment load in downstream facilities. To build a sustainable and resilient city with less flood risk (SDG11.5) and less polluted surface runoff for groundwater or surface water recharge (SDG11b), sustainable drainage systems (for example, bioretention basins, bioswale and constructed wetland) have been increasingly adopted to improve the quality and hydrological performance of stormwater and mitigate the urban heat island effect as a sustainable and resilient infrastructure (SDG9.1). Biochar can serve as part of the filter media in sustainable drainage systems, where it has been shown to augment soil health and vegetation growth, and removing a wide range of contaminants, including pathogens, herbicides, pesticides, metal(loid)s and nutrients,.

Establish a healthy and resilient system

As a conventional soil amendment for ***agriculture***, biochar with suitable design and deployment would augment sustainable drainage system health physically (better soil structure with erosion resistance, enhanced water retention capacity and higher hydraulic conductivity), chemically (enhanced nutrient storage and replenishment, soil fertility and pH buffering capacity) and biologically (abundant and diverse soil biota with balanced functionality),. Healthy sustainable drainage systems would aid plant growth for hydrological functions (plant interception, surface runoff reduction, stormwater infiltration and evapotranspiration) and pollutant removal (suspended solid removal, phytoextraction, phytodegradation, rhizosphere-related immobilization and nutrient uptake),.

For instance, the formation of soil macropores and enhanced growth of vegetation roots would maintain the long-term permeability of sustainable drainage systems. As a carbon-rich material, the release of dissolved organic carbon from biochar and the anoxic environment in biochar micropores can promote the denitrification of stormwater with a low C:N ratio in the constructed wetland, which could consequently achieve higher nitrogen removal (up to 370%) and lower N2O emission.

Biochar can also alter the geo-media properties for better soil fertility and nutrient utilization efficiency as a slow-release fertilizer after suitable modification (Box ), leading to healthier soil biota and plant growth. However, potential drawbacks should be carefully considered before biochar selection. For instance, the particle size of the biochar is important, because large ones could increase the water infiltration with less clogging potential yet decrease the hydraulic retention time and effective contact duration for pollution removal,. Applying fresh biochar might reduce available nutrient elements, owing to the organo-mineral coating. A careful design with a mix of particle sizes is essential for superior hydraulic and environmental performance.

Removing pollutants from stormwater

Biochar-amended sand biofilters can minimize the mobilization of Escherichia coli (a faecal indicator bacteria) during intermittent rainfall events. For instance, sand biofilters amended by wheat-straw-derived biochar exhibited an 84% removal rate of E. coli and one with willow-wood-derived biochar a removal rate of 79%, while acid-modified biochar provided an even higher removal rate (>98%). The surface area and carbon content of biochar were reported to have a positive correlation with the capacity for removal of E. coli, while the ash and volatile matter contents of biochar showed a negative correlation.

Hydrophobic biochar produced at a high temperature is preferable for removing trace organic contaminants (TrOCs) (Box ), owing to the high specific surface area, strong affinity and abundant hydrophobic moieties. In contrast, biochar produced at a lower temperature is more effective for metal removal, owing to rich surface functional groups. For instance, biochar-amended vegetated biofilters could remove ~99% of TrOCs, in comparison to unamended biofilters with less than 50% of TrOC removal. Bioretention systems co-amended with biochar and compost could remove more than 50–70% of metal(loid)s from stormwater influents.

According to the breakthrough curve, biochar-amended sustainable drainage systems could serve for decades before reaching the adsorption capacity of biochar. Nevertheless, depending on the field situation and loading of suspended solids, regular maintenance is mandatory to avoid potential system failure due to clogging and biofouling.

Long-term performance of biochar

The long-term impact of biochar to augment the performance of sustainable drainage systems essentially depends on the change of biochar properties during wet–dry cycles due to different climate and weather conditions. Wet–dry cycles would cause the dissolution or de-ashing of the inherent mineral components and surface oxidation of biochar. The wetting condition provides a higher chance of interaction between biochar and soil moieties, allowing further transition of the biochar properties. These changes during the wet–dry cycles would affect the biochar’s capacity for pollutant immobilization,, thus altering the long-term performance in a sustainable drainage system.

The dynamic hydrological regimes would cause highly ***variable*** redox conditions in sustainable drainage systems, further complicating the geochemistry processes with biochar in the long run. The immobilization capacity of biochar will be directly affected by the transition of redox conditions in soil,. The dissolution of soil minerals and the evolution of soil organic matter with the dynamic redox conditions also causes an indirect impact on the fate of pollutants with biochar,. Although these effects are becoming better understood in the soil environment (especially for flooded paddy soil), a more practical investigation of biochar-amended sustainable drainage systems is still lacking.

In addition to the variation of hydrological conditions, intensive rainfall would cause the fragmentation of biochar with the release of small , which might aid the transport of toxic pollutants,. Biochar colloids display relatively high mobility, and their potent combination with pollutants contributes to the potential risks during soil application,, especially for the long-term operation of sustainable drainage systems. Production conditions and feedstock selection are critical for the amounts, properties and transport behaviour of biochar colloids,. Low-temperature-produced biochar usually has a higher amount of biochar colloids, and biochar with rich O-functionality could facilitate the pollutant co-transport. Understanding the fate of different biochar colloids is necessary for long-term operation.

In summary, biochar used as a filter medium in sustainable drainage systems serves multiple roles by augmenting overall soil health, boosting plant growth and removing pollutants. Thus, both the quality and hydrological performance of stormwater can be improved, together with mitigating the urban island effect.

Partnerships for commercialization

Compared with other (NETs) suggested by the European Academies Science Advisory Council (EASAC), such as bioenergy with carbon capture and storage, biochar is a ready-to-implement strategy that requires a shorter time for actualization. Nevertheless, widespread adoption of biochar for emerging applications beyond soil is still slow in the commercial market owing to low awareness of market benefits, limited access to the carbon offset market, uncertain profits, insufficient production and application standards, and ambiguity of long-term performance or lifespan of biochar,.

Thus, it is crucial to understand the interests of biochar-related stakeholders better and to promote effective public and public–private partnerships for successful commercialization (SDG17) (Fig. ). Primary stakeholders should take the lead to stimulate the biochar market, research and application with policy tools (SDG17.14−17.15), scientific knowledge (SDG17.6−17.8) and financial investments (SDG17.5, 17.9−17.13). Afterwards, global cooperation (SDG17.16−17.17) among secondary stakeholders could maximize the value of biochar and achieve an environmentally sound, economically viable and socially responsible biochar industry for its successful commercialization.

Relationships and roles of stakeholders over the emerging applications of biochar.

National and regional governments, global institutions and financial markets (inner circle) are the primary stakeholders stimulating the biochar market, research and application that could help the world to transition to carbon neutrality. Cooperation among academia, advisory institutions, biomass suppliers, biochar producers and biochar users could maximize the added value of biochar. With scientific guidance from academia and advisory institutions, and with feedback from users, the biomass suppliers and biochar producers can provide a continuous supply of biochar products of stable quality. Understanding the interests of primary and secondary stakeholders in the biochar industry is essential to the partnership for successful commercialization and broad application of biochar. ESG, environmental, social and governance.

Implementation for primary stakeholders

Financial and policy support from local government

To support biochar deployment, local government should initiate and implement a series of actions, including the provision of financial incentives (SDG17.9), policy support (SDG17.14−17.15) and research funding (SDG17.7) (Fig. ). Currently, small-scale biochar users prefer quick profits (~4 years) over long-term benefits such as carbon sequestration. In this context, boosting the high-end niche market of biochar (for instance, as a superior catalyst for pollutant degradation) by providing governmental grants, loans and tax credits is highly recommended to shorten the biochar payback period and increase the commercial viability.

In parallel to financial incentives, policy support such as defining biochar as an environmentally friendly product and a pathway towards carbon neutrality is vital to boost the market demand and enhance public awareness. For instance, since 2020, many countries have declared a climate emergency to ramp up the emission reduction pledges under the Paris Agreement, strengthening the potential market of NETs, which include biochar applications. Moreover, allocating sufficient funding for research and development is necessary to support early-stage innovation and accelerate the evolution of biochar technology to more beneficial and emerging applications.

Standardization and classification of biochar production and application

National or global institutions play an important role in establishing national and international standards or classification systems to support and regulate application-oriented biochar production (SDG17.16) (Fig. ). So far, only a few voluntary certification systems have been developed to ensure the safe use of biochar, such as the International Biochar Initiative (IBI), European Biochar Certificate (EBC) and Biochar Quality Mandate (BQM). The feedstock should be limited to waste biomass such as wood and ***agricultural*** residue to eliminate potential competition with the existing recyclable market, or unintended deforestation.

Nevertheless, the existing voluntary certification systems mainly focus on limiting the potential risks of biochar uses in soil, whereas biochar with distinctive physicochemical properties would create a wide range of options for water treatment. New biochar classification systems with specific indicators for various emerging applications should be established by recognized national and global institutions. For instance, the atomic O:Corg ratio and H:Corg ratio of biochar can be used to predict the mineralization extent, which is crucial for estimating the carbon sequestration and stability of biochar for carbon trading; the specific surface area and pore volume distribution can indicate the biochar porosity for water pollution control capacity and other innovative applications.

Therefore, establishing a broad set of biochar standards and classification systems will lay the foundation for integrating biochar into the existing legislation and guidelines on different environmental applications such as adsorption and carbon sequestration. The use of standardized and tradable products is also helpful in enhancing scale transactions and market liquidity of biochar.

Establishment of carbon trading market

To create investment incentives for low-carbon technologies and applications, carbon trading is adopted (Fig. ) to internalize the impacts of GHG emissions as a measurable cost (SDG17.10). The average carbon footprint of biochar is approximately −2.0 to −3.3 kg CO2-eq kg−1 biochar, depending on the production process and target applications, and the carbon price, for example, ranges from ~10 USD per ton CO2-eq in China to 119 USD per ton CO2-eq in Sweden.

Establishing a stable carbon trading market for certified biochar products with known carbon sequestration capacity could make the economic value of biochar measurable and accelerate the global transition to a decarbonized economy. As one of the NETs, biochar application also contributes to the achievement of sustainable finance by taking it into account for environmental (E) pillar scoring in an ESG (environmental, social and governance) investing approach, such that the investment portfolios can be more resilient to physical and climate transition risks.

Implementation for secondary stakeholders

Reliable supply and cost-efficient production

In view of seasonal variations, awareness of feedstock providers is essential to ensure the continuous availability and stable quality (particle size, moisture content and chemical composition) of biomass waste, such that biochar production efficiency and quality assurance can be secured (Fig. ). To overcome the economic barrier of biochar application, producers should select suitable feedstocks for different environmental applications. For instance, the use of locally available biomass waste, such as wood waste, food waste, sewage sludge and anaerobic digestion residue, as biochar feedstock, instead of purpose-grown biomass, can lower transportation requirements and production cost (a reduction of 16−69 USD ton−1 by shifting purpose-grown feedstock to biomass waste).

Apart from feedstock selection, biochar producers should adopt the correct technology and equipment setup for different target applications to maximize the benefits of biochar applications (Fig. ). It has been suggested that operation at a larger scale (biomass input capacity >6 ton h−1) and higher pyrolysis temperature (>550 °C) can enhance the biochar revenue and render it profitable without subsidies. To make the overall biochar footprint measurable, it is crucial for the producers to conduct material and energy flow analyses to calculate carbon credits.

Research support and knowledge transfer

To support the growth of the booming biochar industry, it is necessary for academia and advisory institutions to conduct both fundamental and applied research on engineering biochar with application-oriented design, advanced characterization and multiscale analysis, and performance evaluation of various emerging applications with life-cycle assessment and techno-economic analysis (Fig. ). Currently, most decision-makers in developed countries are more conservative about biochar application because of its possible risks and uncertainty for long-term application. To overcome this barrier, the ageing mechanisms and the recyclability of biochar need to be understood.

Nevertheless, natural ageing experiments take years; using various quantitative accelerated ageing methods (chemical oxidation, physical ageing and biological ageing) enables us to better understand the evolution of biochar in field-relevant environmental conditions, although long-term demonstrations are still required for performance validation. To support the underlying biochar research activities, fostering knowledge transfer from academia to biochar users, industry and policymakers is crucial to the successful establishment of emerging applications.

Feedback ***collection*** from end-users

To maximize the benefits of biochar, it is recommended that users select certified biochar products after understanding (or consulting relevant experts about) the purposes of the target applications and the desired biochar properties (Fig. ). As the biochar industry is not yet mature, with commercial ***data*** insufficiency over a short period, it is incumbent on users to regularly track the biochar performance and discuss the results with academia and advisory institutions to fill in knowledge gaps and further optimize field-scale biochar designs and applications.

Overall, governments, institutions and financial markets serve as primary stakeholders to build the foundations for the biochar market, research and application. Cooperation among academia, biomass suppliers, biochar producers and industry end-users as secondary stakeholders will ensure the maximization of the added values of biochar commercialization and broad applications.

Summary and future perspectives

Biochar, as a highlighted NET for achieving carbon neutrality by 2050, is an integrated treatment strategy for municipal wastewater, industrial wastewater and stormwater. Commercialization and scaling up of biochar applications for water treatment are necessary to harness multiple SDG synergies by 2030 (Box ). Given the timeframe ahead, collaboration among interdisciplinary stakeholders is strongly recommended to impel the research and development of biochar as a valuable carbon-negative material that can simultaneously tackle challenges from the water–climate–energy nexus. But first, several issues should be addressed so that the broader applications can be accelerated successfully.

***Variable*** or contrasting biochar treatment performances have been reported by different studies, owing to inconsistent experimental settings and production conditions, which could mislead the selection or hinder the robust production of appropriate application-engineered biochar. Standard biochar reference materials or specification and certification are needed to benchmark the performance of biochar from different studies. Computational simulations combined with big-***data*** mining of the current research literature, such as machine learning studies,, can help to unveil the physicochemical properties behind the different biochar designs.

Different wastewater treatment plants with distinct treatment strategies will demand industry-specific designs of biochar. Hence, future efforts are required to develop biochar production plants with various modification capabilities. Scaling up production with different quality grades and ***variable*** application-oriented properties is a future necessity.

Furthermore, biochar’s lifespan and long-term fate are critical for its sustainable use, which has been often overlooked. In addition to the regeneration of spent biochar, secondary utilization for alternative applications is a feasible and resource-efficient direction for widening biochar end-uses, because different applications typically depend on different features and moieties. For instance, after recovering phosphate from wastewater, biochar could serve as soil fertilizer or metal-immobilizing agent. However, the risk level of spent biochar should be fully considered before possible reuse. Low-risk biochar can be further used as an adsorbent or soil amendment, whereas high-risk biochar should be stabilized or possibly reused in cementitious materials, which could concurrently achieve carbon sequestration and pollutant immobilization. Future experimental and mechanistic studies on the fate and reuse of spent biochar should be conducted for closing the loop.

Although industry-specific applications of biochar could have both benefits and limitations, some aspects could have disadvantages. These unintended drawbacks must be addressed and properly managed during biochar commercialization and large-scale application. For instance, the competition and integration of using alternative biomass options, inherent contents of toxic pollutants, high ash or salt contents of some feedstock, or chemical and energy consumption during the modification process could produce a negative impact on related SDGs. An integrated and evidence-based consideration of the benefits and drawbacks of producing and using biochar over its full life cycle is necessary. A quantitative index related to the positive or negative contribution to various SDGs is recommended to be designed and applied for future biochar applications.

**Acknowledgements**

The authors appreciate financial support from the Hong Kong Green Tech Fund (GTF202020153), Hong Kong Environment and Conservation Fund (ECF Project 101/2020) and Hong Kong Research Grants Council (PolyU 15222020) for this study.

**Notes**

Publisher’s noteSpringer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

**Load-Date:** September 6, 2023

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PR Newswire UK Disclose

May 31, 2022 Tuesday 2:00 AM EST

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**Length:** 20909 words

**Dateline:** London, May 30

**Body**

PR Newswire

FIDELITY CHINA SPECIAL SITUATIONS PLC

Final Results for the year ended 31 March 2022

Financial Highlights:

The Board of Fidelity China Special Situations PLC (the “Company”) recommends an annual dividend of 5.50 pence per share, an increase of 17.5% from last year, and the highest since launch.The net asset value (“NAV”) total return of the Company decreased by -34.9% for the year ended 31 March 2022. The Benchmark Index (MSCI China Index) declined by -29.3% in sterling terms.The Company remains focused on stocks and sectors that appear well positioned to benefit from China’s long-term structural growth drivers.Towards the end of the period, net gearing was increased to current levels of around 24% due to a combination of adding to areas where the Portfolio Manager sees significant value and closing the

majority of short positions in the wake of the market corrections.

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FIL Investments International

Chairman’s Statement

The reporting year proved challenging for investors in China – driven by four key factors. China’s apparent recovery from COVID-19 stalled and it returned to its zero-COVID policy, reinstating restrictions on movement and lockdown isolation requirements in several major cities. Fears about China’s slowing growth and debt burden weighed on equities; as did an increase in geopolitical tensions, linked in part to Russia’s invasion of Ukraine. Regulatory crackdowns also held back performance, causing sharp sell-offs in sectors linked to President Xi Jinping’s Three Mountains policy to increase equality in education (and internet), health care and property sectors.

Our Benchmark Index, the MSCI China Index, fell by 29.3% in the reporting year giving up all of the gains it had made during the previous twelve months. The net asset value (“NAV”) per share fell by 34.9% where the gearing effect (-10.9%) outweighed the gains from stock selection (+6.6%). During the same period, the Company’s share price fell by 39.2% as the discount widened to 7.5% from 1.1% at the end of the last reporting year.

The NAV and share price have both been particularly volatile during the last two years since the global pandemic was declared and we will no doubt see further volatility in the future. However, it should be noted that the share price and NAV as at 31 March 2022 of 252.00p and 272.52p respectively are still some way ahead of that at the same date in 2020 (216.00p and 236.27p) when the global pandemic was declared.

At a time when the world is experiencing volatility and uncertainty both politically and in its financial markets, investors will be re-appraising the makeup of their portfolios. Questions are asked, such as “Should a diversified portfolio have direct exposure to China?” “And if so, how?”

The Board continues to believe that a direct exposure to China is an important constituent of a diversified portfolio. Not only is China the second largest economy in the world but its Gross Domestic Product (“GDP”) has for many years grown at a faster rate than the world average and it is projected to continue to do so. A geographically diversified portfolio needs to have exposure to this growth.

Fidelity China Special Situations has set out its stall to offer a “one stop shop” to investors to provide the China content of their portfolios.

Our Portfolio Manager, Dale Nicholls, concentrates on identifying those parts of the Chinese economy which are growing the fastest. He invests in the large capitalisation stocks such as Alibaba Group Holding and Tencent Holdings whose businesses continue to grow strongly. He also uses his large research team on the ground in China to seek out attractively priced medium and smaller capitalisation companies which will generate returns as they grow. Our top ten holdings are described in the Annual Report.

Making use of the closed ended nature of an investment trust, Dale can also invest up to 15% of the portfolio in unlisted companies taking advantage of their early stage growth before they become listed on the public markets. During the year, two of our unlisted holdings achieved their IPO, each recording a significant uplift over their original cost. However, since the dates of their IPOs, the fall in the markets has affected their prices. Subsequent to the year end, the Company converted its preference shares in the ride hailing company Xiaoju Kuaizhi (Didi Chuxing) into American Depositary Shares (ADS). Further details are in Note 22 below. The valuation of Didi has been particularly affected by the fall in the markets, concerns over US listings, and increased regulation requirements. Three more investments were added to the unlisted part of the portfolio. Our unlisted investments are described in the Annual Report.

Because of our confidence in the long-term growth characteristics of the Chinese economy we include an element of gearing in the portfolio. This ensures that positive long-term returns are amplified but does result in increased volatility in the Net Asset Value and Share Price as it also accentuates losses in a falling market, as happened this year.

Dale Nicholls, in his report, describes those parts of the Chinese economy where he perceives the greatest growth, and comments on some of the specific investments he holds including his rationale for holding his five largest investments, which comprise 29.0% of his portfolio.

The Board is mindful of the risks of investing in a single emerging market and monitors those risks, both current risks and our perception of emerging risks. These risks are set out below. We believe, however, that those risks are outweighed by the opportunities of investing in China, and, in particular, in investing in Fidelity China Special Situations.

By investing in the domestic economy, Dale mitigates much of the geopolitical risk of investing in China. The growth of the middle class from a population of 1.4 billion people provides a momentum to consumer spending. Although, in a year when this has been reduced by the effects of the pandemic, Dale has sought value in other parts of the economy which he describes in his report.

The Board believes that the size and quality of Fidelity’s research team gives the Manager a considerable advantage. Market dislocations create stock specific pricing anomalies and these can only be identified by extensive and rigorous research. Research also enables the Manager to position the portfolio to try and mitigate regulatory changes from the Chinese government some of which can be predicted from the nature of a centrally planned economy.

Board visit to China

In the years prior to the pandemic, the Board visited China each year to observe the Manager and his team in action, to meet the Fidelity analysts and also to meet some of the Companies in which we are invested. Last year, for the second time, we were unable to do that but had virtual visits in which we used video conferencing to meet with a combination of the Fidelity team, market commentators and some investee companies.

Among the companies we met was Bilibili, a video sharing internet company based in Shanghai, themed around animation, comics, and games, with whom the Portfolio Manager discussed limiting the impact from regulations, in particular, possible restrictions on “time spent” for minors on video content as seen on games.

We also heard from the management team of Huazhu Group, a hotel management company in China, that was ranked as the No.7 Hotel Group around the world in 2021 by Hotels.com; and from BC Technology Group which specialises in digital assets and blockchain platforms.

The Board was, once again, impressed by the breadth and depth of Fidelity’s team, spending time not only with the Manager and the analysts but also with the Global Head of Stewardship and Sustainable Investing, who is based in Singapore.

I would like to take this opportunity to reiterate the Board’s confidence in our Portfolio Manager, Dale Nicholls, and his team, in their skills and proven track record of identifying growth opportunities in the Chinese marketplace.

Environmental, Social and Governance (ESG) Investment and Climate Change

COP26 was an important global event in November 2021 where governments, businesses, climate experts and campaigners gathered for discussions and negotiations to tackle climate change. It provided a platform to attempt to align and co-ordinate international efforts in the fight against the climate crisis. There is increasing concern about global warming, and a focus on serious efforts to counter its effects. There was progress in the form of commitments and initiatives across a wide range of areas from deforestation to clean energy transition but more needs to be done. Businesses for their part are under pressure to ensure that their activities are environmentally sustainable, as well as demonstrating social responsibility and good corporate governance. Continuing deterioration in the climate brings investment risk into our portfolio. Fidelity International continues to evolve its approach to ESG and has a new climate investing policy as well as sustainable investing voting principles and guidelines and is making further improvements to its proprietary forward-looking ESG and climate ratings.

The growing body of middle-class consumers in China who care about the environmental and social footprints of what they buy means that companies need to take sustainability more seriously. The rise of sustainable investing offers further incentives for companies to step up their ESG efforts for the sake of easier financing. Given this confluence of factors, it is unsurprising that companies are generally willing and, at times, keen to engage with investors on ESG issues.

The evaluation of ESG factors are a core part of our Portfolio Manager’s investment process and he continues to see progress regarding the level of engagement and transparency with Chinese companies. Sustainability factors are key topics of conversation with companies and many management teams are looking at ways to generate a more sustainable outcome for their companies. Although China continues to lag most other major markets in this area, we are encouraged by the fast rates of improvement which we are seeing. China’s regulators are engaging with companies to improve the disclosure of ESG metrics to align themselves more with these standards in Hong Kong. Not only is this a good outcome globally, but we also believe that progress on better ESG practices could be a key source of performance for the portfolio over the longer-term.

Fidelity International has a proprietary sustainability ratings system leveraging its internal research and interactions with issuers. The ratings are designed to generate a forward-looking and holistic assessment of ESG risks and opportunities based on sector specific performance indicators. Analysts quantify the direction of change of companies’ ESG performance (positive, neutral or negative trajectory) and rate the companies using a scale of A to E. The Board pays close attention to the ratings of underlying portfolio companies and challenges the Portfolio Manager and his team on any stocks with lower ratings. The ratings of the companies within the portfolio are well ahead of the broader market and continue to improve.

Dale Nicholls outlines his approach to this important subject in his report and what this means for the Company’s investment portfolio. The Fidelity group of companies (including the Manager) has embedded ESG factors in its investment decision making process. Further details are in the Annual Report which show how the Company is positioned in terms of ESG.

Gearing

The Company has a three-year unsecured fixed rate facility agreement with Scotiabank Europe PLC for US$100,000,000. The interest rate is fixed at 2.606% per annum until the facility terminates on 14 February 2023.

To achieve further gearing, the Company uses contracts for difference (“CFDs”) on a number of holdings in its portfolio. Further details are in Note 20 below.

As at 31 March 2022, the Company’s Gross Gearing, which is Gross Asset Exposure in excess of Net Assets, was 26.1% (2021: 26.2%). The level of Gross Gearing is determined by the Manager within the limit set by the Board of 30%. Net Gearing, which nets off short positions, was 23.5% at the year end (2021: 18.4%).

Dividend

Our investment objective is to achieve long-term capital growth. Nevertheless, the Company has been able to increase the dividend per share every year since the Company launched. With interest rates being low, the Directors recognise that the dividend has become a more important part of the total return to shareholders.

The Board recommends a final dividend of 5.50 pence per share for the year ended 31 March 2022 for approval by shareholders at the Annual General Meeting (“AGM”) to be held on 20 July 2022. This represents an increase of 17.5% over the 4.68 pence paid in respect of the prior year. The dividend will be payable on 27 July 2022 to shareholders on the register on 15 June 2022 (ex-dividend date 14 June 2022).

The revenue per share earned by the Company during the year was 6.42 pence, which is an increase of 36.6% over the 4.70 pence earned in the prior year, and covers the recommended dividend.

Discount Management

The Board believes that investors are best served when the share price trades close to net asset value (“NAV”). The Board recognises that the Company’s share price is affected by the interaction of supply and demand in the market based on investor sentiment towards China and the performance of the NAV per share. The Board has a discount control policy in place whereby it seeks to maintain the discount in single digits in normal market conditions. Subject to market conditions, it will authorise the repurchase of shares with the objective of stabilising the share price discount within a single digit range.

The Company’s discount widened from 1.1% at the start of the reporting year to 7.5% at the end of the reporting year. During the year, the Board authorised the repurchase of 1,506,074 shares into Treasury, representing 0.3% of issued share capital, in its effort to stabilise the discount. These share repurchases have benefited remaining shareholders as the NAV per share has been increased by purchasing shares at a discount. Since the year end and as at the date of this report, the Company has repurchased a further 511,450 ordinary shares into Treasury. No shares have been repurchased for cancellation. The graph in the Annual Report shows the history of the Company’s discount during the year.

At the forthcoming AGM, the Board is seeking to renew the annual authority to repurchase up to 14.99% of the Company’s shares, to be either cancelled or held in Treasury, as it has done each year previously.

Management Fees

With effect from 1 April 2021, the Board agreed a reduced management fee with the Manager, FIL Investment Services (UK) Limited. The revised fee structure is on a tiered basis of 0.90% on the first £1.5 billion of net assets reducing to 0.70% on net assets over £1.5 billion. The ***variable*** element of +/-0.20% from the previous fee structure remains unchanged. At the same time, the fixed annual fee of £100,000 for services other than portfolio management has been removed. The revised fee provides savings on the overall percentage costs for shareholders assuming net assets remain constant.

Details of the fee structure for the year ended 31 March 2022 are set out in the Directors’ Report in the Annual Report.

Ongoing Charge

The Ongoing Charge for the year was 0.94% (2021: 0.97%). As indicated, the Manager is entitled to earn up to an additional 0.20% of NAV per annum if performance is ahead of benchmark over a three-year basis, calculated on a daily basis. Notwithstanding the underperformance against the Benchmark Index in the year, the three year performance has been sufficient to earn the maximum ***variable*** element of 0.20%. As a result the Ongoing Charge for the year, including this ***variable*** element, was 1.14% (2021: 1.09%).

Board of Directors

Elisabeth Scott, having served on the Board as a non-executive Director since 1 November 2011 and as a Senior Independent Director since 22 July 2016, stepped down from the Board at the conclusion of the AGM on 20 July 2021. She was succeeded as a non-executive Director by Alastair Bruce who was appointed to the Board on 1 July 2021 and she was succeeded as Senior Independent Director by Linda Yueh on 20 July 2021.

As part of the Board’s succession plan, I will retire as Chairman at the AGM on 20 July 2022. Following a formal process, the Board decided that Mike Balfour will succeed me as Chairman at the conclusion of the AGM. As Mike is currently Chairman of the Audit and Risk Committee, Alastair will succeed Mike at the same time.

The Board has appointed Georgina Field as a non-executive Director from 1 July 2022. Her biography is in the Annual Report and she will stand for election at the AGM on 20 July 2022.

In accordance with the UK Corporate Governance Code for Directors of FTSE 350 companies, all Directors, with my exception, are subject to annual re-election at the AGM on 20 July 2022. The Directors’ biographies can be found in the Annual Report, and, between them, they have a wide range of appropriate skills and experience to form a balanced Board for the Company.

Board Apprentice

The Board continues to participate in the Board Apprentice Scheme arising from a government-supported initiative to give board exposure to aspiring non-executive directors, particularly women and those from ethnic minority backgrounds. Kal Foley-Khalique was appointed as a Board Apprentice on 1 December 2020 for a period of one year. As COVID affected her exposure to the workings of the Board, it was decided to extend her apprenticeship to the AGM on 20 July 2022. She attends all Board and Committee meetings as an observer and it is intended that this will assist her aspirations in securing a non-executive director role in the future. The Board has commenced the process to identify and appoint a new Board Apprentice.

Outlook

I shall retire from the board at the forthcoming AGM on 20th July 2022 having served, first as Senior Independent Director and then as Chairman, for the 12 years since our IPO in 2010. Much has changed in China during that time but one thing has not changed. We launched the Company to offer investors with a diversified portfolio the opportunity to have direct exposure to China’s growth; and that approach is now widely accepted. Over the 12 years since the Company launched, the share price total return has been 169.3% compared to a Benchmark Index total return of 81.3%.

Official forecasts in China are that, in the year 2022, growth in GDP will be 5.5% which is greater than the OECD forecast of global growth, although some commentators are questioning whether that rate will be achieved. China is too large and growing too fast to be ignored by investors, especially when that growth is translated into attractively priced earnings for listed companies.

The Company is designed to be a one stop shop for investors’ exposure to China. Dale Nicholls invests in companies of all sizes and has established a record of successfully identifying unlisted companies before they do their own IPO. His emphasis is always to identify those parts of the Chinese economy that are growing fastest and he is supported by a large and experienced team of research analysts on the ground.

ESG has become a prominent issue in recent years although it has always been the case that better governed companies make better investments. Fidelity has used its resources to apply its own ESG ranking methodology which enables the Manager to screen his investments and to engage with companies on their ESG standards.

No doubt the progress of the Company’s share price will continue to experience short-term volatility but we have always portrayed holding shares in the Company as a long term investment.

I have been a shareholder since I joined the board and will continue to be one as I retire; and I look forward to seeing the Company going from strength to strength.

Meanwhile, I hope to see you at our Annual General Meeting in July. Details of the AGM are below.

Nicholas Bull

Chairman

30 May 2022

Annual General Meeting – Wednesday, 20 July 2022 at 11.00 am

The AGM of the Company will be held at11.00 am on Wednesday, 20 July 2022at 155 Bishopsgate, London EC2M 3YD and virtually via the online Lumi AGM meeting platform. Full details of the meeting are given in the Notice of Meeting in the Annual Report.

Appropriate social distancing and hygiene measures will be in place for those shareholders attending the AGM in person. For those shareholders who would prefer not to attend in person or for whom travel is not convenient, we will live-stream the formal business and presentations of the meeting online.

Dale Nicholls, the Portfolio Manager, will be making a presentation to shareholders highlighting the achievements and challenges of the year past and the prospects for the year to come. He and the Board will be very happy to answer any questions that shareholders may have. Copies of his presentation can be requested by email [*atinvestmenttrusts@fil.comor*](mailto:atinvestmenttrusts@fil.comor) in writing to the Secretary at FIL Investments International, Beech Gate, Millfield Lane, Lower Kingswood, Tadworth, Surrey KT20 6RP.

Properly registered shareholders joining the AGM virtually will be able to vote on the proposed resolutions. Please see Note 8 to the Notes to the Notice of Meeting in the Annual Report for details on how to vote virtually. Investors viewing the AGM online will be able to submit live written questions to the Board and the Portfolio Manager and we will answer as many as possible at an appropriate juncture during the meeting.

Further information and links to the Lumi platform may be found on the Company’s website[*http://www.fidelity.co.uk/china*](http://www.fidelity.co.uk/china). On the day of the AGM, in order to join electronically and ask questions via the Lumi platform, shareholders will need to connect to the website[*https://web.lumiagm.com*](https://web.lumiagm.com).

Please note that investors on platforms such as Fidelity Personal Investing, Hargreaves Lansdown, Interactive Investor or AJ Bell Youinvest will need to request attendance at the AGM in accordance with the policies of your chosen platform. They may request that you submit electronic votes in advance of the meeting. If you are unable to obtain a unique IVC and PIN from your nominee or platform, we will also welcome online participation as a guest. Once you have accessed[*https://web.lumiagm.comfrom*](https://web.lumiagm.comfrom) your web browser on a tablet or computer, you will need to enter theLumi Meeting IDwhich is152-195-444. You should then select the ‘Guest Access’ option before entering your name and who you are representing, if applicable. This will allow you to view the meeting and ask questions but you will not be able to vote.

Portfolio Manager’s Review

Dale Nicholls was appointed as Portfolio Manager of Fidelity China Special Situations PLC on 1 April 2014. He has 27 years of investment experience and also manages the Fidelity Pacific Fund. He spends much of his time speaking to management teams and competitors of companies in which he invests or may choose to invest, engaging with hundreds of companies each year.

Question

How has the Company performed in the year under review?

Answer

As already mentioned in the Chairman’s Statement, a resurgence in COVID cases, fears over China’s slowing growth and increased regulation caused the Company’s Benchmark Index to give up the gains it had made during the previous twelve months, and produced a total return in UK sterling of-29.3%. In this context, the Company’s NAV total return per share, weighed down by the Company’s gearing, fell by 34.9%. During the same period, the share price total return was-39.2% as the discount widened to 7.5% from 1.1% as at the Company’s last year end.

Question

Investment performance in the year under review has been challenging, especially compared with the previous year. What have been the main drivers?

Answer

Over the period under review, holdings in industries embroiled in regulatory changes detracted from relative performance. Of note, was the sharp sell-off in Chinese stocks triggered by heightened regulatory changes targeting the education, internet, healthcare and property sectors (related to the “Three Mountains” that need to be scaled to deliver China’s policy of Common Prosperity). Analysing regulatory developments and the direction of travel is naturally a core part of our analysis of the operating environments of companies. While there have clearly been some surprises through this tightening cycle, in areas such as education, we had largely exited from the education sector and so the impact on the Company was not significant. Our impact on the healthcare sector was also limited as we had little exposure to the generics part of the market where we expect the most significant pricing pressure to be. The exposure to the property sector was also limited. The main impact was in the internet related area.

However, the position in carrier-neutral internet ***data*** centre (“IDC”) operatorVNET Group(previously 21Vianet Group) weighed down returns due to a number of factors including weaker demand from wholesale customers, increased competition, as well as regulatory concerns that have generally applied to US listed Chinese companies. Furthermore, sentiment was dampened by ongoing concerns relating to the pending share sale by Tuspark (a strategic shareholder) due to its debt restructuring. Whilst capacity addition expectations have been lowered, growth remains solid and valuations have fallen to extreme levels, with the stock trading at a significant discount to its net asset value. More broadly speaking, IDC demand remains a structural growth story in China driven by increasing ***data*** usage of the internet via mobile devices on the consumer side and increasing demand for cloud and IT services on the enterprise side and I believe VNET is well positioned to benefit from this growth.

Given headwinds such as COVID lockdowns and a weakening property market, it is no surprise that consumption-driven sectors have struggled to perform. This in turn has seen increased pressures on the large internet platforms that have been impacted by lower advertising spend. The regulatory impact on sectors such as education has also clearly played a part here.

As often happens in market downturns, some of the smaller holdings in the Company’s portfolio with less liquidity have suffered more. Tencent-backed livestreaming platformKuaishouTechnologyremained out of favour as leading social media and gaming companies faced higher regulatory scrutiny over user ***data*** ***collection*** and usage. Kuaishou is one of the most popular social platforms in China and one of the few internet companies that continues to have robust growth in users and time-spent-online. The company has undergone some major organisational restructuring which should lead to better operating efficiency over the mid-term. The company’s monetisation of the platform is expected to increase as it shifts its focus to commercial activities, with advertising and e-commerce being two of its biggest growth opportunities.

The holding in online marketing technology companyiClickInteractive Asia Group, e-commerce service providerBaozunand supply chain finance technology solution providerLinklogiswere caught in the broader market sell-off. The weaker consumer and related advertising spend clearly weighed on iClick and Baozun, as did US delisting fears. The long-term growth story for Baozun remains intact in light of rising online penetration and category expansion including luxury and fast-moving consumer goods (FMCG). The company’s close relationship with Alibaba and large client resources also enables it to get the best resources from Alibaba. In addition, the volume of customers it serves on other platforms, including the fast growing live-streaming platforms, continues to grow. Even factoring in the headwinds, these companies’ shares look significantly oversold and are trading at significant discounts to where we see fair value.

On a positive note, an exposure toSenseTime, which we bought in 2018 while it was unlisted, added notable value as shares in the artificial intelligence (“AI”) technology company rallied following its initial public offering (IPO). The company continues to capitalise on its lead in algorithm production efficiency and in its commercialisation in comparison to other AI start-ups, along with access to a large addressable market backed by strong capabilities in core areas such as computer vision.

The holding in one of our other unlisted investments, autonomous vehicle technology companyPony.ai, also performed well as subsequent investment rounds were announced at significantly higher than expected valuations (the company is also backed by Toyota). The company’s plans of commercialising autonomous driving for all vehicle sizes remain on track and we are closely monitoring its operations regarding both ride-sharing and delivery service networks. It already operates taxi fleets in cities such as Beijing, and I believe the company remains well-positioned as a leading player in this new and emerging market.

Elsewhere, a leading manufacturer of gas equipment and liquid tanksCIMC Enriccontinues to benefit from solid gas demand growth trends in China over the mid-term, with the shift away from more harmful fossil fuels. As a leader in the business for gas related equipment, the company is well placed to play a role in the innovation required for China to reach its environmental goals. The company is also well positioned in China’s nascent hydrogen supply chain.

Question

COVID cases in China are rising again. Is China likely to continue with its zero-COVID policy and what are the implications for the Company’s portfolio?

ANSWER

Slowing economic growth - notably slowing consumer activity highlighted in ***data*** points such as retail sales - has been exacerbated by the recent COVID lockdowns that we have seen in large cities such as Shanghai. The feedback from consumer related businesses in the region indicate that the impact will be significant in the short-term. Despite the severity of these lockdowns, and while the direction of policy is not always easy to predict, I do believe that we will see a shift towards a loosening of restrictions relatively soon. I believe that recent commentary from certain officials, the approval of foreign antiviral drugs, as well as the evident social strain the policy is having, are all factors that support this view.

There is also a clear impact on supply chains. We are already seeing impact of the recent lockdowns in Shenzhen given the huge productive capacity that was affected there; limits of ports in places like Shanghai are also clearly having a major impact. In terms of implications for the portfolio, as there is a focus on domestic consumption, we are focused on ensuring the fundamentals (such as earnings visibility) of companies we own in the portfolio remain intact.

I do not think that we should underestimate the risks from the zero-COVID policy and I expect the short-term outlook for the consumer sector will be difficult; and this is partly reflected in the portfolio’s current underweight to consumer discretionary positions. However, I remain positive on the long-term potential of the Chinese consumption theme and believe that there is good potential for the unleashing of spending power as the country comes out of the pandemic.

Question

The US has indicated it will delist some Chinese companies from its exchanges – have any of your investments been directly impacted, and will the trend continue?

Answer

While there are liquidity perspectives to consider, I believe this will clearly improve over time and the vast majority of Chinese companies have the capacity to be listed in other markets such as Hong Kong. Most crucial for me is the underlying value of a company, and not where that company is listed. With this in mind, I have been adding to positions over this period, given the opportunities created by some of the sell-offs which took some stock valuations to extreme levels, presenting attractive opportunities. Examples includeVNET,AutohomeandLufax.

Question

There has been a lot of talk about how Russia’s invasion of Ukraine will affect Chinese relations with the West and China’s markets – is this of concern?

Answer

Geopolitics is definitely something we all need to be mindful of. Some of the significant economic concerns we held prior to the Russia and Ukraine conflict have indeed been accentuated by the crisis. For example, there is now a greater risk of global stagflation – with greater risks to growth, and ongoing supply chain disruptions increasing costs for everyone.

It seems likely that China will continue its more ‘neutral’ stance towards the conflict, in keeping with the policy actions taken by other large countries in Emerging Markets. The base case would be that we do not see a further deterioration in what is already a strained relationship with the US. While geopolitics often dominates headline news, what I concentrate and focus on is the potential direct impact this can have on the companies I invest in and their earnings, which in most cases, is negligible.

As in previous years, the sales of the companies in which we invest are predominantly domestic. Of the overall portfolio, sales exposure to China is over 90%.

Regarding cost pressures, while these trends and their short-term impact on earnings need to be monitored, we are very focused on companies that have pricing power that will allow them to pass on these costs over time.

Question

Are people in China domestically experiencing inflation in the same way as in the West and across Europe?

Answer

Inflationary pressures in China have been relatively benign and less of a risk compared to trends seen in many Developed Markets. China’s headline Consumer Prices Index (“CPI”) inflation has maintained relatively moderate levels in the past few months and we will need to watch how this trend evolves. Although the year-on-year CPI could be pushed up by higher-than-normal vegetable prices due to weather conditions and COVID restrictions (which have already been partially offset by widening pork deflation), as well as rising fuel costs due to geopolitical tensions on the supply side, we expect such increases to be moderate as Chinese consumer demand remains weak and domestic supply chain disruptions lessen over time. However, this does need to be monitored given volatile commodity prices.

In contrast, the headline CPI inflation in major Developed Market (“DM”) economies hit decade highs in early 2022. The divergence is partially technical, reflecting relatively high weights of pork but low weights of fuels, as highly regulated prices in China somewhat shield inflationary pressures from the global spike in oil prices. In addition, the difference in labour markets may also contribute to the divergence. Service inflation in China was still muted with the labour market deteriorating due to the zero-COVID Policy and tightened restrictions, while the elevated inflation in DM economies like the US had broadened from goods to services with tight labour markets driving strong wage growth.

Question

There is obviously a lot of macro uncertainty at the moment, which has led to volatility. What does that mean for valuations? Are there reasons to be optimistic?

Answer

The graphs in the Annual Report show the extent of the de-rating that we have experienced in the Chinese markets in the last year. Valuations in China, both on a historical basis and compared to global peers, have become increasingly more attractive. Given the concerns discussed, investor sentiment remains quite negative.

I believe there is good potential for less “negative news” going forward. One key factor will be developments in the property sector – a sector whose correction has also been a major drag on the country’s economy from late 2021. At this point, we are already seeing signs of easing measures from purchasing restrictions being lifted to easing mortgage lending in certain cities. I believe this has good potential to continue and expand.

The regulatory wave has good potential to ebb, with a shift more on the implementation of announced policies versus policy surprises. A key example of this is the government’s messaging at the end of April after their Politburo meeting where it was indicated that policy would shift to support economic growth via increased infrastructure spending, more supportive property measures (albeit the policy that housing is for ‘living not speculating’ remains) and the healthy development of internet platforms in order to help underpin consumption and enable pent up demand and spending once lockdowns are lifted.

Finally, I feel we can expect more actions to be taken on both the monetary and fiscal side to support economic growth. This contrasts significantly with the monetary tightening we are seeing in other markets such as the US. These levers, combined with easier comparisons relative to the slowdown from the first half of 2021, have considerable scope to drive faster earnings growth in the market from the second half of 2022.

Question

In which companies and sectors are you finding the most exciting opportunities?

Answer

In terms of opportunities and ideas, the Company remains focused on stocks and sectors that appear well positioned to benefit from China’s long-term structural growth drivers. Indeed, despite recent uncertainties, powerful trends like the expansion of the middle class provide a long runway for growth.

Following the significant recent falls in technology-related names, we feel that the risk/reward pay-off has tipped much more in our favour in these companies. For example,Alibaba Group Holding, factoring out the value of cash and investments, is trading at a single digit price/earnings ratio. Although it does face some competitive challenges, it remains the dominant platform in China and generates very high returns on capital. As is often the case with broad-based corrections, some stocks with lower regulatory risk have also sold-off, presenting some very appealing investment opportunities. Interestingly, this includes some smaller companies that could actually be beneficiaries of regulatory changes since many of the new reforms focus more on larger companies.

We have also moved to build-up a sizeable position in industrials which now stands as the largest sector overweight position in the Company. The core thesis around industry consolidation remains very much in place as areas such as building materials in China are very fragmented relative to what one sees in the more mature markets. Some of the Company’s paint holdings, for example, have underperformed due to property sector concerns and raw materials cost pressure, but I maintain a high level of conviction in the long-term story and see significant potential for future upside as sentiment and fundamentals start to improve. For many of these companies, the exposure to residential property is relatively low and any direct impacts are well managed. Additionally, they should benefit from increased infrastructure investment which I think is likely.

Elsewhere, within financials, I continue to favour insurers, given the industry’s structural growth prospects driven by the country’s demographic trends and rising incomes, particularly for protection-type life insurance products given relatively low levels of penetration. Thus, the portfolio continues to hold an exposure toChina Lifeand China’s third largest insurance groupChina Pacific Insurance Group(“CPIC”), which covers life as well as property and casualty segments. Both companies are very attractively valued in both absolute terms, versus peer and versus their historic levels. CPIC will implement its so-called “long-journey” reform in 2022, with more focus on productivity and persistency. I am still cautious on mainstream banks in general, but I built a new position in China’s fifth largest state-owned bank,Postal Savings Bank of China. The relatively new management team is focused on leveraging a strong branch network to grow in retail and small to medium enterprise (SME) lending. Its wealth management division is also rapidly ramping up and offers outstanding growth potential. ESG factors are also important – as highlighted below. This all comes at a very attractive valuation.

Another new position was initiated in a leading digital textile printer maker –Hangzhou Honghua Digital Technology. The company’s position is supported by evolving industry trends including increasing the need to shorten production and delivery times, reduction of production batches and rising demand for individualised products. In addition, digital textile printing offers profound environmental benefits in the form of low emissions, wastewater production, energy consumption and waste-material production. Thus, demand push in the form of government policy adoption of digital textile printing also supports what is a long runway for growth. In addition to the building materials examples discussed above, this is a good example of the emergence of companies I would put in the “quality industrial” category. These companies are building real competitive advantages through strong investment in R&D; many of them are seeing strong market share gains, in many cases replacing foreign imports which have dominated these categories.

I also purchased a new holding in China’s second largest pipe company by market share,Yonggao. The company is expected to continue posting solid topline growth amid market consolidation as it continues to take market share from smaller players. The company is building up its distribution channels, warehouses and optimising product flow in weak regions in an effort to improve its utilisation and efficiency. The company also trades at a significant discount to the market and peers.

Within healthcare, I purchased a new position inZhaokeOphthalmology, a biotech company focused on ophthalmological products. The company has a comprehensive ophthalmic drug pipeline which is expected to benefit from what is currently an under penetrated market. China’s aging population and increasing use of IT products leads to an increasing prevalence of eye diseases. As such, increasing disease awareness and affordability of treatment coupled with technological advancement for treatment supports strong industry growth trends.

Question

What is your approach to gearing in the Company’s portfolio?

Answer

Whilst the period under review has seen a sell-off in Chinese equities, given current undemanding valuations and the expected tailwind of policy response, I remain increasingly positive and this is reflected in current gearing levels. Towards the end of the period, net gearing was increased to current levels of around 24%. This is due to a combination of adding to areas where we see significant value and closing the majority of our short positions in the wake of the market corrections.

Question

What is your approach to ESG? How do corporates in China address ESG issues, and does this differ from Western markets?

Answer

Our analyst survey, which is based on the findings of engagements with companies, shows that Chinese companies are embracing ESG challenges. As highlighted previously, improvements are often coming from low bases but the pace of improvement is impressive, and this is the most important thing.

In 2021, both the Shanghai and the Shenzhen bourses revised their listing rules which now include a provision for companies to publish a corporate social responsibility (CSR) report (albeit non-mandatory). China also saw progress in ESG ratings overall, specifically, companies with a BBB or above rating in the MSCI Index increasing when compared to 2020, together with the successful inclusion of a carbon footprint for most companies. In addition, there were a number of developments relating to climate change from the government and regulators. The most notable one is the launch of the national carbon trading market in July 2021 which covers 40% of China’s emissions and around 10% of global total emissions.

In recent years, I have witnessed a notable increased focus on ESG from investee companies. I have found separate ESG focused engagement sessions to be incredibly valuable as these have been comprehensive “deep-dives” into understanding a company’s ESG mindset, strategy and capabilities. It is also encouraging that investee companies seek Fidelity’s advice on how to better represent and report on their credentials in this area.

An interesting area of development that we have been monitoring closely is that of green financing. Two companies that are making strong advancements in the financials space areLufax HoldingandPostal Savings Bank of China. We have engaged with both companies extensively. Lufax differentiates itself by targeting small business owners underserved by the country’s banks by providing them with large ticket-size/long tenor funding. It was encouraging to see the company release its first ESG report last year, committing to adhere to the nation’s guidelines on green finance and inclusive finance by executing their mission of providing inclusive and compassionate financial services.

Postal Savings Bank of China (“PSBC”) was upgraded by MSCI from BBB to A in November 2021, mainly due to the bank’s strong ESG incorporation in both its business practices and its rapid expansion in green loans. PSBC’s targeted ***agricultural*** loans and green loans are more resilient through cycles which enables it to post superior loan growth. Aside from over 30% growth in green loans, PSBC set up its A-Share ESG Index on the Deutsche Boerse over the past year, to promote ESG investment into A-Share companies from a global perspective. The bank also facilitated over 450 corporate customers in conducting their carbon accounting last year.

In the Annual Report, are two examples of our company engagements.Zhejiang Weixingwhich has a good ESG rating but we engaged with to improve further andLenovo Groupwhich has excellent practices on gender diversity.

The chart in the Annual Report demonstrates that the Company’s portfolio has a significantly lower carbon footprint than that of the Benchmark Index.

Question

How much of the portfolio is made up of unlisted investments and how do you feel about these holdings?

Answer

The portfolio’s unlisted positions span a wide range of industries and collectively account for 13.2% of the overall portfolio. These holdings represent some of the most interesting companies in the world. For example, ByteDance, the internet technology company, remains a major holding in this space and the company continues to deliver very strong revenue and profit growth through Douyin in China and TikTok internationally.

However, investing in pre-IPO companies is not without complication as recent experience with ride hailing company Xiaoju Kuaizhi (Didi Chuxing) has reminded us. Didi remains under investigation by the Cyberspace Administration of China (CAC) and is on a path to delist from US Exchanges. This has led to a significant decline in the value of its shares post IPO. Even after taking into account the uncertainty around these factors, I believe Didi’s shares look oversold given its still dominant market position.

Investing in this space is a key differentiating factor for the Company and while it takes some time to find the right opportunities, on balance, it is clear to me that these efforts are worthwhile. We seek to capitalise on the widest set of investment opportunities in China. The fact that world leading companies such as ByteDance and DJI International, are still private, illustrates the importance of looking beyond the listed universe. Notably, two of the unlisted positions – HR management software provider Beisen and auto maintenance platform Tuhu Car – have applied for listings in Hong Kong.

Further details of the Company’s unlisted investments are in the Annual Report.

Question

Can you explain your choice of your five largest holdings?

Answer

Each of my top five holdings are at least 2.5% of the Company’s asset exposure and comprise 29% in total in the portfolio. Generally, this is justified by their strong risk/reward characteristics – scoring well on the core framework by factoring in growth, returns, management and valuations. Below are details of the five holdings.

Tencent Holdings– Tencent’s monopolistic position in social networking in China and the attendant benefits of powerful network effects are reasons why this is my largest holding. Tencent has carefully nurtured and enriched the user experience and benefits from a sizeable user base. As China’s internet user growth slows down, Tencent’s enviable user base gives it a strong competitive advantage. The entire internet industry focus has shifted towards monetisation and Tencent’s position in such an environment remains favourable given its highly loyal user base and strong ecosystem. Tencent remains highly competitive in its core business despite the recent regulatory and macro headwinds. We also expect that the recent resumption in game approvals will eventually extend to games published by Tencent. Valuations are now much more compelling versus both history and peers given the market’s recent correction.

Alibaba Group Holding– Alibaba holds a dominant position in the e-commerce market. The company has built a comprehensive ecosystem that has superior breadth and depth and is the foundation of its loyal merchants and consumers base, which ultimately supports its pricing power. Furthermore, the company is nurtured in an environment of continuous innovation, customer focus and pursuit of excellence which has enabled it to expand beyond its comfort zone and increase the addressable market.

Weak consumption trends and rising competition in e-commerce raise downside risk. Nevertheless, the company’s clear refocus and reprioritisation in its businesses will aid growth. The company’s China commerce division will be focusing on optimising returns whereas its cloud and international business will focus on growth. While we still await regulatory clarity around areas like the Ant financial business, in general regulatory risks are likely close to or past peak in my view. Similar to Tencent or even more so, Alibaba’s valuations are very compelling versus history and peers.

WuXi AppTec– The company is a long-term beneficiary from increasing pharmaceutical and biotech contract research and manufacturing (CDMO/CMO) demand globally. China’s CDMO/CMO business has significant investment potential, supported by a structural shift from generic to innovative drugs in the country’s pharmaceutical market. WuXi has established a talent pool with strong technical skills, which has helped drive a loyal client base. It is well positioned to deliver solid earnings growth broadly supported by its WuXi Chemistry business. Looking ahead, there is exciting potential upside from growing areas such as cell/gene therapy.

Pony.ai– The Toyota backed autonomous vehicle technology company presents significant growth potential as a market leader in an emerging new industry that will transform traditional ways of transportation. The company plans to commercialise autonomous driving for all sizes of vehicles and to operate on both ridesharing and delivery service networks.

SenseTime– The company is a leading artificial intelligence (“AI”) technology company specialising in computer vision. The company has access to a large addressable market backed by strong algorithm capabilities. It has a leading market position in its four key business lines and serves a wide range of industries across commercial space management, urban management, manufacturing, transportation, automobiles, etc. SenseTime is a prime example of a research-oriented company and its culture is deeply rooted in academic excellence. SenseTime was purchased on 7 June 2018 and had its IPO on 6 December 2021 with an uplift of 18.5% per annum. However, our shareholding post IPO has been subject to a 180 day lock-up period.

Question

Does the long-term case for investing in China remain strong?

Answer

Despite recent challenges and ongoing uncertainty, we remain positive on the long-term investment opportunities on offer in China. We believe a lot of the negative news flow is reflected in current valuations, which look very attractive relative to other markets and to China’s own history. As discussed above, we are seeing increased messaging from authorities around measures to support growth and address challenges such as those posed by the property market slowdown. Our ongoing analysis highlights that we should be past the worst of the regulatory headwinds we experienced during 2021. Adding to this is the likely looser policy stance which is in direct contrast to what we are seeing across other major economies - this backdrop supports the case for China to outperform on a relative basis moving forward.

Finally, investor sentiment towards China has been very weak and therefore any alleviation of the factors depressing sentiment could be the catalyst for a share price recovery. The combination of weak sentiment and low valuations has created a number of opportunities and we continue to put money to work in areas where we see long-term value. This is reflected in the increased gearing in the portfolio which stood at 124% at the time of writing, and is a relatively high level versus history. I have also increased my personal holding in the Company to 113,042 shares.

Dale Nicholls

Portfolio Manager

30 May 2022

Principal Risks and Uncertainties and Risk Management

As required by provisions 28 and 29 of the 2018 UK Corporate Governance Code, the Board has a robust ongoing process for identifying, evaluating and managing the principal risks and uncertainties faced by the Company, including those that could threaten its business model, future performance, solvency or liquidity. The Board, with the assistance of the Alternative Investment Fund Manager (FIL Investment Services (UK) Limited/the “Manager”), has developed a risk matrix which, as part of the risk management and internal controls process, identifies the key existing and emerging risks and uncertainties that the Company faces. The Audit and Risk Committee continues to identify any new emerging risks and take any action necessary to mitigate their potential impact. The risks identified are placed on the Company’s risk matrix and graded appropriately. This process, together with the policies and procedures for the mitigation of existing and emerging risks, is updated and reviewed regularly in the form of comprehensive reports considered by the Audit and Risk Committee. The Board determines the nature and extent of any risks it is willing to take in order to achieve its strategic objectives.

The Manager also has responsibility for risk management for the Company. It works with the Board to identify and manage the principal and emerging risks and uncertainties and to ensure that the Board can continue to meet its UK corporate governance obligations.

A key emerging issue that the Board has identified is climate change. It is one of the most critical emerging issues confronting asset managers and their investors. The Board notes that the Manager has integrated ESG considerations, including climate change, into the Company’s investment process. Further details are in the Annual Report. The Board will continue to monitor how this may impact the Company as a risk, the main risk being the impact on investment valuations. Another emerging risk that the Board has identified is regulatory risk and the ability of China’s centralised goverment to enact regulation swiftly that may impact the stock markets negatively and its knock on impact on the Company’s portfolio and net asset value.

The Board considers the following as the principal risks and uncertainties faced by the Company.

Other risks facing the Company include:

Tax and Regulatory Risks

There is a risk of the Company not complying with the tax and regulatory requirements in the UK and China. A breach of Section 1158 of the Corporation Tax Act 2010 could lead to a loss of investment trust status, resulting in the Company being subject to tax on capital gains.

The Board monitors tax and regulatory changes at each Board meeting and through active engagement with regulators and trade bodies by the Manager.

Operational Risks

The Company relies on a number of third party service providers, principally the Manager, Registrar, Custodian and Depositary. It is dependent on the effective operation of the Manager’s control systems and those of its service providers with regard to the security of the Company’s assets, dealing procedures, accounting records and the maintenance of regulatory and legal requirements. The Registrar, Custodian and Depositary are all subject to a risk-based programme of internal audits by the Manager. In addition, service providers’ own internal control reports are received by the Board on an annual basis and any concerns are investigated. Risks associated with these service providers is rated as low, but the financial consequences could be serious, including reputational damage to the Company.

Viability Statement

In accordance with provision 31 of the 2018 UK Corporate Governance Code, the Directors have assessed the prospects of the Company over a longer period than the twelve month period required by the “Going Concern” basis. The Company is an investment trust with the objective of achieving long-term capital growth. The Board considers long-term to be at least five years, and accordingly, the Directors believe that five years is an appropriate investment horizon to assess the viability of the Company, although the life of the Company is not intended to be limited to this or any other period.

In making an assessment on the viability of the Company, the Board has considered the following:

·      The ongoing relevance of the investment objective in prevailing market conditions;

·      The Company’s level of gearing;

·      The Company’s NAV and share price performance;

·      The principal and emerging risks and uncertainties facing the Company as set out above and their potential impact;

·      The future demand for the Company’s shares;

·      The Company’s share price discount to the NAV;

·      The liquidity of the Company’s portfolio;

·      The level of income generated by the Company; and

·      Future income and expenditure forecasts.

The Company’s performance for the five year reporting period to 31 March 2022 is well ahead of the Benchmark Index, with a NAV total return of 28.9%, a share price total return of 38.3% compared to the Benchmark Index total return of 12.9%. The Board regularly reviews the investment policy and considers whether it remains appropriate. The Board has concluded that there is a reasonable expectation that the Company will be able to continue in operation and meet its liabilities as they fall due over the next five years based on the following considerations:

·      The Investment Manager’s compliance with the Company’s investment objective and policy, its investment strategy and asset allocation;

·      The fact that the portfolio comprises sufficient readily realisable securities which can be sold to meet funding requirements if necessary;

·      The Board’s discount management policy; and

·      The ongoing processes for monitoring operating costs and income which are considered to be reasonable in comparison to the Company’s total assets.

In preparing the Financial Statements, the Directors have considered the impact of climate change, particularly in the context of the climate change risk identified within the ESG Risk above. The Board has also considered the impact of regulatory changes and how this may affect the Company.

In addition, the Directors’ assessment of the Company’s ability to operate in the foreseeable future is included in the Going Concern Statement below.

Going Concern Statement

The Financial Statements of the Company have been prepared on a going concern basis.

The Directors have considered the Company’s investment objective, risk management policies, liquidity risk, credit risk, capital management policies and procedures, the nature of its portfolio and its expenditure and cash flow projections. The Directors, having considered the liquidity of the Company’s portfolio of investments (being mainly securities which are readily realisable), the projected income and expenditure and the loan facility agreement, are satisfied that the Company is financially sound and has adequate resources to meet all of its liabilities and ongoing expenses and continue in operational existence for the foreseeable future. The Board has therefore concluded that the Company has adequate resources to continue to adopt the going concern basis for the period to 31 May 2023 which is at least twelve months from the date of approval of the Financial Statements. This conclusion also takes into account the Board’s assessment of the ongoing risks from COVID as set out in the Business Continuity Risk above. The prospects of the Company over a period longer than twelve months can be found in the Viability Statement above.

PROMOTING THE SUCCESS OF THE COMPANY

Under Section 172(1) of the Companies Act 2006, the Directors of a company must act in a way they consider, in good faith, would be most likely to promote the success of the Company for the benefit of its members as a whole, and in doing so have regard (amongst other matters) to the likely consequences of any decision in the long-term; the need to foster relationships with the Company’s suppliers, customers and others; the impact of the Company’s operations on the community and the environment; the desirability of the Company maintaining a reputation for high standards of business conduct; and the need to act fairly as between members of the company.

As an externally managed Investment Trust, the Company has no employees or physical assets, and a number of the Company’s functions are outsourced to third parties. The key outsourced function is the provision of investment management services by the Manager, but other professional service providers support the Company by providing administration, custodial, banking and audit services. The Board considers the Company’s key stakeholders to be the existing and potential shareholders, the external appointed Manager (Fidelity), the providers of debt facilities and other third party professional service providers. The Board considers that the interest of these stakeholders is aligned with the Company’s objective of delivering long-term capital growth to investors, in line with the Company’s stated investment objective and strategy, while providing the highest standards of legal, regulatory and commercial conduct.

The Board, with the Portfolio Manager, sets the overall investment strategy and reviews this at an annual strategy day which is separate from the regular cycle of board meetings. In order to ensure good governance of the Company, the Board has set various limits on the investments in the portfolio, whether in the maximum size of individual holdings, the use of derivatives, the level of gearing and others. These limits and guidelines are regularly monitored and reviewed and are set out in the Annual Report.

The Board places great importance on communication with shareholders. The Annual General Meeting provides the key forum for the Board and the Portfolio Manager to present to the shareholders on the Company’s performance and future plans and the Board encourages all shareholders to attend in person or virtually, and raise questions and concerns. The Chairman and other Board members are available to meet shareholders as appropriate. Shareholders may also communicate with Board members at any time by writing to them at the Company’s registered office at FIL Investments International, Beech Gate, Millfield Lane, Tadworth, Surrey KT20 6RP or via the Company Secretary in writing at the same address or by email [*atinvestmenttrusts@fil.com*](mailto:atinvestmenttrusts@fil.com) The Portfolio Manager meets with major shareholders, potential investors, stock market analysts, journalists and other commentators during the year. These communication opportunities help inform the Board in considering how best to promote the success of the company over the long-term.

The Board seeks to engage with the Manager and other service providers and advisers in a constructive and collaborative way, promoting a culture of strong governance, while encouraging open and constructive debate, in order to ensure appropriate and regular challenge and evaluation. This aims to enhance service levels and strengthen relationships with service providers, with a view to ensuring shareholders’ interests are best served, by maintaining the highest standards of commercial conduct while keeping cost levels competitive.

Whilst the Company’s direct operations are limited, the Board recognises the importance of considering the impact of the Company’s investment strategy on the wider community and environment. The Board believes that a proper consideration of Environmental, Social and Governance (“ESG”) issues aligns with the investment objective to deliver long-term capital growth, and the Board’s review of the Manager includes an assessment of their ESG approach, which is set out in detail in the Annual Report.

In addition to ensuring that the Company’s investment objective was being pursued, key decisions and actions taken by the Directors during the reporting year, and up to the date of this report, have included:

·      Seeking shareholder approval at the AGM on 20 July 2021 to change the Investment Policy to increase the unlisted securities limit from 10% to 15% of Net Assets plus Borrowings in order to recognise the growing importance of unlisted investments within the Company;

·      As a result of the above change in the limit on unlisted investments, seeking shareholder approval at the AGM on 20 July 2021 to amend the Company’s Investment Objective to give more clarity;

·      Authorising the repurchase of 1,506,074 ordinary shares when the Company’s discount widened, in line with the Board’s intention that the ordinary share price should trade at a level close to the underlying NAV;

·      The decision to pay a final dividend of 5.50 pence per ordinary share, the highest rate since the Company was launched; and

·      As part of the Board’s succession plan, the appointment of Georgina Field to the Board with effect from 1 July 2022.

Statement of Directors’ Responsibilities

The Directors are responsible for preparing the Annual Report and the Financial Statements in accordance with applicable United Kingdom law and regulations.

Company law requires the Directors to prepare Financial Statements for each financial period. Under that law they have elected to prepare the Financial Statements in accordance with UK-adopted International Accounting Standards (“IFRS”) in conformity with the requirements of the Companies Act 2006 and IFRIC interpretations. Under company law the Directors must not approve the Financial Statements unless they are satisfied that they give a true and fair view of the state of affairs of the Company and of the profit or loss for the reporting period.

In preparing these Financial Statements the Directors are required to:

·      select suitable accounting policies in accordance with IAS 8: Accounting Policies, Changes in Accounting Estimates and Errors, and then apply them consistently;

·      make judgements and estimates that are reasonable and prudent;

·      present information, including accounting policies, in a manner that provides relevant, reliable, comparable and understandable information;

·      provide additional disclosures when compliance with the specific requirements in IFRS is insufficient to enable users to understand the impact of particular transactions, other events and conditions on the Company’s financial position and financial performance;

·      state whether applicable IFRS and IFRIC interpretations have been followed, subject to any material departures disclosed and explained in the Financial Statements; and

·      prepare the Financial Statements on the going concern basis unless it is inappropriate to assume that the Company will continue in business.

The Directors are responsible for ensuring that adequate accounting records are kept which disclose with reasonable accuracy at any time the financial position of the Company and to enable them to ensure that the Financial Statements comply with the Companies Act 2006. They are also responsible for safeguarding the assets of the Company and hence for taking reasonable steps for the prevention and detection of fraud and other irregularities.

Under applicable law and regulations, the Directors are also responsible for preparing a Strategic Report, a Directors’ Report, a Corporate Governance Statement and a Directors’ Remuneration Report that comply with that law and those regulations.

The Directors have delegated to the Manager the responsibility for the maintenance and integrity of the corporate and financial information included on the Company’s pages of the Manager’s website at[*http://www.fidelity.co.uk/china*](http://www.fidelity.co.uk/china). Visitors to the website need to be aware that legislation in the UK governing the preparation and dissemination of the Financial Statements may differ from legislation in their own jurisdictions.

The Directors confirm that to the best of their knowledge:

·      The Financial Statements, prepared in accordance with UK-adopted International Accounting Standards (“IFRS”) in conformity with the requirements of the Companies Act 2006 and IFRIC interpretations, give a true and fair view of the assets, liabilities, financial position and profit of the Company; and

·      The Annual Report includes a fair review of the development and performance of the business and the position of the Company, together with a description of the principal risks and uncertainties it faces.

The Directors consider that the Annual Report and Financial Statements, taken as a whole, are fair, balanced and understandable and provide the information necessary for shareholders to assess the Company’s performance, business model and strategy.

Approved by the Board on 30 May 2022 and signed on its behalf by:

NICHOLAS BULL

Chairman

FINANCIAL STATEMENTS

Income Statement for the year ended 31 March 2022

The Company does not have any income or expenses that are not included in the profit/(loss) after taxation for the year. Accordingly the profit/(loss) after taxation for the year is also the total comprehensive income for the year and no separate Statement of Comprehensive Income has been presented.

The total column of this statement represents the Income Statement of the Company. The revenue and capital columns are supplementary and presented for information purposes as recommended by the Statement of Recommended Practice issued by the AIC.

All the profit/(loss) and total comprehensive income is attributable to the equity shareholders of the Company. There are no minority interests.

No operations were acquired or discontinued in the year and all items in the above statement derive from continuing operations.

The Notes below form an integral part of these Financial Statements.

STATEMENT OF CHANGES IN EQUITY FOR THE YEAR ENDED 31 MARCH 2022

The Notes below form an integral part of these Financial Statements.

BALANCE SHEET AS AT 31 MARCH 2022

Company number 7133583

The Financial Statements above and below were approved by the Board of Directors on 30 May 2022 and were signed on its behalf by:

NICHOLAS BULL

Chairman

The Notes below form an integral part of these Financial Statements.

CASH FLOW STATEMENT FOR THE YEAR ENDED 31 MARCH 2022

The Notes below form an integral part of these Financial Statements.

NOTES TO THE FINANCIAL STATEMENTS

1PRINCIPAL ACTIVITY

Fidelity China Special Situations PLC is an Investment Company incorporated in England and Wales with a premium listing on the London Stock Exchange. The Company’s registration number is 7133583, and its registered office is Beech Gate, Millfield Lane, Lower Kingswood, Tadworth, Surrey KT20 6RP. The Company has been approved by HM Revenue & Customs as an Investment Trust under Section 1158 of the Corporation Tax Act 2010 and intends to conduct its affairs so as to continue to be approved.

2ACCOUNTING POLICIES

The Company’s Financial Statements have been prepared in accordance with UK-adopted International Accounting Standards (“IFRS”) in conformity with the requirements of the Companies Act 2006, IFRIC interpretations, and as far as it is consistent with IFRS, with the Statement of Recommended Practice: Financial Statements of Investment Trust Companies and Venture Capital Trusts (“SORP”) issued by the Association of Investment Companies (“AIC”) in April 2021. The accounting policies adopted in the preparation of these Financial Statements are summarised below.

a) Basis of accounting– The Financial Statements have been prepared on a going concern basis and under the historical cost convention, except for the measurement at fair value of investments and derivative instruments. The Directors have a reasonable expectation that the Company has adequate resources to continue in operational existence up to 31 May 2023 which is at least twelve months from the date of approval of these Financial Statements. In making their assessment the Directors have reviewed income and expense projections, reviewed the liquidity of the investment portfolio and considered the Company’s ability to meet liabilities as they fall due. This conclusion also takes into account the Director’s assessment of the continuing risks arising from COVID-19.

In preparing these Financial Statements the Directors have considered the impact of climate change risk as a principal and as an emerging risk as set out above, and have concluded that there was no further impact of climate change to be taken into account as the investments are valued based on market pricing. In line with IFRS13 investments are valued at fair value, which for the Company are quoted bid prices for investments in active markets at the balance sheet date. Investments which are unlisted are priced using market-based valuation approaches. All investments therefore reflect the market participants view of climate change risk on the investments held by the Company.

The Company’s Going Concern Statement above takes account of all events and conditions up to 31 May 2023 which is at least twelve months from the date of approval of these Financial Statements.

b) Adoption of new and revised International Financial Reporting Standards– the accounting policies adopted are consistent with those of the previous financial year, other than those stated below. Their adoption has not had any material impact on the disclosures or the amounts reported in these Financial Statements.

·      COVID-19-Related Rent Concessions (amendments to IFRS 16); and

·      Amendments to IFRS 9, IAS 39, IFRS 7, IFRS 4 and IFRS 16 – interest rate benchmark reform – Phase 2.

At the date of authorisation of these Financial Statements, the following revised IAS were in issue but not yet effective:

·      IAS 1 Presentation of Financial Statements (amendments);

·      IAS 8 Accounting Policies, Changes in Accounting estimates and errors (amendments); and

·      IAS 12 Income Taxes (amendments).

The Directors do not expect that the adoption of the above Standards will have a material impact on the Financial Statements of the Company in future periods.

c) Segmental reporting– The Company is engaged in a single segment business and, therefore, no segmental reporting is provided.

d) Presentation of the Income Statement– In order to reflect better the activities of an investment company and in accordance with guidance issued by the AIC, supplementary information which analyses the Income Statement between items of a revenue and capital nature has been prepared alongside the Income Statement. The revenue profit after taxation for the year is the measure the Directors believe appropriate in assessing the Company’s compliance with certain requirements set out in Section 1159 of the Corporation Tax Act 2010.

e) Significant accounting estimates, assumptions and judgements– The preparation of the Financial Statements requires the use of estimates, assumptions and judgements. These estimates, assumptions and judgements affect the reported amounts of assets and liabilities at the reporting date. While estimates are based on best judgement using information and financial ***data*** available, the actual outcome may differ from theses estimates.

The key sources of estimation and uncertainty relate to the fair value of the unlisted investments.

Judgements

The Directors consider whether each fair value is appropriate following detailed review and challenge of the pricing methodology. The judgement applied in the selection of the methodology used (see Note 2 (l) below) for determining the fair value of each unlisted investment can have a significant impact upon the valuation.

Estimates

The key estimate in the Financial Statements is the determination of the fair value of the unlisted investments by the Manager’s Fair Value Committee (“FVC”), with support from the external valuer, for detailed review and appropriate challenge by the Directors. This estimate is key as it significantly impacts the valuation of the unlisted investments at the Balance Sheet date. When no recent primary or secondary transaction in the company’s shares have taken place, the fair valuation process involves estimation using subjective inputs that are unobservable (for which market ***data*** is unavailable). The estimates involved in the valuation process may include the following:

(i)     the selection of appropriate comparable companies. Comparable companies are chosen on the basis of their business characteristics and growth patterns;

(ii)    the selection of a revenue metric (either historical or forecast);

(iii)   the selection of an appropriate illiquidity discount factor to reflect the reduced liquidity of unlisted companies versus their listed peers;

(iv)   the estimation of the likelihood of a future exit of the position through an initial public offering (“IPO”) or a company sale;

(v)    the selection of an appropriate industry benchmark index to assist with the valuation; and

(vi)   the calculation of valuation adjustments derived from milestone analysis and future cash flows (i.e. incorporating operational success against the plans/forecasts of the business into the valuation).

As the valuation outcomes may differ from the fair value estimates a price sensitivity analysis is provided in Other Price Risk Sensitivity in Note 19 below to illustrate the effect on the Financial Statements of an over or under estimation of fair value.

The risk of an over or under estimation of fair value is greater when methodologies are applied using more subjective inputs.

Assumptions

The determination of fair value by the FVC involves key assumptions dependent upon the valuation techniques used. The valuation process recognises that the price of a recent investment may be an appropriate starting point for estimating fair value. The Multiples approach involves subjective inputs and therefore presents a greater risk of over or under estimation, particularly in the absence of a recent transaction.

f) Income– Income from equity investments and long contracts for difference (“CFDs”) is credited to the revenue column of the Income Statement on the date on which the right to receive the payment is established, normally the ex-dividend date. Overseas dividends are accounted for gross of any tax deducted at source. Where the Company has elected to receive its dividends in the form of additional shares rather than cash, the amount of the cash dividend foregone is recognised as income. Any excess in the value of the shares received over the amount of the cash dividend foregone is recognised as a gain in the capital column of the Income Statement. Special dividends are treated as a revenue receipt or a capital receipt depending on the facts and circumstances of each particular case.

Interest received on CFDs, collateral and bank deposits are accounted for on an accruals basis and credited to the revenue column of the Income Statement. Interest received on CFDs represent the finance costs calculated by reference to the notional value of the CFDs.

g) Functional currency and foreign exchange– The functional and reporting currency of the Company is UK sterling, which is the currency of the primary economic environment in which the Company operates. Transactions denominated in foreign currencies are reported in UK sterling at the rate of exchange ruling at the date of the transaction. Assets and liabilities in foreign currencies are translated at the rates of exchange ruling at the Balance Sheet date. Foreign exchange gains and losses arising on translation are recognised in the Income Statement as a revenue or a capital item depending on the nature of the underlying item to which they relate.

h) Investment management and other expenses– These are accounted for on an accruals basis and are charged as follows:

·      The base investment management fee is allocated 25% to revenue and 75% to capital;

·      The ***variable*** investment management fee is charged/credited to capital as it is based on the performance of the net asset value per share relative to the Benchmark Index; and

·      All other expenses are allocated in full to revenue with the exception of those directly attributable to share issues or other capital events.

i) Finance costs– Finance costs comprise interest on the bank loan, collateral and overdrafts and finance costs paid on CFDs, which are accounted for on an accruals basis, and dividends paid on short CFDs, which are accounted for on the date on which the obligation to incur the cost is established, normally the ex-dividend date. Finance costs are allocated 25% to revenue and 75% to capital.

j) Taxation– The taxation charge represents the sum of current taxation and deferred taxation.

Taxation currently payable is based on the taxable profit for the year. Taxable profit differs from profit before taxation, as reported in the Income Statement, because it excludes items of income or expense that are taxable or deductible in other years and items that are never taxable or deductible. The Company’s liability for current taxation is calculated using taxation rates that have been enacted or substantially enacted by the Balance Sheet date.

Deferred taxation is the taxation expected to be payable or recoverable on differences between the carrying amounts of assets and liabilities in the Financial Statements and the corresponding taxation bases used in the computation of taxable profit based on tax rates that have been enacted or substantively enacted when the taxation is expected to be payable or recoverable, and is accounted for using the balance sheet liability method. Deferred taxation liabilities are recognised for all taxable temporary differences and deferred taxation assets are recognised to the extent that it is probable that taxable profits will be available against which deductible temporary differences can be utilised.

Taxation is charged or credited to the revenue column of the Income Statement, except where it relates to items of a capital nature, in which case it is charged or credited to the capital column of the Income Statement. Where expenses are allocated between revenue and capital any tax relief in respect of the expenses is allocated between revenue and capital returns on the marginal basis using the Company’s effective rate of corporation tax for the accounting period. The Company is an approved Investment Trust under Section 1158 of the Corporation Tax Act 2010 and is not liable for UK taxation on capital gains.

k) Dividend paid to shareholders– Dividends payable to equity shareholders are recognised when the Company’s obligation to make payment is established.

l) Investments– The portfolio of financial assets is managed and its performance evaluated on a fair value basis, in accordance with a documented investment strategy, and information about the portfolio is provided on that basis to the Company’s Board of Directors. Under IFRS 9 investments are held at fair value through profit or loss, which is initially taken to be their cost, and is subsequently measured as bid or last traded prices, depending upon the convention of the exchange on which they are listed, where available, or otherwise at fair value based on published price quotations.

Investments which are not quoted, or are not frequently traded, are stated at the best estimate of fair value. The Manager’s Fair Value Committee (“FVC”), which is independent of the Portfolio Manager’s team, and with support from the external valuer, provides recommended fair values to the Directors. These are based on the principles outlined in Note 2 (e) above. The unlisted investments are valued at fair value following a detailed review and appropriate challenge by the Directors of the pricing methodology used by the FVC.

The techniques applied by the FVC when valuing the unlisted investments are predominantly market-based approaches. The market-based approaches are set out below and are followed by an explanation of how they are applied to the Company’s unlisted portfolio:

·      Multiples;

·      Industry Valuation Benchmarks; and

·      Available Market Prices.

The nature of the unlisted investment will influence the valuation technique applied. The valuation approach recognises that the price of a recent investment, if resulting from an orderly transaction, generally represents fair value as at the transaction date and may be an appropriate starting point for estimating fair value at subsequent measurement dates. However, consideration is given to the facts and circumstances as at the subsequent measurement date, including changes in the market or performance of the investee company. Milestone analysis and future cash flows are used where appropriate to incorporate the operational progress of the investee company into the valuation. Consideration is also given to the input received from the Fidelity International analyst that covers the company and from an external valuer. Additionally, the background to the transaction must be considered. As a result, various multiples-based techniques are employed to assess the valuations particularly in those companies with established revenues. An absence of relevant industry peers may preclude the application of the Industry Valuation Benchmarks technique and an absence of observable prices may preclude the Available Market Prices approach.

The unlisted investments are valued according to a three month cycle of measurement dates. The fair value of the unlisted investments will be reviewed before the next scheduled three monthly measurement date on the following occasions:

·      at the year end and half year end of the Company; and

·      where there is an indication of a change in fair value (commonly referred to as ‘trigger’ events).

In accordance with the AIC SORP, the Company includes transaction costs, incidental to the purchase or sale of investments within (losses)/gains on investments held at fair value through profit or loss in the capital column of the Income Statement and has disclosed them in Note 10 below.

m) Derivative instruments– When appropriate, permitted transactions in derivative instruments are used. Derivative transactions into which the Company may enter include CFDs, futures, options, warrants and forward currency contracts. Under IFRS 9 derivatives are classified at fair value through profit or loss – held for trading, and are initially accounted and measured at fair value on the date the derivative contract is entered into and subsequently measured at fair value as follows:

·      CFDs – the difference between the strike price and the value of the underlying shares in the contract, calculated in accordance with accounting policy 2 (l) above;

·      Futures – the difference between contract price and the quoted trade price; and

·      Options – the quoted trade price for the contract.

Where such transactions are used to protect or enhance income, if the circumstances support this, the income derived is included in derivative income in the revenue column of the Income Statement. Where such transactions are used to protect or enhance capital, if the circumstances support this, the gains and losses derived are included in (losses)/gains on derivative instruments held at fair value through profit or loss in the capital column of the Income Statement. Any positions on such transactions open at the year end are reflected on the Balance Sheet at their fair value within current assets or current liabilities.

The Company obtains equivalent exposure to equities through the use of CFDs. All gains and losses in the fair value of the CFDs are included in (losses)/gains on derivative instruments held at fair value through profit or loss in the capital column of the Income Statement.

n) Amounts held at futures clearing houses and brokers– Cash deposits are held in segregated accounts on behalf of brokers as collateral against open derivative contracts. These are carried at amortised cost.

o) Other receivables– Other receivables include amounts receivable on settlement of derivatives, securities sold for future settlement, accrued income, taxation recoverable and other debtors and prepayments incurred in the ordinary course of business. If ***collection*** is expected in one year or less (or in the normal operating cycle of the business, if longer) they are classified as current assets. If not, they are presented as non-current assets. Other receivables are recognised initially at fair value and, where applicable, subsequently measured at amortised cost using the effective interest rate method and as reduced by appropriate allowance for estimated irrecoverable amounts.

p) Bank loans– Loans are initially included in the Financial Statements at cost, being the fair value of the consideration received net of any issue costs relating to the borrowing. After initial recognition, the loans are measured at amortised cost using the effective interest rate method. The amortised cost is calculated by taking into account any issue costs and any discount or premium on settlement.

q) Other payables– Other payables include amounts payable on settlement of derivatives, securities purchased for future settlement, investment management, secretarial and administration fees payable, loan interest payable, finance costs payable and other creditors and expenses accrued in the ordinary course of business. Other payables are classified as current liabilities if payment is due within one year or less (or in the normal operating cycle of the business, if longer). If not, they are presented as non-current liabilities. Other payables are recognised initially at fair value and, where applicable, subsequently measured at amortised cost using the effective interest rate method.

r) Other reserve– The full cost of ordinary shares repurchased and held in Treasury is charged to the other reserve.

s) Capital reserve– The following are transferred to capital reserve:

·      Gains and losses on the disposal of investments and derivatives instruments;

·      Changes in the fair value of investments and derivative instruments, held at the year end;

·      Foreign exchange gains and losses of a capital nature;

·      ***Variable*** investment management fees;

·      75% of base investment management fees;

·      75% of finance costs;

·      Dividends receivable which are capital in nature;

·      Taxation charged or credited relating to items which are capital in nature: and

·      Other expenses which are capital in nature.

Technical guidance issued by the Institute of Chartered Accountants in England and Wales in TECH 02/17BL, guidance on the determination of realised profits and losses in the context of distributions under the Companies Act 2006, states that changes in the fair value of investments which are readily convertible to cash, without accepting adverse terms at the Balance Sheet date, can be treated as realised. Capital reserves realised and unrealised are shown in aggregate as capital reserve in the Statement of Changes in Equity and the Balance Sheet. At the Balance Sheet date, the portfolio of the Company consisted of investments listed on a recognised stock exchange and were considered to be readily convertible to cash, with the exception of the level 3 investments which had unrealised investment holding gains of £17,794,000 (2021: unrealised investment holding losses of £1,569,000). See Note 19 below for further details on the level 3 investments.

3 INCOME

Special dividends of £nil (2021: £29,083,000) have been recognised in capital.

4 INVESTMENT MANAGEMENT FEES

FIL Investment Services (UK) Limited (a Fidelity group company) is the Company’s Alternative Investment Fund Manager (“the Manager”) and has delegated portfolio management to FIL Investment Management (Hong Kong) Limited (“the Investment Manager”).

From 1 April 2021, the base investment management fee is charged at an annual rate of 0.90% on the first £1.5 billion of net assets, reducing to 0.70% of net assets over £1.5 billion. Prior to this date, the investment management fee was charged at an annual rate of 0.90% of net assets. In addition, there is a +/-0.20% variation fee based on the Company’s NAV per share performance relative to the Company’s Benchmark Index. Fees are payable monthly in arrears and are calculated on a daily basis.

The base investment management fee has been allocated 75% to capital reserve in accordance with the Company's accounting policies.

Further details of the terms of the Management Agreement are given in the Directors’ Report in the Annual Report.

5 OTHER EXPENSES

1   Details of the breakdown of Directors’ fees are provided within the Directors’ Remuneration Report in the Annual Report.

2   From 1 April 2021, the fixed annual fee for services other than portfolio management is no longer charged.

6FINANCE COSTS

Finance costs have been allocated 75% to capital reserve in accordance with the Company's accounting policies.

7TAXATION

b) Factors affecting the taxation charge for the year

The taxation charge for the year is lower than the standard rate of UK corporation tax for an investment trust company of 19% (2021: 19%). A reconciliation of the standard rate of UK corporation tax to the taxation charge for the year is shown below:

\*    The Company is exempt from UK corporation tax on capital gains as it meets the HM Revenue & Customs criteria for an investment company set out in Section 1159 of the Corporation Tax Act 2010.

c)Deferred taxation

A deferred tax asset of £35,407,000 (2021: £24,593,000), in respect of excess expenses of £141,629,000 (2021: £129,434,000) has not been recognised as it is unlikely that there will be sufficient future taxable profits to utilise these expenses.

In the Spring Budget of 2021, the UK Government announced that from 1 April 2023 the corporation tax rate will increase to 25%. This rate has been substantively enacted at the balance sheet date and has therefore been applied to calculate the unrecognised deferred tax asset for the current year (2021: 19%).

8EARNINGS/(LOSS) PER ORDINARY SHARE

The earnings/(loss) per ordinary share is based on the profit/(loss) after taxation for the year divided by the weighted average number of ordinary shares held outside Treasury during the year, as shown below:

9 DIVIDENDS PAID TO SHAREHOLDERS

The Directors have proposed the payment of a dividend for the year ended 31 March 2022 of 5.50 pence per ordinary share which is subject to approval by shareholders at the Annual General Meeting on 20 July 2022 and has not been included as a liability in these Financial Statements. The dividend will be paid on 27 July 2022 to shareholders on the register at the close of business on 15 June 2022 (ex-dividend date 14 June 2022).

10 INVESTMENTS AT FAIR VALUE THROUGH PROFIT OR LOSS

\*    The fair value hierarchy of the investments is shown in Note 19 below.

The Company received £925,998,000 (2021: £1,009,419,000) from investments sold in the year. The book cost of these investments when they were purchased was £799,114,000 (2021: £648,403,000). These investments have been revalued over time and until they were sold any unrealised gains/losses were included in the fair value of the investments.

Investment transaction costs incurred in the acquisition and disposal of investments, which are included in the (losses)/gains on investments were as follows:

The portfolio turnover rate for the year was 45.2% (2021: 59.8%). The portfolio turnover rate measures the Company’s trading activity. It is calculated by taking the average of the total amount of securities purchased and the total amount of securities sold in the reporting year divided by the average fair value of investments.

11 DERIVATIVE INSTRUMENTS

\*      The fair value hierarchy of the derivative instruments is shown in Note 19 below.

12 OTHER RECEIVABLES

13 BANK LOAN – REPAYABLE WITHIN ONE YEAR

The current loan agreement with Scotiabank Europe PLC is due to be repaid on 14 February 2023 (see Note 15 below).

14 OTHER PAYABLES

15 BANK LOAN – REPAYABLE AFTER MORE THAN ONE YEAR

On 14 February 2020, the Company entered into a three year unsecured loan agreement with Scotiabank Europe PLC. The interest rate is fixed at 2.606% per annum until the agreement terminates on 14 February 2023.

16 SHARE CAPITAL

\*      The ordinary shares held in Treasury carry no rights to vote, to receive a dividend or to participate in a winding up of the Company.

During the year, the Company repurchased 1,506,074 (2021: 23,345,560) ordinary shares and held them in Treasury. The cost of repurchasing these shares of £4,448,000 (2021: £58,558,000) was charged to the other reserve.

17 CAPITAL AND RESERVES

The capital reserve balance at 31 March 2022 includes investment holding losses on investments of £265,007,000 (2021: gains of £465,708,000) as detailed in Note 10 above. See Note 2 (s) above for further details.The revenue, capital and other reserves are distributable by way of dividend.

18 NET ASSET VALUE PER ORDINARY SHARE

It is the Company's policy that shares held in Treasury will only be reissued at net asset value per share or at a premium to net asset value per share and, therefore, shares held in Treasury have no dilutive effect.

19 FINANCIAL INSTRUMENTSManagement of Risk

The Company’s investing activities in pursuit of its investment objective involve certain inherent risks. The Board confirms that there is an ongoing process for identifying, evaluating and managing the risks faced by the Company. The Board with the assistance of the Investment Manager, has developed a risk matrix which, as part of the internal control process, identifies the risks that the Company faces. Principal risks identified are geopolitical, regulatory and capital market, economic (including pandemic), business continuity, investment performance (including gearing), unlisted securities, market and currency, discount (including investor perception of China), environmental, social and governance ("ESG") and climate and people risks. Other risks identified are tax and regulatory and operational risks, including those relating to third party service providers covering investment management, marketing and business development, company secretarial, fund administration and operations and support functions. Risks are identified and graded in this process, together with steps taken in mitigation, and are updated and reviewed on an ongoing basis. Risks identified are shown above.

This Note is incorporated in accordance with IFRS 7: Financial Instruments: Disclosures and refers to the identification, measurement and management of risks potentially affecting the value of financial instruments.

The Company’s financial instruments may comprise:

·      Equity shares (listed and unlisted), equity linked notes, convertible bonds and rights issues;

·      Derivative instruments including CFDs, warrants, futures and options written or purchased on stocks and equity indices and forward currency contracts;

·      Cash, liquid resources and short-term receivables and payables that arise from its operations; and

·      Bank borrowings.

The risks identified by IFRS 7 arising from the Company’s financial instruments are market price risk (which comprises interest rate risk, foreign currency risk and other price risk), liquidity risk, counterparty risk, credit risk and derivative instrument risk. The Board reviews and agrees policies for managing each of these risks, which are summarised below. These policies are consistent with those followed last year.

Market price risk

Interest rate risk

The Company finances its operations through its share capital raised. In addition, the Company has derivative instruments and an unsecured fixed rate loan facility for US$100,000,000 expiring on 14 February 2023. The Company has drawn down the whole of this facility as disclosed in Note 13 above.

Interest rate risk exposure

The values of the Company’s financial instruments that are exposed to movements in interest rates are shown below:

Foreign currency risk

The Company’s profit/(loss) after taxation and its net assets can be affected by foreign exchange movements because the Company has income, assets and liabilities which are denominated in currencies other than the Company’s functional currency which is UK sterling.

Three principal areas have been identified where foreign currency risk could impact the Company:

·      movements in currency exchange rates affecting the value of investments and bank loan;

·      movements in currency exchange rates affecting short-term timing differences, for example, between the date when an investment is bought or sold and the date when settlement of the transaction occurs; and

·      movements in currency exchange rates affecting income received.

Currency exposure of financial assets

The Company’s financial assets comprise of investments, long positions on derivative instruments, short-term debtors and cash at bank. The currency exposure profile of these financial assets is shown below:

1   The asset exposure of long CFDs and call options after the netting of hedging exposures.

2   Other receivables include amounts held at futures clearing houses and brokers.

1   The asset exposure of long CFDs after the netting of hedging exposures.

2   Other receivables include amounts held at futures clearing houses and brokers.

Currency exposure of financial liabilities

The Company finances its investment activities through its ordinary share capital, reserves and borrowings. The Company’s financial liabilities comprise short positions on derivative instruments, US dollar denominated bank loan and other payables. The currency profile of these financial liabilities is shown below:

\*    The asset exposure of short derivative instruments excluding hedging exposures.

Other price risk

Other price risk arises mainly from uncertainty about future prices of financial instruments. It represents the potential loss the Company might suffer through price movements in its investment positions. The Board meets quarterly to consider the asset allocation of the portfolio and the risk associated with particular industry sectors within the parameters of the investment objective.

The Investment Manager is responsible for actively monitoring the portfolio selected in accordance with the overall asset allocation parameters and seeks to ensure that individual stocks also meet an acceptable risk/reward profile. Other price risks arising from derivative positions, mainly due to the underlying exposures, are assessed by the Investment Manager’s specialist derivative instruments team.

Liquidity risk

Liquidity risk is the risk that the Company will encounter difficulties in meeting obligations associated with financial liabilities. The Company’s assets mainly comprise readily realisable securities and derivative instruments which can be sold easily to meet funding commitments if necessary. Short-term flexibility is achieved by the use of a bank overdraft, if required. The Company has the facility to borrow up to US$100,000,000 (2021: US$100,000,000) until 14 February 2023. The current borrowing is shown in Note 13 above.

Counterparty risk

Certain derivative instruments in which the Company may invest are not traded on an exchange but instead will be traded between counterparties based on contractual relationships, under the terms outlined in the International Swaps and Derivatives Association’s (“ISDA”) market standard derivative legal documentation. These are known as Over The Counter (“OTC”) trades. As a result, the Company is subject to the risk that a counterparty may not perform its obligations under the related contract. In accordance with the risk management process which the Investment Manager employs, this risk is minimised by only entering into transactions with counterparties which are believed to have an adequate credit rating at the time the transaction is entered into, by ensuring that formal legal agreements covering the terms of the contract are entered into in advance, and through adopting a counterparty risk framework which measures, monitors and manages counterparty risk by the use of internal and external credit agency ratings and evaluates derivative instrument credit risk exposure.

Collateral

For OTC and exchange traded derivative transactions, collateral is used to reduce the risk of both parties to the contract. Collateral is managed on a daily basis for all relevant transactions. At 31 March 2022, £21,395,000 (2021: £15,589,000) was held by the brokers in cash denominated in US dollars in a segregated collateral account, on behalf of the Company, to reduce the credit risk exposure of the Company. This collateral comprised: J.P. Morgan Securities plc £15,836,000 (2021: £2,058,000), Goldman Sachs International Ltd £5,559,000 (2021: £4,153,000), UBS AG £nil (2021: £6,639,000) and Morgan Stanley & Co. International Ltd £nil (2021: £2,739,000). As at 31 March 2022, £32,220,000 (2021: £19,872,000), shown as amounts held at futures clearing houses and brokers on the Balance Sheet, was held by the Company, in a segregated collateral account on behalf of the brokers, to reduce the credit risk exposure of the brokers. The collateral comprised: UBS AG £27,437,000 (2021: £14,117,000) in cash, Morgan Stanley & Co. International Ltd £3,977,000 (2021: £nil) in cash and HSBC Bank plc £806,000 (2021: £5,755,000) in cash.

Offsetting

To mitigate counterparty risk for OTC derivative transactions, the ISDA legal documentation is in the form of a master agreement between the Company and the broker. This allows enforceable netting arrangements in the event of a default or termination event. Derivative instrument assets and liabilities that are subject to netting arrangements have not been offset in preparing the Balance Sheet.

The Company’s derivative instrument financial assets and liabilities recognised in the Balance Sheet and amounts that could be subject to netting in the event of a default or termination are shown below:

Credit risk

Financial instruments may be adversely affected if any of the institutions with which money is deposited suffer insolvency or other financial difficulties. All transactions are carried out with brokers that have been approved by the Investment Manager and are settled on a delivery versus payment basis. Limits are set on the amount that may be due from any one broker and are kept under review by the Investment Manager. Exposure to credit risk arises on outstanding security transactions and derivative instrument contracts and cash at bank.

Derivative instrument risk

A Derivative Instrument Charter, including an appendix entitled Derivative Risk Measurement and Management, details the risks and risk management processes used by the Investment Manager. This Charter was approved by the Board and allows the use of derivative instruments for the following purposes:

·      to gain exposure to equity markets, sectors or individual investments;

·      to hedge equity market risk in the Company’s investments with the intention of mitigating losses in the events market falls;

·      to enhance portfolio returns by writing call and put options; and

·      to take short positions in equity markets, which would benefit from a fall in the relevant market price, where the Investment Manager believes the investment is overvalued. These positions distinguish themselves from other short exposures held for hedging purposes since they are expected to add risk to the portfolio.

The risk and investment performance of these instruments are managed by an experienced, specialist derivative team of the Investment Manager using portfolio risk assessment tools for portfolio construction.

RISK SENSITIVITY ANALYSIS

Interest rate risk sensitivity analysis

Based on the financial instruments held and interest rates at the Balance Sheet date, an increase of 0.25% in interest rates throughout the year, with all other ***variables*** held constant, would have increased the loss after taxation for the year and decreased the net assets of the Company by £1,106,000 (2021: decreased the profit after taxation and decreased the net assets by £1,312,000). A decrease of 0.25% in interest rates throughout the year would have had an equal but opposite effect.

Foreign currency risk sensitivity analysis

Based on the financial assets and liabilities held and currency exchange rates ruling at the Balance Sheet date, a strengthening of the UK sterling exchange rate by 10% against other currencies, with all other ***variables*** held constant, would have increased the loss after taxation for the year and decreased the net assets of the Company (2021: decreased the profit after taxation and decreased the net assets) by the following amounts:

Based on the financial assets and liabilities held and the exchange rates ruling at the Balance Sheet date, a weakening of the UK sterling exchange rate by 10% against other currencies would have decreased the loss after taxation for the year and increased the net assets of the Company (2021: increased the profit after taxation and increased the net assets) by the following amounts:

Other price risk sensitivity analysis

Changes in market prices affect the profit/(loss) after taxation for the year and the net assets of the Company. Details of how the Board sets risk parameters and performance objectives are disclosed above.

An increase of 10% in the share prices of the listed investments held at the Balance Sheet date would have decreased the loss after taxation for the year and increased the net assets of the Company by £117,084,000 (2021: increased the profit after taxation and increased the net assets by £200,081,000). A decrease of 10% in share prices of the investments designated at fair value through profit or loss would have had an equal but opposite effect.

An increase of 10% in the valuation of unlisted investments held at the Balance Sheet date would have decreased the loss after taxation for the year and increased the net assets of the Company by £19,465,000 (2021: increased the profit after taxation and increased the net assets by £16,646,000). A decrease of 10% in the valuation would have had an equal but opposite effect.

Derivative instruments exposure sensitivity analysis

The Company invests in derivative instruments to gain or reduce exposure to the equity market. An increase of 10% in the share prices of the investments underlying the derivative instruments at the Balance Sheet date would have decreased the loss after taxation for the year and increased the net assets of the Company by £36,359,000 (2021: increased the profit after taxation and increased the net assets by £41,512,000). A decrease of 10% in share prices of the investments underlying the derivative instruments would have had an equal but opposite effect.

Fair Value of Financial Assets and Liabilities

Financial assets and liabilities are stated in the Balance Sheet at values which are not materially different to their fair values. As explained in Notes 2 (l) and (m) above, investments and derivative instruments are shown at fair value. In the case of cash at bank, book value approximates to fair value due to the short maturity of the instruments. The exception is the US dollar denominated bank loan, its fair value having been calculated by discounting future cash flows at current US dollar interest rates.

Fair Value Hierarchy

The Company is required to disclose the fair value hierarchy that classifies its financial instruments measured at fair value at one of three levels, according to the relative reliability of the inputs used to estimate the fair values.

Categorisation within the hierarchy has been determined on the basis of the lowest level input that is significant to the fair value measurement of the relevant asset. The valuation techniques used by the Company are explained in Notes 2 (l) and (m). The table below sets out the Company’s fair value hierarchy:

Level 3 Investments (unlisted and delisted investments)

Pony.ai

Pony.ai develops artificial intelligence and autonomous driving technology solutions for transportation and is an unlisted company. The valuation at 31 March 2022 is based on a review of a funding round in January 2022 at a US$8.5 billion valuation, the company’s financial performance, the macro-environment and benchmarking the position to a range of comparable market ***data***. As at 31 March 2022, its fair value was £41,134,000 (book cost: £24,892,000).

DJI International

DJI International is a manufacturer of drones and is an unlisted company. The valuation at 31 March 2022 is as follows: the D shares valuation is based on the strike price of the put option in place and the B shares valuation is based on the company’s performance, the macro-environment and benchmarking the position to a range of comparable market ***data***. As at 31 March 2022, its fair value was £32,363,000 (book cost: £22,416,000).

Venturous Holdings

Venturous Holdings is an investment company with a focus in smart city technology companies and is an unlisted company. The valuation at 31 March 2022 is based on a review of the company’s portfolio including performance, the wider macro-environment and benchmarking the position to a range of comparable market ***data***. As at 31 March 2022, its fair value was £27,831,000 (book cost: £26,029,000).

Chime Biologics

Chime Biologics is a China-based Contract Development and Manufacturing Organization (CDMO) that provides a solution supporting customers from early-stage biopharmaceutical development through late-stage clinical and commercial manufacturing and is an unlisted company. The valuation at 31 March 2022 is based on analysis of the company performance, the terms of the convertible note and benchmarking the position to a range of comparable market ***data***. As at 31 March 2022, its fair value was £27,081,000 (book cost: £25,227,000).

ByteDance

ByteDance develops application software and is an unlisted company. The valuation at 31 March 2022 is based on the company’s performance, the macro-environment and benchmarking the position to a range of comparable market ***data***. As at 31 March 2022, its fair value was £25,773,000 (book cost: £7,361,000).

Tuhu Car

Tuhu Car is an online retailer of automobile spare parts and is an unlisted company. The valuation at 31 March 2022 is based on the cost of the investment when it was purchased in June 2021 with consideration given to the company’s performance, the macro-environment and benchmarking the position to a range of comparable market ***data***. As at 31 March 2022, its fair value was £14,296,000 (book cost: £13,129,000).

Cutia Therapeutics

Cutia Therapeutics is a specialty pharmaceutical company and is an unlisted company. The valuation at 31 March 2022 is based on the cost of the investment when it was purchased in September 2021 with consideration given to the company’s performance, the macro-environment and benchmarking the position to a range of comparable market ***data***. As at 31 March 2022, its fair value was £10,720,000 (book cost: £10,266,000).

Beisen

Beisen is a Chinese talent management company that offers talent management and measurement solutions and is an unlisted company. The valuation at 31 March 2022 is based on the cost of the investment when it was purchased in April 2021 with consideration given to the company’s performance, the macro-environment and benchmarking the position to a range of comparable market ***data***. As at 31 March 2022, its fair value was £10,656,000 (book cost: £11,758,000).

Xiaoju Kuaizhi (Didi Chuxing)

Xiaoju Kuaizhi (Didi Chuxing) is a leading Chinese e-commerce company providing transport services. The Company holds unlisted preference shares awaiting ***conversion*** to American Depositary Shares (ADS). The valuation at 31 March 2022 is based on the price of the ADS with a ***conversion*** rate applied. As at 31 March 2022, its fair value was £4,796,000 (book cost: £9,971,000).

Since the year ended 31 March 2022, the company’s preference shares have been converted to ADS shares. See Note 22 for further details.

Shanghai Yiguo

Shanghai Yiguo operates an e-commerce platform, selling fruit and vegetables online to customers in China and is an unlisted company. The company has commenced liquidation proceedings and following internal review, the valuation at £nil remained appropriate as at 31 March 2022 (book cost: £11,806,000).

Companies whose listings are suspended

Four listed companies in the portfolio have had their listing suspended: DBA Telecommunication (Asia) Limited (suspended July 2014), China Animal Healthcare Limited (suspended March 2015), BNN Technology Limited (suspended September 2017) and G3 Exploration (suspended October 2020). As at 31 March 2022, each holding has been valued at £nil.

Significant holdings

Details of significant holdings are noted below in accordance with the disclosure requirements of paragraph 82 of the AIC SORP.  The Company is required to provide a list of all investments at the balance sheet date with a value greater than 5% if its portfolio and at least the ten largest investments, including the value of each investment, and for unlisted investments included in the list, additional detail is required as shown below.  This disclosure includes turnover, pre-tax profits and net assets attributable to investors, as reported within the most recently audited financial statements of the investee companies.

\*    Financial instruments are transferred out of level 3 when they become listed.

20 Capital Resources and Gearing

The Company does not have any externally imposed capital requirements. The financial resources of the Company comprise its share capital, reserves and gearing, which are disclosed on the Balance Sheet. The Company is managed in accordance with its investment policy and in pursuit of its investment objective, both of which are detailed in the Strategic Report in the Annual Report. The principal risks and their management are disclosed above and in Note 19 above.

The Company’s gearing at the year end is set out below:

1   Exposure to the market expressed as a percentage of Net Assets.

2   Gearing is the amount by which Gross Asset Exposure/net exposure exceeds Net Assets expressed as a percentage of Net Assets.

1   Exposure to the market expressed as a percentage of Net Assets.

2   Gearing is the amount by which Gross Asset Exposure/net exposure exceeds Net Assets expressed as a percentage of Net Assets.

21 Transactions with the Manager and Related Parties

FIL Investment Services (UK) Limited is the Company’s Alternative Investment Fund Manager and has delegated portfolio management to FIL Investment Management (Hong Kong) Limited. Both are Fidelity group companies.

Details of the current fee arrangements are given in the Directors’ Report in the Annual Report. During the year, management fees of £19,643,000 (2021: £18,591,000), and accounting, administration and secretarial fees of £nil (2021: £100,000) were payable to the Manager. At the Balance Sheet date, management fees of £1,307,000 (2021: £2,094,000), and accounting, administration and secretarial fees of £nil (2021: £8,000) were accrued and included in other payables. Fidelity also provides the Company with marketing services. The total amount payable for these services was £264,000 (2021: £195,000). At the Balance Sheet date, marketing services of £4,000 (2021: £17,000) were accrued and included in other payables.

Disclosures of the Directors’ interests in the shares of the Company and fees and taxable expenses, relating to reasonable travel expenses, payable to the Directors are given in the Directors’ Remuneration Report in the Annual Report. In addition to the fees and taxable expenses disclosed in the Directors’ Remuneration Report, £19,000 (2021: £17,000) of employers’ National Insurance contributions were paid by the Company. At the Balance Sheet date, Directors’ fees of £15,000 (2021: £14,000) were accrued and payable.

22 Post Balance Sheet Event

Subsequent to the year ended 31 March 2022, the Company elected to convert its holding of unlisted preference shares in Xiaoju Kuaizhi (Didi Chuxing) to listed American Depositary Shares (ADS). There was no impact on the net assets of the Company as a result of this ***conversion***. Subsequently, the company announced its plans to delist from the New York Stock Exchange with the purpose of relisting on another exchange.

Alternative Performance Measures

Discount/Premium

The discount/premium is considered to be an Alternative Performance Measure. It is the difference between the NAV of the Company and the share price and is expressed as a percentage of the NAV. Details of the Company's discount/premium are on the Financial Highlights page in the Annual Report and are both defined in the Glossary of Terms in the Annual Report.

Gearing

Gearing is considered to be an Alternative Performance Measure. See Note 20 above for details of the Company’s gearing.

Net Asset Value ("NAV") per Ordinary Share

The NAV per Ordinary Share is considered to be an Alternative Performance Measure. See the Balance Sheet and Note 18 above for further details.

Ongoing charges

Ongoing charges are considered to be an Alternative Performance Measure. The ongoing charges ratio has been calculated in accordance with guidance issued by the AIC as the total of management fees and other expenses expressed as a percentage of the average net assets throughout the year.

Revenue, Capital and Total Earnings per Share

Revenue, capital and total earnings per share are considered to be Alternative Performance Measures. See the Income Statement and Note 8 above for further details.

Total Return Performance

Total return performance is considered to be an Alternative Performance Measure. NAV per share total return includes reinvestment of the dividend in the NAV of the Company on the ex-dividend date. Share price total return includes the reinvestment of the net dividend in the month that the share price goes ex-dividend.

The tables below provide information relating to the NAV per share and share prices of the Company, the impact of the dividend reinvestments and the total returns for the years ended 31 March 2022 and 31 March 2021.

The Annual Financial Report Announcement is not the Company's statutory accounts. The above results for the year ended 31 March 2022 are an abridged version of the Company's full Annual Report and Financial Statements, which have been approved and audited with an unqualified report. The 2021 and 2022 statutory accounts received unqualified reports from the Company's Auditor and did not include any reference to matters to which the Auditor drew attention by way of emphasis without qualifying the reports and did not contain a statement under s.498 of the Companies Act 2006. The financial information for 2021 is derived from the statutory accounts for 2021 which have been delivered to the Registrar of Companies. The 2021 Financial Statements will be filed with the Registrar of Companies in due course.

A copy of the above results announcement will be available on the Company's website at[*http://www.fidelity.co.uk/chinawithin*](http://www.fidelity.co.uk/chinawithin) two working days.

A copy of the Annual Report will shortly be submitted to the National Storage Mechanism and will be available for inspection at:[*http://www.morningstar.co.uk/uk/NSM*](http://www.morningstar.co.uk/uk/NSM)

The Annual Report will be posted to shareholders later this month and additional copies will be available from the registered office of the Company and on the Company's website:[*http://www.fidelity.co.uk/chinawhere*](http://www.fidelity.co.uk/chinawhere) up to date          information on the Company, including daily NAV and share prices, factsheets and other information can also be found.

Neither the contents of the Company's website nor the contents of any website accessible from hyperlinks on the Company's website (or any other website) is incorporated into, or forms part of, this announcement.

ENDS

**Load-Date:** May 31, 2022

**End of Document**



[***Seawater desalination concentrate—a new frontier for sustainable mining of valuable minerals***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:671W-P2B1-JCWX-C1TS-00000-00&context=1516831)

npj Clean Water

March 2022

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**Section:** Vol. 5; No. 1; ISSN: 2059-7037

**Length:** 12551 words

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**Body**

Introduction

The world economy is heavily reliant on the sustainable supply of rare metals and valuable minerals and the development and deployment of sustainable products to the advanced manufacturing industries of the 21st century will require increased amounts of these materials. Advances in resource recovery technology over the last ten years have made extraction of minerals and metals from seawater desalination brine more cost-competitive in comparison to terrestrial mining–. However, the distribution of chemical compounds present in seawater (Table , Fig. ) is dominated by a few abundant species of relatively low economic value. There have been periodic bursts of research enthusiasm into the isolation of low-abundance species from seawater since the 19th century—gold, then uranium, and more recently lithium—but only the high-abundance species have ever given a commercial return. The goal of this review is to assess qualitatively which products from seawater desalination are commercially realistic in the medium term and which processes and technologies are most critical for enabling commercial production.

Major chemical components of seawater.

| **Component** | | **Standard [mg kg?1]** | **Arabian Gulf Seawater [mg dm?3]** | | | |
| --- | --- | --- | --- | --- | --- | --- |
| **Atomic weight [g mol?1]** | **Dissolved species** | **Ras Al-Khaira** | **Jubailb** | | |
| **Minimum** | **Average** | **Maximum** |
| 40.078 | Ca2+ | 412.1 | 502.1 | 460 | 500 | 560 |
| 24.305 | Mg2+ | 1283.7 | 1660 | 1350 | 1530 | 1660 |
| 22.990 | Na+ | 10,783.7 | 13,900 | 12,500 | 13,500 | 14,500 |
| 39.098 | K+ | 399.1 | 482 | 450 | 530 | 590 |
| 87.620 | Sr2+ | N/A | N/A | 8.0 | 8.5 | 10.0 |
| 61.019 | HCO3? | 108.0 | 171 | 160 | 170 | 180 |
| 96.060 | SO42? | 2712.3 | 3410 | 3000 | 3400 | 3800 |
| 35.450 | Cl? | 19,352.4 | 24,900 | 24,000 | 25,000 | 26,000 |
| 18.998 | F? | 1.3 | 1.2 | 0.8 | 1.2 | 2.0 |
| 10.800 | B | 4.5 | 5.5 | 4.3 | 5.0 | 5.7 |
| 79.904 | Br? | 67.3 |  | 64 | 73 | 82 |
| TDS | 35,000 | 45,000 | 42,600 | 44,900 | 46,700 |  |
| pH | 8.1 | 8.3 | 7.9 | 8.3 | 8.3 |  |

aRas Al-Khair SWRO design condition with TDS = 45,000 mg dm−3 (Saline Water ***Conversion*** Corporation, Saudi Arabia (SWCC))

bSWCC measured ***data*** in mg dm−3; Sum of anions are higher than that of cations by 7.8%, 3.7% and 0.7% for Minimum, Average and Maximum values, respectively. These errors may come from the measurement and the use of Minimum, Average, and Maximum values of individual ions.

Element concentration and price.

Concentration of chemical species in seawater and their commercial value, as estimated in September 2021. Rare earth ***data*** for North Atlantic surface water, Crocket. Copper, Alexander & Corcoran; Germanium, mbari.org/chemsensor/ge/germanium.html; Gold, Falkner & Edmond and references therein; Titanium, Croot.

The metallic elements found in the highest concentration are sodium, magnesium, calcium and potassium, which have been commercially extracted as the chlorides, sulfates, and carbonates while magnesium has been extracted as the hydroxide.

Recent overviews of brine mining possibilities have shown graphs similar to Fig. , with a line separating ‘economically feasible’ from ‘economically challenging’ target elements–. Such figures have sometimes used prices for pure metals which are not significant commercial products; in Fig. , the concentrations and prices of the most commercially relevant salts have been used wherever possible. Concentrations in Fig. are based primarily on the Standard Sea Water (SSW) composition available online at Stanford University ([*https://web.stanford.edu/group/Urchin/mineral.html*](https://web.stanford.edu/group/Urchin/mineral.html)) with price estimates for materials not traded on a publicly available exchange estimated from current price ranges on Indiamart and Alibaba.

The line of ‘economic feasibility’ cannot be a straight line over the entire range of the figure, as production of sodium chloride for a miniscule fraction of a cent would clearly be uneconomic; however, over a range of concentrations corresponding to typical ores a straight line is feasible. While processing costs for terrestrial mining typically scale with tonnage (W) according to W0.5–0.7, below a certain minimum threshold energy costs per kg of product have been found to scale with concentration to the power of -3 . While these are not the only costs involved in mining elements such as Li, Sr, and Rb, these dependencies suggest that a separation line with a slope >1, as in Loganathan et al., is more realistic than the shallower separation lines given in Shahmansouri et al. or Kumar et al. . The lowest grade of ore at which gold mines can operate profitably is about 0.5 ppm, corresponding to about 0.025 ppm on seawater solids.

As can be seen from the two lines presented by Shahmansouri et al., the economics of brine mining will depend significantly on the amount of material processed. A plant producing in excess of 1 million m3 brine per day will be able to implement processes which would be uneconomic for a plant producing 10,000 m3 brine per day. While these lines differ greatly, they clearly delineate two sets of species with only a few doubtful intermediate cases, and only species lying to the right of all lines will be considered further. Note that bromine and sodium chloride, which have demonstrated profitability as products from seawater with current technologies, are present at concentrations more than an order of magnitude greater than all lines.

The potential income obtainable from a given volume of seawater from different sources is not immediately clear from Fig. and has not been quantified explicitly in recent reviews of seawater mining. The relative economic importance of various chemical species extractable from seawater can be roughly estimated by multiplying the potential price range of a product by the total amount of limiting species present (Table ). Only those compounds with a potential value of more than 1 USD per 1000 m3 seawater are shown. Note that in almost every case, additional chemical and energy inputs will be required to get to a final saleable product.

Potential gross value of seawater components (calculated from ***data*** displayed in Fig. ).

| **Final Products** | **Approximate gross value in USD per 1000 m3 Arabian Gulf Seawater** |
| --- | --- |
| NaOH, HCl | 8000?12,000 |
| NaCl, MgCl2·2H2O, Mg, MgSO4·7H2O | 2000?4000 |
| K2SO4, RbCl | 500?1000 |
| Br2, CaCl2, | 300?500 |
| KCl, CaSO4·2H2O | 200?300 |
| H3BO3, CaCO3 | 20?40 |
| Li2CO3, SrSO4 | 10?20 |
| CsCl, I2 | 1?2 |

Brine (concentrate) from desalination plants contains large quantities of minerals, enriched in concentration compared to sea water—thus the figures appearing in Table could be multiplied by a factor between 1.5 and 2.5. In mining seawater directly, energy equivalent to the energy expended in seawater desalination plant operation would need to be explicitly added to the system to achieve such an increase in concentration. Extraction of mineral products from desalination plant concentrate has potential advantages compared to terrestrial mining of the same compounds. These include: the essentially inexhaustible scale of the ocean; the constant composition of the ocean; the vast capacity of the ocean to dilute treated waste streams; and the stable and fixed footprint of the mining operation.

Much of the discovered shallow high-grade mineral ore worldwide has been mined over many decades leaving poorer quality, more difficult to access, and less mineral-enriched ores for future extraction. Mining operations have become progressively more costly over the past few decades because of the increasing depth and scarcity of the mined ores, high costs for environmental impact mitigation, and lower quality ores remaining available for extraction. Conventional mining can create a multitude of environmental problems including the generated wastes and their associated health risks. Even more stringent environmental regulations associated with terrestrial mining are likely to be applied in the future, which would further make terrestrial mining more challenging and costly.

As technologies for seawater brine mining develop, desalination concentrate as a source of minerals becomes more economically and environmentally viable. The economic gain obtained by extracting minerals is proportional to the increase in the concentration of minerals in the concentrate as well as the market price of these minerals. In this respect, mining of compounds of elements including Mg, Na, Ca, K, Sr, Li, Br, B, and Rb could potentially be economically attractive for harvesting from concentrate, if suitable methods of brine concentration and extraction are developed. Economically, the cost of extraction needs to be weighed against the revenue achievable, which relies on market fluctuations of commodity prices. Environmentally, extraction from brine is less intrusive than conventional mining with the added benefit of reduction in brine volumes. Commercial viability has been assessed to be likely for a number of products, including bromine, chlorine, sodium hydroxide, magnesium, potassium salts, and uranium, many of which are currently or were historically produced economically from seawater.

Process intensification is likely to result in further improvement in technologies, specifically membrane technologies, to sustainably recover minerals from concentrate,. Publications in the brine mining area have tended to take a high-level view with a goal of generating excitement in the area, or are narrowly targeted to address specific issues. The goal of this review is to address the most promising current and emerging technologies for brine mining and assess as realistically as possible the prospect for commercial application of these technologies to target minerals.

Mineral recovery economics

Historically, several minerals have been extracted commercially from seawater; some directly, and a larger number indirectly from bitterns after production of commercial NaCl. Due to the fascination of the ocean as a source of minerals, significant research effort has been put into isolation of a much broader range of chemical species than those that have been commercially exploited.

We have considered only those chemical substances appearing on the right-hand side of Fig. , where the combination of price and availability makes economic viability more likely, in the approximate order of viability according to our assessment. For each substance or class of substances common applications are briefly mentioned and the current sources described. Existing or emergent technologies available for production from seawater desalination concentrate are discussed and specific potential benefits of production from desalination concentrate rather than current sources, if any, are highlighted.

Sodium chloride

Virtually every person in the world has some contact with sodium chloride (NaCl, table salt) on a daily basis. Sodium chloride is found in many processed foods, where it is added as an osmotic preservative, fermentation-control additive, texture-control agent and color developer, and consumers routinely add NaCl to their food as a flavor enhancer. However, the diverse industrial uses of salt account most of the world’s consumption. NaCl is not only used directly in many industrial processes, but is a major source of sodium and chlorine compounds used as feed stocks for further chemical syntheses. The single largest use of NaCl is in the chlor-alkali process as feedstock for chlorine and caustic soda manufacture and these two inorganic chemicals are used to make many consumer-related end-use products. Similarly, in the soda ash industry, NaCl is used in the Solvay process to produce sodium carbonate and calcium chloride. Sodium carbonate, in turn, is used to produce glass, sodium bicarbonate, and dyes, as well as a myriad of other chemicals. In the Mannheim process and in the Hargreaves process, NaCl is used for the production of sodium sulfate and hydrochloric acid. It is also used to make sodium chlorate, which is added along with sulfuric acid and water to manufacture chlorine dioxide for disinfection. Further applications of NaCl are in oil and gas exploration, textiles and dyeing, pulp and paper, metal processing, rubber manufacture and tanning and leather treatment. NaCl is also used extensively in water treatment, for softening of hard water, which contains excessive calcium and magnesium ions that contribute to the build-up of a scale or film of alkaline mineral deposits in household and industrial equipment and pipes. Finally, large quantities of NaCl are used for de-icing and anti-icing of roads in sub-freezing weather.

NaCl is currently produced by mining of rock salt, evaporation of seawater, or evaporation of brine from brine wells and salt lakes. In 2020, world production was estimated at 270 million tons, the top five producers (in million tons) being China (60.0), United States (39.0), India (28.0), Germany (14.0), and Australia (12.0). Although NaCl is a relatively low-value commodity, the locations of production are often not near consumers and hence transportation costs significantly add to the price. The shipping cost for oceanic, rail, or truck transportation can be an important determining factor when attempting to secure supply sources. In some cases, pumping NaCl brine through pipelines can be the most economical solution when distances are relatively short. Large bulk shipments of dry NaCl in ocean freighters or river barges are relatively low in cost but are restricted by points of origin and consumption. The type of NaCl (e.g., vacuum, rock, solar), its purity, production, processing, and packaging factors can influence the selling prices. The relevance of both NaCl transport costs and pricing variability to brine mining lies in the fact that NaCl is the bulk of the available product both in terms of amount and net value in seawater (Table ). Where a market can be established for NaCl, the availability of bitterns in which the other components of seawater are further concentrated by more than an order of magnitude dramatically increases the commercial viability of extracting these other components.

Desalination increases the concentration of salt in desalination brine by as much as 100%. Most modern sea water desalination plants use reverse osmosis membranes with a recovery of 30–50%, depending on initial concentration of the sea water and other process factors. As a result, desalination brines can contain as much as 8% NaCl. This significant increase in concentration makes recovery of NaCl from desalination concentrate inherently more economical than conventional production of NaCl from seawater.

Bromine

Bromine was extracted from seawater on an industrial scale throughout the 20th century as a critical ingredient in additives for leaded gasoline. The process involved oxidation of the bromine present in seawater to bromine, followed by blowing air through the seawater to extract the volatile bromine. The bromine vapor was absorbed using alkali solution or sulfur dioxide to generate a concentrated liquor, which was then distilled to generate bromine product,. Ion-exchange and membrane-based methods for bromine extraction from brines have been extensively researched, but have not been applied to commercial production. With the phasing out of leaded gasoline, the bromine market contracted significantly and plants extracting bromine from seawater ceased operations. More recently the bromine market has been expanding rapidly with continuing demand for bromine-containing flame retardants and emerging applications in clear brine fluids for oilfield completion, additives to reduce mercury emissions from coal-burning power plants, and salts for storage batteries for renewable energy. Bromine today is extracted using the same technologies once used from seawater, but from brines that have a higher bromide concentration: the main sources are the Dead Sea, underground brines in Arkansas and Shandong, and the bittern obtained from sea salt manufacture (chiefly in India, China and Japan). About 430,000 tons of bromine are produced worldwide per year. The volume of bittern produced by salt manufacture will clearly be limited by the available markets for sodium chloride, and many of the sources currently exploited are rapidly being depleted (e.g., the Dead Sea and the Bohai Gulf underground brine formations). The growing market for bromine products, the limited availability of natural brines with high bromide concentrations, and the increasing volumes and concentrations available from the output of desalination plants make desalination brine a plausible source to meet the growing demand for bromine.

In desalination brine, bromide obviously exists at a higher concentration than in seawater, which was economically used as a source for bromine until recently. This reduces the volume of material which needs to be handled with concomitant decreases in capital and operating expenditure. Most seawater desalination plants are also located in regions with year-round warm water, giving more efficient removal of bromine by air blowing than historical plants producing bromine from seawater (the Octel Amlwch plant, on the Irish Sea, could not operate at full capacity in the winter months (N. Summers, personal communication)).

Further improvement in the quality of brine as a feedstock for bromine extraction can be achieved by brine concentration, with brines obtained at the Desalination Technologies Research Institute (DTRI) in Saudi Arabia with bromide concentrations up to eight times that of standard seawater. The nanofiltration pre-treatment needed to obtain these concentrations also ensures that the scale-forming ions (primarily Ca2+ and SO42‒) that are a source of operational problems in other brine sources of bromine are removed: scale formation is a limitation to the current efficiency of bromine extraction, particularly from underground brines. Whether brine concentration is cost-effective to maximize bromine production in the absence of a market for other brine components will clearly depend on the details of the market. Where a sufficient market for sodium chloride exists, bromine production can readily be implemented within an integrated process for adding value to desalination brine. This is most cost-effectively done by treating the bittern or crystallizer purge remaining after removal of the commercially available sodium chloride component of the brine.

Magnesium and magnesium salts

Magnesium compounds obtainable in seawater have a variety of useful applications in the ***agricultural***, nutritional, chemical, construction and industrial industries. Magnesium itself is a low-density and therefore lightweight metal that produces strong alloys, which in recent years have replaced aluminum in many products in the construction, automotive, and consumer goods sectors. About 1 million metric tons of magnesium were produced worldwide in 2021. Epsomite (MgSO4·7H2O) has economic value principally as a fertilizer, while bischofite (MgCl2·6H2O) is used in dust and ice control and brucite (Mg(OH)2) is used as a fire retardant and in wastewater treatment. Approximately 3 million tons of epsomite, 3 million tons of bischofite, and 1 million tons of brucite were produced worldwide in 2021.

Historically, magnesium and magnesium salts have been extracted on an industrial scale from seawater and are still extracted commercially from brines. The historical process for producing magnesium from seawater involved precipitation of magnesium as magnesium hydroxide through the addition of lime or dolime. The magnesium hydroxide could then be treated in one of two ways: reacted with hydrochloric acid to generate magnesium chloride solution (Dow Process), or heated at high temperature to generate magnesium oxide which could then be reacted with hydrochloric acid or chlorine to generate anhydrous magnesium chloride (Norsk Hydro Process). In either case, the magnesium chloride was then used as a feedstock for the electrolytic generation of magnesium metal. Despite the greater energy consumption in obtaining a feedstock for electrolysis in the Norsk-Hydro process, the relative simplicity of the electrolysis step in comparison to the Dow process meant that both processes were economic until the 1990s. Production of magnesium salts from desalination brines has been seen as attractive since desalination brines first became available in significant volumes, but has not yet been commercialized,. Over the past quarter-century the production of magnesium and magnesium salts from brines has shrunk in importance with the advent of inexpensive magnesium produced from mined magnesite and dolomite, chiefly from China. Where magnesium metal is still extracted from brines, it is obtained from saline waters with a much higher magnesium content than seawater where large volumes of bischofite or carnallite can be precipitated directly without addition of chemicals (e.g., the Great Salt Lake and the Dead Sea). Magnesium hydroxide is still produced commercially from seawater in China, Japan, Ireland, the United States, and elsewhere, accounting for about 60% of world magnesium hydroxide production.

Key to the profitability of any process based on extraction of magnesium from desalination brine is avoiding as much as possible the chemical costs incurred in producing magnesium chloride and the energy costs in drying magnesium chloride for electrolysis. Within the context of an integrated facility where sodium chloride is also produced, the magnesium-rich bitterns derived from desalination brines could be commercially viable sources for magnesium manufacture. A transformative technology which could greatly improve the viability of this process is nanofiltration: Separation of desalination brines into divalent-rich and monovalent-rich streams by nanofiltration can generate an inexhaustible source of saline water approximating the composition of magnesium-rich lakes, and hence open the way to restoring the ocean as the main source of magnesium salts and magnesium metal. Sequential crystallization of the nanofiltration reject stream can in principle produce gypsum, epsomite, and bischofite requiring relatively little purification before use, although this process is yet to be implemented commercially.

Potassium salts

Potassium salts are in demand worldwide as fertilizer: potassium sulfate (sulfate of potash, SOP) and potassium ammonium sulfate are more attractive for this application than potassium chloride (muriate of potash, MOP) and command higher prices. The total production of potash fertilizers worldwide is over 30 million tons per year. While these are critical materials and shortages have been forecast due to exhaustion of readily accessible evaporite deposits, the relatively low price of these salts means that they have not attracted as much attention as potential products from desalination brines. Processes for sequential evaporation of bitterns to produce KCl have been patented. As with other ions of interest, a variety of electrochemical, membrane-based, and adsorption-based methods have been investigated to the removal of potassium from seawater. Battery deionization using a Fe[Fe(CN)6] electrode has been demonstrated to give 70% removal of K+ with a 140:1 K:Na selectivity from synthetic seawater, but this is likely to be a very capital and energy-intensive method of producing KCl. A polyamide membrane incorporating zeolite was found to give 4:1 K:Na selectivity and was proposed for continuous extraction of potassium from seawater, and diatomite has shown selective adsorption of potassium and been suggested as a pathway to produce fertilizer, but these processes are also unlikely to be economically viable.

Potassium sulfate can be produced from sea salt bitterns by treatment of a kainite (KCl·MgSO4) mineral precipitate formed after removal of NaCl with sulfuric acid and versions of this process have been applied commercially to underground brines. More capital-intensive methods of producing SOP from seawater investigated on the laboratory scale include removal of sulfate from an anion exchange membrane with KCl solution and absorption of K+ on clinoptilite followed by elution with ammonium sulfate.

A process where potassium ammonium sulfate is generated from seawater by reaction of magnesium sulfate (produced by precipitation from chilled bitterns), aqueous ammonia, and potassium tartrate has been proposed; its viability would depend on the efficiency with which tartaric acid could be recycled in the process.

Calcium salts

The calcium salts that could potentially be obtained from brine have market prices of the same order of magnitude as to the magnesium salts obtainable, but the amounts available are significantly less. The potential products are all readily available commercially from mining plentiful reserves (CaCO3, limestone, and CaSO4·2H2O, gypsum), or as a by-product from the Solvay process for production of sodium carbonate (CaCl2), and are used in bulk in construction, ***agriculture***, and chemical processes. More than 200 million tons of gypsum is used worldwide annually, overwhelmingly in low value construction applications. Calcium carbonate is used primarily in the production of cement and in roadbuilding aggregate and as a filler in plastics, with more than 100 million tons consumed annually. There appears to have been minimal academic or commercial interest in utilizing desalination brine as a source of these salts. As of 2017 a brackish water treatment facility in Southern California was producing calcium carbonate pellets economically from treatment of water with TDS of ~1000 ppm, but Ca clearly comprised a much larger proportion of the solids in the source water than is found in seawater.

Lithium salts

Lithium extraction has attracted a great deal of research attention in recent years, due to the rapidly increasing market for Li-containing batteries for consumer electronics and electric cars. Production of lithium salts (in terms of amount of elemental lithium) has increased from 30,000 to ~100,000 metric tons since 2010. The fact that the ocean contains an essentially inexhaustible store of lithium has exerted a hypnotic effect on scientists and funding agencies, despite the widespread availability of non-oceanic sources. While lithium is commercially extracted largely from brines, these are underground brines formed under unusual geological conditions which have concentrations thousands of times greater than that found in seawater—hundreds or thousands of ppm rather than high ppb. This difference in concentration means that existing brine treatment technologies, which rely on precipitating Li salts, cannot be directly applied to seawater or desalination brines. Attempts to achieve selective absorption, selective permeation, and/or exploit the electrochemical behavior of lithium have been the main strategies investigated for extraction of Li from dilute solutions.

Manganese dioxide-based ion-sieve materials have been the most extensively investigated strategy for separation of lithium from complex aqueous solutions. The small size of the Li+ ion means it can penetrate the spinel structure of MnO2 and thus exhibit a higher selective adsorption on MnO2. Various strategies have been employed to improve the selectivity and efficiency of this innate property of manganese dioxide, including combining it with graphene oxide, cellulose, or cellulose acetate membranes, intercalating titanium into the MnO2 lattice, and using electrolytic approaches based on MnO2 electrodes.

Other materials that have been shown promise for selective lithium absorption are polydopamine, polymeric 1,3-diketones, and ruthenium complexes embedded in a poly(methacrylic acid) resin. Methods based on selective complexation of lithium followed by liquid-liquid extraction,, transport through a liquid membrane, or transport through a solid membrane have also attracted significant research interest.

Recently a few studies have reported very large Li+:Na+ selectivities in seawater treatment. An electrochemically driven intercalation process using titania-coated iron (III) phosphate electrodes has achieved a Li+:Na+ selectivity of 18,000 and near quantitative removal of Li+ from a 300 mL sample of salt water over ten cycles of extraction. On a larger scale, gram quantities of Li3PO4 have been obtained by precipitation of a solution in which Li was concentrated 43,000 times by iterative electrically-driven membrane sieving. While both these studies are exciting from the proof-of-concept view, the energy involved in simply moving the large volumes of water required to obtain viable amounts of lithium by either of these process makes them uncompetitive. For this reason it has been suggested that sufficiently-selective technology relying on passive uptake of Li+ to a material submerged in the ocean was the only economically viable way to recover Li from seawater. One possibility that could be suitable for such a process is direct electrochemical reduction of metallic lithium from seawater. Lithium sieves that can also serve as solid-state electrolytes based on materials of formula Li1−xAlyGe2−y(PO4)3 have been shown to be robust under environmental conditions and can generate pure lithium in quantities of the order of 20–50 μg cm−2 h−1 from seawater on the laboratory scale using a variety of metal oxide anodes,. Rates of production of order 200 μg cm−2 h−1 from seawater have been reported using a similar process and material of formula Li7La3Zr2O12. If Li is ***collected*** not directly from seawater or brine, but from the more concentrated solution remaining after the principal components are removed, the hundredfold increase in Li concentration will make many of the approaches currently being investigated much more practicable.

About 60% of current Li comes from hard-rock mines, chiefly in Australia, and about 30% from brines in the Andes of South America, with concentrations at least three orders of magnitude greater than seawater, and there are significant unexploited reserves that have not been fully assessed.

Strontium salts

Studies of strontium recovery from seawater and brine have historically focused on methods for analysis of radioactive 90Sr,, which is of significant concern in monitoring nuclear plant safety. Extraction into organic solvent, or a solid membrane using crown ethers or tertiary amides has been found to be effective in separating strontium from similar ions in seawater. However, the cost of these Sr-complexing compounds means that considerable work in optimizing their regeneration is needed before they could be applied to commercial recovery of strontium salts.

Strontium recovery from synthetic seawater was studied using alginate microspheres,, which not surprisingly showed significant competition from other common cations in seawater and achieved a maximum uptake of 147 mg dm−3 of alginate. The Sr2+ was eluted from the alginate with HCl solution. It was found to be accompanied by approximately ten times as much Cr2+, suggesting strongly that unless Ca2+ is removed from seawater before treatment this would not be a viable strategy for harvesting Sr. In similar work, a magnetite/MnO2/fulvic acid nanocomposite was found to absorb up to 6.4 mg g−1 Sr from natural seawater which was desorbed with hydrochloric acid, but the degree of separation of Sr from Ca and Mg was not assessed. Hydrothermally structured titanate nanotubes have also shown a high sorbent capacity (92 mg g−1), but when applied to seawater were found to have a Sr2+:Ca2+ selectivity of only approximately two.

Overall, the similar chemical properties of Sr and Ca mean that selective membrane rejection or resin absorption strategies are unlikely to be successful, with selective precipitation of insoluble Ca salts such as gypsum (CaSO4·H2O) the most promising strategy to obtain a Sr-enriched solution. Key to the success of such a strategy will be the degree to which Sr is incorporated in the gypsum: if a significant proportion of the Sr is lost in this way such a strategy will be unviable.

Strontium sulfate (celestite) is used in drilling fluids for oil and gas extraction and is the principal strontium ore mined, with a production of about 200,000 tons per annum, principally in China, Iran, Mexico and Spain. There is a significant market for strontium salts and there may be a brine mining opportunity from the geographical concentration of desalination plant brine in areas that are also important for oil and gas extraction.

Rubidium salts

Studies of Rb+ recovery from synthetic seawater have shown that it can be effectively adsorbed using potassium cobalt hexacyanoferrate or potassium copper hexacyanoferrate (KCuFC). While adsorption of Rb+ was affected only slightly by high concentrations of Ca2+, Na+, and Mg2+, sorption of Rb+ was significantly reduced in the presence of K+. To compensate for the effect of K+, the column adsorptive removal of Rb+ was investigated with a polyacrylonitrile-encapsulated KCuFC. Using 0.1 M KCl, the adsorbed Rb+ was desorbed and solution of 68% pure Rb+ was produced by passing through a resorcinol formaldehyde column and subsequently leaching with HCl which kinetically separated the Rb+ from the K+. The commercially available hexacyanoferrate-based ion-exchange resin CsTreat, designed for removal of radioactive cesium from nuclear reactor wastewaters, has shown a high sorption capacity for Rb+ from SWRO brine.

Extraction of Rb into the organic phase from brine using the selective ligands BAMBP [4-tert-butyl-2-(α-methylbenzyl) phenoxide] or dicyclohexano-18-crown-6 has been extensively investigated. BAMBP has been found to be about 12–20 times more selective for Rb+ than K+ (and about 100 times more selective for Cs+ than K+). Calixarenes have also been shown to be effective in selectively extracting Rb+ from brines.

The current market for rubidium products is relatively small and the extremely high prices for metallic Rb quoted in some previous analyses of brine-mining viability apply to a miniscule market. Rubidium salts are used primarily for specialty glasses, with an annual consumption of only about 4 tons, which is supplied almost entirely as a by-product from hard-rock mining of the lithium-rich ores pollucite and lepidolite; there is currently no production of Rb salts outside of China.

Boric acid and borate salts

There is a significant literature on the extraction of boron from seawater, as boron can have negative effects on plant and animal health and historically very low limits (0.5 ppm) were required for desalinated drinking water. However, the absorbed or rejected borate from desalinated water treatment has only hitherto been returned to the waste stream, rather than being converted into a saleable product. The principal strategies for removing boron have been complexation of borate with a resin incorporating vicinal diol ligands, which are highly selective for borate and have little uptake of other species present in seawater; rejection of borate using RO membranes; electrodialysis; and combination methods where borate is complexed with polymers or nanoparticles, which can be removed from the seawater stream by UF or a coarser filtration system. Combination methods avoid the increased concentration of scale-forming ions that would otherwise arise from NF: as the pH must be above the pKa of borate in seawater (~8.6 @30 °C) in order for any of these removal methods to function, and as the scaling potential of Mg2+ and Ca2+ increases with pH, scaling has historically been of concern in boron rejection systems. Figure suggests that boric acid could be a commercially viable product, and complexation of borate with particles that can be readily removed and regenerated with high efficiency is probably the most appropriate strategy. Boric acid has metallurgical and pharmaceutical applications and is used as a fireproofing agent for wood. Commercially boric acid and borate salts are obtained primarily from deposits of the highly water-soluble mineral borax (Na2B4O7·10H2O), with production of about 4 million tons per year primarily from dry lakes in Turkey, the United States, and Chile. In Russia and China there is significant production of boric acid from other minerals which require more significant processing, and it is industrial markets without ready access to borax where extraction of borate from seawater is likely to be most practicable.

Existing brine mining technologies

Concentrate from desalination plants is still seen mainly as a waste product for disposal- a potential problem to be managed, rather than an opportunity. The costs of using brine to generate useful products remains high, and terrestrial sources are still far cheaper for most products, e.g., gypsum for construction. However, with advancing costs and more stringent regulation of land-based mining, and continuing improvements in water recovery leading to ever more concentrated brine, the beneficiation technologies described in this review are likely to become more competitive. With the appeal to brine producers of environmentally positive large-scale beneficial use of desalination plant concentrate, technologies are expected to evolve significantly.

As indicated in Tables and , seawater contains most minerals in low concentration, and while desalination concentrates may be twice this concentration, they must be both concentrated to dryness and separated into their separate components in order to afford commercially viable products. The previous section has considered potential products from seawater desalination concentrate individually. In this section, established technologies of general application to separation of chemical products from seawater desalination brine will be considered on a process basis.

Rejection of high-value ions by NF and SWRO elements.

| **High-value metal/ion in brine** | **Seawater concentration (mg dm?3)** | **Rejection by NF membranesa (%)** | **Rejection by SWRO membranes (%)** |
| --- | --- | --- | --- |
| Barium (Ba)/Ba2+ | 0.021 | 92?99 | 99.6 |
| Cesium (Cs)/ Cs+ | 0.0003 | 95?99 | 99.6 |
| Lithium (Li)/Li+ | 0.17 | 1 | 99.6 |
| Magnesium (Mg)/Mg2+ | 1290 | 76?86 92 | 99.6 |
| Rubidium (Rb)/Rb+ | 0.12 | 27 | 99.6 |
| Strontium (Sr)/Sr2+ | 8.1 | 92?99 | 99.6 |
| Uranium (U)/UO2(CO3)2?32?/4? | 0.0033 | 95?98 | 99.6 |
| Nickel (Ni)/Ni2+ | 0.0066 | 99 | 99.6 |

aRejection by NF membranes is highly dependent on the specific model of the membrane as well as the design of NF system (i.e., number of elements, stages and recovery) and its operating conditions (such as temperature and pressure). Uranium value is from Raff and Wilken.

The main technologies applied or proposed to mine minerals from seawater are evaporation with sequential precipitation, selective sequential precipitation, membrane separation, electrodialysis, membrane distillation and crystallization (MDC), and adsorption/desorption/crystallization. In all these technologies, the concentration of the metal targeted for extraction is first increased to the level of supersaturation to enable their crystallization. In all these technologies except the last, recovery of minerals requires that the solubility product of the salt needs to be less than the enriched ionic product of the constituent ions. Only the method of adsorption/desorption/crystallization is not dependent on concentration of the brine. It has been more frequently proposed for obtaining minerals containing less common elements such as Li, Sr, Rb, and U,,,. Adsorbents allow these minerals to be adsorbed with other minerals and later quantitatively desorbed and crystallized.

One recurring outcome of our assessments of proposed brine mining operations is that targeting a single product is less viable than integrated processes which allow the isolation of a number of commercial products from a process stream.

Evaporation with sequential precipitation

The purpose of the process of salt solidification and recovery is to selectively recover high purity beneficial salts from the desalination plant concentrate. Technologies most commonly used currently are based on fractional crystallization and precipitation. Salts are crystallized either through evaporation of concentrate, or, within limits, by temperature control or alteration of the solvent quality.

Minerals precipitate from seawater via evaporation in the order shown in Fig. . Calcium carbonate (aragonite or calcite) and calcium sulfate (gypsum) are most easily extracted, followed by sodium chloride (table salt). The remaining salts are precipitated in the last 2.5% of evaporation and in the conventional salt solidification process of seawater brines (Fig. ) are deposited as mixed salts (e.g., MgCl2.KCl·H2O, carnallite) which require further processing and separation before use.

Sequence of precipitation of minerals from seawater.

Sequence of precipitation of minerals from seawater, adapted with permission from Voutchkov and Kaiser.

Salt separation and recovery system.

Schematic of salt solidification and recovery system, adapted with permission from Voutchkov and Kaiser.

Solar evaporation in ponds is the oldest method for extraction of minerals such as sodium chloride from seawater and desalination plant concentrate. Evaporation ponds are designed as a system of shallow pools to concentrate and crystallize desalination plant brine. Evaporation pond systems are relatively easy to construct, require low maintenance and minimal mechanical equipment. Significant land area is however required, and the period for brine concentration and crystallization can be quite lengthy—typically at least two years of operation is required before product is obtained. To prevent groundwater pollution, the ponds must be lined with clay, poly(vinyl chloride), or polyethylene materials. The main expenditure for solar evaporation ponds is the cost of land as such ponds are very land-intensive. Only minerals with high content (e.g., NaCl) can be economically recovered through this process alone, but this is the essential first step in producing bitterns highly enriched in potassium and magnesium minerals, as well as bromine.

Thermal evaporation and crystallization can be applied in an analogous manner to isolate first scale-forming salts, and then relatively pure sodium chloride, from seawater or desalination brine: however, the energy costs of such processes are prohibitively high and the process is commercially viable only for high-value salt intended for human consumption.

Potash (MOP, potassium chloride), magnesium chloride, magnesium sulfate, magnesium hydroxide and bromine, may all be produced at a plausible cost for commercial production from bitterns remaining from solar salt production by thermal treatment–. While the bitterns remaining after crystallization of sodium chloride are more highly concentrated in magnesium and potassium salts than desalination brines, the mixed salts that precipitate on further concentration require further separation and chemical treatment in order to produce saleable products.

The second stage bitterns remaining after crystallization of these minerals can be economically exploited for the recovery of rarer elements (specifically rubidium, for which bitterns remaining from potash extraction were historically an important source in the United States of America). Production of minerals from salt making bitterns has recently been reviewed by Bagastyo et al..

Selective sequential precipitation

Addition of counter-ions to produce insoluble salts can alter the sequence of fractional precipitation shown in Figs. and , selectively removing a specific mineral from the concentrate: for example, Mg2+ as Mg(OH)2 or Ca2+ as CaCO3. Such magnesium and calcium salts have been selectively precipitated from desalination brine using several existing commercial technologies and assessed as commercial commodities.

Chemical precipitation has been used to recover salts from seawater and RO reject brines using sodium carbonate and sodium phosphate. Carbonate addition gave recovery of between 89 and 96% of the Ca2+ and between 86 and 91% of the Mg in seawater and two RO brines. Phosphate gave a similar recovery rate of Ca2+, but a lower recovery of Mg2+, and had much more ***variable*** results between seawater and brines. In seawater, sodium phosphate led to 98% recovery of calcium and 47% of magnesium while in concentrate, these rates were 75% and 24%, respectively. Approximately 2 kg of calcium and magnesium salts were precipitated from concentrate per 1 kg of sodium carbonate used, while only 1.43 kg of calcium and magnesium salts could be obtained from seawater per 1 kg of sodium carbonate, indicating the greater cost-effectiveness of treating desalination concentrate. In a similar study, a seawater RO brine containing 830 mg dm−3 Ca and 2620 mg dm−3 Mg was treated with 14 g dm−3 Na2CO3 at 25 °C, removing 94% of Ca and 70% of Mg; at 65 °C, due to the inverse solubility behavior of CaCO3 and Mg(OH)2, 8.5 g dm−3 of Na2CO3 removed 95% of Ca and 82% of Mg. Attempts to push extraction to higher levels by increasing pH were ineffective, despite commercial modeling software suggesting that this would be effective. In addition, this research indicates that the recovery of calcium and magnesium is hindered by antiscalants and other metallic ions in the reject brine. To compensate for the inhibitory effect of antiscalants on precipitation of calcium and magnesium, the reject brine was further concentrated by electrodialysis (ED), reducing the amount of antiscalants in the brine. A range of 0.35–14 g dm−3 of sodium carbonate and 0.85 g dm−3 of sodium hydroxide were used to maximize the removal of calcium and magnesium. The residual from the ED-RO process contained 10 mg dm−3 of calcium and magnesium and the overall removal efficiency of these minerals from brine exceeded 95%.

A further precipitation technology patented by GEO-Processors has found application in Australia and the United States. Through the SALPROC process, salts are precipitated through a combination of chemical reactions with repeated evaporation and cooling steps. In this way, salts such as magnesium carbonate, calcium carbonate and gypsum are recovered from concentrate,.

Careful control of pH and stoichiometry is needed to precipitate CaCO3 without co-precipitation of Mg(OH)2. As separation of precipitates into relatively pure fractions of a single salt is required for most applications, there is little scope for technologies that precipitate Ca and Mg salts simultaneously. These technologies are all unlikely to be economically competitive for extraction of minerals from brine, due to the requirement of addition of stoichiometric (or greater than stoichiometric) quantities of other reagents in order to generate the product(s) of interest. These required reagents, such as calcium hydroxide, sodium carbonate, sodium phosphate and sodium hydroxide, tend to be only slightly less costly than the relatively low-value target minerals.

Membrane-based separations

In seawater and brine, elements of greater value and lower concentration may exist as cationic or anionic species. Some of the high-value metals that are frequently present as cationic species in seawater and brine include copper, nickel, cobalt, and lithium. In contrast, uranium, platinum, molybdenum, and vanadium are present in brine as anionic species. Table presents the concentration of key rarer elements contained in seawater and the rejection of these elements by NF and SWRO membranes. As seen from this table, NF brine has a high rejection of most key high-value elements except for lithium and rubidium. Usually, NF membranes reject over 85% of the calcium and magnesium in the seawater, with a similar rejection of other multivalent ions, and only reject 15–20% of sodium, chloride, and other monovalent ions.

Brine can be further concentrated by membrane osmotically-assisted RO when the concentrations of the minerals approach saturation or by Forward Osmosis (FO) membranes. The technical limit of such methods is the point of crystallization of salts from the brine; they become uncompetitive with thermal concentration methods at a slightly lower TDS. Membrane-based methods will be treated in more detail below.

Electrodialysis (ED)

Electrodialysis (ED) can be applied for brine concentration and is applied commercially for concentration of seawater in Japan, Korea, and Kuwait. Electrodialysis is fundamentally more energy-consuming than membrane-based methods that rely on movement of water though a membrane rather than the movement of ions through a membrane and has almost twice the power consumption per ton of salt produced of the most advanced membrane-based methods,.

Electrodialysis has however an additional benefit, as in combination with selective monovalent cation and anion permeable membranes, it can be used to separate monovalent ions, such as Na+ and Cl−, from divalent ions, such as Ca2+, Mg2+, and SO42- . This produces both a concentrated solution enriched in NaCl and an NaCl-depleted solution with Mg2+ concentration which is four to six times higher than that in seawater. These solutions can then be treated by other methods to obtain solid product. Evaporation of the NaCl-rich stream will obtain crystalline NaCl with greater purity and a lower energy input than direct evaporation of brine, while Mg2+ can be precipitated as Mg(OH)2 from the Mg-enriched stream. This has been done electrolytically by decomposing water to H2 and OH−, giving Mg(OH)2 of ~99% purity. Mg(OH)2 can also be obtained by increasing pH to 11 by the addition of Ca(OH)2 or NaOH. While Ca2+ can inhibit the precipitation of Mg(OH)2, this can be avoided by pre-treatment with an appropriate stoichiometric amount of Na2CO3 to precipitate CaCO3, or by deaeration at an appropriate pH to remove CO32− as CO2.

Appropriate combination of cation-selective and anion-selective membranes can separate a brine stream into product streams where the divalent cations and anions are sent in different directions: e.g., where one stream can be used to obtain the sulfate component of the brine as Na2SO4, and another can obtain the calcium component of the brine as CaCl2. While this additional flexibility in obtaining desired mineral products would be of great value, at the present time the energy requirements of such systems are prohibitively high for high TDS solutions (G. Qile, personal communication).

Ongoing development of monovalent cation-permeable and anion-permeable membranes which can separate monovalent and divalent ions has the prospect to improve ED as a process for mineral recovery. Membrane research is expected to yield further improvements in permeable membranes sensitive to specific individual ions, for example, Li+, for coupling to ED, but the energy requirements for electrodialysis in concentrated brines remain such that only high value components will be of potential interest.

Membrane distillation crystallization (MDC)

Membrane distillation crystallization (MDC) is an innovative technique for implementation of membrane technology in crystallization processes. MDC exploits the excellent ability of membrane distillation (MD) process, a thermally-driven operation, to concentrate the feed solution up to supersaturation. In MDC, the saturated solute is crystallized out from the solution when the solution reaches the saturation state. Hence the system attains suitable conditions for crystallization. The advantages of MDC include well-controlled nucleation and growth kinetics, fast crystallization rates and reduced induction time, and production of high-quality crystals.

MDC has drawn attention as an attractive alternative method for water recovery as well as for crystal production, especially for high-value products. MDC inherits all of the benefits embedded in MD, such as lower operating temperatures and energy requirements. MDC is generally used at temperatures ranging from 30 to 85 °C, which is below conventional distillation. This offers the possibility to use low-grade heat (e.g., solar and geothermal) or waste heat (e.g., surplus heat from industrial processes) for operation,, which can reduce the cost of the process significantly and also offers a “carbon-neutral” technique for processing different streams.

The most typical membranes used in existing MDC processes are those fabricated from polymeric materials containing polypropylene, polyvinylidene fluoride, polytetrafluoroethylene, and polyethersulfone. Flat-sheet and hollow fiber membrane modules are commonly applied. The flat-sheet membrane module has the advantages of simple structure, convenient cleaning, and low cost, but the specific surface area and packing densities are lower than in the hollow fiber membrane module. In principle, all MD configurations can be used as MDC, including direct contact membrane distillation (DCMD), air gap membrane distillation, sweeping gas membrane distillation, and vacuum membrane distillation (VMD). The optimum configuration should be determined depending on feed solution and the operative conditions. DCMD is the main applied configuration of MDC due to its simplicity and low cost but VMD is preferred to achieve a high degree of concentration. In addition to these traditional MDC types, novel configurations have been also investigated, including submerged MDC, percrystallization, bubble MDC, and MDC coupled with cooling crystallization.

When MDC is applied to brines from seawater desalination plants, it leads to reduction in brine discharge, flexibility in site selection, production of dry salts of high quality and controlled properties, and increased production in fresh water–. There have been many reports on the use of MDC to recover minerals from either natural or synthetic seawater brines. MDC has been widely applied to produce NaCl crystals, and has been also used to harvest MgSO4, CaCO3, CaSO4, and Na2SO4. Moreover, MDC had potential to increase the recovery of fresh water by controlling the membrane scaling due to mineral crystallization,. The introduction of MDC units on both brines in a NF-SWRO system increases the water recovery so much that it can reach values higher than 90% and also allows the production of NaCl, CaCO3, and MgSO4, etc.. Recent research focus on MDC has shifted to recover more valuable components such as Li and Rb.

Although there are many advantages in MDC for mineral recovery from brines, it also has shortcomings associated with membrane fouling and pore wetting,. The lack of appropriate membrane materials and modules is also a critical issue. Unlike other membrane systems such as NF and RO, scale-up of MDC is still difficult, which results from insufficient information and experience. Due to these challenges, most work on MDC has been carried out on bench scales and only a handful of experiments have been done on pilot scales,. In addition, a serious consideration in application of MDC to brine mining is that it has no inherent mechanism for separating out particular crystalline species from a complex mixture such as seawater, so cannot produce pure minerals except for those with clearly separated crystallization points, such as NaCl and CaSO4.

Adsorption/desorption

Minerals are naturally found in low concentration in seawater, which is a major reason why land mining has generally been economically favored. Separating most individual minerals by precipitation or crystallization given their low concentrations in seawater is difficult with existing technologies. Thus, adsorbent materials that can selectively bind particular chemical species in solution have been an attractive goal for research. Once adsorption is complete, the selected mineral must be desorbed and precipitated to form the crystalized salt. The desorbed solution may contain other minerals which in turn need to be removed through applying adsorbents specifically to these minerals. Very high selectivity is required for adsorption/desorption processes, due to the low concentration of the target ions relative to the main species present in seawater. In assessing the viability of the processes, it is necessary to consider the operational costs of regenerating the adsorbent material, which will usually require the use of stoichiometric quantities of acid, or very much greater than stoichiometric quantities of fresh water. While increased concentration of the feed brine will enhance the extent and rate of adsorption of dissolved ions to the adsorbent, it will not improve selectivity or significantly reduce the relative amount of reagent needed for desorption. Adsorption studies of potassium, lithium, strontium, and rubidium have already been discussed above with reference to those elements. Branched polyethyleneimine (PEI) macromolecules have been suggested as one class of adsorbents with selectivity for metal ions in seawater, specifically Cu2+ and UO22+. PEI has also been embedded in high-capacity chelating resins and membrane absorbers have been studied for selective recovery of boron from seawater and brine. It has been suggested that to avoid the high energy costs of pumping seawater or brine, adsorbent material could be placed directly in a static body of seawater or brine and removed when saturated. In one embodiment of this approach to selectively extract Rb+, a submersible device combining membrane distillation to produce a concentrated brine gave ~87% recovery of Rb+ from a spiked solution of SWRO brine containing 5 ppm Rb.

Brine concentration and nanofiltration: the keys to brine mining

Two key transformative technologies are discussed in this chapter: Nanofiltration (NF), to separate brine into mixed dissolved ion stream into mono-valent enriched and multi-(di-)valent enriched streams; and Membrane Brine Concentration (MBC), to concentrate the brine into higher salinity in a more energy-efficient way than a conventional thermal evaporator. While individually these technologies can improve the performance of brine mining operations, the combination of NF and MBC technologies can make a significant impact on the feasibility of brine mining, with an electricity consumption of 75–79 kWh per ton of NaCl isolated calculated in comparison with 165 kWh per ton salt for commercial ED systems,.

Nanofiltration (NF)

The single most important technology for improving brine mining is selective nanofiltration membranes which have a significantly greater rejection of divalent ions than monovalent ions. These allow separation of one stream, NF reject, with a significantly higher concentration of divalent ions such as Ca2+, Mg2+, and SO42−, and a second stream, NF permeate, with greatly reduced concentrations of these ions. In terms of any process aimed at recovering a particular mineral, this reduces the volume of liquid that must be treated in order to obtain the mineral and reduces the number of interfering species. Processes for extracting bromine, for example, need only be applied to the permeate stream, while processes for extracting magnesium hydroxide need only be applied to the reject stream, in each case using reduced quantities of reagents for pH adjustment and requiring smaller volumes of liquid to be processed.

In application of methods such as MDC or solar evaporation following NF, concentration of NF reject would not form significant quantities of the mixed salts kainite (KMg(SO4)Cl·3H2O) or carnallite (KCl.MgCl2·6H2O)—which would require further processing to obtain saleable mineral products—but would lead directly to the precipitation of saleable bischofite (MgCl2·6H2O) well-separated from the other precipitated salt products. Similarly, on the permeate side, the removal of Mg makes it possible for direct precipitation of sylvite (KCl) rather than mixed salts with magnesium. As the divalent ions are the principal scale forming species, their removal into the reject stream also makes it possible to concentrate the permeate stream to higher levels by brine concentration, reducing further the volume which must be handled in brine mining operations.

Exemplary mineral recovery steps on the NF reject stream could be as follows:

Recovery of CaSO4·2H2O (gypsum). Because CaSO4 is the most likely scale-forming ion in the reject of NF applied to seawater, the typical saturation at NF reject will easily exceed 100% and could be up to 400% depending on the composition in the raw seawater, NF recovery and ion rejection ratios. Although antiscalant is usually dosed to prevent CaSO4 scale deposition, several technologies, e.g., Membrane Crystallization, might be considered to harvest CaSO4.

MBC as an intermediate step, which produces a less saline stream (to be recycled to NF system or to be considered as additional water production if the considered MBC is a dewatering (e.g., RO) type) and a more saline stream (limited only by the scale deposition risk).

Evaporation ponds and sequential bittern concentration steps to recover NaCl, MgCl2·6H2O, CaCl2·2H2O, and so on.

A commercial-scale project is being undertaken by the Saline Water ***Conversion*** Corporation (SWCC) to construct a NF plant in Shoaiba, Saudi Arabia ([*https://idadesal.org/ida-academy-webinar-on-innovation-in-desalination-brine-mining-with-swcc/*](https://idadesal.org/ida-academy-webinar-on-innovation-in-desalination-brine-mining-with-swcc/)). The main purpose is to harvest magnesium for two major beneficial uses. The first is to for supplementation of drinking water. There have been numerous studies which have found a link between Mg content in drinking water and human health, with low Mg content in drinking water being linked to negative outcomes in bone and cardiovascular health, and high content giving more positive outcomes in diabetes and cancer treatment,. Desalination product water is usually deficient in Mg2+ (<1 ppm) and the level of 15 ppm Mg2+ associated with improved health outcomes is being targeted by installing a multi-stage NF system with inter-stage dilution, similar to the system proposed by Birnhack et al.. As the Mg2+ in seawater is vastly higher than 15 ppm (~1500 ppm), in comparison to the capacity of the seawater intake in a desalination plant, only a small fraction of seawater or brine needs to be treated to extract the required Mg for this post-treatment. When 400,000 m3 per day desalinated water is considered, for example, where its seawater intake capacity would be 1,000,000 m3 per day with 40% of overall recovery, for example, the intake seawater contains ~1500 ton per day Mg. 15 ppm of 400,000 m3 per day indicates 6 tons per day of Mg is required, which can be harvested by treating only 0.4% of the intake seawater. In a practical design, due to non-perfect rejection of Mg ion in NF membranes, around 0.8% of intake seawater will be treated by multi-stage NF system to harvest and supply Mg to the desalination product water.

The second beneficial use is to supply the Mg-enriched low-salinity brine as a liquid fertilizer. Many acidic soils contain very low levels of soluble magnesium, which is essential for photosynthesis, and crop yields generally increase by of order 10% when magnesium fertilizer is added. Certain tropical fruits, such as mango, are more heavily dependent on magnesium levels, with fruit quality declining if magnesium is deficient ([*www.ks-minerals-and-****agriculture****.com/uken/fertiliser/advisory\_service/crops/mango.html;*](http://www.ks-minerals-and-agriculture.com/uken/fertiliser/advisory_service/crops/mango.html;) [*www.mango.org/wp-content/uploads/2018/04/Magnesium\_Fertilization\_Final\_Report\_Eng.pdf*](http://www.mango.org/wp-content/uploads/2018/04/Magnesium_Fertilization_Final_Report_Eng.pdf)). Irrigated farms in the vicinity of desalination plants, especially for tropical fruit and at large scales, can realize significant cost savings by replacing commercial magnesium sulfate fertilizer with a liquid fertilizer system utilizing the Mg-enriched low-salinity brine from a multi-stage NF system.

Membrane brine concentration (MBC)

A second key technology to make brine mining more attractive is membrane brine concentration. Davenport et al. have reported that a membrane-based technology would require less than half of the energy consumption by conventional thermal evaporation technology in the application of hypersaline brine desalination. In an example of concentrating 70,000 mg dm−3 feed brine to 250,000 mg dm−3, they estimated specific energy consumption (SEC) of 24 kWh m‒3 with two-stage MVC, while it would drop to 7.3 kWh m‒3 with two-stage high pressure RO (HPRO). They indicated the maximum operation pressure for typical SWRO as 80 bar and analyzed two scenarios—one with HPRO up to 150 bar (double the current operating limit) and the other with HPRO up to 300 bar (due to around 290 bar of osmotic pressure at 250,000 mg dm−3).

Practically, the maximum operating pressure of SWRO is a function of temperature as well, which varies between 70 and 82.7 bar. A higher temperature allows for a lower maximum operating pressure in order to minimize the risk from membrane compaction. This penalty could be partially moderated with improved membrane materials, e.g., with new core tube material. There are commercial HPRO membranes of up to 120–124 bar available in the market, such as Hydranautics’ PRO-XP1 ([*http://pureaqua.com/content/pdf/hydranautics-pro-xp1-membrane.pdf*](http://pureaqua.com/content/pdf/hydranautics-pro-xp1-membrane.pdf)) (Fig. ) and Dupont (Filmtec)’s XUS180808 ([*www.dupont.com/content/dam/dupont/amer/us/en/water-solutions/public/documents/en/45-D01736-en.pdf*](http://www.dupont.com/content/dam/dupont/amer/us/en/water-solutions/public/documents/en/45-D01736-en.pdf)). Ultra-high-pressure RO of up to 200 bar has been reported in special applications, e.g., landfill leachate treatment as early as 2000, and currently PWS (Pacific Water Solutions) is working on the same pressure range ([*https://pws-water.com/project-ultra-hgh-pressure-ro-uhpro-membrane-module-development-for-international-desalination-company/*](https://pws-water.com/project-ultra-hgh-pressure-ro-uhpro-membrane-module-development-for-international-desalination-company/)), which membranes are currently being tested by SWCC-DTRI ([*https://idadesal.org/ida-academy-webinar-on-innovation-in-desalination-brine-mining-with-swcc/*](https://idadesal.org/ida-academy-webinar-on-innovation-in-desalination-brine-mining-with-swcc/)).

Operation limits for SWRO membranes.

Comparison of temperature and pressure operation limits for a conventional SWRO membrane and LG Chem SWRO membranes ([*www.lgwatersolutions.com/en/technical-document/technical-bulletins-tsb*](http://www.lgwatersolutions.com/en/technical-document/technical-bulletins-tsb), technical service bulletin 106) and Hydranautics PRO-XP (HPRO) membrane (Hydranautics, PRO-XP1 membrane specification, ([*http://pureaqua.com/content/pdf/hydranautics-pro-xp1-membrane.pdf*](http://pureaqua.com/content/pdf/hydranautics-pro-xp1-membrane.pdf))).

Even though there are continuous efforts in the development and application of (U)HPRO, the practical application of (U)HPRO in a large scale will be challenging due to the need for the expensive materials in pump, pipe, valve, instruments and so on. A very high operating pressure presents an additional difficulty in materials where hypersaline brine is already a big challenge. In order to overcome this issue of very high pressures, osmotically assisted RO (OARO) has gained attention from many researchers and industrial players. There have been a number of proposals to overcome the limit of osmotic pressure when RO is applied–. The principle of OARO is to reduce an osmotic pressure gradient across the membrane by allowing a certain salinity brine flow on the conventional permeate side of the membrane. The feed to reject side of the membrane is pressurized while the permeate side has much lower pressure, and if the pressure difference between the two sides are higher than the osmotic pressure difference, mostly water molecules rather than other solutes (such as Na and Cl) will pass through the semi-permeable membrane (e.g., RO, FO, or pressure retarded osmosis), thus the feed side becomes more concentrated and the permeate side becomes more diluted. It is possible that even NF membranes could be used, depending on the solute of interest to be concentrated on the feed side.

The typical configurations of OARO are illustrated in Fig. . A single OARO is shown in (a) where the flow could be either co-current (a1) or counter-current (a2). When a series of OARO is considered, both (b) and (c) could be considered, where (c) has at least 1 recycling stream inside OARO,. As an example, if (b) configuration is considered, the leftward arrow on the right top (brown) could be considered as seawater, which flow rate increases and concentration is getting less through OAROs while receiving water flux from lower side of the diagram, thus the leftward arrow on the left end (blue), which could be SWRO feed is already diluted with increased flow rate, thus higher recovery of fresh water in SWRO can be expected. The rightward arrow on the left end (orange), which could be SWRO reject, is getting concentrated with losing its flow rates through OAROs, and the final rightward arrow (red) will be higher concentration with less flow rate compared to the typical SWRO reject. In this way, the concept of MBC is achieved within a limited maximum operating pressure.

OARO configurations.

Osmotically-assisted Reverse Osmosis (OARO) configurations. a Example of co-current (a1) and counter-current (a2) flows; b Example of multiple OARO in series, c example when OARO includes at least one recycling stream. (The block sky-blue arrows indicate the flux of permeate (usually water) thus indicating the pressure gradient on the membrane. Solid arrow color indicates salinity (higher towards red, lower towards sky-blue) and the thickness indicates flow rate).

Peters and Hankins analyzed several OARO processes and compared their theoretical energy consumption to multi-stage RO (MSRO, which is the combination of SWRO and HPRO in series). As the membrane modeling of OARO is similar to that of pressure assisted FO (PAFO), they adopted the model of B. Kim. et al., for water flux calculation and the model of J. Kim, et al., for solute flux calculation. Two scenarios were considered: 1) concentrating 35,000 mg dm−3 to 125,000 mg.dm−3 and 2) concentrating 70,000 mg.dm−3 to 125,000 mg dm−3. The theoretical SEC comparison showed that MSRO consumes less energy than OARO, where SECs by MSRO were 3.32 and 5.16 kWh m–3 while SECs by OARO were 4.09 and 6.37 kWh m–3 for scenario 1 and 2, respectively. The reduced energy efficiency was could be explained by the increase in entropy arising from dilution and mixing of the saline streams in OARO However, it should be noted that Peters and Hankins considered 48.3 bar as the maximum operating pressure of OARO as per the earlier study by other researchers on Pressure Retarded Reverse Osmosis (PRO) with commercially available TFC FO membrane. Membranes operating at 70 bar are already commercially available for OARO without additional high-cost components (e.g., a porous steel plate as feed spacer). Toyobo has a commercial membrane product for brine concentration purpose (Toyobo, FB10155FI) and FTS H2O also has a commercial product for OARO (FTSHBCR-01/04, https//:ftsh2o.com/products/hbcr-high-brine-concentration-and-recovery/). DTRI-SWCC has tested Toyobo’s HFF membrane product for more than nine months, and was able to concentrate 110,000 ppm HPRO reject (operated at 120 bar with Hydranautics HPRO membrane) to 170,000 ppm with two-stage OARO (70 bar with Toyobo HFF BC membrane) continuously and up to 220,000 ppm with three-stage OARO. The commercially available FTSHBCR membranes are already delivered to DTRI-SWCC and are undergoing testing long-term operation, with a pilot facility designed to concentrate 78,000 ppm SWRO reject to 220,000 ppm with three-stage OARO ([*https://idadesal.org/ida-academy-webinar-on-innovation-in-desalination-brine-mining-with-swcc/*](https://idadesal.org/ida-academy-webinar-on-innovation-in-desalination-brine-mining-with-swcc/)).

Comparing the two MBC candidates, HPRO could be more energy efficient, while OARO may reduce the capital and maintenance cost thanks to its operation at relatively lower pressure (70 bar). Also, the challenges on HPRO becomes much larger when higher levels of concentration are required, because much higher pressure is required, while for OARO, higher concentration forces to increase its number of stages but there is no technical challenge from high pressure. Therefore, further studies at DTRI-SWCC aim to determine an optimal concentration by HPRO, by OARO, and by the combination of the two methods.

Combination of nanofiltration and membrane brine concentration (NF-RO-MBC)

The idea of combining the above two key technologies was recently proposed by DTRI-SWCC,. The key concept of applying NF upstream of RO and MBC as the core of an integrated facility for seawater concentrate mining is illustrated in Fig. ,. When “towards Zero Liquid Discharge” is discussed, it is essential to secure economic feasibility to realize an idea to a real life on a commercial scale. Therefore, the principal idea in this NF-RO-MBC system is to produce two commercially valuable concentrate steams in addition to a higher recovery of freshwater production. The high selectivity nature of the NF system is adopted to make the seawater which has mixed dissolved ions in nature into two streams—a high purity monovalent ions steam in its permeate and a highly concentrated multivalent ions stream in its retentate. With the following RO and/or MBC systems, both streams could be concentrated further to the level of concentration where downstream industries could utilize it as a source brine for their processes or where the following mineral harvesting steps could become economically feasible. The pilot plant using commercial-size membranes was successfully demonstrated to produce concentrated multivalent ions steam of about 90,000 mg dm−3 with high concentrations of divalent ions, i.e., 3.40 times Ca2+, 5.16 times Mg2+, and 6.56 times SO42− compared to these ions in seawater and NF feed, and to produce the high-purity highly-concentrated monovalent ions stream where the sum of Na and Cl portion in the TDS of about 170,000 mg dm−3 is increased to about 96.85% from 85.98% in seawater.

NF-RO-BC system for mineral recovery.

Integrated application of Nanofiltration, Reverse-Osmosis and Brine Concentration for separation and recovery of valuable minerals.

Summary and outlook

Since as long ago as the 19th century the imagination of researchers has been seized by the potential of obtaining useful minerals and metals from the sea. Exploiting desalination concentrate, rather than direct use of seawater, is necessarily going to be more energetically favorable: the energy that would have otherwise removed the amount of water produced by the desalination plant has already been expended. Thus the expansion of seawater desalination in recent decades brings this longstanding dream a step closer to commercial reality. Research developments around the world are taking further small steps in this direction, despite a perception that resource recovery from brine may be entering a “trough of disillusionment”. Processing large volumes of seawater desalination brine to extract a single component—with the exception of NaCl—will be less competitive than integrated processes designed to obtain several commercial species from concentrate. For a long time to come, it is likely that commercial utilization of the non-NaCl components of desalination brine will depend on the available market for NaCl, as the challenges and costs of extracting the other mineral components from bitterns in which they are highly enriched are so much less than those faced in direct treatment of brines.

The most important technologies for economic use of products from desalination plant concentrate are technologies for more economic separation and technologies for more economic concentration. In terms of separation, a long sequence of complex steps treating the entire volume of concentrate is unlikely ever to be viable, so the most promising separation technologies are those, such as NF, that separate the brine into streams enriched/depleted in entire classes of constituents with the least possible input of energy and reagents. In terms of concentration, rapid advances in OARO technology that allow the application of low-energy membrane-based methods of concentration to ever more concentrated brines are a transformative development for sustainable mining of seawater.

**Notes**

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**Load-Date:** May 3, 2023

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[***Federal Register: National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units-Revocation of the 2020 Reconsideration, and Affirmation of the Appropriate and Necessary Supplemental Finding; Notice of Proposed Rulemaking Pages 7624 - 7673 [FR DOC #2022-02343]***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:64RP-67Y1-JDG9-Y3RM-00000-00&context=1516831)

Impact News Service

February 9, 2022 Wednesday

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**Length:** 60258 words

**Body**

Washington: Office of the Federal Register has issued the following notice:Environmental Protection Agency-----------------------------------------------------------------------40 CFR Part 63National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units--Revocation of the 2020 Reconsideration, and Affirmation of the Appropriate and Necessary Supplemental Finding; Notice of Proposed Rulemaking; Proposed RuleFederal Register / Vol. 87 , No. 27 / Wednesday, February 9, 2022 / Proposed Rules[[Page 7624]]-----------------------------------------------------------------------ENVIRONMENTAL PROTECTION AGENCY40 CFR Part 63[EPA-HQ-OAR-2018-0794; FRL-6716.2-01-OAR]RIN 2060-AV12National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units--Revocation of the 2020 Reconsideration, and Affirmation of the Appropriate and Necessary Supplemental Finding; Notice of Proposed RulemakingAGENCY: Environmental Protection Agency (EPA).ACTION: Proposed rule.-----------------------------------------------------------------------SUMMARY: The EPA is proposing to revoke a May 22, 2020 finding that it is not appropriate and necessary to regulate coal- and oil-fired electric utility steam generating units (EGUs) under Clean Air Act (CAA) section 112, and to reaffirm the Agency's April 25, 2016 finding that it remains appropriate and necessary to regulate hazardous air pollutant (HAP) emissions from EGUs after considering cost. The Agency is also reviewing another part of the May 22, 2020 action, a residual risk and technology review (RTR) of Mercury and Air Toxics Standards (MATS). Accordingly, in addition to soliciting comments on all aspects of this proposal, the EPA is soliciting information on the performance and cost of new or improved technologies that control HAP emissions, improved methods of operation, and risk-related information to further inform the Agency's review of the MATS RTR as directed by Executive Order 13990.DATES: Comments must be received on or before April 11, 2022. Public hearing: The EPA will hold a virtual public hearing on February 24, 2022. See SUPPLEMENTARY INFORMATION for information on the hearing.ADDRESSES: You may send comments, identified by Docket ID No. EPA-HQ-OAR-2018-0794, by any of the following methods: Federal eRulemaking Portal: [*https://www.regulations.gov*](https://www.regulations.gov)/ (our preferred method). Follow the online instructions for submitting comments. Email: [*a-and-r-docket@epa.gov*](mailto:a-and-r-docket@epa.gov) Include Docket ID No. EPA-HQ-OAR-2018-0794 in the subject line of the message. Fax: (202) 566-9744. Attention Docket ID No. EPA-HQ-OAR-2018-0794. Mail: U.S Environmental Protection Agency, EPA Docket Center, Docket ID No. EPA-HQ-OAR-2018-0794, Mail Code 28221T, 1200 Pennsylvania Avenue NW, Washington, DC 20460. Hand/Courier Delivery: EPA Docket Center, WJC West Building, Room 3334, 1301 Constitution Avenue NW, Washington, DC 20004. The Docket Center's hours of operation are 8:30 a.m -4:30 p.m , Monday-Friday (except Federal holidays). Instructions: All submissions received must include the Docket ID No. for this rulemaking. Comments received may be posted without change to [*https://www.regulations.gov/*](https://www.regulations.gov/), including any personal information provided. For detailed instructions on sending comments and additional information on the rulemaking process, see the SUPPLEMENTARY INFORMATION section of this document. Out of an abundance of caution for members of the public and our staff, the EPA Docket Center and Reading Room are closed to the public, with limited exceptions, to reduce the risk of transmitting COVID-19. Our Docket Center staff will continue to provide remote customer service via email, phone, and webform. We encourage the public to submit comments via [*https://www.regulations.gov*](https://www.regulations.gov)/ or email, as there may be a delay in processing mail and faxes. Hand deliveries and couriers may be received by scheduled appointment only. For further information on EPA Docket Center services and the current status, please visit us online at [*https://www.epa.gov/dockets.FOR*](https://www.epa.gov/dockets.FOR) FURTHER INFORMATION CONTACT: For questions about this proposed action, contact Melanie King, Sector Policies and Programs Division (D243-01), Office of Air Quality Planning and Standards, U.S Environmental Protection Agency, Research Triangle Park, North Carolina 27711; telephone number: (919) 541-2469; and email address: [*king.melanie@epa.gov.SUPPLEMENTARY*](mailto:king.melanie@epa.gov.SUPPLEMENTARY) INFORMATION: The EPA is proposing to revoke a May 22, 2020 finding that it is not appropriate and necessary to regulate coal- and oil-fired EGUs under CAA section 112, and to reaffirm the Agency's April 25, 2016 finding that it remains appropriate and necessary to regulate HAP emissions from EGUs after considering cost. The 2016 finding was made in response to the U.S Supreme Court's 2015 Michigan v. EPA decision, where the Court held that the Agency had erred by not taking cost into consideration when taking action on February 16, 2012, to affirm a 2000 EPA determination that it was appropriate and necessary to regulate HAP emissions from EGUs. In the same 2012 action, the EPA also promulgated National Emission Standards for Hazardous Air Pollutants (NESHAP) for coal- and oil-fired EGUs, commonly known as the Mercury and Air Toxics Standards or MATS. Based on a re-evaluation of the administrative record and the statute, the EPA proposes to conclude that the framework applied in the May 22, 2020 finding was ill-suited to assessing and comparing the full range of benefits to costs, and the EPA concludes that, after applying a more suitable framework, the 2020 determination should be withdrawn. For reasons explained in this notice, the EPA further proposes to reaffirm that it is appropriate and necessary to regulate HAP emissions from EGUs after weighing the volume of pollution that would be reduced through regulation, the public health risks and harms posed by these emissions, the impacts of this pollution on particularly exposed and sensitive populations, the availability of effective controls, and the costs of reducing this harmful pollution including the effects of control costs on the EGU industry and its ability to provide reliable and affordable electricity. This notice also presents information and analysis that has become available since the 2016 finding, pertaining to the health risks of mercury emissions and the costs of reducing HAP emissions, that lend further support for this determination. The review that led to this proposal is consistent with the direction in Executive Order 13990, ``Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis,'' signed by President Biden on January 20, 2021. In response to the Executive Order, the Agency is also reviewing another part of the May 22, 2020 action, a RTR of MATS. Accordingly, in addition to soliciting comments on all aspects of this proposal, the EPA is soliciting information on the performance and cost of new or improved technologies that control HAP emissions, improved methods of operation, and risk-related information to further inform the Agency's review of the MATS RTR as directed by the Executive Order. Results of the EPA's review of the RTR will be presented in a separate action. Participation in virtual public hearing. Please note that the EPA is deviating from its typical approach for public hearings because the President has declared a national emergency. Due to the current Centers for Disease Control and Prevention (CDC) recommendations, as well as state and local orders for social distancing to limit the spread of COVID-19, the EPA[[Page 7625]]cannot hold in-person public meetings at this time. The virtual public hearing will be held via teleconference on February 24, 2022 and will convene at 10:00 a.m Eastern Time (ET) and will conclude at 7:00 p.m ET. The EPA may close a session 15 minutes after the last pre-registered speaker has testified if there are no additional speakers. For information or questions about the public hearing, please contact the public hearing team at (888) 372-8699 or by email at [*SPPDpublichearing@epa.gov*](mailto:SPPDpublichearing@epa.gov) The EPA will announce further details at [*https://www.epa.gov/stationary-sources-air-pollution/mercury-and-air-toxics-standards*](https://www.epa.gov/stationary-sources-air-pollution/mercury-and-air-toxics-standards). The EPA will begin pre-registering speakers for the hearing no later than 1 business day following publication of this document in the Federal Register. The EPA will accept registrations on an individual basis. To register to speak at the virtual hearing, please use the online registration form available at [*https://www.epa.gov/stationary-sources-air-pollution/mercury-and-air-toxics-standards*](https://www.epa.gov/stationary-sources-air-pollution/mercury-and-air-toxics-standards) or contact the public hearing team at (888) 372-8699 or by email at [*SPPDpublichearing@epa.gov*](mailto:SPPDpublichearing@epa.gov) The last day to pre-register to speak at the hearing will be February 18, 2022. Prior to the hearing, the EPA will post a general agenda that will list pre-registered speakers in approximate order at: [*https://www.epa.gov/stationary-sources-air-pollution/mercury-and-air-toxics-standards*](https://www.epa.gov/stationary-sources-air-pollution/mercury-and-air-toxics-standards). The EPA will make every effort to follow the schedule as closely as possible on the day of the hearing; however, please plan for the hearings to run either ahead of schedule or behind schedule. Each commenter will have 5 minutes to provide oral testimony. The EPA encourages commenters to provide the EPA with a copy of their oral testimony electronically (via email) by emailing it to [*king.melanie@epa.gov*](mailto:king.melanie@epa.gov) The EPA also recommends submitting the text of your oral testimony as written comments to the rulemaking docket. The EPA may ask clarifying questions during the oral presentations but will not respond to the presentations at that time. Written statements and supporting information submitted during the comment period will be considered with the same weight as oral testimony and supporting information presented at the public hearing. Please note that any updates made to any aspect of the hearing will be posted online at [*https://www.epa.gov/stationary-sources-air-pollution/mercury-and-air-toxics-standards*](https://www.epa.gov/stationary-sources-air-pollution/mercury-and-air-toxics-standards). While the EPA expects the hearing to go forward as set forth above, please monitor our website or contact the public hearing team at (888) 372-8699 or by email at [*SPPDpublichearing@epa.gov*](mailto:SPPDpublichearing@epa.gov) to determine if there are any updates. The EPA does not intend to publish a document in the Federal Register announcing updates. If you require the services of a translator or a special accommodation such as audio description, please pre-register for the hearing with the public hearing team and describe your needs by February 16, 2022. The EPA may not be able to arrange accommodations without advanced notice. Docket. The EPA has established a docket for this rulemaking under Docket ID No. EPA-HQ-OAR-2018-0794.\1\ All documents in the docket are listed in [*https://www.regulations.gov/*](https://www.regulations.gov/). Although listed, some information is not publicly available, e.g , Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the internet and will be publicly available only in hard copy. With the exception of such material, publicly available docket materials are available electronically in [*https://www.regulations.gov/.---------------------------------------------------------------------------*](https://www.regulations.gov/.---------------------------------------------------------------------------) \1\ As explained in a memorandum to the docket, the docket for this action includes the documents and information, in whatever form, in Docket ID Nos. EPA-HQ-OAR-2009-0234 (National Emission Standards for Hazardous Air Pollutants for Coal- and Oil-fired Electric Utility Steam Generating Units), EPA-HQ-OAR-2002-0056 (National Emission Standards for Hazardous Air Pollutants for Utility Air Toxics; Clean Air Mercury Rule (CAMR)), and Legacy Docket ID No. A-92-55 (Electric Utility Hazardous Air Pollutant Emission Study). See memorandum titled Incorporation by reference of Docket Number EPA-HQ-OAR-2009-0234, Docket Number EPA-HQ-OAR-2002-0056, and Docket Number A-92-55 into Docket Number EPA-HQ-OAR-2018-0794 (Docket ID Item No. EPA-HQ-OAR-2018-0794-0005).--------------------------------------------------------------------------- Instructions. Direct your comments to Docket ID No. EPA-HQ-OAR-2018-0794. The EPA's policy is that all comments received will be included in the public docket without change and may be made available online at [*https://www.regulations.gov/*](https://www.regulations.gov/), including any personal information provided, unless the comment includes information claimed to be CBI or other information whose disclosure is restricted by statute. Do not submit electronically any information that you consider to be CBI or other information whose disclosure is restricted by statute. This type of information should be submitted by mail as discussed below. The EPA may publish any comment received to its public docket. Multimedia submissions (audio, video, etc.) must be accompanied by a written comment. The written comment is considered the official comment and should include discussion of all points you wish to make. The EPA will generally not consider comments or comment contents located outside of the primary submission (i.e , on the Web, cloud, or other file sharing system). For additional submission methods, the full EPA public comment policy, information about CBI or multimedia submissions, and general guidance on making effective comments, please visit [*https://www.epa.gov/dockets/commenting-epa-dockets*](https://www.epa.gov/dockets/commenting-epa-dockets). The [*https://www.regulations.gov*](https://www.regulations.gov)/ website allows you to submit your comment anonymously, which means the EPA will not know your identity or contact information unless you provide it in the body of your comment. If you send an email comment directly to the EPA without going through [*https://www.regulations.gov/*](https://www.regulations.gov/), your email address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the internet. If you submit an electronic comment, the EPA recommends that you include your name and other contact information in the body of your comment and with any digital storage media you submit. If the EPA cannot read your comment due to technical difficulties and cannot contact you for clarification, the EPA may not be able to consider your comment. Electronic files should not include special characters or any form of encryption and be free of any defects or viruses. For additional information about the EPA's public docket, visit the EPA Docket Center homepage at [*https://www.epa.gov/dockets*](https://www.epa.gov/dockets). The EPA is temporarily suspending its Docket Center and Reading Room for public visitors, with limited exceptions, to reduce the risk of transmitting COVID-19. Our Docket Center staff will continue to provide remote customer service via email, phone, and webform. We encourage the public to submit comments via [*https://www.regulations.gov*](https://www.regulations.gov)/ as there may be a delay in processing mail and faxes. Hand deliveries or couriers will be received by scheduled appointment only. For further information and updates on EPA Docket Center services, please visit us online at [*https://www.epa.gov/dockets*](https://www.epa.gov/dockets). The EPA continues to carefully and continuously monitor information from the CDC, local area health departments, and our Federal partners so that we can respond rapidly as conditions change regarding COVID-19. Submitting CBI. Do not submit information containing CBI to the EPA[[Page 7626]]through [*https://www.regulations.gov*](https://www.regulations.gov)/ or email. Clearly mark the part or all of the information that you claim to be CBI. For CBI information on any digital storage media that you mail to the EPA, mark the outside of the digital storage media as CBI and then identify electronically within the digital storage media the specific information that is claimed as CBI. In addition to one complete version of the comments that includes information claimed as CBI, you must submit a copy of the comments that does not contain the information claimed as CBI directly to the public docket through the procedures outlined in Instructions above. If you submit any digital storage media that does not contain CBI, mark the outside of the digital storage media clearly that it does not contain CBI. Information not marked as CBI will be included in the public docket and the EPA's electronic public docket without prior notice. Information marked as CBI will not be disclosed except in accordance with procedures set forth in title 40 of the Code of Federal Regulations (CFR) part 2. Send or deliver information identified as CBI only to the following address: OAQPS Document Control Officer (C404-02), OAQPS, U.S Environmental Protection Agency, Research Triangle Park, North Carolina 27711, Attention Docket ID No. EPA-HQ-OAR-2018-0794. Note that written comments containing CBI and submitted by mail may be delayed and no hand deliveries will be accepted. Preamble acronyms and abbreviations. We use multiple acronyms and terms in this preamble. While this list may not be exhaustive, to ease the reading of this preamble and for reference purposes, the EPA defines the following terms and acronyms here:ACI activated carbon injectionATSDR Agency for Toxic Substances and Disease RegistryARP Acid Rain ProgramBCA benefit-cost analysisCAA Clean Air ActCAAA Clean Air Act Amendments of 1990CAMR Clean Air Mercury RuleCBI Confidential Business InformationCFR Code of Federal RegulationsCVD cardiovascular diseaseDSI dry sorbent injectionEGU electric utility steam generating unitEIA Energy Information AdministrationEPA Environmental Protection AgencyESP electrostatic precipitatorEURAMIC European Multicenter Case-Control Study on Antioxidants, Myocardial Infarction, and Cancer of the Breast StudyFF fabric filterFGD flue gas desulfurizationFR Federal RegisterGW gigawattHAP hazardous air pollutant(s)HCl hydrogen chlorideHF hydrogen fluorideIHD ischemic heart diseaseIPM Integrated Planning ModelIRIS Integrated Risk Information SystemKIHD Kuopio Ischaemic Heart Disease Risk Factor StudykW kilowattMACT maximum achievable control technologyMATS Mercury and Air Toxics StandardsMI myocardial infarctionMIR maximum individual riskMW megawattNAS National Academy of SciencesNESHAP national emission standards for hazardous air pollutantsOMB Office of Management and BudgetO&M operation and maintenancePM particulate matterPUFA polyunsaturated fatty acidRfD reference doseRIA regulatory impact analysisRTR residual risk and technology reviewSCR selective catalytic reductionSO2 sulfur dioxideTSD technical support documenttpy tons per year Organization of this document. The information in this preamble is organized as follows:I. General Information A. Executive Summary B. Does this action apply to me? C. Where can I get a copy of this document and other related information?II. Background A. Regulatory History B. Statutory BackgroundIII. Proposed Determination Under CAA Section 112(n)(1)(A) A. Public Health Hazards Associated With Emissions From EGUs B. Consideration of Cost of Regulating EGUs for HAP C. Revocation of the 2020 Final Action D. The Administrator's Proposed Preferred Framework and Proposed Conclusion E. The Administrator's Proposed Benefit-Cost Analysis Approach and Proposed ConclusionIV. Summary of Cost, Environmental, and Economic ImpactsV. Request for Comments and for Information To Assist With Review of the 2020 RTRVI. Statutory and Executive Order Reviews A. Executive Order 12866: Regulatory Planning and Review and Executive Order 13563: Improving Regulation and Regulatory Review B. Paperwork Reduction Act (PRA) C. Regulatory Flexibility Act (RFA) D. Unfunded Mandates Reform Act (UMRA) E. Executive Order 13132: Federalism F. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments G. Executive Order 13045: Protection of Children From Environmental Health Risks and Safety Risks H. Executive Order 13211: Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use I. National Technology Transfer and Advancement Act (NTTAA) J. Executive Order 12898: Federal Actions To Address Environmental Justice in Minority Populations and Low-Income PopulationsI. General InformationA. Executive Summary On January 20, 2021, President Biden signed Executive Order 13990, ``Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis'' (86 FR 7037, January 25, 2021). The Executive Order, among other things, instructs the EPA to review the 2020 final action titled, ``National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units--Reconsideration of Supplemental Finding and Residual Risk and Technology Review'' (85 FR 31286; May 22, 2020) (2020 Final Action) and consider publishing a notice of proposed rulemaking suspending, revising, or rescinding that action. Consistent with the Executive Order, the EPA has undertaken a careful review of the 2020 Final Action, in which the EPA reconsidered its April 25, 2016 supplemental finding (81 FR 24420) (2016 Supplemental Finding). Based on that review, the Agency proposes to find that the decisional framework for making the appropriate and necessary determination under CAA section 112(n)(1)(A) that was applied in the 2020 Final Action was unsuitable because it failed to adequately account for statutorily relevant factors. Therefore, we propose to revoke the May 2020 determination that it is not appropriate and necessary to regulate HAP emissions from coal- and oil-fired EGUs under section 112 of the CAA. We further propose to reaffirm our earlier determinations--made in 2000 (65 FR 79825; December 20, 2000) (2000 Determination), 2012 (77 FR 9304; February 16, 2012) (2012 MATS Final Rule), and 2016--that it is appropriate and necessary to regulate coal- and oil-fired EGUs under section 112 of the CAA. In 1990, frustrated with the EPA's pace in identifying and regulating HAP, Congress radically transformed its treatment of that pollution. It rewrote section 112 of the CAA to require the EPA to swiftly regulate 187 HAP with technology-based standards that would require all major sources (defined by the quantity of pollution a facility has the potential to emit) to meet the levels of reduction achieved in practice by the best-performing similar sources. EGUs were the one major source category excluded from automatic application of these new standards. EGUs were treated differently primarily because the 1990[[Page 7627]]Amendments to the CAA (1990 Amendments) included the Acid Rain Program (ARP), which imposed criteria pollution reduction requirements on EGUs. Congress recognized that the controls necessary to comply with this and other requirements of the 1990 Amendments might reduce HAP emissions from EGUs as well. Therefore, under CAA section 112(n)(1)(A), Congress directed the EPA to regulate EGUs if, after considering a study of ``the hazards to public health reasonably anticipated to occur as a result of [HAP] emissions by [EGUs] . . . after imposition of the [Acid Rain Program and other] requirements of this chapter,'' the EPA concluded that it ``is appropriate and necessary'' to do so. See CAA section 112(n)(1)(A). The EPA completed that study in 1998 and, in 2000, concluded that it is appropriate and necessary to regulate HAP emissions from coal- and oil-fired EGUs. See 65 FR 79825 (December 20, 2000). The EPA reaffirmed that conclusion in 2012, explaining that the other requirements of the CAA, in particular the ARP, did not lead to the HAP emission reductions that had been anticipated because many EGUs switched to lower-sulfur coal rather than deploy pollution controls that may have also reduced emissions of HAP. Indeed, the statute contemplated that the EPA would be conducting the required study within 3 years of the 1990 Amendments; but when the EPA re-examined public health hazards remaining after imposition of the Act's requirements in 2012, the Agency accounted for over 20 years of CAA regulation, and EGUs still remained one of the largest sources of HAP pollution. Specifically, in 2012, the EPA concluded that EGUs were the largest domestic source of emissions of mercury, hydrogen fluoride (HF), hydrogen chloride (HCl), and selenium; and among the largest domestic contributors of emissions of arsenic, chromium, cobalt, nickel, hydrogen cyanide, beryllium, and cadmium. The EPA further found that a significant majority of EGUs were located at facilities that emitted above the statutory threshold set for major sources (e.g , 10 tons per year (tpy) of any one HAP or 25 tpy or more of any combination of HAP). See 77 FR 9304 (February 16, 2012). In 2012, the EPA also established limits for emissions of HAP from coal- and oil-fired EGUs. Id. Many aspects of the EPA's appropriate and necessary determination and the CAA section 112 regulations were challenged in the U.S Court of Appeals for the District of Columbia Circuit (D.C Circuit), and all challenges were denied and the finding and standards upheld in full in White Stallion Energy Center v. EPA, 748 F.3d 1222 (2014). The Supreme Court granted review on a single issue and, in Michigan v. EPA, 576 U.S 743 (2015), the Court held that the EPA erred when it failed to consider the costs of its regulation in determining that it is appropriate and necessary to regulate HAP emissions from EGUs, and remanded that determination to the D.C Circuit for further proceedings. Following Michigan, in 2016 the EPA issued a Supplemental Finding that it is appropriate and necessary to regulate EGU HAP after considering the costs of such regulation. See 81 FR 24420 (April 25, 2016). In 2020, the Agency reversed that determination.\2\ In this action, we conclude that the methodology we applied in 2020 is ill-suited to the appropriate and necessary determination because, among other reasons, it did not give adequate weight to the significant volume of HAP emissions from EGUs and the attendant risks remaining after imposition of the other requirements of the CAA, including many adverse health and environmental effects of EGU HAP emissions that cannot be quantified or monetized. We propose, therefore, to revoke the 2020 Final Action.--------------------------------------------------------------------------- \2\ The 2020 Final Action, while reversing the 2016 Supplemental Finding as to the EPA's determination that it was ``appropriate'' to regulate HAP from EGUs, did not rescind the Agency's prior determination that it was necessary to regulate. See 84 FR 2674 (February 7, 2019). Instead, the 2020 rulemaking stated that its rescission was based on the appropriate prong alone: ``CAA section 112(n)(1)(A) requires the EPA to determine that both the appropriate and necessary prongs are met. Therefore, if the EPA finds that either prong is not satisfied, it cannot make an affirmative appropriate and necessary finding. The EPA's reexamination of its determination . . . focuses on the first prong of that analysis.'' Id.--------------------------------------------------------------------------- We further propose to affirm, once again, that it is appropriate and necessary to regulate coal- and oil-fired EGUs under CAA section 112. We first examine the benefits or advantages of regulation, including new information on the risks posed by EGU HAP. We then examine the costs or disadvantages of regulation, including both the costs of compliance (which we explain we significantly overestimated in 2012) and how those costs affect the industry and the public. We then weigh these benefits and costs to reach the conclusion that it is appropriate and necessary to regulate using two alternative methodologies. Our preferred methodology, as it was in the 2016 Supplemental Finding, is to consider all of the impacts of the regulation--both costs and benefits to society--using a totality-of the-circumstances approach rooted in the Michigan court's direction to ``pay[ ] attention to the advantages and disadvantages of [our] decision[ ].'' 576 U.S at 753; see id. at 752 (``In particular, `appropriate' is `the classic broad all-encompassing term that naturally includes consideration of all relevant factors.''). To help determine the relevant factors to weigh, we look to CAA section 112(n)(1)(A), the other provisions of CAA section 112(n)(1), and to the statutory design of CAA section 112. Initially, we consider the human health advantages of reducing HAP emissions from EGUs because in CAA section 112(n)(1)(A) Congress directed the EPA to make the appropriate and necessary determination after considering the results of a ``study of the hazards to public health reasonably anticipated to occur as a result of [HAP] emissions'' from EGUs. See CAA section 112(n)(1)(A). We consider all of the advantages of reducing emissions of HAP (i.e , the risks posed by HAP) regardless of whether those advantages can be quantified or monetized, and we explain why almost none of those advantages can be monetized. Consistent with CAA section 112(n)(1)(B)'s direction to examine the rate and mass of mercury emissions, and the design of CAA section 112, which required swift reduction of the volume of HAP emissions based on an assumption of risk, we conclude that we should place substantial weight on reducing the large volume of HAP emissions from EGUs--both in absolute terms and relative to other source categories--that, absent MATS, was entering our air, water, and land, thus reducing the risk of grave harms that can occur as a result of exposure to HAP. Also consistent with the statutory design of CAA section 112, in considering the advantages of HAP reductions, we consider the distribution of those benefits, and the statute's clear goal in CAA section 112(n)(1)(C) and other provisions of CAA section 112 to protect the most exposed and susceptible populations, such as communities that are reliant on local fish for their survival, and developing fetuses. We think it is highly relevant that while EGUs generate power for all, and EGU HAP pollution poses risks to all Americans exposed to such HAP, a smaller set of Americans who live near EGUs face a disproportionate risk of being significantly harmed by toxic pollution. Finally, we also consider the identified risks to the environment posed by mercury and acid-gas HAP, consistent with CAA section 112(n)(1)(B) and the general goal of CAA[[Page 7628]]section 112 to reduce risks posed by HAP to the environment. We next weigh those advantages against the disadvantages of regulation, principally in the form of the costs incurred to control HAP before they are emitted into the environment. Consistent with the statutory design, we consider those costs comprehensively, examining them in the context of the effect of those expenditures on the economics of power generation more broadly, the reliability of electricity, and the cost of electricity to consumers. These metrics are relevant to our weighing exercise because they give us a more complete picture of the disadvantages to producers and consumers of electricity imposed by this regulation, and because our conclusion might change depending on how this burden affects the ability of the industry to thrive and to provide reliable, affordable electricity to the benefit of all Americans. These metrics are relevant measures for evaluating costs to the utility sector in part because they are the types of metrics considered by the owners and operators of EGUs themselves. See 81 FR 24428 (April 25, 2016). Per CAA section 112(n)(1)(B), we further consider the availability and cost of control technologies, including the relationship of that factor to controls installed under the ARP. As explained in detail in this document, we ultimately propose to conclude that, weighing the risks posed by HAP emissions from EGUs against the costs of reducing that pollution on the industry and society as a whole, it is worthwhile (i.e , ``appropriate'') to regulate those emissions to protect all Americans, and in particular the most vulnerable populations, from the inherent risks posed by exposure to HAP emitted by coal- and oil-fired EGUs. We propose to find that this is true whether we are looking at the record in 2016 (i.e , information available as of the time of the 2012 threshold finding and rulemaking) or at the updated record in 2021, in which we quantify additional risks posed by HAP emissions from EGUs and conclude that the actual cost of complying with MATS was almost certainly significantly less than the EPA's projected estimate in the 2011 RIA, primarily because fewer pollution controls were installed than projected and because the unexpected increases in natural gas supply led to a dramatic decrease in the price of natural gas. In the 2016 Supplemental Finding we did not consider non-HAP health benefits that occur by virtue of controlling HAP from EGUs as a relevant factor for our consideration under the preferred approach. However, because the Supreme Court in Michigan directed us to consider health and environmental effects beyond those posed by HAP, ``including, for instance, harms that regulation might do to human health or the environment,'' and stressed that ``[n]o regulation is `appropriate' if it does significantly more harm than good,'' 576 U.S at 752, we take comment on whether it is reasonable to also consider the advantages associated with non-HAP emission reductions that result from the application of HAP controls as part of our totality-of-the-circumstances approach. In the 2012 MATS Final Rule, we found that regulating EGUs for HAP resulted in substantial health benefits accruing from coincidental reductions in particulate matter (PM) pollution and its precursors. We also projected that regulating EGUs for HAP would similarly result in an improvement in ozone pollution. While we propose to reach the conclusion that HAP regulation is appropriate even absent consideration of these additional benefits, adding these advantages to the weighing inquiry would provide further support for our proposed conclusion that the advantages of regulation outweigh the disadvantages. We recognize, as we did in 2016, that our preferred, totality-of-the-circumstances approach to making the appropriate and necessary determination is an exercise in judgment, and that ``[r]easonable people, and different decision-makers, can arrive at different conclusions under the same statutory provision'' (81 FR 24431; April 25, 2016). However, this type of weighing of factors and circumstances is an inherent part of regulatory decision-making, and we think it is a reasonable approach where the factors the statute identifies as important to consider cannot be quantified or monetized. Next, we turn to our alternative approach of a formal benefit-cost analysis (BCA). This approach independently supports the determination that it is appropriate to regulate EGU HAP. Based on the 2011 Regulatory Impacts Analysis (2011 RIA) \3\ performed as part of the 2012 MATS Final Rule, the total net benefits of MATS were overwhelming even though the EPA was only able to monetize one of the many benefits of reducing HAP emissions from EGUs. Like the preferred approach, this conclusion is further supported by newer information on the risks posed by HAP emissions from EGUs as well as the actual costs of implementing MATS, which almost certainly were significantly lower than estimated in the 2011 RIA.--------------------------------------------------------------------------- \3\ U.S EPA. 2011. Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards. EPA-452/R-11-011. Available at: [*https://www3.epa.gov/ttn/ecas/docs/ria/utilities\_ria\_final-mats\_2011-12.pdf.---------------------------------------------------------------------------*](https://www3.epa.gov/ttn/ecas/docs/ria/utilities_ria_final-mats_2011-12.pdf.---------------------------------------------------------------------------) Our proposal is organized as follows. In section II.A of this preamble, we provide as background the regulatory and procedural history leading up to this proposal. We also detail, in preamble section II.B, the statutory design of HAP regulation that Congress added to the CAA in 1990 in the face of the EPA's failure to make meaningful progress in regulating HAP emissions from stationary sources. In particular, we point out that many provisions of CAA section 112 demonstrate the value Congress placed on reducing the volume of HAP emissions from stationary sources as much as possible and quickly, with a particular focus on reducing HAP related risks to the most exposed and most sensitive members of the public. This background assists in identifying the relevant statutory factors to weigh in considering the advantages and disadvantages of HAP regulation. Against this backdrop, we propose to revoke the 2020 Final Action and reaffirm the 2016 determination that it remains appropriate to regulate HAP emissions from EGUs after a consideration of cost. Specifically, in section III.A of this preamble, we review the long-standing and extensive body of evidence, as well as new mercury-related risk analyses performed since 2016, identifying substantial risks to human health and the environment from HAP emissions from coal- and oil-fired EGUs that support a conclusion that regulating HAP emissions from EGUs is appropriate. In preamble section III.B, we analyze information regarding how the power sector elected to comply with MATS, and how our 2012 projections for the cost of regulation almost certainly overestimated the actual costs of the regulation by a significant amount. In preamble section III.C, we explain our reasons for revoking the 2020 Final Action, which applied an ill-suited framework for evaluating cost because it gave little to no weight to the statutory concern with reducing the volume of and risks from HAP emissions to protect even the most exposed and most vulnerable members of the public. In section III.D of this preamble, we describe and apply our preferred, totality-of-the-circumstances approach, giving particular weight to the factors identified in CAA section 112(n)(1) and 112 more generally. We propose to conclude that after considering all of the[[Page 7629]]relevant factors and weighing the advantages of regulation against the cost of doing so, it is appropriate and necessary to regulate EGUs under CAA section 112. In section III.E of this preamble, we propose an alternative formal benefit-cost approach for making the appropriate and necessary determination. Under this approach, we propose to conclude that it remains appropriate to regulate HAP emissions from EGUs after considering cost because the BCA issued with the MATS rule indicated that the total net benefits of MATS were overwhelming even though the EPA was only able to monetize one of many statutorily identified benefits of regulating HAP emissions from EGUs. The new information examined by the EPA with respect to updated science and cost information only strengthens our conclusions under either of these methodologies. Section IV of this preamble notes that because this proposal reaffirms prior determinations and does not impact implementation of MATS, this action, if finalized, would not change those standards. Finally, in preamble section V, in addition to soliciting comments on all aspects of this proposed action, we separately seek comment on any ***data*** or information that will assist in the EPA's ongoing review of the RTR that the Agency completed for MATS in 2020.B. Does this action apply to me? The source category that is the subject of this proposal is Coal- and Oil-Fired EGUs regulated by NESHAP under 40 CFR 63, subpart UUUUU, commonly known as MATS. The North American Industry Classification System (NAICS) codes for the Coal- and Oil-Fired EGU source category are 221112, 221122, and 921150. This list of NAICS codes is not intended to be exhaustive, but rather provides a guide for readers regarding the entities that this proposed action is likely to affect.C. Where can I get a copy of this document and other related information? In addition to being available in the docket, an electronic copy of this action is available on the internet. Following signature by the EPA Administrator, the EPA will post a copy of this proposed action at [*https://www.epa.gov/stationary-sources-air-pollution/mercury-and-air-toxics-standards*](https://www.epa.gov/stationary-sources-air-pollution/mercury-and-air-toxics-standards). Following publication in the Federal Register, the EPA will post the Federal Register version of the proposal and key technical documents at this same website.II. BackgroundA. Regulatory History In the 1990 Amendments, Congress substantially modified CAA section 112 to address hazardous air pollutant emissions from stationary sources. CAA section 112(b)(1) sets forth a list of 187 identified HAP, and CAA sections 112(b)(2) and (3) give the EPA the authority to add or remove pollutants from the list. CAA section 112(a)(1) and (2) specify the two types of sources to be addressed: major sources and area sources. A major source is any stationary source or group of stationary sources at a single location and under common control that emits or has the potential to emit, considering controls, 10 tpy or more of any HAP or 25 tpy or more of any combination of HAP. CAA section 112(a)(1). Any stationary source of HAP that is not a major source is an area source.\4\ CAA section 112(a)(2). All major source categories, besides EGUs, and certain area source categories, were required to be included on an initial published list of sources subject to regulation under CAA section 112. See CAA sections 112(a)(1) and (c)(1). The EPA is required to promulgate emission standards under CAA section 112(d) for every source category on the CAA section 112(c)(1) list.--------------------------------------------------------------------------- \4\ The statute includes a separate definition of ``EGU'' that includes both major and area source power plant facilities. CAA section 112(a)(8).--------------------------------------------------------------------------- The general CAA section 112(c) process for listing source categories does not apply to EGUs. Instead, Congress enacted a special provision, CAA section 112(n)(1)(A), which establishes a separate process by which the EPA determines whether to add EGUs to the CAA section 112(c) list of source categories that must be regulated under CAA section 112. Because EGUs were subject to other CAA requirements under the 1990 Amendments, most importantly the ARP, CAA section 112(n)(1)(A) directs the EPA to conduct a study to evaluate the hazards to public health that are reasonably anticipated to occur as a result of the HAP emissions from EGUs ``after imposition of the requirements of this chapter.'' See CAA section 112(n)(1)(A); see also Michigan v. EPA, 576 U.S at 748 (``Quite apart from the hazardous-air-pollutants program, the Clean Air Act Amendments of 1990 subjected power plants to various regulatory requirements. The parties agree that these requirements were expected to have the collateral effect of reducing power plants' emissions of hazardous air pollutants, although the extent of the reduction was unclear.''). The provision directs that the EPA shall regulate EGUs under CAA section 112 if the Administrator determines, after considering the results of the study, that such regulation is ``appropriate and necessary.'' CAA section 112(n)(1)(A), therefore, sets a unique process by which the Administrator is to determine whether to add EGUs to the CAA section 112(c) list of sources that must be subject to regulation under CAA section 112. The study required under CAA section 112(n)(1)(A) is one of three studies commissioned by Congress under CAA section 112(n)(1), a subsection entitled ``Electric utility steam generating units.'' The first, which, as noted, the EPA was required to consider before making the appropriate and necessary determination, was completed in 1998 and was entitled the Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units-Final Report to Congress (Utility Study).\5\ The Utility Study contained an analysis of HAP emissions from EGUs, an assessment of the hazards and risks due to inhalation exposures to these emitted pollutants, and a multipathway (inhalation plus non-inhalation exposures) risk assessment for mercury and a subset of other relevant HAP. The study indicated that mercury was the HAP of greatest concern to public health from coal- and oil-fired EGUs. The study also concluded that numerous control strategies were available to reduce HAP emissions from this source category. The second study commissioned by Congress under CAA section 112(n)(1)(B), the Mercury Study Report to Congress (Mercury Study),\6\ was released in 1997. Under this provision, the statute tasked the EPA with focusing exclusively on mercury, but directed the Agency to look at other stationary sources of mercury emission in addition to EGUs, the rate and mass of emissions coming from those sources, available technologies for controlling mercury and the costs of such technologies, and a broader scope of impacts including environmental effects. As in the Utility Study, the EPA confirmed that mercury is highly toxic, persistent, and bioaccumulates in food chains. Fish consumption is the primary pathway for human exposure to mercury, which can lead to higher risks in certain populations. The third study, required under CAA section 112(n)(1)(C),[[Page 7630]]directed the National Institute of Environmental Health Sciences (NIEHS) to conduct a study to determine the threshold level of mercury exposure below which adverse human health effects were not expected to occur (NIEHS Study). The statute required that the study include a threshold for mercury concentrations in the tissue of fish that could be consumed, even by sensitive populations, without adverse effects to public health. NIEHS submitted the required study to Congress in 1995.\7\ See 76 FR 24982 (May 3, 2011). Later, after submission of the CAA section 112(n)(1) reports and as part of the fiscal year 1999 appropriations, Congress further directed the EPA to fund the National Academy of Sciences (NAS) to perform an independent evaluation of the ***data*** related to the health impacts of methylmercury, and, similar to the CAA section 112(n)(1)(C) inquiry, specifically to advise the EPA as to the appropriate reference dose (RfD) for methylmercury. Congress also indicated in the 1999 conference report directing the EPA to fund the NAS Study, that the EPA should not make the appropriate and necessary regulatory determination until the EPA had reviewed the results of the NAS Study. See H.R Conf. Rep. No. 105-769, at 281-282 (1998). This last study, completed by the NAS in 2000, was entitled Toxicological Effects of Methylmercury (NAS Study),\8\ and it presented a rigorous peer-review of the EPA's RfD for methylmercury. Based on the results of these studies and other available information, the EPA determined on December 20, 2000, pursuant to CAA section 112(n)(1)(A), that it is appropriate and necessary to regulate HAP emissions from coal- and oil-fired EGUs and added such units to the CAA section 112(c) list of source categories that must be regulated under CAA section 112. See 65 FR 79825 (December 20, 2000) (2000 Determination).\9\--------------------------------------------------------------------------- \5\ U.S EPA. Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units--Final Report to Congress. EPA-453/R-98-004a. February 1998. \6\ U.S EPA. 1997. Mercury Study Report to Congress. EPA-452/R-97-003 December 1997. \7\ National Institute of Environmental Health Sciences (NIEHS) Report on Mercury; available in the rulemaking docket at EPA-HQ-OAR-2009-0234-3053. \8\ National Research Council (NAS). 2000. Toxicological Effects of Methylmercury. Committee on the Toxicological Effects of Methylmercury, Board on Environmental Studies and Toxicology, National Research Council. Many of the peer-reviewed articles cited in this section are publications originally cited in the NAS report. \9\ In the same 2000 action, the EPA Administrator found that regulation of HAP emissions from natural gas-fired EGUs is not appropriate or necessary because the impacts due to HAP emissions from such units are negligible. See 65 FR 79831 (December 20, 2000).--------------------------------------------------------------------------- In 2005, the EPA revised the original 2000 Determination and concluded that it was neither appropriate nor necessary to regulate EGUs under CAA section 112 in part because the EPA concluded it could address risks from EGU HAP emissions under a different provision of the statute. See 70 FR 15994 (March 29, 2005) (2005 Revision). Based on that determination, the EPA removed coal- and oil-fired EGUs from the CAA section 112(c) list of source categories to be regulated under CAA section 112. In a separate but related 2005 action, the EPA also promulgated the Clean Air Mercury Rule (CAMR), which established CAA section 111 standards of performance for mercury emissions from EGUs. See 70 FR 28605 (May 18, 2005). Both the 2005 Revision and the CAMR were vacated by the D.C Circuit in 2008. New Jersey v. EPA, 517 F.3d 574 (DC Cir. 2008). The D.C Circuit held that the EPA failed to comply with the requirements of CAA section 112(c)(9) for delisting source categories, and consequently also vacated the CAA section 111 performance standards promulgated in CAMR, without addressing the merits of those standards. Id. at 582-84. Subsequent to the New Jersey decision, the EPA conducted additional technical analyses, including peer-reviewed risk assessments on human health effects associated with mercury (2011 Final Mercury TSD) \10\ and non-mercury metal HAP emissions from EGUs (2011 Non-Hg HAP Assessment).\11\ Those analyses, which focused on populations with higher fish consumption (e.g , subsistence fishers) and residents living near the facilities who experienced increased exposure to HAP through inhalation, found that mercury and non-mercury HAP emissions from EGUs remain a public health hazard and that EGUs were the largest anthropogenic source of mercury emissions to the atmosphere in the U.S Based on these findings, and other relevant information regarding the volume of HAP, environmental effects, and availability of controls, in 2012, the EPA affirmed the original 2000 Determination that it is appropriate and necessary to regulate EGUs under CAA section 112. See 77 FR 9304 (February 16, 2012).--------------------------------------------------------------------------- \10\ U.S EPA. 2011. Revised Technical Support Document: National-Scale Assessment of Mercury Risk to Populations with High Consumption of Self-caught Freshwater Fish in Support of the Appropriate and Necessary Finding for Coal- and Oil-Fired Electric Generating Units. Office of Air Quality Planning and Standards. December 2011. EPA-452/R-11-009. Docket ID Item No. EPA-HQ-OAR-2009-0234-19913 (2011 Final Mercury TSD). \11\ U.S EPA. 2011. Supplement to the Non-Hg Case Study Chronic Inhalation Risk Assessment In Support of the Appropriate and Necessary Finding for Coal- and Oil-Fired Electric Generating Units. Office of Air Quality Planning and Standards. November 2011. EPA-452/R-11-013. Docket ID Item No. EPA-HQ-OAR-2009-0234-19912 (2011 Non-Hg HAP Assessment).--------------------------------------------------------------------------- In the same 2012 action, the EPA established a NESHAP, commonly referred to as MATS, that required coal- and oil-fired EGUs to meet HAP emission standards reflecting the application of the maximum achievable control technology (MACT) for all HAP emissions from EGUs.\12\ MATS applies to existing and new coal- and oil-fired EGUs located at both major and area sources of HAP emissions. An EGU is a fossil fuel-fired steam generating combustion unit of more than 25 megawatts (MW) that serves a generator that produces electricity for sale. See CAA section 112(a)(8) (defining EGU). A unit that cogenerates steam and electricity and supplies more than one-third of its potential electric output capacity and more than 25 MW electric output to any utility power distribution system for sale is also an EGU. Id.--------------------------------------------------------------------------- \12\ Although the 2012 MATS Final Rule has been amended several times, the amendments are not a result of actions regarding the appropriate and necessary determination and, therefore, are not discussed in this preamble. Detail regarding those amendatory actions can be found at [*https://www.epa.gov/stationary-sources-air-pollution/mercury-and-air-toxics-standards.---------------------------------------------------------------------------*](https://www.epa.gov/stationary-sources-air-pollution/mercury-and-air-toxics-standards.---------------------------------------------------------------------------) For coal-fired EGUs, MATS includes standards to limit emissions of mercury, acid gas HAP, non-mercury HAP metals (e.g , nickel, lead, chromium), and organic HAP (e.g , formaldehyde, dioxin/furan). Standards for HCl serve as a surrogate for the acid gas HAP, with an alternate standard for sulfur dioxide (SO2) that may be used as a surrogate for acid gas HAP for those coal-fired EGUs with flue gas desulfurization (FGD) systems and SO2continuous emissions monitoring systems that are installed and operational. Standards for filterable PM serve as a surrogate for the non-mercury HAP metals, with standards for total non-mercury HAP metals and individual non-mercury HAP metals provided as alternative equivalent standards. Work practice standards that require periodic combustion process tune-ups were established to limit formation and emissions of the organic HAP. For oil-fired EGUs, MATS includes standards to limit emissions of HCl and HF, total HAP metals (e.g , mercury, nickel, lead), and organic HAP (e.g , formaldehyde, dioxin/furan). Standards for filterable PM serve as a surrogate for total HAP metals, with standards for total HAP metals and individual HAP metals provided as alternative equivalent standards. Periodic combustion process tune-up work practice standards were established to[[Page 7631]]limit formation and emissions of the organic HAP. Additional detail regarding the types of units regulated under MATS and the regulatory requirements that they are subject to can be found in 40 CFR 63, subpart UUUUU.\13\ The existing source compliance date was April 16, 2015, but many existing sources were granted an additional 1-year extension of the compliance date for the installation of controls.--------------------------------------------------------------------------- \13\ Available at [*www.ecfr.gov/cgi-bin/text-idx?node=sp40.15.63.uuuuu.---------------------------------------------------------------------------*](http://www.ecfr.gov/cgi-bin/text-idx?node=sp40.15.63.uuuuu.---------------------------------------------------------------------------) After MATS was promulgated, both the rule itself and many aspects of the EPA's appropriate and necessary determination were challenged in the D.C Circuit. In White Stallion Energy Center v. EPA, the D.C Circuit unanimously denied all challenges to MATS, with one exception discussed below in which the court was not unanimous. 748 F.3d 1222 (D.C Cir. 2014). As part of its decision, the D.C Circuit concluded that the ``EPA's `appropriate and necessary' determination in 2000, and the reaffirmation of that determination in 2012, are amply supported by EPA's findings regarding the health effects of mercury exposure.'' Id. at 1245.\14\ While joining the D.C Circuit's conclusions as to the adequacy of the EPA's identification of public health hazards, one judge dissented on the issue of whether the EPA erred by not considering costs together with the harms of HAP pollution when making the ``appropriate and necessary'' determination, finding that cost was a required consideration under that determination. Id. at 1258-59 (Kavanaugh, J., dissenting).--------------------------------------------------------------------------- \14\ In discussing the 2011 Final Mercury TSD, the D.C Circuit concluded that the EPA considered the available scientific information in a rational manner, and stated: As explained in the technical support document (TSD) accompanying the Final Rule, EPA determined that mercury emissions posed a significant threat to public health based on an analysis of women of child-bearing age who consumed large amounts of freshwater fish. See [2011 Final] Mercury TSD . . . . The design of EPA's TSD was neither arbitrary nor capricious; the study was reviewed by EPA's independent Science Advisory Board, stated that it ``support[ed] the overall design of and approach to the risk assessment'' and found ``that it should provide an objective, reasonable, and credible determination of potential for a public health hazard from mercury emissions emitted from U.S EGUs.'' . . . In addition, EPA revised the final TSD to address SAB's remaining concerns regarding EPA's ***data*** ***collection*** practices. Id. at 1245-46.--------------------------------------------------------------------------- The U.S Supreme Court subsequently granted certiorari, directing the parties to address a single question posed by the Court itself: ``Whether the Environmental Protection Agency unreasonably refused to consider cost in determining whether it is appropriate to regulate hazardous air pollutants emitted by electric utilities.'' Michigan v. EPA, 135 S. Ct. 702 (Mem.) (2014). In 2015, the U.S Supreme Court held that ``EPA interpreted [CAA section 112(n)(1)(A)] unreasonably when it deemed cost irrelevant to the decision to regulate power plants.'' Michigan, 576 U.S at 760. In so holding, the U.S Supreme Court found that the EPA ``must consider cost-including, most importantly, cost of compliance-before deciding whether regulation is appropriate and necessary.'' Id. at 2711. It is ``up to the Agency,'' the Court added, ``to decide (as always, within the limits of reasonable interpretation) how to account for cost.'' Id. The rule was ultimately remanded back to the EPA to complete the required cost analysis, and the D.C Circuit left the MATS rule in place pending the completion of that analysis. White Stallion Energy Center v. EPA, No. 12-1100, ECF No. 1588459 (D.C Cir. December 15, 2015). In response to the U.S Supreme Court's direction, the EPA finalized a supplemental finding on April 25, 2016, that evaluated the costs of complying with MATS and concluded that the appropriate and necessary determination was still valid. The 2016 Supplemental Finding promulgated two different approaches to incorporate cost into the decision-making process for the appropriate and necessary determination. See 81 FR 24420 (April 25, 2016). The EPA determined that both approaches independently supported the conclusion that regulation of HAP emissions from EGUs is appropriate and necessary. The EPA's preferred approach to incorporating cost evaluated estimated costs of compliance with MATS against several cost metrics relevant to the EGU sector (e.g , historical annual revenues, annual capital expenditures, and impacts on retail electricity prices), and found that the projected costs of MATS were reasonable for the sector in comparison with historical ***data*** on those metrics. The evaluation of cost metrics that the EPA applied was consistent with approaches commonly used to evaluate environmental policy cost impacts.\15\ The EPA also examined as part of its cost analysis what the impact of MATS would be on retail electricity prices and the reliability of the power grid. Using a totality-of-the-circumstances approach, the EPA weighed these supplemental findings as to cost against the existing administrative record detailing the identified hazards to public health and the environment from mercury, non-mercury metal HAP, and acid gas HAP that are listed under CAA section 112, and the other advantages to regulation. Based on that balancing, the EPA concluded under the preferred approach that it remains appropriate to regulate HAP emissions from EGUs after considering cost. See 81 FR 24420 (April 25, 2016) (``After evaluating cost reasonableness using several different metrics, the Administrator has, in accordance with her statutory duty under CAA section 112(n)(1)(A), weighed cost against the previously identified advantages of regulating HAP emissions from EGUs--including the agency's prior conclusions about the significant hazards to public health and the environment associated with such emissions and the volume of HAP that would be reduced by regulation of EGUs under CAA section 112.'')--------------------------------------------------------------------------- \15\ For example, see ``Economic Impact and Small Business Analysis-Mineral Wool and Wool Fiberglass RTRs and Wool Fiberglass Area Source NESHAP'' (U.S EPA, 2015; [*https://www.epa.gov/sites/default/files/2020-07/documents/mwwf\_eia\_neshap\_final\_07-2015.pdf*](https://www.epa.gov/sites/default/files/2020-07/documents/mwwf_eia_neshap_final_07-2015.pdf)) or ``Economic Impact Analysis of Final Coke Ovens NESHAP'' (U.S EPA, 2002; [*https://www.epa.gov/sites/default/files/2020-07/documents/coke-ovens\_eia\_neshap\_final\_08-2002.pdf).---------------------------------------------------------------------------*](https://www.epa.gov/sites/default/files/2020-07/documents/coke-ovens_eia_neshap_final_08-2002.pdf).---------------------------------------------------------------------------) In a second alternative and independent approach (referred to as the alternative approach), the EPA considered the BCA in the 2011 RIA for the 2012 MATS Final Rule. Id. at 24421. In that analysis, even though the EPA was only able to monetize one HAP-specific endpoint, the EPA estimated that the final MATS rule would yield annual monetized net benefits (in 2007 dollars) of between $37 billion to $90 billion using a 3-percent discount rate and between $33 billion to $81 billion using a 7-percent discount rate, in comparison to the projected $9.6 billion in annual compliance costs. See id. at 24425. The EPA therefore determined that the alternative approach also independently supported the conclusion that regulation of HAP emissions from EGUs remains appropriate after considering cost. Id. Several state and industry groups petitioned for review of the 2016 Supplemental Finding in the D.C Circuit. Murray Energy Corp. v. EPA, No. 16-1127 (D.C Cir. filed April 25, 2016). In April 2017, the EPA moved the D.C Circuit to continue oral argument and hold the case in abeyance in order to give the then-new Administration an opportunity to review the 2016 action, and the D.C Circuit ordered that the consolidated challenges to the 2016[[Page 7632]]Supplemental Finding be held in abeyance (i.e , temporarily on hold).\16\--------------------------------------------------------------------------- \16\ Order, Murray Energy Corp. v. EPA, No. 16-1127 (D.C Cir. April 27, 2017), ECF No. 1672987. In response to a joint motion from the parties to govern future proceedings, the D.C Circuit issued an order in February 2021 to continue to hold the consolidated cases in Murray Energy Corp. v. EPA in abeyance. Order, Murray Energy Corp. v. EPA, No. 16-1127 (D.C Cir. February 25, 2021), ECF No. 1887125.--------------------------------------------------------------------------- Accordingly, the EPA reviewed the 2016 action, and on May 22, 2020, finalized a revised response to the Michigan decision. See 85 FR 31286 (May 22, 2020). In the 2020 Final Action, after primarily comparing the projected costs of compliance to the one post control HAP emission reduction benefit that could be monetized, the EPA reconsidered its previous determination and found that it is not appropriate to regulate HAP emissions from coal- and oil-fired EGUs after a consideration of cost, thereby reversing the Agency's conclusion under CAA section 112(n)(1)(A), first made in 2000 and later affirmed in 2012 and 2016. Specifically, in its reconsideration, the Agency asserted that the 2016 Supplemental Finding considering the cost of MATS was flawed based on its assessment that neither of the two approaches to considering cost in the 2016 Supplemental Finding satisfied the EPA's obligation under CAA section 112(n)(1)(A), as that provision was interpreted by the U.S Supreme Court in Michigan. Additionally, the EPA determined that, while finalizing the action would reverse the 2016 Supplemental Finding, it would not remove the Coal- and Oil-Fired EGU source category from the CAA section 112(c)(1) list, nor would it affect the existing CAA section 112(d) emissions standards regulating HAP emissions from coal- and oil-fired EGUs that were promulgated in the 2012 MATS Final Rule.\17\ See 85 FR 31312 (May 22, 2020).--------------------------------------------------------------------------- \17\ This finding was based on New Jersey v. EPA, 517 F.3d 574 (D.C Cir. 2008), which held that the EPA is not permitted to remove source categories from the CAA section 112(c)(1) list unless the CAA section 112(c)(9) criteria for delisting have been met.--------------------------------------------------------------------------- In the 2020 Final Action, the EPA also finalized the risk review required by CAA section 112(f)(2) and the first technology review required by CAA section 112(d)(6) for the Coal- and Oil-Fired EGU source category regulated under MATS.\18\ The EPA determined that residual risks due to emissions of air toxics from the Coal- and Oil-Fired EGU source category are acceptable and that the current NESHAP provides an ample margin of safety to protect public health and to prevent an adverse environmental effect. In the technology review, the EPA did not identify any new developments in HAP emission controls to achieve further cost-effective emissions reductions. Based on the results of these reviews, the EPA found that no revisions to MATS were warranted. See 85 FR 31314 (May 22, 2020).--------------------------------------------------------------------------- \18\ CAA section 112(f)(2) requires the EPA to conduct a one-time review of the risks remaining after imposition of MACT standards under CAA section 112(d)(2) within 8 years of the effective date of those standards (risk review). CAA section 112(d)(6) requires the EPA to conduct a review of all CAA section 112(d) standards at least every 8 years to determine whether it is necessary to establish more stringent standards after considering, among other things, advances in technology and costs of additional control (technology review). The EPA has always conducted the first technology review at the same time it conducts the risk review and collectively the actions are known at RTRs.--------------------------------------------------------------------------- Several states, industry, public health, environmental, and civil rights groups petitioned for review of the 2020 Final Action in the D.C Circuit. American Academy of Pediatrics v. Regan, No. 20-1221 and consolidated cases (D.C Cir. filed June 19, 2020). On September 28, 2020, the D.C Circuit granted the EPA's unopposed motion to sever from the lead case and hold in abeyance two of the petitions for review: Westmoreland Mining Holdings LLC v. EPA, No. 20-1160 (D.C Cir. filed May 22, 2020) (challenging the 2020 Final Action as well as prior EPA actions related to MATS, including a challenge to the MATS CAA section 112(d) standards on the basis that the 2020 Final Action's reversal of the appropriate and necessary determination provided a ``grounds arising after'' for filing a petition outside the 60-day window for judicial review of MATS), and Air Alliance Houston v. EPA, No. 20-1268 (D.C Cir. filed July 21, 2020) (challenging only the RTR portion of the 2020 Final Action).\19\--------------------------------------------------------------------------- \19\ Order, Westmoreland Mining Holdings LLC v. EPA, No. 20-1160 (D.C Cir. September 28, 2020), ECF No. 1863712.--------------------------------------------------------------------------- On January 20, 2021, President Biden signed Executive Order 13990, ``Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis.'' The Executive Order, among other things, instructs the EPA to review the 2020 Final Action and consider publishing a notice of proposed rulemaking suspending, revising, or rescinding that action. In February 2021, the EPA moved the D.C Circuit to hold American Academy of Pediatrics and consolidated cases in abeyance, pending the Agency's review of the 2020 Final Action as prompted in Executive Order 13990, and on February 16, 2021, the D.C Circuit granted the Agency's motion.\20\--------------------------------------------------------------------------- \20\ Order, American Academy of Pediatrics v. Regan, No. 20-1221 (D.C Cir. February 16, 2021), ECF No. 1885509.--------------------------------------------------------------------------- In the meantime, the requirements of MATS have been fully implemented, resulting in significant reductions in HAP emissions from EGUs and the risks associated with those emissions. The EPA had projected that annual EGU mercury emissions would be reduced by 75 percent with MATS implementation. In fact, EGU emission reductions have been far more substantial (down to approximately 4 tons in 2017), which represents an 86 percent reduction compared to 2010 (pre-MATS) levels. See Table 4 at 84 FR 2689 (February 7, 2019). Acid gas HAP and non-mercury metal HAP have similarly been reduced--by 96 percent and 81 percent, respectively--as compared to 2010 levels. Id. MATS is the only Federal requirement that guarantees this level of HAP control from EGUs. The EPA is now proposing to revoke the 2020 reconsideration of the 2016 Supplemental Finding and to reaffirm once again that it is appropriate and necessary to regulate emissions of HAP from coal- and oil-fired EGUs. We will provide notice of the results of our review of the 2020 RTR in a separate future action.B. Statutory Background Additional statutory context is useful to help identify the relevant factors that the Administrator should weigh when making the appropriate and necessary determination.1. Pre-1990 History of HAP Regulation In 1970, Congress enacted CAA section 112 to address the millions of pounds of HAP emissions that were estimated to be emitted from stationary sources in the country. At that time, the CAA defined HAP as ``an air pollutant to which no ambient air quality standard is applicable and which, in the judgment of the Administrator may cause, or contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness,'' but the statute left it to the EPA to identify and list pollutants that were HAP. Once a HAP was listed, the statute required the EPA to regulate sources of that identified HAP ``at the level which in [the Administrator's] judgment provides an ample margin of safety to protect the public health from such hazardous air pollutants.'' CAA section 112(b)(1)(B) (pre-1990 amendments); Legislative History of the CAA Amendments of 1990 (``Legislative[[Page 7633]]History''), at 3174-75, 3346 (Comm. Print 1993). The statute did not define the term ``ample margin of safety'' or provide a risk metric on which the EPA was to establish standards, and initially the EPA endeavored to account for costs and technological feasibility in every regulatory decision. In Natural Resources Defense Council (NRDC) v. EPA, 824 F.2d 1146 (D.C Cir. 1987), the D.C Circuit concluded that the CAA required that in interpreting what constitutes ``safe,'' the EPA was prohibited from considering cost and technological feasibility. Id. at 1166. The EPA subsequently issued the NESHAP for benzene in accordance with the NRDC holding.\21\ Among other things, the Benzene NESHAP concluded that there is a rebuttable presumption that any cancer risk greater than 100-in-1 million to the most exposed individual is unacceptable, and per NRDC, must be addressed without consideration of cost or technological feasibility. The Benzene NESHAP further provided that, after evaluating the acceptability of cancer risks, the EPA must evaluate whether the current level of control provides an ample margin of safety for any risk greater than 1-in-1 million and, if not, the EPA will establish more stringent standards as necessary after considering cost and technological feasibility.\22\--------------------------------------------------------------------------- \21\ National Emissions Standards for Hazardous Air Pollutants: Benzene Emissions from Maleic Anhydride Plants, Ethylbenzene/Styrene Plants, Benzene Storage Vessels, Benzene Equipment Leaks, and Coke By-Product Recovery Plants (Benzene NESHAP). 54 FR 38044 (September 14, 1989). \22\ ``In protecting public health with an ample margin of safety under section 112, EPA strives to provide maximum feasible protection against risks to health from hazardous air pollutants by (1) protecting the greatest number of persons possible to an individual lifetime risk level no higher than approximately 1 in 1 million and (2) limiting to no higher than approximately 1 in 10 thousand the estimated risk that a person living near a plant would have if he or she were exposed to the maximum pollutant concentrations for 70 years.'' Benzene NESHAP, 54 FR 38044-5, September 14, 1989.---------------------------------------------------------------------------2. Clean Air Act 1990 Amendments to Section 112 In 1990, Congress radically transformed section 112 of the CAA and its treatment of hazardous air pollution. The legislative history of the amendments indicates Congress' dissatisfaction with the EPA's slow pace addressing these pollutants under the 1970 CAA: ``In theory, [hazardous air pollutants] were to be stringently controlled under the existing Clean Air Act section 112. However, . . . only seven of the hundreds of potentially hazardous air pollutants have been regulated by EPA since section 112 was enacted in 1970.'' H.R Rep. No. 101-490, at 315 (1990); see also id. at 151 (noting that in 20 years, the EPA's establishment of standards for only seven HAP covered ``a small fraction of the many substances associated . . . with cancer, birth defects, neurological damage, or other serious health impacts.''). Congress was concerned with how few sources had been addressed during this time. Id. (``[The EPA's] regulations sometimes apply only to limited sources of the relevant pollutant. For example, the original benzene standard covered just one category of sources (equipment leaks). Of the 50 toxic substances emitted by industry in the greatest volume in 1987, only one--benzene--has been regulated even partially by EPA.''). Congress noted that state and local regulatory efforts to act in the face of ``the absence of Federal regulations'' had ``produced a patchwork of differing standards,'' and that ``[m]ost states . . . limit the scope of their program by addressing a limited number of existing sources or source categories, or by addressing existing sources only on a case-by-case basis as problem sources are identified'' and that ``[o]ne state exempts all existing sources from review.'' Id. In enacting the 1990 Amendments with respect to the control of hazardous air pollution, Congress noted that ``[p]ollutants controlled under [section 112] tend to be less widespread than those regulated [under other sections of the CAA], but are often associated with more serious health impacts, such as cancer, neurological disorders, and reproductive dysfunctions.'' Id. at 315. In its substantial 1990 Amendments, Congress itself listed 189 HAP (CAA section 112(b)) and set forth a statutory structure that would ensure swift regulation of a significant majority of these HAP emissions from stationary sources. Specifically, after defining major and area sources and requiring the Agency to list all major sources and many area sources of the listed pollutants (CAA section 112(c)), the new CAA section 112 required the Agency to establish technology-based emission standards for listed source categories on a prompt schedule and to revisit those technology-based standards every 8 years (CAA section 112(d) (emission standards); CAA section 112(e) (schedule for standards and review)). The 1990 Amendments also obligated the EPA to evaluate the residual risk within 8 years of promulgation of technology-based standards. CAA section 112(f)(2). In setting the standards, CAA section 112(d) requires the Agency to establish technology-based standards that achieve the ``maximum degree of reduction,'' ``including a prohibition on such emissions where achievable.'' CAA section 112(d)(2). Congress specified that the maximum degree of reduction must be at least as stringent as the average level of control achieved in practice by the best performing sources in the category or subcategory based on emissions ***data*** available to the Agency at the time of promulgation. This technology-based approach permitted the EPA to swiftly set standards for source categories without determining the risk or cost in each specific case, as the EPA had done prior to the 1990 Amendments. In other words, this approach to regulation quickly required that all major sources and many area sources of HAP install control technologies consistent with the top performers in each category, which had the effect of obtaining immediate reductions in the volume of HAP emissions from stationary sources. The statutory requirement that sources obtain levels of emission limitation that have actually been achieved by existing sources, instead of levels that could theoretically be achieved, inherently reflects a built-in cost consideration.\23\--------------------------------------------------------------------------- \23\ Congress recognized as much: ``The Administrator may take the cost of achieving the maximum emission reduction and any non-air quality health and environmental impacts and energy requirements into account when determining the emissions limitation which is achievable for the sources in the category or subcategory. Cost considerations are reflected in the selection of emissions limitations which have been achieved in practice (rather than those which are merely theoretical) by sources of a similar type or character.'' A Legislative History of the Clean Air Act Amendments of 1990 (CAA Legislative History), Vol 5, pp. 8508 -8509 (CAA Amendments of 1989; p. 168-169; Report of the Committee on Environment and Public Works S. 1630).--------------------------------------------------------------------------- Further, after determining the minimum stringency level of control, or MACT floor, CAA section 112(d)(2) requires the Agency to determine whether more stringent standards are achievable after considering the cost of achieving such standards and any non-air-quality health and environmental impacts and energy requirements of additional control. In doing so, the statute further specifies in CAA section 112(d)(2) that the EPA should consider requiring sources to apply measures that, among other things, ``reduce the volume of, or eliminate emissions of, such pollutants . . .'' (CAA section 112(d)(2)(A)), ``enclose systems or processes to eliminate emissions'' (CAA section 112(d)(2)(B)), and ``***collect***, capture, or treat such pollutants when released . . .'' (CAA section 112(d)(2)(C)). The 1990 Amendments also built in a regular review of new[[Page 7634]]technologies and a one-time review of risks that remain after imposition of MACT standards. CAA section 112(d)(6) requires the EPA to evaluate every NESHAP no less often than every 8 years to determine whether additional control is necessary after taking into consideration ``developments in practices, processes, and control technologies,'' without regard to risk. CAA section 112(f) requires the EPA to ensure that the risks are acceptable and that the MACT standards provide an ample margin of safety. The statutory requirement to establish technology-based standards under CAA section 112 avoided the need for the EPA to identify hazards to public health and the environment in order to justify regulation of HAP emissions from stationary sources, reflecting Congress' judgment that such emissions are inherently dangerous. See S. Rep. No. 101-228, at 148 (``The MACT standards are based on the performance of technology, and not on the health and environmental effects of the [HAP].''). The technology review required in CAA section 112(d)(6) further mandates that the EPA continually evaluate standards to determine if additional reductions can be obtained, without consideration of the specific risk associated with the HAP emissions that would be reduced. Notably, the CAA section 112(d)(6) review of what additional reductions may be obtained based on new technology is required even after the Agency has conducted the CAA section 112(f)(2) review and determined that the existing standard will protect the public with an ample margin of safety. The statutory structure and legislative history also demonstrate Congress' concern with the many ways that HAP can harm human health and Congress' goal of protecting the most exposed and vulnerable members of society. The committee report accompanying the 1990 Amendments discussed the scientific understanding regarding HAP risk at the time, including the 1989 report on benzene performed by the EPA noted above. H.R Rep. No. 101-490, at 315. Specifically, Congress highlighted the EPA's findings as to cancer incidence, and importantly, lifetime individual risk to the most exposed individuals. Id. The report also notes the limitations of the EPA's assessment: ``The EPA estimates evaluated the risks caused by emissions of a single toxic air pollutant from each plant. But many facilities emit numerous toxic pollutants. The agency's risk assessments did not consider the combined or synergistic effects of exposure to multiple toxics, or the effect of exposure through indirect pathways.'' Id. Congress also noted the EPA's use of the maximum exposed individual (MEI) tool to assess risks faced by heavily exposed citizens. Id. The report cited particular scientific studies demonstrating that some populations are more affected than others--for example, it pointed out that ``[b]ecause of their small body weight, young children and fetuses are especially vulnerable to exposure to PCB-contaminated fish. One study has found long-term learning disabilities in children who had eaten high-levels of Great Lakes fish.'' Id. The statutory structure confirms Congress' approach to risk and sensitive populations. As noted, the CAA section 112(f)(2) residual risk review requires the EPA to consider whether, after imposition of the CAA section 112(d)(2) MACT standard, there are remaining risks from HAP emissions that warrant more stringent standards to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect. See CAA section 112(f)(2)(A). Specifically, the statute requires the EPA to promulgate standards under the risk review provision if the CAA section 112(d) standard does not ``reduce lifetime excess cancer risks to the individual most exposed to emissions from a source in the category or subcategory to less than one in one million.'' Id. Thus, even after the application of MACT standards, the statute directs the EPA to conduct a rulemaking if even one person has a risk, not a guarantee, of getting cancer. This demonstrates the statutory intent to protect even the most exposed member of the population from the harms attendant to exposure to HAP emissions. If a residual risk rulemaking is required, as noted above, the statute incorporates the detailed rulemaking approach set forth in the Benzene NESHAP for determining whether HAP emissions from stationary sources pose an unacceptable risk and whether standards provide an ample margin of safety. See CAA section 112(f)(2)(B) (preserving the prior interpretation of ``ample margin of safety'' set forth in the Benzene NESHAP). That approach includes a rebuttable presumption that any cancer risk greater than 100-in-1 million to the most exposed person is per se unacceptable. For non-cancer chronic and acute risks, the EPA has more discretion to determine what is acceptable, but even then, the statute requires the EPA to evaluate the risks to the most exposed individual and our RfDs are developed with the goal of being protective of even sensitive members of the population. See e.g , CAA section 112(n)(1)(C) (requiring, in part, the development of ``a threshold for mercury concentration in the tissue of fish which may be consumed (including consumption by sensitive populations) without adverse effects to public health''). If risks are found to be unacceptable, the EPA must impose additional control requirements to ensure that post CAA section 112(f) risks from HAP emissions are at an acceptable level, regardless of cost and technological feasibility. After determining whether the risks are acceptable and developing standards to achieve an acceptable level of risk if necessary, the EPA must then determine whether more stringent standards are necessary to provide an ample margin of safety to protect public health, and at this stage we must take into consideration cost, technological feasibility, uncertainties, and other relevant factors. As stated in the Benzene NESHAP, ``In protecting public health with an ample margin of safety under section 112, EPA strives to provide maximum feasible protection against risks to health from hazardous air pollutants by . . . protecting the greatest number of persons possible to an individual lifetime risk level no higher than approximately 1 in 1 million.'' See 54 FR 38044-45 (September 14, 1989); see also NRDC v. EPA, 529 F.3d 1077, 1082 (D.C Cir. 2008) (finding that ``the Benzene NESHAP standard established a maximum excess risk of 100-in-one million, while adopting the one-in-one million standard as an aspirational goal.''). The various listing and delisting provisions of CAA section 112 further demonstrate a statutory intent to reduce risk and protect the most exposed members of the population from HAP emissions. See, e.g , CAA section 112(b)(2) (requiring the EPA to add pollutants to the HAP list if the EPA determines the HAP ``presents, or may present'' adverse human health or adverse environmental effects); id. at CAA section 112(b)(3)(B) (requiring the EPA to add a pollutant to the list if a petitioner shows that a substance is known to cause or ``may reasonably be anticipated to cause adverse effects to human health or adverse environmental effects''); id. at CAA section 112(b)(3) (authorizing the EPA to delete a substance only on a showing that ``the substance may not reasonably be anticipated to cause any adverse effects to human health or adverse environmental effects.''); id. at CAA section 112(c)(9)(B)(i) (prohibiting the EPA from delisting a source category if even one source in the category causes[[Page 7635]]a lifetime cancer risk greater than 1-in-1 million to ``the individual in the population who is most exposed to emissions of such pollutants from the source.''); id. at CAA section 7412(c)(9)(B)(i) (prohibiting the EPA from delisting a source category unless the Agency determines that the non-cancer causing HAP emitted from the source category do not ``exceed a level which is adequate to protect public health with an ample margin of safety and no adverse environmental effect will result from emissions of any source'' in the category); id. at CAA section 112(n)(1)(C) (requiring a study to determine the level of mercury in fish tissue that can be consumed by even sensitive populations without adverse effect to public health). The deadlines for action included in the 1990 Amendments indicate that Congress wanted HAP pollution addressed quickly. The statute requires the EPA to list all major source categories within 1 year of the 1990 Amendments and to regulate those listed categories on a strict schedule that prioritizes the source categories that are known or suspected to pose the greatest risks to the public. See CAA sections 112(c)(1), 112(e)(1) and 112(e)(2). For area sources, where the statute provides the EPA with greater discretion to determine the sources to regulate, it also directs the Agency to ***collect*** the information necessary to make the listing decision for many area source categories and requires the Agency to act on that information by a date certain. For example, CAA section 112(k) establishes an area source program designed to identify and list at least 30 HAP that pose the greatest threat to public health in the largest number of urban areas (urban HAP) and to list for regulation area sources that account for at least 90 percent of the area source emissions of the 30 urban HAP. See CAA sections 112(k) and 112(c)(3). In addition to the urban air toxics program, CAA section 112(c)(6) directs the EPA to identify and list sufficient source categories to ensure that at least 90 percent of the aggregate emissions of seven bioaccumulative and persistent HAP, including mercury, are subject to standards pursuant to CAA sections 112(d)(2) or (d)(4). See CAA section 112(c)(6). Notably, these requirements were in addition to any controls on mercury and other CAA section 112(c)(6) HAP that would be imposed if the EPA determined it was appropriate and necessary to regulate EGUs under CAA section 112. This was despite the fact that it was known at the time of enactment that other categories with much lower emissions of mercury would have to be subject to MACT standards because of the exclusion of EGUs from CAA section 112(c)(6). As the preceding discussion demonstrates, throughout CAA section 112 and its legislative history, Congress made clear its intent to quickly secure large reductions in the volume of HAP emissions from stationary sources because of its recognition of the hazards to public health and the environment inherent in exposure to such emissions. CAA section 112 and its legislative history also reveal Congress' understanding that fully characterizing the risks posed by HAP emissions was exceedingly difficult; thus, Congress purposefully replaced a regime that required an assessment of risk in the first instance with one that assumed that risk and directed swift and substantial reductions. The statutory design and direction also repeatedly emphasize that the EPA should regulate with the most exposed and most sensitive members of the population in mind in order to achieve an acceptable level of HAP emissions with an ample margin of safety. As explained further below, this statutory context informs the EPA's judgment as to the relevant factors to weigh in the analysis of whether regulation remains appropriate after a consideration of cost.III. Proposed Determination Under CAA Section 112(n)(1)(A) In this action, the EPA is proposing to revoke the 2020 Final Action and to reaffirm the appropriate and necessary determination made in 2000, and reaffirmed in 2012 and 2016.\24\ We propose to find that, under either our preferred totality-of-the-circumstances framework or our alternative formal BCA framework, the information that would have been available to the Agency as of the time of the 2012 rulemaking supports a determination that it is appropriate and necessary to regulate HAP from EGUs. We also consider new information regarding the hazards to public health and the environment and the costs of compliance with MATS that has become available since the 2016 Supplemental Finding, and find that the updated information strengthens the EPA's conclusion that it is appropriate and necessary to regulate HAP from coal- and oil-fired EGUs.--------------------------------------------------------------------------- \24\ Our proposal focuses on an analysis of the ``appropriate'' prong of the CAA section 112(n)(1)(A). The Michigan decision and subsequent EPA actions addressing that decision have been centered on supplementing the Agency's record with a consideration of the cost of regulation as part of the ``appropriate'' aspect of the overall determination. As noted, the 2020 Final Action, while reversing the 2016 Supplemental Finding as to the EPA's determination that it was ``appropriate'' to regulate HAP from EGUs, did not rescind the Agency's prior determination that it was necessary to regulate. See 84 FR 2674 (February 7, 2019) (``CAA section 112(n)(1)(A) requires the EPA to determine that both the appropriate and necessary prongs are met. Therefore, if the EPA finds that either prong is not satisfied, it cannot make an affirmative appropriate and necessary finding. The EPA's reexamination of its determination . . . focuses on the first prong of that analysis.''). The ``necessary'' determination rested on two primary bases: (1) In 2012, the EPA determined that the hazards posed to human health and the environment by HAP emissions from EGUs would not be addressed in its future year modeling, which accounted for all CAA requirements to that point; and (2) our conclusion that the only way to ensure permanent reductions in U.S EGU emissions of HAP and the associated risks to public health and the environment was through standards set under CAA section 112. See 76 FR 25017 (May 23, 2011). We therefore continue our focus in this proposal on reinstating the ``appropriate'' prong of the determination, leaving undisturbed the Agency's prior conclusions that regulation of HAP from EGUs is ``necessary.'' See 65 FR 79830 (December 20, 2000); 76 FR 25017 (May 3, 2011); 77 FR 9363 (February 16, 2012).--------------------------------------------------------------------------- At the outset, we note that CAA section 112(n)(1)(A) is silent as to whether the EPA may consider updated information when acting on a remand of the appropriate and necessary determination. CAA section 112(n)(1)(A) directs the EPA to conduct the Utility Study within 3 years, and requires the EPA to regulate EGUs if the Administrator makes a finding that it is appropriate and necessary to do so ``after'' considering the results of the Utility Study. Consistent with the EPA's interpretation in 2005, 2012, 2016, and 2020, we do not read this language to require the EPA to consider the most-up-to-date information where the Agency is compelled to revisit the determination, but nor do we interpret the provision to preclude consideration of new information where reasonable. See 70 FR 16002 (March 29, 2005); 77 FR 9310 (February 16, 2012); 81 FR 24432 (April 25, 2016); 85 FR 31306 (May 22, 2020). As such, the Agency has applied its discretion in determining when to consider new information under this provision based on the circumstances. For example, when the EPA was revisiting the determination in 2012, we noted that ``[b]ecause several years had passed since the 2000 finding, the EPA performed additional technical analyses for the proposed rule, even though those analyses were not required.'' 77 FR 9310 (February 16, 2012).\25\ Similarly, we think that it is reasonable to consider new information in the context of this proposal, given that almost a decade has passed since we last considered updated information. In this proposed reconsideration of the[[Page 7636]]determination per the President's Executive Order, both the growing scientific understanding of public health risks associated with HAP emissions and a clearer picture of the cost of control technologies and the make-up of power sector generation over the last decade may inform the question of whether it is appropriate to regulate, and, in particular, help address the inquiry that the Supreme Court directed us to undertake in Michigan. We believe the evolving scientific information with regard to benefits and the advantage of hindsight with regard to costs warrant considering currently available information in making this determination. To the extent that our determination should flow from information that would have been available at the ``initial decision to regulate,'' Michigan, 576 U.S at 754, we propose conclusions here based on analyses limited to this earlier record. But we also believe it is reasonable to consider new ***data***, and propose to find that the new information regarding both public health risks and costs bolsters the finding and supports a determination that it is appropriate and necessary to regulate EGUs for HAP.--------------------------------------------------------------------------- \25\ The EPA was not challenged on this interpretation in White Stallion.--------------------------------------------------------------------------- In section III.A of this preamble, we first describe the advantages of regulation--the reduction in emissions of HAP and attendant reduction of risks to human health and the environment, including the distribution of these health benefits. We carefully document the numerous risks to public health and the environment posed by HAP emissions from EGUs. This includes information previously recognized and documented in the statutorily mandated CAA section 112(n)(1) studies, the 2000 Determination, the 2012 MATS Final Rule, and the 2016 Supplemental Finding about the nature and extent of health and environmental impacts from HAP that are emitted by EGUs, as well as additional risk analyses supported by new scientific studies. Specifically, new risk screening analyses on the connection between mercury and heart disease as well as IQ loss in children across the U.S further supports the conclusion that HAP emissions from EGUs pose hazards to public health and the environment warranting regulating under CAA section 112. The EPA also discusses the challenges associated with fully quantifying and monetizing the human health and environmental effects associated with HAP emissions. Finally, we note that in addition to reducing the identified risks posed by HAP emissions from EGUs, regulation of such HAP emissions results in significant health and environmental co-benefits. We then turn in preamble section III.B to the disadvantages of regulation--the costs associated with reducing EGU HAP emissions and other potential impacts to the sector and the economy associated with MATS. With the benefit of hindsight, we first consider whether MATS actually cost what we projected in the 2011 RIA and conclude that the projection in the 2011 RIA was almost certainly a significant overestimate of the actual costs. We then evaluate the costs estimated in the 2011 RIA against several metrics relevant to the impacts those costs have on the EGU sector and American electricity consumers (e.g , historical annual revenues, annual capital and production expenditures, impacts on retail electricity prices, and impacts on resource adequacy and reliability). These analyses, based on ***data*** available in 2012 and based on updated ***data***, all show that the costs of MATS were within the bounds of typical historical fluctuations and that the industry would be able to comply with MATS and continue to provide a reliable source of electricity without price increases that were outside the range of historical variability. In section III.C of this preamble, we explain why the methodology used in our 2020 Finding was ill-suited to determining whether EGU HAP regulation is appropriate and necessary because it gave virtually no weight to the volume of HAP that would be reduced, and the vast majority of the benefits of reducing EGU HAP, including the reduction of risk to sensitive populations, based on the Agency's inability to quantify or monetize post-control benefits of HAP regulations. In preamble section III.D, we explain our preferred totality-of-the-circumstances methodology that we propose to use to make the appropriate determination, and our application of that methodology. This approach looks to the statute, and particularly CAA section 112(n)(1)(A) and the other provisions in CAA section 112(n)(1), to help identify the relevant factors to weigh and what weight to afford those factors. Under that methodology we weigh the significant health and environmental advantages of reducing EGU HAP, and in particular the benefits to the most exposed and sensitive individuals, against the disadvantages of expending money to achieve those benefits--i.e , the effects on the electric generating industry and its ability to provide reliable and affordable electricity. We ultimately propose to conclude that the advantages outweigh the disadvantages whether we look at the record from 2012 or at our new record, which includes an expanded understanding of the health risks associated with HAP emissions and finds that the costs projected in the 2011 RIA were almost certainly significantly overestimated. We further consider that, if we also account for the non-HAP benefits in our preferred totality-of-the-circumstances approach, such as the benefits (including reduced mortality) of coincidental reductions in PM and ozone that flow from the application of controls on HAP, the balance weighs even more heavily in favor of regulating HAP emissions from coal- and oil-fired EGUs. Finally, in section III.E, we consider an alternative methodology to make the appropriate determination, using a formal BCA of MATS that was conducted consistent with economic principles. This methodology is not our preferred way to consider advantages and disadvantages for the CAA section 112(n)(1)(A) determination, because the EPA's inability to generate a monetized estimate of the full benefits of HAP reductions can lead to an underestimate of the monetary value of the net benefits of regulation. To the extent that a formal BCA is appropriate for making the CAA section 112(n)(1)(A) determination, however, that approach demonstrates that the monetized benefits of MATS outweigh the monetized costs by a considerable margin, whether we look at the 2012 record or our updated record. We therefore propose that it is appropriate to regulate EGUs for HAP applying a BCA approach as well. In sum, the EPA proposes to conclude that it is appropriate and necessary to regulate HAP emissions from coal- and oil-fired EGUs, whether we are applying the preferred totality-of-the-circumstances methodology or the alternative formal benefit-cost approach, and whether we are considering only the administrative record as of the original EPA response on remand to Michigan in 2016 or based on new information made available since that time. The information and ***data*** amassed by the EPA over the decades of administrative analysis and rulemaking devoted to this topic overwhelmingly support the conclusion that the advantages of regulating HAP emissions from coal- and oil-fired EGUs outweigh the costs. The EPA requests comment on this proposed finding and on the supporting information presented in this proposal, including information related to the risks associated with HAP emissions from U.S EGUs and the actual costs incurred by the power sector due to MATS, as well as on the[[Page 7637]]preferred and alternative methodologies for reaching the proposed conclusion.A. Public Health Hazards Associated With Emissions From EGUs1. Overview The administrative record for the MATS rule detailed several hazards to public health and the environment from HAP emitted by EGUs that remained after imposition of the ARP and other CAA requirements. See 80 FR 75028-29 (December 1, 2015). See also 65 FR 79825-31 (December 20, 2000); 76 FR 24976-25020 (May 3, 2011); 77 FR 9304-66 (February 16, 2012). The EPA considered all of this information again in the 2016 Supplemental Finding, noting that this sector represented a large fraction of U.S emissions of mercury, non-mercury metal HAP, and acid gases. Specifically, the EPA found that even after imposition of the other requirements of the CAA, but absent MATS, EGUs remained the largest domestic source of mercury, HF, HCl, and selenium and among the largest domestic contributors of arsenic, chromium, cobalt, nickel, hydrogen cyanide, beryllium, and cadmium, and that a significant majority of EGU facilities emitted above the major source thresholds for HAP emissions. Further, the EPA noted that the totality of risks that accrue from these emissions were significant. These hazards include potential neurodevelopmental impairment, increased cancer risks, contribution to chronic and acute health disorders, as well as adverse impacts on the environment. Specifically, the EPA pointed to results from its revised nationwide Mercury Risk Assessment (contained in the 2011 Final Mercury TSD) \26\ as well as an inhalation risk assessment (2011 Non-Hg HAP Assessment) for non-mercury HAP (i.e , arsenic, nickel, chromium, selenium, cadmium, HCl, HF, hydrogen cyanide, formaldehyde, benzene, acetaldehyde, manganese, and lead). The EPA estimated lifetime cancer risks for inhabitants near some coal- and oil-fired EGUs to exceed 1-in-1 million \27\ and noted that this case-study-based estimate likely underestimated the true maximum risks for the EGU source category. See 77 FR 9319 (February 16, 2012). The EPA also found that mercury emissions pose a hazard to wildlife, adversely affecting fish-eating birds and mammals, and that the large volume of acid gas HAP associated with EGUs also pose a hazard to the environment.\28\ These technical analyses were all challenged in the White Stallion case, and the D.C Circuit found that the EPA's risk finding as to mercury alone--that is, before reaching any other risk finding--established a significant public health concern. The court stated that ``EPA's `appropriate and necessary' determination in 2000, and its reaffirmation of that determination in 2012, are amply supported by EPA's finding regarding the health effects of mercury exposure.'' White Stallion Energy Center v. EPA, 748 F.3d 1222, 1245 (D.C Cir. 2014). Additional scientific evidence about the human health hazards associated with EGU HAP emissions that has been ***collected*** since the 2016 Supplemental Finding and is discussed in this section has extended our confidence that these emissions pose an unacceptable risk to the American public and in particular, to vulnerable, exposed populations.--------------------------------------------------------------------------- \26\ U.S EPA. 2011. Revised Technical Support Document: National-Scale Assessment of Mercury Risk to Populations with High Consumption of Self-caught Freshwater Fish In Support of the Appropriate and Necessary Finding for Coal- and Oil-Fired Electric Generating Units. Office of Air Quality Planning and Standards. November. EPA-452/R-11-009. Docket ID Item No. EPA-HQ-OAR-2009-0234-19913. \27\ The EPA determined the 1-in-1 million standard was the correct metric in part because CAA section 112(c)(9)(B)(1) prohibits the EPA from removing a source category from the list if even one person is exposed to a lifetime cancer risk greater than 1-in-1 million, and CAA section 112(f)(2)(A) directs the EPA to conduct a residual risk rulemaking if even one person is exposed to a lifetime excess cancer risk greater than 1-in-1 million. See White Stallion at 1235-36 (agreeing it was reasonable for the EPA to consider the 1-in-1 million delisting criteria in defining ``hazard to public health'' under CAA section 112(n)(1)(A)). \28\ The EPA had determined it was reasonable to consider environmental impacts of HAP emissions from EGUs in the appropriate determination because CAA section 112 directs the EPA to consider impacts of HAP emissions on the environment, including in the CAA section 112(n)(1)(B) Mercury Study. See White Stallion at 1235-36 (agreeing it was reasonable for the EPA to consider the environmental harms when making the appropriate and necessary determination).--------------------------------------------------------------------------- This section of the preamble starts by briefly reviewing the long-standing and extensive body of evidence, including new scientific information made available since the 2016 Supplemental Finding, which demonstrates that HAP emissions from oil- and coal-fired EGUs present hazards to public health and the environment warranting regulation under CAA section 112 (section III.A.2). This is followed by an expanded discussion of the health risks associated with domestic EGU mercury emissions based on additional evidence regarding cardiovascular effects that has become available since the 2016 Supplemental Finding (section III.A.3). In section III.A.4, the EPA describes the reasons why it is extremely difficult to estimate the full health and environmental impacts associated with exposure to HAP. We note the longstanding challenges associated with quantifying and monetizing these effects, which may be permanent and life-threatening and are often distributed unevenly (i.e , concentrated among highly exposed individuals). Next, the section provides an expanded discussion of some identified environmental justice (EJ) issues associated with these emissions (section III.A.5). Section III.A.6 identifies health effects associated with other, non-HAP emissions from EGUs such as SO2, direct PM2.5and other PM2.5and ozone precursors. Because these pollutants are co-emitted with HAP, the controls necessary to reduce HAP emissions from EGUs often reduce these pollutants as well. After assessing all the evidence, the EPA concludes again (section III.A.7) that regulation of HAP emissions from EGUs under CAA section 112 greatly improves public health for Americans by reducing the risks of premature mortality from heart attacks, cancer, and neurodevelopmental delays in children, and by helping to restore economically vital ecosystems used for recreational and commercial purposes. Further, we conclude that these public health improvements will be particularly pronounced for certain segments of the American population that are especially vulnerable (e.g , subsistence fishers \29\ and their children) to impacts from EGU HAP emissions. In addition, the concomitant reductions in co-emitted pollutants will also provide substantial public health and environmental benefits.--------------------------------------------------------------------------- \29\ Subsistence fishers, who by definition obtain a substantial portion of their dietary needs from self-caught fish consumption, can experience elevated levels of exposure to chemicals that bioaccumulate in fish including, in particular, methylmercury. Subsistence fishing activity can be related to a number of factors including socio-economic status (poverty) and/or cultural practices, with ethnic minorities and tribal populations often displaying increased levels of self-caught fish consumption (Burger et al., 2002, Shilling et al., 2010, Dellinger 2004). Burger J, (2002). Daily consumption of wild fish and game: exposures of high end recreationalists. International Journal of Environmental Health Research 12:4, p. 343-354. Shilling F, White A, Lippert L, Lubell M, (2010). Contaminated fish consumption in California's Central Valley Delta. Environmental Research 110, p. 334-344. Dellinger J, (2004). Exposure assessment and initial intervention regarding fish consumption of tribal members in the Upper Great Lakes Region in the United States. Environmental Research 95, p. 325-340.---------------------------------------------------------------------------2. Overview of Health Effects Associated With Mercury and Non-Mercury HAP In calling for the Agency to consider the regulation of HAP from EGUs, the[[Page 7638]]CAA stipulated that the EPA complete three studies (all of which were extensively peer-reviewed) exploring various aspects of risk posed to human health and the environment by HAP released from EGUs. The first of these studies, the Utility Study, published in 1998, focused on the hazards to public health specifically associated with EGU-sourced HAP including, but not limited to, mercury. See CAA section 112(n)(1)(A). A second study, the Mercury Study, released in 1997, while focusing exclusively on mercury, was broader in scope including not only human health, but also environmental impacts and specifically addressed the potential for mercury released from multiple emissions sources (in addition to EGUs) to affect human health and the environment. See CAA section 112(n)(1)(B). The third study, required under CAA section 112(n)(1)(C), the NIEHS Study, submitted to Congress in 1995, considered the threshold level of mercury exposure below which adverse human health effects were not expected to occur. An additional fourth study, the NAS Study, directed by Congress in 1999 and completed in 2000, focused on determining whether a threshold for mercury health effects could be identified for sensitive populations and, as such, presented a rigorous peer review of the EPA's RfD for methylmercury. The aggregate results of these peer-reviewed studies commissioned by Congress as part of CAA section 112(n)(1) supported the determination that HAP emissions from EGUs represented a hazard to public health and the environment that would not be addressed through imposition of the other requirements of the CAA. In the 2 decades that followed, the EPA has continued to conduct additional research and risk assessments and has surveyed the latest science related to the risk posed to human health and the environment by HAP released from EGUs.a. Review of Health Effects and Previous Risk Analyses for Methylmercury Mercury is a persistent and bioaccumulative toxic metal that, once released from power plants into the ambient air, can be readily transported and deposited to soil and aquatic environments where it is transformed by microbial action into methylmercury. See Mercury Study; 76 FR 24976 (May 3, 2011) (2011 NESHAP Proposal); 80 FR 75029 (December 1, 2015) (2015 Proposal). Methylmercury bioaccumulates in the aquatic food web eventually resulting in highly concentrated levels of methylmercury within the larger and longer-living fish, which can then be consumed by humans.\30\ As documented in both the NAS Study and the Mercury Study, fish and seafood consumption is the primary route of human exposure to methylmercury, with populations engaged in subsistence-levels of consumption being of particular concern.\31\ The NAS Study reviewed the effects of methylmercury on human health, concluding that it is highly toxic to multiple human and animal organ systems. Of particular concern is chronic prenatal exposure via maternal consumption of foods containing methylmercury. Elevated exposure has been associated with developmental neurotoxicity and manifests as poor performance on neurobehavioral tests, particularly on tests of attention, fine motor function, language, and visual-spatial ability. Evidence also suggests potential for adverse effects on the cardiovascular system, adult nervous system, and immune system, as well as potential for causing cancer.\32\ Below we review the broad range of public health hazards associated with methylmercury exposure.--------------------------------------------------------------------------- \30\ We recognize that mercury deposition over land with subsequent impacts to ***agricultural***-sourced food may also represent a public health concern, however as noted below, primary exposure to the U.S population is through fish consumption. \31\ In light of the methylmercury impacts, the EPA and the Food and Drug Administration have collaborated to provide advice on eating fish and shellfish as part of a healthy eating pattern ([*https://www.fda.gov/food/consumers/advice-about-eating-fish*](https://www.fda.gov/food/consumers/advice-about-eating-fish)). In addition, states provide fish consumption advisories designed to protect the public from eating fish from waterbodies within the state that could harm their health based on local fish tissue sampling. \32\ National Research Council. 2000. Toxicological Effects of Methylmercury. Washington, DC: The National Academies Press. [*https://doi.org/10.17226/9899.---------------------------------------------------------------------------*](https://doi.org/10.17226/9899.---------------------------------------------------------------------------) Neurodevelopmental Effects of Exposure to Methylmercury. Methylmercury is a powerful neurotoxin. Because the impacts of the neurodevelopmental effects of methylmercury are greatest during periods of rapid brain development, developing fetuses and young children are particularly vulnerable. Children born to populations with high fish consumption (e.g , people consuming fish as a dietary staple) or impaired nutritional status (e.g , people with iron or vitamin C deficiencies) are especially vulnerable to adverse neurodevelopmental outcomes. These dietary and nutritional vulnerabilities are often particularly pronounced in underserved communities with minority populations and low-income populations that have historically faced economic and environmental injustice and are overburdened by cumulative levels of pollution.\33\--------------------------------------------------------------------------- \33\ Burger J, 2002. Daily consumption of wild fish and game: Exposures of high end recreationalists. International Journal of Environmental Health Research 12:4, p. 343-354.--------------------------------------------------------------------------- Infants in the womb can be exposed to methylmercury when their mothers eat fish and shellfish that contain methylmercury. This exposure can adversely affect unborn infants' growing brains and nervous systems. Children exposed to methylmercury while they are in the womb can have impacts to their cognitive thinking, memory, attention, language, fine motor skills, and visual spatial skills. Based on scientific evidence reflecting concern about a range of neurodevelopmental effects seen in children exposed in utero to methylmercury, the EPA defined an RfD of 0.0001 mg/kg-day for methylmercury.\34\ An RfD is defined as an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime (EPA, 2002).\35\--------------------------------------------------------------------------- \34\ U.S EPA. 2001. IRIS Summary for Methylmercury. U.S Environmental Protection Agency, Washington, DC. (USEPA, 2001). \35\ U.S EPA. 2002. A Review of the Reference Dose and Reference Concentration Processes. EPA/630/P-02/002F, December 2002.--------------------------------------------------------------------------- Prenatal exposure to methylmercury from maternal consumption of fish has been associated with several adverse neurodevelopmental outcomes in various fish consuming populations. Although ***data*** are limited, the EPA has focused on several subpopulations likely to be at higher risk from methylmercury exposure associated with EGU HAP due to fish consumption. As part of the 2011 Final Mercury TSD, the EPA completed a national-scale risk assessment focused on mercury emissions from domestic EGUs. Specifically, we examined risk associated with mercury released from U.S EGUs that deposits to watersheds within the continental U.S , bioaccumulates in fish as methylmercury, and is consumed when fish are eaten by female subsistence fishers of child-bearing age and other freshwater self-caught fish consumers. There is increased risk for in utero exposure and adverse outcomes in children born to female subsistence fishers with elevated exposure to methylmercury. The risk assessment modeled scenarios representing high-end self-caught fish consumers active at inland freshwater lakes and streams. The analysis estimated that 29 percent of the watersheds studied would lead to[[Page 7639]]female subsistence fishers having exposures which exceeded the methylmercury RfD, based on in utero effects, due in whole or in part to the contribution of domestic EGU emissions of mercury. This included up to 10 percent of modeled watersheds where deposition from U.S EGUs alone leads to potential exposures that exceed the RfD.\36\--------------------------------------------------------------------------- \36\ The EPA chose this risk metric in part because CAA section 112(n)(1)(C) directed the NIEHS to develop a threshold for mercury concentration in fish tissue that can be consumed by even sensitive populations without adverse effect and because CAA section 112(c)(6) demonstrates a special interest in protecting the public from exposure to mercury.--------------------------------------------------------------------------- In addition to the 2011 Final Mercury TSD focusing on subsistence fishers referenced above, the EPA also completed a RIA in 2011 including the characterization of benefits associated with the prospective reduction of U.S EGU mercury emissions under MATS.\37\ However, due to limitations on the available ***data*** with regard to the extent of subsistence fishing activity in the U.S , which prevented the enumeration of subsistence fisher populations, the EPA was unable to develop a quantitative estimate of the reduction in population-level risk or associated dollar benefits for children of female subsistence fishers. Instead, in the 2011 MATS RIA, the EPA focused on a different population of self-caught fish consumers that could be enumerated. Specifically, we quantitatively estimated the amount and value of IQ loss associated with prenatal methylmercury exposure among the children of recreational anglers consuming self-caught fish from inland freshwater lakes, streams and rivers (unlike subsistence fishers, available ***data*** allow the characterization of recreational fishing activity across the U.S including enumeration of these populations). Although the EPA acknowledged uncertainty about the size of the affected population and acknowledged that it could be underestimated, these unborn children associated with recreational anglers represented precisely the type of sensitive population most at risk from mercury exposure that CAA section 112 is designed to protect. The results generated in the 2011 RIA for recreational anglers suggested that by reducing methylmercury exposure, MATS was estimated to yield an additional 511 IQ points among the affected population of children, which would increase their future lifetime earnings. The EPA noted at the time that the analysis likely underestimated potential benefits for children of recreational anglers since, due to ***data*** limitations, it did not cover consumption of recreationally caught seafood from estuaries, coastal waters, and the deep ocean which was expected to contribute significantly to overall exposure. Nevertheless, this single endpoint alone, evaluated solely for the recreational angler, provides evidence of potentially significant health harm from methylmercury exposure.--------------------------------------------------------------------------- \37\ The 2011 MATS RfD-based risk assessment focusing on the subsistence fisher population was designed as a screening-level analysis to inform consideration for whether U.S EGU-sourced mercury represented a public health hazard. As such, the most appropriate risk metric was modeled exposure (for highly-exposed subsistence fishers) compared to the RfD for methylmercury. By contrast, the 2011 RIA was focused on estimating the dollar benefits associated with MATS and as such focused on a health endpoint which could be readily enumerated and then monetized, which at the time was IQ for infants born to recreational anglers.--------------------------------------------------------------------------- In 2011 we noted that other, more difficult to quantify endpoints may also contribute to the overall burden across a broader range of subgroups. The metrics studied in addition to IQ include those measured by performance on neurobehavioral tests, particularly on tests of attention, fine motor-function, language, and visual spatial ability (USEPA, 2001; Agency for Toxic Substances and Disease Registry (ATSDR), 1999).\38\ Such adverse neurodevelopmental effects are well documented in cohorts of subsistence fisher populations (i.e , Faroe Islands and the Nunavik region of Arctic Canada).--------------------------------------------------------------------------- \38\ Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for mercury. Atlanta, GA: U.S Department of Health and Human Services, Public Health Service.--------------------------------------------------------------------------- At this time, the EPA is conducting an updated methylmercury IRIS assessment and recently released preliminary assessment materials, an IRIS Assessment Plan (IAP) and Systematic Review Protocol for methylmercury.\39\ The update to the methylmercury IRIS assessment will focus on updating the quantitative aspects of neurodevelopmental outcomes associated with methylmercury exposure. As noted in these early assessment materials, new studies are available, since 2001, assessing the effects of methylmercury exposure on cognitive function, motor function, behavioral, structural, and electrophysiological outcomes at various ages following prenatal or postnatal exposure to methylmercury (USEPA, 2001; NAS Study; 84 FR 13286 (April 4, 2019); \40\ 85 FR 32037 (May 8, 2020)).\41\--------------------------------------------------------------------------- \39\ [*https://iris.epa.gov/ChemicalLanding/&substance\_nmbr=73*](https://iris.epa.gov/ChemicalLanding/&substance_nmbr=73). \40\ Availability of the IRIS Assessment Plan for Methylmercury. 84 FR 13286 (April 4, 2019). \41\ Availability of the Systematic Review Protocol for the Methylmercury Integrated Risk Information System (IRIS) Assessment. 85 FR 32037 (May 28, 2020).--------------------------------------------------------------------------- Cardiovascular Impacts of Exposure to Methylmercury. The NAS Study indicated that there was evidence that exposure to methylmercury in humans and animals can have adverse effects on both the developing and adult cardiovascular system. Infant exposure in the womb to methylmercury has been associated with altered blood-pressure and heart-rate variability in children. In adults, dietary exposure to methylmercury has been linked to a higher risk of acute myocardial infarction (MI), coronary heart disease, or cardiovascular heart disease. To date, the EPA has not attempted to utilize a quantitative dose-response assessment for cardiovascular effects associated with methylmercury exposures because of a lack of consensus among scientists on the dose-response functions for these effects and inconsistency among available studies as to the association between methylmercury exposure and various cardiovascular system effects. However, additional studies have become available that have increased the EPA's confidence in characterizing the dose-response relationship between methylmercury and adverse cardiovascular outcomes. These new studies were leveraged to inform new quantitative screening analyses (described in section III.A.3, below) to estimate one cardiovascular endpoint--incidence of MI mortality--that may potentially be linked to U.S EGU mercury emissions as well as the number of U.S EGU impacted watersheds. In addition to a new meta-analysis (Hu et al., 2021) \42\ on the association of methylmercury generally with cardiovascular disease (CVD), stroke, and ischemic heart disease (IHD), there is a limited body of existing literature that has examined associations between mercury and various cardiovascular outcomes. These include acute MI, hypertension, atherosclerosis, and heart rate variability (Roman et al., 2011).\43\--------------------------------------------------------------------------- \42\ Hu, X. F., Lowe, M., Chan, H.M , Mercury exposure, cardiovascular disease, and mortality: A systematic review and dose-response meta-analysis. Environmental Research 193 (2021),110538. \43\ Roman HA, Walsh TL, Coull BA, Dewailly [Eacute], Guallar E, Hattis D, Mari[euml]n K, Schwartz J, Stern AH, Virtanen JK, Rice G. Evaluation of the cardiovascular effects of methylmercury exposures: Current evidence supports development of a dose-response function for regulatory benefits analysis. Environ Health Perspect. 2011 May;119(5):607-14. doi: 10.1289/ehp.1003012 Epub 2011 Jan 10.---------------------------------------------------------------------------[[Page 7640]] Immunotoxic Effects of Exposure to Methylmercury. Although exposure to some forms of mercury can result in a decrease in immune activity or an autoimmune response (ATSDR, 1999), evidence for immunotoxic effects of methylmercury is limited (NAS Study). Other Mercury-Related Human Toxicity ***Data*** Including Potential Carcinogenicity. The Mercury Study noted that methylmercury is not a potent mutagen but is capable of causing chromosomal damage in a number of experimental systems. The NAS Study indicated that the evidence that human exposure to methylmercury causes genetic damage is inconclusive; it noted that some earlier studies showing chromosomal damage in lymphocytes may not have controlled sufficiently for potential confounders. One study of adults living in the Tapajos River region in Brazil (Amorim et al., 2000) \44\ reported a relationship between methylmercury concentration in hair and DNA damage in lymphocytes, as well as effects on chromosomes. Long-term methylmercury exposures in this population were believed to occur through consumption of fish, suggesting that genotoxic effects (largely chromosomal aberrations) may result from dietary, chronic methylmercury exposures similar to and above those seen in the populations studied in the Faroe Islands and Republic of Seychelles. Since 2000, more recent studies have evaluated methylmercury genotoxicity in vitro in human and animal cell lines and in vivo in rats.--------------------------------------------------------------------------- \44\ Amorim MI, Mergler D, Bahia MO, Dubeau H, Miranda D, Lebel J, Burbano RR, Lucotte M. Cytogenetic damage related to low levels of methyl mercury contamination in the Brazilian Amazon. An Acad Bras Cienc. 2000 Dec;72(4):497-507. doi: 10.1590/s0001-37652000000400004.--------------------------------------------------------------------------- Based on limited human and animal ***data***, methylmercury is classified as a ``possible human carcinogen'' by the International Agency for Research on Cancer (IARC, 1993) \45\ and in IRIS (USEPA, 2001). However, a quantitative estimate of the carcinogenic risk of methylmercury has not been assessed under the IRIS program at this time. Multiple human epidemiological studies have found no significant association between methylmercury exposure and overall cancer incidence, although a few studies have shown an association between methylmercury exposure and specific types of cancer incidence (e.g , acute leukemia and liver cancer) (NAS Study).--------------------------------------------------------------------------- \45\ International Agency for Research on Cancer (IARC) Working Group on the Evaluation of Carcinogenic Risks to Humans. Beryllium, Cadmium, Mercury, and Exposures in the Glass Manufacturing Industry. Lyon (FR): International Agency for Research on Cancer; 1993. (IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, No. 58.) Mercury and Mercury Compounds. Available from: [*https://www.ncbi.nlm.nih.gov/books/NBK499780.---------------------------------------------------------------------------*](https://www.ncbi.nlm.nih.gov/books/NBK499780.---------------------------------------------------------------------------) Some evidence of reproductive and renal toxicity in humans from methylmercury exposure exists. However, overall, human ***data*** regarding reproductive, renal, and hematological toxicity from methylmercury are very limited and are based on studies of the two high-dose poisoning episodes in Iraq and Japan or animal ***data***, rather than epidemiological studies of chronic exposures at the levels of interest in this analysis.b. Review of Health Effects for Non-Mercury HAP As noted earlier, EGUs are the largest source of HCl, HF, and selenium emissions, and are a major source of metallic HAP emissions including arsenic, chromium, nickel, cobalt, and others. Exposure to these HAP, depending on exposure duration and levels of exposures, is associated with a variety of adverse health effects. These adverse health effects may include chronic health disorders (e.g , irritation of the lung, skin, and mucus membranes; decreased pulmonary function, pneumonia, or lung damage; detrimental effects on the central nervous system; damage to the kidneys; and alimentary effects such as nausea and vomiting). As of 2021, three of the key metal HAP emitted by EGUs (arsenic, chromium, and nickel) have been classified as human carcinogens, while three others (cadmium, selenium, and lead) are classified as probable human carcinogens. Overall (metal and non-metal), the EPA has classified four of the HAP emitted by EGUs as human carcinogens and five as probable human carcinogens. See 76 FR 25003-25005 (May 3, 2011) for a fuller discussion of the health effects associated with these pollutants. As summarized in the Supplement to the Non-Hg Case Study Chronic Inhalation Risk Assessment In Support of the Appropriate and Necessary Finding for Coal- and Oil-Fired Electric Generating Units (2011 Non-Hg HAP Assessment),\46\ the EPA previously completed a refined chronic inhalation risk assessment for 16 EGU case studies in order to assess potential public health risk associated with non-mercury HAP. The 16 case studies included one unit that used oil and 15 that used coal. As noted in the 2015 Proposal, this set of case studies was designed to include those facilities with potentially elevated cancer and non-cancer risk based on an initial risk screening of prospective EGU units completed utilizing the Human Exposure Model paired with HAP emissions ***data*** obtained from the 2005 National Emissions Inventory. For each of the 16 case study facilities, we conducted refined dispersion modeling with the EPA's AERMOD (American Meteorological Society/Environmental Protection Agency Regulatory Model) system to calculate annual ambient concentrations (see 2011 Non-Hg HAP Assessment). Average annual concentrations were calculated at census block centroids. We calculated the MIR for each facility as the cancer risk associated with a continuous lifetime (24 hours per day, 7 days per week, and 52 weeks per year for a 70-year period) exposure to the maximum concentration at the centroid of an inhabited census block, based on application of the unit risk estimate from the EPA's IRIS program. Based on estimated actual emissions, the highest estimated individual lifetime cancer risk from any of the 16 case study facilities was 20-in-1 million, driven by nickel emissions from the one case study facility with oil-fired EGUs. Of the facilities with coal-fired EGUs, five facilities had MIR greater than 1-in-1 million (the highest was 5-in-1 million), with the risk from four due to emissions of chromium VI and the risk from one due to emissions of nickel. There were also two facilities with coal-fired EGUs that had MIR equal to 1-in-1 million. Based on this analysis, the EPA concludes that cancer risks associated with these HAP emissions supports a finding that it is appropriate to regulate HAP emissions from EGUs.--------------------------------------------------------------------------- \46\ U.S EPA. 2011. Supplement to the Non-Hg Case Study Chronic Inhalation Risk Assessment In Support of the Appropriate and Necessary Finding for Coal- and Oil-Fired Electric Generating Units. Office of Air Quality Planning and Standards. November. EPA-452/R-11-013. Docket ID Item No. EPA-HQ-OAR-2009-0234-19912.---------------------------------------------------------------------------c. Review of Other Adverse Environmental Effects Associated With EGU HAP Emissions Ecological Effects of Methylmercury. Along with the human health hazards associated with methylmercury, it is well-established that birds and mammals are also exposed to methylmercury through fish consumption (Mercury Study). At higher levels of exposure, the harmful effects of methylmercury include slower growth and development, reduced reproduction, and premature mortality. The effects of methylmercury on wildlife are ***variable*** across species but have been observed in the environment[[Page 7641]]for numerous avian species and mammals including polar bears, river otters, and panthers. These adverse effects can propagate into impacts on human welfare to the extent they influence economies that depend on robust ecosystems (e.g , tourism). Ecological Effects of Acid Gas HAP. Even after the ARP was largely implemented in 2005, EGU sources comprised 82 percent of all anthropogenic HCl (a useful surrogate for all acid gas HAP) emissions in the U.S When HCl dissolves in water, hydrochloric acid is formed. When hydrochloric acid is deposited by rainfall into terrestrial and aquatic ecosystems, it results in acidification of those systems. The MATS rule was expected to result in an 88 percent reduction in HCl emissions. As part of a recent Integrated Science Assessment (EPA, 2020),\47\ the EPA concluded that the body of evidence is sufficient to infer a causal relationship between acidifying deposition and adverse changes in freshwater biota. Affected biota from acidification of freshwater include plankton, invertebrates, fish, and other organisms. Adverse effects can include physiological impairment, as well as alteration of species richness, community composition, and biodiversity in freshwater ecosystems. This evidence is consistent and coherent across multiple species. More species are lost with greater acidification.--------------------------------------------------------------------------- \47\ U.S EPA. Integrated Science Assessment (ISA) for Oxides of Nitrogen, Oxides of Sulfur and Particulate Matter Ecological Criteria (Final Report). U.S Environmental Protection Agency, Washington, DC, EPA/600/R-20/278, 2020.---------------------------------------------------------------------------3. Post-2016 Screening-Level Risk Assessments of Methylmercury Impacts This section of the preamble describes three screening-level risk assessments completed since the 2016 Supplemental Finding that further strengthen the conclusion that U.S EGU-sourced mercury represents a hazard to public health. These ``screening-level'' assessments are designed as broad bounding exercises intended to illustrate the potential scope and public health importance of methylmercury risks associated with U.S EGU emissions. In some cases, they incorporate newer peer-reviewed literature that was not available to the Agency previously. Remaining uncertainties, however, prohibit the EPA from generating a more precise estimate at this time. Two of the three risk assessments focus on the potential for methylmercury exposure to increase the risk of MI-related mortality in adults and for that reason, section III.A.3.a begins by describing the methodology used in the analyses, including discussion of the concentration response (CR) function \48\ for MI-related mortality and the incorporation of confidence cutpoints designed to address uncertainty. Then, the EPA describes an extension of the original watershed-level subsistence fisher methylmercury risk assessment to evaluate the potential for elevated MI-mortality risk among subsistence fishers (section III.A.3.b). In addition, a separate risk assessment is presented for elevated MI mortality among all adults utilizing a bounding approach that explores potential risks associated with exposure of the general U.S population to methylmercury (sourced from U.S EGUs) through fish consumption (section III.A.3.c). Finally, focusing on neurodevelopmental outcomes, another bounding analysis is presented that focuses on the risk of IQ points loss in children exposed in utero through maternal fish consumption by the population of general U.S fish consumers (section III.A.3.d). Each of these analyses quantify potential impacts on incidence of adverse health effects. Section III.A.4 provides illustrative examples of how these incidence estimates translate to monetized benefits.--------------------------------------------------------------------------- \48\ Concentration-response functions relate levels of exposure for the chemical of interest to the probability or rate of response for the adverse health outcome in the exposed individual or population. Typically these mathematical relationships are based on ***data*** obtained either from human epidemiology studies, clinical studies, or toxicological (animal) studies. In this case, CR functions for MI-related mortality are based on epidemiology studies as discussed further below.---------------------------------------------------------------------------a. Methodology for Estimating MI-Mortality This section describes the methodology used in the new screening-level risk assessments related to mortality, including the EPA's application of a CR function characterizing the relationship between increased MI-mortality and methylmercury exposure. As discussed further in the 2021 Risk TSD,\49\ which is contained in the docket for this action, the approach draws on recommendations provided by an expert panel convened by the EPA in 2010 to evaluate the cardiovascular effects associated with methylmercury exposure (the findings of the expert panel were summarized as a peer-reviewed paper, Roman et al., 2011). The panel ``found the body of evidence exploring the link between [methylmercury] and acute myocardial infarction (MI) to be sufficiently strong to support its inclusion in future benefits analyses, based both on direct epidemiological evidence of [a methylmercury]-MI link and on [methylmercury's] association with intermediary impacts that contribute to MI risk.'' Given the likely mechanism of action associated with MI, the panel further recommended that either hair-mercury or toenail-mercury be used as an exposure metric because both reflect a longer-term pattern of exposure. Regarding the shape of the CR function, the panel noted that the EURAMIC study (Guallar et al., 2002) \50\ had identified a log-linear model form with log-of exposure providing the best fit using toenail mercury as the biomarker of exposure. The panel also discussed the issue of potential effect modification by cardioprotective compounds including polyunsaturated fatty acids (PUFA).\51\ Kuopio Ischaemic Heart Disease Risk Factor Study (KIHD) and European Multicenter Case-Control Study on Antioxidants, Myocardial Infarction, and Cancer of the Breast Study (EURAMIC) datasets ``provide the strongest and most useful ***data*** sets for quantifying methylmercury-related incidence of MI.'' However, the panel did note the disconnect between typical levels of exposure to methylmercury in the U.S population and the relatively higher levels of exposure reflected in the two recommended epidemiology studies (KIHD and EURAMIC). Therefore, the panel suggested that consideration be given to restricting modeling MI mortality to those with higher concentrations reflecting the levels of exposure found in the two key epidemiology studies (corresponding to roughly 75th to 95th percentile hair-mercury levels for U.S women of child-bearing age, as characterized in National Health and Nutrition Examination[[Page 7642]]Survey (NHANES) ***data*** and referenced by the panel).--------------------------------------------------------------------------- \49\ U.S EPA. 2021. National-Scale Mercury Risk Estimates for Cardiovascular and Neurodevelopmental Outcomes for the National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units--Revocation of the 2020 Reconsideration, and Affirmation of the Appropriate and Necessary Supplemental Finding; Notice of Proposed Rulemaking. \50\ Guallar E, Sanz-Gallardo MI, van't Veer P, Bode P, Aro A, G[oacute]mez-Aracena J, Kark JD, Riemersma RA, Mart[iacute]n-Moreno JM, Kok FJ; Heavy Metals and Myocardial Infarction Study Group. Mercury, fish oils, and the risk of myocardial infarction. N Engl J Med. 2002 Nov 28;347(22):1747-54. doi: 10.1056/NEJMoa020157. \51\ Virtanen JK, Voutilainen S, Rissanen TH, Mursu J, Tuomainen TP, Korhonen MJ, Valkonen VP, Sepp[auml]nen K, Laukkanen JA, Salonen JT. Mercury, fish oils, and risk of acute coronary events and cardiovascular disease, coronary heart disease, and all-cause mortality in men in eastern Finland. Arterioscler Thromb Vasc Biol. 2005 Jan;25(1):228-33. doi: 10.1161/01.ATV.0000150040.20950.61 Epub 2004 Nov 11.--------------------------------------------------------------------------- In the intervening period since the release of the expert panel's findings in 2011 (Roman et al., 2011), the EPA has continued to review literature characterizing the relationship between methylmercury exposure and cardiovascular effects. While the EPA has not yet conducted a systematic review, two recent studies are of particular interest for quantifying the potential relationship between U.S EGU mercury emissions and acute MI that informed a modeling approach. Giang and Selin (2016) \52\ presented an approach for modeling MI mortality reflecting a number of the recommendations presented in Roman et al., 2011 including the use of the KIHD and EURAMIC studies as the basis for a CR function including both the log-linear functional form and the effect estimate derived from the KIHD study results. A second study, Hu et al. 2021,\53\ presented a meta-analysis looking at the relationship between methylmercury exposure and mortality. That paper utilized eight studies each determined to be of good quality and reflecting at a minimum, adjustments for age, sex, and n-3 PUFA in specifying dose-response relationships. Historically, studies which account for n-3 PUFA have assumed a linear relationship between PUFAs and risk of MI (Roman et al., 2011). However, the association between PUFA intake and cardiovascular risk may not be linear (Mozaffarian and Rimm, 2006).\54\ The potential for confounding and effect modification by PUFA and selenium makes it difficult to interpret the relationship between methylmercury and MI, particularly at lower doses where there is potential for masking of methylmercury toxicity. The results of the meta-analysis by Hu et al., 2021 illustrated this phenomenon with their J-shaped functions for both IHD and CVD, both of which showed an initial region of negative slope (diminishing net risk with methylmercury exposure) before reaching an inflection point (between 1 and 2 microgram per gram ([micro]g/g) hair-mercury depending on the endpoint) where the function turns positive (increasing risk).--------------------------------------------------------------------------- \52\ Giang A, Selin NE. Benefits of mercury controls for the United States. Proc Natl Acad Sci U S A. 2016 Jan 12;113(2):286-91. doi: 10.1073/pnas.1514395113 Epub 2015 Dec 28. \53\ Hu XF, Lowe M, Chan HM. Mercury exposure, cardiovascular disease, and mortality: A systematic review and dose-response meta-analysis. Environ Res. 2021 Feb;193:110538. doi: 10.1016/j.envres.2020.110538 Epub 2020 Dec 5. \54\ Mozaffarian D, Rimm EB. Fish intake, contaminants, and human health: Evaluating the risks and the benefits. JAMA. 2006 Oct 18;296(15):1885-99. doi: 10.1001/jama.296.15.1885 Erratum in: JAMA. 2007 Feb 14;297(6):590.--------------------------------------------------------------------------- For the EPA's new screening-level assessment, we have considered the recommendations presented in Roman et al., 2011, as well as the J-shaped functions presented in Hu et al., 2021, and their implications for considering overall confidence in specifying the relationship between cardiovascular-related mortality and methylmercury exposure. In particular, the EPA has higher confidence in the log-linear relationship at levels of hair-mercury exposure above the selected confidence cutpoints. In specifying these confidence cutpoints (for modeling MI mortality) we have looked to recommendations presented in Roman et al., 2011, specifically that we consider modeling risk for levels of exposure reflected in the EURAMIC and KIHD studies (with these equating to roughly 0.66 and 1.9 [micro]g/g hair-mercury, respectively, or approximately the 75th-95th percentile of hair-mercury levels seen in women of childbearing age in available 1999-2000 NHANES survey ***data*** \55\). Further, we note that these confidence cutpoints roughly match the inflection point for IHD and CVD seen in the J-shaped plot presented in Hu et al., 2021, which further supports their use in defining regions of methylmercury exposure above which we have increased confidence in modeling MI mortality. However, as noted earlier, we are not concluding here that there is an absence of risk below these cutpoints, as such conclusions would require a weight of the evidence analysis and subsequent independent peer review. Rather, we are less confident in our ability to specify the nature of the CR function in those lower exposure regions due to possible effect modification and/or confounding by PUFA and/or selenium. Therefore, in applying the CR function in modeling MI mortality, we included a set of three functions-two including the cutpoints described above and a third no-cutpoint version of the function reflecting the assumption that risk extends across the entire range of methylmercury exposure. In terms of the other elements of the CR function (shape and effect estimate), we have also followed the advice presented in Roman et al., 2011, as further illustrated through the analysis published by Giang and Selin 2016, and utilized a log-linear form and an effect estimate of 0.10 for MI mortality obtained from the KIHD study (see 2021 Risk TSD). As with the other risk estimates presented for methylmercury, these estimates reflect the baseline for U.S EGUs prior to implementation of MATS (i.e , 29 tons).--------------------------------------------------------------------------- \55\ NHANES has not continued to ***collect*** hair-mercury ***data*** in subsequent years since the NHANES dataset referenced here. While NHANES has continued with total blood-mercury monitoring, hair mercury is a better biomarker for characterizing methylmercury exposure over time. Given that the CR functions based on the KIHD study (as well as observations presented in Roman et al. 2011 regarding cardio-modeling) were all based on hair-mercury, this was chosen as the anchoring analytical biometric. The potential for bias due to the use of the 1999-2000 NHANES ***data*** is further discussed in the 2021 Risk TSD.---------------------------------------------------------------------------b. Increased MI-Mortality Risk in Subsistence Fishers Exposed to Methylmercury This screening-level analysis of MI-mortality risk is an extension of the female subsistence-fisher-based at-risk watershed analysis originally completed as part of the 2011 risk assessment supporting the appropriate and necessary determination (USEPA, 2011) and documented in the 2011 Final Mercury TSD. In that original analysis, a series of female subsistence fisher risk scenarios was evaluated for a subset of 3,141 watersheds within the continental U.S for which there were sampled methylmercury fish tissue ***data*** (that fish tissue ***data*** allowing a higher-confidence empirically-based assessment of methylmercury risk to be generated for those watersheds). For each watershed, we used the fish tissue methylmercury ***data*** to characterize total mercury-related risk and then we estimated the portion of that total risk attributable to U.S EGUs (based on the fraction of total mercury deposition to those watersheds associated with U.S EGU emissions as supported by the Mercury Maps approach, USEPA, 2011).\56\--------------------------------------------------------------------------- \56\ A detailed discussion of the Mercury Maps approach (establishing a proportional relationship between mercury deposition and methylmercury concentrations in fish at the watershed level) is presented in section 1.4.6.1 of the 2011 Final Mercury TSD which in turn references: Mercury Maps--A Quantitative Spatial Link Between Air Deposition and Fish Tissue Peer Reviewed Final Report. U.S EPA, Office of Water, EPA-823-R-01-009, September, 2001.--------------------------------------------------------------------------- We have now extended the at-risk watershed analysis completed in 2011 for the subsistence fisher scenarios to include an assessment of the potential for increased MI mortality risk.\57\ Specifically, we have utilized the U.S EGU-attributable methylmercury exposure estimates ([micro]g/kg-day methylmercury intake) generated for the subsistence fisher scenario in each[[Page 7643]]watershed to generate equivalent hair-mercury exposure estimates for that subsistence fisher scenario in each watershed (see 2021 Risk TSD for additional detail on the ***conversion*** of daily methylmercury intake rates into hair-mercury levels). We then compare those hair-mercury levels to the confidence cutpoints developed for the MI mortality screening-level risk assessment described above in section III.A.3.a If the hair-mercury level for a particular watershed is above either the EURAMIC or KIHD confidence cutpoint (i.e , above 0.66 and 1.9 [micro]g/g hair-mercury, respectively), then we consider that watershed to be at increased risk for MI mortality exclusively due to that U.S EGU-attributable methylmercury exposure.\58\ Note, that this is not to suggest that exposures at watersheds where U.S EGU-attributable contributions are below these cutpoints are without risk, but rather that when exposure levels exceed these cutpoints, we have increased confidence in concluding there is an increased risk of MI mortality for subsistence fishers active within that watershed. It is also important to note that in many cases, total methylmercury exposure (i.e , EGU contribution plus contributions from other sources) may exceed these confidence cutpoints such that subsistence fishers active at those watersheds would be at increased risk of MI mortality at least in part due to EGU emissions. See White Stallion, 748 F.3d at 1242-43 (finding reasonable the EPA's decision to consider cumulative impacts of HAP from EGUs and other sources in determining whether HAP emissions from EGUs pose a hazard to public health under CAA section 112(n)(1)(A)); see also CAA section 112(n)(1)(B) (directing the EPA to study the cumulative impacts of mercury emissions from EGUs and other domestic stationary sources of mercury).--------------------------------------------------------------------------- \57\ Note that while the 2011 Final Mercury TSD, in utilizing an RfD-based approach reflecting neurodevelopmental effects, focused on female subsistence fishers; the analysis focused on MI-mortality risk covers all adult subsistence fishers, and we use our cutpoint bounding analysis because there is not an RfD focused specifically on cardiovascular effects for methylmercury. \58\ Although we have used the MI-mortality CR function described in section III.A.3.a of this preamble to generate mortality incidence estimates for the general fish consuming population (see section III.A.3.c), this is not possible for subsistence fishers since we are not able at this point to enumerate them. Consequently, we use the confidence cutpoints associated with that CR function to identify exposures associated with MI mortality risk as described here.--------------------------------------------------------------------------- Table 3 of the 2021 Risk TSD presents the results of the analysis of risk for MI-mortality for the subsistence fisher scenarios. As with the original RfD-based risk estimates, these results are dimensioned on two key parameters (self-caught fish consumption rate and the watershed percentile exposure level--hair-mercury [micro]g/g). Those watershed percentile hair-mercury values that exceed the EURAMIC-based MI mortality confidence cutpoints (0.66 [micro]g/g hair-mercury) are shaded in the table and those cells that also exceed the KIHD-based MI mortality confidence cutpoint (1.9 [micro]g/g hair-mercury) are bolded. Once again, these thresholds identify levels of methylmercury exposure (hair-mercury) associated with a clear association with MI-related health effects (i.e , increased risk). Unlike the RfD-based risk estimates, for MI-mortality estimates we only focus on U.S EGU-attributable methylmercury (i.e , whether U.S EGU-attributable hair-mercury exceeds the cutpoints of interest). Results for the typical subsistence fisher, representing high-end self-caught fish consumption in the U.S population, suggest that up to 10 percent of the watersheds modeled are associated with hair-mercury levels (due to U.S EGU mercury emissions alone) that exceed the lower EURAMIC cutpoint for MI-mortality risk, with 1 percent of modeled watersheds also exceeding the KIHD cutpoint (due to U.S EGU-mercury emissions alone). For low-income Black subsistence fishers active in the Southeast, up to 25 percent of the watersheds exceed the lower EURAMIC confidence threshold (assuming the highest rate of fish consumption), with only the upper 1 percent of watersheds exceeding the KIHD threshold (again based only on U.S EGU-sourced mercury exposure).c. Characterization of MI-Mortality Risk for the General U.S Population Resulting From the Consumption of Commercially-Sourced Fish The second of the three new screening-level risk analyses estimates the incidence of MI mortality in the general U.S population resulting from consumption of commercially-sourced fish containing methylmercury emitted from U.S EGUs.\59\ This is accomplished by first estimating the total burden of methylmercury-related MI mortality in the U.S population and then estimating the fraction of that total increment attributable to U.S EGUs. The task of modeling this health endpoint can involve complex mechanistic modeling of the multi-step process leading from U.S EGU mercury emissions to mercury deposition over global/regional fisheries to bioaccumulation of methylmercury in fisheries stocks to exposure of U.S fish consumers through consumption of those commercially-sourced fish (e.g , Giang and Selin, 2016). However, in recognition of the uncertainty associated with attempting to model this more complex multi-step process, we have instead developed a simpler screening analysis approach intended to generate a range of risk estimates that reflects the impact of critical sources of uncertainty associated with this exposure scenario. Rather than attempting to generate a single high-confidence estimate of risk, which in our estimation is challenging given overall uncertainty associated with this exposure pathway, the goal with the bounding approach is simply to generate a range of risk estimates for MI mortality that furthers our understanding of the significant public health burden associated with EGU HAP emissions.--------------------------------------------------------------------------- \59\ Although the analysis presented here focuses on methylmercury exposure associated with fish consumption which, as noted earlier, is the primary source of methylmercury exposure for the U.S population, EGU mercury deposited to land can also impact other food sources including those associated with ***agricultural*** production (e.g , rice). In the context of fish consumption, commercially-sourced fish refers to fish consumed in restaurants or from food stores.--------------------------------------------------------------------------- The bounding approach developed for this particular scenario is based on the assumption that fish sourced from global commercial fisheries are loaded by mercury deposited to those fisheries and that the fraction of that deposited mercury originating from U.S EGUs will eventually be reflected as a fraction of methylmercury in those fish and subsequently as a fraction of MI mortality risk associated with those U.S EGUs. One of the challenges associated with this screening analysis is how to attribute domestic EGU contributions to global fisheries and how that might vary from location to location. For simplicity, the bounding analysis includes two assumptions: (1) A potential lower-bound reflecting the assumption that U.S fish consumption is largely sourced from global fisheries and consequently the U.S EGU contribution to total global mercury emissions (anthropogenic and natural) can be used to approximate the U.S EGU fractional contribution to MI mortality and (2) a potential upper-bound where we assume that fisheries closer to U.S EGUs (e.g , within the continental U.S or just offshore and/or along the U.S Atlantic and Pacific coastlines) supply most of the fish and seafood consumed within the U.S , and therefore U.S EGU average deposition over the U.S (as a fraction of total mercury deposition) can be used to approximate the U.S EGU fractional contribution to MI mortality (see 2021 Risk TSD for more detail).\60\ The EPA is[[Page 7644]]continuing to review the literature (including consideration of research by FDA) to better define the relative contributions for sources of fish consumed within the U.S Note that the bounding analysis also includes consideration for another key source of uncertainty, namely, the specification of the CR function linking methylmercury exposure to increased MI mortality and, in particular, efforts to account for increased confidence in specifying the CR function for higher levels of methylmercury exposure through the use of confidence cutpoints (section III.A.3.a). Additional detail on the stepwise process used to first generate the total U.S burden of MI-mortality related to total methylmercury exposure and then apportion that total risk estimate to the fraction contributed by U.S EGUs is presented the 2021 Risk TSD. Based on the 29 tons of mercury emitted by U.S EGUs prior to implementation of MATS, the bounding estimates from the fraction of total mercury deposition attributable to U.S EGUs at the global scale is 0.48 percent (lower bound) and 1.8 percent (upper bound). These estimated bounding percentages are important since they have a significant impact on the overall incidence of MI mortality ultimately attributable to U.S EGU-sourced mercury.--------------------------------------------------------------------------- \60\ Another way of stating this is that the lower-bound estimate reflects an assumption that U.S EGU mercury is diluted as part of a global pool and impacts commercial fish sourced from across the globe (with lower levels of methylmercury contribution) while the upper-bound estimate reflects a focus on more near-field regional impacts by U.S EGU mercury to fish sourced either within the continental U.S or along its coastline (with greater relative contribution to methylmercury levels).--------------------------------------------------------------------------- Reflecting both the spread in the apportionment of U.S EGU-sourced mercury (as described above) and application of the three possible applications of the CR function for MI mortality (no confidence-cutpoint, KIHD cutpoint, EURAMIC cutpoint), the estimated MI-mortality attributable to U.S EGU-sourced mercury for the general U.S population associated primarily with consumption of commercially-sourced fish ranges from 5 to 91 excess deaths each year.\61\ For those Americans with high levels of methylmercury in their body (i.e , above certain cutpoints), the science suggests that any additional increase in methylmercury exposure will raise the risk of fatal heart attacks. Based on this screening analysis, even after imposition of the ARP and other CAA criteria pollutant requirements that also reduce HAP emissions from domestic EGU sources, we find that mercury emissions from EGUs pose a risk of premature mortality due to MI.--------------------------------------------------------------------------- \61\ Inclusion of 95th percentile confidence intervals for the effect estimate used in modeling MI mortality extends this range to from 3 to 143 deaths (reflecting the 5th percentile associated with the 5 lower bound estimate to the 95th percentile for the upper bound estimate of 91).---------------------------------------------------------------------------d. Characterization of IQ Loss for Children Born to Mothers in the General U.S Population Resulting From the Consumption of Commercially Sourced Fish (and Other Food Items Containing Methylmercury) The third new screening-level risk analysis estimates the incidence of IQ loss in children in the general U.S population resulting from maternal consumption of commercially sourced fish containing methylmercury attributable to U.S EGUs (resulting in subsequent prenatal exposure to methylmercury). The approach used in estimating incidence of this adverse health effect shares several elements with the approach described above for modeling MI mortality in the general U.S population, including in particular, the method used to apportion the total methylmercury-related health burden to the fraction associated with U.S EGU mercury emissions (e.g , use of lower and upper bound estimates of the fractional contribution of domestic EGU sources). Other elements of the modeling approach, including the specification of the number of children born annually in the U.S , the specification of maternal baseline hair-mercury levels (utilizing NHANES ***data***) and the characterization of the linkage between methylmercury exposure (in utero) and IQ loss, are based on methods used in the original 2011 benefits analysis completed for MATS (USEPA, 2011) and are documented in the 2021 Risk TSD. As with the MI-mortality estimates described earlier, the two bounding estimates for the fraction of total mercury deposition attributable to U.S EGUs at the global and regional scales (0.48 percent and 1.8 percent, respectively) have a significant impact on the overall magnitude of IQ points lost (for children born to the general U.S population) which are ultimately attributable to U.S EGUs. However, the EPA has relatively high confidence in modeling this endpoint due to greater confidence in the IQ loss CR function. The range in IQ points lost annually due to U.S EGU-sourced mercury is estimated at 1,600 to 6,000 points, which is distributed across the population of U.S children covered by this analysis.\62\ Given variation in key factors related to maternal methylmercury exposure, it is likely that modeled IQ loss will not be uniformly distributed across the population of exposed children and may instead, display considerable heterogeneity.\63\ The bounding analysis described here was not designed to characterize these complex patterns of heterogeneity in IQ loss across the population of children simulated and we note that such efforts would be subject to considerable uncertainty. However, it does provide evidence of specific adverse outcomes with real implications to those affected. Even small degradations in IQ in the early stages of life are associated with diminished future outcomes in education and earnings potential.--------------------------------------------------------------------------- \62\ Inclusion of 95th percentile confidence intervals for the effect estimate used in modeling this endpoint extends this range to from 80 to 12,600 IQ points lost (reflecting the 5th and 95th percentiles). \63\ Maternal exposure (and hence IQ impacts to children) from U.S EGU-sourced mercury can display considerable variation due to (a) spatial patterns of U.S EGU mercury fate and transport (including deposition and methylation) which affects impacts on fish methylmercury and (b) variations in fish consumption by mothers (including differences in daily intake, types of fish consumed and geographical origins of that fish).---------------------------------------------------------------------------4. Most HAP Benefits Cannot Be Quantified or Monetized Despite the array of adverse health and environmental risks associated with HAP emissions from U.S coal- and oil-fired EGUs documented above, as the above discussion demonstrates, it can be technically challenging to estimate the extent to which EGU HAP emissions will result in adverse effects quantitively across the U.S population absent regulation. In fact, the vast majority of the post-control benefits of reducing HAP cannot be quantified or monetized with sufficient quality to inform regulatory decisions due to ***data*** gaps, particularly with respect to sensitive populations. But that does not mean that these benefits are small, insignificant, or nonexistent. There are numerous unmonetized effects that contribute to additional benefits realized from emissions reductions. These include additional reductions in neurodevelopmental and cardiovascular effects from exposure to methylmercury, adverse ecosystem effects including mercury-related impacts on recreational and commercial fishing, health risks from exposure to non-mercury HAP, and health risks in EJ subpopulations that face disproportionally high exposure to EGU HAP. Congress well understood the challenges in monetizing risks. As discussed in section II.B above, the statutory language in CAA section 112 clearly supports a conclusion that the intended benefit of HAP regulation is a reduction in the volume of HAP emissions to reduce assumed and[[Page 7645]]identified risks from HAP with the goal of protecting even the most exposed and most sensitive members of the population. The statute requires the EPA to move aggressively to quickly reduce and eliminate HAP, placing high value on doing so in the face of uncertainty regarding the full extent of harm posed by hazardous pollutants on human health and welfare. The statute also clearly places great value on protecting even the most vulnerable members of the population, by instructing the EPA, when evaluating risk in the context of a determination of whether regulation is warranted, to focus on risk to the most exposed and most sensitive members of the population. See, e.g , CAA sections 112(c)(9)(B), 112(f)(2)(B), and 112(n)(1)(C). For example, in evaluating the potential for cancer effects associated with emissions from a particular source category under CAA section 112(f)(2), the EPA is directed by Congress to base its determinations on the maximum individual risk (MIR) to the most highly exposed individual living near a source. Similarly, in calculating the potential for non-cancer effects to occur, the EPA evaluates the impact of HAP to the most exposed individual and accounts for sensitive subpopulations. Notably, Congress in CAA section 112 did not require the EPA to quantify risk across the entire population, or to calculate average or ``typical'' risks. The statutory design focusing on maximum risk to individuals living near sources acknowledges the inherent difficulty in enumerating HAP effects, given the large number of pollutants and the uncertainties associated with those pollutants, as well as the large number of sources emitting HAP. However, this does not mean that these effects do not exist or that society would not highly value these reductions, despite the fact that the post-control effects of the reductions generally cannot be quantified. The EPA has long acknowledged the difficulty of quantifying and monetizing HAP benefits. In March 2011, the EPA issued a report on the post-control benefits and costs of the CAA. This Second Prospective Report \64\ is the latest in a series of EPA studies that estimate and compare the post-control benefits and costs of the CAA and related programs over time. Notably, it was the first of these reports to include any attempt to quantify and monetize the impacts of reductions in HAP, and it concentrated on a small case study for a single pollutant, entitled ``Air Toxics Case Study--Health Benefits of Benzene Reductions in Houston, 1990-2020.'' As the EPA summarized in the Second Prospective Report, ``[t]he purpose of the case study was to demonstrate a methodology that could be used to generate human health benefits from CAAA controls on a single HAP in an urban setting, while highlighting key limitations and uncertainties in the process. . . . Benzene was selected for the case study due to the availability of human epidemiological studies linking its exposure with adverse health effects.'' (pg. 5-29). In describing the approach, the EPA noted: ``[b]oth the Retrospective analysis and the First Prospective analysis omitted a quantitative estimation of the benefits of reduced concentrations of air toxics, citing gaps in the toxicological database, difficulty in designing population-based epidemiological studies with sufficient power to detect health effects, limited ambient and personal exposure monitoring ***data***, limited ***data*** to estimate exposures in some critical microenvironments, and insufficient economic research to support valuation of the types of health impacts often associated with exposure to individual air toxics.'' (pg. 5-29). These difficulties have long hindered the Agency's ability to quantify post-control HAP impacts and estimate the monetary benefits of HAP reductions.--------------------------------------------------------------------------- \64\ U.S EPA Office of Air and Radiation, April 2011. The Benefits and Costs of the Clean Air Act from 1990 to 2020, Final Report--Rev. A. Available at [*https://www.epa.gov/sites/production/files/2015-07/documents/fullreport\_rev\_a.pdf.---------------------------------------------------------------------------*](https://www.epa.gov/sites/production/files/2015-07/documents/fullreport_rev_a.pdf.---------------------------------------------------------------------------) In preparing the benzene case study for inclusion in the Second Prospective Report, the Agency asked the Advisory Council on Clean Air Compliance Analysis (the Council) to review the approach. In its 2008 consensus advice to the EPA after reviewing the benzene case study,\65\ the Council noted that ``Benzene . . . has a large epidemiological database which OAR used to estimate the health benefits of benzene reductions due to CAAA controls. The Council was asked to consider whether this case study provides a basis for determining the value of such an exercise for HAP benefits characterization nationwide.'' They concluded:--------------------------------------------------------------------------- \65\ U.S EPA Advisory Council on Clean Air Act Compliance Analysis, Review of the Benzene Air Toxics Health Benefits Case Study. July 11, 2008. Available at [*https://nepis.epa.gov/Exe/ZyPDF.cgi/P1000ZYP.PDF?Dockey=P1000ZYP.PDF*](https://nepis.epa.gov/Exe/ZyPDF.cgi/P1000ZYP.PDF?Dockey=P1000ZYP.PDF). As recognized by OAR, the challenges for assessing progress in health improvement as a result of reductions in emissions of hazardous air pollutants (HAPs) are daunting. Accordingly, EPA has been unable to adequately assess the economic benefits associated with health improvements from HAP reductions due to a lack of exposure-response functions, uncertainties in emissions inventories and background levels, the difficulty of extrapolating risk estimates to low doses and the challenges of tracking health progress for diseases, such as cancer, that have long latency periods. . . . The benzene case study successfully synthesized best practices and implemented the standard damage function approach to estimating the benefits of reduced benzene, however the Council is not optimistic that the approach can be repeated on a national scale or extended to many of the other 187 air toxics due to insufficient epidemiological ***data***. With some exceptions, it is not likely that the other 187 HAPs will have the quantitative exposure-response ***data*** needed for such analysis. Given EPA's limited resources to evaluate a large number of HAPs individually, the Council urges EPA to consider alternative approaches to estimate the benefits of air toxics regulations. In addition to the difficulties noted by the Council, there are other challenges that affect the EPA's ability to fully characterize post-control impacts of HAP on populations of concern, including sensitive groups such as children or those who may have underlying conditions that increase their risk of adverse effects following exposure to HAP. Unlike for criteria pollutants such as ozone and PM, the EPA lacks information from controlled human exposure studies conducted in clinical settings which enable us to better characterize dose-response relationships and identify subclinical outcomes. Also, as noted by the Council and by the EPA itself in preparing the benzene case study, the almost universal lack of HAP-focused epidemiological studies is a significant limitation. Estimated risks reported in epidemiologic studies of fine PM (PM2.5) and ozone enable the EPA to estimate health impacts across large segments of the U.S population and quantify the economic value of these impacts. Epidemiologic studies are particularly well suited to supporting air pollution health impact assessments because they report measures of population-level risk that can be readily used in a risk assessment. However, such studies are infrequently performed for HAP. Exposure to HAP is typically more uneven and more highly concentrated among a smaller number of individuals than exposure to criteria pollutants. Hence, conducting an epidemiologic study for HAP is inherently more challenging; for starters, the small population size means such studies often lack sufficient statistical power to detect effects. For example, in the case of mercury, the most exposed and most sensitive members of the population[[Page 7646]]may be both small and highly concentrated, such as the subsistence fishers that the EPA has identified as likely to suffer deleterious effects from U.S EGU HAP emissions. While it is possible to estimate the potential risks confronting this population in a case-study approach (an analysis that plays an important role in supporting the public health hazard determination for mercury as discussed above in sections III.A.2 and III.A.3), it is not possible to translate these risk estimates into post-control quantitative population-level impact estimates for the reasons described above. Further, for many HAP-related health endpoints, the Agency lacks economic ***data*** that would support monetizing HAP impacts, such as willingness to pay studies that can be used to estimate the social value of avoided outcomes like heart attacks, IQ loss, and renal or reproductive failure. In addition, the absence of socio-demographic ***data*** such as the number of affected individuals comprising sensitive subgroups further limits the ability to monetize HAP-impacted effects. All of these deficiencies impede the EPA's ability to quantify and monetize post-control HAP-related impacts even though those impacts may be severe and/or impact significant numbers of people. Though it may be difficult to quantify and monetize most post-control HAP-related health and environmental benefits, this does not mean such benefits are small. The nature and severity of effects associated with HAP exposure, ranging from lifelong cognitive impairment to cancer to adverse reproductive effects, implies that the economic value of reducing these impacts would be substantial if they were to be quantified completely. By extension, it is reasonable to expect both that reducing HAP-related incidence affecting individual endpoints would yield substantial benefits if fully quantified, and moreover that the total societal impact of reducing HAP would be quite large when evaluated across the full range of endpoints. In judging it appropriate to regulate based on the risks associated with HAP emissions from U.S EGUs, the EPA is placing weight on the likelihood that these effects are significant and substantial, as supported by the health evidence. The EPA's new screening-level analyses laid out in the Risk TSD for this proposal illustrate this point. Specifically, in exploring the potential for MI-related mortality risk attributable to mercury emissions from U.S EGUs, the EPA's upper bound estimate is that these emissions may contribute to as many as 91 additional premature deaths each year. The value society places on avoiding such severe effects is very high; as the EPA illustrates in the valuation discussion in the 2021 Risk TSD, the benefit of avoiding such effects could approach $720 million per year. Similarly, for IQ loss in children exposed in utero to U.S EGU-sourced mercury, our upper bound estimate approaches 6,000 IQ points lost which could translate into a benefit approaching $50 million per year. These estimates are intended to illustrate the point that the HAP impacts are large and societally meaningful, but not to suggest that they are even close to the full benefits of reducing HAP. There are many other unquantified effects of reducing EGU HAP that would also have substantial value to society. As described above, mercury alone is associated with a host of adverse health and environmental effects. The statute clearly identifies this basket of effects as a significant concern in directing the EPA to study them specifically. If the EPA were able to account for all of these post-control effects in our quantitative estimates, the true benefits of MATS would be far clearer. However, available ***data*** and methods currently preclude a full quantitative accounting of the post-control impacts of reducing HAP emissions from U.S EGUs and a monetization of these impacts. There are other aspects of social willingness to pay that are not accounted for in the EPA's quantitative estimate of benefits either. For example, in previous MATS-related rulemakings and analysis, the EPA has not estimated what individuals would be willing to pay in order to reduce the exposure of others who are exposed (even if they are not experiencing high levels of HAP exposure themselves). These may be considered and quantified as benefits depending on whether it is the health risks to others in particular that is motivating them.\66\ For example, Cropper et al. (2016) found that focus group participants indicated a preference for more equitable distribution of health risks than for income, which indicates that it is specifically the risks others face that was important to the participants.\67\ This result is particularly important as exposure to HAP is often disproportionately borne by underserved and underrepresented communities (Bell and Ebisu, 2012).\68\ Unfortunately, studies to quantify the willingness to pay for a more equitable distribution of HAP exposures are limited, so quantification of this benefit likely cannot be performed until new research is conducted.--------------------------------------------------------------------------- \66\ Jones-Lee, M.W Paternalistic Altruism and the Value of Statistical Life. The Economic Journal, vol. 102, no. 410, 1992, pp. 80-90. \67\ Cropper M., Krupnick A., and W. Raich, Preferences for Equality in Environmental Outcomes, Working Paper 22644 [*http://www.nber.org/papers/w22644*](http://www.nber.org/papers/w22644) National Bureau of Economic Research, September 2016. \68\ Bell, Michelle L., and Keita Ebisu. Environmental inequality in exposures to airborne particulate matter components in the United States. Environmental Health Perspectives 120.12 (2012): 1699-1704.--------------------------------------------------------------------------- The HAP-related legislative history for the 1990 Amendments includes little discussion of the monetized benefits of HAP, perhaps due to these attendant difficulties. When such monetized benefits were estimated in several outside reports submitted to Congress before passage of the 1990 Amendments, the estimates were based on reduced cancer deaths and the value of the benefits that are quantified were estimated to be small as compared to the estimated costs of regulating HAP emissions under CAA section 112. See, e.g , A Legislative History of the Clean Air Act Amendments of 1990, Vol. I at 1366-67 (November 1993) (estimating the total annual cost of CAA section 112 to be between $6 billion and $10 billion per year and the estimated annual benefits to be between $0 and $4 billion per year); id. at 1372-73 (estimating the total annual cost of CAA section 112 to be between $14 billion and $62 billion per year and the estimated annual benefits to be between $0 and $4 billion per year). Despite the apparent disparity of estimated costs and monetized benefits, Congress still enacted the revisions to CAA section 112. Thus, it is reasonable to conclude that Congress found HAP emissions to be worth regulating even without evidence that the monetized benefits of doing so were greater than the costs. The EPA believes this stems from the value that the statute places on reducing HAP regardless of whether the post-control benefits of doing so can be quantified or monetized, and the statute's purpose of protecting even the most exposed and most sensitive members of the population.5. Characterization of HAP Risk Relevant to Consideration of Environmental Justice In assessing the adverse human health effects of HAP pollution from EGUs, we note that these effects are not borne equally across the population, and that some of the most exposed individuals and subpopulations--protection of whom is, as noted, of particular concern under CAA section 112--are minority and/or low-income populations. Executive Order 12898 (59 FR 7629;[[Page 7647]]February 16, 1994) establishes Federal executive policy on EJ issues. That Executive Order's main provision directs Federal agencies, to the greatest extent practicable and permitted by law, to make EJ part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. Executive Order 14008 (86 FR 7619; February 1, 2021) also calls on Federal agencies to make achieving EJ part of their missions ``by developing programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts.'' That Executive Order also declares a policy ``to secure environmental justice and spur economic opportunity for disadvantaged communities that have been historically marginalized and overburdened by pollution and under-investment in housing, transportation, water and wastewater infrastructure, and health care.'' Under Executive Order 13563, Federal agencies may consider equity, human dignity, fairness, and distributional considerations, where appropriate and permitted by law. In the context of MATS, exposure scenarios of clear relevance from an EJ perspective include the full set of subsistence fisher scenarios included in the watershed-level risk assessments completed for the rule. Subsistence fisher populations are potentially exposed to elevated levels of methylmercury due to their elevated levels of self-caught fish consumption which, in turn, are often driven either by economic need (i.e , poverty) and/or cultural practices. In the context of MATS, we completed watershed-level assessments of risks for a broad set of subsistence fisher populations covering two health endpoints of clear public health significance including: (a) Neurodevelopmental effects in children exposed prenatally to methylmercury (the methylmercury-based RfD analysis described in the 2011 Final Mercury TSD) and (b) potential for increased MI-mortality risk in adults due to methylmercury exposure (section III.A.3.b above). The general subsistence fisher population that was evaluated nationally for both analyses was not subdivided by socioeconomic status, race, or cultural practices.\69\ Therefore, the risk estimates derived do not fully inform our consideration of EJ impacts, although the significantly elevated risks generated for this general population are clearly relevant from a public health standpoint. However, the other, more differentiated subsistence fisher populations, which are subdivided into smaller targeted communities, are relevant in the EJ context and in some instances were shown to have experienced levels of risk significantly exceeding those of the general subsistence fisher population, as noted earlier in section III.A.3.b --------------------------------------------------------------------------- \69\ Note that the RfD-based analysis described in the 2011 Final Mercury TSD and referenced here addressed the potential for neurodevelopmental effects in children and therefore focused on the ingestion of methylmercury by female subsistence fishers. By contrast, the analysis focusing on increased MI-mortality risk for subsistence fishers described in the 2021 Risk TSD and referenced here was broader in scope and encompassed all adult subsistence fishers.--------------------------------------------------------------------------- In particular, for the watershed analysis focusing on the methylmercury RfD-based analysis (i.e , neurodevelopmental risk for children exposed prenatally), while the general female fisher scenario suggested that modeled exposures (from U.S EGU-sourced mercury alone) exceeded the methylmercury RfD in approximately 10 percent of the watersheds modeled (2011 Final Mercury TSD, Table 2-6), for low-income Black subsistence fisher females in the Southeast, modeled exposures exceeded the RfD in approximately 25 percent of the watersheds. These results suggest a greater potential for adverse effects in low-income Black populations in the Southeast. Similarly, while the general subsistence fisher had exposure levels suggesting an increased risk for MI-mortality risk in 10 percent of the watersheds modeled, two sub-populations were shown to be even further disadvantaged. Low-income Black and white populations in the Southeast and tribal fishers active near the Great Lakes had the potential for increased risk in 25 percent of the watersheds modeled.\70\ Both of these results (the neurodevelopmental RfD-based analysis and the analysis of increased MI-mortality risk) suggest that subsistence fisher populations that are racially or culturally, geographically, and income-differentiated could experience elevated risks relative to not only the general population but also the population of subsistence fishers generally. We think these results are relevant in considering the benefits of regulating EGU HAP.--------------------------------------------------------------------------- \70\ Recognizing challenges in obtaining high-end consumption rates for tribal populations active in areas of high U.S EGU impact (e.g , Ohio River valley, areas of the central Southeast such as northern Georgia, northern South Carolina, North Carolina and Tennessee) there is the potential for our analysis of tribal-associated risk to have missed areas of elevated U.S EGU-sourced mercury exposure and risk. In that case, estimates simulated for other subsistence populations active in those areas (e.g , low-income whites and Blacks in the Southeast as reported here and in Table 3 of the 2021 Risk TSD) could be representative of the ranges of risk experienced by tribal populations to the extent that cultural practices result in similar levels of increased fish consumption.---------------------------------------------------------------------------6. Overview of Health and Environmental Effects Associated With Non-HAP Emissions From EGUs Alongside the HAP emissions enumerated above, U.S EGUs also emit a substantial quantity of criteria pollutants, including direct PM2.5, nitrogen oxides (NOX) (including NO2), and SO2, even after implementation of the ARP and numerous other CAA requirements designed to control criteria pollutants. In the 2011 RIA, for example, the EPA estimated that U.S EGUs would emit 3.4 million tons of SO2and 1.9 million tons of NOXin 2015 prior to implementation of any controls under MATS (see Table ES-2). These EGU SO2emissions were approximately twice as much as all other sectors combined (EPA SO2Integrated Science Assessment, 2017).\71\ These pollutants contribute to the formation of PM2.5and ozone criteria pollutants in the atmosphere, the exposure to which is causally linked with a range of adverse public health effects. SO2both directly affects human health and is a precursor to PM2.5 Short-term exposure to SO2causes respiratory effects, particularly among adults with asthma. SO2serves as a precursor to PM2.5, the exposure to which increases the risk of premature mortality among adults, lung cancer, new onset asthma, exacerbated asthma, and other respiratory and cardiovascular diseases. Likewise, EGU-related emissions of NOXwill adversely affect human health in the form of respiratory effects including exacerbated asthma. NOXis a precursor pollutant to both PM2.5and ground-level ozone. Exposure to ozone increases the risk of respiratory-related premature death, new onset asthma, exacerbated asthma, and other outcomes. Fully accounting for the human health impacts of reduced EGU emissions under MATS entails quantifying both the direct impacts of HAP as well as the avoided premature deaths and illnesses associated with reducing these co-emitted criteria pollutants. Similarly,[[Page 7648]]U.S EGUs emit substantial quantities of CO2, a powerful greenhouse gas (GHG): The EPA estimated these emissions at 2.23 million metric tpy in 2015 (2011 RIA, Table ES-2). The environmental impacts of GHG emissions are accounted for through the social cost of carbon,\72\ which can be used to estimate the benefits of emissions reductions due to regulation.--------------------------------------------------------------------------- \71\ U.S EPA. Integrated Science Assessment for Sulfur Oxides--Health Criteria (Final Report). U.S Environmental Protection Agency, Washington, DC, EPA/600/R-17-451, December 2017. \72\ See [*https://19january2017snapshot.epa.gov/climatechange/social-cost-carbon\_.html:*](https://19january2017snapshot.epa.gov/climatechange/social-cost-carbon_.html:) ``EPA and other federal agencies use estimates of the social cost of carbon (SC-CO2) to value the climate impacts of rulemakings. The SC-CO2is a measure, in dollars, of the long-term damage done by a ton of carbon dioxide (CO2) emissions in a given year. This dollar figure also represents the value of damages avoided for a small emission reduction (i.e , the benefit of a CO2reduction). The SC-CO2is meant to be a comprehensive estimate of climate change damages and includes changes in net ***agricultural*** productivity, human health, property damages from increased flood risk, and changes in energy system costs, such as reduced costs for heating and increased costs for air conditioning. However, given current modeling and ***data*** limitations, it does not include all important damages.''--------------------------------------------------------------------------- Not all of the non-HAP benefits of MATS were quantified or monetized in the 2011 RIA. However, the EPA thoroughly documented these potential effects and identified those for which quantification and/or monetization was possible. Specifically, the EPA calculated the number and value of avoided PM2.5-related impacts, including 4,200 to 11,000 premature deaths, 4,700 nonfatal heart attacks, 2,600 hospitalizations for respiratory and cardiovascular diseases, 540,000 lost work days, and 3.2 million days when adults restrict normal activities because of respiratory symptoms exacerbated by PM2.5(2011 RIA, p. ES-3). We also estimated substantial additional health improvements for children from reductions in upper and lower respiratory illnesses, acute bronchitis, and asthma attacks. In addition, we included in our monetized co-benefits estimates the effect from the reduction in CO2emissions resulting from this rule, based on the interagency SC-CO2estimates. These benefits stemmed from imposition of MATS and would be coincidentally realized alongside the HAP benefits.7. Summary of Public Health Hazards Associated With Emissions From EGUs The EPA is proposing to find that the evidence provided in this section of the preamble, informed where possible with new scientific evidence available since the publication of the 2016 Supplemental Finding, once again demonstrates that HAP released from U.S EGUs represent a significant public health hazard absent regulation under CAA section 112. As noted earlier, the EPA found that even after imposition of the other requirements of the CAA, EGUs were the largest domestic source of mercury, HF, HCl, and selenium and among the largest domestic contributors of arsenic, chromium, cobalt, nickel, hydrogen cyanide, beryllium, and cadmium. The EPA has documented a wide range of adverse health effects in children and adults associated with mercury including, in particular, neurodevelopmental effects in children exposed prenatally (e.g , IQ, attention, fine motor-function, language, and visual spatial ability) and a range of cardiovascular effects in adults including fatal MI and non-fatal IHD. Non-mercury HAP have also been associated with a wide range of chronic health disorders (e.g , irritation of the lung; decreased pulmonary function, pneumonia, or lung damage; detrimental effects on the central nervous system; and damage to the kidneys). Furthermore, three of the key metal HAP emitted by EGUs (arsenic, chromium, and nickel) have been classified as human carcinogens and there is evidence to suggest that, prior to MATS, emissions from these sources had the potential to result in cancer risks greater than 1-in-1 million. Further, this section describes the results from several new screening-level risk assessments considering mercury from domestic EGU sources. These risk assessments focused on two broad populations of exposure: (a) Subsistence fishers exposed to mercury through self-caught fish consumption within the continental U.S and (b) the general U.S population exposed to mercury through the consumption of commercially-sourced fish (i.e , purchased from restaurants and food stores). The results of these screening-level risk assessments are useful for informing our understanding about the potential scope and public health importance of these impacts, but remaining uncertainties prohibit precise estimates of the size of these impacts currently. For example, numerous studies considering multiple, large cohorts have shown that people exposed to high amounts of mercury are at higher risk of fatal and non-fatal CVD. While U.S EGUs are only one of multiple global sources that contribute to this mercury exposure, the EPA's screening analysis suggests the potential for U.S EGU emissions of mercury to contribute to premature mortality in the general U.S population. Furthermore, as part of the subsistence fisher analyses, we included scenario modeling for a number of EJ-relevant populations showing that several populations (including low-income Blacks and whites in the Southeast and tribal populations near the Great Lakes) had risk levels that were significantly above the general subsistence fisher population modeled for the entire U.S As noted earlier, the EPA believes that Congress intended in CAA section 112 to address risks to the most exposed and most sensitive members of the public. These additional risk assessments suggest that there are populations that are particularly vulnerable to EGU HAP emissions, including populations of concern from an EJ standpoint. MATS plays a critical role in reducing the significant volume and risks associated with EGU HAP emissions discussed above. Mercury emissions have declined by 86 percent, acid gas HAP by 96 percent, and non-mercury metal HAP by 81 percent since 2010 (pre-MATS). See Table 4 at 84 FR 2689 (February 7, 2019). MATS is the only Federal requirement that guarantees this level of HAP control from EGUs. At the same time, the concomitant reductions in CO2,NOX, and SO2, also provide substantial public health and environmental benefits. Given the numerous and important public health and environmental risks associated with EGU emissions, the EPA again concludes that the advantages of regulating HAP emissions from this sector are significant. Acknowledging the difficulties associated with characterizing risks from HAP emissions discussed earlier in this section, we solicit comments about the health and environmental hazards of EGU HAP emissions discussed in this section and the appropriate approaches for quantifying such risks, as well any information about additional risks and hazards not discussed in this proposal.B. Consideration of Cost of Regulating EGUs for HAP1. Introduction In evaluating the costs and disadvantages of MATS, we begin with the costs to the power industry of complying with MATS. This assessment uses a sector-level (or system-level) accounting perspective to estimate the cost of MATS, looking beyond just pollution control costs for directly affected EGUs to include incremental costs associated with changes in fuel supply, construction of new capacity, and costs to non-MATS units that were also projected to adjust operating decisions as the power system adjusted to meet MATS requirements. Such an approach is warranted due to the nature of the power sector, which is a large, complex, and interconnected industry.[[Page 7649]]This means that while the MATS requirements are directed at a subset of EGUs in the power sector, the compliance actions of the MATS-regulated EGUs can affect production costs and revenues of other units due to generation shifting and fuel and electricity price changes. Thus, the EPA's projected compliance cost estimate represents the incremental costs to the entire power sector to generate electricity, not just the compliance costs projected to be incurred by the coal- and oil-fired EGUs that are regulated under MATS. Limiting the cost estimate to only those expenditures incurred by EGUs directly regulated by MATS would provide an incomplete estimate of the costs of the rule. Using this broad view, in the 2011 RIA we projected that the compliance cost of MATS would be $9.6 billion per year in 2015.\73\ This estimate of compliance cost was based on the change in electric power generation costs between a base case without MATS and a policy case where the sector complies with the HAP emissions limits in the final MATS. The EPA generated this cost estimate using the Integrated Planning Model (IPM).\74\ This model is designed to reflect electricity markets as accurately as possible using the best available information from utilities, industry experts, natural gas and coal market experts, financial institutions, and government statistics. Notably, the model includes cost and performance estimates for state-of-the-art air pollution control technologies with respect to mercury and other HAP controls. But there are inherent limits to what can be predicted ex ante. And because the estimate was made 5 years prior to full compliance with MATS, stakeholders, including a leading power sector trade association, have indicated that our initial cost projection significantly overestimated actual costs expended by industry. There are significant challenges to producing an ex post cost estimate that provides an apples-to-apples comparison to our initial cost projections, due to the complex and interconnected nature of the industry. However, independent analyses provided to the EPA indicate that we may have overestimated the cost of MATS by billions of dollars per year. Moreover, there have been significant changes in the power sector in the time since MATS was promulgated that were not anticipated in either EPA or U.S Energy Information Administration (EIA) projections at the time.\75\ Entirely outside of the realm of EPA regulation, there were dramatic shifts in the cost of natural gas and renewables, state policies, and Federal tax incentives, which have also further encouraged construction of new renewables. These have led to significantly faster and greater than anticipated retirement of coal capacity and coal-fired generation.--------------------------------------------------------------------------- \73\ All costs were reported in 2007 dollars. \74\ IPM, developed by ICF International, is a state-of-the-art, peer-reviewed, dynamic, deterministic linear programming model of the contiguous U.S electric power sector. IPM provides forecasts of least-cost capacity expansion, electricity dispatch, and emission control strategies while meeting electricity demand and various environmental, transmission, dispatch, and reliability constraints. The EPA has used IPM for over 2 decades to understand power sector behavior under future business-as-usual conditions and to evaluate the economic and emission impacts of prospective environmental policies. \75\ In 2009, coal-fired generation was by far the most important source of utility scale generation, providing more power than the next two sources (natural gas and nuclear) combined. By 2016, natural gas had passed coal-fired generation as the leading source of generation in the U.S While natural gas-fired generation, nuclear generation and renewable generation have all increased since 2009, coal-fired generation has significantly declined.--------------------------------------------------------------------------- While there are significant limitations to producing an ex post cost estimate, we have endeavored, where possible, to approximate the extent of our overestimate. The unexpected shifts in the power sector, including the rapid increase in natural gas supplies that occurred after promulgation of MATS, resulted in our projected estimates of natural gas prices to be approximately double what they were in actuality. Incremental natural gas expenditures accounted for approximately 25 percent of the $9.6 billion compliance cost estimate for 2015 in the 2011 RIA. The market trends of the power sector also had major impacts on the number of controls installed and operated on coal-fired EGUs in the years following promulgation of MATS. With respect to just pollution control installation and operation, we project that we overestimated annual compliance costs by at least $2.2 to 4.4 billion per year, simply as a result of fewer pollution controls being installed than were estimated in the 2011 RIA. Though this range of an overestimate is limited to costs associated with pollution controls and operation, those costs made up 70 percent of the projected $9.6 billion figure. We additionally find that the controls that were installed at MATS-regulated EGUs were likely both less expensive and more effective in reducing pollution than originally projected, resulting in our estimate likely being too high for these reasons as well. Lastly, since completing the 2011 RIA, we have updated several assumptions in our modeling that would also have resulted in a lower cost estimate had they been incorporated into our modeling at the time of the rule. Taking into account the above considerations, we believe we overestimated the cost of MATS by billions of dollars. We next examine the projected cost of MATS--both total cost and specific types of costs--using sector-level metrics that put those cost estimates in context with the economics of the power sector. The reason we examine these metrics is to better understand the disadvantages that expending these costs had on the EGU industry and the public more broadly, just as on the benefits side we look beyond the volume of pollution reductions to the health and environmental advantages conferred by the reductions. For purposes of these analyses, we use the 2011 RIA projections, keeping in mind our newer analyses, which indicated that those projections were almost certainly overestimated. Specific to the power sector, we evaluate the projected costs of the rule to revenues from electricity sales across nearly 20 years, and we compare the projected expenditures required under the rule with historic expenditures by the industry over the same time period. We additionally evaluate broader impacts on the American public by looking at projected effects of MATS on retail electricity prices and our analyses of whether the power sector could continue to provide adequate and reliable electricity after imposition of the rule. We find that, when viewed in context, the projected costs of MATS to both the power sector and the public were small relative to these metrics and well within the range of historical variability. Moreover, experience has borne out our projection that the EGU sector could continue to provide adequate, reliable, and affordable electricity to the American public after the imposition of the rule. Section III.B.2 contains our discussion of the ways in which the compliance costs for MATS were likely overestimated. Section III.B.3 expands upon and re-evaluates the cost metrics used in the 2016 Supplemental Finding by adding post-promulgation information to our analysis, and we discuss impacts on power sector generating capacity. In section III.B.4, we propose to reaffirm additional cost considerations regarding the availability and cost of control technologies discussed in earlier rulemakings, and in section III.B.5, we provide our proposed conclusions regarding the costs, or disadvantages, of regulating HAP from EGUs.[[Page 7650]]2. Compliance Cost Projections in the 2011 RIA Were Likely Significantly Overestimated In issuing this proposal, the EPA finds itself in a position Congress was not likely to have contemplated when it promulgated the 1990 Amendments. The statute contemplated that the EPA would have completed the required studies and presumably made its determination more than 20 years ago. Due to litigation and multiple changes of administration following Michigan, we are, at this point, nearly 10 years after promulgation of the regulation about which we are making a threshold determination, and 5 years after full implementation of that regulation. The vast majority of MATS-affected sources were required to be in compliance with the rule's requirements by April 2016, and installation of new controls-or upgrades to existing controls-were in place by 2017.\76\ This means we now have on hand unit-level ***data*** regarding installations, a clearer picture about market trends, and updated, more accurate assumptions that, taken together, produce a very different picture of the actual costs of MATS than what we projected when we reaffirmed the appropriate and necessary determination and promulgated the rule in 2012. Therefore, while the Agency considers that the information that was available at the time of MATS promulgation provided a valid analytical basis for the threshold appropriate and necessary determination, because many years have elapsed since then, the EPA believes it is reasonable to examine how the power sector has evolved since MATS was finalized and, with the benefit of hindsight, compare important aspects of the 2011 RIA projections with what actually happened since MATS was promulgated. Because our obligation under CAA section 112(n)(1)(A) is to fully consider the advantages and disadvantages of regulating a large, critically important industry, whose role impacts the lives of every American, we think it is important to evaluate and consider the best, currently available information, even if, as discussed in sections III.B.3 and 4, the pre-existing record supports the same conclusion. This ex post examination demonstrates that the EPA almost certainly significantly overestimated compliance costs in the 2011 RIA, which further supports the determination that regulation is appropriate and necessary after considering cost. We also do not view this updated, post-hoc evaluation of what happened post-promulgation as undermining the record we established in 2012. Models are not invalidated ``solely because there might be discrepancies between those predictions and the real world. That possibility is inherent in the enterprise of prediction.'' EME Homer City Generation, L.P v. EPA, 795 F.3d 118, 135-36 (D.C Cir. 2015).--------------------------------------------------------------------------- \76\ Affected sources were required to be in compliance with the requirements in MATS within 3 years after the effective date of the rule (i.e , by April 2015). However, sources were allowed to request an additional year to comply with the rule and the vast majority of sources were required to be in compliance with the rule's requirements by April 2016. We therefore think 2017 is a reasonable year in which to analyze installed controls on the EGU fleet.--------------------------------------------------------------------------- In an ideal world, with perfect information, we would be able to generate an ex post analysis of regulatory costs that could be compared to our ex ante cost estimate prepared at the time MATS was issued. However, it is extremely challenging to produce rigorous retrospective estimates of regulatory costs. A literature review and series of case studies performed by EPA staff provides insights on how analysts can perform retrospective cost analysis.\77\ Kopits et al. (2015) identifies several challenges associated with ex post cost assessments, including ***data*** limitations with respect to how facilities chose to comply with regulations and comprehensive facility-level pollution abatement costs. A key component to a rigorous retrospective analysis noted by the authors that can be particularly difficult to achieve is an accurate definition of the counterfactual, that is, what would have occurred absent the rule. It is this counterfactual that provides the baseline against which the incremental costs of regulation are estimated.--------------------------------------------------------------------------- \77\ Kopits, E., A. McGartland, C. Morgan, C. Pasurka, R. Shadbegian, N. B. Simon, D. Simpson and A. Wolverton (2015). Retrospective cost analyses of EPA regulations: a case study approach. Journal of Benefit-Cost Analysis 5(2): 173-193.--------------------------------------------------------------------------- In the case of MATS, to construct an estimate of ex post implementation costs that is directly comparable to the ex ante 2011 RIA cost estimate, we would first need to accurately attribute changes in the power sector that were due to MATS requirements rather than to market and technological changes, other regulations, or, importantly, combinations of these factors (i.e , properly specify the counterfactual). Second, we would need actual information of the incremental costs that had been associated with facility-level operational changes due to MATS, such as observed changes in dispatch, actual fuel consumption, and how controls in MATS-affected units were actually operated. Even the operation of non-MATS affected units would be relevant to such an analysis, because operational decisions are interconnected on the grid via dispatch decisions as well as through fuel markets. While there may be approaches such as econometric analysis, simulation modeling, and event study analysis that could capture and estimate components of the problem identified above and derive an estimate of ex post MATS costs, the approach would very likely require different methods and assumptions than the 2011 RIA estimates which were based on the comparison of two forward-looking sets of projections. Even if we undertook such additional analysis or modeling, ultimately we would still only be able to provide a new estimate of regulatory costs, not an actual cost. Given how challenging it is to produce rigorous retrospective estimates of regulatory costs, particularly at a system-level, an ex post analysis is better suited to comparing particular aspects of the analysis, which can help us understand whether costs in the 2011 RIA were over- or under-estimated and can yield a general sense of how much reality diverged from the projection, than to attempting to generate a new and precise ``actual'' total compliance cost estimate for MATS. Estimating retrospective costs for a rule of the magnitude of MATS is an especially significant challenge because the rule regulates hundreds of units within a complex, interdependent, and dynamic economic sector. Units within the power sector are also subject to many regulatory requirements and other economic drivers. While we can observe the decisions of the sector and individual units in terms of decisions on controls, fuels, and retirement, we cannot pinpoint the reason(s) behind each unit-level decision. With respect to identifying the counterfactual against which to evaluate retrospective compliance costs, several unforeseen factors since MATS promulgation have driven changes in the power sector that have led to the composition of the current fleet being different than the fleet projected in the 2011 RIA. For example, dramatic increases in the supply of natural gas, along with advances in cost and performance of renewable generation technologies and low electricity demand growth, none of which were fully anticipated in the 2011 RIA, have made strong contributions to shifts away from coal-fired generation.78 79 Additionally, other[[Page 7651]]EPA regulations such as the Disposal of Coal Combustion Residuals from Electric Utilities final rule, the Steam Electric Power Generating Effluent Guidelines--2015 Final Rule, and the 2020 Steam Electric Reconsideration Rule, were promulgated after MATS.\80\ While the compliance periods of these rules all postdate the MATS compliance date, utilities are likely to consider multiple regulations simultaneously when making planning decisions, a likelihood that also complicates the identification of the counterfactual scenario of a world without MATS that is needed to generate an ex post incremental cost estimate of MATS that would be directly comparable to the ex ante 2011 RIA cost estimate.--------------------------------------------------------------------------- \78\ Linn, J. and K. McCormack (2019). The Roles of Energy Markets and Environmental Regulation in Reducing Coal-Fired Plant Profits and Electricity Sector Emissions. RAND Journal of Economics 50: 733-767. \79\ Coglianese, J., et al. (2020). The Effects of Fuel Prices, Environmental Regulations, and Other Factors on U.S Coal Production, 2008-2016. The Energy Journal 41(1): 55-82. \80\ 85 FR 53516 (August 28, 2020), 80 FR 67838 (November 3, 2015), and 85 FR 64650 (October 13, 2020), respectively.--------------------------------------------------------------------------- Even though it is extremely challenging to produce the type of ex post incremental cost estimate discussed above, several stakeholders have conducted analyses, focusing on different components of the regulation's cost, to assess actual costs of compliance. While none of these estimates can be precisely compared against the EPA ex ante estimates because they use different methods than the power sector modeling the EPA used in the 2011 RIA, all of the independent analyses suggested that the actual compliance costs expenditures were significantly lower--by billions of dollars--than the EPA estimated in the 2011 RIA. First, a 2015 analysis by Andover Technology Partners focused on the capital and operating costs associated with the actual installation and operation of pollution control equipment at MATS-regulated units and made two key findings: the number of installed controls was significantly lower than the number of controls that was projected in the 2011 RIA and the cost of the installed controls was generally lower than the control costs that the EPA assumed in the 2011 RIA modeling. Based on these findings, the study estimated that the EPA's projected cost of compliance was over-estimated by approximately $7 billion.81 82 In other words, the Andover Technology Partners estimated that the EPA's projected cost was approximately four times higher than their retrospective estimate of cost, which they estimated to be approximately $2 billion per year.--------------------------------------------------------------------------- \81\ Declaration of James E. Staudt, Ph.D , CFA, at 3, White Stallion Energy Center v. EPA, No. 12-1100 (DC Cir., December 24, 2015). Also available at Docket ID Item No. EPA-HQ-OAR-2009-0234-20549. \82\ In addition to the 2015 study, Andover Technology Partners produced two other analyses in 2017 and 2019, respectively, that estimated the ongoing costs of MATS. The 2017 report estimated that the total annual operating cost for MATS-related environmental controls was about $620 million, an estimate that does not include ongoing payments for installed environmental capital. The 2019 report estimates the total annual ongoing incremental costs of MATS to be about $200 million; again, this estimate does not include ongoing MATS-related capital payment. The 2017 report is available in Docket ID Item No. EPA-HQ-OAR-2018-0794-0794. The 2019 report is available in Docket ID Item No. EPA-HQ-OAR-2018-0794-1175.--------------------------------------------------------------------------- Second, a 2017 study performed by M.J Bradley & Associates (MJB&A) used information from the EIA and estimated that owners and operators of coal-fired EGUs incurred total capital expenditures on environmental retrofits of $4.45 billion from December 2014 to April 2016.\83\ To the EPA's understanding, the MJB&A cost estimate represents total upfront capital costs (not ongoing operating and maintenance expenditures), and is not annualized as was the capital expenditure in the 2011 RIA-based projected cost estimate. For comparison, the estimated total upfront (not annualized) capital expenditures underpinning the 2011 RIA annual compliance cost estimate is about $36.5 billion, which is more than eight times higher than the MJB&A estimates. This result suggests that the capital cost component of the 2011 RIA cost projections was significantly overestimated, potentially by a factor of more than eight.--------------------------------------------------------------------------- \83\ Available in Docket ID Item No. EPA-HQ-OAR-2018-0794-1145.--------------------------------------------------------------------------- Third, the Edison Electric Institute (EEI), the association that represents all U.S investor-owned electric companies, estimated that by April 2019, owners and operators of coal- and oil-based EGUs incurred cumulative (not annual) compliance costs of more than $18 billion to comply with MATS, including both capital and operations and maintenance costs since MATS became effective in April 2012.\84\ In order to provide a simple comparison between the EEI figure, which was incurred over 7 years, and the annualized amount presented in the 2011 RIA ($9.6 billion), we can divide the EEI figure by 7 to estimate an average annual amount of approximately $2.6 billion, which is similar to the Andover Technology Partners estimate of approximately $2 billion. Also in line with the Andover Technology Partners estimate, EEI's estimate suggests that the annual costs related to MATS compliance were overestimated in the 2011 RIA by approximately $7 billion. While there is some uncertainty in the amount of time over which those costs were incurred, as well as the exact nature of those expenditures, it is clear that the information provided by EEI supports a conclusion that the costs of compliance with MATS were significantly lower than the Agency's projections.--------------------------------------------------------------------------- \84\ Available in Docket ID Item No. EPA-HQ-OAR-2018-0794-2267.--------------------------------------------------------------------------- In summary, it is the EPA's understanding that two of these studies indicate that the 2011 RIA may have overestimated annual compliance costs by approximately $7 billion, and the third study finds that the projected total upfront capital costs may have been overestimated by a factor of more than eight. While each of these retrospective cost estimates is developed from bases that are dissimilar from one another and, in particular, from how the EPA developed the prospective cost estimates in the 2011 RIA, each of the independent analyses indicate that the costs of MATS are likely significantly less than the EPA estimated in the 2011 RIA. For this proposal, the EPA has evaluated whether the ex ante estimates in the 2011 RIA were likely accurate, overestimated, or underestimated, and the details of the EPA's new analysis are contained in the docketed TSD (referred to herein as the ``Cost TSD'').\85\ Consistent with our systems-level approach, we begin our analysis with an evaluation of natural gas expenditures during the relevant time period. The rapid decrease in the price of natural gas during this time period affected U.S power generation profoundly, including U.S EGU fuel expenditures; this has significant implications for our ex post analysis because natural gas expenditures constituted approximately 25 percent of the projected 2015 compliance costs in the 2011 RIA.\86\ These market shifts in the industry also impacted expenditures associated with the installation and operation of pollution control equipment at MATS-affected facilities. Those costs constituted a majority--about 70 percent--of the projected annual compliance costs in 2015. The following[[Page 7652]]sections closely examine these two components of the compliance cost and use available information to evaluate whether the projected compliance costs reported in the 2011 RIA were likely higher or lower than actual costs. We also review important cost assumptions used in the 2011 RIA. Taken together, this suite of quantitative and qualitative evaluations indicates that the projected costs in the 2011 RIA were almost certainly significantly overestimated. We find that the 2011 RIA's estimate of the number of installations alone led to an overestimate of about $2.2 to $4.4 billion, and that if recent updates to the cost and performance assumption for pollution controls had been reflected in the 2011 RIA modeling, the projected compliance costs would likely have been even lower (suggesting the overestimate could be greater than $4.4 billion).--------------------------------------------------------------------------- \85\ U.S EPA. 2021. Supplemental ***Data*** and Analysis for the National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units--Revocation of the 2020 Reconsideration, and Affirmation of the Appropriate and Necessary Supplemental Finding; Notice of Proposed Rulemaking (``Cost TSD''). \86\ We projected that regulation of coal- and oil-fired EGUs under MATS would induce units to switch to natural gas, which in turn would increase the price of natural gas and the cost of those expenditures.---------------------------------------------------------------------------a. Natural Gas Supply The natural gas industry has undergone significant change in recent years. Starting in the mid-2000s, technological changes in natural gas drilling and extraction initiated major market changes that resulted in significant increases to domestic supplies of natural gas. As these technologies have continued to advance, they have had a lasting impact on natural gas markets, resulting in major shifts in the economics of electric sector operations given the abundant supply of natural gas at relatively low costs. This section summarizes these changes and the implications for the cost projection presented in the 2011 RIA. In 2005, the EIA estimated that proved reserves of natural gas were 213 trillion cubic feet (tcf).\87\ In 2019, the estimate of proved reserves was 495 tcf, an increase of 132 percent. The market effects of this major supply shift were profound across the economy, but especially for the power sector. By the end of 2019, aided by advances in drilling and hydraulic fracturing techniques, natural gas production from tight and shale gas formations was the major source of domestic production (see Table 1 below) and had increased three-fold from 2005 production levels.--------------------------------------------------------------------------- \87\ U.S Crude Oil and Natural Gas Proved Reserves, Year-end 2019 (Table 9: U.S proved reserves of natural gas). EIA, January 11, 2021 release available at [*https://www.eia.gov/naturalgas/crudeoilreserves*](https://www.eia.gov/naturalgas/crudeoilreserves). Accessed July 23, 2021. Table 1--U.S Natural Gas Production, by Source [Trillion cubic feet]---------------------------------------------------------------------------------------------------------------- Tight/shale Other lower Lower 48 Year gas 48 onshore offshore Other----------------------------------------------------------------------------------------------------------------2005............................................ 7.2 5.1 3.4 2.32006............................................ 8.0 5.1 3.2 2.32007............................................ 9.0 4.9 3.1 2.32008............................................ 10.3 4.9 2.6 2.42009............................................ 11.1 4.5 2.7 2.42010............................................ 12.4 4.2 2.5 2.22011............................................ 14.8 4.0 2.0 2.12012............................................ 16.7 3.7 1.6 2.02013............................................ 17.6 3.5 1.4 1.72014............................................ 19.5 3.4 1.3 1.62015............................................ 21.0 3.2 1.4 1.52016............................................ 21.1 2.8 1.3 1.42017............................................ 22.2 2.7 1.1 1.32018............................................ 25.7 2.7 1.0 1.32019............................................ 29.3 2.4 1.0 1.22020............................................ 29.2 2.3 1.2 1.2----------------------------------------------------------------------------------------------------------------Source: U.S EIA, [*https://www.eia.gov/energyexplained/natural-gas/where-our-natural-gas-comes-from.php*](https://www.eia.gov/energyexplained/natural-gas/where-our-natural-gas-comes-from.php), accessed July 25, 2021. Note: ``Other'' includes production from Alaska and Coalbed Methane sources. As a result, the natural gas market underwent a long period of sustained low prices (see Table 2 below). These market shifts were not fully anticipated or predicted by observers, as indicated by natural gas futures prices at the time of MATS promulgation. Although these changes took root in the mid-2000s, the lasting market disruption would take more time to cement itself. From 2010 through 2019, the U.S became one of the world's leading producers of natural gas, breaking domestic production records year-on-year through the decade, while maintaining record-low prices. During this timeframe, the U.S shifted from a total net energy importer to an exporter,\88\ while maintaining some of the lowest relative natural gas prices globally.\89\--------------------------------------------------------------------------- \88\ Monthly Energy Review, EIA (June 24, 2021) and Today in Energy (``U.S total energy exports exceed imports in 2019 for the first time in 67 years''), EIA (April 20, 2020) available at [*https://www.eia.gov/todayinenergy/detail.php?id=43395*](https://www.eia.gov/todayinenergy/detail.php?id=43395). Accessed July 23, 2021. \89\ BP, Statistical Review of World Energy 2021 available at [*https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html*](https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html). Accessed July 23, 2021. Table 2--Natural Gas Prices---------------------------------------------------------------------------------------------------------------- NYMEX natural gas NYMEX natural gas Henry Hub natural Henry Hub natural Henry Hub spot gas futures ($/ gas futures ($/ natural gas index Year MMBtu), annual MMBtu), annual annual average average, as of: average, as of: price ($/MMBtu) 2011-03-16 2011-12-21----------------------------------------------------------------------------------------------------------------2005................................................... ................. ................. 8.632006................................................... ................. ................. 6.742007................................................... ................. ................. 6.96[[Page 7653]] 2008................................................... ................. ................. 8.902009................................................... ................. ................. 3.942010................................................... ................. ................. 4.372011................................................... 4.24 ................. 4.002012................................................... 4.91 3.43 2.752013................................................... 5.31 4.07 3.732014................................................... 5.67 4.43 4.372015................................................... 6.04 4.66 2.632016................................................... 6.36 4.90 2.512017................................................... 6.67 5.16 2.982018................................................... 6.97 5.43 3.162019................................................... 7.25 5.70 2.562020................................................... 7.50 5.96 2.032021................................................... 7.76 6.23 .................2022................................................... 8.02 6.50 .................2023................................................... 8.28 6.78 .................2024................................................... ................. 7.06 .................----------------------------------------------------------------------------------------------------------------Source: Annual Average Henry Hub Price, EIA. NYMEX price, from S&P Global ***data***. 2015 ***data*** from 2011 RIA, Chapter 3. The EPA projected a 2015 natural gas price of roughly $5/MMBtu when MATS was finalized in December 2011, which was a reasonable expectation based on prevailing market conditions at that time. However, natural gas prices post-MATS promulgation ended up being considerably lower than anticipated, which resulted in major shifts in the economics of fossil fuel-fired electric generating technologies (see Table 2 above and Chart A-1 in the Cost TSD). From 2005 through 2010, annual average natural gas prices (at Henry Hub) averaged about $6.60/MMBtu. Several years later, as MATS compliance began, prices averaged roughly $2.75/MMBtu for the years 2015 through 2019. This market shift greatly changed the economics of power plant operation for fossil fuel-fired facilities, with the electric sector surpassing the industrial sector to become the largest consumer of natural gas (38 percent of the total in 2020),\90\ and gas-fired generators becoming the leading source of electric generation in the electric sector, representing 40 percent of total generation in 2020.\91\--------------------------------------------------------------------------- \90\ Table 4.3, Monthly Energy Review, EIA, April 2021, available at [*https://www.eia.gov/totalenergy/****data****/monthly/archive/00352104.pdf*](https://www.eia.gov/totalenergy/data/monthly/archive/00352104.pdf). \91\ EIA, Electricity ***Data*** Browser, Net generation, United States, all sectors, annual, available at [*https://www.eia.gov/electricity/****data****/browser/.---------------------------------------------------------------------------*](https://www.eia.gov/electricity/data/browser/.---------------------------------------------------------------------------) The modeling supporting the 2011 RIA did not anticipate this major change in natural gas supply, which has clearly had a significant impact on the electric power sector and those sources covered by MATS. While we do not quantify the impact this change would have on the projected compliance costs associated with incremental changes in natural gas use and price (about 25 percent of the total projected compliance cost in the 2011 RIA), we note that any closures of covered units that occurred as a result of the changed relative economics of fuel prices would decrease the MATS-related compliance costs for the sector. These closures reduced the amount of control capacity necessary for compliance with MATS, and we estimate below a range of costs associated with the overestimation of control installations in the 2011 RIA. Several researchers have investigated the role of relative fuel prices as a factor in decisions that were made regarding closures of coal-fired units around 2015. Generally, these studies attribute closures primarily to the decrease in natural gas prices, and they also note smaller factors such as advances in the cost and performance of renewable generating sources, lower-than-anticipated growth in electricity demand, and environmental regulations. For example, Linn and McCormack (2019) developed a simulation model of the U.S Eastern Interconnection that reproduced unit operation, emissions, and retirements over the 2005-2015 period. The authors use this model to explain the relative contributions of demand, natural gas prices, wind generation, and environmental regulations, including MATS, to the changes in the share of coal in electricity generation. The results showed that lower electricity consumption and natural gas prices account for a large majority of the declines in coal plant profitability and resulting retirements. The authors found that the environmental regulations they modeled, NOXemissions caps and MATS, played a relatively minor role in declines of coal plant profitability and retirements. Additionally, Coglianese et al. (2020) developed a statistical modeling approach to enable the decomposition of changes in U.S coal production from 2008-2016 into changes due to a variety of factors, including changes in electricity demand, natural gas prices relative to coal, renewable portfolio standards, and environmental regulations that affect coal-fired plants. The results indicated that declines in natural gas prices explained about 92 percent of the decrease in coal production between 2008 and 2016. Air regulations, including MATS, explained about 6 percent of the drop in coal production. The study attributed about 5.2 GW of coal-fired EGU retirements to MATS. These studies both demonstrate that the decrease in natural gas prices played a significant role in closures of coal-fired EGUs. While we do not quantify the impact this change had on the projected costs included in the 2011 RIA, we note that any closures of covered units that occurred as a result of the dramatically changed relative economics of fuel prices would decrease the MATS-related compliance costs for the sector.[[Page 7654]]b. Projected Versus Observed Pollution Control Installations The 2011 RIA reported a sector-level compliance cost of $9.6 billion annually in 2015. The majority of those costs--about 70 percent--represented the incremental annualized capital and annual operation and maintenance (O&M) costs associated with installation and operation of pollution controls for compliance with MATS at coal steam units. Given the time that has passed, we can now compare the incremental projected pollution control capacity reported in the 2011 RIA with available information regarding actual (observed) control installations. For this proposal, therefore, the EPA has compared observed installations and costs over 2013-2016 to unit-level estimates of the control installation capacity and associated costs presented in the 2011 RIA. This analysis demonstrates, subject to the caveats and uncertainty discussed below, that the 2011 RIA likely overestimated total pollution control retrofit capacity that would occur in response to MATS and, thus, likely overestimated MATS compliance costs. For example, the analysis that follows demonstrates that fabric filter (FF) systems--which are an expensive and capital-intensive control technology--were only installed on less than one-third of the capacity anticipated in the 2011 RIA analysis. This comparison of projected to observed control capacity installations relies on the simplifying assumption that all dry scrubbers (e.g , dry FGD systems), dry sorbent injection (DSI) systems, activated carbon injection (ACI) systems, and FF systems installed during the 2013-2016 period were installed for compliance with the MATS emissions limits. This assumption is necessitated by the absence of comprehensive ***data*** on the specific reasons EGUs installed pollution control equipment. While assuming pollution controls of these types that were installed in this period are singularly attributable to MATS requirements is a reasonable assumption for this analysis, it is a highly conservative assumption given that some of the observed installations likely occurred in response to other regulations to control criteria air pollutants (e.g , Cross-State Air Pollution Rule, Regional Haze, Federal implementation plans, or state implementation plans) or enforcement actions (e.g , consent decrees). Because some of the observed installations in this analysis likely resulted from non-MATS requirements, the approach potentially over-attributes the amount of pollution controls built specifically for MATS compliance, thereby leading to an overestimate of the control costs associated with MATS. Table 3 presents the findings of this analysis in capacity terms. The total capacity projected to retrofit with each control in the 2011 RIA is reported for the base case (i.e , projected future conditions absent MATS) and under MATS. The difference is presented in the `Projected Incremental Controls' column. So, for example, in the 2011 RIA the EPA projected that there would be an incremental 20.3 GW of capacity retrofitting with dry FGD that is attributable to MATS. We compare the projected incremental controls capacity value to the observed installations capacity value. Note that we are unable to estimate the total capacity of observed upgrades to electrostatic precipitators (ESP) and scrubbers due to a lack of available ***data*** regarding such upgrades. For additional information, see the docketed Cost TSD. Table 3--Projected vs. Observed Capacity [Gigawatts (GW)]-------------------------------------------------------------------------------------------------------------------------------------------------------- Percent Projected Observed Difference: difference: Pollution control retrofit Base case MATS incremental installations Observed minus Observed minus controls (2013-2016) projected projected (2013-2016) (2013-2016)--------------------------------------------------------------------------------------------------------------------------------------------------------Dry FGD................................................. 4.6 24.8 20.3 16.0 -4.3 -21DSI..................................................... 8.6 52.5 43.9 15.8 -28.1 -64ACI..................................................... 0 99.3 99.3 96.1 -3.2 -3FF...................................................... 12.7 114.7 102 31.4 -70.6 -69ESP Upgrade............................................. 0 33.9 33.9 N/A N/A N/AScrubber Upgrade........................................ 0 63.1 63.1 N/A N/A N/A--------------------------------------------------------------------------------------------------------------------------------------------------------Source: Projected Controls: 2011 RIA; Observed Installations: NEEDS v.5.16 Note: FF installations include installations specifically related to PM control, as well as installations included with dry scrubber, DSI, and some ACI retrofits in the modeling. Totals may not sum due to rounding. This analysis demonstrates that projected incremental capacity of dry FGD, DSI, ACI, and FF was likely significantly overestimated in the 2011 RIA. The capacities of actual installed control technologies are lower, often significantly lower, than projected (and again, this analysis attributes all control installations of certain types during this time period to MATS, even though some portion of those installations were likely made in whole or in part due to other regulations). For example, the installed DSI capacity is about two-thirds lower than was projected. The difference between observed installed control capacities and what we projected those incremental control capacities would be translates directly into significantly lower costs than estimated. Because the vast majority of compliance costs in the 2011 RIA were related to the installation and operation of pollution controls, and because significant deployment of any higher-cost compliance strategies did not occur, the large differences observed in Table 3 suggest that the projected compliance costs were likely significantly overestimated as well. For example, approximately $2 billion was estimated to be attributable to the installation and operation of DSI controls (21 percent of the total annual projected costs of MATS), when in actuality, only one-third of those installations occurred (and some were likely attributable to regulations other than MATS). We also conduct an analysis of the approximate costs related to the overestimate of projected incremental pollution controls. This analysis is discussed in detail in the Cost TSD. Specifically, we compared observed installations over 2013-2016 to unit-level estimates of the control installation capacity and associated costs presented in the 2011 RIA to develop a range of the potential overestimate of compliance costs related[[Page 7655]]to projected control installations that did not occur. As result of this analysis, we find that based on this one ***variable***--the number of control technology installations--the 2011 RIA overestimated control costs by about $2.2 to $4.4 billion (or 2.7 times). If recent updates to the cost and performance assumptions for pollution controls had been reflected in the 2011 RIA modeling, the projected compliance costs would likely have been even lower (suggesting the overestimate could be greater than $4.4 billion). The EPA did not quantify advances in cost and performance of control technology between the time of the EPA's modeling and implementation of the rule due to uncertainty. We note that this may be one reason that the Andover Technology Partners' overestimate for control costs of $7 billion exceeds the EPA's range of overestimates ($2.2-4.4 billion) for the same control and operation costs. The next section helps explain some of the difference quantified above, and provides further qualitative evidence supporting the EPA's conclusion that the 2011 RIA likely significantly overestimated the compliance costs associated with meeting MATS requirements.c. 2011 RIA Modeling Assumptions Since promulgation of MATS, the EPA has found it necessary to update some of the modeling assumptions used in the IPM modeling that informed the RIA cost estimate, in order to capture the most recently available information and best reflect the current state of the power sector. Several of these recent updates are directly related to pollution control retrofits that were projected to be installed for MATS in the 2011 RIA. Had these updates been reflected in our modeling, it likely would have projected fewer controls needing to be installed and therefore a lower cost estimate overall. The full suite of assumptions utilized in the IPM modeling are reported in the model documentation, which provides additional information on the assumptions discussed here as well as all other assumptions and inputs to the model.\92\ Updates specific to MATS modeling are also in the IPM 4.10 Supplemental Documentation for MATS.\93\ As was included in the 2011 RIA discussion regarding uncertainty and limitations of the power sector modeling analysis (Section 3.15), the cost and emissions impact projections did not take into account the potential for advances in the capabilities of pollution control technologies or reductions in their costs over time. EPA modeling cannot anticipate in advance the full spectrum of compliance strategies that the power sector may innovate to achieve required emission reductions, and experience has shown that regulated industry often is able to comply at lower costs through innovation or efficiencies. Where possible, the EPA designs regulations to assure environmental performance while preserving flexibility for affected sources to design their own solutions for compliance. Industry will employ an array of responses, some of which regulators may not fully anticipate and will generally lead to lower costs associated with the rule than modeled in ex ante analysis. See, e.g , section III.D of this preamble, discussing how the actual cost of the ARP was up to 70 percent less than what had been estimated.--------------------------------------------------------------------------- \92\ See [*https://www.epa.gov/airmarkets/ipm-analysis-proposed-mercury-and-air-toxics-standards-mats*](https://www.epa.gov/airmarkets/ipm-analysis-proposed-mercury-and-air-toxics-standards-mats). Accessed July 23, 2021. \93\ See [*https://www.epa.gov/airmarkets/documentation-supplement-base-case-v410mats*](https://www.epa.gov/airmarkets/documentation-supplement-base-case-v410mats). Accessed July 23, 2021.--------------------------------------------------------------------------- A first example regards the assumptions of HCl removal for certain types of coal. When lignite and subbituminous coals are combusted, the chemistry of coal ash alkalinity removes HCl emissions. The 2011 RIA modeling assumed a 75 percent reduction of HCl emissions from lignite and subbituminous coals.\94\ Upon subsequent review of available ***data***, the EPA updated this assumption to 95 percent HCl removal.\95\ This revised assumption regarding improved HCl removal from coal ash alkalinity effectively lowers uncontrolled HCl emissions rates in the projections and is a better reflection of actual removal rates observed by EGUs combusting subbituminous and/or lignite coal. This updated assumption, had it been used in the 2011 RIA modeling, would have significantly decreased the incremental capacity of acid gas controls (e.g , DSI, dry FGD) that the model projected to be needed for compliance with the MATS acid gas limits.\96\ The lower projection for controls would in turn have resulted in a lower cost estimate.--------------------------------------------------------------------------- \94\ Id. \95\ See [*https://www.epa.gov/sites/default/files/2019-03/documents/chapter\_5.pdf*](https://www.epa.gov/sites/default/files/2019-03/documents/chapter_5.pdf). Accessed July 23, 2021. \96\ While we are unable to quantify precisely the impact that updating this assumption would have on the projected compliance costs, we can observe that most incremental DSI capacity (about 40 GW) would not require DSI controls in the 2011 RIA modeling, holding all else constant.--------------------------------------------------------------------------- For a second example, the EPA updated the DSI retrofit cost methodology used in our power sector modeling. The 2011 RIA compliance cost projections assumed an SO2removal rate of 70 percent and a corresponding HCl removal effect of 90 percent \97\ based on a technical report, developed by Sargent and Lundy in August 2010.\98\ These assumptions have been updated to reflect an SO2removal rate of 50 percent and a corresponding HCl removal effect of 98 percent for units with FF in the EPA's recent modeling,\99\ based on an updated technical report from Sargent and Lundy.\100\--------------------------------------------------------------------------- \97\ See [*https://www.epa.gov/sites/production/files/2015-07/documents/updates\_to\_epa\_base\_case\_v4.10\_ptox.pdf*](https://www.epa.gov/sites/production/files/2015-07/documents/updates_to_epa_base_case_v4.10_ptox.pdf). Accessed July 23, 2021. \98\ See Dry Sorbent Injection Cost Development Methodology at [*https://www.epa.gov/sites/production/files/2015-07/documents/append5\_4.pdf*](https://www.epa.gov/sites/production/files/2015-07/documents/append5_4.pdf). Accessed July 23, 2021. \99\ See [*https://www.epa.gov/airmarkets/documentation-epa-platform-v6-november-2018-reference-case-chapter-5-emission-control*](https://www.epa.gov/airmarkets/documentation-epa-platform-v6-november-2018-reference-case-chapter-5-emission-control). Accessed July 23, 2021. \100\ See Dry Sorbent Injection for SO2/HCl Control Cost Development Methodology at [*https://www.epa.gov/sites/production/files/2018-05/documents/attachment\_5-5\_dsi\_cost\_development\_methodology.pdf*](https://www.epa.gov/sites/production/files/2018-05/documents/attachment_5-5_dsi_cost_development_methodology.pdf). Accessed July 23, 2021.--------------------------------------------------------------------------- These revised assumptions, which better reflect the actual cost and performance of DSI, would reduce the ***variable*** costs significantly, by about one-third at a representative plant,\101\ because less sorbent is required to achieve the same amount of HCl reduction. If the EPA had been able to use this new information in the 2011 RIA modeling, the projected compliance costs would have been lower, reflecting the reduced sorbent necessary to achieve the MATS emission limits. Furthermore, we note that while these modeling assumptions are based on a single sorbent (trona), alternative sorbents are available, potentially at a lower cost for some units.--------------------------------------------------------------------------- \101\ Based on a 500 MW plant with a heat rate of 9,500 Btu/kWh burning bituminous coal.--------------------------------------------------------------------------- A third example relates to the assumed cost of ESP upgrades. In the 2011 RIA modeling, the EPA assumed that a range of upgrades would be necessary at units with existing ESP controls in order to meet the MATS PM standard. The EPA assumed the cost of these upgrades ranged from $55/kilowatt (kW) to $100/kW (in 2009 dollars). However, new evidence suggests that many ESP upgrades were installed and are available at less than $50/kW.\102\--------------------------------------------------------------------------- \102\ Analysis of PM and Hg Emissions and Controls from Coal-Fired Power Plants. Andover Technology Partners (August 19, 2021), available in the rulemaking docket.--------------------------------------------------------------------------- These examples highlight the uncertainty inherent in ex ante compliance cost projections, and contribute additional evidence that the projected compliance costs presented in[[Page 7656]]the 2011 RIA were likely overestimated and that actual compliance costs for MATS in 2015 were likely significantly less than the $9.6 billion estimate.d. Conclusion That the 2011 RIA Costs Were Overestimated After reviewing this suite of quantitative and qualitative updates and considering studies that were performed by outside entities, the EPA concludes that the available ex post evidence points to significantly lower costs of compliance for the power sector under MATS than suggested by the ex ante projections in the 2011 RIA. There are numerous reasons for this, and chief among them is the fact that the natural gas industry has undergone profound change in recent years. Following the promulgation of MATS, natural gas supply increased substantially, leading to dramatic price decreases that resulted in major shifts in the economics of fossil fuel-fired electric generating technologies. The 2011 RIA modeling did not fully anticipate this historic change in natural gas supply and the related decrease in natural gas prices. As a result of this and other fundamental changes in the industry, we see a very different pattern of control installations than was projected: \103\--------------------------------------------------------------------------- \103\ As discussed above, although we attributed all controls of these types to MATS in this analysis, even those controls that were installed were likely due in part or in whole for reasons other than MATS.--------------------------------------------------------------------------- 21 percent less capacity of dry FGD than projected; 64 percent less capacity of DSI than projected; 3 percent less capacity of ACI than projected; 69 percent less capacity of FF than projected; and Likely fewer ESP and scrubber control upgrades than projected.These controls were responsible for approximately 70 percent of the projected annual compliance costs in the 2011 RIA. Because so many projected controls were not installed, we know that the control-related costs were almost certainly significantly overestimated. By simply comparing between projected and installed controls, we now find that the projected control-related costs for 2015 of about $7 billion were likely overestimated by $2.2 to $4.4 billion, and possibly more. In addition, we have updated some of the modeling assumptions that supported the 2011 RIA. Specifically: HCl emissions for EGUs burning subbituminous and lignite coals are much lower than originally modeled, reducing the number of controls necessary for compliance in the model; DSI controls require less sorbent than originally assumed, lower the operating cost of these controls, and other lower-cost sorbents are likely available; and The assumed cost of ESP upgrades in the modeling was likely much higher than the actual cost of these upgrades. While not quantified here, the advances in cost and performance of control technology between the time of the EPA's modeling and implementation of the rule would, if quantified, likely add to the $2.2 to $4.4 billion overestimate. Furthermore, the three studies submitted to the EPA during earlier rulemakings support this finding that the 2011 RIA cost projection was significantly overestimated: Andover Technology Partners estimated that the actual costs of compliance with MATS were approximately $2 billion, and that the 2011 RIA may have overestimated compliance costs by approximately $7 billion. MJB&A estimated that the total upfront capital expenditures of pollution controls installed for compliance with the rule were overestimated in the 2011 RIA by a factor of more than eight. EEI, the association that represents all U.S investor-owned electric companies, estimated cumulative costs incurred by the industry in response to MATS, and that estimate suggests an annual amount about $7 billion less than the 2011 RIA projected. Taken together, this information indicates that the projected costs in the 2011 RIA were almost certainly significantly overestimated. We solicit comment on ***data*** resource and methods such as econometric, simulation, and event study approaches that may aid the EPA in better characterizing the ex post regulatory costs of MATS for consideration before we issue the final rule.3. Evaluation of Metrics Related to MATS Compliance In the next four sections, we place the costs that we estimated in 2011, and which, as just explained, were likely significantly overestimated, in the context of the EGU industry and the services the EGU industry provides to society. The purpose of these comparisons is to better understand the disadvantages conferred by expending this money, both in terms of their scale and distribution, in order to weigh cost as a factor in our preferred methodology for making the appropriate determination. While we recognize the projected cost estimate from the 2011 RIA in absolute terms is perceived as a large number, our findings demonstrate that, for example, the (overestimated) projected cost estimate is less than 3 percent of the power sector's revenues from electricity sales, even when compared against ***data*** from 2019 (which had the lowest electricity sale revenues in a nearly 20 year period). As we did in 2016, we first contextualize the costs of MATS against power sector ***data*** for the years 2000 to 2011, i.e , the information that was available to the Agency when we were promulgating MATS in 2012 and reaffirming the appropriate and necessary determination. For purposes of this proposal, we also expand our assessment to compare the 2011 cost estimates to the most recent years of ***data*** available regarding, for example, industry revenue and electricity prices. The intent of expanding the years of analysis is to update our assessments from the 2016 Supplemental Finding considering power sector trends with the newest information. We continue to use projections developed for the 2011 RIA for purposes of these evaluations, because as discussed in section III.B.2, we are unable to generate new, bottom-line actual cost projections. However, in section III.D, we consider these evaluations in light of the EPA's finding that the projected costs were almost certainly significantly overestimated.a. Compliance Costs as a Percent of Power Sector Sales The first metric examined here (as in 2016) is a comparison of the annual compliance costs of MATS to electricity sales at the power sector-level (i.e , revenues), often called a sales test. The sales test is a frequently used indicator of potential impacts from compliance costs on regulated industries.\104\ Incorporating updated information from the EIA, Section 2.a and Table A-4 of the Cost TSD present the value of retail electricity sales from 2000 to 2019, as well as net generation totals for the electric power sector for the same period.--------------------------------------------------------------------------- \104\ For example, the sales test is often used by the EPA when evaluating potential economic impacts of regulatory actions on small entities. In the context of a small entity analysis, an evaluation of the change in profits to owners is likely the best approach to assessing the economic burden to owners from a regulatory action. ***Data*** limitations prevent solely analyzing profit changes to EGU owners as a result of MATS in this proposal.--------------------------------------------------------------------------- This information indicates that the $9.6 billion in annual compliance costs of MATS projected for 2015 would have represented about 2.7 percent of 2008 power sector revenues from retail electricity sales, the peak year during[[Page 7657]]the 2000 to 2019 period. The $9.6 billion in projected compliance costs would constitute about 2.9 percent of 2019 sales, which was the lowest sales level observed in the post-2011 period. These projected compliance costs are a very small percentage of total EGU revenues from electricity sales in both robust or lean years, and newer ***data*** confirms the findings of the 2016 record. Moreover, if we account for the fact that the $9.6 billion figure likely significantly overestimated the actual cost of compliance, the percentage of compliance costs to revenues would be even smaller.b. Compliance Expenditures Compared to the Power Sector's Annual Expenditures The next metrics we examine are a comparison of the annual capital expenditures projected in the 2011 RIA to be needed for MATS compliance to historical power sector-level overall capital expenditures, followed by a comparison of projected annual capital and production expenditures related to MATS compliance to historical power sector-level overall capital and production expenditures. First, we evaluate capital expenditures. Capital costs represent largely irreversible investments for firms that must be paid off regardless of future economic conditions, as opposed to other important ***variable*** costs, such as fuel costs, that may vary according to economic conditions and generation needs. Section 2.b and Table A-5 of the Cost TSD present two sets of estimates for trends in annual capital expenditures by the electric power sector through 2019. The first set of information is based on ***data*** compiled by S&P Global, a private sector firm that provides ***data*** and analytical services. The second set of information is from the U.S Census Bureau's Annual Capital Expenditures Survey. While each dataset has limitations, the estimates from each correspond to one another reasonably well. The 2011 RIA modeling estimated the incremental capital expenditures associated with MATS compliance to be $4.2 billion for 2015. As discussed in section III.B.2, the 2011 RIA likely significantly overestimated compliance costs. This conclusion also applies to the capital cost component of the overall cost because, as detailed earlier, fewer pollution controls were installed during the 2013-2016 timeframe than were projected in the 2011 RIA. While the EPA is not able to produce an alternative capital cost estimate directly comparable to the estimates from the 2011 RIA, the analysis discussed in section III.B.2 and the Cost TSD indicated the annualized capital expenditures at units that installed controls under MATS might be as low as $0.7 billion ($3.5 billion lower than projected in 2011 RIA, or less than one-fifth). Even using the significantly overestimated figure of $4.2 billion in our comparison shows that the projected capital expenditures associated with MATS represent a small fraction of the power sector's overall capital expenditures in recent years. Specifically, the $4.2 billion estimate represents about 3.6 or 3.7 percent of 2019 (i.e , most recent) power sector level capital expenditures based on the S&P Global and U.S Census information, respectively. Compared against 2004 power sector level capital expenditures (i.e , the 20-year low), the $4.2 billion figure represents 10.4 or 9.3 percent of sector level capital expenditures (using the two respective ***data*** sets). Additionally, the projected $4.2 billion in incremental capital costs is well within the range of annual variability associated with capital expenditures for the sector over the 2000-2019 period. During this period, based on the Census information, for example, the largest year-to-year decrease in power sector-level capital expenditures was $19.5 billion (from 2001 to 2002) and the largest year-to-year increase in power sector-level capital expenditures was $23.4 billion (from 2000 to 2001). This wide range (-$19.5 to +$23.4 billion) indicates substantial year-to-year variability in industry capital expenditures, and the projected $4.2 billion increase in capital expenditures in 2015 projected under MATS falls well within this variability. Similar results are found using the S&P Global information. If a $4.2 billion increase in capital expenditures in 2015 projected under MATS falls well within the variability of historical trends, then a capital expenditure of less than $4.2 billion would also fall within this variability. Next, in order to provide additional perspective to the projected cost information, we look at a broader set of costs faced by industry, including both capital and production expenditures together. Section 2.b and Table A-6 of the Cost TSD present two sets of estimates through 2019 for trends in annual total (capital and production) expenditures by the electric power sector using the same two ***data*** sets as above, which we then compare with the projected annual total expenditures required by MATS. We find that even the overestimated $9.6 billion compliance cost projection from the 2011 RIA represents a small fraction of the power sector's annual capital and production expenditures compared to historical ***data***, and is well within annual variability in total costs over the 2000 to 2011 and the 2012 to 2019 periods. Compared to 2008 ***data*** (i.e , the historic high for total industry expenditures), the projected $9.6 billion estimate represents about 4.2 to 4.3 percent of total expenditures. The MATS projected compliance cost represents 6.2 to 6.6 percent of total expenditures in 2003 (which was the lowest year for total industry expenditures during the studied time period). Additionally, the EPA notes that, similar to the capital expenditures analysis set forth in the 2015 Proposal, the projected $9.6 billion in incremental capital plus production costs is well within the range of annual variability in costs in general over the 2000 to 2019 period. For example, during this period, the largest year-to-year decrease in power sector-level capital and production expenditures ranged from $30.5 billion to $32.8 billion. The largest year-to-year increase in power sector-level capital and production expenditures in this period ranged from $27.5 billion to $28.7 billion. If a $9.6 billion increase in expenditures falls well within the variability of historical trends, then an expenditure substantially less than $9.6 billion would also fall within this variability.c. Impact on Retail Price of Electricity We are cognizant that, for an industry like the power sector, costs and disadvantages to regulation are not solely absorbed by regulated sources. Many firms in the industry are assured cost-recovery for expenditures, so there is considerable potential for EGUs to pass through the costs of compliance to consumers via increases in retail electricity prices. This is especially true given that the demand for electricity is not particularly price-responsive. That is, because people are dependent on electricity for daily living, they are not likely to reduce their consumption of electricity even when the price goes up but will instead pay the higher price, thus absorbing the costs of compliance incurred by the industry. Notably, average retail electricity prices have fallen since the promulgation of MATS. While we analyze these aspects of cost separately, control costs and electricity prices are not separate economic indicators. Electricity price increases are generally related to increases in the capital and operating expenditures by the power sector. Therefore, the electricity price impacts and the associated increase in electricity[[Page 7658]]bills by consumers are not costs that are additional to the compliance costs described earlier in this section. In fact, to the extent the compliance costs are passed on to electricity consumers, the costs to the EGU owners in the power sector are reduced. Therefore, in order to further assess the disadvantages to regulation, in this case to consumers of electricity in all sectors (residential, commercial, industrial, transportation, and other sectors), we evaluate as we did in 2016 the projected effect MATS was anticipated to have on retail electricity prices, as measured against the variations in electricity prices from year to year. For this proposal, we expanded that analysis using updated ***data*** from the EIA, as presented in section 2.c and Table A-7 of the Cost TSD. Looking at 2000-2019 ***data***, we find that the projected 0.3 cents per kilowatt-hour projected increase in national average retail electricity price under MATS is well within the range of annual variability over the 2000-2019 period. During that time period, the largest year-to-year decrease in national average retail electricity price was -0.2 cents per kilowatt-hour (from 2001 to 2002) and the largest year-to-year increase was 0.5 cents per kilowatt-hour (from 2005 to 2006). For the newer ***data*** analyzed, we also found that average retail electricity prices have generally decreased since 2011, from 9.33 cents per kilowatt-hour in 2011 to 8.68 cents per kilowatt-hour in 2019, or by nearly 7 percent. After considering the potential impacts of MATS on retail electricity prices, the EPA concludes that the projected increase in electricity prices is within the historical range. In addition, any increase in electricity prices would not be additive to the overall compliance costs of MATS. Rather, such price impacts would in part reflect the ability of many EGUs to pass their costs on to consumers, thereby reducing the share of MATS compliance costs borne by owners of EGUs. Given the relationship between compliance costs and electricity prices, we would also therefore expect the significant overestimate of compliance costs reflected in the $9.6 billion figure to translate into overestimates in our projections for electricity price increases. Therefore, incorporating this newer ***data*** into our analysis, we find that MATS did not result in increases in electricity prices for American consumers that were outside the range of normal year-to-year variability, and during the period when MATS was implemented, electricity prices generally decreased.d. Impact on Power Sector Generating Capacity We recognize that the power sector plays a role of critical importance to the American public. A potential disadvantage to regulation that we consider to be a relevant factor in our consideration under CAA section 112(n)(1)(A) is how such regulation would impact the provision of adequate and reliable electricity throughout the country.\105\ Therefore, we analyzed, as part of the 2012 record, projected net changes in generation capacity under MATS, as compared to the base case, that is, what expected generation capacity would have been absent the rule.\106\ We also conducted an analysis of the impacts of projected retirements on electric reliability. Id. And finally, in parallel with finalizing MATS, the EPA's Office of Enforcement and Compliance Assurance issued a policy memorandum describing an approach for units that were reliability critical that could demonstrate a need to operate in noncompliance with MATS for up to a year.\107\--------------------------------------------------------------------------- \105\ The EPA generally uses the term ``reliability'' to refer to the ability to deliver the resources to the projected electricity loads so the overall power grid remains stable, and the term ``resource adequacy'' generally refers to the provision of adequate generating resources to meet projected load and generating reserve requirements in each region. \106\ U.S EPA. 2011. Resource Adequacy and Reliability in the Integrated Planning Model Projections for the MATS Rule (Resource Adequacy and Reliability TSD), [*http://www3.epa.gov/ttn/atw/utility/revised\_resource\_adequacy\_tsd.pdf*](http://www3.epa.gov/ttn/atw/utility/revised_resource_adequacy_tsd.pdf), Docket ID Item No. EPA-HQ-OAR-2009-0234-19997. \107\ U.S EPA. 2011. The Environmental Protection Agency's Enforcement Response Policy For Use of Clean Air Act Section 113(a) Administrative Orders In Relation To Electric Reliability And The Mercury and Air Toxics Standard, [*https://www.epa.gov/sites/default/files/documents/mats-erp.pdf*](https://www.epa.gov/sites/default/files/documents/mats-erp.pdf), Docket ID Item No. EPA-HQ-OAR-2009-0234-20577.--------------------------------------------------------------------------- Our analysis indicated that the vast majority of the generation capacity in the power sector directly affected by the requirements of MATS would remain operational following MATS. Specifically, our model projected that operational capacity with MATS in place would be reduced by less than 1 percent nationwide. See Resource Adequacy and Reliability TSD at 2. With respect to reliability, our modeling indicated that coal retirements would be distributed throughout the power grid, and that there would only be small impacts at the regional level, and that in those regions, we anticipated small decreases in overall adequacy of resources and robust remaining reserve margins. Id. These analyses therefore found that the power sector would be able to continue to provide adequate and reliable electricity even with regulation of the EGU sector for HAP. Additionally, since MATS was promulgated, the EPA has not been made aware of reliability or resource adequacy problems attributable to MATS. As noted, the EPA's enforcement office concurrently issued a policy memorandum to work with sources that faced demonstrated reliability concerns, and five administrative orders were issued in connection with the policy.\108\ We think this small number of sources obtaining relief due to their reliability critical status provides some confirmation of the EPA's projections that regulation would not cause widespread resource and reliability problems.--------------------------------------------------------------------------- \108\ [*https://www.epa.gov/enforcement/enforcement-response-policy-mercury-and-air-toxics-standard-mats.---------------------------------------------------------------------------4*](https://www.epa.gov/enforcement/enforcement-response-policy-mercury-and-air-toxics-standard-mats.---------------------------------------------------------------------------4). Other Cost Considerations We also propose to reaffirm our previous findings regarding the costs of mercury controls, consistent with the instruction from the statute to study the availability and cost of such controls in CAA section 112(n)(1)(B). 80 FR 75036-37 (December 1, 2015). We similarly propose to reaffirm our previous records and findings regarding the cost of controls for other HAP emissions from EGUs, and the cost of implementing the utility-specific ARP, which Congress wrote into the 1990 CAA Amendments and implementation of which Congress anticipated could result in reductions in HAP emissions. Id. With respect to the costs of technology for control of mercury and non-mercury HAP, the record evidence shows that in 2012 controls were available and routinely used and that control costs had declined considerably over time. Id. at 75037-38. With regard to the ARP, industry largely complied with that rule by switching to lower-sulfur coal, and subsequently the actual costs of compliance were substantially lower than projected. Though the reasons for discrepancies between projected and actual costs are different for MATS, as discussed in section III.B.2, the newer information examined as part of this proposal demonstrates that the projected cost estimates for MATS were also likely significantly overestimated.5. Summary of Consideration of Cost of Regulating EGUs for HAP In this section, the EPA noted several studies performed by outside entities suggesting that costs of MATS may have been overestimated in the 2011 RIA. We discussed the dramatic impacts to the power sector over the last 10 years due to increasing supplies and decreasing price of natural gas and renewables, and[[Page 7659]]we conducted a suite of quantitative and qualitative updates to the information available in the 2011 RIA. Based on this information, we propose to conclude that the available ex post evidence points to a power sector that incurred significantly lower costs of compliance obligations under MATS than anticipated based on the ex ante projections when the rule was finalized in 2012. This overestimate was significant--for just one part of the original compliance cost estimate, the EPA was able to quantify a range of at least $2.2 to $4.4 billion in projected costs related to the installation, operation, and maintenance of controls which were not expended by industry. This projected overestimation is limited to these costs; it does not account for other ways in which the rule's costs were likely overestimated, such as advances in control technologies that made control applications less expensive or more efficient at reducing emissions. The other studies conducted by stakeholders asserted there were even greater differences between projected and actual costs of MATS. We next examined the 2011 projected costs, which were almost certainly significantly overestimated, in the context of the EGU industry and the services the EGU industry provides to society. The purpose of these comparisons was to better understand the disadvantages imposed by these costs, in order to weigh cost as a factor in our preferred methodology for making the appropriate determination. Even though the cost estimates we used in this analysis were almost certainly significantly overestimated, we noted they were relatively small when placed in the context of the industry's revenues and expenditures, and well within historical variations. Based on the 2011 RIA, the total projected cost of the MATS rule to the power sector in 2015 represented between 2.7 and 3.0 percent of annual electricity sales when compared to years from 2000 to 2019, a small fraction of the value of overall sales (and even smaller when one takes into account that the 2011 RIA projections were likely significantly overestimated). Looking at capital expenditures, the EPA demonstrated that the projected MATS capital expenditures in 2015 represented between 3.6 and 10.4 percent of total annual power sector capital expenditures when compared to years surrounding the finalization of the MATS rule. Such an investment by the power sector would comprise a small percentage of the sector's historical annual capital expenditures on an absolute basis and also would fall within the range of historical variability in such capital expenditures. Similarly, the EPA demonstrated that the projected capital and operating expenditures in 2015 represented between 4.3 and 6.2 percent of total annual power sector capital and operating expenditures over 2000 to 2019, and is well within the substantial range of annual variability. This proposal's analysis indicating that the far fewer controls were installed than the EPA had projected would be required is particularly relevant to considering our findings as to this metric; with the overestimation of capital expenditures in mind, actual investments by the power sector to comply with MATS would have comprised an even smaller percentage of historical annual capital expenditures. With respect to impacts on the wider American public, the EPA examined impacts on average retail electricity prices and found the modest increases--which, like overall compliance costs, are also likely to have been significantly overestimated--to be within the range of historical variability. Experience has also shown that national average retail electricity prices in years after MATS promulgation have declined. Finally, previous analysis indicated that the vast majority of the generation capacity in the power sector would remain operational and that the power sector would be able to continue to provide adequate and reliable electricity after implementation of the rule, and we have seen no evidence to contradict those findings. The EPA proposes that each of these analyses are appropriate bases for evaluating the disadvantages to society conferred by the MATS-related projected compliance expenditures. As we note above, even though the projected costs we use in this analysis are almost certainly significantly overestimated, we find that they are still relatively small when placed in the context of the economics of the industry, and well within historical variations. We solicit comments on all aspects of this proposed consideration of costs.C. Revocation of the 2020 Final Action We are proposing to revoke the 2020 Final Action because we find that the framework used to consider cost in 2020, which centered the Agency's mandated determination under CAA section 112(n)(1)(A) on a comparison of costs to monetized HAP benefits, was an approach ill-suited to making the appropriate and necessary determination in the context of CAA section 112(n)(1)(A) specifically and the CAA section 112 program generally. Moreover, the statutory text and legislative history do not support a conclusion that the 2020 framework is required under CAA section 112(n)(1)(A), and we exercise our discretion to adopt a different approach. We also disagree with the conclusions presented in the 2020 Final Action as to the 2016 Supplemental Finding's two approaches. The 2020 Final Action established the following framework for making the appropriate and necessary determination. It stated: ``The Administrator has concluded that the following procedure provides the appropriate method under which the EPA should proceed to determine whether it is appropriate and necessary to regulate EGUs under CAA section 112(n)(1)(A). First, the EPA compares the monetized costs of regulation against the subset of HAP benefits that could be monetized. . . . Second, the EPA considers whether unquantified HAP benefits may alter that outcome. . . . Third, the EPA considers whether it is appropriate, notwithstanding the above, to determine that it is ``appropriate and necessary'' to regulate EGUs under CAA section 112(n)(1)(A) out of consideration for the PM co-benefits that result from such regulation.'' 85 FR 31302 (May 22, 2020). Applying the first part of the framework, the Agency noted that the costs of regulation estimated in the 2011 RIA were disproportionately higher--by three orders of magnitude--than the monetized HAP benefits, and concluded ``[t]hat does not demonstrate `appropriate and necessary.' '' Id. Under the framework's second inquiry, the EPA determined that the unquantified HAP benefits, even if monetized, were unlikely to alter its conclusion under the first part of the framework. Id.; see also 85 FR 31304 (noting that ``valuing HAP-related morbidity outcomes would not likely result in estimated economic values similar to those attributed to avoiding premature deaths''). Finally, applying the third part of its framework, the EPA noted that nearly all of the monetized benefits of MATS as reflected in the 2011 RIA were derived from PM benefits. See 85 FR 31302-03 (May 22, 2020). The EPA then posited that, ``[h]ad the HAP-specific benefits of MATS been closer to the costs of regulation, a different question might have arisen as to whether the Administrator could find that co-benefits legally form part of the justification for determination that regulation of EGUs under CAA section 112(d) is appropriate and necessary.'' See 85 FR 31303 (May 22, 2020). However, because of the factual scenario presented in the record, the Agency in the 2020 Final Action stated that ``[t]he[[Page 7660]]EPA does not need to, and does not, determine whether that additional step would be appropriate . . . given that the monetized and unquantified HAP-specific benefits do not come close to a level that would support the prior determination.'' Id. In conclusion, the EPA stated that ``[u]nder the interpretation of CAA section 112(n)(1)(A) that the EPA adopts in this action, HAP benefits, as compared to costs, must be the primary question in making the `appropriate and necessary' determination.'' Id. We note that the three-step framework employed by the 2020 Final Action is not a BCA conforming to recognized principles (see, e.g , OMB Circular A-4, EPA Economic Guidelines). BCA is a specific tool developed by economists to assess total society-wide benefits and costs, to determine the economic efficiency of a given action. Instead of conforming to this comprehensive approach, the three-step framework focused primarily on comparing the rule's total costs to a very small subset of HAP benefits that could be monetized. The Agency gave secondary weight to the vast majority of the benefits of regulating HAP emissions from stationary sources that cannot be quantified, and completely ignored the non-HAP monetized benefits directly attributable to the MATS rule. We propose to find that this three-step framework is an unsuitable approach to making the appropriate and necessary determination under CAA section 112(n)(1)(A) because it places undue primacy on those HAP benefits that have been monetized, and fails to consider critical aspects of the inquiry posed to the EPA by Congress in CAA section 112(n)(1). The 2020 three-step framework also did not in any meaningful way grapple with the bases upon which the EPA had relied to design the 2016 preferred approach, as discussed above, including the broad statutory purpose of CAA section 112 to reduce the volume of HAP emissions with the goal of reducing the risk from HAP emissions to a level that is protective of even the most exposed and most sensitive subpopulations; the fact that we rarely can fully characterize or quantify risks, much less benefits, at a nationwide level; and the fact that except for one of the many health endpoints for only one of the many HAP emitted from EGUs, the EPA lacked the information necessary to monetize any post-control benefit of reductions in HAP emissions. The sole rationale provided in the 2020 Final Action for rejecting the relevance of the statute's clear purpose as evinced in the broader CAA section 112 program and reflected in the provisions of CAA section 112(n)(1) was that CAA section 112(n)(1)(A) is a separate provision and threshold determination. See 85 FR 31293-94 (May 22, 2020). But we do not think it is sensible to view the statute's direction to the EPA to make a separate determination as to EGUs as an invitation to disregard the statutory factors of CAA section 112(n)(1) and the greater statutory context in which that determination exists, and we do not think that the 2020 Final Action provided an adequately reasoned basis for abandoning the interpretation and assessment provided in the 2016 Supplemental Finding. And in any event, we believe the methodology we propose today is better suited to making the statutory finding than the 2020 framework. In the 2020 rulemaking, the EPA did not explain its rationale for its decision to anchor the appropriate and necessary determination at step one as a comparison between the monetized costs of regulation and monetized HAP specific benefits. Rather, the proposed and final rules repeatedly state that the ``primary'' inquiry in the determination should be a comparison of costs and HAP benefits, but did not explain why only monetized HAP benefits should be given primacy. See, e.g , 85 FR 31286, 31288, 31303 (May 22, 2020). Given the Agency's recognition of the broad grant of discretion inherent in the phrase ``appropriate and necessary,'' see 81 FR 24430-31 (April 25, 2016), its acknowledgement of Congress' ``particularized focus on reducing HAP emissions and addressing public health and environmental risks from those emissions'' in CAA section 112, see 85 FR 31299 (May 22, 2020), and its knowledge and recognition that the dollar value of one of its points of comparison represented but a small subset of the advantages of regulation, see 85 FR 31302 (May 22, 2020), we now believe it was inappropriate to adopt a framework that first and foremost compared dollar value to dollar value. Nothing in the CAA required the Agency's decision in 2020 to hinge its framework on monetized HAP benefits. The consideration of the non-monetized benefits of MATS (i.e , dozens of endpoints, including virtually all of the HAP benefits associated with this rule) occurred only at step two, where the Agency considered whether the unquantified benefits, if monetized, were ``likely to overcome the imbalance between the monetized HAP benefits and compliance costs in the record.'' See 85 FR 31296 (May 22, 2020). This approach discounts the vast array of adverse health and environmental impacts associated with HAP emissions from coal- and oil-fired EGUs that have been enumerated by the EPA \109\ and discounts the social value (benefit) of avoiding those impacts through regulation, simply because the Agency cannot assign a dollar value to those impacts. Further, the three-step framework gave no consideration to the important statutory objective of protecting the most at-risk subpopulations. As noted above, in CAA section 112(n)(1)(C) Congress directed the EPA to establish threshold levels of exposure under which no adverse effect to human health would be expected to occur, even considering exposures of sensitive populations, and throughout CAA section 112, Congress placed special emphasis on regulating HAP from sources to levels that would be protective of those individuals most exposed to HAP emissions and most sensitive to those exposures. The rigid and narrow approach to making the appropriate and necessary determination in the 2020 Final Action is at odds with the text and purpose of CAA section 112, and is certainly not required under the express terms of CAA section 112 or CAA section 112(n)(1)(A).--------------------------------------------------------------------------- \109\ See, e.g , 65 FR 79829-30 (December 20, 2000); 76 FR 24983-85, 24993-97, 24999-25001, 25003-14, 25015-19 (May 3, 2011).--------------------------------------------------------------------------- Commenters on the 2019 Proposal objected strenuously to the Agency's revised framework for making the appropriate and necessary determination, arguing that the 2019 Proposal's interpretation ``fails to meaningfully address factors that are `centrally relevant' to the inquiry of whether it is appropriate and necessary to regulate HAP from EGUs,'' and that the Agency's new interpretation must fall because the EPA failed to provide a reasoned explanation for its change in policy, as required by Motor Vehicle Mfrs. Ass'n of United States, Inc. v. State Farm Mut. Automobile Ins. Co., 463 U.S 29 (1983), and FCC v. Fox Television Stations, Inc., 556 U.S 502 (2009). See 85 FR 31294 (May 22, 2020). Among the factors that commenters argued had been inadequately addressed under the new framework were the ``hazards to public health reasonably anticipated to occur'' that had not been monetized; the non-monetizable benefits of HAP regulation such as preservation of tribal social practices; the latency, persistence in the environment, and toxicity of HAP as recognized by Congress; and the distributional impacts on particular communities and individuals most[[Page 7661]]impacted by HAP emitted from power plants. In responses to these comments, the EPA claimed that it was not ``disregarding'' or ``dismissing'' the concerns raised by the commenters, but rather simply weighing them differently, and explained that the Administration's changed priorities provided the ``reasoned basis'' for its changed interpretation. See 85 FR 31296-97 (May 22, 2020). Agencies do have broad discretion to re-evaluate policies and change their ``view of what is in the public interest,'' State Farm, 463 U.S at 57, but such re-evaluations must still adhere to principles of reasoned decision-making. The 2020 Final Action did not aver that the concerns identified by commenters were factors that the statute does not instruct the Agency to consider in making its appropriate and necessary determination. Instead, the EPA stated that it was permitted to pick its decisional framework and admitted that its decisional framework might undervalue certain factors. For example, with respect to commenters' concerns that the revised appropriate and necessary framework did not adequately account for adverse impacts on tribal culture or undue concentration of public health risks on certain population subgroups or individuals, the EPA stated, ``In a cost-benefit comparison, the overall amount of the benefits stays the same no matter what the distribution of those benefits is. The EPA, therefore, believes it is reasonable to conclude that those factors to which the EPA previously gave significant weight-including qualitative benefits, and distributional concerns and impacts on minorities-will not be given the same weight in a comparison of benefits and costs for this action under CAA section 112(n)(1)(A).'' 85 FR 31297 (May 22, 2020). The decisional framework in the 2020 Final Action, however, did not give ``less weight'' to these factors--it gave them none. In both the selection and application of its framework, the EPA in the 2020 Final Action effectively ignored these factors altogether, and we do not agree that the inability to monetize a factor should render it unimportant. Cf. Am. Trucking Ass'ns, Inc. v. EPA, 175 F.3d 1027, 1052-53 (D.C Cir. 1999), reversed in part on other grounds in Whitman v. Am. Trucking Ass'ns, 531 U.S 457 (2001) (holding that the EPA was not permitted to ignore information ``because the . . . benefits are difficult, if not impossible, to quantify reliably and because there is `no convincing basis for concluding that any such effects . . . would be significant' ''); Pub. Citizen v. Fed. Motor Carrier Safety Admin., 374 F.3d 1209, 1219 (D.C Cir. 2004) (``The mere fact that the magnitude of . . . effects is uncertain is no justification for disregarding the effect entirely.'') (emphasis in original). The mere mention and summary dismissal of factors does not constitute meaningful consideration of those factors. In the 2020 Final Action, like the 2016 Supplemental Finding before it, the EPA maintained that there is more than one permissible way to interpret the Agency's obligation to consider cost in the appropriate and necessary determination. Given the Agency's knowledge of the significant risks and often irreversible impacts of HAP exposure on vulnerable populations like developing fetuses, the disproportionate impact of EGU HAP emissions on communities who subsist on freshwater fish due to cultural practices and/or economic necessity, and the record of ***data*** demonstrating risks to public health amassed over decades, and, perhaps more importantly, the overwhelming quantity of advantages to regulation that could not be monetized, we do not think that selecting a framework that compared first and foremost monetized HAP benefits with costs was appropriate. And even if the framework ultimately addressed the statutorily relevant factors because at the second step the EPA stated that it was considering non-monetized HAP benefits, we think that the application of that second step fell short. The secondary consideration of non-monetized HAP benefits in the three-step framework only considered post-control HAP-related impacts of regulation insofar as the EPA speculated about what the monetized value of those benefits might be (see 85 FR 31296 (May 22, 2020), asserting that monetized value of avoiding morbidity effects such as neurobehavioral impacts is ``small'' compared to monetized value associated with avoided deaths). The Agency did not, at this second step, grapple with the existing risk analyses, including those stemming from the statutorily mandated studies in CAA section 112(n)(1). Those analyses demonstrated substantial public health and environmental hazards, even if the hazards were not translated into post-control monetized benefits. See White Stallion, 748 F.3d at 1245. The Agency also did not explain why other attributes of risk--such as impacts on vulnerable populations and the reality that HAP pollution from EGUs is not distributed equally across the population but disproportionately impacts some individuals and communities far more than others--were unimportant, stating only that the selected framework did not accommodate consideration of those factors. As noted, the Agency did not point to anything in the CAA as supporting the use of its three-step framework. This is in stark contrast to the 2016 Supplemental Finding rulemaking, in which the EPA examined CAA section 112(n)(1)(A) and the other section 112(n)(1) provisions, and the rest of CAA section 112 generally, and D.C Circuit case law on CAA cost considerations to inform the EPA's interpretation of CAA section 112(n)(1)(A). See 80 FR 75030 (December 1, 2015); 2015 Legal Memorandum. In the 2020 Final Action, the EPA merely asserted that a comparison of benefits to costs is ``a traditional and commonplace way to assess costs'' and claimed that the Supreme Court's holding in Entergy Corp. v. Riverkeeper, 556 U.S 208 (2009) supported the EPA's 2020 position that, absent an unambiguous prohibition to use a BCA, an agency may generally rely on a BCA as a reasonable way to consider cost. See 85 FR 31293 (May 22, 2020). The 2020 Final Action also pointed out ``many references comparing'' costs and benefits from the Michigan decision, including: ``EPA refused to consider whether the costs of its decision outweighed the benefits'' (576 U.S at 743); ``[o]ne would not say that it is rational, never mind `appropriate,' to impose billions of dollars in economic costs in return for a few dollars in health or environmental benefits'' (Id. at 752); and ``[n]o regulation is `appropriate' if it does more harm than good'' (Id.). But while we agree that a comparison of benefits to costs is a traditional way to assess costs, the 2020 framework was not a BCA. There is no economic theory or guidance of which we are aware that endorses the version of BCA presented in the 2020 Final Action, in which total costs are compared against a small subset of total benefits. See section III.E for further discussion. Moreover, general support for weighing costs and benefits does not justify placing undue weight on monetized HAP benefits, with secondary consideration for all other benefits, and only valuing those other benefits to the extent of their speculative monetized effects. As noted in Justice Breyer's concurrence in Entergy Corp., the EPA has the ability ``to describe environmental benefits in non-monetized terms and to evaluate both costs and benefits in accordance with its expert judgment and scientific knowledge,'' and to engage in this balancing outside of ``formal cost-[[Page 7662]]benefit proceedings and futile attempts at comprehensive monetization.'' 556 U.S at 235 (Breyer, J., concurring). Benefits--the advantages of regulation--can encompass outcomes that are not or cannot be expressed in terms of dollars and cents, just as the Court found that `` `cost' includes more than the expense of complying with regulations; any disadvantage could be termed a cost.'' Michigan, 576 U.S at 752. And the Court faulted the EPA's interpretation for ``preclud[ing] the Agency from considering any type of cost--including, for instance, harms that regulation might do to human health or the environment. . . . No regulation is `appropriate' if it does significantly more harm than good.'' Id. The constricted view of benefits that the Agency adopted in 2020 was ill-suited to the statutory inquiry as interpreted in Michigan. The primary basis in the 2020 action upon which the EPA relied to find that the 2016 preferred approach was flawed was that the preferred approach failed to ``satisf[y] the Agency's obligation under CAA section 112(n)(1)(A) as interpreted by the Supreme Court in Michigan.'' See 84 FR 2674 (February 7, 2019). The 2019 Proposal claimed that the chief flaw of the preferred approach was the Agency's failure to ``meaningfully consider cost within the context of a regulation's benefits,'' asserting that the Michigan Court contemplated that a proper consideration of cost would be relative to benefits. See 84 FR 2675 (February 7, 2019). But that is not an accurate characterization of the 2016 preferred approach, wherein the Agency weighed the existing record from 2012 demonstrating that HAP emissions from EGUs pose a number of identified hazards to both public health and the environment remaining after imposition of the ARP and other CAA requirements against the cost of MATS. See 81 FR 24420 (April 25, 2016) (``After evaluating cost reasonableness using several different metrics, the Administrator has, in accordance with her statutory duty under CAA section 112(n)(1)(A), weighed cost against the previously identified advantages of regulating HAP emissions from EGUs--including the agency's prior conclusions about the significant hazards to public health and the environment associated with such emissions and the volume of HAP that would be reduced by regulation of EGUs under CAA section 112.''). The 2020 Final Action further stated that the preferred approach was an ``unreasonable'' interpretation of CAA section 112(n)(1)(A) and impermissibly de-emphasized the importance of the cost consideration in the appropriate and necessary determination. See 85 FR 31292 (May 22, 2020). It is a decisional framework which rests primarily upon a comparison of the costs of a regulation and the small subset of HAP benefits which could be monetized that does not ``meaningfully consider[s] cost within the context of a regulation's benefits,'' because such a narrow approach relegates as secondary (and in application appeared to ignore altogether) the vast majority of that rule's HAP benefits and other advantages. We therefore propose to revoke the 2020 three-step approach and determination because we do not think it is a suitable way to assess the advantages and disadvantages of regulation under CAA section 112(n)(1)(A) and in applying it, the Agency failed to meaningfully address key facts in the existing record. Even if the Agency's selection of the 2020 framework could be considered a permissible interpretation of the broad ``appropriate and necessary'' determination in CAA section 112(n)(1)(A), we exercise our discretion under the statute and as described in Michigan, to approach the determination differently.D. The Administrator's Proposed Preferred Framework and Proposed Conclusion The EPA is proposing a preferred, totality-of-the-circumstances approach as a reasonable way to ``pay attention to the advantages and disadvantages of [our] decision,'' Michigan, 576 U.S at 753, in determining whether it is appropriate to regulate coal- and oil-fired EGUs under section 112 of the CAA. This approach, including which factors we consider and how much weight we give them, is informed by Congress' design of CAA section 112(n)(1) specifically, and CAA section 112 generally. Specifically, under this approach we first consider and weigh the advantages of reducing EGU HAP via regulation. We focus on the public health advantages of reducing HAP emissions because in CAA section 112(n)(1)(A), Congress specifically directed the EPA to regulate EGUs under CAA section 112 after considering the results of the ``study of hazards to public health reasonably anticipated to occur as a result of emissions'' by EGUs. We also consider the other studies commissioned by Congress in CAA sections 112(n)(1)(B) and (C) and the types of information the statute directed the EPA to examine under those provisions--the rate and mass of EGU mercury emissions, the health and environmental effects of such emissions, and the threshold level of mercury concentrations in fish tissue which may be consumed (even by sensitive populations) without adverse effects to public health.\110\ We place considerable weight on the factors addressed in the studies required in the other provisions of CAA section 112(n)(1) because that provision is titled ``Electric utility steam generating units,'' so it is reasonable to conclude that the information in those studies is important and relevant to a determination of whether HAP emissions from EGUs should be regulated under CAA section 112.\111\ See Michigan, 576 U.S at 753-54 (citing CAA sections 112(n)(1)(B) and (C), its caption, and the additional studies required under those subparagraphs as relevant statutory context for the appropriate and necessary determination).--------------------------------------------------------------------------- \110\ CAA section 112(n)(1)(B) also directs the EPA to study available technologies for controlling mercury and the cost of such controls, and we consider those in our assessment of cost. \111\ The statute directed the EPA to complete all three CAA section 112(n)(1) studies within 4 years of the 1990 Amendments, expressing a sense of urgency with regard to HAP emissions from EGUs on par with addressing HAP emissions from other stationary sources. See CAA section 112(e) (establishing schedules for setting standards on listed source categories as expeditiously as practicable, but no later than between 2-10 years).--------------------------------------------------------------------------- Notably, the studies of CAA section 112(n)(1) place importance on the same considerations that are expressed in the terms and overall structure of CAA section 112. For example, CAA section 112(n)(1)(A) and section 112(n)(1)(B) both show interest in the amount of HAP emissions from EGUs--section 112(n)(1)(A) by requiring the EPA to estimate the risk remaining after imposition of the ARP and other CAA requirements and section 112(n)(1)(B) by requiring the EPA to study the rate and mass of mercury emissions; therefore, we believe it is reasonable to conclude that we should consider and weigh the volume of toxic pollution EGUs contributed to our air, water, and land absent regulation under CAA section 112, in total and relative to other domestic anthropogenic sources, and the potential to reduce that pollution, thus reducing its grave harms. In addition, the clear goal in CAA section 112(n)(1)(C) and elsewhere to consider risks to the most exposed and susceptible populations supports our decision to place significant weight on reducing the risks of HAP emissions from EGUs to the most sensitive members of the population (e.g , developing fetuses and children), and communities that are reliant on self-[[Page 7663]]caught local fish for their survival. Finally, we also consider the identified risks to the environment posed by mercury and acid-gas HAP, consistent with CAA section 112(n)(1)(B) and the general goal of CAA section 112 to address adverse environmental effects posed by HAP emissions. See CAA section 112(a)(7) (defining ``adverse environmental effect''). We next examine the disadvantages of regulation, principally in the form of the costs incurred to capture HAP before they enter the environment. As with the advantages side of the equation, where we consider the consequences of reducing HAP emissions to human health and the environment, we consider the consequences of these expenditures for the electricity generating sector and society. We therefore consider compliance costs comprehensively, placing them in the context of the effect those expenditures have on the economics of power generation more broadly, the reliability of electricity, and the cost of electricity to consumers. These metrics are relevant to our weighing exercise because they give us a more complete picture of the disadvantages to society imposed by this regulation, and because our conclusion might change depending on how this burden affects the ability of the industry to thrive and provide reliable, affordable electricity to the benefit of all Americans. Consistent with CAA section 112(n)(1)(B), we further consider relevant control costs for EGUs and the relationship of control costs expected and experienced under the ARP and MATS. Below, consistent with this framework, we consider and weigh the advantages to regulation against the costs of doing so, giving particular weight to our examination of the public health hazards we reasonably anticipate to occur as a result of HAP emissions from EGUs, and the risks posed by those emissions to exposed and vulnerable populations. We note as well that had we found regulation under CAA section 112 to impose significant barriers to provision of affordable and reliable electricity to the American public, this would have weighed heavily in our decision. We acknowledge, as we recognized in the 2016 preferred approach, that this approach to making the appropriate and necessary determination is an exercise in judgment, and that ``[r]easonable people, and different decision-makers, can arrive at different conclusions under the same statutory provision,'' (81 FR 24431; April 25, 2016), but this type of weighing of factors and circumstances is an inherent part of regulatory decision-making. As noted in then-Judge Kavanaugh's dissent in White Stallion, ``All regulations involve tradeoffs, and . . . Congress has assigned EPA, not the courts, to make many discretionary calls to protect both our country's environment and its productive capacity.'' 748 F.3d at 1266 (noting as well that ``if EPA had decided, in an exercise of its judgment, that it was `appropriate' to regulate electric utilities under the MACT program because the benefits outweigh the costs, that decision would be reviewed under a deferential arbitrary and capricious standard of review''). Bright-line tests and thresholds are not required under the CAA's instruction to determine whether regulation is ``appropriate and necessary,'' nor have courts interpreted broad provisions similar to CAA section 112(n)(1)(A) in such manner. In Catawba Cty. v. EPA, the D.C Circuit held that ``[a]n agency is free to adopt a totality-of-the-circumstances test to implement a statute that confers broad authority, even if that test lacks a definite `threshold' or `clear line of demarcation to define an open-ended term.' '' 571 F.3d 20, 37 (D.C Cir. 2009). In undertaking this analysis, we are cognizant that, while the Agency has been studying the science underlying this determination for decades, the understanding of risks, health, and environmental impacts associated with toxic air pollution continues to evolve. In this notice, we explained the additional information that has become available to the Agency since we performed our national risk assessments, and explained why, despite the certainty of the science demonstrating substantial health risks, we are unable at this time to quantify or monetize many of the effects associated with reducing HAP emissions from EGUs.\112\ We continue to think it is appropriate to give substantial weight to these public health impacts, even where we lack information to precisely quantify or monetize those impacts. As the D.C Circuit stated in Ethyl Corp. v. EPA,--------------------------------------------------------------------------- \112\ Unquantified effects include additional neurodevelopmental and cardiovascular effects from exposure to methylmercury, ecosystem effects, health risks from exposure to non-mercury HAP, and effects in EJ relevant subpopulations that face disproportionally high risks. ``Where a statute is precautionary in nature, the evidence difficult to come by, uncertain, or conflicting because it is on the frontiers of scientific knowledge, the regulations designed to protect public health, and the decision that of an expert administrator, we will not demand rigorous step-by-step proof of cause and effect. . . . [I]n such cases, the Administrator may assess risks. . . . The Administrator may apply his expertise to draw conclusions from suspected, but not completely substantiated, relationships between facts, from trends among facts, from theoretical projections from imperfect ***data***, from probative ---------------------------------------------------------------------------preliminary ***data*** not yet certifiable as `fact,' and the like.''541 F.2d 1, 28 (D.C Cir. 1976). See also Lead Industries Ass'n v. EPA, 647 F.2d 1130, 1155 (D.C Cir. 1980) (``[R]equiring EPA to wait until it can conclusively demonstrate that a particular effect is adverse to health before it acts is inconsistent with both the [Clean Air] Act's precautionary and preventive orientation and the nature of the Administrator's statutory responsibilities.''). The EPA is not alone in needing to make difficult judgments about whether a regulation that has a substantial economic impact is ``worth it,'' in the face of uncertainty such as when the advantages of the regulation are hard to quantify in monetary terms. The Transportation Security Administration (TSA), when determining whether to require Advanced Imaging Technology at certain domestic airports, faced assertions that the high cost of widespread deployment of this type of screening was ``not worth the cost.'' TSA acknowledged that it did not ``provide monetized benefits'' or ``degree of benefits'' to justify the use of the screening, but noted that the agency ``uses a risk-based approach . . . in order to try to minimize risk to commercial air travel.'' See 81 FR 11364, 11394 (March 3, 2016). The agency pointed out that it could not consider ``only the most easily quantifiable impacts of a terrorist attack, such as the direct cost of an airplane crashing,'' but rather that it had an obligation to ``pursue the most effective security measures reasonably available so that the vulnerability of commercial air travel to terrorist attacks is reduced,'' noting that some commenters were failing to consider the more difficult to quantify aspects of the benefits of avoiding terrorist attacks, such as ``substantial indirect effects and social costs (such as fear) that are harder to measure but which must also be considered by TSA when deciding whether an investment in security is cost-beneficial.'' Id. In reviewing Agency decisions like these, courts do ``not to substitute [their] judgment[s] for that of the agenc[ies],'' State Farm, 463 U.S at 43 (1983), and ``[t]his is especially true when the agency is called upon to weigh the costs and benefits of alternative policies,'' Center for Auto Safety v. Peck, 751 F.2d 1336, 1342 (D.C Cir. 1985). See also[[Page 7664]]United Church of Christ v. FCC, 707 F.2d 1413, 1440 (D.C Cir. 1983) (``[C]ost benefit analyses epitomize the types of decisions that are most appropriately entrusted to the expertise of an agency.''). Agencies are entitled to this deference even where, or perhaps particularly where, costs or benefits can be difficult to quantify. For example, in Consumer Elecs. Ass'n v. FCC, the D.C Circuit upheld the FCC's mandate to require digital tuners, finding reasonable the Commission's identification of benefits, that is, ``principally speeding the congressionally-mandated ***conversion*** to DTV and reclaiming the analog spectrum,'' coupled with the FCC's ``adequate[ ] estimate[ of] the long-range costs of the digital tuner mandate within a range sufficient for the task at hand . . . and [its finding of] the estimated costs to consumers to be `within an acceptable range.''' 347 F.3d 291, 303-04 (D.C Cir. 2003) (``We will not here second-guess the Commission's weighing of costs and benefits.''). Similarly, the Food and Drug Administration, in weighing the costs and benefits of deeming electronic cigarettes to be ``tobacco products,'' described the benefits qualitatively, `` `potentially coming from' . . . premarket review [i.e , the statutory consequence of deeming], which will result in fewer harmful or additive products from reaching the market than would be the case in the absence of the rule; youth access restrictions and prohibitions on free samples, which can be expected to constrain youth access to tobacco products and curb rising uptake; health warning statements, which will help consumers understand and appreciate the risks of using tobacco products; prohibitions against false or misleading claims and unsubstantiated modified risk claims; and other changes [such as monitoring and ingredient listings].'' Nicopure Labs, LLC v. FDA, 266 F. Supp. 3d 360, 403-404 (D.D.C 2017), aff'd, 944 F.3d 267 (D.C Cir. 2019). Plaintiffs challenging the rule claimed that because the FDA had not quantified the benefits of the rule, it ``cannot realistically determine that a rule's benefits justify its costs,'' because ``it does not have . . . a general grasp of the rule's benefits.'' Id. at 406. The court disagreed, finding the agency's statement of benefits to have ``provided substantial detail on the benefits of the rule, and the reasons why quantification was not possible'' and in any case agreeing with the agency that there was no obligation to quantify benefits in any particular way. Id. We think the inquiry posed to the Agency by CAA section 112(n)(1)(A) has similarities to these other decisions, in which agencies tasked with protecting and serving the American public elected to take actions that would impose significant costs in order to achieve important benefits that could not be precisely quantified or were in some cases uncertain--protection from terrorist attacks, speeding the advancement of digital technology, and subjecting a new product to marketing and safety regulation. In those cases, the framework for decision-making was to make a judgment after a weighing of advantages against disadvantages, considering qualitative factors as well as quantified metrics. Here, we employ a similar totality-of-the-circumstances approach to the CAA section 112(n)(1)(A) inquiry as to whether it is appropriate to regulate HAP emissions from EGUs. Earlier sections of this preamble (sections III.A and III.B ) discuss in detail the EPA's evaluation of the public health and environmental advantages of regulating HAP from U.S EGUs and the reasons it is not possible to quantify or monetize most of those advantages, as well as the EPA's comprehensive assessment of the costs of doing so. We will not in this section repeat every detail and ***data*** point, but we incorporate all of that analysis here and highlight only a few of the considerations that weighed heavily in our application of the preferred totality-of-the-circumstances approach. Under our preferred approach, we first consider the public health advantages to reducing HAP from EGUs, and the other focuses for study identified by Congress in CAA section 112(n)(1). As noted, we give particular weight in our determination to the information related to the statutory factors identified for the EPA's consideration by the studies--namely, the hazards to public health reasonably anticipated to occur as a result of EGU HAP emissions (112(n)(1)(A)), the rate and mass of mercury emissions from EGUs (112(n)(1)(B)), the health and environmental effects of such emissions (112(n)(1)(B)), and the levels of mercury exposure below which adverse human health effects are not expected to occur as well as the mercury concentrations in the tissue of fish which may be consumed (including by sensitive populations) without adverse effects to public health (112(n)(1)(C)). The statutorily mandated studies are the foundation for the Agency's finding that HAP emissions from U.S EGUs represent a clear hazard to public health and the environment, but as documented in section III.A , the EPA has continued to amass an extensive body of evidence related to the original study topics that only furthers the conclusions drawn in the earlier studies. As discussed in section III.A, the EPA completed a national-scale risk assessment focused on mercury emissions from U.S EGUs as part of the 2011 Final Mercury TSD. That assessment specifically examined risk associated with mercury released from U.S EGUs that deposits to watersheds within the continental U.S , bioaccumulates in fish as methylmercury, and is consumed when fish are eaten by female subsistence fishers of child-bearing age and other freshwater self-caught fish consumers. We focused on the female subsistence fisher subpopulation because there is increased risk for in utero exposure and adverse outcomes in children born to female subsistence fishers with elevated exposure to methylmercury.\113\ Our analysis estimated that 29 percent of the watersheds studied would lead to exposures exceeding the methylmercury RfD for this population, based on in utero effects, due in part to the contribution of domestic EGU emissions of mercury. We also found that deposition of mercury emissions from U.S EGUs alone led to potential exposures that exceed the RfD in up to 10 percent of modeled watersheds.--------------------------------------------------------------------------- \113\ The NAS Study had also highlighted this population as one of particular concern due to the regular and frequent consumption of relatively large quantities of fish. See 65 FR 79830 (December 20, 2000).--------------------------------------------------------------------------- We have also examined impacts of prenatal methylmercury exposure on unborn children of recreational anglers consuming self-caught fish from inland freshwater lakes, streams, and rivers, and found significant IQ loss in the affected population of children. Our analysis, which we recognized did not cover consumption of recreationally caught seafood from estuaries, coastal waters, and the deep ocean, nevertheless indicated significant health harm from methylmercury exposure. Methylmercury exposure also leads to adverse neurodevelopmental effects such as performance on neurobehavioral tests, particularly on tests of attention, fine motor function, language, and visual spatial ability. See section III.A.2.a The population that has been of greatest concern with respect to methylmercury exposure is women of childbearing age because the developing fetus is the most sensitive to the effects of methylmercury. See 85 FR 24995 (May 3, 2011). In the Mercury Study, the EPA estimated that, at the time of the study, 7 percent of women of childbearing age in the continental U.S [[Page 7665]](or about 4 million women) were exposed to methylmercury at levels that exceeded the RfD and that about 1 percent of women of childbearing age (or about 580,000 women) had methylmercury exposures three to four times the RfD. See 65 FR 79827 (December 20, 2000). We also performed a new bounding analysis for this proposal that focuses on the potential for IQ points lost in children exposed in utero through maternal fish consumption by the population of general U.S fish consumers (section III.A.3.d). Another important human health impact documented by the EPA over the last 2 decades includes cardiovascular impacts of exposure to methylmercury--including altered blood-pressure and heart-rate variability in children as a result of infant exposure in the womb and higher risk of acute MI, coronary heart disease, and cardiovascular heart disease in adults, due to dietary exposure. Studies that have become available more recently led the EPA to perform new quantitative screening analyses (as described in section III.A.3) to estimate the incidence of MI (heart attack) mortality that may be linked to U.S EGU mercury emissions. The new analyses performed include an extension of the original watershed-level subsistence fisher methylmercury risk assessment to evaluate the potential for elevated MI-mortality risk among subsistence fishers (section III.A.3.b; 2021 Risk TSD) and a separate risk assessment examining elevated MI mortality among all adults that explores potential risks associated with exposure of the general U.S population to methylmercury from domestic EGUs through commercially-sourced fish consumption (section III.A.3.c; 2021 Risk TSD). The updated subsistence fisher analysis estimated that up to 10 percent of modeled watersheds are associated with exposures linked to increased risk of MI mortality, but for some populations such as low-income Black subsistence fishers active in the Southeast, that number is approximately 25 percent of the watersheds modeled. The bounding analysis results estimating MI-mortality attributable to U.S EGU-sourced mercury for the general U.S population range from 5 to 91 excess deaths annually. As noted, we give significant weight to these findings and analyses examining public health impacts associated with methylmercury, given the statutory focus in CAA section 112(n)(1)(B) and 112(n)(1)(C) on adverse effects to public health from EGU mercury emissions and the directive to develop an RfD (``threshold level of mercury exposure below which adverse human health effects are not expected to occur''), and in particular one that is designed to assess ``mercury concentrations in the tissue of fish which may be consumed (including consumption by sensitive populations).'' See CAA section 112(n)(1)(C). Because of CAA section 112(n)(1)(A)'s broader focus on hazards to public health from all HAP, not just mercury, we also give considerable weight to health effects associated with non-mercury HAP exposure (see section III.A.2.b for further detail), including chronic health disorders such as irritation of the lung, skin, and mucus membranes; decreased pulmonary function, pneumonia, or lung damage; detrimental effects on the central nervous system; damage to the kidneys; and alimentary effects such as nausea and vomiting). The 2011 Non-Hg HAP Assessment, performed as part of the EPA's 2012 reaffirmation of the appropriate and necessary determination, expanded on the original CAA section 112(n)(1)(A) Utility Study by examining further public health hazards reasonably anticipated to occur from EGU HAP emissions after imposition of other CAA requirements. This study included a refined chronic inhalation risk assessment that was designed to assess how many coal- and oil-fired EGUs had cancer and non-cancer risks associated with them, and indicated that absent regulation, a number of EGUs posed cancer risks to the American public (see section III.A.2.b). As discussed in section II.B, the statutory design of CAA section 112 quickly secured dramatic reductions in the volume of HAP emissions from stationary sources. CAA section 112(n)(1)(B) also directs the EPA to study, in the context of the Mercury Study, the ``rate and mass'' of mercury emissions. We therefore think it is reasonable to consider, in assessing the advantages to regulating HAP emissions from EGUs, what the volume of emissions was from that sector prior to regulation--as an absolute number and relative to other sources--and what the expected volume of emissions would be with CAA section 112(d) standards in place. Prior to the EPA's promulgation of MATS in 2012, the EPA estimated that in 2016, without MATS, coal-fired U.S EGUs above 25 MW would emit 29 tons of mercury per year. While these mercury emissions from U.S EGUs represented a decrease from 1990 and 2005 levels (46 tons and 53 tons, respectively), they still represented nearly half of all anthropogenic mercury emissions in 2011 (29 out of 64 tons total). Considered on a proportional basis, the relative contribution of U.S EGUs to all domestic anthropogenic mercury emissions was also stark. The EGU sector emitted more than six times as much mercury as any other sector (the next highest being 4.6 tons). See Table 3 at 76 FR 25002 (May 3, 2011). Prior to MATS, U.S EGUs were estimated to emit the majority of HCl and HF nationally, and were the predominant source of emissions nationally for many metal HAP as well, including antimony, arsenic, chromium, cobalt, and selenium. Id. at 25005-06. In 2012, the EPA projected that MATS would result in an 88 percent reduction in hydrogen chloride emissions, a 75 percent reduction in mercury emissions, and a 19 percent reduction in PM emissions (a surrogate for non-mercury metal HAP) from coal-fired units greater than 25 MW in 2015 alone. See 77 FR 9424 (February 16, 2012). In fact, actual emission reductions since MATS implementation have been even more substantial. In 2017, by which point all sources were required to have complied with MATS, the EPA estimated that acid gas HAP emissions from EGUs had been reduced by 96 percent, mercury emissions had been reduced by 86 percent, and non-mercury metal HAP emissions had been reduced by 81 percent compared to 2010 levels. See 84 FR 2689 (February 7, 2019). Retaining the substantial reductions in the volume of toxic pollution entering our air, water, and land, from this large fleet of domestic sources reduces the substantial risk associated with this pollution faced by all Americans. Even though reducing HAP from EGUs would benefit all Americans by reducing risk and hazards associated with toxic air pollution, it is worth noting that the impacts of EGU HAP pollution in the U.S have not been borne equally nationwide. Certain communities and individuals have historically borne greater risk from exposure to HAP emissions from EGUs prior to MATS, as demonstrated by the EPA's risk analyses. The individuals and communities that have been most impacted have shouldered a disproportionate burden for the energy produced by the power sector, which in turn benefits everyone--i.e , these communities are subject to a greater share of the externalities of HAP pollution that is generated by EGUs producing power for everyone. A clear example of these disproportionately impacted populations are subsistence fishers who live near U.S EGUs[[Page 7666]]experiencing increased risk due to U.S EGU mercury deposition at the watersheds where they are active (2011 Final Mercury TSD). CAA section 112(n)(1)(C) directed the EPA to examine risks to public health experienced by sensitive populations as a result of the consumption of mercury concentrations in fish tissue, which we think includes fetuses and communities that are reliant on local fish for their survival, and CAA section 112 more generally is drafted in order to be protective of small cohorts of highly exposed and susceptible populations. We therefore weigh heavily the importance of reducing risks to particularly impacted populations, including those who consume large amounts of self-caught fish reflecting cultural practice and/or economic necessity, including tribal populations, specific ethnic communities and low-income populations including Black persons living in the southeastern U.S Consistent with CAA section 112(n)(1)(B) and the general goal of CAA section 112 to reduce risks posed by HAP to the environment, we also consider the ecological effects of methylmercury and acid gas HAP (see section III.A.2.c). Scientific studies have consistently found evidence of adverse impacts of methylmercury on fish-eating birds and mammals, and insect-eating birds. These harmful effects can include slower growth and development, reduced reproduction, and premature mortality. Adverse environmental impacts of emissions of acid gas HAP, in particular HCl, include acidification of terrestrial and aquatic ecosystems. In the EPA's recent Integrated Science Assessment for Oxides of Nitrogen, Oxides of Sulfur and Particulate Matter--Ecological Criteria (2020), we concluded that the body of evidence is sufficient to infer a causal relationship between acidifying deposition and adverse changes in freshwater biota like plankton, invertebrates, fish, and other organisms. Adverse effects on those animals can include physiological impairment, loss of species, changes in community composition, and biodiversity. Because EGUs contribute to mercury deposition in the U.S , we conclude that EGUs are contributing to the identified adverse environmental effects, and consider the beneficial impacts of mitigating those effects by regulating EGUs. We turn next in our application of the preferred approach to the consideration of the disadvantages of regulation, which in this case we measure primarily in terms of the costs of that regulation. As discussed in section III.B, for purposes of this preferred totality-of-the-circumstances approach, we start with the sector-level estimate developed in the 2011 RIA. Given the complex, interconnected nature of the power sector, we think it is appropriate to consider this estimate, which represents the incremental costs to the entire power sector to generate electricity, not just the compliance costs projected to be borne by regulated EGUs. We explain in section III.B that while a precise ex post estimate of this sector-level figure is not possible, we update those aspects of the cost estimate where we can credibly do so (see section III.B.2), and our consideration of the cost of regulation therefore takes into account the fact that new analyses performed as part of this proposal demonstrate that the 2011 RIA cost estimate was almost certainly significantly overestimated. We propose to conclude that regulation is appropriate and necessary under either cost estimate. As with the benefits side of the ledger, where we look comprehensively at the effects of reducing the volume of HAP, we also comprehensively assess costs in an attempt to evaluate the economic impacts of the regulation as a whole. We situate the cost of the regulation in the context of the economics of power generation, as we did in 2016, because we think examining the costs of the rule relative to three sector-wide metrics provides a useful way to evaluate the disadvantages of expending these compliance costs to this sector beyond a single monetary value. For each of these metrics, we use our 2011 estimate of compliance costs, which, as is discussed in section III.B.2 and the Cost TSD, was likely to have been significantly overestimated by a figure in the billions of dollars. We first evaluate the 2011 projected annual compliance costs of MATS as a percent of annual power sector sales, also known as a ``sales test.'' A sales test is a frequently used indicator of potential impacts from compliance costs on regulated industries, and the EPA's analysis showed that projected 2015 compliance costs, based on the 2011 estimate, represented between 2.7-3.5 percent of power sector revenues from historical annual retail electricity sales. See section III.B.3; Cost TSD; 80 FR 75033 (December 1, 2015). We also examine the annual capital expenditures that were expected for MATS compliance as compared to the power sector's historical annual capital expenditures. We conclude that projected incremental annual capital expenditures of MATS would be a small percentage of 2011 power sector-level capital expenditures, and well within the range of historical year-to-year variability on industry capital expenditures. Id. Finally, we consider the annual operating or production expenses in addition to capital expenditures because we were encouraged during the 2016 rulemaking to use this broader metric of power industry costs to provide perspective on the cost of MATS relative to total capital and operational expenditures by the industry historically. Consistent with our other findings, we conclude that, even when using the likely overestimated cost of MATS based on the 2011 RIA, the total capital and operational expenditures required by MATS are in the range of about 5 percent of total historical capital and operational expenditures by the power sector during the period of 2000-2011. See section III.B.3; Cost TSD; 81 FR 24425 (April 25, 2016). In this proposal, we re-analyze all of these metrics using updated ***data*** to reflect more recent information (as of 2019), and took into consideration the fact that the 2011 RIA cost estimate was almost certainly significantly overestimated. All of this new analysis further supports our findings as to the cost of MATS relative to other power sector economics based on the record available to the Agency at the time we were making the threshold determination (i.e , the 2012 record). Consistent with the Michigan Court's instruction to consider all advantages and disadvantages of regulation, we also assess, as we did in 2016, disadvantages to regulation that would flow to the greater American public. Specifically, we examine whether regulation of EGUs would adversely impact the provision of reliable, affordable electricity to the American public, because had regulation been anticipated to have such an effect, it would have weighed heavily on our decision as to whether it was appropriate to require such regulation. The CAA tasks the EPA with the purpose of protecting and enhancing air quality in the U.S , but directs that in doing so we promote public health and welfare and the productive capacity of the U.S population. CAA section 101(b)(1). As noted, we also think examining these potential impacts is consistent with the ``broad and all-encompassing'' nature of the term ``appropriate,'' as characterized by the Supreme Court. Michigan, 576 U.S at 752. We were particularly interested in examining the expected impact of MATS implementation on the retail price of electricity, because in electricity markets, utility expenditures can be fully or partially passed to consumers. It was therefore reasonable to assume[[Page 7667]]that the cost of MATS could result in increased retail electricity prices for consumers, although we emphasize, as we did in 2016, that the electricity price impacts examined under this metric do not reflect additional compliance costs on top of the estimate produced in the 2011 RIA but rather reflect the passing on of a share of those costs to consumers (and ultimately reducing the costs EGU owners would otherwise bear). However, even though the impacts on electricity prices are reflected in the total cost estimate to the sector as a whole, we think, for the reasons stated above, that electricity price impacts are worthy of special attention because of the potential effect on the American public. We therefore estimate the percent increase in retail electricity prices projected to result from MATS compared to historical levels of variation in electricity prices. See section III.B.3; 80 FR 75035 (December 1, 2015). We estimate that retail electricity prices for 2015 would increase by about 0.3 cents per kilowatt-hour, or 3.1 percent with MATS in place. Between 2000 and 2011, the largest annual year-to-year decrease in retail electricity price was -0.2 cents per kilowatt-hour and the largest year-to-year increase during that period was +0.5 cents per kilowatt-hour. The projected 0.3 cents increase due to MATS was therefore well within normal historical fluctuations. Id. As with the other metrics examined, as the increase in retail electricity prices due to MATS was within the normal range of historical variability, a substantially lower estimate for impacts on electricity prices would only further support the EPA's determination. We also note in section III.B.3 that the year-to-year retail electricity price changes in the new information we examined (i.e , years 2011-2019) were within the same ranges observed during the 2000-2011 period, and that in fact, during that period when MATS was implemented, retail electricity prices have generally decreased (9.3 cents per kilowatt-hour in 2011 to 8.7 cents per kilowatt-hour in 2019). Consistent with these observed trends in retail electricity prices, as discussed in section III.B.2 and further below, our ex post analysis of MATS indicates that the projected compliance costs in the 2011 RIA--and, as a corollary, the projected increases in retail electricity prices--were likely significantly overestimated. Certainly, we have observed nothing in the ***data*** that suggests the regulation of HAP from EGUs resulted in increases in retail electricity prices for the American public that would warrant substantial concern in our weighing of this factor. Similar to our reasoning for examining impacts on electricity prices for American consumers, in assessing the potential disadvantages to regulation, we elected to also look at whether the power sector would be able to continue to provide reliable electricity to all Americans after the imposition of MATS. We think this examination naturally fits into our assessment of whether regulation is ``appropriate,'' because had MATS interfered with the provision of reliable electricity to the American public, that would be a significant disadvantage to regulation to weigh in our analysis. In examining this factor, we looked at both resource adequacy and reliability--that is, the provision of generating resources to meet projected load and the maintenance of adequate reserve requirements for each region (resource adequacy) and the sector's ability to deliver the resources to the projected electricity loads so that the overall power grid remains stable (reliability). See section III.B.3; U.S EPA 2011, Resource Adequacy and Reliability TSD; 80 FR 75036 (December 1, 2015). Our analysis indicated that the power sector would have adequate and reliable generating capacity, while maintaining reserve margins over a 3-year MATS compliance period. Id. We did not in this proposal update the Resource Adequacy and Reliability Study conducted in 2011, but we note that the EPA, as a primary regulator of EGUs, is keenly aware of adequacy and reliability concerns in the power sector and in particular the relationship of those concerns to environmental regulation. We have not seen evidence in the last decade to suggest that the implementation of MATS caused power sector adequacy and reliability problems, and only a handful of sources obtained administrative orders under the enforcement policy issued with MATS to provide relief to reliability critical units that could not comply with the rule by 2016. In addition to the cost analyses described above, the EPA revisited its prior records examining the costs of mercury controls consistent with the requirement in CAA section 112(n)(1)(B), the cost of controls for other HAP emissions from EGUs, and the cost of implementing the utility-specific ARP, which Congress wrote into the 1990 CAA Amendments and implementation of which Congress anticipated could result in reductions in HAP emissions. 80 FR 75036-37 (December 1, 2015). The ARP, like MATS, was expected to have a significant financial impact on the power sector, with projections of its cost between $6 billion to $9 billion per year (in 2000 dollars), based on the expectation that many utilities would elect to install FGD scrubbers in order to comply with the ARP. Id. at 75037. The actual costs of compliance were much less (up to 70 percent lower than initial estimates), in large part because of the utilities' choice to comply with the ARP by switching to low sulfur coal instead of installing scrubbers.\114\ This choice also resulted in far fewer reductions in HAP emissions than would have occurred if more EGUs had installed SO2scrubbers. We believe the considerable reduction in the implementation cost of the ARP is important because of the economic benefit that accrued from delaying the large capital costs of controls by almost 25 years. With respect to the costs of technology for control of mercury and non-mercury HAP, the record evidence shows that in 2012 controls were available and routinely used and that control costs had declined considerably over time. Id. at 75037-38. We also note that, as explained at length in section III.B.2, the actual compliance costs of MATS, with respect to capital and operating expenditures associated with installing and operating controls, were significantly lower than what we projected at the time of the rule. In addition, the newer information examined as part of this proposal demonstrates that actual control costs were much lower than we projected, which weighs further in favor of a conclusion that it is appropriate to impose those costs in order to garner the advantages of regulation.--------------------------------------------------------------------------- \114\ U.S EPA Clean Air Markets Div., 2011, National Acid Precipitation Assessment Program Report to Congress 2011: An Integrated Assessment, National Science and Technology Council, Washington, DC.--------------------------------------------------------------------------- Our review of the record and application of the preferred totality-of-the-circumstances approach has demonstrated that we have, over the last 2 decades, amassed a voluminous and scientifically rigorous body of evidence documenting the significant hazards to public health associated with HAP emissions from EGUs, particularly to certain vulnerable populations that bear greater risk from these emissions than the general public. We have looked at the volume of emissions coming from these sources and what the impact of regulation would be on that volume. We examined the cost of regulation to industry (even using an estimate of cost that we know to be higher than what was expended), and the potential[[Page 7668]]adverse impacts that could be felt by the American public via increased electricity prices and access to reliable electricity. And, consistent with the statute, we have also considered adverse impacts of EGU pollution on the environment as well as availability of controls and the costs of those controls. Even based solely on the record available to us at the time we issued the regulation and made the threshold determination in 2012, we find that the benefits of regulation are manifold, and they address serious risks to vulnerable populations that remained after the implementation of the ARP and other controls imposed upon the power sector that were required under the CAA. We have placed considerable weight on these benefits, given the statutory directive to do so in CAA section 112(n)(1)(A) and Congress' clear purpose in amending CAA section 112 in 1990. In contrast, the costs, while large in absolute terms, were shown in our analyses to be within the range of other expenditures and commensurate with revenues generated by the sector, and our analysis demonstrated that these expenditures would not and did not have any significant impacts on electricity prices or reliability. After considering and weighing all of these facts and circumstances, in an exercise of his discretion under the Act, the Administrator proposes to conclude that the substantial benefits of reducing HAP from EGUs, which accrue in particular to the most vulnerable members of society, are worth the costs. Consequently, we propose to find after weighing the totality of the circumstances, that regulation of HAP from EGUs is appropriate after considering cost. The newer information examined as part of this proposal regarding both benefits and costs is directionally consistent with all of the findings the EPA has made in the 2016 administrative record. The robust and long-standing scientific foundation regarding the adverse health and environmental risks from mercury and other HAP is fundamentally unchanged since the comprehensive studies that Congress mandated in the CAA were completed decades ago. But in this proposal, we completed screening level risk assessments, informed by newer meta-analyses of the dose-response relationship between methylmercury and cardiovascular disease, which indicate that a segment of the American public is at increased risk of prematurely dying by heart attack due to methylmercury exposure with as many as 91 deaths per year (and possibly more) being attributable to mercury emissions from EGUs.\115\ Further, analyses show that some populations (e.g , low-income Blacks in the Southeast and certain tribal communities engaging in subsistence fishing activity) likely bear a disproportionately higher risk from EGU HAP emissions than the general populace.--------------------------------------------------------------------------- \115\ This estimate of premature mortality is for the EGU sector after imposition of the ARP and other CAA requirements, but before MATS implementation.--------------------------------------------------------------------------- The new cost information analyzed by the EPA, discussed in section III.B, indicates that the cost projection used in the 2016 Supplemental Finding (i.e , the 2011 RIA cost estimate) likely significantly overestimated the actual costs of compliance of MATS. Specifically, the EGU sector installed far fewer controls to comply with the HAP emissions standards than projected; certain modeling assumptions, if updated with newer information, would have resulted in a lower cost estimate; unexpected advancements in technology occurred; and the country experienced a dramatic increase in the availability of comparatively inexpensive natural gas. All of these factors likely resulted in a lower actual cost of compliance than the EPA's projected estimates in 2011. We therefore find that when we consider information available to the Agency after implementation of the rule, our conclusion that it was appropriate to regulate this sector for HAP is further strengthened. The costs projected in the 2011 RIA were almost certainly overestimated by an amount in the billions of dollars. We note as well that during prior rulemaking processes related to the appropriate and necessary determination, stakeholders suggested that undermining the threshold finding in order to pave the way to rescinding MATS would have grave economic and health consequences. Utilities reported that they rely upon the mandated status of MATS in order to recoup expenditures already made to comply with the rule before Public Utility Commission proceedings.\116\ States asserted that they rely upon the Federal protections achieved by the rule in state implementation planning and other regulatory efforts.\117\ And other industries, such as pollution control companies, have made business decisions based on the existence of MATS.\118\ We think these reliance interests, nearly all of which are aligned, also weigh in favor of retaining the appropriate and necessary determination, particularly given the fact that a significant portion of compliance costs have already been spent.--------------------------------------------------------------------------- \116\ See, e.g , Comment Letter from Edison Electric Institute, Docket ID Item No. EPA-HQ-OAR-2018-0794-2267; Comment Letter from Edison Electric Institute, NRECA, American Public Power Association, The Clean Energy Group, Class of '85 Regulatory Response Group, Large Public Power Council, Global Energy Institute, International Brotherhood of Electrical Workers, International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers & Helpers, and the Laborers' International Union of North America, Docket ID Item No. EPA-HQ-OAR-2018-0794-0577. \117\ See, e.g , Comment Letter from Attorneys General of Massachusetts, California, Connecticut, Delaware, Illinois, Iowa, Maine, Maryland, Michigan, Minnesota, Nevada, New Jersey, New Mexico, New York, North Carolina, Oregon, Rhode Island, Vermont, Virginia, Washington, and the District of Columbia, the Maryland Department of the Environment, the City Solicitor of Baltimore, the Corporation Counsels of Chicago and New York City, the County Attorney of the County of Erie, NY, and the County Counsel for the County of Santa Clara, CA, Docket ID Item No. EPA-HQ-OAR-2018-0794-1175. \118\ See, e.g , Comment Letter from ADA Carbon Solutions, LLC, Docket ID Item No. EPA-HQ-OAR-2018-0794-0794; Comment Letter from Advanced Emissions Solutions, Inc., Docket ID Item No. EPA-HQ-OAR-2018-0794-1181; Comment Letter from Exelon Corporation, Docket ID Item No. EPA-HQ-OAR-2018-0794-1158.--------------------------------------------------------------------------- Finally, while we focus on the HAP benefits, we note that the Michigan court directed that ``any disadvantage could be termed a cost.'' Michigan, at 752. The corollary is that any advantage could be termed a benefit. And so, while it is not necessary to our conclusion that regulation is appropriate, we also consider, under our totality-of-the-circumstances approach, whether there are additional advantages or disadvantages to the specific controls imposed under MATS. Specifically, we note that because the controls required to reduce HAP from U.S EGUs resulted in substantial reductions in co-emitted pollutants, including direct PM2.5as well as SO2and NOX, which are both precursors to ozone and fine particle formation, the Administrator's proposed conclusion is further supported by the ramifications of the regulatory requirements in MATS for these pollutants. We propose that the benefits associated with such reductions may be appropriate to consider where the framework for making the CAA section 112(n)(1)(A) determination is a totality-of-the-circumstances approach, and we take comment on that approach. Therefore, while we conclude that the benefits associated with regulating HAP alone outweigh the costs without consideration of non-HAP benefits, we also propose that, to the extent we consider benefits attributable to reductions in co-emitted pollutants as a concomitant advantage, these benefits act to confirm that regulation is[[Page 7669]]appropriate under a totality-of-the-circumstances approach. Specifically, we note that reductions in co-emissions of direct PM2.5, SO2and NOXwill have substantial health benefits in the form of decreased risk of premature mortality among adults, and reduced incidence of lung cancer, new onset asthma, exacerbated asthma, and other respiratory and cardiovascular diseases. In the 2011 RIA, the EPA estimated the number and value of avoided PM2.5-related impacts, including 4,200 to 11,000 premature deaths, 4,700 nonfatal heart attacks, 2,600 hospitalizations for respiratory and cardiovascular diseases, 540,000 lost work days, and 3.2 million days when adults restrict normal activities because of respiratory symptoms exacerbated by PM2.5. We also estimated substantial additional health improvements for children from reductions in upper and lower respiratory illnesses, acute bronchitis, and asthma attacks. In addition, we estimated the benefit of reductions in CO2emissions under MATS. Although the EPA only partially monetized the benefits associated with these reductions in co-emitted pollutants in the 2011 RIA, the Agency estimated that--due in particular to the strong causal relationship between PM2.5and premature mortality--these reductions could result in as much as $90 billion (in 2016 dollars) in additional public health benefits annually. Therefore, if these non-HAP benefits are considered in the totality-of-the-circumstances approach, we take note of the fact that regulating EGUs for HAP emissions results in substantial other health benefits accruing to the American public by virtue of regulating HAP from EGUs.E. The Administrator's Proposed Benefit-Cost Analysis Approach and Proposed Conclusion In addition to the preferred approach, we separately put forward an alternative approach, as we did in 2016, to support a determination that it is appropriate and necessary to regulate HAP from EGUs when looking at the results of a formal BCA. The formal BCA we conducted for purposes of meeting Executive Order 12866 using established BCA practices also demonstrates that the benefits estimated for MATS far exceed the estimated costs, as reported in the 2011 RIA.\119\ In its net benefits projection, the 2011 RIA monetized only one post control benefit from regulating HAP emissions from EGUs because the Agency did not and does not have the information necessary to monetize the many other benefits associated with reducing HAP emissions from EGUs. See section III.A.4 However, the 2011 RIA properly accounted for all benefits by discussing qualitatively those that could not be quantified and/or monetized. While some of the impacts on particularly impacted populations--such as the children of recreational anglers experiencing IQ loss--were reflected in the net benefits calculation, that accounting does not really grapple with the equitable question of whether a subset of Americans should continue to bear disproportionate health risks in order to avoid the increased cost of controlling HAP from EGUs. We continue to prefer a totality-of-the-circumstances approach to making the determination under CAA section 112(n)(1)(A), but we think that if a BCA is to be used, it should, consistent with economic theory and principles, account for all costs and all benefits.--------------------------------------------------------------------------- \119\ We use the term ``formal benefit-cost analysis'' to refer to an economic analysis that attempts to quantify all significant consequences of an action in monetary terms in order to determine whether an action increases economic efficiency. Assuming that all consequences can be monetized, actions with positive net benefits (i.e , benefits exceed costs) improve economic efficiency.--------------------------------------------------------------------------- BCA has been part of executive branch rulemaking for decades. Over the last 50 years, Presidents have issued Executive Orders directing agencies to conduct these analyses as part of the rulemaking development process. Executive Order 12866, currently in effect, requires a quantification of benefits and costs to the extent feasible for any regulatory action that is likely to result in a rule that may have an annual effect on the economy of $100 million or more or adversely affect in a material way certain facets of society. Executive Order 12866, at section 3(f)(1). The EPA performed a formal BCA to comport with Executive Order 12866 as part of the 2012 MATS rulemaking process (referred to herein as the 2011 RIA). In the 2016 Supplemental Finding, the EPA relied on the BCA it had performed for Executive Order 12866 purposes as an alternative basis upon which to make the appropriate and necessary determination. That BCA, which reflected in its net benefits calculation only certain categories of benefits that could be confidently monetized, estimated that the final MATS would yield annual net monetized benefits (in 2007 dollars) of between $37 billion to $90 billion using a 3-percent discount rate and $33 billion to $81 billion using a 7-percent discount rate. See 80 FR 75040 (December 1, 2015). These estimates included the portion of the HAP benefits described in section III.A that could be monetized at the time, along with additional health benefits associated with the controls necessary to control the HAP emissions from U.S EGUs. Specifically, as noted, the net benefits estimates included only one of the many HAP benefits associated with reduction of HAP. Nonetheless, the monetized benefits of MATS outweighed the estimated $9.6 billion in annual monetized costs by between 3-to-1 or 9-to-1 depending on the benefit estimate and discount rate used. The implementation of control technologies to reduce HAP emissions from EGU sources also led to reductions in emissions of SO2,direct PM2.5, as well as other precursors to PM2.5and ozone. In the 2011 RIA, the EPA did not quantify the benefits associated with ozone reductions resulting from the emissions controls under MATS, but we did include estimates of the projected benefits associated with reductions in PM2.5 These benefits were quite substantial and had a large economic value. Newer scientific studies strengthen our understanding of the link between PM2.5exposure to a variety of health problems, including: premature death, lung cancer, non-fatal heart attacks, new onset asthma, irregular heartbeat, aggravated asthma, decreased lung function, and respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing. Furthermore, since the RIA was completed in 2011, the EPA has updated its conclusions about how PM2.5emissions can adversely affect the environment through acidic deposition, materials damage, visibility impairment, and exacerbating climate change (EPA, 2019).\120\ In its most recent review of the effects of ozone pollution, the EPA concluded that ozone is associated with a separate but similarly significant set of adverse outcomes including respiratory-related premature death, increased frequency of asthma attacks, aggravated lung disease, and damage to vegetation (EPA, 2020).\121\--------------------------------------------------------------------------- \120\ U.S EPA. Integrated Science Assessment (ISA) for Particulate Matter (Final Report, Dec 2019). U.S Environmental Protection Agency, Washington, DC, EPA/600/R-19/188, 2019. \121\ U.S EPA. Integrated Science Assessment (ISA) for Ozone and Related Photochemical Oxidants (Final Report, Apr 2020). U.S Environmental Protection Agency, Washington, DC, EPA/600/R-20/012, 2020.

**Load-Date:** February 10, 2022

**End of Document**



[***Picton Property Income Ltd - Preliminary Annual Results***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:65J2-JCN1-DXP3-R120-00000-00&context=1516831)

PR Newswire UK Disclose

May 26, 2022 Thursday 2:00 AM EST

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**Length:** 19182 words

**Dateline:** London, May 25

**Body**

PR Newswire

26 May 2022

PICTON PROPERTY INCOME LIMITED

(“Picton”, the “Company” or the “Group”)

LEI: 213800RYE59K9CKR4497

Preliminary Annual Results

Picton announces its annual results for the year ending 31 March 2022.

Strong financial performance

–  Profit after tax of £147 million, the highest profit recorded since launch in 2005 (2021: £34 million)

–  Net assets of £657 million, or 120p per share, an increase of 24.4% (2021: £528 million or 97p per share)

–  Earnings per share of 27.0p (2021: 6.2p)

–  Total return of 28.3% (2021: 6.6%)

–  Increased dividends paid of £18.4 million with dividend cover of 115%

–  Loan to value ratio maintained at 21% with significant headroom against loan covenants

–  Refinanced existing debt facility increasing borrowings by £49 million while reducing the cost of debt and extending the term

Outperforming property portfolio

–  Significant valuation gains with like-for-like valuation increase of 21%

–  Total property return of 24.3%, outperforming MSCI UK Quarterly Property Index of 19.6%

–  Outperformed MSCI UK Quarterly Property Index for the ninth consecutive year

–  Upper quartile outperformance against MSCI over three, five and ten years, and since inception

–  Well positioned portfolio comprising Industrial 60%, Office 30%, Retail and Leisure 10%

–  Like-for-like increase in passing rent of 2.1%

–  Like-for-like estimated rental value increase of 5.4%

–  Selective investment activity:

        -     Two industrial assets acquired for £25.0 million

        -     One retail asset disposal for £0.7 million, 16% ahead of March 2021 valuation

–  Rent ***collection*** back to pre-pandemic levels

Occupier focused asset management

–  Increased occupancy to 93% (2021: 91%)

–  76 asset management transactions completed including:

        -     34 lettings or agreements to lease, 8% ahead of ERV

        -     21 lease renewals or regears, 3% ahead of ERV

        -     12 rent reviews, 7% ahead of ERV

        -     9 other asset management transactions

–  £10 million invested into asset refurbishment, upgrades and repositioning projects

Responsible stewardship

–  Improved EPC ratings with 71% rated A-C (2021: 64% rated A-C)

–  Pathway to net zero carbon published:

        -     Target date of 2040

        -     Includes both operational and embodied emissions

–  Signatory to Better Buildings Partnership Climate Commitment

Picton Chair, Lena Wilson CBE, commented:

“We are delighted to announce a record set of results, which are reflective of the work and dedication of the team during a period which was still impacted by disruption caused during lockdown. We have restored the dividend to pre-pandemic levels and our recent acquisitions will further help to improve our earnings. We remain focused on delivering long-term shareholder value, reinforced by our recently announced net zero carbon commitments.”

Michael Morris, Chief Executive of Picton, commented:

“This year we have delivered strong financial performance driven by a portfolio that has seen a marked uplift in value. We have again outperformed the MSCI UK Quarterly Property Index, delivering upper quartile performance since our launch in 2005. Our lettings success and asset management have improved occupancy across our industrial, office and retail assets. We will continue to invest into our assets, ensuring they remain attractive to occupiers, enhancing their sustainability credentials and protecting both income and value.”

This announcement contains inside information.

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Note to Editors

Picton, established in 2005, is a UK REIT. It owns and actively manages a £849 million diversified UK commercial property portfolio, invested across 47 assets and with around 400 occupiers (as at 31 March 2022). Through an occupier focused, opportunity led approach to asset management, Picton aims to be one of the consistently best performing diversified UK focused property companies listed on the main market of the London Stock Exchange.

For more information please visit:[*http://www.picton.co.uk*](http://www.picton.co.uk)

Chair’s Statement

I am delighted to report that Picton has delivered a total profit of £147 million, resulting in the most successful year since our launch in 2005.

As lockdown restrictions were lifted, the economy rebounded. Driven by improving income and marked capital growth, our portfolio was well positioned. The majority of our assets saw a significant improvement in value.

Almost all our key performance indicators have improved from last year.

Performance

We have delivered a total return of 28.3% alongside a 5.5% increase in EPRA earnings, which has enabled us to increase dividends accordingly.

Our total shareholder return was 18.7% and whilst it saw a healthy improvement during the year, like many listed real estate companies, our share price currently remains below our net asset value.

We have delivered property performance ahead of the MSCI UK Quarterly Property Index. This continues to reinforce our strong longer-term track record, achieving upper quartile property performance against this Index over three, five and ten years, and since inception.

Property portfolio

Our outperformance at a property level has principally been driven by our high exposure to the industrial, warehouse and logistics sector, but we have also benefitted this year from a recovery in the value of our retail warehouse assets. Performance in the office sector has been more muted, but our focus on asset management has helped to offset a wider market slowdown.

Encouragingly we have had leasing success across all three sectors, and grown occupancy to 93% from 91% a year ago. This has had a positive impact in terms of void holding costs, which will flow into future years.

In separate transactions, we acquired two multi-let industrial assets and disposed of one small high street retail asset. Although at the early stage of our asset management plans, our acquisitions have already delivered valuation and income growth.

Capital structure

During the year we have extended and increased our longer-term borrowings by £49 million, insulating the business from further rising borrowing costs. Our new debt facility is at a lower cost than our existing borrowings and we incurred one-off costs in resetting the facility to a lower overall rate. By substantially repaying our revolving credit facility, we have future operational flexibility and firepower. At the year-end borrowings totalled £219 million, with the loan to value ratio broadly constant over the year at 21%.

Dividends

On the back of strong leasing activity and improving rent ***collection***, we have increased the dividend twice during the period. We have restored our distributions back to their pre-pandemic level and we can report a healthy dividend cover of 115% over the period.

Our aim is to continue to grow dividends on a progressive basis, which in the short-term will be driven by further improvement in occupancy and rental growth, predominantly coming from our industrial assets.

Sustainability

We have made significant progress on our sustainability priorities, recently publishing our plan to become net zero carbon by 2040.

Our net zero carbon pathway ambition of 2040 is ten years ahead of the Government target and although our initial focus will be on reducing Scope 1 and 2 emissions, we intend to work with our occupiers to reduce the most significant part of the portfolio’s emissions, which come under Scope 3. We will report regularly on our progress.

I am grateful to Maria Bentley who has agreed to act as Board champion and oversee the work with the Executive Committee on sustainability.

Outlook

We are acutely aware of the new challenges emerging both directly and indirectly from the conflict in Ukraine. Rising energy, food and commodity prices, along with supply chain disruptions and labour market shortages are becoming increasingly visible and will impact economic growth.

We are already seeing rising interest rates and gilt yields have risen this year. Real estate has both an income and capital element and can offer inflation protection as evidenced by our performance this year, particularly in areas where supply is constrained, and demand enables rents to continue to rise.

As a UK diversified REIT we have greater flexibility with regard to asset selection giving us the ability to position the portfolio for the long-term. We will continue to explore opportunities for growth, but this must be on terms that are attractive to our shareholders and with the right quality of asset. We remain disciplined in our approach.

As in previous years we have invested in our assets and upgraded the quality of accommodation. This approach is increasingly relevant to a discerning occupier base, and will enable us to grow income.

Whilst returns in 2022 are likely to soften from those seen over this reporting period, we can be confident that we have a portfolio that will continue to see further growth.

Lena Wilson CBE

Chair

25 May 2022

Chief Executive’s Review

We have had a very successful year, delivering a record profit against a backdrop of reduced pandemic-related disruption. Our clear purpose and strategic priorities have enabled us to focus on what matters.

To reflect the closer integration of sustainability into our business model and our commitment to achieving net zero carbon, we have redefined our Purpose, which now states:

‘To be a responsible owner of commercial real estate, helping our occupiers succeed and being valued by all our stakeholders.’

We have also added two strategic priorities, specifically relating to the work we are doing to reduce our impact on climate change:

–  Adapting to and mitigating the impact of climate change; and,

–  reducing emissions to become carbon net zero in or before 2040.

This makes it clear that the focus of our sustainability strategy is aligned with our occupiers and other stakeholders.

Portfolio performance

Income and capital growth

We have seen exceptionally strong portfolio growth over the period. This has been predominantly driven by our industrial, warehouse and logistics assets where both rental and capital values have continued to move higher. Our retail portfolio, which now comprises 65% retail warehouse assets, has also seen strong valuation growth, with a reversal of some of the writedowns seen during the pandemic. Our office assets have not seen the valuation growth we might have expected, especially recognising the leasing success in this sector. This in part reflects perceived changes in working habits and costs associated with improving sustainability credentials.

We will seek to offset increasing cost pressures where we can attract premium rents, either due to limited supply or by providing high quality space.

Growing occupancy and income profile

We have improved occupancy this year, which has led to increased income. Our rent ***collection*** over the period has averaged 98% and was close to 100% for the December 2021 and March 2022 quarters. This higher level of income has enabled us to increase the dividend twice during the year, which we cover in more detail in the Financial Review.

Enhancing asset quality

During the year, we have invested £10 million in upgrading our assets. The impact of some of this activity is very obvious, such as the creation of Rum Runner Works, at Regency Wharf, in Birmingham where we have converted leisure space into offices; however, some of the less visible work is equally important as it aligns to our sustainability targets. For example, the complete upgrade and removal of our gas-fired air-conditioning system at 50 Farringdon Road, London, will help with our net zero commitments and improve energy efficiency for our occupiers.

In our refurbishments at Angel Gate, London, 180 West George Street, Glasgow and Longcross, Cardiff, we have also focused on improving occupier amenities, creating more communal and informal space with outside areas where possible.

Outperforming MSCI

We have outperformed the MSCI UK Quarterly Property Index for the ninth consecutive year. This year, across the Index, the range between lower quartile and upper quartile returns was the widest on record at 10.7%. We delivered a portfolio return of 24.3% compared to the Index of 19.6% and upper quartile of 24.9%. Whilst we are just below upper quartile for the year, we have still delivered upper quartile returns against the Index over three, five and ten years, and since inception.

Of note, our industrial assets delivered a total property return of 38.2%, our retail assets delivered 25.6%, which comprised retail warehousing delivering 33.4%, and our office assets delivered 4.4%.

Operational excellence

Efficient platform

We continue to run the business as efficiently as possible and have maintained our cost ratio at 1.0%. We have a small but very dedicated team and use external resource as appropriate. We are not immune from rising costs and it is clear that sustainability focused measures will add to both our workload and costs. We expect to recruit further this year to support our transition to net zero carbon.

Adaptable business model

One of the advantages of our diversified approach is our ability to position the portfolio as market conditions dictate. As returns become more convergent we are looking more widely across sectors. During the year we acquired two adjoining city centre industrial estates, off attractive pricing. Our most recent acquisition post period end was an office and retail asset in London.

This year we introduced SwiftSpace, our flexible lease offering, in response to changes in occupier demand, particularly as we face increased competition from serviced office providers. Our solution provides fast, flexible, inclusive leases, which we are offering in our smaller multi-let offices.

Earnings growth

Our earnings per share of 27.0p are significantly higher than the preceding year, reflecting the growth in the portfolio value. Our EPRA earnings are 5.5% higher reflecting the enhanced income position.

Capital structure

We have recently completed the refinancing of one of our long-term debt facilities, which not only increases the maturity by four years until 2031, but also reduces the overall interest rate. As part of the same transaction, we increased our borrowings by £49 million, which has allowed us to repay most of our revolving credit facility and gives us future financial flexibility. Recognising the asset value growth over the period, the loan to value ratio remained stable at the year-end at 21%.

Growth and economies of scale

We have seen growth this year in two forms: firstly, the valuation growth from the portfolio, which with the use of gearing has increased net assets and secondly, through acquisitions. We have made £25 million of acquisitions, which are earnings accretive, although during the period we have been impacted by stamp duty and other transaction costs.

Within our Interim results, we expressed a desire to grow and highlighted the wide discounts across the listed REIT sector, as well as some of the challenges in the UK real estate open ended sector, which are still prevalent. While we have not yet concluded any transactions, we have been proactive in our dialogue with suitable prospects. We will continue to advocate for change, but remain selective to ensure enhanced future performance.

Acting responsibly

Values and alignment

Ultimately, the performance of the business is delivered by those who work here. Having a small team means that we are able to operate quickly and efficiently with clear objectives that are aligned to remuneration. Our values of being principled, progressive and perceptive have guided us through the challenges of this year. We have broadened our team objectives and asked everyone, irrespective of their role, to help to reduce our impact on the environment.

Working closely with our occupiers

We have spent much of this year focused on a return to normal working practices, as have our occupiers. We have worked with many occupiers to help them rightsize their business. This has enabled us to retain income and de-risk future lease events. We have undertaken 12 transactions where we have extended leases or enabled occupiers to remain in our buildings.

Sustainability

We have devoted significant resource this year to further integrating sustainability within our business model. Specifically, much of the year was spent considering climate-related risks and creating a plan to mitigate these. In addition, we have been preparing our net zero carbon pathway, which is now published, and sets out a clear direction for the business as we aim to meet our 2040 target. The majority of the team have benefitted from specific training in this area and contributed to the formulation of our net zero carbon pathway. We have held externally facilitated workshops on relevant sustainability issues, alongside an internal workshop to ensure that the team is appropriately briefed on our future plans.

Outlook

We are positive about our future. Although we have had considerable letting success during the year, we can still increase income by improving occupancy. Most of the assets are now seeing stabilised or increasing values. In the industrial sector, we are generally seeing rental growth that is ahead of inflation and believe it is likely that growth will continue, especially if construction costs continue to rise and this impacts supply.

The team is aligned with the need to continue to enhance the portfolio and mitigate any risks from changing occupier habits or climate change. Our future engagement with occupiers and communication of our plan will be crucial moving forwards.

Macroeconomic events are likely to dampen a further recovery in property values, but despite this we believe that the right assets will remain attractive to occupiers and investors alike. We have created a quality portfolio, that is well managed and offers scope to continue to grow both the income and capital position.

Michael Morris

Chief Executive

25 May 2022

Our marketplace

Economic backdrop

As Covid-19 concerns began to dissipate, the war in Ukraine has become a fresh source of uncertainty. The consequences of the sanctions on Russia and embargo on Russian oil and gas are multifaceted. In the UK, we are fortunately less reliant on Russian imports than our neighbours in Europe but the added pressure on household incomes as a result of commodity price increases and persistent inflation will still be considerable.

UK GDP saw an annual rise of 7.4% in 2021 following a -9.3% fall in 2020 and at the end of March 2022 was 0.7% above its pre-pandemic level in December 2019. In the short-term, the rate of economic recovery is expected to be impacted on the supply side by disrupted supply chains and shortages of goods and labour and on the demand side by the cut in household incomes. Forecasters have revised down their GDP growth expectations for 2022 to reflect the impact of the crisis, which are now 3.8% for 2022 according to the Office for Budget Responsibility.

Quantitative easing and Government stimulus during the pandemic supported households and injected significant capital into the economy. As lockdowns ended and more and more businesses were able to reopen, consumer demand increased but this was not always matched with increases in supply, putting upward pressure on prices. The 12-month CPI inflation rate hit a new 40-year high of 9.0% in April 2022. The increase reflects the change in Ofgem’s energy price cap in April causing a jump in utility prices, alongside the rise in fuel and food prices as the ***agriculture*** sector faced increasing cost pressures.

The Bank of England’s response to rising inflation has been a series of base rate increases from a historic low of 0.1% to 1.0% in May 2022, the highest level since 2009. Further rate increases are expected, together with a programme of quantitative tightening.

Growth in average total pay (including bonuses) was 7.0% and growth in regular pay (excluding bonuses) was 4.2% among employees in January to March 2022. In real terms, total pay increased on the year by 1.4% and regular pay fell on the year by -1.2%.

In terms of demand, there is still momentum from the reopening of the economy, particularly for the travel industry which is one of the last to see restrictions lifted. As workers have returned to the office, albeit in a more flexible capacity, this will hopefully create an increase in the consumption associated with business travel, city centre retail and leisure activity.

Retail sales volumes are 4.1% above their level in February 2020, however did fall by -0.3% in the three months to April 2022, fuelling concerns that consumers are being hit by affordability pressures. The proportion of online retail sales stood at 27.0% in April 2022, remaining significantly higher than the 19.9% level in February 2020 before the pandemic.

The end of the furlough scheme in September 2021 did not have a significant impact on unemployment. The unemployment rate has fallen below pre-pandemic levels and job vacancies are at a record high. The number of job vacancies in February 2022 to April 2022 rose to a new record of 1.3 million, an increase of 0.5 million from its January to March 2020 level.

UK ten-year gilt yields have been on a generally upward trajectory since December 2021, but remain relatively low by historic standards.

House prices accelerated during the pandemic as changes to the tax paid on property purchases were announced. UK average house prices increased by 10.9% over the year to February 2022. Rising interest rates are likely to dampen the housing market to some extent in the short-term.

Despite the now more muted outlook for the UK economy and the current inflationary environment, there are reasons for cautious optimism. The Covid-19 pandemic has moved into the rear-view mirror. With the vast majority of adults in the UK fully vaccinated, restrictions have been lifted and normality has largely resumed. In a global context the UK remains a safe haven for international capital and posted the strongest GDP growth of all the G7 economies in 2021.

UK property market

The speed and strength of the property market’s recovery from the pandemic was better than expected. Although the average returns are positive, there is still polarisation between sectors and within subsectors, particularly

retail.

According to the MSCI UK Quarterly Property Index, commercial property delivered a total return of 19.6% for the year ended March 2022, which compares to 1.1% for the year ending March 2021. The stellar performance was largely attributable to the continued growth in the industrial sector and a recovery in values in the retail warehouse subsector. All Property capital growth was 14.9% in the year to March 2022, significantly better than the -3.2% recorded for the previous year. The income return was 4.2%, slightly lower than the 4.5% recorded for the preceding year.

The industrial sector had an extraordinarily strong year. The industrial total return for the year ending March 2022 was 40.7%, with annual capital growth reaching an all time high of 35.9% and an income return of 3.6%. Industrial ERV growth for the period was 11.2%, with a subsector range of 15.8% to 8.2%. Capital growth ranged from 47.7% to 28.2% within subsectors. Equivalent yields for industrial property now stand at 4.1% (March 2021: 5.0%).

The office sector continued to face a degree of uncertainty over future demand levels and suffered an additional setback in December 2021 as people were once again advised to work from home in the face of the Omicron wave. The office sector produced a total return of 6.9% for the year to March 2022, comprising 3.2% capital growth and 3.7% income return. All Office annual rental growth was 1.4% ranging from 2.4% to 0.9% within subsectors. Office capital growth ranged from 6.5% to -0.6%. Equivalent yields for office property now stand at 5.5% (March 2021: 5.8%).

The elevated rate of online sales over bricks and mortar retail and oversupply of retail units continues to hamper the retail sector as a whole, albeit some segments have recently seen a return to positive capital growth. The retail sector produced a total return of 14.9% for the year to March 2022. This comprised capital growth of 8.9% and income return of 5.6%. Rental values fell -2.0% over the period, ranging from 0.6% to -7.0%. Retail subsector capital growth ranged from 22.9% to -5.8%. The retail warehouse subsector was the driver of growth, with increased demand from investors pushing down yields. Equivalent yields for all retail property now stand at 5.9% (March 2021: 6.7%).

According to Property ***Data***, the total investment volume for the year to March 2022 was £70.5 billion, a 66.5% increase on the year to March 2021. The volume of investment by overseas investors in the year to March 2022 was £33.0 billion, accounting for 46.8% of all transactions.

As the disruptive threat of the pandemic recedes, new challenges for the property market are emerging from the macroeconomic and geopolitical environment. In times of uncertainty, UK property is often seen as a safe haven for investment. During periods of increased inflationary pressure property can provide a hedge in the form of an opportunity to grow income through rental growth and in turn generate capital growth. Certain property types are more akin to acting as an inflation hedge. At the current time, assets where demand is strong and supply limited are likely to offer protection through rising rental values, equally leases with fixed or inflation linked leases will also provide support.

Portfolio Review

Throughout the year we have continued to engage with our occupiers, invested into our assets and driven forward our sustainability priorities, which is at the forefront of our thinking as we actively manage the portfolio.

Driven by significant investor and occupier demand in the industrial sector, combined with a rebound in the retail warehousing sector, we have seen strong valuation gains. We have had like-for-like increases in passing rent and estimated rental value (ERV).

It has been another busy year in terms of the portfolio, with 76 asset management transactions completed. Our repositioning programme has especially helped us secure new office occupiers seeking best in class space, and this has resulted in an increase in occupancy over the period to 93%, up from 91% in the prior year.

Our occupier focused approach has always been key to enabling us to actively manage the portfolio. We are guided by our Picton Promise of Action, Community, Technology, Support and Sustainability. This philosophy of working in collaboration with our occupiers is a significant contributor to our long-term track record of outperformance.

During the year we have launched SwiftSpace at several of our office buildings, this initiative recognises that flexibility and ease of occupation are particularly important for some smaller businesses, and we are offering bespoke leasing solutions to include fitted space, inclusive rents and flexibility.

Performance

Our portfolio comprises 47 assets, with around 400 occupiers, and is valued at £849 million with a net initial yield of 4.0% and a reversionary yield of 5.4%.

Our asset allocation, with 60% in industrial, 30% in office and 10% in retail and leisure, combined with increasing occupancy and transactional activity, has enabled us to outperform the MSCI UK Quarterly Property Index over the year.

Overall, the like-for-like valuation was up 21%, with the industrial sector up 34%, offices up by 2% and retail and leisure up by 17%. This compares with the MSCI UK Quarterly Property Index recording a capital value increase of 15% over the period.

The overall portfolio passing rent is £38.7 million, an increase from the prior year of £2.2 million. On a like-for-like basis the passing rent increased by 2% and the contracted rent, which is the gross rent receivable after lease incentives, increased by £2.7 million or 7%.

The March 2022 ERV of the portfolio is £49.8 million, an increase from the prior year of 5% on a like-for-like basis. We had positive growth in all three sectors, with the industrial sector increasing 11% and the other two sectors both up 1%.

We have set out below the principal activity in each of the sectors in which we are invested and believe our sector strategy and proactive occupier engagement has delivered positive performance this year.

The industrial sector has had a very strong year, with considerable investment demand, with multiple buyers for well-located assets, resulting in further price growth. A lack of supply, especially of multi-let estates, coupled with increasing build costs, means that occupiers have restricted choice when looking for a unit, which in turn has driven strong rental growth across the country and especially in London and the South East where 73% of our portfolio is located. As examples, the ERV at Datapoint, London increased by 26%, Lyon Business Park, Barking by 15% and River Way, Harlow by 11%.

The office sector is returning to a ‘new normal’ with building occupancy improving, albeit on a more flexible basis. Increasingly businesses are focused on providing best in class space for their employees with good sustainability characteristics. There is good demand for Grade A space with take-up almost at pre-pandemic levels, but poorer quality buildings are struggling to attract occupiers.

Many companies are revising working patterns, with offices being used two or three days a week and staff working from home the rest of the time. We have invested substantially into our office portfolio over the last few years, which has meant we have best in class assets which we have been able to lease during the year as well as retaining existing occupiers.

Retail warehouse parks have performed strongly, and our parks are busy with occupiers trading well. Investment demand has resulted in price growth in 2021 and early 2022, however we have not yet seen significant rental growth. This investor demand has not translated to the high street, but there is activity at the prime end with the indication that pricing has reached a floor for best in class assets. The leisure market is returning to normal, with pubs and restaurants reporting brisk trading.

We believe the portfolio remains well placed in respect of our sector allocations. Combined with the quality of our assets, we will be able to continue to drive performance going forward.

Activity

We have had another good year in respect of asset management transactions. We completed 12 rent reviews, 7% ahead of ERV, 21 lease renewals or regears, 3% ahead of ERV and 34 lettings or agreements to lease, 8% ahead of ERV. Two industrial assets were acquired for £23.5 million plus costs and one retail asset disposed of for £0.7 million, 16% ahead of March 2021 valuation.

Over the year we have invested £10 million into the portfolio principally across eight key projects. These have all been aimed at enhancing space to attract occupiers, improve sustainability credentials and grow income.

A major renovation project was recently completed at Rum Runner Works, Regency Wharf, Birmingham, where we have converted leisure space to offices with the development being shortlisted for the British Council of Offices Awards 2022.

The air conditioning plant was replaced at 50 Farringdon Road, while the building was fully leased. The system has now been converted from gas to electric, reducing carbon emissions and improving the EPC from a D to a B.

Our largest void is Angel Gate Office Village, London. The property offers space for smaller businesses and this market is beginning to pick up. We have upgraded the common parts, installed an occupier lounge, which is already very popular, and fitted out office suites for immediate occupation in line with our SwiftSpace concept.

We are continually focused on futureproofing assets from a sustainability perspective, which has resulted in an improvement in our EPCs with 71% now rated C and above. The average lot size of the portfolio is £18.1 million, 22% ahead of last year.

Our total void is £3.6 million per annum by ERV. By sector, 70% is in offices, 16% is in industrial and 14% is in retail and leisure.

Retention rates and occupancy

Over the year, total ERV at risk due to lease expiries or break options totalled £5.5 million, a reduction on the £6.6 million in the year to March 2021.

We retained 37% of total ERV at risk in the year to March 2022. Of the ERV that was not retained, a further 29% or £1.6 million was re-let to a different occupier during the year.

In addition, a further £2.1 million of ERV was retained by either removing future breaks or extending future lease expiries ahead of the lease event.

Occupancy has increased during the year from 91% to 93%, which is ahead of the MSCI UK Quarterly Property Index of 92% at March 2022. The increase primarily reflects the success of the refurbishment programmes in the office sector, with occupiers seeking best in class space. In addition, we have seen strong demand for our industrial units and the retail portfolio remains well let. Industrial occupancy is 98% (2021: 100%), office occupancy is 87% (2021: 82%) and retail and leisure occupancy is 93% (2021: 92%).

At the year end, over half of our vacant buildings were being refurbished, with the remainder available to let and being actively marketed.

Outlook

As the UK opened up we saw a bounce in consumer confidence and spending. Subsequently, the war in Ukraine has caused a more uncertain outlook with inflationary pressure and supply chain issues being the immediate result. The war has not had any direct repercussions on the property market to date, however we are mindful of the fact that there could be secondary impacts going forward.

Our net zero carbon pathway is in place, and we continue to focus on sustainability and upgrading our buildings to ensure they are attractive to occupiers.

We have had success in securing occupiers in all sectors, with industrial demand remaining very strong. Our occupiers remain key and we have long-standing relationships in place with many of them, which enable us to work with and assist businesses as they grow and contract.

As at 31 March 2022 the portfolio had £11.1 million of reversionary income potential, £3.6 million from letting the vacant space, £4.5 million from expiring rent free periods and £3.0 million where the passing rent is below market level.

Demand for our industrial properties continues to be robust as proven by our high occupancy and growing ERVs. With this sector accounting for 60% of the total portfolio by value, we believe it will continue to contribute strongly to our performance, with supply constraints likely to lead to further rental growth.

The majority of office occupiers are now working on a flexible basis, with staff coming into the office two or three days a week. The longer-term implications differ from business to business but we are not seeing a significant reduction in overall floorspace. As we predicted, there has been a flight to quality, with companies wanting to upgrade their space to retain and attract staff. There is now a limited supply of Grade A space, as the development pipeline has slowed over the last two years, and this should result in rental growth. Poor quality buildings are less in demand, with many requiring significant expenditure to incorporate sustainability requirements and make them appealing to occupiers. We expect a significant proportion of these buildings to be repurposed in due course.

Retail warehousing, which makes up 65% of our retail allocation, has seen a valuation rebound, with retailers preferring out of town units to the high street. We have succeeded in letting all of our vacant retail warehouse units during the year and our parks are now fully leased.

We remain in a strong position with advantageous portfolio weightings, good quality assets and a proven occupier focused approach. Looking forward, we will continue to grow occupancy and income, acquire value accretive assets, engage with our occupiers, and invest further into our properties.

Jay Cable

Senior Director and Head of Asset Management

25 May 2022

Top ten occupiers

The largest occupiers, based as a percentage of contracted rent, as at 31 March 2022, are as follows:

Top ten assets

The largest assets, as at 31 March 2022, ranked by capital value, represent 55% of the total portfolio valuation and are detailed below:

\*Denotes leasehold interest in excess of 950 years.

Longevity of income

As at 31 March 2022, expressed as a percentage of contracted rent, the average length of the leases to the first termination was 4.8 years (2021: 4.9 years). This is summarised as follows:

The industrial sector accounts for 60% of the portfolio and had the strongest sector performance of the year.

Continued strength in the investment market, driven by strong occupational fundamentals, has resulted in another very positive year for this sector. Strong occupational demand, combined with active management extending income and securing rental uplifts, have all contributed to performance.

On a like-for-like basis, the value of our industrial assets increased by £123.4 million or 34%. The passing rent was £17.6 million at year end, with an ERV of £23.4 million. Due to eight occupiers being in rent-free periods the passing rent decreased by -5% on a like-for-like basis, but on a contracted rent basis the rent increased by 8%. The portfolio has an average weighted lease length of 4.2 years and £5.8 million of reversionary potential.

We have seen ERV growth of 11% across the industrial portfolio, reflecting a supply constrained market. Occupancy is 98%, with all of the vacant units being refurbished.

Portfolio activity

Madleaze and Mill Place Trading Estates, located in Gloucester city centre, were acquired in two separate transactions, for a combined purchase price of £23.5 million or £35 per sq ft, considerably below replacement cost. Our combined ownership now totals over 29 acres, with 670,000 sq ft of warehouse and ancillary accommodation, with a site coverage of 52%. The average rent on acquisition was only £2.76 per sq ft with a further 100,000 sq ft of vacant accommodation available to upgrade or redevelop, subject to occupational demand. We have already leased 22,000 sq ft without any capital expenditure and are in discussions with a number of occupiers in respect of either expansion or relocation.

At Rugby, we let a 99,500 sq ft unit to a logistics operator for ten years, subject to break. The lease commenced the day after the existing occupier vacated, meaning there were no void costs or capital expenditure. The new rent agreed at £0.7 million per annum is 11% ahead of both the previous passing rent and the ERV.

At Lyon Business Park, Barking we had an occupier severely affected by the pandemic. We actioned a landlord break option on the 45,000 sq ft unit, which was subsequently refurbished and leased to a catering company on a 15-year lease. The new rent of £0.6 million per annum is 46% ahead of the previous passing rent and 5% ahead of ERV. We renewed and extended three further leases on the estate securing £0.1 million per annum, 23% ahead of the previous passing rent and in line with ERV. We recently had another pandemic related void at the estate and have a 26,000 sq ft unit to lease, which is currently being refurbished.

At The Business Centre, Wokingham, we have driven income growth through agreeing two rent reviews, increasing the passing rent by 26% to £0.4 million per annum and leasing two units for a combined £0.1 million per annum, 2% ahead of ERV. The estate is fully leased.

At Dencora Way, Luton, we increased income through settling a rent review, increasing the passing rent by 43%, 1% ahead of ERV and renewing two leases at a rent 30% ahead of the previous passing rent. We leased one unit for £0.1 million per annum, 9% ahead of ERV.

At Easter Court, Warrington, following the completion of a rent review, we achieved a 47% uplift in rent, 3% ahead of ERV. A further lease was renewed, increasing the passing rent by 31% to £0.1 million per annum, 7% ahead of ERV.

Outlook

The industrial sector has performed exceptionally well this year, with continued strong demand, low vacancy rates and rental growth. Where units have come back due to occupiers relocating or insolvencies, we have been able to promptly re-let them at higher rents, post refurbishment.

We do not anticipate a material slowdown in occupational demand, and combined with limited availability and development pipeline, especially for multi-let estates, we expect continued rental growth.

The focus going forward is to maintain high occupancy, continue to capture rental growth, and work proactively with our occupiers to unlock asset management opportunities. We have 41 lease events forecast for the coming year, and the overall ERV for these units is 10% higher than the current passing rent of £2.7 million. This provides us with the opportunity to grow income and value further.

The office sector accounts for 30% of the portfolio and delivered positive performance driven by leasing activity and active management.

The value of the office portfolio has increased on a like-for-like basis by £5.7 million or 2% to £251.1 million and the annual rental income increased by £0.8 million or 6% to £14.0 million.

Occupancy within the office sector has increased from 82% to 87%. We have secured £2.9 million per annum from lettings and have worked with our occupiers to extend income elsewhere.

The office portfolio has an average weighted lease length of 4.0 years and £5.3 million of reversionary potential. The ERV has increased slightly over the year, which is mainly due to regional offices with London being stable.

The impact of the global pandemic on working practices continues to be felt, however this varies dramatically from business to business. Occupational demand has picked up, especially for better quality space as businesses return to the office and review their requirements.

We have launched our SwiftSpace offering in order to meet the need for more flexible space requirements in a post-Covid-19 environment. From a regulatory standpoint, the Welsh Government retained their work from home policy until the end of our financial year, and this had an impact on demand for our Cardiff building.

We invested £6.2 million into our office assets during the period. Key projects were completed at Angel Gate, London, 50 Farringdon Road, London, 180 West George Street, Glasgow and Longcross, Cardiff.

Portfolio activity

At 50 Farringdon Road, London, we extended a lease, due for expiry later this year. This was our largest lease event in the office sector retaining £0.6 million per annum, which is 2% ahead of ERV. The transaction follows an upgrade of the heating and cooling system last year, transitioning from gas to electric, reducing carbon emissions from the building and upgrading the EPC from a D to a B.

At 180 West George Street, Glasgow, following a comprehensive refurbishment of the first, fifth and sixth floors to include new external roof terraces, we leased all three floors to separate occupiers, securing a combined rent of £0.6 million per annum, 19% ahead of ERV. This is a good example of occupiers seeking best in class space for their employees.

In Chatham, we completed the letting of all the remaining space at 50 Pembroke Court to NatWest at £0.3 million per annum, 8% ahead of ERV, for a term of five years, subject to break. In line with the occupier’s sustainability policy the refurbished floor achieved a B-rated EPC.

Following the completion of the refurbishment of Stanford Building, London, we leased the remaining two office floors to a recruitment company, securing a rent of £0.5 million per annum, 3% below ERV but reflecting a longer ten-year lease commitment. We also leased the flagship retail unit, which is covered in the Retail and Leisure section.

At Colchester Business Park, we renewed three leases securing a combined rent of £0.4 million per annum, an 11% increase on the previous passing rent and 1% ahead of ERV. Two large occupiers vacated towards year end, and we are therefore refurbishing this space. We expect good levels of demand on completion of the works.

At Grafton Gate, Milton Keynes, we retained an occupier on lease expiry and removed two break options in return for taking back one suite this summer. The combined rent secured was £0.4 million per annum, 5% ahead of ERV. One rent review was agreed, securing a 33% increase to £0.2 million per annum, 4% ahead of ERV.

Our largest office void is Angel Gate, London, which has suffered from smaller businesses choosing to work from home during the pandemic and only now beginning to look to return to the office. The common areas have been redesigned and we have converted a ground floor office suite into an occupier lounge that has proved attractive to occupiers. We renewed two leases during the year for a combined £0.2 million per annum, 19% ahead of ERV and relocated four occupiers, all of whom upgraded their space and we let one fully fitted suite, securing a combined £0.4 million per annum, 5% ahead of ERV. We are beginning to see enquiries rise and believe our SwiftSpace option is attractive to occupiers looking for this type of flexible space.

Outlook

As we predicted, we are seeing a flight to quality with businesses looking for best in class space to attract their employees back to the office.

The majority of businesses have moved to a flexible working pattern, with employees working from home one or two days a week. This means they still require office space for all of their staff, and we have not seen a lot of second hand space being put on the market.

Sustainability is an ever-increasing factor in choosing a building and older stock, where the capital expenditure required to upgrade is prohibitive, will be converted to other uses. We have invested £15.2 million into our office portfolio over the last three years, creating high quality contemporary space with occupier amenities that offer flexibility in workspace planning, meaning our buildings are attractive to occupiers as demonstrated by our leasing success.

We have 33 lease events forecast for the coming year, with the current ERV for these units being 4% higher than the current passing rent of £2.6 million and a 13% void, with an ERV of £2.5 million, providing us with the opportunity to significantly grow income and value.

The retail and leisure sector accounts for 10% of the portfolio and delivered a marked improvement in performance over the year.

The value of the retail and leisure sector increased on a like-for-like basis by £12.8 million or 17% with the majority of the increase relating to our retail parks, which account for 65% of this element of the portfolio. The annual rental income increased by £0.8 million or 14% to £7.1 million. The portfolio has an average weighted lease length of 8.1 years with the ERV being £7.1 million.

Investor demand for retail warehouse parks has increased substantially over the last six months, resulting in valuation increases on the back of yield movement. While the sector remains more attractive to retailers seeking accommodation, we have yet to see significant rental growth coming through.

The high street is still struggling following the pandemic with an oversupply in most markets. Shoppers are however returning to city centres and local shopping is still performing well, with signs of occupational demand returning off rebased rents.

We have seen positive ERV growth of 1% across this element of the portfolio and pleasingly we have been able to increase occupancy during this period to 93%. Our largest retail void is the office element of Regency Wharf, Birmingham and we only have three vacant high street shops, one is under offer, and we have interest in the other two.

£2.5 million was invested into the retail portfolio during the period, the majority into the Regency Wharf ***conversion***.

Portfolio activity

At Stanford Building, London, we let the flagship retail unit to Scotch & Soda, an international fashion retailer, for ten years, subject to break. The rent of £0.5 million per annum is 22% ahead of ERV. The lease starts in May 2022 and the incentive package was less than one year’s rent.

We had success at our retail parks, with a letting to the UK Government in Swansea for a Job Centre, which worked well in this end of terrace unit. We secured a five-year lease, subject to break, at a rent of £0.1 million per annum, in line with ERV. The park is fully leased with occupiers including Lidl, FarmFoods, JD Gyms, and Pets at Home.

At Angouleme Way Retail Park, Bury we leased the final vacant unit to JD Gyms. We secured a ten-year term certain at a rent of £0.2 million per annum, in line with ERV. The park is fully leased with occupiers including TK Maxx, Argos and JYSK.

At Scots Corner, Birmingham, where we have a parade of local high street retail units with a Job Centre above, we extended two leases for a combined rent of £0.1 million per annum, which was 5% ahead of ERV. At the same property we leased a unit securing a rent 23% ahead of ERV. We have one unit to lease, and we have interest.

Victoria Lane, Huddersfield, was sold in September. The property consisted of three small retail units, with short income to Argos, Savers, and Peacocks, but with Argos vacating. The property was sold for £0.7 million, 16% ahead of valuation, to the local council.

Outlook

The retail and leisure sector is stabilising following the pandemic. Retail warehouse parks are trading well and are in demand from investors. Although there remains an oversupply of floorspace in the high street and shopping centre subsectors, there are signs that yields have reached a floor and there could be opportunities in carefully selected prime assets.

Our portfolio is well leased, provides an attractive income return and with 65% in the retail warehouse sector we are strategically well placed. We have been successful in securing new occupiers over the year and our parks have remained busy. High street valuations, which have moved down over the past few years, are now stabilising.

The inflationary pressures currently being felt may result in a drop in consumer spending. Therefore, we remain cautious within the sector and will be selective when considering potential investments.

Financial Review

This financial year has seen a significant rebound in the economy, with UK GDP returning above pre-pandemic levels by the end of March 2022. However the conflict in Ukraine has tempered the outlook, with rising inflation expected to restrain growth in the short-term.

The total profit for the year was £147.4 million, up from £33.8 million in 2021. Both income and capital elements were ahead of the previous year’s position.

On the capital side, we saw very strong growth in our industrial and retail warehouse assets, with the overall valuation movement of £130 million for the year. The like-for-like gain in the valuation of the property portfolio was 21%.

Our EPRA earnings, comprising the operating results and net interest expense, increased to £21.2 million for the year, an increase of 5.5%. As discussed below, property revenue rose by over £3 million compared to 2021, or over 7%. With the new acquisitions made in the year, plus the one recently announced post year-end, we expect revenue to move forward again next year.

We have raised the level of dividend twice in the year, and this is now back to the pre-pandemic level.

The total return for the year was 28%, significantly improving upon the 6.6% recorded last year.

Net asset value

The net assets of the Group increased to £657.1 million, or 120 pence per share, which was a rise of 24.4% over the year. The chart below shows the components of this increase.

The following table reconciles the net asset value calculated in accordance with International Financial Reporting Standards (IFRS) with that of the European Public Real Estate Association (EPRA).

Income statement

As noted above our results for the year are very strong. Valuation gains are at a record level, but there has also been growth in EPRA earnings, with an increase in property income.

Total revenue from the property portfolio for the year was £46.5 million, up from £43.3 million last year. Rental income has increased by 9.8% compared to 2021, as a result of the new acquisitions made during the year, as well as the increased occupancy and reduced bad debt provisions. On a like-for-like basis, rental income increased by 9.5% compared to the previous year, on an EPRA basis.

Rent ***collection*** has largely returned to pre-pandemic levels.

Property operating and void costs are slightly higher than the previous year, at £4.9 million compared to £4.6 million. Although occupancy has increased, following a number of lettings towards the end of the year, void holding costs are higher this year, impacted by general inflationary pressure.

Administrative expenses for the year were £5.8 million, compared to £5.4 million in 2021. Staff costs are some 6% higher compared to the previous year, reflecting higher ***variable*** remuneration provisions as well as the new fee and salary rates agreed for 2021/22. There have been other additional costs this year relating to developing the net zero carbon pathway and other sustainability related issues.

Interest costs for this year are £8.5 million. This includes the additional amortisation this year of costs associated with the original Canada Life facility from 2012, which, as set out below, has been extended this year. We have also made drawdowns under our revolving credit facility, although these were largely repaid within the year. As a result of resetting the interest rate on our Canada Life facility our cost of debt will be lower going forward.

Capital gains on the portfolio were £130.2 million for the year, including the gains on owner-occupied property. There were strong valuation gains across the portfolio, with the industrial and retail warehouse assets performing particularly well. One disposal of a retail asset was made during the year, realising a small gain compared to the March 2021 valuation.

The total profit for the year was £147.4 million, up by over 300% compared to 2021.

Dividends

As the restrictions caused by the pandemic have eased and our rent ***collection*** rate has risen, we have been able to increase the quarterly dividend twice over the course of the year, and have now returned to the pre-pandemic rate of 0.875 pence per share. The full dividend for the year was 3.375 pence per share, with total dividends paid out of £18.4 million, compared to £15.0 million last year, an increase of 23%. Dividend cover for the full year was 115%.

Investment properties

The appraised value of our investment property portfolio was £849.3 million at 31 March 2022, up from £682.4 million a year previously. We have made two acquisitions this year, for a total consideration of £25.0 million, as well as a disposal of one small retail property, for net proceeds of £0.7 million. The two industrial acquisitions are discussed in more detail in the Portfolio Review section. This year we have invested £9.6 million of capital expenditure in the portfolio. There have been a number of key refurbishment projects undertaken this year, principally at Regency Wharf, Birmingham, Longcross, Cardiff and at 50 Farringdon Road, London. There were significant portfolio valuation gains totalling £130.2 million this year, principally in the industrial and retail warehouse sectors.

As last year, the value of the floor that we occupy at Stanford Building, London, has been excluded from the value of Investment Properties and included separately with Property, Plant and Equipment. Any gains arising from the revaluation of this element of the property are shown within Other Comprehensive Income.

At 31 March 2022 the portfolio comprised 47 assets, with an average lot size of £18.1 million.

Borrowings

Total borrowings are now £218.8 million at 31 March 2022, with the loan to value ratio at 21.2%. The weighted average interest rate on our borrowings has reduced to 3.7%, while the average loan duration is now 9.6 years.

In March, we extended and amended our Canada Life facility. Previously the outstanding £80 million loan had a maturity date of July 2027, which we have moved out to July 2031. We have also borrowed an additional £49 million under this facility, increasing the principal to £129 million, and at the same time reducing the interest rate payable on the full amount to 3.25%. As a result of resetting the rate on the original principal we have incurred one-off prepayment fees of £4.0 million.

Our senior loan facility with Aviva reduced by the regular amortisation, £1.3 million in the year.

The Group remained fully compliant with its loan covenants throughout the year. During the year we utilised our revolving credit facility to acquire the two industrial assets mentioned above. Much of this has been repaid using the proceeds from the new Canada Life borrowings. At 31 March 2022 we had £4.9 million drawn under the revolving credit facility, which had been used to fund capital expenditure projects. The revolving credit facility, originally for an initial term of three years, was extended by a further year in 2021/22, and a further one-year extension has now been granted, taking the maturity to 2025.

The fair value of our borrowings at 31 March 2022 was £225.6 million, higher than the book amount. Lending margins have fallen slightly compared to the previous year, but gilt rates have risen more significantly.

A summary of our borrowings is set out below:

Cash flow and liquidity

Our overall cash position increased by £15.1 million over the year. This was partly due to the additional borrowings that were received in March 2022, but additionally the cash flow from operating activities was higher this year at £20.0 million. Cash outflows from investing activities was £33.8 million for the year, being the consideration paid for the two new assets, plus £9.6 million of capital expenditure. Dividends paid increased to £18.4 million. Our cash balance at the year-end stood at £38.5 million, compared to the previous year’s balance of £23.4 million.

Share capital

No new ordinary shares were issued during the year.

The Company’s Employee Benefit Trust acquired a further 750,000 shares, at a cost of £0.7 million, or 97 pence per share, during the year. This was to satisfy the future vesting of awards made under the Long-term Incentive Plan and Deferred Bonus Plan, and now holds a total of 1,974,253 shares. As the Trust is consolidated into the Group’s results these shares are effectively held in treasury and therefore have been excluded from the net asset value and earnings per share calculations, from the date of purchase.

Andrew Dewhirst

Finance Director

25 May 2022

Principal Risks

Managing risks

The Board recognises that there are risks and uncertainties that could have a material impact on the Group’s results.

Risk management provides a structured approach to the decision making process such that the identified risks can be mitigated and the uncertainty surrounding expected outcomes can be reduced. The Board has developed a risk management policy which it reviews on a regular basis. The Audit and Risk Committee carries out a detailed assessment of all risks, whether investment or operational, and considers the effectiveness of the risk management and internal control processes. The Executive Committee is responsible for implementing strategy within the agreed risk management policy, as well as identifying and assessing risk in day-to-day operational matters. The management committees support the Executive Committee in these matters. The small number of employees and relatively flat management structure allow risks to be quickly identified and assessed. The Group’s risk appetite will vary over time and during the course of the property cycle. The principal risks – those with potential to have a material impact on performance and results – are set out below, together with mitigating controls.

The UK Corporate Governance Code requires the Board to make a Viability Statement. This considers the Company’s current position and principal and emerging risks and uncertainties combined with an assessment of the future prospects for the Company, in order that the Board can state that the Company will be able to continue its operations over the period of their assessment.

Covid-19 impacts

The impacts of the Covid-19 pandemic have lessened over the past year as restrictions have been lifted and the UK economy has largely recovered, with GDP above pre-pandemic levels. However, the longer-term implications may be felt for some time. Government borrowing has increased significantly during the pandemic which could lead to higher taxes and lower growth. Other consequences of the pandemic, such as flexible working and increased online retailing, are unlikely to reverse.

Climate-related risks

The Board has carried out an assessment of the physical and transition risks most relevant to the business, and undertaken a review of its procedures for identifying and managing those risks. This review made a number of recommendations which will be implemented during the coming year.

Emerging risks

During the year the Board has considered themes where emerging risks or disrupting events may impact the business. These may arise from behavioural changes, political or regulatory changes, advances in technology, environmental factors, economic conditions or demographic changes. All emerging risks are reviewed as part of the ongoing risk management process.

The principal emerging risks have been identified to be:

–  rising inflation in the UK economy, caused by higher energy, food and commodity prices;

–  the legacy effects of the pandemic, which has heightened awareness of social injustice and global inequality, and the pressure on businesses to create positive societal value;

–  cyber security, heightened by the disruption during the pandemic and greater home working;

–  the increasing importance of sustainability issues to all stakeholders;

–  office working is evolving into a more flexible model, making businesses reassess their space requirements;

–  online retailing continues to reduce the demand for physical space in the retail market;

–  advances in technology are impacting both the real estate sector, in areas such as smart building systems and electric vehicle charging, and also occupiers’ businesses, changing their space requirements;

–  changes in regulations are increasing environmental standards and property owners must keep pace to avoid the risk of stranded assets.

Corporate Strategy

Property

Operational

Financial

Viability assessment and statement

The UK Corporate Governance Code requires the Board to make a ‘viability statement’ which considers the Company’s current position and principal and emerging risks and uncertainties combined with an assessment of the future prospects for the Company, in order that the Board can state that the Company will be able to continue its operations over the period of their assessment.

The Board conducted this review over a five-year timescale, considered to be the most appropriate for long-term investment in commercial property. The assessment has been undertaken taking into account the principal and emerging risks and uncertainties faced by the Group which could impact its investment strategy, future performance, loan covenants and liquidity.

The major risks identified were those relating to rising inflation, geopolitical tensions and the legacy effects of the Covid-19 pandemic on the UK economy and commercial property market over the period of the assessment. In the ordinary course of business, the Board reviews a detailed financial model on a quarterly basis, including forecast market returns. This model allows for different assumptions regarding lease expiries, breaks and incentives. For the purposes of the viability assessment of the Group, the model covers a five-year period and is stress tested under various scenarios.

The Board considered a number of scenarios and their impact on the Group’s property portfolio and financial position. These scenarios included different levels of rent ***collection***, occupier defaults, void periods and incentives within the portfolio, and the consequential impact on property costs and loan covenants. All lease events and assumptions were reviewed over the period under the different scenarios including their impact on revenue and cash flow. Forecast movements in capital values were included in these scenarios including their potential impact on the Group’s loan covenants. The Group’s long-term loan facilities are contracted to be in place throughout the assessment period, while the Board has assumed that the Group will continue to have access to its short-term facilities. The Board considered the impact of these scenarios on its ability to continue to pay dividends at different rates over the assessment period.

These matters were assessed over the period to 31 March 2027 and will continue to be assessed over rolling five-year periods.

The Directors consider that the stress testing performed was sufficiently robust that even under extreme conditions the Company remains viable.

Based on their assessment, and in the context of the Group’s business model and strategy, the Directors expect that the Group will be able to continue in operation and meet its liabilities as they fall due over the five-year period to 31 March 2027.

Statement of Directors’ responsibilities

The Directors are responsible for preparing the Annual Report and the financial statements in accordance with applicable law and regulations.

Company law requires the Directors to prepare financial statements for each financial year. Under that law they are required to prepare the financial statements in accordance with International Financial Reporting Standards, as issued by the IASB, and applicable law.

Under company law the Directors must not approve the financial statements unless they are satisfied that they give a true and fair view of the state of affairs of the Company and of its profit or loss for that period.

In preparing these financial statements, the Directors are required to:

–  select suitable accounting policies and then apply them consistently;

–  make judgements and estimates that are reasonable, relevant and reliable;

–  state whether applicable accounting standards have been followed, subject to any material departures disclosed and explained in the financial statements;

–  assess the Group and Company’s ability to continue as a going concern, disclosing, as applicable, matters related to going concern; and

–  use the going concern basis of accounting unless they either intend to liquidate the Group or the Company or to cease operations, or have no realistic alternative but to do so.

The Directors are responsible for keeping proper accounting records that are sufficient to show and explain the Company’s transactions and disclose with reasonable accuracy at any time the financial position of the Company and enable them to ensure that its financial statements comply with the Companies (Guernsey) Law, 2008. They are responsible for such internal controls as they determine are necessary to enable the preparation of the financial statements that are free from material misstatement, whether due to fraud or error, and have a general responsibility for taking such steps as are reasonably open to them to safeguard the assets of the Group and to prevent and detect fraud and other irregularities.

The Directors are responsible for the maintenance and integrity of the corporate and financial information included on the Company’s website, and for the preparation and dissemination of financial statements. Legislation in Guernsey governing the preparation and dissemination of financial statements may differ from legislation in other jurisdictions.

Directors’ responsibility statement in respect of the Annual Report and financial statements

We confirm that to the best of our knowledge:

–  the financial statements, prepared in accordance with the applicable set of accounting standards, give a true and fair view of the assets, liabilities, financial position and profit or loss of the Company; and

–  the Strategic Report includes a fair review of the development and performance of the business and the position of the Issuer, together with a description of the principal risks and uncertainties that they face.

We consider the Annual Report and accounts, taken as a whole, are fair, balanced and understandable and provide the information necessary for shareholders to assess the Company’s position and performance, business model and strategy.

By Order of the Board

Andrew Dewhirst

25 May 2022

Financial Statements

Consolidated statement of comprehensive income

for the year ended 31 March 2022

All items in the above statement derive from continuing operations.

All of the profit and total comprehensive income for the year is attributable to the equity holders of the Company.

Notes 1 to 27 form part of these consolidated financial statements.

Consolidated statement of changes in equity

for the year ended 31 March 2022

Notes 1 to 27 form part of these consolidated financial statements.

Consolidated balance sheet

as at 31 March 2022

These consolidated financial statements were approved by the Board of Directors on 25 May 2022 and signed on its behalf by:

Andrew Dewhirst

Director

25 May 2022

Notes 1 to 27 form part of these consolidated financial statements.

Consolidated statement of cash flows

for the year ended 31 March 2022

Notes 1 to 27 form part of these consolidated financial statements.

Notes to the consolidated financial statements

for the year ended 31 March 2022

1. General information

Picton Property Income Limited (the ‘Company’ and together with its subsidiaries the ‘Group’) was established on 15 September 2005 as a closed ended Guernsey domiciled investment company and entered the UK REIT regime on 1 October 2018. The consolidated financial statements are prepared for the year ended 31 March 2022 with comparatives for the year ended 31 March 2021.

2. Significant accounting policies

Basis of accounting

The financial statements have been prepared on a going concern basis and adopt the historical cost basis, except for the revaluation of investment properties. Historical cost is generally based on the fair value of the consideration given in exchange for the assets. The financial statements, which give a true and fair view, are prepared in accordance with International Financial Reporting Standards (IFRS) as issued by the IASB and the Companies (Guernsey) Law, 2008.

The Directors have assessed whether the going concern basis remains appropriate for the preparation of the financial statements. They have reviewed the Group’s principal and emerging risks, existing loan facilities, access to funding and liquidity position and then considered a number of scenarios around different levels of rent ***collection***, (and the potential consequences on financial performance), asset values, capital projects and loan covenants. Under all of these scenarios the Group has sufficient resources to continue its operations, and remain within its loan covenants, for a period of at least 12 months from the date of these financial statements.

Based on their assessment and knowledge of the portfolio and market, the Directors have therefore continued to adopt the going concern basis in preparing the financial statements.

The financial statements are presented in pounds sterling, which is the Company’s functional currency. All financial information presented in pounds sterling has been rounded to the nearest thousand, except when otherwise indicated.

New or amended standards issued

The accounting policies adopted are consistent with those of the previous financial period, as amended to reflect the adoption of new standards, amendments and interpretations which became effective in the year as shown below.

–  Interest Rate Benchmark Reform – Phase 2

–  Covid-19 Related Rent Concessions (Amendment to IFRS 16)

The adoption of these standards has had no material effect on the consolidated financial statements of the Group.

At the date of approval of these financial statements there are a number of new and amended standards in issue but not yet effective for the financial year ended 31 March 2022 and thus have not been applied by the Group.

–  Classification of liabilities as current or non-current (Amendments to IAS 1)

–  Disclosure of Accounting Policies (Amendments to IAS 1 and IFRS Practice Statement 2)

–  Definition of Accounting Estimate (Amendment to IAS 8)

–  Sale or Contribution of Assets between an Investor and its Associate or Joint Venture (Amendment to IFRS 10 and IAS 28)

–  Onerous Contracts - Cost of fulfilling a Contract (Amendments to IAS 37)

–  Annual Improvements to IFRS Standards 2018-2020

The adoption of these new and amended standards, together with any other IFRSs or IFRIC interpretations that are not yet effective, are not expected to have a material impact on the financial statements of the Group.

Use of estimates and judgements

The preparation of financial statements in conformity with IFRS requires management to make judgements, estimates and assumptions that affect the application of policies and the reported amounts of assets, liabilities, income and expenses. The estimates and associated assumptions are based on historical experience and various other factors that are believed to be reasonable under the circumstances, the results of which form the basis of estimates about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates. The estimates and underlying assumptions are reviewed on an ongoing basis.

Significant judgements and estimates

Judgements made by management in the application of IFRSs that have a significant effect on the financial statements and major sources of estimation uncertainty are disclosed in Note 13.

The critical estimates and assumptions relate to the investment property and owner-occupied property valuations applied by the Group’s independent valuer. Revisions to accounting estimates are recognised in the year in which the estimate is revised if the revision affects only that year, or in the year of the revision and future years if the revision affects both current and future years.

Basis of consolidation

The consolidated financial statements incorporate the financial statements of the Company and entities controlled by the Company at the reporting date. The Group controls an entity when it is exposed to, or has rights to, ***variable*** returns from its involvement with the entity and has the ability to affect these returns through its control over the entity.

Subsidiaries are consolidated from the date on which control is transferred to the Group and cease to be consolidated from the date on which control is transferred out of the Group. These financial statements include the results of the subsidiaries disclosed in Note 12. All intra-group transactions, balances, income and expenses are eliminated on consolidation.

Fair value hierarchy

The fair value measurement for the Group’s assets and liabilities is categorised into different levels in the fair value hierarchy based on the inputs to valuation techniques used. The different levels have been defined as follows:

Level 1: quoted prices (unadjusted) in active markets for identical assets or liabilities that the Group can access at the measurement date.

Level 2: inputs other than quoted prices included within Level 1 that are observable for the asset or liability, either directly or indirectly.

Level 3: unobservable inputs for the asset or liability.

The Group recognises transfers between levels of the fair value hierarchy as of the end of the reporting period during which the transfer has occurred.

Investment properties

Freehold property held by the Group to earn income or for capital appreciation, or both, is classified as investment property in accordance with IAS 40 ‘Investment Property’. Property held under head leases for similar purposes is also classified as investment property. Investment property is initially recognised at purchase cost plus directly attributable acquisition expenses and subsequently measured at fair value. The fair value of investment property is based on a valuation by an independent valuer who holds a recognised and relevant professional qualification and who has recent experience in the location and category of the investment property being valued.

The fair value of investment properties is measured based on each property’s highest and best use from a market participant’s perspective and considers the potential uses of the property that are physically possible, legally permissible and financially feasible.

The fair value of investment property generally involves consideration of:

–  Market evidence on comparable transactions for similar properties;

–  The actual current market for that type of property in that type of location at the reporting date and current market expectations;

–  Rental income from leases and market expectations regarding possible future lease terms;

–  Hypothetical sellers and buyers, who are reasonably informed about the current market and who are motivated, but not compelled, to transact in that market on an arm’s length basis; and

–  Investor expectations on matters such as future enhancement of rental income or market conditions.

Gains and losses arising from changes in fair value are included in the Consolidated Statement of Comprehensive Income in the year in which they arise. Purchases and sales of investment property are recognised when contracts have been unconditionally exchanged and the significant risks and rewards of ownership have been transferred.

An investment property is derecognised for accounting purposes upon disposal or when no future economic benefits are expected to arise from the continued use of the asset. Any gain or loss arising on derecognition of the asset (calculated as the difference between the net disposal proceeds and the carrying amount of the item) is included in the Consolidated Statement of Comprehensive Income in the year the asset is derecognised. Investment properties are not depreciated.

The majority of the investment properties are charged by way of a first ranking mortgage as security for the loans made to the Group; see Note 18.

Property, plant and equipment

Owner-occupied property

Owner-occupied property is stated at its revalued amount, which is determined in the same manner as investment property. It is depreciated over its remaining useful life (in this case 40 years) with the depreciation included in administrative expenses. On revaluation, any accumulated depreciation is eliminated against the gross carrying amount of the property concerned, and the net amount restated to the revalued amount. Subsequent depreciation charges are adjusted based on the revalued amount. Any difference between the depreciation charge on the revalued amount and that which would have been charged under historic cost is transferred between the revaluation reserve and retained earnings as the property is used. Any gain arising on this remeasurement is recognised in profit or loss to the extent that it reverses a previous impairment loss on the specific property, with any remaining gain recognised in other comprehensive income and presented in the revaluation reserve. Any loss is recognised in profit or loss. However, to the extent that an amount is included in the revaluation surplus for that property, the loss is recognised in other comprehensive income and reduces the revaluation surplus within equity.

Plant and equipment

Plant and equipment is depreciated on a straight-line basis over the estimated useful lives of each item of plant and equipment. The estimated useful lives are between three and five years.

Leases

Where the Group holds interest in investment properties other than as freehold interests (e.g. as a head lease), these are accounted for as right of use assets, which is recognised at its fair value on the Balance Sheet, within the investment property carrying value. Upon initial recognition, a corresponding liability is included as a finance lease liability. Minimum lease payments are apportioned between the finance charge and the reduction of the outstanding liability so as to produce a constant periodic rate of interest on the remaining finance lease liability. Contingent rent payable, being the difference between the rent currently payable and the minimum lease payments when the lease liability was originally calculated, are charged as expenses within property expenditure in the years in which they are payable.

The Group leases its investment properties under commercial property leases which are held as operating leases. An operating lease is a lease other than a finance lease. A finance lease is one whereby substantially all the risks and rewards of ownership are passed to the lessee. Lease income is recognised as income on a straight-line basis over the lease term. Direct costs incurred in negotiating and arranging an operating lease are added to the carrying amount of the leased asset and recognised as an expense over the lease term on the same basis as the lease income. Upon receipt of a surrender premium for the early termination of a lease, the profit, net of dilapidations and non-recoverable outgoings relating to the lease concerned, is immediately reflected in revenue from properties if there are no relevant conditions attached to the surrender.

Cash and cash equivalents

Cash includes cash in hand and cash with banks. Cash equivalents are short-term, highly liquid investments that are readily convertible to known amounts of cash with original maturities in three months or less and that are subject to an insignificant risk of change in value.

Income and expenses

Income and expenses are included in the Consolidated Statement of Comprehensive Income on an accruals basis. All of the Group’s income and expenses are derived from continuing operations.

Lease incentive payments are amortised on a straight-line basis over the period from the date of lease inception to the end of the lease term and presented within accounts receivable. Lease incentives granted are recognised as a reduction of the total rental income, over the term of the lease.

Property operating costs include the costs of professional fees on letting and other non-recoverable costs.

The income charged to occupiers for property service charges and the costs associated with such service charges are shown separately in Notes 3 and 4 to reflect that, notwithstanding this money is held on behalf of occupiers, the ultimate risk for paying and recovering these costs rests with the property owner.

Employee benefits

Defined contribution plans

A defined contribution plan is a retirement benefit plan under which the Company pays fixed contributions into a separate entity and will have no legal or constructive obligation to pay further amounts. Obligations for contributions to defined contribution pension plans are recognised as an expense in the Consolidated Statement of Comprehensive Income in the periods during which services are rendered by employees.

Short-term benefits

Short-term employee benefit obligations are measured on an undiscounted basis and are expensed as the related service is provided. A liability is recognised for the amount expected to be paid under short-term cash bonus or profit-sharing plans if the Company has a present legal or constructive obligation to pay this amount as a result of past service provided by the employee and the obligation can be estimated reliably.

Share-based payments

The fair value of the amounts payable to employees in respect of the Deferred Bonus Plan, when these are to be settled in cash, is recognised as an expense with a corresponding increase in liabilities, over the period that the employees become unconditionally entitled to payment. Where the awards are equity settled, the fair value is recognised as an expense, with a corresponding increase in equity. The liability is remeasured at each reporting date and at settlement date. Any changes in the fair value of the liability are recognised under the category staff costs in the Consolidated Statement of Comprehensive Income.

The grant date fair value of awards to employees made under the Long-term Incentive Plan is recognised as an expense, with a corresponding increase in equity, over the vesting period of the awards. The amount recognised as an expense is adjusted to reflect the number of awards for which the related non-market performance conditions are expected to be met, such that the amount ultimately recognised is based on the number of awards that meet the related non-market performance conditions at the vesting date. For share-based payment awards with market conditions, the grant date fair value of the share-based awards is measured to reflect such conditions and there is no adjustment between expected and actual outcomes.

The cost of the Company’s shares held by the Employee Benefit Trust is deducted from equity in the Consolidated Balance Sheet. Any shares held by the Trust are not included in the calculation of earnings or net assets per share.

Dividends

Dividends are recognised in the period in which they are declared.

Accounts receivable

Accounts receivable are stated at their nominal amount as reduced by appropriate allowances for estimated irrecoverable amounts. The Group applies the IFRS 9 simplified approach to measuring expected credit losses, which uses a lifetime expected impairment provision for all applicable accounts receivable. Bad debts are written off when identified.

Loans and borrowings

All loans and borrowings are initially recognised at cost, being the fair value of the consideration received net of issue costs associated with the borrowing. After initial recognition, loans and borrowings are subsequently measured at amortised cost using the effective interest method. Amortised cost is calculated by taking into account any issue costs, and any discount or premium on settlement. Gains and losses are recognised in profit or loss in the Consolidated Statement of Comprehensive Income when the liabilities are derecognised for accounting purposes, as well as through the amortisation process.

Assets classified as held for sale

Any investment properties on which contracts for sale have been exchanged but which had not completed at the period end are disclosed as properties held for sale. Investment properties included in the held for sale category continue to be measured in accordance with the accounting policy for investment properties.

Other assets and liabilities

Other assets and liabilities, including trade creditors, accruals, other creditors, and deferred rental income, which are not interest bearing are stated at their nominal value.

Share capital

Ordinary shares are classified as equity.

Revaluation reserve

Any surplus or deficit arising from the revaluation of owner-occupied property is taken to the revaluation reserve.

Taxation

The Group elected to be treated as a UK REIT with effect from 1 October 2018. The UK REIT rules exempt the profits of the Group’s UK property rental business from UK corporation and income tax. Gains on UK properties are also exempt from tax, provided they are not held for trading. The Group is otherwise subject to UK corporation tax.

Principles for the Consolidated Statement of Cash Flows

The Consolidated Statement of Cash Flows has been drawn up according to the indirect method, separating the cash flows from operating activities, investing activities and financing activities. The net result has been adjusted for amounts in the Consolidated Statement of Comprehensive Income and movements in the Consolidated Balance Sheet which have not resulted in cash income or expenditure in the related period.

The cash amounts in the Consolidated Statement of Cash Flows include those assets that can be converted into cash without any restrictions and without any material risk of decreases in value as a result of the transaction.

3. Revenue from properties

Rents receivable have been adjusted for lease incentives recognised of £2.8 million (2021: £2.0 million).

4. Property expenses

5. Operating segments

The Board is responsible for setting the Group’s strategy and business model. The key measure of performance used by the Board to assess the Group’s performance is the total return on the Group’s net asset value. As the total return on the Group’s net asset value is calculated based on the net asset value per share calculated under IFRS as shown at the foot of the Consolidated Balance Sheet, assuming dividends are reinvested, the key performance measure is that prepared under IFRS. Therefore, no reconciliation is required between the measure of profit or loss used by the Board and that contained in the financial statements.

The Board has considered the requirements of IFRS 8 ‘Operating Segments’. The Board is of the opinion that the Group, through its subsidiary undertakings, operates in one reportable industry segment, namely real estate investment, and across one primary geographical area, namely the United Kingdom, and therefore no segmental reporting is required. The portfolio consists of 47 commercial properties, which are in the industrial, office, retail and leisure sectors.

6. Administrative expenses

7. Director and staff costs

Employees participate in two share-based remuneration arrangements: the Deferred Bonus Plan and the Long-term Incentive Plan (the ‘LTIP’).

For all employees, a proportion of any discretionary annual bonus will be an award under the Deferred Bonus Plan. With the exception of Executive Directors, awards are cash settled and vest after two years. The final value of awards is determined by the movement in the Company’s share price and dividends paid over the vesting period. For Executive Directors, awards are equity settled and also vest after two years. On 22 June 2021, awards of 531,108 notional shares were made which vest in June 2023 (2021: 599,534 notional shares). The next awards are due to be made in June 2022 for vesting in June 2024.

The table below summarises the awards made under the Deferred Bonus Plan. Employees have the option to defer the vesting date of their awards for a maximum of seven years.

The Group also has a Long-term Incentive Plan for all employees which is equity settled. Awards are made annually and vest three years from the grant date. Vesting is conditional on three performance metrics measured over each three-year period. Awards to Executive Directors are also subject to a further two-year holding period. On 22 June 2021, awards for a maximum of 1,107,155 shares were granted to employees in respect of the three-year period ending on 31 March 2024. In the previous year, awards of 860,740 shares were made on 29 June 2020 for the period ending 31 March 2023.

The three performance metrics are:

–  Total shareholder return (TSR) of Picton Property Income Limited, compared to a comparator group of similar listed companies;

–  Total property return (TPR) of the property assets held within the Group, compared to the MSCI UK Quarterly Property Index; and

–  Growth in EPRA earnings per share (EPS) of the Group.

The fair value of share grants is measured using a combination of a Monte Carlo model for the market conditions (TSR) and a Black-Scholes model for the non-market conditions (TPR and EPS). The fair value is recognised over the expected vesting period. For the awards made during this year and the previous year the main inputs and assumptions of the models, and the resulting fair values, are:

The Trustee of the Company’s Employee Benefit Trust acquired 750,000 ordinary shares during the year for £730,000 (2021: 958,000 shares for £643,000).

The Group employed nine members of staff at 31 March 2022 (2021: ten). The average number of people employed by the Group for the year ended 31 March 2022 was ten (2021: nine).

8. Interest paid

The loan arrangement costs incurred to 31 March 2022 are £3,325,000 (2021: £4,590,000). These are amortised over the duration of the loans with £967,000 amortised in the year ended 31 March 2022 and included in interest payable on loans (2021: £531,000).

9. Tax

The charge for the year is:

A reconciliation of the tax charge applicable to the results at the statutory tax rate to the charge for the year is as follows:

As a UK REIT, the income profits of the Group’s UK property rental business are exempt from corporation tax, as are any gains it makes from the disposal of its properties, provided they are not held for trading. The Group is otherwise subject to UK corporation tax at the prevailing rate.

As the principal company of the REIT, the Company is required to distribute at least 90% of the income profits of the Group’s UK property rental business. There are a number of other conditions that are also required to be met by the Company and the Group to maintain REIT tax status. These conditions were met in the year and the Board intends to conduct the Group’s affairs such that these conditions continue to be met for the foreseeable future. Accordingly, deferred tax is no longer recognised on temporary differences relating to the property rental business.

10. Dividends

The interim dividend of 0.875 pence per ordinary share in respect of the period ended 31 March 2022 has not been recognised as a liability as it was declared after the year-end. This dividend of £4,774,000 will be paid on 31 May 2022.

11. Earnings per share

Basic and diluted earnings per share is calculated by dividing the net profit for the year attributable to ordinary shareholders of the Company by the weighted average number of ordinary shares in issue during the year, excluding the average number of shares held by the Employee Benefit Trust for the year. The diluted number of shares also reflects the contingent shares to be issued under the Long-term Incentive Plan.

The following reflects the profit and share ***data*** used in the basic and diluted profit per share calculation:

12. Investments in subsidiaries

The Company had the following principal subsidiaries as at 31 March 2022 and 31 March 2021:

The results of the above entities are consolidated within the Group financial statements.

Picton UK Real Estate Trust (Property) Limited and Picton (UK) REIT (SPV) Limited own 100% of the units in Picton (UK) Listed Real Estate, a Guernsey Unit Trust (the ‘GPUT’). The GPUT holds a 99.9% interest in both Picton No 2 Limited Partnership and Picton No 3 Limited Partnership, the remaining balances are held by Picton (General Partner) No 2 Limited and Picton (General Partner) No 3 Limited respectively.

13. Investment properties

The following table provides a reconciliation of the opening and closing amounts of investment properties classified as Level 3 recorded at fair value.

The fair value of investment properties reconciles to the appraised value as follows:

The investment properties were valued by independent valuers, CBRE Limited, Chartered Surveyors, as at 31 March 2022 and 31 March 2021 on the basis of fair value in accordance with the version of the RICS Valuation – Global Standards (incorporating the International Valuation Standards) and the UK national supplement (the Red Book) current as at the valuation date. The total fees earned by CBRE Limited from the Group are less than 5% of their total UK revenue.

The fair value of the Group’s investment properties has been determined using an income capitalisation technique, whereby contracted and market rental values are capitalised with a market capitalisation rate. The resulting valuations are cross-checked against the equivalent yields and the fair market values per square foot derived from comparable market transactions on an arm’s length basis.

In addition, the Group’s investment properties are valued quarterly by CBRE Limited. The valuations are based on:

–  Information provided by the Group including rents, lease terms, revenue and capital expenditure. Such information is derived from the Group’s financial and property systems and is subject to the Group’s overall control environment.

–  Valuation models used by the valuers, including market-related assumptions based on their professional judgement and market observation.

The assumptions and valuation models used by the valuers, and supporting information, are reviewed by senior management and the Board through the Property Valuation Committee. Members of the Property Valuation Committee, together with senior management, meet with the independent valuer on a quarterly basis to review the valuations and underlying assumptions, including considering current market trends and conditions, and changes from previous quarters. The Board will also consider whether circumstances at specific investment properties, such as alternative uses and issues with occupational tenants, are appropriately reflected in the valuations. The fair value of investment properties is measured based on each property’s highest and best use from a market participant’s perspective and considers the potential uses of the property that are physically possible, legally permissible and financially feasible.

As at 31 March 2022 and 31 March 2021 all of the Group’s properties, including owner-occupied property, are Level 3 in the fair value hierarchy as it involves use of significant judgement. There were no transfers between levels during the year and the prior year. Level 3 inputs used in valuing the properties are those which are unobservable, as opposed to Level 1 (inputs from quoted prices) and Level 2 (observable inputs either directly, i.e. as prices, or indirectly, as derived from prices).

Information on these significant unobservable inputs per sector of investment properties is disclosed as follows:

An increase/decrease in ERV will increase/decrease valuations, while an increase/decrease to yield decreases/increases valuations. We have reviewed the ranges used in assessing the impact of changes in unobservable inputs on the fair value of the Group’s property portfolio and concluded these were still reasonable. The table below sets out the sensitivity of the valuation to changes of 50 basis points in yield.

14. Property, plant and equipment

Property, plant and equipment principally comprises the fair value of owner-occupied property. The fair value of these premises is based on the appraised value at 31 March 2022.

15. Accounts receivable

The estimated fair values of receivables are the discounted amount of the estimated future cash flows expected to be received and the approximate value of their carrying amounts.

Amounts are considered impaired using the lifetime expected credit loss method. Movement in the balance considered to be impaired has been included in the Consolidated Statement of Comprehensive Income. As at 31 March 2022, tenant debtors of £302,000 (2021: £1,874,000) were considered impaired and provided for.

16. Cash and cash equivalents

Cash at bank and in hand earns interest at floating rates based on daily bank deposit rates. Short-term deposits are made for varying periods of between one day and one month depending on the immediate cash requirements of the Group and earn interest at the respective short-term deposit rates. The carrying amounts of these assets approximate to their fair value.

17. Accounts payable and accruals

18. Loans and borrowings

The following table provides a reconciliation of the movement in loans and borrowings to cash flows arising from financing activities.

The Group has refinanced its existing loan facility with Canada Life increasing borrowings to £129.0 million and extending the maturity date until July 2031. Interest is now fixed at 3.25% (previously 4.08%) over the remaining life of the loan. A debt prepayment fee of £4.0 million was incurred during the year to reset the interest rate on the existing debt. The loan agreement has a loan to value covenant of 65% and an interest cover test of 1.75. The loan is secured over the Group’s properties held by Picton No 2 Limited Partnership and Picton UK Real Estate Trust (Property) No 2 Limited, valued at £415.2 million (2021: £330.0 million).

Additionally, the Group has a £95.3 million term loan facility with Aviva Commercial Finance Limited which matures in July 2032. The loan is for a term of 20 years and was fully drawn on 24 July 2012 with approximately one-third repayable over the life of the loan in accordance with a scheduled amortisation profile. The Group has repaid £1.3 million in the year (2021: £1.3 million). Interest on the loan is fixed at 4.38% over the life of the loan. The facility has a loan to value covenant of 65% and a debt service cover ratio of 1.4. The facility is secured over the Group’s properties held by Picton No 3 Limited Partnership and Picton Property No 3 Limited, valued at £208.1 million (2021: £184.9 million).

The Group also has a £50 million revolving credit facility (‘RCF’) with National Westminster Bank Plc which matures in May 2025. There is currently £4.9 million drawn under the facility, interest is charged at 150 basis points over SONIA from 20 January 2022 (previously 150 basis points over LIBOR) on drawn balances and there is an undrawn commitment fee of 60 basis points. The facility is secured on properties held by Picton UK Real Estate Trust (Property) Limited, valued at £163.2 million (2021: £131.7 million).

The fair value of the drawn loan facilities at 31 March 2022, estimated as the present value of future cash flows discounted at the market rate of interest at that date, was £225.6 million (2021: £187.2 million). The fair value of the secured loan facilities is classified as Level 2 under the hierarchy of fair value measurements.

There were no transfers between levels of the fair value hierarchy during the current or prior years.

The weighted average interest rate on the Group’s borrowings as at 31 March 2022 was 3.7% (2021: 4.2%).

19. Contingencies and capital commitments

The Group has entered into contracts for the refurbishment of six properties with commitments outstanding at 31 March 2022 of approximately £2.4 million (2021: £6.7 million). No further obligations to construct or develop investment property or for repairs, maintenance or enhancements were in place as at 31 March 2022 (2021: £nil).

20. Share capital and other reserves

The Company has 547,605,596 ordinary shares in issue of no par value (2021: 547,605,596).

No new ordinary shares were issued during the year ended 31 March 2022.

The fair value of awards made under the Long-term Incentive Plan is recognised in other reserves.

Subject to the solvency test contained in the Companies (Guernsey) Law, 2008 being satisfied, ordinary shareholders are entitled to all dividends declared by the Company and to all of the Company’s assets after repayment of its borrowings and ordinary creditors. The Trustee of the Company’s Employee Benefit Trust has waived its right to receive dividends on the 1,974,253 shares it holds but continues to hold the right to vote. Ordinary shareholders have the right to vote at meetings of the Company. All ordinary shares carry equal voting rights.

The Directors have authority to buy back up to 14.99% of the Company’s ordinary shares in issue, subject to the annual renewal of the authority from shareholders. Any buy-back of ordinary shares will be made subject to Guernsey law, and the making and timing of any buy-backs will be at the absolute discretion of the Board.

21. Adjustment for non-cash movements in the cash flow statement

22. Obligations under leases

The Group has entered into a number of head leases in relation to its investment properties. These leases are for fixed terms and subject to regular rent reviews. They contain no material provisions for contingent rents, renewal or purchase options nor any restrictions outside of the normal lease terms.

Lease liabilities in respect of rents on leasehold properties were payable as follows:

The present value of minimum lease payments is analysed as follows:

Operating leases where the Group is lessor

The Group leases its investment properties under commercial property leases which are held as operating leases.

At the reporting date, the Group’s future income based on the unexpired lease length was as follows (based on annual rentals):

These properties are measured under the fair value model as the properties are held to earn rentals. Commercial property leases typically have lease terms between five and ten years and include clauses to enable periodic upward revision of the rental charge according to prevailing market conditions. Some leases contain options to break before the end of the lease term.

23. Net asset value

The net asset value per share calculation uses the number of shares in issue at the year-end and excludes the actual number of shares held by the Employee Benefit Trust at the year-end; see Note 20.

24. Financial instruments

The Group’s financial instruments comprise cash and cash equivalents, accounts receivable, secured loans, obligations under head leases and accounts payable that arise from its operations. The Group does not have exposure to any derivative financial instruments. Apart from the secured loans, as disclosed in Note 18, the fair value of the financial assets and liabilities is not materially different from their carrying value in the financial statements.

Categories of financial instruments

25. Risk management

The Group invests in commercial properties in the United Kingdom. The following describes the risks involved and the risk management framework applied by the Group. Senior management reports regularly both verbally and formally to the Board, and its relevant committees, to allow them to monitor and review all the risks noted below.

Capital risk management

The Group aims to manage its capital to ensure that the entities in the Group will be able to continue as a going concern while maximising the return to stakeholders through optimising its capital structure. The Board’s policy is to maintain a strong capital base so as to maintain investor, creditor and market confidence and to sustain future development of the business.

The capital structure of the Group consists of debt, as disclosed in Note 18, cash and cash equivalents and equity attributable to equity holders of the Company, comprising issued share capital, reserves, retained earnings and revaluation reserve. The Group is not subject to any external capital requirements.

The Group monitors capital on the basis of its gearing ratio. This ratio is calculated as the principal borrowings outstanding, as detailed under Note 18, divided by the gross assets. There is a limit of 65% as set out in the Articles of Association of the Company. Gross assets are calculated as non-current and current assets, as shown in the Consolidated Balance Sheet.

At the reporting date the gearing ratios were as follows:

The Board of Directors monitors the return on capital as well as the level of dividends to ordinary shareholders. The Group has managed its capital risk by entering into long-term loan arrangements with different maturities, which will enable the Group to manage its borrowings in an orderly manner over the long-term. The Group also has a revolving credit facility which provides greater flexibility in managing the level of borrowings.

The Group’s net debt to equity ratio at the reporting date was as follows:

Credit risk

The following tables detail the balances held at the reporting date that may be affected by credit risk:

Credit risk refers to the risk that a counterparty will default on its contractual obligations resulting in financial loss to the Group. The Group has adopted a policy of only dealing with creditworthy counterparties and obtaining sufficient collateral where appropriate, as a means of mitigating the risk of financial loss from defaults. The Group’s exposure to and credit ratings of, its counterparties are continuously monitored and the aggregate value of transactions concluded is spread amongst approved counterparties.

Tenant debtors consist of a large number of occupiers, spread across diverse industries and geographical areas. Ongoing credit evaluations are performed on the financial condition of tenant debtors and, where appropriate, credit guarantees or rent deposits are acquired. Rent ***collection*** is outsourced to managing agents who report regularly on payment performance and provide the Group with intelligence on the continuing financial viability of occupiers. The Group does not have any significant concentration risk whether in terms of credit risk exposure to any single counterparty or any group of counterparties having similar characteristics. The credit risk on liquid funds is limited because the counterparties are banks with strong credit ratings assigned by international credit rating agencies.

The carrying amount of financial assets recorded in the financial statements, net of any allowances for losses, represents the Group’s maximum exposure to credit risk. The Board continues to monitor the Group’s overall exposure to credit risk.

The Group has a panel of banks with which it makes deposits, based on credit ratings assigned by international credit rating agencies and with set counterparty limits that are reviewed regularly. The Group’s main cash balances are held with National Westminster Bank Plc (‘NatWest’), Nationwide International Limited (‘Nationwide’) and Lloyds Bank Plc (‘Lloyds’). Insolvency or resolution of the bank holding cash balances may cause the Group’s recovery of cash held by them to be delayed or limited. The Group manages its risk by monitoring the credit quality of its bankers on an ongoing basis. NatWest, Nationwide and Lloyds are rated by all the major rating agencies. If the credit quality of any of these banks were to deteriorate, the Group would look to move the relevant short-term deposits or cash to another bank. Procedures exist to ensure that cash balances are split between banks to minimise exposure. At 31 March 2022 and at 31 March 2021, Standard & Poor’s short-term credit rating for each of the Group’s bankers were A-1.

There has been no change in the fair values of cash or receivables as a result of changes in credit risk in the current or prior periods, due to the actions taken to mitigate this risk, as stated above.

Liquidity risk

Ultimate responsibility for liquidity risk management rests with the Board, which has put in place an appropriate liquidity risk management framework for the management of the Group’s short, medium and long-term funding and liquidity management requirements. The Group’s liquidity risk is managed on an ongoing basis by senior management and monitored on a quarterly basis by the Board by maintaining adequate reserves and loan facilities, continuously monitoring forecasts, loan maturity profiles and actual cash flows and matching the maturity profiles of financial assets and liabilities for a period of at least 12 months.

The table below has been drawn up based on the undiscounted contractual maturities of the financial assets/(liabilities), including interest that will accrue to maturity.

The Group expects to meet its financial liabilities through the various available liquidity sources, including a secure rental income profile, asset sales, undrawn committed borrowing facilities and, in the longer-term, debt refinancing.

Market risk

The Group’s activities are primarily within the real estate market, exposing it to very specific industry risks.

The yields available from investments in real estate depend primarily on the amount of revenue earned and capital appreciation generated by the relevant properties as well as expenses incurred. If properties do not generate sufficient revenues to meet operating expenses, including debt service costs and capital expenditure, the Group’s operating performance will be adversely affected.

Revenue from properties may be adversely affected by the general economic climate, local conditions such as oversupply of properties or a reduction in demand for properties in the market in which the Group operates, the attractiveness of the properties to occupiers, the quality of the management, competition from other available properties and increased operating costs

In addition, the Group’s revenue would be adversely affected if a significant number of occupiers were unable to pay rent or its properties could not be rented on favourable terms. Certain significant expenditure associated with investment in real estate (such as external financing costs and maintenance costs) is generally not reduced when circumstances cause a reduction in revenue from properties. By diversifying in regions, sectors, risk categories and occupiers, senior management expects to mitigate the risk profile of the portfolio effectively. The Board continues to oversee the profile of the portfolio to ensure risks are managed.

The valuation of the Group’s property assets is subject to changes in market conditions. Such changes are taken to the Consolidated Statement of Comprehensive Income and thus impact on the Group’s net result. A 5% increase or decrease in property values would increase or decrease the Group’s net result by £42.5 million (2021: £34.1 million).

Interest rate risk management

Interest rate risk arises on interest payable on the revolving credit facility only. The Group’s senior debt facilities have fixed interest rates over the terms of the loans. The amount drawn under the revolving credit facility makes up a small proportion of the overall debt, therefore the Group has limited exposure to interest rate risk on its borrowings and no sensitivity is presented.

Interest rate risk

The following table sets out the carrying amount, by maturity, of the Group’s financial assets/(liabilities).

Concentration risk

As discussed above, all of the Group’s investments are in the UK and therefore the Group is exposed to macroeconomic changes in the UK economy. Furthermore, the Group derives its rental income from around 400 occupiers with the single largest occupier accounting for only 5.0% of the Group’s annual contracted rental income.

Currency risk

The Group has no exposure to foreign currency risk.

26. Related party transactions

The total fees earned during the year by the Non-Executive Directors of the Company amounted to £275,000 (2021: £250,000). As at 31 March 2022, the Group owed £nil to the Non-Executive Directors (2021: £nil).

Picton Property Income Limited has no controlling parties.

27. Events after the Balance Sheet date

A dividend of £4,774,000 (0.875 pence per share) was approved by the Board on 26 April 2022 and will be paid on 31 May 2022.

The Group has completed on the acquisition of one property for £13.7 million.

END

**Load-Date:** May 26, 2022

**End of Document**



[***Cadogan Petroleum Plc - Annual Financial Report***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:65B9-BB41-JB72-128B-00000-00&context=1516831)

PR Newswire UK Disclose

April 29, 2022 Friday 2:00 AM EST

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**Length:** 40693 words

**Dateline:** London, April 28

**Body**

PR Newswire

Cadogan Petroleum plc

Annual Results for year ended 31 December 2021

The Board of Cadogan Petroleum plc, (“Cadogan” or “the Company”), is pleased to announce the Company’s annual results for the year ended 31 December 2021.

Key Financial Highlights of 2021:

Loss for the year: $5.1 million (2020: loss of $1.0 million)Average realized price: $55.7 /boe (2020: $32.9/boe)Gross revenues[1]: $8.8 million (2020: $5.1 million)G&A[2]: $3.7 million (2020: $3.8 million)Loss per share: 2.1 cents (2020: loss of 0.4 cents)Cash at year end: $15.0 million (2020: $13.3 million)

Key Operational Highlights of 2021:

Production: 127,662 bbl (2020: 106,398 boe), a 20% increase year-on-yearGas trading profit of $0.6 million (2020: profit of $0.6 million)Services business loss of $0.06 million (2020: loss of $0.05 million), net of services provided to the group[3]No LTI/TRI[4]ISO 14001 and ISO 45001 certifications revalidated for a new 3-year term

Group overview

In 2021, the Group continued to maintain exploration and production assets, to conduct gas trading operations and to operate an oil services business in Ukraine. Cadogan’s assets are concentrated in the West of the country. Gas trading includes the import of gas from Slovakia, Hungary and Poland and local purchase and sales with physical delivery of natural gas. The oil services business focuses on workover operations, civil works services and other services to satisfy Cadogan intra-group operational needs.

Our business model

We aim to increase value through:

Maintaining a robust balance sheet, monetising the remaining value of our Ukrainian assets and supplementing E&P cash flow with revenues from gas trading and oil servicesPursuing farm-out to progress investments in Ukrainian licensesDiversify Cadogan’s portfolio, both geographically and operationally

Ukraine

West Ukraine

The Group continued to produce oil from its production Blazhiv license located in the West of Ukraine. Production in 2021 continued to grow. The average net production in 2021 was 350 bbl, a 20% increase over the production of the previous year and was the highest in the company’s history. This production result was achieved thanks to the full operation of the 4 wells, the optimization of the operational regimes of these wells and the successful stimulation of Blazhiv-10 well.

In March 2020 and August 2020 Usenco Nadra filed the claims with the Kyiv Administrative Court to acknowledge inaction of the State Service of Geology (SGS) as unlawful, particularly their refusal to issue the Bitlyanska 20-year exploration and development license and requested the Court to carry out commercial activities at the area effective from December 2019. This decision was taken by the subsoil controlling authority notwithstanding that Cadogan had fulfilled all license obligations, obtained all regulatory approvals and timely submitted the application on 19 August 2019 well ahead the license expiry date of 23 December 2019 and the new regulatory framework. During 2021 the claims have not been considered by the Court due to delays caused by the Covid-19 pandemic. In February 2022, the company received the information from a public register that its claim was rejected by the Court. Usenco Nadra did not receive any formal court notification of such decision. Despite the restrictions imposed by the martial law in Ukraine, Usenco Nadra exercised its right for appeal against this decision and submitted an appeal.

East Ukraine

The Pirkovska exploration license expired in October 2015. Astrogaz filed in due time an application for a new exploration and production license, but the Licensing Authority returned it 6 times for different reasons. Despite the efforts of the Company and its reply in due time to each of the comments, the license was not awarded, and the 3-year period for ***conversion*** expired in October 2018. In 2019, Astrogaz filed a claim at the Administrative Court for the non-granting of the license by the Licensing Authority. The Court of First Instance, in its decision of October 2020, partly satisfied the claim and confirmed inaction of the Licensing Authority and obliged it to review the application. Astrogaz filed a claim before the Court of Appeal proposing the license award approval. In February 2021, the Court of Appeal rejected Astrogaz claim. In December 2021, the Supreme Court, similar to the Appeal Court, rejected the claim of Astrogaz. This decision will not have any financial impact as Pirkovska license had been totally impaired before.

In 2020, LLC AstroInvest-Energy, a fully owned subsidiary of Cadogan, introduced a claim against the State fiscal authority regarding additional tax assessment and related penalties. The Company won in the Court of First Instance and in the Court of Appeal. The State fiscal authority filed an appeal with the Supreme Court. The hearing and the decision were expected during 2022.

Subsidiary businesses

Cadogan has sold the remaining 7.54 million m3 of gas during the first semester 2021.

Astroservice LLC, the oil services subsidiary, continued to support Blazhiv license wells’ operations.

Italy

The Group owns a 90% interest in Exploenergy s.r.l., an Italian company, which has filed applications for two exploration licenses (Reno Centese and Corzano), located in the Po Valley region (Northern Italy). The leads identified on these licenses have combined unrisked prospective resources estimated to be in excess of 60 bcf of gas.

In February 2019, the Italian Parliament approved a moratorium of 18 months in the award of new licenses and a 25-fold increase of license fees. Exploenergy has subsequently reduced its activity to the minimum required to fulfil its statutory obligations. It has also identified areas which can be voluntarily released in order to mitigate the impact of higher fees, when licenses are awarded, with a minimum impact on their exploration potential.

In 2020, the moratorium was extended. In February 2022, the Plan for the Sustainable Energy Transition of Suitable Areas (“PiTESAI”) was approved by the Ministry for Environmental Transition. It delivers a new framework for the possible resumption of exploration and production activities on land and at sea. Exploenergy is analysing the impact of this new regulation framework on its activities. No exploration and evaluation assets are held on the Group balance sheet in respect of the licences.

In February 2019, the Group entered in a 2-year loan agreement with Proger Management & Partners Srl (“PMP”) with an option to convert it into a 33% equity interest in Proger Ingegneria Srl which in turn held at 31 December 2020 a 75.95% equity interest in Proger Spa. Proger is an Italian engineering company providing services in Italy and in different international areas.

Cadogan did not exercise the Call Option. In February 2021, Cadogan notified PMP that according to the Loan Agreement, the Maturity Date occurred on 25 February 2021. As the Call Option was not exercised, PMP must fulfill the payment of EUR 14,857,350, being the reimbursement of the Loan in terms of principal and the accumulated interest. PMP is in default since 25 February 2021. End of March 2021, PMP requested an arbitration to have the Loan Agreement recognised as an equity investment contract, which is rejected by Cadogan as the terms of the agreement are clear and include the right to repayment at maturity if the Call Option is not exercised.

The arbitration process is going on. The investigation phase is closed. The decision of the College of Arbitrators is expected in July 2022.

Strategic Report

The Strategic Report has been prepared in accordance with Section 414A of the Companies Act 2006 (the “Act”) and presented hereunder. Its purpose is to inform stakeholders and help them assess how the Directors have performed their legal duty under Section 172 of the Act to promote the success of the Company.

Section 172 Statement

The Company’s section 172 statement is presented on page 35 and 36 and forms part of this strategic report.

Principal activity and status of the Company

The Company is registered as a public limited company (registration number 05718406) in England and Wales. Its principal activity is oil and gas exploration, development and production; the Company also conducts gas trading and provides services.

The Company’s shares have a standard listing on the Official List of the UK Listing Authority and are traded on the Main Market of the London Stock Exchange.

Key performance indicators

The Group monitors its performance through five key performance indicators (“KPIs”):

to increase oil, gas and condensate production measured on the number of barrels of oil equivalent produced per day (“boepd”);to decrease administrative expenses;to increase the Group’s basic earnings per share;to maintain no lost time incidents; andto grow geographically and operationally diversify the portfolio.

The Group’s performance in 2021 against these KPI’s is set out in the table below, together with the prior year performance ***data***.

Average production is calculated as the average daily production during the yearBasic (loss)/profit per ordinary share is calculated by dividing the net (loss)/profit for the year attributable to equity holders of the parent company by the weighted average number of ordinary shares during the yearLost time incidents relate to the number of injuries where an employee/contractor is injured and has time off work (IOGP classification)

Chairman’s Statement

Our Group is involved in Ukraine since 2007 and is considered as a real foreign investor in this country. The invasion of Ukraine by the Russian army has left us deeply saddened. This war, as any war, has brought huge suffering and destruction. All the Board stand in solidarity with the Ukrainian population.

The safety of our people is our highest priority. The Group is taking all possible actions to preserve the safety of its employees and meet their needs.

2021 remained another challenging year above any expectation. The pandemic Covid-19, that has been affecting all, and was followed by economic and social instability worldwide and in Ukraine in particular. The measures that were quickly implemented have allowed to protect our staff and keep the Group’s activities on-going. The effectiveness of these measures and the dedication of everyone have been essential to achieve this result. Moreover, the Group is proud to report zero fatalities, disabilities, or medical complications among its staff since the beginning of the pandemic.

In 2021, Cadogan continued to be committed to the territory and the communities where we operate and fully financed social programs commitment for 2021 as agreed before with the Lviv Regional Administration and the local communities.

In a highly challenging context, Cadogan has delivered on its strategy of a sustainable platform for growth. During 2021, the oil and gas markets volatility had favorable impact on oil prices. The quick response of the Group and the measures that were put in place have allowed the Group to mitigate the operational and the economic challenges. The negative impacts were contained, and improvements were brought to our activities despite the year loss.

With the ongoing war in the Country, we are expecting more uncertain times.

Despite all these challenges, the Group was able to improve its fundamentals and operate at high industry standards. This was possible thanks to the commitment of all with a competent and strong management. The Board remain focused on maximizing value from our assets and build a future for getting a profitable company with sustainable growth. Our objective remains the future diversification of our geographical presence and of our activities in sectors providing lower impacts on environment.

Michel Mee—s

Non-Independent Non-Executive Chairman

28 April 2022

Chief Executive’s Review

In 2021, the business worldwide and in Ukraine has managed to operate in the new Covid-19 volatile reality. However, the turbulence which resulted from the pandemic of corona virus has continued to affect Ukraine and Cadogan’s activities. At the same time, during 2021 we witnessed recovery of the Brent oil price exceeding $75 per bbl in December.

With the Covid-19 pandemic, it has been another challenging time for Ukraine as with other countries. The government has been repeatedly tightening restriction measures to get the virus spread under control and to mitigate Covid pandemic distribution in the country as well as to launch a vaccination plan for the population. Despite these measures, the level of fatalities caused by the virus was one of the highest in Europe.

To keep its personnel safe, the Company continued to implement strict sanitary and hygienic procedures and personal protection, constant medical supervision during the work shift, regular sanitation of cars, offices and facilities. We are proud to report zero fatalities among the staff.

While 2021 witnessed signs of recovery for the oil & gas industry, it has been another difficult year for Ukraine. The government of Ukraine continued making some progress towards the modernisation of its oil & gas legislative framework as well as in its anti-corruption measures. However, this has not yet been sufficient to create a favourable environment for the significant investments needed to increase the Country’s domestic production especially in the time of instability all over the world. At the same time high oil and gas prices have allowed to smoothen the trend of Ukraine’s production decline, mainly due to private operators’ operational activity growth.

In 2021, Ukraine pursued efforts to attract new investments, including in its oil and gas sector, by promoting incentives such as “investment nanny’s”, new areas under e-auctions and award of Production Share Agreement (PSA). However, the already existing risks of military escalation with Russian Federation and the invasion threats have been a real stopping factor for foreign investments in the oil and gas industry of Ukraine. In this uncertain context, Cadogan remained one of the few truly foreign investors operating in Ukraine’s E&P sector.

Against this challenging background, Cadogan’s operational activities performed as following:

a 20% increase in production, from 106,398 bbl in 2020 to 127,662 bbl in 2021. This allowed the Group to record in 2021 its highest net production rate of 350 bbl per day, a 3 % decrease of overhead (G&A), from $3.8 million in 2020 to $3.7 million in 2021;a challenging year for trading which generated a positive result;a robust balance sheet, with $15 million of net cash, kept mostly in the UK banks;another year without LTIs’

Core operations

Cadogan has continued to safely produce from its Blazhiv field in the West of Ukraine. Oil production has increased by 20% over the previous year. The uninterrupted production of four wells during 2021, and the optimization of the mechanical production regimes with the stimulation of Blazh-10 well, have allowed to achieve such positive results.

Regarding the Bitlyanska 20-year exploration and development license, given the delay to award the license by the State Geological Service (SGS) beyond the regular timeline provided by legislation and the further rejection of the application on the basis of the new regulatory framework that took effect on 25 February 2020, Cadogan filed two claims with the Administrative Court to acknowledge inaction of SGS as unlawful and to grant the right to carry out commercial activities on the Bitlyanska field. In February 2022 the Company received information from a public register that the claim was rejected by the Court. Usenco Nadra has not yet been formally notified by the Administrative Court of this decision. Despite the restrictions imposed by the martial law in Ukraine, Usenco Nadra exercised its right for appeal against this decision.

In the Pirkovska license notwithstanding, the Court of First Instance hearing results and partial satisfaction of LLC Astrogaz claim, the Supreme Court, similar to the Appeal Court, rejected the claim of Astrogaz in December 2021. This decision will not have a financial impact as Pirkovska license had been totally impaired before.

Operational excellence of the Group has been confirmed again by zero LTI or TRI, with a total over 1,400,000 manhours since the last incident, and the renewal of ISO 14001 & 45001 certifications for a new 3-year term.

The activity in Italy has been limited to routine housekeeping.

Non E&P operations

Cadogan sold 7,56 million m3 of gas stored. The Company continues to monitor the gas markets in Europe and Ukraine, but in light of the extreme volatilities the Company follows its prudent and low risk trading strategy.

The oil services activities were used primarily to serve the Group’s wells’ operations.

Proger

In February 2019, Cadogan used part of its cash (euros 13.385 million) to enter into a 2-year Loan Agreement with Proger Managers & Partners, together with a Call Option Agreement to convert it, subject to shareholders’ approval into a 33 % equity interest in Proger Ingegneria which in turn held, as at 31 December 2021, a 96.48% equity interest in Proger.

As at 25 February 2021, being the Maturity Date, the Call Option was not exercised and accordingly to its previous notification Cadogan demanded repayment of the Loan together with the accumulated interest which in total amounted Euro 14,857,350. After five business days, PMP was in default and asked for an additional term that ended on 19 March 2021. The terms of the Loan Agreement provide for an additional default interest of 2%. At this time, the Group reclassified the loan instrument from fair value through profit and loss to a loan at amortised cost. End of March 2021, PMP contested the default situation and the obligation to reimburse and asked for an Arbitration, according to the said Loan Agreement, to get the Loan Agreement recognized as an equity investment contract. Cadogan consider PMP’s arguments as groundless and consider that they are intended to delay PMP reimbursement obligations. The Arbitration process is ongoing. The investigation phase is closed. The decision of the College of Arbitrators is expected in July 2022.

Outlook

After several months of military confrontation, Russia invaded Ukraine on 24 February 2022. The safety of our employees is our highest priority. We are in daily close contact with them and doing all we can to ensure their safety and their essential needs.

The war is increasingly affecting the economy of Europe and exacerbating ongoing economic challenges, including issues such as rising inflation and supply-chain disruption. The degree to which the Group will be affected by them largely depends on the nature and duration of uncertain and unpredictable events, such as further military action and reactions to ongoing developments by global financial markets. At the beginning of March 2022, the Company stopped its production operations for 3 weeks and was able to resume them after having secured its employees safety, the transactions with its customers and deliveries. Starting the end of March 2022 and till the date of the report the Group is operating in due course, production operates with a full capacity, product shipments are not interrupted.

Despite all the difficulties and uncertain times, the Group has managed to successfully preserve its human, operational and financial assets. Thanks to its flexibility, the Group has been able to manage the fluctuations in commodity prices and is prepared to manage such ongoing situation. However, the delays, due to the pandemic Covid-19 and the arbitration process with PMP for the recoverability of the loan provided in 2019, have led to postpone the original plans for the business development and the diversification of our activities. The Group maintains its objectives to invest in new activities with a lower impact on environment, to continue to monitor and contain the environmental impact of its existing oil and gas activities, and to diversify geographically its presence. In the current circumstances of the war in Ukraine, its unpredictable duration and the related uncertainties impacting the general economy, our Group will continue to maintain a prudent business development approach taking into account our available resources and the economic momentum of the targeted business areas.

Fady Khallouf

Chief Executive Officer

28 April 2022

Operations Review

Overview

At 31 December 2021, in the west of Ukraine, the Group held working interests in one conventional gas, condensate and oil exploration and production license and was expecting the Court decision for the award of the new license for another one. These assets are operated by the Group and are located in the Carpathian basin in close proximity to the Ukrainian gas distribution infrastructures.

(1)  E&D = Exploration and Development

(2)  The Bitlyanska license expired on 23 December 2019 and its renewal is in the process of litigation. Usenco filed a claim at the Court of Appeal.

East Ukraine

The Pirkivska production license expired in 2015. Astrogaz applied for a new license. After several years and the end of the 3-year period allowed for ***conversion*** of the previous license, the Company initiated court proceedings to defend its rights and to challenge the Licensing Authority’s actions. As the result, the Court of First Instance has partly satisfied the claim and confirmed inaction of the Licensing Authority and obliged it to review the application. Astrogaz introduced a claim with the Court of Appeal proposing license award approval. In its decision of February 2021, the Court of Appeal rejected the Astrogaz claim.  In March 2021, the Company filed an appeal with the Supreme Court. The Supreme Court rejected the claim of Astrogaz in December 2021.

West Ukraine

E&P activity remained focused on maintaining and securing its licenses for the new term and safely and efficiently producing from the existing wells as well as implementing non-invasive production enhancement scenarios within the Blazhiv oil field.

The Bitlyanska license covers an area of 390 square kilometers. Bitlyanska, Borynya and Vovchenska are three hydrocarbon discoveries in this license area. The Borynya and Bitlya fields hold 3P reserves, contingent recoverable resources and prospective resources. Vovchenska field holds contingent recoverable resources.

Borynya 3 and Vovche-2 wells are suspended and routinely monitored. All activities in the area are temporarily on hold until the license award is granted. However, the State Geological Service failed to meet the timeline for responding to the application provided for under legislation and, subsequently rejected the application.

The Group filed to the State Geological Service an application for a 20-year production license 5 months ahead the license expiry date of 23 December 2019. The Group secured approval of the Environmental Impact Assessment study by the Ministry of Ecology, the approval of the Reserves Report by the State Commission of Reserves and the approval of the license award by the Lviv Regional Council. Given the delay to award the new license beyond the regular timeline provided by legislation, Cadogan filed two claims with the Administrative Court to challenge the non-granting of the 20-year production license by the Licensing Authority. During 2021 the claims have not been considered by the Court due to delays caused by the Covid-19 pandemic.  In February 2022 the company received information from public register that its claim was rejected by the Court of first instance. Usenco Nadra has not yet been notified. Despite the restrictions imposed by the martial law in Ukraine, Usenco Nadra exercised its right for appeal.

During 2021, the average gross oil production rated at 350bpd, which is 20% higher than in 2020 (291bpd). Such result was achieved thanks to an uninterrupted production of the four Blazhiv wells supported by optimization of their operational regimes.

In 2021 the Company conducted and completed full hydrodynamic surveys of Blazhiv-1, Blazh-3, Blazhiv-Monastyrets-3 and Blazhiv-10 wells.

For the purpose of geological construction precision of Blazhiv oil field and Monastyretska fold and also identification of new perspective structures within the license area boundary, Cadogan has launched analyses for ***data*** reprocessing and reinterpretation of old 2D seismic ***data***. Upon works completion, it is expected to receive required ***data*** for field skeleton structural and tectonic modeling.  The structural tectonic and petrophysical modeling of the area, hydrocarbons reserves & resources reassessment as well as the hydrodynamic model refining is planned to be conducted after the completion of the seismic reprocessing/ reinterpretation.

Gas trading

Cadogan thoroughly monitored EU and Ukraine gas markets evolution to define best momentum for trading in the challenging environment of 2021. In 2021, the Company sold 7.56 million m3 at favorable conditions. The Company has no gas in storage at the year ended 31 December 2021. In light of these extreme volatilities, the Company, following its prudent and low risk trading strategy, decided to monitor the appropriate time for resuming trading activity.

Service

The Group continued to provide services through its wholly owned subsidiary Astroservice LLC. The provided services were primarily focused on serving intra-group operational needs in wells’ re-entry/ repairs and stimulation operations, well surveys and field on-site activities.

Other events

After an inspection conducted by Ukraine’s tax authorities in September 2019, Astroinvest Energy LLC was notified of a tax claim related to the historic costs for the liquidation of wells on the Zagoryanska license. The tax authorities notified Astroinvest Energy LLC that they consider recoverable VAT totalling $3.6 million, that has subsequently been used to offset output VAT, to be non-deductible. They additionally consider that the subsidiary’s tax losses carry forward of $15.3 million should be reduced (note 21). Astroinvest Energy LLC has launched a claim against the tax authority’s decision based on the current tax legislation and related court decisions. The Company has won litigation in the Court of First Instance and in the Court of Appeal. The Court’s decision has come into legal force. The tax authorities filed an appeal with the Supreme Court, the decision of which is expected during 2022.

In October 2021 Cadogan has reached an agreement with Actio Law Firm (registered in Ukraine) for the sale of Ramet Holdings Limited, a wholly owned Cypriot subsidiary. This transaction has allowed to minimize related administrative costs and to optimize corporate structure.

Financial Review

Overview

In 2021, the Group increased its production by 20%, and the average realized oil price increased by 69%. As a result, E&E revenue increased significantly compared to the previous year. The Group’s operating divisions delivered a profit of $1.8 million (2020: profit of $0.5 million) (note 5) before the impairment of oil and gas assets which is recognized due to the longer dispute process on Bitlyanska license award.

The E&P business positively contributed to the financial results of the Group, due to the increase in oil prices and the increase of production volume. The average realized oil price increased by 69% from $32.9 to $55.7 per barrel. The services business focused on providing workover services to the subsidiaries of the Group. The trading business realized all stored gas in the first half and made a positive contribution to the Group’s performance.

Cash position increased to $15.0 million as at 31 December 2021 compared to $13.3 million as at 31 December 2020. This was mostly due to the sales of 7.56 mcm of natural gas which were held in inventory at the beginning of the year and the positive result of the E&P segment of business.

Income statement

Revenues from production increased from $3.5 million in 2020 to $7.0 million in 2021, reflecting a combination of an increase of the production volume from 106,398 boe in 2020 to 127,662 boe in 2021 supported by an increase in average realized prices by 69 %. E&P costs of sales increased from $3.0 million in 2020 to $5.3 million in 2021. These include production royalties and taxes, fees paid for the rented wells, depreciations, depletion of producing wells, direct staff costs and other costs for exploration and development. Overall, in 2021, E&P made a positive contribution of $1.8 million (2020: $0.4 million) to gross profit.

The oil services business in 2021 remained focused on internal activities providing its services, including drilling and workover, to the Group’s subsidiaries.

The gas trading business revenues slightly increased from $1.6 million in 2020 to $1.8 million in 2021, cost of sales decreased, from $1.4 million in 2020 to $1.1 million in 2021, resulting in an overall gross margin of $0.7 million (2020: $0.2 million).

Administrative expenses (“G&A”) remained contained with a slight decrease in 2021, note 7.

Impairment of oil and gas assets totalled $2.5 million representing the recognition of impairment of the Bitlyanska license. Impairment of other assets includes impairment of other inventories of $1.0 million (2020:nil).

The Group recognized interest on the Proger loan of $1.2 million. Refer to note 26 for details.

Net finance income of $25 thousand (2020: $40 thousand) reflects interest income on cash deposits used for trading of $68 thousand (2020: $25 thousand); ii) investment revenue of $8 thousand (2020: $37 thousand); less iii) Unwinding of discount on decommissioning provision of $23 thousand (2020: $22 thousand); iv) $28 thousand of finance expenses recognized on lease (2020: nil).

Balance sheet

Intangible Exploration and Evaluation (“E&E”) assets have been impaired to $nil (2020: $2.4 million) due to the legal dispute on the Bitlyanska license award and the uncertainty on the legal timeframe due to the ongoing war. The Property Plant & Equipment (PP&E) balance was $9.6 million at 31 December 2021 (2020: $9.9 million). It primarily represents the carrying value of the assets invested and engaged in Blazhiv license. The E&E and PP&E are held by Ukrainian subsidiaries with functional currency Ukrainian Hryvna. Ukrainian Hryvna improved its value as at 31 December 2021 compared to 31 December 2020 generating a movement in the E&E and PP&E value presented in the US Dollar.

Trade and other receivables of $0.3 million (2019: $1.6 million) include $0.1 million of recoverable VAT (2020: $1.5 million), which is expected to be recovered through production activities, and $0.2 million (2020: $0.1 million) of other receivables.

Inventories reduced from $2.2 million to $0.2 million principally due to the sale of gas volumes held in storage at 31 December 2020 and additional provision recognized on other inventories.

The Proger loan was held at amortised cost at $16.7 million (2020: $16.8 million). The loan has been reclassified as current based on the maturity in 2021 and anticipated receipt. Refer to the Chief Executives Report for further details together with note 4(d) and 26.

The $1.5 million of trade and other payables as of 31 December 2021 (2020: $1.4 million) consist of $0.6 million (2020: $0.5 million) of accrued expenses and $0.9 million (2019: $0.9 million) of other creditors.

Provisions include $0.3 million (2020: $0.2 million) of long-term provision for decommissioning costs which represents the present value of costs that are expected to be incurred in 2039 for producing assets, when the licenses will expire.

Net cash increased to $15.0 million at 31 December 2021 compared to $13.3 million at 31 December 2020. This was mostly due to the sale of 7.6 mcm of natural gas which has been at stock at the beginning of the year and supported by production result for the year 2021.

Cash flow statement

The Consolidated Cash Flow Statement on page 81 shows operating cash outflow before movements in working capital of $0.4 million (2020: outflow of $2.5 million), which represents mostly cash used by the E&P and Trading business segment net of corporate expenses.

Positive operating cash flow from movements in working capital is represented mostly by movements in inventory and VAT recoverable positions due to the sales of natural gas and oil during 2021.

Cash outflow from investing activities represents investments in Blazhiv field during the year 2021.

Related party transactions

Related party transactions are set out in note 28 to the Consolidated Financial Statements.

Treasury

The Group continually monitors its exposure to currency risk. It maintains a portfolio of cash mainly in US dollars (“USD”) and Euro held primarily in the UK. Production revenues from the sale of hydrocarbons are received in the local currency in Ukraine, however, the hydrocarbon prices are linked to the USD denominated gas and oil prices.

Risks and uncertainties

There are several potential risks and uncertainties that could have a material impact on the Group’s long-term performance and could cause the results to differ materially from expected and historical results. Executive management review the potential risks and then classify them as having a high impact, above $5 million, medium impact, above $1 million but below $5 million, and low impact, below $1 million. They also assess the likelihood of these risks occurring. Risk mitigation factors are reviewed and documented based on the level and likelihood of occurrence. The Audit Committee reviews the risk register and monitors the implementation of risk mitigation procedures via Executive management, who are carrying out a robust assessment of the principal risks facing the Group, including those potentially threatening its business model, future performance, solvency and liquidity.

The Group has analysed the following categories as key risks:

Statement of Reserves and Resources

In 2021, the company conducted routine rig-less production support activities at the Blazhiv-1, Blazhiv-3 and Blazhiv-Monastyrets-3 and Blazhiv-10 wells to maintain sustainable production using sucker rod pumping systems.

Summary ofReserves1

at 31 December 2021

1 The study was conducted in 2016 by Brend Vik.

2 The Bitlyanska license expired on 23 December 2019 and its renewal is in the process of litigation.

In addition to the tabled reserves, Cadogan has 0.6 million boe of contingent resources associated with the Blazhiv licence.

Corporate Responsibility

Under Section 414C of the Companies Act 2006 (the “Act”), the Board is required to disclose information about environmental matters, employees, human rights and community issues, including information about any policies it has in relation to these matters and the effectiveness of these policies.

Being sustainable in our activities means conducting our business with respect for the environment and for the communities hosting us, with the aim of increasing the benefit and value to our stakeholders. We recognize that this is a key element to be competitive and to maintain our license to operate.

The Board recognizes that the protection of the health and safety of its employees, the communities and the environment in which it operates is not just an obligation but is part of the personal ethics and beliefs of management and staff. These are the key drivers for a sustainable development of the Company’s activity. Cadogan Petroleum, its management and employees are committed to continuously improve Health, Safety and Environment (HSE) performance; follow our Code of Ethics and apply, in conducting our operations, internationally recognized best practices and standards.

Our activities are carried out in accordance with a policy manual, endorsed by the Board, which has been disseminated to all staff. The manual includes a Working with Integrity policy and policies on business conduct and ethics, anti-bribery, the acceptance of gifts and hospitality and whistleblowing. Such policies are subject to regular review.

In August 2018, Cadogan Ukraine LLC obtained ISO 14001 and ISO 45001 certifications for the following scope: “Supervision, coordination, management support, control in the field of oil and gas on-shore exploration and production.” This provides formal recognition of the process embedded in the Company and demonstrates the commitment and efforts delivered by our employees and management. It is considered a baseline to continue with the efforts to improve the way we conduct the business.

The Board believes that health and safety procedures and training across the Group should be in line with best practice in the oil and gas sector. Accordingly, it has set up a committee to review and agree on the health and safety initiatives for the Company and to report back to the Board on the progress of these initiatives. Management regularly reports to the Board on HSE and key safety and environmental issues, which are discussed at the Executive Management level. The report of the Health, Safety and Environment Committee can be found on page 40 to 41.

The General Director of Cadogan Ukraine is the acting Chairman of the HSE Committee and is supported in his role by Cadogan Ukraine’s HSE Manager. In accordance with the ISO 14001 and ISO 45001, his role is to ensure that the Group continuously develops suitable procedures, that operational management and their teams incorporate them into daily operations and that the HSE management has the necessary level of autonomy and authority to discharge their duties effectively and efficiently.

Health, safety and environment

2021 was still challenging with COVID-19 pandemic. Cadogan applied special measures to mitigate the risk of personnel infection with the virus. All personnel have been instructed on the situation, remote access to the working environment has been settled for all office personnel to restrict contacts to minimum, field personnel are provided with transfer to the oil field, all personnel are provided with respirators and antiseptics, temperature control is performed before the start of each working day for all personnel who does not work remotely. Besides, the Company is putting maximum efforts to ensure reasonable vaccination level of the staff

The HSE management monitors health status of the personnel daily. Up to now, 15 employees of the company have been infected by Covid-19 during 2021. All of them have fully recovered.

The Group has implemented an integrated HSE management system in accordance with the ISO requirements. The system aims to ensure that a safe and environmentally friendly/protection culture is embedded in the organization with a focus on the local community involvement. The HSE management system ensures that both Ukrainian and international standards are met, with the Ukrainian HSE legislation requirements taken as an absolute minimum. All the Group’s local operating companies actively participate in the process. ISO 14001 and ISO 45001 certification were re-validated by the respective authority in July 2020.

A proactive approach based on a detailed induction process and near miss reporting has been in place throughout 2021 to prevent incidents. Staff training on HSE matters and discussions on near miss reporting are recognized as the key factors to continuously improve. In-house training is provided to help staff meet international standards and follow best practice. The process enacted by the certification, enhances attention to training on risk assessments, emergency response, incident prevention, reporting and investigation, as well as emergency drills regularly run-on operations’ sites and offices. This process is essential to ensure that international best practices and standards are maintained to comply with, or exceed, those required by Ukrainian legislation, and to promote continuous improvement.

The Board monitors the main Key Performance Indicators (lost time incidents, mileage driven, training received, CO2 emissions) as business parameters. The Board has benchmarked safety performance against the HSE performance index measured and published annually by the International Association of Oil and Gas Producers. In 2021, the Group recorded over 155,000 man-hours worked with no incidents and over 1,400,000 hours have been worked since the last injury in February 2016.

During 2021 the Group continued to monitor its greenhouse gas emissions and ***collect*** statistical ***data*** relating to the consumption of electricity, industrial water and fuel consumption by cars, plants and other work sites, recording a continuous improvement in the efficient use of resources.

Employees

Wellness and professional development are part of the Company’s sustainable development policy and wherever possible, local staff are recruited. The Group’s activity in Ukraine is entirely managed by local staff. Qualified local contractors are engaged to supplement the required expertise when and to the extent it is necessary.

Procedures are in place to ensure that recruitment is undertaken on an open, transparent and fair basis with no discrimination against applicants. Each operating company has its own Human Resources function to ensure that the Group’s employment policies are properly implemented and followed. The Group’s Human Resources policy covers key areas such as equal opportunities, wages, overtime and non-discrimination. As required by Ukrainian legislation, ***Collective*** Agreements are in place with the Group’s Ukrainian subsidiary companies, which outline agreed level of staff benefits and other safeguards for employees.

All staff are aware of the Group’s grievance procedures. All employees have access to health insurance provided by the Group to ensure that all employees have access to adequate medical facilities.

Each employee’s training needs are assessed on an individual basis to ensure that their skills are adequate to support the Group’s operations, and to help them to develop.

Diversity

The Board recognizes the benefits and importance of diversity (gender, ethnic, age, sex, disability, educational and professional backgrounds, etc.) and strives to apply diversity values across the business.  We endeavour to employ a skilled workforce that reflects the demographic of the jurisdictions in which we operate. The board will review the existing policies and intends to develop a diversity policy.

Gender diversity

The Board of Directors of the Company comprised of five Directors as of 31 December 2021. The appointment of any new Director is made based on merit. See pages 23 and 24 for more information on the composition of the Board.

As at 31 December 2021, the Company comprised a total of 78 persons, as follows:

Human rights

Cadogan’s commitment to the fundamental principles of human rights is embedded in our HSE policies and throughout our business processes. We promote the core principles of human rights pronounced in the UN Universal Declaration of Human Rights and our support for these principles is embedded throughout our Code of Conduct, our employment practices and our relationships with suppliers and partners wherever we do business.

Community

The Group’s activities are carried out in rural areas of Ukraine and the Board is aware of its responsibilities to the local communities in which it operates and from which some of the employees are recruited. In our operational sites, management work with the local councils to ensure that the impact of operations is as low as practicable by putting in place measures to mitigate their effect. Projects undertaken include improvement of the road infrastructure in the area, which provides easier access to the operational sites while at the same time minimizing inconvenience for the local population and allowing improved road communications in the local communities, especially during winter season or harsh weather conditions. Specific community activities are undertaken for the direct benefit of local communities. All activities are followed and supervised by managers who are given specific responsibility for such tasks.

The Group’s companies in the Ukraine see themselves as part of the community and are involved and offer practical help and support. All these activities are run in accordance with our “Working with Integrity” policy and procedures. The recruitment of local staff generates additional income for areas that otherwise are predominantly dependent on the ***agricultural*** sector.

The enactment in 2018 of new legislation which introduces Environmental Impact Assessment studies and public hearings as part of the license’s award/renewal processes was anticipated effectively by the Group. The Group is complying with these requirements, building on the recognized competence of its people and advisors as well as on the good communication and relations established with local communities.

Cadogan is committed to the territory and the communities where it operates and has fully financed social programs commitment for 2021 as per signed Memorandum between the Company, Lviv Regional Administration and local communities in 2019

In 2020, the Group’s operating locations were suffering from levels of COVID-19 infection and normal working patterns have been disrupted. The national and local governments in all regions are recommending and implementing restrictions to manage the situation. The Group is following all the recommendations and provides comprehensive measures inside the Group to restrict COVID-19 infection and spread.

As part of its commitment to the local communities in which it operates, the Group provided sanitary material to local medical institution to sustain the efforts to contain the Covid-19 pandemic on the territory.

Approval

The Strategic Report was approved by the Board of Directors on 28 April 2022 and signed by order of the Board by:

Ben Harber

Company Secretary

28 April 2022

Board of Directors

Current directors

Michel Mee—s, 69, Belgian

Non-Independent non-executive Chairman

Mr Mee—s was appointed as a Non-executive Director on 23 June 2014. Mr. Mee—s was former Chairman of the Board of Directors of Theolia, an independent international developer and operator of wind energy projects. Since 2007, he has been a director within the Alcogroup SA Company (which gathers the ethanol production units of the Group), as well as within some of its subsidiaries. Before joining Alcogroup, Mr Mee—s carved out a career in the financial sector, at Chase Manhattan Bank in Brussels and London, then at Security Pacific Bank in London, then finally at Electra Kingsway Private Equity in London.

Mr Meeus is currently Chairman of the Remuneration and Nomination Committees.

Fady Khallouf, 61, French

Chief Executive Officer

Fady Khallouf was appointed as Director and CEO on 15 November 2019. He has a 35-year experience in the energy, the environment, the engineering and the infrastructure sectors. He has previously held the position of CEO and CFO of FUTUREN (Renewable Energy, listed on Euronext Paris) where he achieved the restructuring and the turnaround of the group. Prior to that, he was the CEO of Tecnimont group (Petrochemicals and Oil & Gas), the Vice-President Strategy and Development of EDISON group (Electricity and Gas, E&P), the Head of M&A of EDF group (Energy). Fady Khallouf had beforehand held various management positions at ENGIE (Energy), Suez (Environmental Services), and DUMEZ (Construction and Infrastructures).

Lilia Jolibois, 57, American

Independent non-Executive Director

Lilia Jolibois was appointed as Director on 15 November 2019. She is currently a member of three Boards: Cadogan Petroleum Plc, INSEAD Foundation, and CARA (UK and Wales). She is also a Venture and CEO Advisor at Loyal Venture Capital, a global VC fund. Her career spans Merrill Lynch Investment Banking, Sara Lee, and Lafarge in the USA and Europe. At Lafarge Group, Ms. Jolibois served in numerous positions in finance, strategy, business development, CEO and Chair of the Board for Lafarge Cement and Gypsum in Ukraine, and SVP and Chief Marketing-Sales-Supply Chain Officer for Lafarge Aggregates, Asphalt & Paving.

Lilia is currently Chairman of the Company’s Audit Committee and a member of the Remuneration and Nomination Committees.

Jacques Mahaux, 70, Belgian

Non-Executive Director

Jacques Mahaux was appointed as Director on 15 November 2019. He is currently the partner and manager of EKHMA sarl and its permanent representative in the Boards of Directors of OREA CAPITAL SA and AUREUS ARS ET SCIENTIA asbl. He has held various executive and directorship positions in Group Crédit Agricole in Luxembourg, CA Indosuez, Indosuez Bank and various Luxembourg and Swiss Holding companies active in industrial sectors.  Previously he acted as an Attorney at Law at the Brussels Bar. He is a former Supervisory Board member and President of the Audit Committee of ETAM SCA.

Mr Mahaux is currently a member of the Audit, Remuneration and Nomination Committees.

Gilbert Lehmann, 76, French

Senior Independent Non-Executive Director

Mr Lehmann was appointed to the Board on 18 November 2011. He was an adviser to the Executive Board of Areva, the French nuclear energy business, having previously been its Deputy Chief Executive Officer responsible for finance. He is also a former Chief Financial Officer and deputy CEO of Framatone, the predecessor to Areva, and was CFO of Sogee, part of the Rothschild Group. Mr Lehmann was also Deputy Chairman and Chairman of the Audit Committee of Eramet, the French minerals and alloy business. He is Deputy Chairman and Audit Committee Chairman of Assystem SA, the French engineering and innovation consultancy. He was Chairman of ST Microelectronics NV, one of the world’s largest semiconductor companies, from 2007 to 2009, and stepped down as Vice Chairman in 2011.

Mr Lehmann is currently a member of the Remuneration and Nomination Committees.

Report of the Directors

Directors

The Directors in office during the year and to the date of this report are as shown below:

Directors’ re-election

The Board has decided previously that all Directors are subject to annual election by shareholders, in accordance with industry best practice and as such, all Directors will be seeking re-election at the Annual General Meeting to be held on 24 June 2022.

The biographies of the Directors in office at the date of this report are shown on pages 23 and 24.

Appointment and replacement of Directors

The Company’s Articles of Association allow the Board to appoint any individual willing to act as a Director either to fill a vacancy or act as an additional Director. The appointee may hold office only until the next annual general meeting of the Company whereupon his or her election will be proposed to the shareholders.

The Company’s Articles of Association prescribe that there shall be no fewer than three Directors and no more than fifteen.

Directors’ interests in shares

The beneficial interests of the Directors in office at 31 December 2021 and their connected persons in the Ordinary shares of the Company at 31 December 2021 are set out below.

Conflicts of Interest

The Company has procedures in place for managing conflicts of interest. Should a director become aware that they, or any of their connected parties, have an interest in an existing or proposed transaction with the Company, its subsidiaries or any matters to be discussed at meetings, they are required to formally notify the Board in writing or at the next Board meeting. In accordance with the Companies Act 2006 and the Company’s Articles of Association, the Board may authorize any potential or actual conflict of interest that may otherwise involve any of the directors breaching his or her duty to avoid conflicts of interest. All potential and actual conflicts approved by the Board are recorded in register of conflicts, which is reviewed by the Board at each Board meeting.

Directors’ indemnities and insurance

The Company’s Articles of Association provide that, subject to the provisions of the Companies Act 2006, all Directors of the Company are indemnified by the Company in respect of any liability incurred in connection with their duties, powers or office. Save for such indemnity provisions, there are no qualifying third-party indemnity provisions. In addition, the Company continues to maintain Directors’ and Officers’ Liability Insurance for all Directors who served during the year.

Powers of Directors

The Directors are responsible for the management of the business and may exercise all powers of the Company subject to UK legislation and the Company’s Articles of Association, which includes powers to issue or buy back the Company’s shares given by special resolution. The authorities to issue and buy back shares, granted at the 2021 Annual General Meeting, remains unused.

Dividends

The Directors do not recommend payment of a dividend for the year ended 31 December 2021 (2020: nil).

Principal activity and status

The Company is registered as a public limited company (registration number 05718406) in England and Wales. The principal activity and business of the Company is oil and gas exploration, development and production.

Subsequent events

In February 2022, Usenco Nadra received information from a public register that its claim was rejected by the Court of first instance. Despite the restrictions imposed by the martial law in Ukraine, Usenco Nadra exercised its right for appeal. As a result and given the present uncertainty on the process and decision timing due to the ongoing war, the Group recognized impairment on the full balance sheet value of E&E assets in an amount of $2.5 million.

After several months of military confrontation, Russia invaded Ukraine on 24 February 2022. The war is increasingly affecting the economy of Europe and exacerbating ongoing economic challenges, including issues such as rising inflation and supply-chain disruption. The degree to which the Group will be affected by them largely depends on the nature and duration of uncertain and unpredictable events, such as further military action and reactions to ongoing developments by global financial markets. At the beginning of March 2022, the Company stopped its production operations for 3 weeks and was able to resume them after having secured its employees safety, the transactions with its customers and deliveries. Starting the end of March 2022 and till the date of the report the Group is operating in due course, production operates with a full capacity, product shipments are not interrupted.

Structure of share capital

The authorized share capital of the Company is currently £30,000,000 divided into 1,000,000,000 Ordinary shares of 3 pence each. The number of shares in issue as at 31 December 2021 was 244,128,487 Ordinary shares (each with one vote) with a nominal value of £7,323,854.61. The total number of voting rights in the Company is 244,128,421. The Companies (Acquisition of Own Shares) (Treasury Shares) Regulations 2003 allow companies to hold shares in treasury rather than cancel them. Following the consolidation of the issued capital of the Company on 10 June 2008, there were 66 residual Ordinary shares, which were transferred to treasury. No dividends may be paid on shares whilst held in treasury and no voting rights attached to shares held in treasury.

Rights and obligations of Ordinary shares

In accordance with applicable laws and the Company’s Articles of Association, holders of Ordinary shares are entitled to:

receive shareholder documentation including the notice of any general meeting;attend, speak and exercise voting rights at general meetings, either in person or by proxy; anda dividend where declared and paid out of profits available for such purposes. On a return of capital on a winding up, holders of Ordinary shares are entitled to participate in such a return.

Exercise of rights of shares in employee share schemes

None of the share awards under the Company’s incentive arrangements are held in trust on behalf of the beneficiaries.

Agreements between shareholders

The Board is unaware of any agreements between shareholders, which may restrict the transfer of securities or voting rights.

Restrictions on voting deadlines

The notice of any general meeting of the Company shall specify the deadline for exercising voting rights and appointing a proxy or proxies to vote at a general meeting. To accurately reflect the views of shareholders, where applicable it is the Company’s policy at present to take all resolutions at any general meeting on a poll. Following the meeting, the results of the poll are released to the market via a regulatory news service and published on the Company’s website.

Substantial shareholdings

As at 31 December 2021 and 21 April 2022, being the last practicable date, the Company had been notified of the following interests in voting rights attached to the Company’s shares:

Amendment of the Company’s Articles of Association

The Company’s Articles of Association may only be amended by way of a special resolution of shareholders.

Disclosure of information to auditor

As required by section 418 of the Companies Act 2006, each of the Directors as at 28 April 2022 confirms that:

(a) so far as the Director is aware, there is no relevant audit information of which the Company’s auditor is unaware; and

(b) the Director has taken all the steps that he ought to have taken as a Director in order to make himself aware of any relevant audit information and to establish that the Company’s auditor is aware of that information.

Going concern

The Group’s business activities, together with the factors likely to affect its future development, performance and position, are set out on pages 14 to 17.

Having considered the Company’s financial position and its principal risks and uncertainties, including uncertainties regarding the war in Ukraine and the assessment of potential risks associated with Covid-19 including a) restrictions applied by governments, illness amongst our workforce and disruption to supply chain and sales channels; and b) market volatility in respect of commodity prices associated with Covid-19 in addition to geopolitical factors, the Directors have a reasonable expectation that the Company and the Group have adequate resources to continue in operational existence for the foreseeable future. Accordingly, they continue to adopt the going concern basis in preparing the Consolidated and Company Financial Statements.

Reporting year

The reporting year coincides with the Company's fiscal year, which is 1 January 2021 to 31 December 2021.

Financial risk management objectives and policies

The Company’s financial risk management objectives and policies including its policy for managing its exposure of the Company to price risk, credit risk, liquidity risk and cash flow risk.

Management co-ordinates access to domestic and international financial markets and monitors and manages the financial risks relating to the operations of the Group in Ukraine through internal risks reports, which analyse exposures by degree and magnitude of risks. These risks include commodity price risks, foreign currency risk, credit risk, liquidity risk and cash flow interest rate risk. The Group does not enter into or trade financial instruments, including derivative financial instruments, for speculative purposes.

Outlook

Future developments in the business of the Company are presented on page 9.

Change of control – significant agreements

The Company has no significant agreements containing provisions, which allow a counterparty to alter and amend the terms of the agreement following a change of control of the Company.

Should a change in control occur then certain Executive directors are entitled to a payment of salary and benefits for a period of six months.

Streamlined energy and carbon reporting

This section contains information on greenhouse gas (“GHG”) emissions required by the Companies Act 2006 (Strategic Report and Directors' Report).

 Methodology

The principal methodology used to calculate the emissions is drawn from the ‘Environmental Reporting Guidelines: including mandatory greenhouse gas emissions reporting guidance (June 2013)’, issued by the Department for Environment, Food and Rural Affairs (“DEFRA”) and DEFRA GHG ***conversion*** factors for company reporting were utilised to calculate the CO2 equivalent of emissions from various sources (2018 update). Also, the used methodology was also updated based on methods proposed by DNV GL and in of GHG emissions Inventory referring to the following guidelines and international standards.

The Company has reported on all the emission sources required under the Regulations.

The Company does not have responsibility for any emission sources that are not included in its consolidated statement.

Consolidation approach and organisation boundary

An operational control approach was used to define the Company's organisational boundary and responsibility for GHG emissions. All material emission sources within this boundary have been reported upon, in line with the requirements of the Regulations.

Scope of reported emissions

Emissions ***data*** from the sources within Scope 1 and Scope 2 of the Company's operational boundaries is detailed below. This includes direct emissions from assets that fall within the Company’s organisational boundaries (Scope 1 emissions), as well as indirect emissions from energy consumption, such as purchased electricity and heating (Scope 2 emissions).

Scope 1 emissions in 2021 increased compared to the previous year (13,063 tons in 2021 vs 7,720 tons in 2020). This was caused by the increase of production in 2021 and increase of the gas factor in the produced oil.

Conversely, Scope 2 emissions decreased in 2021 (137 tons in 2021 vs 143 tons in 2020), as a result of the processes started in 2016 to improve the efficiency of the structure, logistic and facilities. Total emissions in 2021 were 13,200 tons versus the 7,863 tons of 2020.

Intensity ratio

In order to express the GHG emissions in relation to a quantifiable factor associated with the Company's activities, wellhead production of crude oil and natural gas has been chosen as the normalisation factor for calculating the intensity ratio. This will allow comparison of the Company’s performance over time, as well as with other companies in the Company’s peer group.

The intensity ratio for E&P operations (same reporting perimeter) increased to 103,4 tons CO2e/Kboe in 2021 vs 73,9 tons CO2e/Kboe in 2020.

Total greenhouse gas emissions ***data*** for the year from 1 January to 31 December

Energy consumption

The Company started in 2020 to monitor energy consumption in KwH.

Energy consumption in the UK is immaterial.

2022 Annual General Meeting

The 2022 Annual General Meeting (“AGM”) of the Company provides an opportunity to communicate with shareholders and the Board welcomes their participation. Board members constantly strive to engage with shareholders on strategy, governance and a number of other issues.

The Board looks forward to welcoming shareholders to the AGM.  The AGM notice will be issued to shareholders well in advance of the meeting with notes to provide an explanation of all resolutions to be put to the AGM. In addition, shareholder information will be enclosed as usual with the AGM notice to facilitate voting and feedback in the usual way.

The Chairman of the Board and the members of its committees will be available to answer shareholder questions at the AGM. All relevant shareholder information including the annual report for 2021 and any other announcements will be published on our website –[*http://www.cadoganpetroleum.com*](http://www.cadoganpetroleum.com).

This Report of Directors comprising pages 25 to 30 has been approved by the Board and signed by the order of the Board by:

Ben Harber

Company Secretary

28 April 2022

Corporate Governance Statement

This Corporate Governance Statement forms part of the Directors’ Report

As a Company listed on the standard segment of the London Stock Exchange it is not required to apply a specific corporate governance code and, given its size, has elected not to do so. However, the Board of the Company is committed to the highest standards of corporate governance and believe that the 2018 UK Corporate Governance Code (“the Code”) issued by the Financial Reporting Council (“FRC”) and believes that the Code provides a suitable benchmark for the Company’s corporate governance framework. This Statement outlines how Cadogan Petroleum plc (“Cadogan” or the “Company”) has applied the relevant principles of the Code and complied with its provisions.

This Statement outlines how Cadogan Petroleum plc (“Cadogan” or the “Company”) has applied the relevant principles of the Code and complied with its provisions.

During the year under review, the Company complied with all the provisions of the Code, other than the exceptions noted below or elsewhere in this statement:

Provision 5 (Workforce Engagement): Given the size of the business, the Board does not consider it appropriate to adopt the suggested methods outlined within the UK Corporate Governance Code 2018 to engage with its employees given the size of the Company. Employee engagement continues to be undertaken by senior management and any issues are escalated to the Board through the Chief Executive Officer. The Board believes that the arrangements in place are effective but will continue to keep this under review.Provision 9 (regarding the independence criteria of the Chair on appointment): Under the 2018 Corporate Governance Code, the Company’s Chair, Mr Michel Mee—s, is not considered to be independent given the size of his shareholding in the Company. Despite this, the Board considers Mr Mee—s to be independent in character, mindset and judgement.Provision 21 (Board Evaluation): Given the size of the Board it was felt that a board evaluation would not provide added value however the Board will continue to assess this provision periodically. Provision 24 (Audit Committee Composition): Given the size of the Board, the Audit Committee does not totally consist of independent non-executive directors. Ms Lilia Jolibois, Independent non-executive director, chairs the Audit Committee whilst Mr Jacques Mahaux, non-executive director, is a member of the Audit Committee.Provision 32 (Remuneration Committee Composition): Given the size of the Board, the Audit Committee does not totally consist of independent non-executive directors. The Remuneration Committee consists of Mr Michel Mee—s, Ms. Lilia Jolibois, Mr Jacques Mahaux and Mr Gilbert Lehmann.

Board Leadership and Company Purpose

The Board provides leadership and oversight, and its role is to ensure the long-term success of the Company by implementing the Company’s strategy and business plan, overseeing its affairs, and providing constructive challenge to management as they do this. In addition to this, the Board oversees financial matters, governance, internal controls and risk management. The purpose of the Board is to:

monitor Group activities to see that sustainable value is being created;evaluate business strategies and monitor their implementation;monitor and review the performance of management;provide accountability to shareholders through appropriate reporting and regulatory compliance;understand and ensure the management of operational business and financial risks to which the Group is exposed; andensure that the financial controls and systems of risk management are robust and defensible

The Board comprises a Non-Independent non-executive Chairman, Chief Executive Officer, two Independent Non-Executive Directors and a non-executive Director. The Board has appointed Mr Lehmann as the Senior Independent Director.

The biographical details for each of the Directors and their membership of Committees are incorporated into this report by reference and appear on pages 23 to 24.

The formal schedule of matters reserved for the Board’s decision is available on the Company’s website.

The Board recognises the importance of building strong relationships with stakeholders and understanding their views in order to help the Company deliver its strategy and promote the development of the business over the long-term. The Board is committed to having effective engagement with its stakeholders. Our section 172 statement can be found on pages 35 to 36 which summarises the Board’s engagement with the Company’s main stakeholders and some examples of how their views have been taken into account in the Board’s decision-making.

The Company seeks to ensure that it always acts lawfully, ethically and with integrity. The Company has in place the following policies which the Board reviews periodically:

Code of Business Conduct and EthicsAnti-Bribery PolicyShare Dealing CodeDisclosure PolicyHealth, Safety and Environmental policies.

The Company has procedures in place for managing conflicts of interest. Should a director become aware that they, or any of their connected parties, have an interest in an existing or proposed transaction with the Company, its subsidiaries or any matters to be discussed at meetings, they are required to formally notify the Board in writing or at the next Board meeting. In accordance with the Companies Act 2006 and the Company’s Articles of Association, the Board may authorize any potential or actual conflict of interest that may otherwise involve any of the directors breaching his or her duty to avoid conflicts of interest. All potential and actual conflicts approved by the Board are recorded in register of conflicts, which is reviewed by the Board at each Board meeting.

Directors’ declarations of interests is a regular Board agenda item. A register of directors’ interests (including any actual or potential conflicts of interest) is maintained and reviewed regularly to ensure all details are kept up to date. Authorisation is sought prior to a director taking on a new appointment or if any new conflicts or potential conflicts arise. New Directors are required to declare any conflicts, or potential conflicts, of interest to the Board at the first Board meeting after his or her appointment. The Board believes that the procedures established to deal with conflicts of interest are operating effectively.

Division of Responsibilities

The Directors possess a wide range of skills, knowledge and experience relevant to the strategy of the Company, including financial, legal, governance, regulatory and industry experience as well as the ability to provide constructive challenge to the views and actions of executive management in meeting agreed strategic goals and objectives.

The roles and responsibilities of the Chairman and Chief Executive Officer are separate with a clear and formal division of each individual’s responsibilities, which has been agreed and documented by the Board.

The Non-Executive Directors bring an independent view to the Board’s discussions and the development of its strategy. Their range of experience ensures that management’s performance in achieving the business goals are challenged appropriately. Two Non-Executive Directors, Ms Lilia Jolibois, and Mr Gilbert Lehmann are considered by the Board to be independent. Mr Gilbert Lehmann, Senior Independent non-executive Director, has served on the Board for longer than 9 years since his appointment, the board is of the view that he retains his independent judgement and continues to make a valuable contribution to the board.

Mr Michel Mee—s, who is a significant shareholder and Mr Jacques Mahaux are not considered independent as defined within the UK Corporate Governance Code 2018, however the Board believes they are independent in character and judgement and free from relationships or circumstances that could affect their judgement.

The Board has access to the advice of the company secretary.

Composition, Succession and Evaluation

The Company has established a nomination committee which leads the process for Board appointments by identifying and nominating candidates for the approval of the Board to fill Board vacancies and making recommendations to the Board on Board’s composition and balance. The Company’s Nomination Committee Report can be found on pages 42 to 43.

Under the Company’s Articles of Association, all Directors must seek re-election by members at least once every three years. However, the Board has agreed that all Directors will be subject to annual election by shareholders in line with Corporate Governance best practice. Accordingly, all members of the Board will be standing for re-election at the 2022 Annual General Meeting due to be held on 24 June 2022.

All Directors continue to be effective and have sufficient time available to perform their duties. The letters of appointment for the Non-Executive Directors are available for review at the Registered Office and prior to the Annual General Meeting. Each of the Non-Executive Directors independently ensures that they update their skills and knowledge sufficiently to enable them to fulfil their duties appropriately.

The Chairman, in conjunction with the Company Secretary, plans the programme for the Board during the year. While no formal structured continuing professional development program has been established for the non-executive Directors, every effort is made to ensure that they are fully briefed before Board meetings on the Company’s business. The agenda for Board and Committee meetings are considered by the relevant Chairman and issued with supporting papers during the week preceding the meeting. For each Board meeting, the Directors receive a Board pack including management accounts, briefing papers on commercial and operational matters and major capital projects including acquisitions. The Board also receives briefings from key management on specific issues.

Audit, Risk and Internal Control

The Board has delegated certain responsibilities to its committees including its audit committee. The Company’s Audit Committee Report can be found on pages 37 to 39.

The role of the Audit Committee is to monitor the integrity of the Company’s financial reporting, to review the Company’s internal control and risk management systems and to oversee the relationship with the Group’s external auditors. The Audit Committee focuses particularly on compliance with legal requirements, accounting standards and the rules of the Financial Services Authority. The Audit Committee will meet at least three times a year with further meetings that are determined by the committee. Any member of the committee or the external auditors may request any additional meetings they consider necessary.

The Directors are responsible for the Group’s system of internal control and for maintaining and reviewing its effectiveness. The Group’s systems and controls are designed to safeguard the Group’s assets and to ensure the reliability of information used both within the business and for publication. The Board has delegated responsibility for the monitoring and review of the Group’s internal controls to the Audit Committee.

Systems are designed to manage, rather than eliminate the risk of failure to achieve business objectives and can provide only reasonable, and not absolute assurance against material misstatement or loss.

The key features of the Group’s internal control and risk management systems that ensure the accuracy and reliability of financial reporting include clearly defined lines of accountability and delegation of authority, policies and procedures that cover financial planning and reporting, preparing consolidated financial statements, capital expenditure, project governance and information security.

The key features of the internal control systems, which operated during 2021 and up to the date of signing the Financial Statements are documented in the Group’s Corporate Governance Policy Manual and Finance Manual. These manuals and policies have been circulated and adopted throughout the Group throughout the period.

Day-to-day responsibility for the management and operations of the business has been delegated to the Chief Executive Officer and senior management. Certain specific administrative functions are controlled centrally. Taxation and treasury functions report to the Group Director of Finance who reports directly to the Chief Executive Officer.

The legal function for Ukraine’s related assets and activities is managed by the General Counsel, who reports to the General Director of Cadogan Ukraine. The Health, Safety and Environment functions report to the Chairman of the HSE Committee, the HSE Committee Report can be found on pages 40 to 41. The Group does not have an internal audit function. Due to the small scale of the Group’s operations at present, the Board does not feel that it is appropriate or economically viable to have an internal audit function in place, however this will be kept under review by the Audit Committee on an annual basis.

The Board has reviewed internal controls and risk management processes, in place from the start of the year to the date of approval of this report. During the course of its review the Board did not identify nor were advised of any failings or weaknesses which it has deemed to be significant.

A summary of the principal risks facing the Company and the mitigating actions in place are contained on pages 14 to 17 of the annual report.

The Company’s going concern is contained on page 28 of the annual report.

Further information on the work undertaken by the Committee during the year can be found on pages 36 to 37 of the annual report.

Remuneration

The Board has established a Remuneration Committee and the Company’s Remuneration Committee Report can be found on pages 45 to 66 of the annual report.

The role of the Remuneration Committee is to determine and agree with the Board the broad policy for the remuneration of executives and Senior Managers as designated, as well as for setting the specific remuneration packages, including pension rights and any compensation payments of all executive Directors and the Chairman. The Company’s remuneration policies and practices are designed to support its long-term strategy and promote the long-term sustainable success of the Company.

Attendance at Meetings

Six Board meetings took place during 2021. The attendance of those Directors in place at the year end at Board and Committee meetings during the year was as follows:

Responsibilities and membership of Board Committees

The Board has agreed written terms of reference for the Nomination Committee, Remuneration Committee, Audit Committee and HSE committee. The terms of reference for the Board Committees are published on the Company’s website,[*http://www.cadoganpetroleum.com*](http://www.cadoganpetroleum.com), and are also available from the Company Secretary at the Registered Office. A review of the Committees including their membership and activities of all Board Committees is provided on pages 37 to 44.

Relations with shareholders

The Chairman and Executive Directors of the Company have a regular dialogue with analysts and substantial shareholders. The outcome of these discussions is reported to the Board at quarterly meetings and discussed in detail. Mr Lehmann, as the Senior Independent Director, is available to meet with shareholders who have questions that they feel would be inappropriate to raise via the Chairman or Executive Directors.

The Annual General Meeting is used as an opportunity to communicate with all shareholders. In addition, financial results are posted on the Company’s website,[*http://www.cadoganpetroleum.com*](http://www.cadoganpetroleum.com), as soon as they are announced. The Notice of the Annual General Meeting is also contained on the Company’s website,[*http://www.cadoganpetroleum.com*](http://www.cadoganpetroleum.com). It is intended that the Chairmen of the Nomination, Audit and Remuneration Committees will be present at the Annual General Meeting. The results of all resolutions will be published on the Company’s website,[*http://www.cadoganpetroleum.com*](http://www.cadoganpetroleum.com).

Directors’ section 172 statement

The disclosure describes how the Directors have regard to the matters set out in section 172(1)(a) to (f) and forms the Directors’ statement required under section 414CZA of The Companies Act 2006. This new reporting requirement is made in accordance with the new corporate governance requirements identified in The Companies (Miscellaneous Reporting) Regulations 2018.

The matters set out in section 172(1) (a) to (f) are that a Director must act in the way they consider, in good faith, would be most likely to promote the success of the Company for the benefit of its members as a whole, and in doing so have regard (amongst other matters) to:

(a) the likely consequences of any decision in the long term;

(b) the interests of the Company’s employees;

(c) the need to foster the Company’s business relationships with suppliers, customers and others;

(d) the impact of the Company’s operations on the community and the environment;

(e) the desirability of the Company maintaining a reputation for high standards of business conduct; and

(f) the need to act fairly between members of the Company.

Being sustainable in our activities means conducting our business with respect for the environment and for the communities hosting us, with the aim of increasing the benefit and value to our stakeholders. We recognize that this is a key element to be competitive and to maintain our licence to operate.

Further details of how the Directors have regard to the issues, factors and stakeholders considered relevant in complying with S 172 (1) (a)-(f), the methods used to engage with stakeholders and the effect on the Group’s decision making can be found throughout the annual report and in particular pages 34 (which outlines how the Company engages with its stakeholders), pages 19 to 22 (which contains Cadogan’s corporate responsibility statement) pages 28 to 29 (which contains the Company’s report on greenhouse gas emissions) and page 34 (which outlines the ways in which the Company engages with its shareholders).

In particular, during 2021 the Directors reviewed the impact of Covid-19 pandemic on the processes of the Company and specifically its employees and the communities in which it operates. Specific decisions and measures have been taken to ensure the health and security and to provide assistance where needed (pages 19 to 20).

Also, as a consequence of the continuous Covid-19 and the volatility of the oil and gas prices, and their potential impact on the operational activities and financial situation of the Group, the Directors carefully analysed the going concern and any consequence on the future activities (pages 14 to 17).

The Group has implemented an integrated HSE management system aiming to ensure a safe and environmentally friendly culture in the organization (pages 19 to 20). However, regarding the environmental sustainability of the Group’s activities, the Directors are fully aware of the need to direct future development in new activities with a lower impact on environment (CEO outlook page 9, 28).

When assessing the Proger instrument (Loan and Call Option), the Directors carefully considered the issues and decisions with their impact on the Group and all of its stakeholders (pages 8, 9,14-17).

The Board has a formal schedule of matters specifically reserved for its decision, including approval of acquisitions and disposals, major capital projects, financial results, Board appointments, dividend recommendations, material contracts and Group strategy. For each Board meeting, the Directors receive a Board pack including management accounts, briefing papers on commercial and operational matters and major capital projects including acquisitions. The Board also receives briefings from key management on specific issues.

In particular, as a consequence of the increasing military confrontation between Ukraine and Russia which ended with the invasion of Ukraine by Russia in February 2022, the Board discussed the current situation prevailing in Ukraine and its consequences on the security of the employees, the organization of the operations in Ukraine and the potential impacts on its human, financial and operational assets. The Group has been able to implement immediately emergency procedures with safety and protection measures communicated to all employees and put in place for every location. Specific measures have been put in place for the operations on site to ensure the human, the industrial and the environmental safety. The Group is monitoring the situation daily and taking appropriate action to ensure the safety and essential needs of its employees.

Board Committee Reports

Audit Committee Report

The Audit Committee is appointed by the Board, on the recommendation of the Nomination Committee, from the Non-Executive Directors of the Group. The Audit Committee’s terms of reference are reviewed annually by the Audit Committee and any changes are then referred to the Board for approval. The terms of reference of the Committee are published on the Company’s website,[*http://www.cadoganpetroleum.com*](http://www.cadoganpetroleum.com), and are also available from the Company Secretary at the Registered Office. Two members constitute a quorum.

Responsibilities

To monitor the integrity of the annual and interim financial statements, the accompanying reports to shareholders, and announcements regarding the Group’s results;To review and monitor the effectiveness and integrity of the Group’s financial reporting and internal financial controls;To review the effectiveness of the process for identifying, assessing and reporting all significant business risks and the management of those risks by the Group;To oversee the Group’s relations with the external auditor and to make recommendations to the Board, for approval by shareholders, on the appointment and removal of the external auditor;To consider whether an internal audit function is appropriate to enable the Audit Committee to meet its objectives; andTo review the Group’s arrangements by which staff of the Group may, in confidence, raise concerns about possible improprieties in matters of financial reporting or other matters.

Governance

Ms Jolibois and Mr Mahaux are both members of the Audit Committee. The Audit Committee is chaired by Ms Jolibois who had relevant financial experience within a major European company as well as holding several non-executive roles in major international entities.

At the invitation of the Audit Committee, the Group Director of Finance and external auditor regularly attend meetings. The Company Secretary attends all meetings of the Audit Committee.

The Audit Committee also meets the external auditor without management being present.

Activities of the Audit Committee

During the year, the Audit Committee discharged its responsibilities as follows:

Assessment of the effectiveness of the external auditor

The Committee has assessed the effectiveness of the external audit process. They did this by:

Reviewing the 2021 external audit plan;Discussing the results of the audit including the auditor’s views on material accounting issues and key judgements and estimates, and their audit report;Considering the robustness of the audit process;Reviewing the quality of the service and people provided to undertake the audit; andConsidering their independence and objectivity.

Financial statements

The Audit Committee examined the Group’s consolidated and Company’s financial statements and, prior to recommending them to the Board, considered:

the appropriateness of the accounting policies adopted;reviewed critical judgements, estimates and underlying assumptions; andassessed whether the financial statements are fair, balanced and understandable.

Going concern

Notwithstanding the Group’s current financial performance and position, the Board are cognisant of the actual impacts on the Group of COVID-19 and specifically the war situation in Ukraine. The Board has considered possible reverse stress case scenarios for the impact on the Group’s operations, financial position and forecasts. Whilst the potential future impacts of Covid-19 and the invasion of Ukraine by Russia are unknown, the Board has considered operational disruption that may be caused by the factors such as a) restrictions applied by governments, illness amongst our workforce and disruption to supply chain and sales channels; b) market volatility in respect of commodity prices associated with Covid-19 in addition to military and geopolitical factors.

In addition to sensitivities that reflect future expectations regarding country, commodity price and currency risks that the Group may encounter reverse stress tests have been run to reflect possible negative effects of Covid-19 and war in Ukraine. The Group’s forecasts demonstrate that owing to its cash resources the Group is able to meet its operating cash flow requirements and commitments whilst maintaining significant liquidity for a period of at least the next 12 months allowing for sustained reductions in commodity prices and extended and severe disruption to operations should such a scenario occur.

After making enquiries and considering the uncertainties described above, the Committee has a reasonable expectation that the Company and the Group has adequate resources to continue in operational existence for the foreseeable future and consider the going concern basis of accounting to be appropriate.

Internal controls and risk management

The Audit Committee reviews and monitors financial and control issues throughout the Group including the Group’s key risks and the approach for dealing with them. Further information on the risks and uncertainties facing the Group are detailed on pages 14 to 17.

External auditor

The Audit Committee is responsible for recommending to the Board, for approval by the shareholders, the appointment of the external auditor.

The Audit Committee considers the scope and materiality for the audit work, approves the audit fee, and reviews the results of the external auditor’s work. Following the conclusion of each year’s audit, it considers the effectiveness of the external auditor during the process. An assessment of the effectiveness of the audit process was made, considering reports from the auditor on its internal quality procedures. The Committee reviewed and approved the terms and scope of the audit engagement, the audit plan and the results of the audit with the external auditor, including the scope of services associated with audit-related regulatory reporting services. Additionally, auditor independence and objectivity were assessed, considering the auditor’s confirmation that its independence is not impaired, the overall extent of non-audit services provided by the external auditor and the past service of the auditor. A breakdown of the non-audit fees is disclosed in note 10 to the Consolidated Financial Statements. The Audit Committee has reviewed the nature, level and timing of these services in the course of the year and is confident that the objectivity and independence of the auditor are not impaired by the reason of such non-audit work.

Internal audit

The Audit Committee considers annually the need for an internal audit function and believes that, due to the size of the Group and its current stage of development, an internal audit function will be of little benefit to the Group.

Whistleblowing

The Group’s whistleblowing policy encourages employees to report suspected wrongdoing and sets out the procedures employees must follow when raising concerns. The policy, which was implemented during 2008 is reviewed periodically.  The Group’s policies on anti-bribery, the acceptance of gifts and hospitality, and business conduct and ethics are circulated to staff as part of a combined manual on induction with changes regularly communicated.

Overview

As a result of its work during the year, the Audit Committee has concluded that it has acted in accordance with its terms of reference and has ensured the independence and objectivity of the external auditor.

The Chairman of the Audit Committee will be available at the Annual General Meeting to answer any questions about the work of the Audit Committee.

Lilia Jolibois

Chairman of the Audit Committee

28 April 2022

Health, Safety and Environment Committee Report

The Health, Safety and Environment Committee (the ”HSE Committee”) is appointed by the Board, on the recommendation of the Nomination Committee. The HSE Committee’s terms of reference are reviewed annually by the Committee and any changes are then referred to the Board for approval. The terms of reference of the Committee are published on the Company’s website,[*http://www.cadoganpetroleum.com*](http://www.cadoganpetroleum.com), and are also available from the Company Secretary at the Registered Office. Two members constitute a quorum, one of whom must be a Director.

Governance

The Committee is chaired by Mr Andrey Bilyi (Cadogan Ukraine General Director) as acting Head of the HSE Committee and its other member is Ms Snizhana Buryak (HSE Manager). The CEO attends meetings of the HSE Committee as necessary. During 2021, the HSE Committee held four meetings to monitor the HSE risks and activities across the business, following which actions were identified for the continuous improvement of the various processes and the mitigation of risk.

Responsibilities

To regularly maintain and implement the continuous improvement of the HSE Management System with the aim of improving the Company’s performances;To manage and mitigate the risks of personnel infection with covid-19 virus. Work-out respective administrative and healthcare measures to provide safe working conditions for the employees. Prevent the spread of covid-19 as well as ensuring staff reasonable vaccination level.Assessments of the risks to employees, contractors, customers, partners, and any other people who could be affected by the Company’s activities with the aim of reducing the global risk of the Company and increasing its level of acceptability;Evaluate the effectiveness of the Group’s policies and systems for identifying and managing health, safety and environmental risks within the Group’s operation;Assess the policies and systems within the Group for ensuring compliance with health, safety and environmental regulatory requirements;Assess the performance of the Group with regard to the impact of health, safety, environmental and community relations decisions and actions upon employees, communities and other third parties and also assess the impact of such decisions and actions on the reputation of the Group and make recommendations to the Board on areas for improvement;On behalf of the Board, receive reports from management concerning any fatalities and serious accidents within the Group and actions taken by management as a result of such fatalities or serious accidents;Evaluate and oversee, on behalf of the Board, the quality and integrity of any reporting to external stakeholders concerning health, safety, environmental and community relations issues; andWhere it deems it appropriate to do so, appoint an independent auditor to review performance with regard to health, safety, environmental and community relations matters and review any strategies and action plans developed by management in response to issues raised and, where appropriate, make recommendations to the Board concerning the same.

Activities of the Health, Safety and Environment Committee

The HSE Committee in discharging its duties reviewed and considered the following:

Company activities execution and control over contractors services execution in line with company policies and HSE proceduresMonthly statistics and reports on the activity were regularly distributed to the CEO, Management and to the members of the committee;Ensured that the implementation of new legislation and requirements were punctually followed-up and promptly updated;Compliance with HSE regulatory requirements was ensured through discussion of the results of inspections, both internal inspections and those carried out by the Authorities. The results of the inspections and drills were analysed and commented to assess the need for corrective actions and/or training initiatives;A standing item was included on the agenda at every meeting to monitor monthly HSE performance, key indicators and statistics allowing the HSE Committee to assess the Company’s performance by analysing any lost-time incidents, near misses, HSE training and other indicators;Interaction with contractors, Authorities, local communities and other stakeholders were discussed among other HSE activities;Compliance to ISO 14001 and ISO 45001 has been proved by the authorized third party auditor. Also the Company had its entire ***data*** calculation process as well as emissions measurement system re-validated by a different independent third party.Ensuring all the Observation and Actions requested by the Certification Body have been implemented

Overview

The Company’s HSE Management System and the Guidelines and Procedures have been updated to fit with the ISO requirements and are adequate for the proper execution of the Company’s operations.

As a result of its work during the year, the HSE Committee has concluded that it has acted in accordance with its terms of reference.

Nomination Committee Report

The Board delegates some of its duties to the Nomination Committee and appoints the members of the Nomination Committee which are non-executive Directors of the Group. The membership of the Committee is reviewed annually and any changes to its composition are referred to the Board for approval. The terms of reference of the Nomination Committee are published on the Company’s website,[*http://www.cadoganpetroleum.com*](http://www.cadoganpetroleum.com), and are available from the Company Secretary at the Registered Office. Two members constitute a quorum.

Governance

Mr. Michel Mee—s (Remuneration and Nomination Committee Chairman), Ms. Lilia Jolibois, Mr. Jacques Mahaux and Mr. Gilbert Lehmann (Non-Executive Directors) are the members of the Nomination Committee. The Company Secretary attends all meetings of the Nomination Committee.

Responsibilities

To regularly review the structure, size and composition (including the skills, knowledge and experience) required of the Board compared to its current position and make recommendations to the Board with regard to any changes;Be responsible for identifying and nominating candidates to fill Board vacancies as and when they arise, for the Board’s approval;Before appointments are made by the Board, evaluate the balance of skills, knowledge, experience and diversity (gender, ethnic, age, sex, disability, educational and professional backgrounds, etc.) on the Board and, in the light of this evaluation, prepare a description of the role and capabilities required for a particular appointment; andIn identifying suitable candidates, the Nomination Committee shall use open advertising or the services of external advisers to facilitate the search and consider candidates from a wide range of backgrounds on merit, ensuring that appointees have enough time available to devote to the position.

The Nomination Committee shall also make recommendations to the Board concerning:

Formulating plans for succession for both executive and non-executive Directors and in particular for the key roles of Chairman and Chief Executive Officer;Membership of the Audit and Remuneration Committees, in consultation with the Chairmen of those committees;The reappointment of any non-executive Director at the conclusion of their specified term of office, having given due regard to their performance and ability to continue to contribute to the Board in the light of the knowledge, skills and experience required; andThe re-election by shareholders of any Director having due regard to their performance and ability to continue to contribute to the Board in the light of the knowledge, skills and experience required.

Any matters relating to the continuation in office of any Director at any time including the suspension or termination of service of an executive Director as an employee of the Company subject to the provisions of the law and their service contract.

Activities of the Nomination Committee

During the financial year under review, the Committee reviewed and considered the following:

The size, structure and composition of the Board in the light of the current business environment, the Company's anticipated future activities and particularly the independence of the Non-Executive Directors;Its internal governance documents and the Policy;

The Committee recommends the re-election of the five incumbent Directors at the AGM.

Overview

As a result of its work during the year, the Committee has concluded that it has acted in accordance with its terms of reference. The Chairman of the Nomination Committee will be available at the Annual General Meeting to answer any questions about the work of the Committee.

Michel Mee—s

Nomination Committee Chairman

28 April 2022

Remuneration Committee

Statement from the Chairman

I am pleased to present the Annual Report on Remuneration for the year ended 31 December 2021.

Cadogan’s Remuneration Policy was approved as proposed by the shareholders at the Annual General Meeting of June 25, 2021 and is attached at the end of the Annual Report on Remuneration. The Remuneration Committee is not proposing to make any changes to the existing Policy however in line with industry best practice and the three-year Policy cycle the Company will be seeking shareholder approval at this year’s AGM.

The key elements of the Remuneration Policy are:

A better long-term alignment of the executives’ remuneration with the interests of the shareholders;A material reduction in the maximum remuneration level for the Executive Directors, both in terms of annual bonus and of long-term incentive (performance share plan);The payment of at least 50% of the Annual Bonus in shares with the remaining 50% to be paid in cash or shares at the discretion of the Remuneration Committee. Shares will be priced for this award based on their market value at closing on the Business Day prior to the Subscription Date;The introduction of claw-back and malus provisions on both bonuses and share awards; andThe expectation that the Executive Directors build a substantial shareholding position in the company through their mandate.

Michel Mee—s

Chairman of the Remuneration Committee

28 April 2022

ANNUAL REPORT ON REMUNERATION

Remuneration Committee Report

The Remuneration Committee is committed to principles of accountability and transparency to ensure that remuneration arrangements demonstrate a clear link between reward and performance.

Governance

The Remuneration Committee is appointed by the Board from the non-executive Directors of the Company. The Remuneration Committee’s terms of reference are reviewed annually by the Remuneration Committee and any changes are then referred to the Board for approval. The terms of reference of the Remuneration Committee are published on the Company’s website,[*http://www.cadoganpetroleum.com*](http://www.cadoganpetroleum.com), and are also available from the Company Secretary at the Registered Office.

The Remuneration Committee consists of Mr. Michel Mee—s, Ms. Lilia Jolibois, Mr. Jacques Mahaux and Mr. Gilbert Lehmann. At the discretion of the Remuneration Committee, the Chief Executive Officer is invited to attend meetings when appropriate but is not present when his own remuneration is being discussed. None of the directors are involved in deciding their own remuneration. The Company Secretary attends the meetings of the Remuneration Committee.

Responsibilities

In summary, the Remuneration Committee’s responsibilities, as set out in its terms of reference, are as follows:

To determine and agree with the Board the policy for the remuneration of the executive Directors, the Company Secretary and other members of executive management as appropriate;To consider the design, award levels, performance measures and targets for any annual or long-term incentives and approve any payments made and awards vesting under such schemes;Within the terms of the agreed remuneration policy, to determine the total individual remuneration package of each executive Director and other senior executives including bonuses, incentive payments and share options or other share awards; andTo ensure that contractual terms on termination, and any payments made, are fair to the individual and the Company, that failure is not rewarded and that the duty to mitigate loss is fully recognised.

Overview

The Chairman and Executive Directors of the Company have a regular dialogue with analysts and substantial shareholders, which includes the subject of Directors’ Remuneration. The outcome of these discussions is reported to the Board and discussed in detail both there and during meetings of the Remuneration Committee.

As a result of its work during the year, the Remuneration Committee has concluded that it has acted in accordance with its terms of reference. The chairman of the Remuneration Committee will be available at the Annual General Meeting to answer any questions about the work of the Committee.

Remuneration consultants

The Remuneration Committee did not take any advice from external remuneration consultants, with the exception of the review undertaken of the Remuneration Report.

Single total figure of remuneration for executive and non-executive directors (audited)

Notes to the table

Mr Fady Khallouf

Mr Khallouf was appointed as Chief Executive Officer on 15 November 2019. Mr Khallouf’s salary is €440,000 per annum. As part of Mr Khallouf’s employment agreement, a welcome bonus equivalent in value to 5,500,000 ordinary shares (using the market value of the shares on the business day prior to the date of issue) is payable to Mr Khallouf and a holding period of two years is applicable to the shares acquired. Pursuant to the terms of the bonus, the amount must be subscribed for ordinary shares in the Company at such time as the executive agrees. The welcome bonus was provided to Mr Khallouf in May 2020.

KPIs

In 2020 the CEO was subject to a performance-related, bonus scheme built around a scorecard with a set of challenging KPI’s aligned with the company strategy. The Remuneration Committee, after consultation with the CEO, have decided to postpone any ***variable*** performance related bonus for year ended 2020 given the impact of Covid-19 and volatility in oil and gas prices.

Benefits

Benefits may be provided to the executive directors, in the form of private medical insurance and life assurance.

The Chairman and Non-Executive Directors

As mentioned above, fees for non-Executive Directors were reduced by 20 percent on 15th January 2020 with effect from 15th November 2019. The fees are as follows: the Chairman’s fee at $89,000 and the fee for acting as a non-executive Director at $38,000 with an additional $10,000 for acting as Chairman of the Audit Committee and an additional $5,000 for a committee membership.

Scheme interests awarded during the financial year (audited)

There were no scheme interests awarded during the year.

Payments to past directors (audited)

In 2021 there were no payments to past directors.

Payments for loss of office (audited)

No notice period was either worked or paid.

Directors’ interests in shares (audited)

The beneficial interests of the Directors in office as at 31 December 2021 and their connected persons in the Ordinary shares of the Company at 31 December 2021 are set out below.

There were changes in the Directors shareholding at 31 December 2021 compared to 31 December 2020 (Fady Khallouf).

The Company does not currently operate formal shareholding guidelines. Whilst there is no specified level, the Company expects that under the new Remuneration Policy, the Executive Director will continue to build up a significant shareholding position in the Company during his mandate.

The Company’s performance

The graph below highlights the Company’s total shareholder return (“TSR”) performance for the last twelve years compared to the FTSE All Share Oil & Gas Producers index. This index has been selected on the basis that it represents a sector specific group, which is an appropriate group for the Company to compare itself against, and has been retained ever since, primarily for continuity purposes TSR is the return from a share or index based on share price movements and notional reinvestment of declared dividends.

Historic Remuneration of Chief Executive

Under the Company’s Remuneration Policy, the Remuneration Committee has the authority to review and award an annual performance bonus to executive directors.

In 2021, the Remuneration Committee, after consultation with the CEO, have decided to postpone any ***variable*** performance related bonus for year ended 2021 given the impact of Covid-19 and volatility in oil and gas prices.

In 2022, given the current situation in Ukraine and any potential future difficulties for the Company, Mr Fady Khallouf has requested that any annual performance related bonus to be considered and paid by the Remuneration Committee in respect of the financial year ended 31st December 2021 be waived.

The annual bonus received by the CEO as a percentage of the maximum opportunity is presented in the following table.

Percentage change in the remuneration of the Chief Executive

The following table shows the percentage change in the remuneration of the Chief Executive in 2021 and 2020 compared to that of all employees within the Group.

[i] All employees mean all employees of the Group, including CEO and other Directors (note 11, page 98).

[ii] Includes taxable benefits for 2019.

In 2021 none of the directors participated in long-term incentives.

In 2021 there was no increase in executive and non-executive directors' salary in base currency. The difference in pay represents the change in exchange rate between the base currency and USD as a reporting currency.

Percentage change in Non-Executive director remuneration

Relative importance of spend on pay

The table below compares shareholder distributions (i.e. dividends and share buybacks) and total employee pay expenditure of the Group for the financial years ended 31 December 2020 and 31 December 2021.

Shareholder voting at the Annual General Meeting

The Directors’ Remuneration Policy was approved by shareholders at the Annual General Meeting held on 25 June 2021 and remains unchanged. The Remuneration Policy can be found on the Group’s website and at pages 53 to 66 of this Annual Report on Remuneration. The votes cast by proxy were as follows:

The Directors’ Annual Report on Remuneration is approved by shareholders at each Annual General Meeting. A summary of the votes cast by proxy in 2019 and 2020 were as follows:

Implementation of Remuneration Policy in 2021

The performance related elements of remuneration remain unchanged and will be built around a scorecard with a set of KPI’s aligned with the Group strategy. The Remuneration Policy can be found on the Group’s website and at pages 53 to 66 of this Annual Report on Remuneration.

Approval

The Directors’ Annual Report on Remuneration was approved by the Board on 28 April 2022 and signed on its behalf by:

Michel Mee—s

Chairman

28 April 2022

Directors’ Remuneration Policy

Introduction

This Directors’ Remuneration Policy (the “Policy”) contains the information required to be set out as the directors’ remuneration policy for the purposes of The Large and Medium-sized Companies and Groups (Accounts and Reports) (Amendment) Regulations 2013.

The Policy was approved by shareholders at the 2021 AGM of the Company. The Remuneration Committee is not proposing to make any changes to the existing Policy however in line with industry best practice and the three-year Policy cycle the Company will be seeking shareholder approval at this year’s AGM. The effective date of this Policy is the date on which the Policy is approved by shareholders.

The Policy applies in respect of all executive officers appointed to the Board of Directors (“executive directors”) and non-executive directors. Other senior executives may be subject to the Policy, including in relation to annual bonus and shares incentive arrangements in particular if and to the extent that the Remuneration Committee determines it is appropriate.

The Remuneration Committee will keep the Policy under review to ensure that it continues to promote the long-term success of the Company by giving the Company its best opportunity of delivering on the business strategy. It is the Remuneration Committee’s intention that the Policy be put to shareholders for approval every three years unless there is a need for the Policy to be approved at an earlier date.

The Company aims to provide sufficient flexibility in the Policy for unanticipated changes in compensation practices and business conditions to ensure the Remuneration Committee has appropriate discretion to retain its top executives who perform. The Remuneration Committee reserves the right to approve any payments that may be outside the terms of this Policy, where the terms of that payment were agreed before the Policy came into effect, or before the individual became a director of the Company.

Maximum caps are provided to comply with the required legislation and should not be taken to indicate an intent to make payments at that level. The maximum caps are valid at the time that the relevant employment agreement or appointment letter is entered into and the caps may be adjusted to take into account fluctuations in exchange rates.

Remuneration policy table: executive directors

Notes to the executive directors' remuneration policy table

The Remuneration Committee's philosophy is that remuneration arrangements should be appropriately positioned to support the Group's business strategy over the longer term and the creation of value for shareholders. In this context the following key principles are considered to be important:

remuneration arrangements should align executive and employee interests with those of shareholders;remuneration arrangements should help retain key executives and employees; andremuneration arrangements should incentivise executives to achieve short, medium and long-term business targets which represent value creation for shareholders. Targets should relate to the Group's performance in terms of overall revenue and profit and the executive's own performance. Exceptional rewards should only be delivered if there are exceptional returns.

The Remuneration Committee reserves the right to make any remuneration payments (including satisfying awards of ***variable*** remuneration) and payments for loss of office notwithstanding that they are not in line with the Policy set out above, where the terms of that payment were agreed before the Policy came into effect, or before the individual became a director of the Company (provided the payment was not in consideration for the individual becoming a director).

Performance measures and targets

(a)           Annual Bonus

The performance measures for executive directors comprise of financial measures and business goals linked to the Company's strategy, which could include financial and non-financial measures. The business goals are tailored to reflect each executive director's role and responsibilities during the year. The performance measures are chosen to enable the Remuneration Committee to review the Company's and the individual's performance against the Company's business strategy and appropriately incentivise and reward the executive directors.

Annual bonus targets are set by the Remuneration Committee each year. They are stretching but realistic targets which reflect the most important areas of strategic focus for the Company. The factors taken into consideration when setting targets include the Company's Key Performance Indicators (which are determined annually by the Remuneration Committee), and the extent to which they are under the control or influence of the executive whose remuneration is being determined.

Performance is measured over the financial year against the measures and targets set according to the scorecard. The Remuneration Committee retains the right to exercise its judgement to adjust the bonus outcome for an individual to ensure the outcome reflects any other aspects of the Company's performance that become relevant during the financial year.

The Remuneration Committee used Company operational and financial performances and safety as performance measures for the 2020 scorecard. For years following 2020, the structure of the annual bonus scorecard is reviewed by the Remuneration Committee.

2021Annual bonus scorecard measures for executive directors

(b)           Share Plans

The Remuneration Committee will make the vesting of a Plan award conditional upon the satisfaction of stretching but realistic performance conditions. These conditions are meant to achieve a long-term alignment of the executives’ remuneration with the interest of the shareholders.

EBITDA growth, increase of P1 reserves (in millions boe), and changes to the free cash-flow are the key KPIs to be used by the Remuneration Committee and will be measured over time periods of three financial years. The performance measures are chosen to align the performance of participants with the attainment of financial performance targets over the vesting period of the award. The targets are set by the Remuneration Committee by reference to the Company's strategy and business plan and the results achieved at the time of the vest are determined by the Remuneration Committee.

Under the PSP plan rules, the Board may vary a performance target where it considers that any performance target to which an award is subject is no longer a true or fair measure of the participant's performance, provided that the Board must act fairly and reasonably and that the new performance target is materially no more difficult and no less difficult to satisfy than the original performance target.

Malus and clawback (applicable to bonuses and share awards)

The Remuneration Committee has the discretion to reduce the bonus before payment or require the executive director to pay back shares or a cash amount in the event of material financial misstatement of the Company or fraud or material misconduct on the part of the executive. The amount that may be clawed back on any such event is limited to the value of the bonus, taking into account the cash paid and the shares delivered to the executive, taking the value of the shares at the time of the clawback, less any income tax or employee social security contributions paid on the bonuses.

Share ownership guidelines for executives

The Remuneration Committee is planning to implement share ownership guidelines for executive directors to further align the interests of the executive directors with those of shareholders. The share ownership guidelines will include an expectation that executive directors build up their shareholding to 200% of base salary over a period of five years from the later of: the date of adoption of this policy and the date of appointment. Once the shareholding guideline is reached, executive directors would be expected to maintain it. The intention would be for the shareholding guideline to be reached through the retention of vested shares from share plans (e.g. the deferred share element of the annual bonus and shares vested under the PSP). As such, the Remuneration Committee's discretion may be used to increase the proportion of an annual bonus to be delivered in shares to assist the executive director in meeting this guideline. The deferred share mechanism in the annual bonus and the design of the PSP will assist executive directors in reaching the guidelines. Executive directors will not be expected to top up their shareholding with personal acquisitions of Company shares outside the usual share plans described in the Policy. The Remuneration Committee will monitor the executive directors' shareholdings and may adjust the guideline in special individual and Company circumstances, for example in the case of a share price fall.

PSP Plan Limits

The PSP may operate over new issue shares, treasury shares or shares purchased in the market. In any ten-calendar year period, the Company may not issue (or grant rights to issue) more than:

(a)           10% of the issued ordinary share capital of the Company under the Plan and any other employee share plan adopted by the Company; and

(b)           5% of the issued ordinary share capital of the Company under the Plan and any other executive share plan adopted by the Company.

Treasury shares will count as new issue shares for the purposes of these limits unless institutional investors decide that they need not count. These limits do not include rights to shares which have been renounced, released, lapsed or otherwise become incapable of vesting, awards that the Remuneration Committee determines after grant to be satisfied by the transfer of existing shares and shares allocated to satisfy bonuses (including pursuant to the Deferred Bonus Plan).

Remuneration throughout the Group

Differences in the Company's pay policy for executive directors from that applying to employees within the Group generally reflect the appropriate market rate for the individual executive roles.

Remuneration policy table: non-executive directors

Notes to the Policy Table

The payment policy for non-executive directors is to pay a rate which will secure persons of a suitable calibre. The remuneration of the non-executive directors is determined by the Board. External benchmarking ***data*** and specialist advisers are used when setting fees, which will be reviewed at appropriate intervals. The maximum caps are valid at the time that the relevant appointment letter is entered into and the caps may be adjusted to take into account fluctuations in exchange rates.

Expenses reasonably and wholly incurred in the performance of the role of non-executive director of the Company may be reimbursed or paid for directly by the Company, as appropriate, and may include any tax due on the expense.

The non-executive directors' fees are non-pensionable. The non-executive directors have not to date been eligible to participate in any incentive plans (such as bonuses or share plans); however, the Board considers that it may be appropriate in the future to enable such participation, subject to suitably stretching performance thresholds.

Non-executive directors may receive professional advice in respect of their duties with the Company which will be paid for by the Company. They will be covered by the Company's insurance policy for directors.

Recruitment

The Company's policy on the recruitment of directors is to pay a fair remuneration package for the role being undertaken and the experience of the individual being recruited. The Remuneration Committee will consider all relevant factors, which include the abilities of the individual, their existing remuneration package, market practice, and the existing arrangements for the Company's current directors.

The Remuneration Committee will determine that any arrangements offered are in the best interests of the Company and shareholders and will endeavour to pay no more than is necessary.

The Remuneration Committee intends that the components of remuneration set out in the policy tables, and the approach to the components as set out in the policy tables, will be equally applicable to new recruits, i.e. salary, annual bonus, share plan awards, pension and benefits for executive directors, and fees for non-executive directors. However, the Company acknowledges that additional flexibility may be required to ensure the Company is in the best position to recruit the best candidate for any vacant roles and, as such, a buy-out arrangement may be required.

Flexibility

The salary and compensation package designed for a new recruit may be higher or lower than that applying for existing directors. The Remuneration Committee may decide to appoint a new executive director to the Board at a lower than typical salary, such that larger and more frequent salary increases may then be awarded over a period of time to reflect the individual's growth in experience within the role.

Remuneration will normally not exceed those set out in the policy table above. However, to ensure that the Company can sufficiently compete with its competitors, the Remuneration Committee considers it important that the recruitment policy has sufficient flexibility in order to attract and appropriately remunerate the high-performing individuals that the Company requires to achieve its strategy. As such, the Remuneration Committee reserves discretion to provide a buy-out arrangement and benefits (such as a sign-on bonus and additional share awards) in addition to those set out in the policy table (or mentioned in this section) where the Remuneration Committee considers it reasonable and necessary to do so in order to secure an external appointment (see below for more detail in relation to buy-out arrangements).

Buy-out arrangements

The Remuneration Committee retains the discretion to enter into buy-out arrangements to compensate new hires for incentive awards forfeited in joining the Company. The Remuneration Committee will use its discretion in awarding and setting any such compensation, which will be decided on a case-by-case basis and likely on an estimated like-for-like basis. In deciding the appropriate type and quantum of compensation to replace existing awards, the Remuneration Committee will take into account all relevant factors, including the type of award being forfeited, the likelihood of any performance measures attached to the forfeited award being met, and the proportion of the vesting period remaining. The Remuneration Committee will appropriately discount the compensation payable to take account of any uncertainties over the likely vesting of the forfeited award to ensure that the Company does not, in the view of the Remuneration Committee, pay in excess of what is reasonable or necessary.

Compensation for awards forfeited may take the form of a bonus payment or a share award. For the avoidance of doubt, the maximum amounts of compensation contained in the policy table will not apply to such buy-out arrangements. The Company has not placed a maximum value on the compensation that can be paid under this section, as it does not believe it would be in shareholders' interests to set any expectations for prospective candidates regarding such awards.

Payments for loss of office

Any compensation payable in the event that the employment of an executive director is terminated will be determined in accordance the terms of the employment contract between the Company and the executive, as well as the relevant rules of any share plan and this Policy, and in accordance with the prevailing best practice.

The Remuneration Committee will consider a variety of factors when considering leaving arrangements for an executive director and exercising any discretions it has in this regard, including (but not limited to) individual and business performance during office, the reason for leaving, and any other relevant circumstances (for example, ill health).

In addition to any payment that the Remuneration Committee may decide to make, the Remuneration Committee reserves discretion as it considers appropriate to:

(a)           pay an annual bonus for the year of departure;

(b)           continue providing any benefits for a period of time; and

(c)           provide outplacement services.

Non-executive directors are subject to one month notice periods prior to termination of service and are not entitled to any compensation on termination save for accrued fees as at the date of termination and reimbursement of any expenses properly incurred prior to that date.

Share plan awards

The treatment of any share award on termination will be governed by the PSP rules.

Under the PSP, outstanding share awards held by an individual who ceases to be a director or employee of the Company will lapse, unless the cessation is due to death, illness, injury or disability, redundancy, retirement, the Company ceasing to be a member of the Group or the transfer of an undertaking or part of an undertaking to a person who is not a member of the Group, or the Board exercises its discretion otherwise.

Under the PSP, the Board has discretion to decide the period of time for which the award will continue, and whether any unvested award shall be treated as vesting on the date of cessation of employment or in accordance with the original vesting schedule, in both cases have regard to the extent to which the performance targets have been satisfied prior to the date of cessation.

For executive directors, the vesting period will be set by the Remuneration Committee with a minimum three-year period.  The Remuneration Committee will (unless the vesting period is set as a period equal to or longer than five years) impose a holding period on shares (or awards) so that the executive is not able to sell the shares that the executive director acquires through the PSP until the fifth anniversary of the date of the award.   The holding period will not apply to the number of shares equivalent in value to the amount required by the Company or the executive director to fund any income tax and employee social security contributions due on the vesting of the awards or otherwise in connection with the awards.

Executive director employment agreements

This section contains the key employment terms and conditions of the executive directors that could impact on their remuneration or loss of office payments.

The Company's policy on employment agreements is that executive directors' agreements should be terminable by either the Company or the director on not more than six months' notice. The employment agreements contain provision for early termination, among other things, in the event of a breach by the executive but make no provision for any termination benefits except in the event of a change of control of the Company, where the executive becomes entitled to a lump sum equal to 24 months' base salary plus benefits plus (if any), bonus received on termination by the Company. The employment agreements contain restrictive covenants for a period of 12 months following termination of the agreement. Details of employment agreements in place as at the date of this report are set out below:

Directors' employment agreements are available for inspection at the Company's registered office in London.

Non-executive directors' letters of appointment

This section contains the key terms of the appointments of non-executive directors that could impact on their remuneration.

Typically, the non-executive directors are appointed by letter of appointment for an initial term of three years which may be extended. All non-executive directors are subject to annual re-election by the Company's shareholders and their appointments may be terminated earlier with one month's prior written notice (or with immediate effect, in the case of specific serious circumstances such as fraud or dishonesty). On termination of appointment, non-executive directors are usually only entitled to accrued fees as at the date of termination together with reimbursement of any expenses properly incurred prior to that date and the company has no obligation to pay further compensation when the appointment terminates. Non-executive directors' letters of appointment are available for inspection at the Company's registered office in London and at Zhylyanska street 48/50, 01033 Kyiv, Ukraine.

Illustration of the Remuneration Policy

The bar charts below show the levels of remuneration that the CEO could earn over the coming year under the Policy.

CEO: minimum and maximum remuneration

The bar chart shows future possible maximum remuneration.

Pension entitlements were provided in 2020.

Consideration of shareholder views

The Chairman and executive directors of the Company have a regular dialogue with analysts and substantial shareholders, which includes the subject of directors' remuneration. The outcome of these discussions is reported to the Board and discussed in detail both there and during meetings of the Remuneration Committee.

The Remuneration Committee will take into account the results of the shareholder vote on remuneration matters when making future remuneration decisions. The Remuneration Committee remains mindful of shareholder views when evaluating and setting ongoing remuneration strategy.

Consideration of employment conditions within the Group

When determining remuneration levels for its executive directors, the Board considers the pay and employment conditions of employees across the Group. The Remuneration Committee will be mindful of average salary increases awarded across the Group when reviewing the remuneration packages of the executive directors.

Minor changes

The Remuneration Committee may make, without the need for shareholder approval, minor amendments to the Policy for regulatory, exchange control, tax or administrative purposes or to take account of changes in legislation.

Statement of Directors’ Responsibilities

Statement of Directors’ Responsibilities in respect of the Annual Report and the Financial Statements

The Directors are responsible for preparing the Annual Report and the financial statements in accordance with applicable law and regulations. Company law requires the Directors to prepare financial statements for each financial year. The Directors are required by law to prepare the Group financial statements in accordance with UK-adopted international accounting standards and in conformity with the requirements of the Companies Act 2006 and Article 4 of the International Accounting Standards (“IAS”) regulation and have also elected to prepare the Parent Company financial statements under UK-adopted international accounting standards in conformity with the requirements of the  Companies Act 2006 and as applied in accordance with the provisions of the Companies Act 2006. Under Company law, the Directors must not approve the financial statements unless they are satisfied that they give a true and fair view of the state of affairs of the Company and Group and of the profit or loss for that period. In preparing the Company and Group’s financial statements, IAS Regulation requires that Directors:

properly select and apply accounting policies;make judgements and accounting estimates that are reasonable and prudent;present information, including accounting policies, in a manner that provides relevant, reliable, comparable and understandable information;state whether they have been prepared in accordance with UK-adopted international accounting standards  in conformity with the requirements of the Companies Act 2006, subject to any material departures disclosed and explained in the financial statements;provide additional disclosures when compliance with the specific requirements in UK-adopted international accounting standards are insufficient to enable users to understand the impact of particular transactions, other events and conditions on the Company’s and Group’s financial position and financial performance; andmake an assessment of the Company’s and Group’s ability to continue as a going concern, prepare the financial statements on the going concern basis unless it is inappropriate to presume that the Company and Group will continue in business.

The Directors are responsible for keeping adequate accounting records that are sufficient to show and explain the Company and Group’s transactions and disclose with reasonable accuracy at any time the financial position of the Company and Group and enable them to ensure that the financial statements comply with the Companies Act 2006 They are also responsible for safeguarding the assets of the Company and hence for taking reasonable steps for the prevention and detection of fraud and other irregularities. Under applicable law and regulations, the Directors are also responsible for preparing a Strategic Report, Directors’ Report, Annual Report on Remuneration, Directors’ Remuneration Policy and Corporate Governance Statement that comply with that law and those regulations. The Directors are responsible for the maintenance and integrity of the corporate and financial information and statements included on the Company’s website,[*http://www.cadoganpetroleum.com*](http://www.cadoganpetroleum.com). Legislation in the United Kingdom governing the preparation and dissemination of the financial statements may differ from legislation in other jurisdictions. The directors' responsibility also extends to the ongoing integrity of the financial statements contained therein.

Responsibility Statement of the Directors in respect of the Annual Report

We confirm to the best of our knowledge:

(1) the financial statements, prepared in accordance with UK-adopted international accounting standards in conformity with the requirements of the Companies Act 2006, give a true and fair view of the assets, liabilities, financial position and profit or loss of the Company and the undertakings included in the consolidation as a whole; and

(2) the Annual Report, includes a fair review of the development and performance of the business and the position of the Company and the undertakings included in the consolidation taken as a whole, together with a description of the principal risks and uncertainties that they face; and

(3) the annual report and the financial statements, taken as a whole, are fair, balanced and understandable, and provide the information necessary for the shareholders to assess the Group’s position, performance, business model and strategy.

On behalf of the Board

Michel Mee—s

Chairman

28 April 2022

Independent auditor’s report to the members of Cadogan Petroleum plc

Report on the audit of the consolidated financial statements

Qualified Opinion

We have audited the financial statements of Cadogan Petroleum Plc (the ‘Parent Company’) and its subsidiaries (the ‘Group’) for the year ended 31 December 2021 which comprise the consolidated income statement, the consolidated statement of comprehensive income, the consolidated balance sheet, the consolidated cash flow statement, the consolidated statement of changes in equity, the company balance sheet, the company cash flow statement, the company statement of changes in equity and notes to the financial statements, including a summary of significant accounting policies. The financial reporting framework that has been applied in their preparation is applicable law and UK adopted international accounting standards.

In our opinion, except for the possible effects of the matter described in the Basis for qualified opinion paragraph below:

the financial statements give a true and fair view of the assets, liabilities and financial position of the Group’s and of the Parent Company as at 31 December 2021 and of the Group’s financial performance and cash flow for the year then ended;the Group and Parent Company financial statements have been properly prepared in accordance with UK-adopted international accounting standards and Companies Act 2006; andthe Group financial statements have been prepared in accordance with, Article 4 of the IAS Regulation.

Basis for Qualified Opinion

In February 2019, the Group advanced a Euro 13,385,000 loan to Proger Managers & Partners Srl (“PMP”), a privately owned Italian company whose only interest is a 72.92% participation in Proger Ingegneria Srl (“Proger Ingegneria”), a privately owned company which held a 75.95% participating interest in Proger S.P.A (“Proger”) at 31 December 2020. The loan carries an entitlement to interest at a rate of 5.5% per year, payable at maturity (which is 24 months after the execution date (February 2019) and assuming that the call option described below is not exercised). The principal of the loan is secured by a pledge over PMP’s current participating interest in Proger Ingegneria Srl, up to a maximum guaranteed amount of Euro 13,385,000.

The Group was granted a call option to acquire, at its sole discretion, 33% of participating interest in Proger Ingegneria; the exercise of the option would have given Cadogan, through Cadogan Petroleum Holdings BV, an indirect 25% interest in Proger at 31 December 2020. The call option was granted at no additional cost and could be exercised at any time between the 6th (sixth) and 24th (twenty-fourth) months following the execution date of the loan agreement.

The call option was not exercised within the timeframe (February 2021) and then in accordance with the loan agreement the principal amount and any accrued interest became repayable in full. At this time the Group reclassified the asset from fair value through profit and loss to amortised cost.

In March 2021, PMP requested arbitration to have the loan agreement recognized as an equity investment contract. The arbitration process is ongoing however the investigation process is closed. The decision of the College of Arbitrators is expected in July 2022.

We considered the recoverability of the loan to be a key audit matter, and in respect of this matter we:

made inquiries of management and the Audit Committee regarding the structure of the transaction and reviewed the accounting entries;reviewed the original loan documents including call option agreement;we met with management to obtain an understanding of their assessment as to why they believe no impairment is required against the carrying value of the loan;discussed with management their understanding of the current arbitrations proceedings and any information that they could relay to us from the confidential hearings;had minimal contact with the Cadogan legal advisors due to the deemed confidential nature of the Arbitration process;assessed the ability of the counterparty to repay the amounts due, based on available information, including the potential assessment of the value of the shares pledged as security;reviewed the disclosures in relation to financial instruments including the accounting policy, critical judgments and estimates and financial instrument disclosures.

As noted above, given the ongoing arbitration process, we have not been able to obtain sufficient, appropriate audit evidence regarding the loan, and accordingly are not able to conclude whether the carrying value is materially accurate. In 2020, the predecessor auditor, was not able to obtain sufficient, appropriate audit evidence to conclude whether the fair value of the loan note instrument was materially accurate and as such we do not know what impact this has on the current year results. As a result, the audit opinion for the year ended 31 December 2020 was also qualified in respect of this limitation on the scope of the audit.

We conducted our audit in accordance with International Standards on Auditing (UK) (‘ISAs (UK)’) and applicable law. Our responsibilities under those standards are further described in the ‘Responsibilities of the auditor for the audit of the financial statements’ section of our report. We are independent of the [group and] company in accordance with the ethical requirements that are relevant to our audit of the financial statements in the United Kingdom, including the FRC’s Ethical Standard and the ethical pronouncements established by Chartered Accountants Ireland, applied as determined to be appropriate in the circumstances for the entity. We have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our qualified opinion.

Conclusions relating to going concern

In auditing the financial statements, we have concluded that the Directors’ use of the going concern basis of accounting in the preparation of the financial statements is appropriate. Our evaluation of the Directors’ assessment of the Group and the Parent Company’s ability to continue to adopt the going concern basis of accounting included:

Reviewing management’s assessment of the impact of the ongoing War in Ukraine and its potential impact on production assets, revenue generation, availability of people and resources and various scenario planning in respect of same;Reviewing management’s cash flow forecasts for the period to April 2023 and evaluating the level of headroom available and the assumptions including, potential geopolitical impacts, oil production, oil prices, operating expenditure and capital expenditure. In doing so we compared production forecasts to historical trends and considered the oil price assumptions against consensus market prices and historical discount levels between Brent oil prices and the local market. We compared forecast costs with historical expenditure.Reviewing licences for commitments to check these have been reflected in the cash flow forecasts.Reviewing the disclosures in the financial statements in respect of going concern against the requirements of the standards.

Based on the work we have performed, we have not identified any material uncertainties relating to events or conditions that, individually or collectively, may cast significant doubt on the Group’s and Parent Company’s ability to continue as a going concern for a period of at least twelve months from when the financial statements are authorised for issue. Our responsibilities and the responsibilities of the Directors with respect to going concern are described in the relevant sections of this report.

Emphasis of Matter

We draw attention to the Report of the Directors and Note 29 to the financial statements which describes the ongoing War in Ukraine. The outcome, length, scale and extent of the War is unknown and as such its impact on the group cannot be predicted at the time of issuing the audit opinion.. The Group continue to monitor any impact and have included various scenario planning in relation to the War in its cash flow projections.  In view of the significance of this matter, we consider that it should be drawn to your attention. The ultimate outcome of this matter cannot presently be determined and the financial statements do not include any potential adjustment(s) that may be required arising out of alternative outcomes. Our opinion is not modified in respect of this matter.

Other matter

The financial statements of the Group and Parent Company for the year ended December 31, 2020, were audited by BDO LLP who expressed a qualified opinion on those statements on May 5, 2021. The qualification related to the group advanced loan through a subsidiary which was recorded at fair value through profit loss and the predecessor auditor could not obtain sufficient, appropriate audit evidence to conclude on the fair value of the loan note instrument.

Key audit matters

Key audit matters are those matters that, in our professional judgement, were of most significance in our audit of the financial statements of the current period and include the most significant assessed risks of material misstatement (whether or not due to fraud) that we identified, including those which had the greatest effect on: the overall audit strategy, the allocation of resources in the audit, and directing the efforts of the engagement team. These matters were addressed in the context of our audit of the financial statements as a whole, and in forming our opinion thereon, and we do not provide a separate opinion on these matters.

In addition to the matter described in the ‘’Basis for qualified opinion’’ section, which discusses the valuation of the loan, we have determined the matters described below to be the key audit matters to be communicated in our report:

Valuation of oil and gas exploration and production assets

An overview of the scope of our audit

Our Group audit was scoped by obtaining an understanding of the Group and its environment, including the Group’s system of internal control, and assessing the risks of material misstatement in the financial statements. We also addressed the risk of management override of internal controls, including assessing whether there was evidence of bias by the Directors that may have represented a risk of material misstatement.

Whilst Cadogan Petroleum Plc is a company listed on the Standard Segment of the London Stock Exchange, the Group’s operations principally comprise an exploration & development of oil and gas assets located in Ukraine, together with gas trading and oil services activities. We assessed there to be four significant components within the Ukrainian sub-group, comprising components holding exploration & development assets and gas trading activities which were subject to a full scope audit. Together with the Parent Company, Cadogan Petroleum Holdings Ltd, Cadogan Petroleum Holdings B.V. and the Group consolidation, which was also subject to a full scope audit, these represent the significant components of the Group. The audits of each of the Ukrainian components were principally performed in the Ukraine by a Grant Thornton member firm under the supervision and direction of the Group audit team. The audits of the parent company, Cadogan Petroleum Holdings Ltd, Cadogan Petroleum Holdings B.V. and the Group consolidation were performed in Ireland by the Group audit team. The remaining components of the Group were considered non-significant and these components were principally subject to analytical review procedures by the Group audit team or Grant Thornton member firm in Ukraine.

Our involvement with component auditors

For the work performed by component auditors, we determined the level of involvement needed in order to be able to conclude whether sufficient appropriate audit evidence has been obtained as a basis for our opinion on the Group financial statements as a whole. Our involvement with component auditors included the following:

Detailed Group reporting instructions were sent to the component auditor, which included the significant areas to be covered by the audit (including areas that were considered to be key audit matters as detailed below), and set out the information required to be reported to the Group audit team.As a result of travel restrictions resulting from the Covid-19 pandemic or the ongoing War, the Group audit partner and senior members of the Group audit team were unable to visit the Ukraine to meet with component management and the component auditors during the audit. Accordingly, we performed a remote review of the component audit files in the Ukraine using appropriate technologies, held regular calls and videoconferences with the component audit team and component management during the audit.The Group audit team was actively involved in the direction of the audits performed by the component auditors for Group reporting purposes, along with the consideration of findings and determination of conclusions drawn. We performed our own additional procedures in respect of the significant risk areas that represented Key Audit Matters in addition to the procedures performed by the component auditor.

Our application of materiality

We apply the concept of materiality both in planning and performing our audit, and in evaluating the effect of misstatements. We consider materiality to be the magnitude by which misstatements, including omissions, could influence the economic decisions of reasonable users that are taken on the basis of the financial statements.

In order to reduce to an appropriately low level the probability that any misstatements exceed materiality, we use a lower materiality level, performance materiality, to determine the extent of testing needed. Importantly, misstatements below these levels will not necessarily be evaluated as immaterial as we also take account of the nature of identified misstatements, and the particular circumstances of their occurrence, when evaluating their effect on the financial statements as a whole.

Based on our professional judgement, we determined materiality for the financial statements as a whole and performance materiality as follows:

The reporting threshold is set as the amount below which identified misstatements are considered as being clearly trivial. We agreed with the Board and the Audit Committee that we would report to them misstatements identified during our audit of amounts greater than 5% of materiality as well as misstatements below that amount that, in our view, warranted reporting for qualitative reasons.

Key audit matters identified

The risks of material misstatement that had the greatest effect on our audit, including the allocation of our resources and effort, are set out below as significant matters together with an explanation of how we tailored our audit to address these specific areas in order to provide an opinion on the financial statements as a whole. This is not a complete list of all risks identified by our audit.

Other information

Other information comprises information included in the annual report, other than the financial statements and our auditor’s report therein. Our opinion on the financial statements does not cover the other information and, except to the extent otherwise explicitly stated in our report, we do not express any form of assurance conclusion thereon.

In connection with our audit of the financial statements, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit, or otherwise appears to be materially misstated. If we identify such material inconsistencies in the financial statements, we are required to determine whether there is a material misstatement in the financial statements or a material misstatement of the other information. If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact.

Except for the possible effect of the matter described in the basis for the qualified opinion section we have nothing to report in this regard.

Opinions on other matters prescribed by the Companies Act 2006

In our opinion, based on the work undertaken in the course of the audit:

Except for the possible effect of the matter described in the basis for qualified opinion section of our report, in our opinion, based on the work undertaken in the course of the audit the information given in the Strategic Report and the Directors’ Report for the financial year for which the financial statements are prepared is consistent with the financial statements; andthe Strategic Report and the Directors’ Report have been prepared in accordance with applicable legal requirements.

Except for any amendments that we may have considered necessary had we been able to obtain sufficient appropriate audit evidence in relation to the fair value of the loan receivable as described in the basis for qualified opinion section of our report, in the light of the knowledge and understanding of the Group and Parent Company and its environment obtained in the course of the audit, we have not identified material misstatements in the strategic report or the Directors’ report.

Matters on which we are required to report by exception

Arising solely from the limitation on our work relating to the loan receivable described above, we have not obtained all the information and explanations that we considered necessary for the purpose of our audit. We have nothing to report in respect of the following matters where the Companies Act 2006 requires us to report to you if, in our opinion:

adequate accounting records have not been kept by the Parent Company, or returns adequate for our audit have not been received from branches not visited by us; orthe Parent Company financial statements and the part of the Directors’ remuneration report to be audit are not in agreement with the accounting records and returns; orcertain disclosures of directors’ remuneration specified by law are not made;

Responsibilities of Directors and those charged with governance for the financial statements

As explained more fully in the Directors' responsibilities statement, management is responsible for the preparation of the financial statements which give a true and fair view in accordance UK adopted international accounting standards, and for such internal control as directors determine necessary to enable the preparation of financial statements are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, the Directors are responsible for assessing the group and company’s ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the group and company or to cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing the group and company’s financial reporting process.

Responsibilities of the auditor for the audit of the financial statements

The objectives of an auditor are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor’s report that includes their opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with ISAs (UK) will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

A further description of an auditor’s responsibilities for the audit of the financial statements is located on the Financial Reporting Council’s website at:[*http://www.frc.org.uk/auditorsresponsibilities*](http://www.frc.org.uk/auditorsresponsibilities). This description forms part of our auditor’s report.

Explanation as to what extent the audit was considered capable of detecting irregularities, including fraud

Irregularities, including fraud, are instances of non-compliance with laws and regulations. We design procedures in line with our responsibilities, outlined above, to detect material misstatements in respect of irregularities, including fraud. Owing to the inherent limitations of an audit, there is an unavoidable risk that material misstatement in the financial statements may not be detected, even though the audit is properly planned and performed in accordance with the ISAs (UK). The extent to which our procedures are capable of detecting irregularities, including fraud is detailed below.

In response to these principal risks, our audit procedures included but were not limited to:

enquiries of management board, risk and compliance and legal functions and audit committee on the policies and procedures in place regarding compliance with laws and regulations, including consideration of known or suspected instances of non-compliance and whether they have knowledge of any actual, suspected or alleged fraud;inspection of the group’s regulatory and legal correspondence and review of minutes of board, director’s and audit committee meetings during the year to corroborate inquiries made;gaining an understanding of the internal controls established to mitigate risk related to fraud;discussion amongst the engagement team in relation to the identified laws and regulations and regarding the risk of fraud, and remaining alert to any indications of non-compliance or opportunities for fraudulent manipulation of financial statements throughout the audit;identifying and testing journal entries to address the risk of inappropriate journals and management override of controls;designing audit procedures to incorporate unpredictability around the nature, timing or extent of our testing;assessing the susceptibility of the Group’s financial statements to material misstatement, including how fraud might occur;testing the appropriateness of journal entries made through the year by applying specific criteria to detect possible irregularities and fraud;obtaining an understanding of management’s procedures to evaluate the validity of supplier arrangements and identify and assess any unusual items;Performing a review of supplier contract arrangements across the Group, making inquiries regarding the nature and purpose of the arrangement and reviewing contracts for certain supplier arrangements;Performing a detailed review of the Group’s year-end adjusting entries and investigating any that appear unusual as to nature or amount and agreeing to supporting documentation;challenging assumptions and judgements made by management in their significant accounting estimates, including impairment assessment of assets ; andreview of the financial statement disclosures to underlying supporting documentation and inquiries of management.We requested information from component auditors on instances of non-compliance with laws or regulations that could give rise to a material misstatement of the group financial statements.Directing the auditors of the significant components to ensure an assessment is performed on the extent of the components compliance with the relevant local and regulatory framework. Reviewing this work and holding meetings with relevant internal management and external third parties to form our own opinion on the extent of Group wide compliance.ensuring the engagement team collectively had the appropriate competence and capabilities to identify or recognise non-compliance with the laws and regulation and they were appropriately briefed on where the risk areas are;

Our audit procedures were designed to respond to risks of material misstatement in the financial statements, recognising that the risk of not detecting a material misstatement due to fraud is higher than the risk of not detecting one resulting from error, as fraud may involve deliberate concealment by, for example, forgery, misrepresentations or through collusion. There are inherent limitations in the audit procedures performed and the further removed noncompliance with laws and regulations is from the events and transactions reflected in the financial statements, the less likely we are to become aware of it.

The purpose of our audit work and to whom we owe our responsibilities

This report is made solely to the company’s members, as a body, in accordance with chapter 3 of Part 16 of the Companies Act 2006. Our audit work has been undertaken so that we might state to the company’s members those matters we are required to state to them in an auditor’s report and for no other purpose. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than the company and the company’s members as a body, for our audit work, for this report, or for the opinions we have formed.

Report on other legal and regulatory requirements

Following the recommendation of the audit committee, we were appointed by the Board of Directors on 7 December 2021 to audit the financial statements for the year ended 31 December 2021 and subsequent financial periods. This is the first year we have been engaged to audit the financial statements of the company. The period of total uninterrupted engagement including renders reappointments of the firm is 1 year.

We have not provided non-audit services prohibited by the FRC’s Ethical Standard and have remained independent of the entity in conducting the audit.

The audit opinion is consistent with the additional report to the audit committee.

Cathal Kelly

(Senior Statutory Auditor)

For and on behalf of

Grant Thornton

Chartered Accountants & Statutory Auditors

12-18 City Quay

Dublin 2,

Ireland

28 April 2022

The consolidated financial statements of Cadogan Petroleum plc, registered in England and Wales no. 05718406, were approved by the Board of Directors and authorised for issue on 28 April 2022. They were signed on its behalf by:

Fady Khallouf

Chief Executive Officer

28 April 2022

The notes on pages 83 to 111 form an integral part of these financial statements.

Notes to the Consolidated Financial Statements for the year ended 31 December 2021

1.        General information

Cadogan Petroleum plc (the “Company”, together with its subsidiaries the “Group”), is registered in England and Wales under the Companies Act 2006. The address of the registered office is 6th Floor, 60 Gracechurch Street, London EC3V 0HR.

The Group principal activity is oil and gas exploration, development and production; the Company also conducts gas trading and provides services.

The Company’s shares have a standard listing on the Official List of the UK Listing Authority and are traded on the Main Market of the London Stock Exchange.

2.        Adoption of new and revised Standards

 New IFRS accounting standards, amendments and interpretations effective from 1 January 2021

The disclosed policies have been applied consistently by the Group for both the current and previous financial year with the exception of the new standards adopted.

The IFRS financial information has been drawn up on the basis of accounting policies consistent with those applied in the financial statements for the year to 31 December 2020, except for the following:

(a)   Interest Rate Benchmark Reform - Amendments to IFRS 7, IFRS 9, IAS 39, IFRS 4 and IFRS 16;

(b)   COVID-19-related Rent Concessions beyond 30 June 2021 - Amendments to IFRS 16.

The application of the above standards has had no impact on the disclosures or the amounts recognised in the Group's consolidated financial statements.

New IFRS accounting standards, amendments and interpretations not yet effective

Below is a list of new and revised IFRSs that are not yet mandatorily effective (but allow early application) for the year ending 31 December 2021 and have not been early adopted by the Group. These standards are not expected to have a material impact on the Group in the future reporting periods and on foreseeable future transactions.

3.      Significant accounting policies

(a)    Basis of accounting

The Group’s financial statements have been prepared and approved by the directors in accordance with UK-adopted international accounting standards (collectively “IFRS”) applied in accordance with the provisions of the Companies Act 2006.

The financial statements have been prepared on the historical cost convention basis.

The principal accounting policies adopted are set out below:

(b)    Going concern

The Group’s cash balance at 31 December 2021 was $15.0 million (2020: $13.3 million). The Directors believe that the funds available at the date of the issue of these financial statements are sufficient for the Group to manage its business risks and planned investments successfully.

The Directors’ have carried out a robust assessment of the principal risks facing the Group.

The Group’s forecasts and projections, taking into account reasonably possible changes in trading activities, operational performance, flow rates for commercial production and the price of hydrocarbons sold to Ukrainian customers, show that there are reasonable expectations that the Group will be able to operate on funds currently held and those generated internally, for the foreseeable future.

Notwithstanding the Group’s current financial performance and position, the Board are cognisant of the actual impacts on the Group of COVID-19 and the war situation in Ukraine. The Board has considered possible reverse stress case scenarios for the impact on the Group’s operations, financial position and forecasts.  Whilst the potential future impacts of Covid-19 and the invasion of Ukraine by Russia are unknown, the Board has considered operational disruption that may be caused by the factors such as a) restrictions applied by governments, illness amongst our workforce and disruption to supply chain and sales channels; b) market volatility in respect of commodity prices associated with Covid-19 in addition to military and geopolitical factors.

In addition to sensitivities that reflect future expectations regarding country, commodity price and currency risks that the Group may encounter reverse stress tests have been run to reflect possible negative effects of Covid-19 and war in Ukraine. The Group’s forecasts demonstrate that owing to its cash resources the Group is able to meet its operating cash flow requirements and commitments whilst maintaining significant liquidity for a period of at least the next 12 months allowing for sustained reductions in commodity prices and extended and severe disruption to operations should such a scenario occur.

After making enquiries and considering the uncertainties described above, the Directors have a reasonable expectation that the Company and the Group have adequate resources to continue in operational existence for the foreseeable future and consider the going concern basis of accounting to be appropriate and, thus, they continue to adopt the going concern basis of accounting in preparing the annual financial statements.

(c) Basis of consolidation

The consolidated financial statements incorporate the financial statements of the Company and entities controlled by the Company (its subsidiaries) made up to 31 December each year. IFRS 10 defines control to be investor control over an investee when it is exposed, or has rights, to ***variable*** returns from its involvement with the investee and has the ability to control those returns through its power over the investee. The results of subsidiaries disposed of during the year are included in the consolidated income statement from the effective date of acquisition or up to the effective date of disposal, as appropriate. Where necessary, adjustments are made to the financial statements of subsidiaries to bring accounting policies used into line with those used by the Group. All intra-group transactions, balances, income and expenses are eliminated on consolidation.

3.    Significant accounting policies (continued)

(c)    Basis of consolidation (continued)

Non-controlling interests in subsidiaries are identified separately from the Group’s equity therein. Those interests of non-controlling shareholders that are present ownership interests entitling their holders to a proportionate share of net assets upon liquidation may be initially measured at fair value or at the non-controlling interests’ proportionate share of the fair value of the acquiree’s identifiable net assets. The choice of measurement is made on an acquisition-by-acquisition basis. Other non-controlling interests are initially measured at fair value.

Subsequent to acquisition, the carrying amount of non-controlling interests is the amount of those interests at initial recognition plus the non-controlling interests’ share of subsequent changes in equity. Total comprehensive income is attributed to non-controlling interests even if this results in the non-controlling interests having a deficit balance.

Changes in the Group’s interests in subsidiaries that do not result in a loss of control are accounted for as equity transactions. The carrying amount of the Group’s interests and the non-controlling interests are adjusted to reflect the changes in their relative interests in the subsidiaries. Any difference between the amount by which the non-controlling interests are adjusted and the fair value of the consideration paid or received is recognised directly in equity and attributed to the owners of the Company.

(d)    Revenue recognition

Revenue from contracts with customers is recognized when or as the Group satisfies a performance obligation by transferring a promised good or service to a customer. A good or service is transferred when the customer obtains control of that good or service. Revenue is measured based on measurement principles of IFRS 15 and represents amounts receivable for hydrocarbon products and services provided in the normal course of business, net of value added tax (‘VAT’) and other sales-related taxes, excluding royalties on production.  Royalties on production are recorded within cost of sales.

E&P and Trading business segments

The transfer of control of hydrocarbons usually coincides with title passing to the customer and the customer taking physical possession as the product passes a physical point such as a designated point in the pipeline for the sale of gas or loading point in the case of oil. The Group principally satisfies its performance obligations at a point in time.

To the extent that revenue arises from test production during an evaluation programme, an amount is credited to evaluation costs and charged to cost of sales, to reflect a zero-net margin.

Services business segment

Revenue from services is recognized in the accounting period in which services are rendered. The main types

of services provided by the Group are drilling and civil works services.  Revenue is recorded as the service is provided over time such as through day rates for supply of drill rigs, civil works and manpower.

Interest income is accrued on a time basis, by reference to the principal outstanding and at the effective interest rate applicable, which is the rate that exactly discounts estimated future cash receipts through the expected life of the financial asset to that asset’s net carrying amount on initial recognition.

3.  Significant accounting policies (continued)

(e)    Foreign currencies

The functional currency of the Group’s Ukrainian operations is Ukrainian Hryvnia.  The functional currency of the Group’s UK subsidiaries and the parent company is US Dollar.

In preparing the financial statements of the individual companies, transactions in currencies other than the functional currency of each Group company (‘foreign currencies’) are recorded in the functional currency at the rates of exchange prevailing on the dates of the transactions. At each balance sheet date, monetary assets and liabilities that are denominated in foreign currencies are retranslated into the functional currency at the rates prevailing on the balance sheet date. Non-monetary assets and liabilities carried at fair value that are denominated in foreign currencies are translated at the rates prevailing at the date when the fair value was determined. Non-monetary items that are measured in terms of historical cost in a foreign currency are not retranslated. Foreign exchange differences on cash are recognized in operating profit or loss in the period in which they arise.

Exchange differences are recognized in the profit or loss in the period in which they arise except for exchange differences on monetary items receivable from or payable to a foreign operation for which settlement is neither planned nor likely to occur. This forms part of the net investment in a foreign operation, which is recognized in the foreign currency translation reserve and in profit or loss on disposal of the net investment.

For the purpose of presenting consolidated financial statements, the results and financial position of each entity of the Group, where the functional currency is not the US dollar, are translated into US dollars as follows:

i.             assets and liabilities of the Group’s foreign operations are translated at the closing rate on the balance sheet date;

ii.            income and expenses are translated at the average exchange rates for the period, where it approximates to actual rates. In other cases, if exchange rates fluctuate significantly during that period, the exchange rates at the date of the transactions are used; and

iii.           all resulting exchange differences arising, if any, are recognized in other comprehensive income and accumulated equity (attributed to non-controlling interests as appropriate), transferred to the Group’s translation reserve. Such translation differences are recognized as income or as expenses in the period in which the operation is disposed of.

3.    Significant accounting policies (continued)

(g)  Taxation

The tax expense represents the sum of the tax currently payable and deferred tax.

The tax currently payable is based on taxable profit for the year. Taxable profit differs from net profit as reported in the consolidated income statement because it excludes items of income or expense that are taxable or deductible in other years and it further excludes items that are never taxable or deductible. The Group’s liability for current tax is calculated using tax rates that have been enacted or substantively enacted by the balance sheet date.

Deferred tax is the tax expected to be payable or recoverable on differences between the carrying amounts of assets and liabilities in the financial statements and the corresponding tax bases used in the computation of taxable profit. This is accounted for using the balance sheet liability method. Deferred tax liabilities are generally recognized for all taxable temporary differences and deferred tax assets are recognised to the extent that it is probable that taxable profits will be available against which deductible temporary differences can be utilised. Such assets and liabilities are not recognized if the temporary difference arises from the initial recognition of goodwill or from the initial recognition (other than in a business combination) of other assets and liabilities in a transaction that affects neither the taxable profit nor the accounting profit. Deferred tax liabilities are recognized for taxable temporary differences arising on investments in subsidiaries and associates, and interests in joint ventures, except where the Group is able to control the reversal of the temporary difference and it is probable that the temporary difference will not reverse in the foreseeable future.

The carrying amount of deferred tax assets is reviewed at each balance sheet date and reduced to the extent that it is no longer probable that sufficient taxable profits will be available to allow all or part of the asset to be recovered. Deferred tax is calculated at the tax rates that are expected to apply in the period when the liability is settled or the asset is realized. Deferred tax is charged or credited in the income statement, except when it relates to items charged or credited in other comprehensive income, in which case the deferred tax is also dealt with in other comprehensive income.

Deferred tax assets and liabilities are offset when there is a legally enforceable right to set off current tax assets against current tax liabilities and when they relate to income taxes levied by the same taxation authority and the Group intends to settle its current tax assets and liabilities on a net basis.

In case of the uncertainty of the tax treatment, the Group assess, whether it is probable or not, that the tax treatment will be accepted, and to determine the value, the Group use the most likely amount or the expected value in determining taxable profit (tax loss), tax bases, unused tax losses, unused tax credits and tax rates.

(h)    Other property, plant and equipment

Property, plant and equipment (‘PP&E’) are carried at cost less accumulated depreciation and any recognized impairment loss. Depreciation and amortization is charged so as to write-off the cost or valuation of assets, other than land, over their estimated useful lives, using the straight-line method, on the following bases:

Other PP&E                                       10% to 30%

The gain or loss arising on the disposal or retirement of an asset is determined as the difference between the sales proceeds and the carrying amount of the asset and is recognized in income.

(i)    Intangible exploration and evaluation assets

The Group applies the modified full cost method of accounting for intangible exploration and evaluation (‘E&E’) expenditure, which complies with requirements set out in IFRS 6Exploration for and Evaluation of Mineral Resources. Under the modified full cost method of accounting, expenditure made on exploring for and evaluating oil and gas properties is accumulated and initially capitalized as an intangible asset, by reference to

3.    Significant accounting policies (continued)

(i)    Intangible exploration and evaluation assets(continued)

appropriate cost centres being the appropriate oil or gas property. E&E assets are then assessed for impairment on a geographical cost pool basis, which are assessed at the level of individual licences.

E&E assets comprise costs of (i) E&E activities which are in progress at the balance sheet date, but where the existence of commercial reserves has yet to be determined (ii) E&E expenditure which, whilst representing part of the E&E activities associated with adding to the commercial reserves of an established cost pool, did not result in the discovery of commercial reserves.

Costs incurred prior to having obtained the legal rights to explore an area are expensed directly to the income statement as incurred.

Exploration and Evaluation costs

E&E expenditure is initially capitalized as an E&E asset. Payments to acquire the legal right to explore, costs of technical services and studies, seismic acquisition, exploratory drilling and testing are also capitalized as intangible E&E assets.

Tangible assets used in E&E activities (such as the Group’s vehicles, drilling rigs, seismic equipment and other property, plant and equipment) are normally classified as PP&E. However, to the extent that such assets are consumed in developing an intangible E&E asset, the amount reflecting that consumption is recorded as part of the cost of the intangible asset. Such intangible costs include directly attributable overheads, including the depreciation of PP&E items utilised in E&E activities, together with the cost of other materials consumed during the exploration and evaluation phases.

E&E assets are not amortized prior to the conclusion of appraisal activities.

Treatment of E&E assets at conclusion of appraisal activities

Intangible E&E assets related to each exploration property are carried forward, until the existence (or otherwise) of commercial reserves has been determined. If commercial reserves have been discovered, the related E&E assets are assessed for impairment on individual assets basis as set out below and any impairment loss is recognized in the income statement. Upon approval of a development programme, the carrying value, after any impairment loss, of the relevant E&E assets is reclassified to the development and production assets within PP&E.

Intangible E&E assets which relate to E&E activities that are determined not to have resulted in the discovery of commercial reserves remain capitalized as intangible E&E assets at cost less accumulated amortization, subject to meeting a pool-wide impairment test in accordance with the accounting policy for impairment of E&E assets set out below.

Impairment of E&E assets

E&E assets are assessed for impairment when facts and circumstances suggest that the carrying amount may exceed its recoverable amount. Such indicators include, but are not limited to those situations outlined in paragraph 20 of IFRS 6Exploration for and Evaluation of Mineral Resourcessuch as, a) license expiry during year or in the near future and will not likely to be renewed; b) expenditure on E&E activity neither budgeted nor planned; c) commercial quantities of mineral resources have been discovered; and d) sufficient ***data*** exist to indicate that carrying amount of E&E asset is unlikely to be recovered in full from successful development or sale.

Where there are indications of impairment, the E&E assets concerned are tested for impairment. Where the E&E assets concerned fall within the scope of an established full cost pool, which are not larger than an operating segment, they are tested for impairment together with all development and production assets associated with that cost pool, as a single cash generating unit.

The aggregate carrying value of the relevant assets is compared against the expected recoverable amount of the pool, generally by reference to the present value of the future net cash flows expected to be derived from production of commercial reserves from that pool. Where the assets fall into an area that does not have an established pool or if there are no producing assets to cover the unsuccessful exploration and evaluation costs, those assets would fail the impairment test and be written off to the income statement in full.

Impairment losses are recognized in the income statement and are separately disclosed.

(j) Development and production assets

Development and production assets are accumulated on a field-by-field basis and represent the cost of developing the commercial Reserves discovered and bringing them into production, together with E&E expenditures incurred in finding commercial Reserves transferred from intangible E&E assets.

The cost of development and production assets comprises the cost of acquisitions and purchases of such assets, directly attributable overheads, finance costs capitalized, and the cost of recognizing provisions for future restoration and decommissioning.

Depreciation of producing assets

Depreciation is calculated on the net book values of producing assets on a field-by-field basis using the unit of production method. The unit of production method refers to the ratio of production in the reporting year as a proportion of the Proved and Probable Reserves of the relevant field based on assessments of internal geologists utilising the most recent Competent Person Report and subsequent drilling and exploration, taking into account future development expenditures necessary to bring those Reserves into production.

Producing assets are generally grouped with other assets that are dedicated to serving the same Reserves for depreciation purposes, but are depreciated separately from producing assets that serve other Reserves.

(k) Impairment of development and production assets and other property, plant and equipment

At each balance sheet date, the Group reviews the carrying amounts of its PP&E to determine whether there is any indication that those assets have suffered an impairment loss. If any such indication exists, the recoverable amount of the asset is estimated in order to determine the extent of the impairment loss (if any). Where the asset does not generate cash flows that are independent from other assets, the Group estimates the recoverable amount of the cash-generating unit to which the asset belongs. The recoverable amount is the higher of fair value less costs to sell and value in use. In assessing value in use, the estimated future cash flows are discounted to their present value using a pre-tax discount rate that reflects current market assessments of the time value of money and the risks specific to the asset for which the estimates of future cash flows have not been adjusted. In determining fair value less cost to sell, the estimated future cash flows are discounted to their present value using a post-tax discount rate that reflects current market assessments of the time value of money and the risks specific to the asset for which the estimates of future cash flows have not been adjusted.  Such cash flows include relevant development expenditure that a market participant would reasonably be expected to undertake.

If the recoverable amount of an asset (or cash-generating unit) is estimated to be less than its carrying amount, the carrying amount of the asset (cash-generating unit) is reduced to its recoverable amount. An impairment loss is recognised as an expense immediately.

Where an impairment loss subsequently reverses, the carrying amount of the asset (cash-generating unit) is increased to the revised estimate of its recoverable amount, but so that the increased carrying amount does not exceed the carrying amount that would have been determined had no impairment loss been recognised for the asset (cash-generating unit) in prior years. A reversal of an impairment loss is recognized as income immediately.

(l)      Inventories

Oil and gas stock and spare parts are stated at the lower of cost and net realisable value. Costs comprise direct materials and, where applicable, direct labour costs and those overheads that have been incurred in bringing the inventories to their present location and condition. Cost is allocated using the weighted average method. Net realisable value represents the estimated selling price less all estimated costs of completion and costs to be incurred in marketing, selling and distribution.

(m)  Financial instruments

Financial assets and financial liabilities are recognized in the consolidated statement of financial position when the Group becomes party to the contractual provisions of the instrument.

Loan classified at fair value through profit and loss (applicable for 2020)

Loan instruments which include options to convert the instrument into equity are classified as fair value through profit and loss instruments because they do not meet the criteria for amortized cost measurement as they are not held for the ***collection*** of contractual cash flows representing solely payments of principal and interest. Such loan instruments are initially recorded at fair value which is typically the cash advanced under the instrument and subsequently recorded at fair value with changes in fair value recorded in the income statement. Transaction costs for loans classified at fair value through profit or loss are expensed in the income statement.

Loan classified at amortised cost (applicable for 2021)

Loan is measured at the amount recognised at initial recognition minus principal repayments, plus or minus the cumulative amortization of any difference between that initial amount and the maturity amount, and any loss allowance. Interest income is calculated using the effective interest method and is recognised in profit and loss. Changes in fair value are recognised in profit and loss when the asset is derecognised or reclassified. In accordance with IFRS 9, the loan is measured at amortised cost. The Group applies the simplified approach to providing for expected credit losses (ECL) prescribed by IFRS 9, which permits the use of the lifetime expected loss provision for the loan. Expected credit losses are assessed on a forward-looking basis. The loss allowance is measured at initial recognition and throughout its life at an amount equal to lifetime ECL. Any impairment is recognized in the income statement.

Trade and other payables

Payables are initially measured at fair value, net of transaction costs and are subsequently measured at amortized cost using the effective interest method.

Trade and other receivables

Trade and other receivables are recognized initially at their transaction price in accordance with IFRS 9 and are subsequently measured at amortised cost. The Group applies the simplified approach to providing for expected credit losses (ECL) prescribed by IFRS 9, which permits the use of the lifetime expected loss provision for all trade receivables. Expected credit losses are assessed on a forward-looking basis. The loss allowance is measured at initial recognition and throughout its life at an amount equal to lifetime ECL. Any impairment is recognized in the income statement.

Cash

Cash comprise cash on hand and on-demand deposits. Deposits are recorded as cash and cash equivalents when they have a maturity of less than 90 days at inception.

(n)    Provisions

Provisions are recognized when the Group has a present obligation (legal or constructive) as a result of a past event, it is probable that the Group will be required to settle that obligation and a reliable estimate can be made of the amount of the obligation. The amount recognized as a provision is the best estimate of the consideration required to settle the present obligation at the balance sheet date, taking into account the risks and uncertainties surrounding the obligation. When a provision is measured using the cash flows estimated to settle the present obligation, its carrying amount is the present value of those cash flows.

(o)      Decommissioning

A provision for decommissioning is recognized in full when the related facilities are installed. The decommissioning provision is calculated as the net present value of the Group’s share of the expenditure expected to be incurred at the end of the producing life of each field in the removal and decommissioning of the production, storage and transportation facilities currently in place. The cost of recognizing the decommissioning provision is included as part of the cost of the relevant asset and is thus charged to the income statement on a unit of production basis in accordance with the Group’s policy for depletion and depreciation of tangible non-current assets. Period charges for changes in the net present value of the decommissioning provision arising from discounting are included within finance costs.

(p)     Leases

At inception of a contract, the Group assesses whether a contract is, or contains, a lease based on whether the contract conveys the right to control the use of an identified asset for a period of time in exchange for consideration. Service agreements for equipment on the working sites are not considered leases as, based upon an assessment of the terms and nature of their contractual arrangements, the contracts do not convey the right to control the use of an identified asset.

The right-of-use asset is initially measured based on the initial amount of the lease liability adjusted for any lease payments made at or before the commencement date, plus any initial direct costs incurred and an estimate of costs to dismantle and remove the underlying asset or to restore the underlying asset or the site on which it is located, less any lease incentives received.

The asset is depreciated to the earlier of the end of the useful life of the right-of-use asset or the lease term using the straight-line method as this most closely reflects the expected pattern of consumption of the future economic benefits. The lease term includes periods covered by an option to extend if the Group is reasonably certain to exercise that option. In addition, the right-of-use asset is periodically reduced by impairment losses, if any, and adjusted for certain remeasurements of the lease liability.

The lease liability is initially measured at the present value of the lease payments that are not paid at the commencement date, discounted using the interest rate implicit in the lease or, if that rate cannot be readily determined, the incremental borrowing rate. The lease liability is measured at amortized cost using the effective interest method. It is remeasured when there is a change in future lease payments arising from a change in an index or rate, if there is a change in the Group’s estimate of the amount expected to be payable under a residual value guarantee, or if the Group changes its assessment of whether it will exercise a purchase, extension or termination option. When the lease liability is remeasured in this way, a corresponding adjustment is made to the carrying amount of the right-of-use asset, or the effect is recorded in profit or loss if the carrying amount of the right-of-use asset has been reduced to zero.

The Group elected to apply the practical expedient not to recognise right-of-use assets and lease liabilities for short-term leases that have a lease term of 12 months or less and leases of low-value assets. The Group also made use of the practical expedient to not recognize a right-of-use asset or a lease liability for leases for which the lease term ends within 12 months of the date of initial application.

The lease payments associated with these leases are recognized as an expense on a straight-line basis over the lease term.

4.      Critical accounting judgements and key sources of estimation uncertainty

In the application of the Group’s accounting policies, which are described in note 3, the Directors are required to make judgements, estimates and assumptions about the carrying amounts of the assets and liabilities that are not readily apparent from other sources. The estimates and associated assumptions are based on historical experience and other factors that are considered to be relevant. Actual results may differ from these estimates.

The estimates and underlying assumptions are reviewed on an ongoing basis. Revisions to accounting estimates are recognized in the period in which the estimate is revised if the revision affects only that period or in the period of the revision and future periods if the revision affects both the current and future periods.

The following are the critical judgements and estimates that the Directors have made in the process of applying the Group’s accounting policies and that have the most significant effect on the amounts recognized in the financial statements.

Critical judgements and estimates

(a) Impairment indicator assessment for E&E assets

Cadogan has fully complied with legislative requirements and submitted its application for a 20-year exploration and production license 5 months before its expiry on 23 December 2019. A decision on the award was expected to be provided by State Geological Service of Ukraine before 19 January 2020, since all other intermediary approvals had been secured in line with the applicable legislation requirements. Given the delay to granting of the new license beyond the regular timeline provided by legislation in the Ukraine, Cadogan has launched a claim before the Administrative Court to challenge the non-granting of the 20-year production license by the Licensing Authority.

In February 2022 the company received information from public register that its claim was rejected by the Court.  Despite the restrictions imposed by the martial law in Ukraine, Usenco Nadra exercised its right for appeal.

The current geopolitical and military situation in Ukraine do not allow to make any grounded expectation on the legal process time frame and the Court of appeal decision. Considering this fact, Cadogan has fully impaired the Bitlyanska license (note 15).

(b)    Impairment of PP&E

Management assesses its development and production assets for impairment indicators and if indicators of impairment are identified performs an impairment test. Management performed an impairment assessment using a discounted cash flow model which required estimates including forecast oil prices, reserves and production, costs and discount rates (note 16).

(c)   Recoverability and measurement of VAT

Judgment is required in assessing the recoverability of VAT assets and the extent to which historical impairment provisions remain appropriate, particularly noting the recent recoveries against historically impaired VAT. In forming this assessment, the Group considers the nature and age of the VAT, the likelihood of eligible future supplies to VAT, the pattern of recoveries and risks and uncertainties associated with the operating environment.

(d)  Classification of the Loan instrument in 2020 and the Loan in 2021

In February 2019, the Group advanced a Euro 13,385,000 loan to Proger Managers & Partners Srl (“PMP”), a privately owned Italian company whose only interest is a 72.92% participation in Proger Ingegneria Srl (“Proger Ingegneria”), a privately owned company which held a 75.95% participating interest in Proger Spa (“Proger”) at 31 December 2020. The loan carries an entitlement to interest at a rate of 5.5% per year, payable at maturity (which is 24 months after the execution date (February 2019) and assuming that the call option described below is not exercised). The principal of the loan is secured by a pledge over PMP’s current participating interest in

Proger Ingegneria Srl, up to a maximum guaranteed amount of Euro 13,385,000.

Through the Call Option Agreement, the Group was granted a call option to acquire, at its sole discretion, 33% of participating interest in Proger Ingegneria; the exercise of the option would have given Cadogan, through CPHBV, an indirect 25% interest in Proger at 31 December 2020. The call option was granted at no additional cost and could be exercised at any time between the 6th (sixth) and 24th (twenty-fourth) months following the execution date of the loan agreement and subject to Cadogan shareholders having approved the exercise of the call option as explained further below. Should CPHBV exercise the call option, the price for the purchase of the 33% participating interest in Proger Ingegneria shall be paid by setting off the corresponding amount due by PMP to CPHBV, by way of reimbursement of the principal, pursuant to the Loan Agreement. If the Call Option is exercised, then the obligation on PMP to pay interest is extinguished.

Management considered the extent to which the Option and rights to representation on the Board of Proger Ingegneria and Proger meant significant influence existed.  The requirement to obtain shareholders’ approval for any exercise of the option was considered to represent a substantive condition such that the option was not ‘currently exercisable’ under IFRS at 31 December 2020. In consequence, the potential voting rights associated with any subsequent exercise of the Option were not considered to contribute to significant influence over the investee.

In 2019 and 2020, under the Group’s accounting policies, the instrument was held at fair value through profit and loss and determination of fair value required assessment of both key investee specific information regarding financial performance and prospects and market information. The determination of fair value was made at 31 December 2020 based on facts and circumstances at that date, notwithstanding that the borrower failed to repay the loan at maturity in 2021.

The Group’s original investment decision involved assessment of Proger Spa business plans and analysis with professional advisers including valuations performed using the income method (discounted cash flows) and market approach using both the precedent transactions and trading multiples methods.

Unfortunately, Proger refused to provide Cadogan information regarding its 2020 financial performance or updated forecasts to undertake a detailed fair value assessment using the income method or market approach at 31 December 2020. As a consequence, management assessed the fair value of the instrument based on the

terms of the agreement, including the pledge over shares, together with financial information in respect of prior periods and determined that $16.8 million represented the best estimate of fair value, being equal to anticipated receipts and timing thereof discounted at an estimated market rate of interest of 7.8%.  In forming its assessment at 31 December 2020, management particularly considered the impact of any claim under the pledge and further litigation options on the underlying investee business and shareholders and resulting incentive that created for the borrower to ultimately meet the contractual payment obligation. Management further considered information relevant to Proger business and PMP’s ability to pay, noting the absence of 2020 financial information. However, the absence of information regarding Proger’s 2020 financial performance and prospects represented a significant limitation on the fair value exercise and, as a result, if received, the fair value could be materially higher or lower than this value.

Since the Call Option was not exercised before the Maturity Date and the asset is held within a business model whose objective is to hold assets in order to ***collect*** contractual cash flows, the Loan provided was reclassified from ‘Financial assets at fair value through profit and loss’ to ‘Financial assets at amortised cost’ at the value carried at the Company balance at the date of the Call Option expiry.

(e)  Well services and rental agreements

The Group’s well rental arrangements in Ukraine for oil and gas extraction activities are outside of the scope of IFRS 16. Judgment was required in forming this assessment, based on analysis of the scope of IFRS 16 and the nature of the well rental arrangements. This assessment focused on the extent to which the rental agreements provided access to sub-surface well structures to extract hydrocarbons versus surface level infrastructure for the transport and processing of extracted hydrocarbons.

(f)  Contingent liabilities

Judgment has been applied in assessing the likelihood of financial loss in respect of the ongoing litigation in respect of VAT and tax losses detailed in note 27. In forming the conclusion no provision is required management considered the findings of the first and second instance courts, although the matter remains subject to appeal.

(g)Deferred tax assets

Deferred tax assets and liabilities require management judgement in determining the amounts to be recognised. In particular, significant judgement is used when assessing the extent to which deferred tax assets should be recognised, with consideration given to the timing and level of future taxable income in the relevant tax jurisdiction.

5. Segment information

Segment information is presented on the basis of management’s perspective and relates to the parts of the Group that are defined as operating segments. Operating segments are identified on the basis of internal reports provided to the Group’s chief operating decision maker (“CODM”). The Group has identified its senior management team as its CODM and the internal reports used by the senior management team to oversee operations and make decisions on allocating resources serve as the basis of information presented. These internal reports are prepared on the same basis as these consolidated financial statements.

Segment information is analysed on the basis of the type of activity, products sold, or services provided. The majority of the Group’s operations and all Group’s revenues are located within Ukraine. Segment information is analysed on the basis of the types of goods supplied by the Group’s operating divisions. The Group’s reportable segments under IFRS 8 are therefore as follows:

Exploration and Production

E&P activities on the exploration and production licences for natural gas, oil and condensate.

Service

Drilling services to exploration and production companies; andCivil works services to exploration and production companies.

Trading

Import of natural gas from European countries; andLocal purchase and sales of natural gas operations with physical delivery of natural gas.

The accounting policies of the reportable segments are the same as the Group’s accounting policies described in note 3. Sales between segments are carried out at rates considered to approximate market prices. The segment result represents operating profit under IFRS before unallocated corporate expenses. Unallocated corporate expenses include management remuneration, representative expenses and expenses incurred in respect of the maintenance of office premises. This is the measure reported to the CODM for the purposes of resource allocation and assessment of segment performance. The Group does not present information on segment assets and liabilities as the CODM does not review such information for decision-making purposes.

As of 31 December 2021 and for the year then ended the Group’s segmental information was as follows:

Net finance income includes $68 thousand of interest on cash deposits used for trading.The services business segment in 2021 primarily provided well workovers and other works to other Group companies.Includes interest on loan of $1,225 thousand.

As of 31 December 2020 and for the year then ended the Group’s segmental information was as follows:

Net finance income includes $25 thousand of interest on cash deposits used for trading.The services business segment in 2020 primarily provided well workovers and other works to other Group companies.Includes decrease in FVPL of $334 thousand.

6.        Revenue

Revenue is generated in the Ukraine. Refer to note 3 (f) for details of the performance obligations. Service revenue and associated contract assets and liabilities are immaterial.

Information about major customers

Included in revenues arising from the Trading segment for the year ended 31 December 2021 are revenues of $1.8 million, which arose from sales to the Group’s four customers.

65% of exploration and production business segment revenue arose from sales to four largest customers. Each of them contributed for more than 10% of the total revenue of the exploration and production business segment revenue for the year ended 31 December 2021.

In 2020, Trading segment revenue for the year ended 31 December 2020 of $1.6 million arose from sales to the Group’s four customers. Each of them contributed for more than 10% of the total revenue of the exploration and production business segment revenue for the year ended 31 December 2020.

7.        Administrative expenses

8.        Reversal of impairment/(impairment) ofinventory andother assets

In 2020, $0.6 million of provision against VAT has been released in respect of input VAT historically impaired that has been offset against output VAT.

$1.5 million (2020: $1.5 million) of historical VAT receivables remain impaired. Refer to Note 4.

Impairment totalled $1 million (2020: $53 thousand) includes impairment of inventories.

9.   Other operating expenses, net

For the details on disposal of subsidiaries please refer to Note 17.

10.         Auditor’s remuneration

The analysis of auditor’s remuneration is as follows:

Audit fees for 2021 refer to Grant Thornton of $164 thousand for the audit of group accounts and subsidiaries as of and for the year ended 31 December 2021.

11.      Staff costs

The average monthly number of employees (including Executive Directors) was:

12.      Finance income/(costs), net

13.  Tax

The Group’s operations are conducted primarily outside the UK, namely in Ukraine. The most appropriate tax rate for the Group is therefore considered to be 18 % (2020: 18%), the rate of profit tax in Ukraine, which is the primary source of revenue for the Group. Taxation for other jurisdictions is calculated at the rates prevailing in the respective jurisdictions.

The taxation charge for the year can be reconciled to the profit/(loss) per the income statement as follows:

Permanent differences mostly represent items, including provisions, accruals and impairments related to taxation in Ukraine, these are items not deductible in tax computations.

14.      Loss per Ordinary share

Basic loss per Ordinary share is calculated by dividing the net loss for the year attributable to owners of the Company by the weighted average number of Ordinary shares outstanding during the year. The calculation of the basic loss per share is based on the following ***data***:

In 2021 and 2020 the Group generated a loss and therefore there is no difference between basic and diluted EPS.

15.      Intangible exploration and evaluation assets

The carrying amount of E&E assets at 31 December 2021 relates to the Bitlyanska license.

Cadogan has fully complied with legislative requirements and submitted its application for a 20-year exploration and production license 5 months before its expiry on 23 December 2019. A decision on the award was expected to be provided by State Geological Service of Ukraine before 19 January 2020, since all other intermediary approvals had been secured in line with the applicable legislation requirements. Given the delay to granting of the new license beyond the regular timeline provided by legislation in the Ukraine, Cadogan has launched a claim before the Administrative Court to challenge the non-granting of the 20-year production license by the Licensing Authority.

In February 2022 the company received information from public register that its claim was rejected by the Court.  Despite the restrictions imposed by the martial law in Ukraine, Usenco Nadra exercised its right for appeal.

The current geopolitical and military situation in Ukraine do not allow to make any grounded expectation on the legal process time frame and the Court of appeal decision. Considering this fact, Cadogan has fully impaired the Bitlyanska license.

16.      Property, plant and equipment

Other property, plant and equipment include fixtures and fittings for the development and production activities.

The carrying amount of development and production assets at 31 December 2021 of $9,3 million relates to the Blazhiv license. Depreciation includes $0.7 million for the Blazhiv license.

Management has performed an impairment review of Development and production assets.  As part of the information considered management carried out the assessment of the Blazhivska license’s recoverable amount based on the underlying discounted cash flow forecasts. The impairment review supported the conclusion that no impairment was applicable. Key assumptions used in the impairment assessment were: future oil prices which were assumed at a constant $401 (2020: $297), real per tonne; a production forecast with a natural decline; estimated reserves and a discount rate of 15%, nominal.

 Sensitivity analysis for the Blazhiv license

Any impairment is dependent on judgement used in determining the most appropriate basis for the assumptions and estimates made by management, particularly in relation to the key assumptions described above. Sensitivity analysis to potential changes in key assumptions to reach break-even has been provided below:

17.      Subsidiaries

The Company had investments in the following subsidiary undertakings at 31 December 2021:

During the year ended 31 December 2021, the Group’s structure continued to be rationalised both to reduce the number of legal entities and to replace the structure of multiple jurisdictions with one based on a series of sub-holding companies incorporated in the Netherlands for each licence area. In December 2021, the Group sold Ramet Holding Ltd which holds 79.9% of OJSC AgroNaftoGasTechService for nominal consideration. Investments into Ramet Holdings Ltd had been impaired in the past reporting periods.

18.      Inventories

The impairment provision at 31 December 2021 and 2020 is made so as to reduce the carrying value of the inventories to the net realizable value.

19.      Trade and other receivables

The Group considers that the carrying amount of receivables approximates their fair value.

VAT recoverable is presented net of the cumulative provision of $1.3 million (2020: $1.5 million) against Ukrainian VAT receivable that has been recognized as at 31 December 2021. VAT recoverable relates to the oil production and gas trading operations and is expected to be recovered through the gas and oil sales VAT.

20.      Notes supporting statement of cash flows

Cash at 31 December 2021 of $15.0 million (2020: $13.3 million) comprise cash held by the Group. The Directors consider that the carrying amount of these assets approximates to their fair value. There were no cash transactions from financing activities for the year 2021.

21.      Deferred tax

The following are the major deferred tax liabilities and assets recognised by the Group and movements thereon during the current and prior reporting period:

At 31 December 2021, the Group had the following unused tax losses available for offset against future taxable profits:

21.      Deferred tax (continued)

Deferred tax assets have been recognized in respect of those tax losses where there is sufficient certainty that profit will be available in future periods against which they can be utilized. The Group’s unused tax losses of $19.9 million (2020: $56.4 million) relating to losses incurred in the UK are available to shelter future non-trading profits arising within the Company. These losses are not subject to a time restriction on expiry. No deferred tax asset is recorded.

Unused tax losses incurred by Ukraine subsidiaries amount to $50.8 million (2020: $49.4 million). Under general tax law provisions, these losses may be carried forward indefinitely to be offset against any type of taxable income arising from the same company. Tax losses may not be surrendered from one Ukraine subsidiary to another. The deferred tax asset recorded is expected to be utilized based on forecasts and relates to oil production subsidiaries which are generating taxable profits in the foreseeable future.

22.      Lease liabilities

The Group recognized right-of-use assets and lease liabilities based on rental contract for a rent of Kyiv office with maturity date end of February 2024. The Group initially recognized right-of-use assets of $292 thousand as of 31 December 2020. Right-of-use asset is depreciated over the useful life of the underlying asset. Depreciation of $92 thousand is recognized for the year 2021 and represented as a part of other administrative expenses. Carrying value of right-of-use assets is $200 thousand as of 31 December 2021.

The following table sets out a maturity analysis of lease liability, showing the undiscounted lease payments to be paid after the reporting date.

23.      Trade and other payables

Trade creditors and accruals principally comprise amounts outstanding for ongoing costs. The average credit period taken for trade purchases is 29 days (2020: 30 days). The Group has financial risk management policies to ensure that all payables are paid within the credit timeframe.

Other payables include unused vacation reserve provision of $0.34 million (2020: $0.28 million), subsoil tax payables of $0.35 million (2020: $0.17) and other payables of $0.1 million (2020: $0.12).

The Directors consider that the carrying amount of trade and other payables approximates to their fair value. No interest is generally charged on outstanding balances.

24.      Provisions

The provisions at 31 December 2021 comprise of $0.3 million (2020: $0.2 million) of decommissioning provision.

Decommissioning

In accordance with the Group’s environmental policy and applicable legal requirements as of 31st December 2021, the Group intends to restore the sites it is working on after completing exploration or development activities.

A long-term provision of $0.3 million (2020: $0.2 million) has been made for decommissioning costs, which are expected to be incurred at the end of the licenses period as a result of the demobilization of gas and oil facilities and respective site restoration.

25.      Share capital

Authorised and issued equity share capital

Authorized but unissued share capital of £30 million has been translated into US dollars at the historic exchange rate of the issued share capital. The Company has one class of Ordinary shares, which carry no right to fixed income.

Issued equity share capital

Mr. Khallouf was appointed as Chief Executive Officer on 15 November 2019. As part of Mr. Khallouf’s employment agreement, a welcome bonus equivalent in value to 5,500,000 ordinary shares (using the market value of the shares on the business day prior to the date of issue) is payable to Mr. Khallouf and a holding period of two years is applicable to the shares acquired. Pursuant to the terms of the bonus, the amount must be subscribed for ordinary shares in the Company at such time as the executive agrees. The welcome bonus was provided to Mr. Khallouf in May 2020.

26.      Financial instruments

Capital risk management

The Group manages its capital to ensure that entities in the Group will be able to continue as a going concern, while maximising the return to shareholders.

The capital resources of the Group consist of cash arising from equity attributable to owners of the Company, comprising issued capital, reserves and retained earnings as disclosed in the Consolidated Statement of Changes in Equity.

Externally imposed capital requirement

The Group is not subject to externally imposed capital requirements.

Categories of financial instruments

Refer to note 4(d) for details of the terms of the Proger loan recorded as a financial asset at fair value through profit and loss.  The instrument was recorded at management’s best estimate of fair value as set out in note 4(d) although management had not been able to undertake a valuation exercise under the income method based on Proger’s underlying cash flows or market-based method which would incorporate relevant recent financial information on the investee or its prospects.

The Group has applied a level 3 valuation under IFRS as inputs to the valuation have included assessment of the cash repayments anticipated under the loan terms at maturity, delayed by the arbitration process requested by PMP (the Borrower), historical financial information for the periods prior to 2020 and assessment of the security provided by the pledge over shares together with the impact of the Covid-19 on the activity of Proger. As a result, $ 16.8 million was determined as the best estimate of fair value as at 31 December 2020, being equal to anticipated receipts and timing thereof discounted at an estimated market rate of interest of 7.8%.

In February 2021, Cadogan notified PMP that according to the Loan Agreement, the Maturity Date occurred on 25 February 2021. As the Call Option was not exercised, PMP must fulfil the payment of EUR 14,857,350, being the reimbursement of the Loan in terms of principal and the accumulated interest. PMP is in default since 25 February 2021. In case of default payment, the terms of the agreement provide for the application of an increased interest rate on the amount of the debt.

Since the Call Option was not exercised before the Maturity Date and the asset is held within a business model whose objective is to hold assets in order to ***collect*** contractual cash flows, the Loan provided was reclassified from ‘Financial assets at fair value through profit and loss’ to ‘Financial assets at amortized cost’.

The Group considers that the carrying amount of financial instruments approximates their fair value.

Financial risk management objectives

Management co-ordinates access to domestic and international financial markets and monitors and manages the financial risks relating to the operations of the Group in Ukraine through internal risks reports, which analyse exposures by degree and magnitude of risks. These risks include commodity price risks, foreign currency risk, credit risk, liquidity risk and cash flow interest rate risk. The Group does not enter into or trade financial instruments, including derivative financial instruments, for speculative purposes.

The Audit Committee of the Board reviews and monitors risks faced by the Group at meetings held throughout the year.

Interest rate risk

Interest rate risk arises from the possibility that changes in interest rates will affect the value of the financial instruments. The Group is not exposed to interest rate risk because entities of the Group borrow funds at fixed interest rates.

Commodity price risk

The commodity price risk related to Ukrainian gas and condensate prices and prices for crude oil are the Group’s most significant market risk exposures. World prices for gas and crude oil are characterised by significant fluctuations that are determined by the global balance of supply and demand and worldwide political developments, including actions taken by the Organization of Petroleum Exporting Countries.

These fluctuations may have a significant effect on the Group’s revenues and operating profits going forward. In 2020 the price for Ukrainian gas significantly decreased and was mainly based on the current price of the European gas imports. Management continues to expect that the Group’s principal market for gas will be the Ukrainian domestic market.

The Group does not hedge market risk resulting from fluctuations in gas, condensate and oil prices, and holds no financial instruments, which are sensitive to commodity price risk.

Foreign exchange risk and foreign currency risk management

The Company holds a large portion of its monetary assets in the US Dollars and Euro, mitigating the exchange risk between the US Dollars and Euro and monetary liability in the US Dollars.

Sensitivity analysis is represented below based on 10% exchange rate deviation:

Inflation risk management

Inflation in Ukraine and in the international market for oil and gas may affect the Group’s cost for equipment and supplies. The Directors will proceed with the Group’s practices of keeping deposits in US dollar accounts until funds are needed and selling its production in the spot market to enable the Group to manage the risk of inflation.

Credit risk management

Credit risk refers to the risk that counterparty will default on its contractual obligations resulting in financial loss to the Group. The Group’s credit management process includes the assessment, monitoring and reporting of counterparty exposure on a regular basis. Credit risk with respect to receivables and advances is mitigated by active and continuous monitoring the credit quality of its counterparties through internal reviews and assessment. There was no material past due receivables as at year end.

The Group makes allowances for expected credit losses on receivables in accordance with its accounting policy.

The credit risk on liquid funds (cash) is considered to be limited because the counterparties are financial institutions with high and good credit ratings, assigned by international credit-rating agencies in the UK and Ukraine respectively.

The carrying amount of financial assets recorded in the financial statements represents the Group’s maximum exposure to credit risk.

Liquidity risk management

Ultimate responsibility for liquidity risk management rests with the Board of Directors, which has built an appropriate liquidity risk management framework for the management of the Group’s short, medium and long-term funding and liquidity management requirements. The Group manages liquidity risk by maintaining adequate cash reserves and by continuously monitoring forecast and actual cash flows.

The following tables sets out details of the expected contractual maturity of financial liabilities.

27.   Commitments and contingencies

Licence contingent liability

The Group has working interests in Blazhiv licence to conduct its exploration and development activities in Ukraine. The licence is not holding any obligation for carrying  exploration activities within its term.

Tax contingent liabilities

The Group assesses its liabilities and contingencies for all tax years open for audit by UK, Netherlands and Ukraine tax authorities based upon the latest information available. Where management concludes that it is not probable that a particular tax treatment is accepted, a provision is recorded based on the most likely amount or the expected value of the tax treatment when determining taxable profit (tax loss), tax bases, unused tax losses, unused tax credits and tax rates. The decision should be based on which method provides better predictions of the resolution of the uncertainty. Inherent uncertainties exist in estimates of tax contingencies due to complexities of interpretation and changes in tax laws.

Whilst the Group believes it has adequately provided for the outcome of these matters, certain periods are under audit by the UK, Netherlands and Ukraine tax authorities, and therefore future results may include favourable or unfavourable adjustments to these estimated tax liabilities in the period the assessments are made or resolved. The final outcome of tax examinations may result in a materially different outcome than assumed in the tax liabilities.

After an inspection conducted by Ukraine’s tax authorities in September 2019, Astroinvest Energy LLC was notified of a tax claim related to the historic costs for the liquidation of wells on the Zagoryanska license. The tax authorities notified Astroinvest Energy LLC that they consider recoverable VAT ($3.6 million) that has subsequently been used to offset output VAT to be non-deductible and additionally that the subsidiary’s tax losses carry forward should be reduced by $15.3 million (Note 21). Astroinvest Energy LLC has launched a claim against the tax authority’s decision on the basis of the current tax legislation and related court decisions and considers the potential for a liability to be less than probable.

If unsuccessful Astroinvest Energy LLC would offset the amount of notified tax losses with part of the historical accumulated tax losses. The disputed amount of VAT would be partially covered with recoverable VAT not recognized as of 31 December 2020 (note 19) such that the eventual impact would be $2.1 million.

28.   Related party transactions

All transactions between the Company and its subsidiaries, which are related parties, have been eliminated on consolidation and are not disclosed in this note.

In February 2019, the Group entered in a 2-year loan agreement with Proger Management & Partners Srl with an option to convert it into a direct 33% equity interest in Proger Ingegneria. At that time, Mr Michelotti was a non-executive Director of Proger Ingegneria Srl and Proger Spa, and CEO of Cadogan Petroleum PLC. Mr Michelotti did not participate to the voting for the approval of the loan agreement at the Board of Cadogan.Directors’ remuneration

The remuneration of the Directors, who are the key management personnel of the Group, is set out below in aggregate for each of the categories specified in IAS 24Related Party Disclosures. Further information about the remuneration of individual Directors is provided in the audited part of the Annual Report on Remuneration 2020 on page 44.

The total remuneration of the highest paid Director was $0.5 million in the year (2020: $0.6 million).

No guarantees have been given or received and no provisions have been made for doubtful debts in respect of the amounts owed by related parties.

29.    Events after the balance sheet date

In February 2022, Usenco Nadra received information from a public register that its claim was rejected by the Court of first instance. Despite the restrictions imposed by the martial law in Ukraine, Usenco Nadra exercised its right for appeal. As a result and given the present uncertainty with the military situation on the process and decision timing, the Group recognized impairment on the full balance sheet value of E&E assets in an amount of $2.5 million.

After several months of military confrontation, Russia invaded Ukraine on 24 February 2022. The war is increasingly affecting the economy of Europe and exacerbating ongoing economic challenges, including issues such as rising inflation and supply-chain disruption. The degree to which the Group will be affected by them largely depends on the nature and duration of uncertain and unpredictable events, such as further military action and reactions to ongoing developments by global financial markets. At the beginning of March 2022, the Company stopped its production operations for 3 weeks and was able to resume them after having secured its employees safety, the transactions with its customers and deliveries. Starting the end of March 2022 and till the date of the report the Group is operating in due course, production operates with a full capacity, product shipments are not interrupted.

The financial statements of Cadogan Petroleum plc, registered in England and Wales no. 05718406, were approved by the Board of Directors and authorized for issue on 28 April 2022.

They were signed on its behalf by:

Fady Khallouf

Chief Executive Officer

28 April 2022

The notes on pages 115 to 118 form part of these financial statements.

Notes to the Company Financial Statements for the year ended 31 December 2021

30.    Significant accounting policies

The separate financial statements of the Company are presented as required by the Companies Act 2006 (the “Act”). As permitted by the Act, the separate financial statements have been prepared in accordance with UK-adopted international accounting standards (“IFRSs”).

The financial statements have been prepared on the historical cost basis. The principal accounting policies adopted are the same as those set out in note 3 to the Consolidated Financial Statements except as noted below.

As permitted by section 408 of the Act, the Company has elected not to present its profit and loss account for the year. Cadogan Petroleum plc reports a loss for the financial year ended 31 December 2021 of $3.7 million (2020: profit $0.2 million).

Investments

Investments in subsidiaries are stated at cost less, where appropriate, provisions for impairment.

Receivables from subsidiaries

Loans to subsidiary undertakings are subject to IFRS 9’s new expected credit loss model. As all intercompany loans are repayable on demand, the loan is considered to be in stage 3 of the IFRS 9 ECL model on the basis the subsidiary does not have enough liquid assets in order to repay the loans if demanded. Lifetime ECLs are determined using all relevant, reasonable and supportable historical, current and forward-looking information that provides evidence about the risk that the subsidiaries will default on the loan and the amount of losses that would arise as a result of that default. Analysis indicated that the Company will fully recover the carrying value of the loans (net of historic credit loss provisions) so no additional ECL has been recognised in the current period.

Critical accounting judgements and key sources of estimation uncertainty

The Company’s financial statements, and in particular its investments in and receivables from subsidiaries, are affected by certain of the critical accounting judgements and key sources of estimation uncertainty.

The critical estimates and judgments referred to application of the expected credit loss model to intercompany receivables (note 33). Management determined that the interest free on demand loans were required to be assessed on the lifetime expected credit loss approach and assessed scenarios considering risks of loss events and the amounts which could be realised on the loans.  In doing so, consideration was given to factors such as the cash held by subsidiaries and the underlying forecasts of the Group’s divisions and their incorporation of prospective risks and uncertainties.

31.      Auditor’s remuneration

The auditor’s remuneration for audit and other services is disclosed in note 10 to the Consolidated Financial Statements.

32.      Investments

The Company’s subsidiaries are disclosed in note 17 to the Consolidated Financial Statements. The investments in subsidiaries are all stated at cost less any provision for impairment.

33.      Financial assets

The Company’s principal financial assets are bank balances and cash and receivables from related parties none of which are past due. The Directors consider that the carrying amount of receivables from related parties approximates to their fair value.

Receivables from subsidiaries

At the balance sheet date gross amounts receivable from the fellow Group companies were $350 million (2020: $351 million). The Company recognized additional expected credit loss provisions in relation to receivables from subsidiaries of $0.7 million in 2021 (2020: nil). The accumulated provision on receivables at 31 December 2021 was $313.2 million (2020: $312.4 million). The carrying value of the receivables from the fellow Group companies at 31 December 2021 was $36.8 million (2020: $38.6 million). Receivables from subsidiaries are interest free and repayable on demand. There are no past due receivables. The receivables are classified as non-current based on the expected timing of receipt notwithstanding their terms.

Cash

Cash comprises cash held by the Company and short-term bank deposits with an original maturity of three months or less. The carrying value of these assets approximates to their fair value.

34.    Financial liabilities

Trade and other payables

Trade payables principally comprise amounts outstanding for trade purchases and ongoing costs. The average credit period taken for trade purchases is 29 days (2020: 30 days).

The Directors consider that the carrying amount of trade and other payables approximates to their fair value. No interest is charged on balances outstanding.

35.  Share capital

The Company’s share capital is disclosed in note 25 to the Consolidated Financial Statements.

36.  Cumulative translation reserve

The directors decided to change the functional currency of the Company from sterling to US dollars with effect from 1 January 2016. The effect of a change in functional currency is accounted for prospectively. In other words, the Company translates all items into the US dollar using the exchange rate at the date of the change. The resulting translated amounts for non-monetary items are treated as their historical cost. Exchange differences arising from the translation of an operation previously recognised in other comprehensive income in accordance with paragraphs 32 and 39(c) IAS 21“Foreign Currency”are not reclassified from equity to profit or loss until the disposal of the operation.

37. Financial instruments

The Company manages its capital to ensure that it is able to continue as a going concern while maximising the return to shareholders. Refer to note 26 for the Group’s overall strategy and financial risk management objectives.

The capital resources of the Company consist of cash arising from equity, comprising issued capital, reserves and retained earnings.

Categories of financial instruments

Interest rate risk

All financial liabilities held by the Company are non-interest bearing. As the Company has no committed borrowings, the Company is not exposed to any significant risks associated with fluctuations in interest rates.

Credit risk

Credit risk refers to the risk that counterparty will default on its contractual obligations resulting in financial loss to the Company. For cash, the Company only transacts with entities that are rated equivalent to investment grade and above. Other financial assets consist of amounts receivable from related parties.

The Company’s credit risk on liquid funds is limited because the counterparties are banks with high credit ratings assigned by international credit-rating agencies.

The carrying amount of financial assets recorded in the Company financial statements, which is net of any impairment losses, represents the Company’s maximum exposure to credit risk.

Liquidity risk management

Ultimate responsibility for liquidity risk management rests with the Board of Directors, which has built an appropriate liquidity risk management framework for the management of the Company’s short, medium and long-term funding and liquidity management requirements. The Company maintains adequate reserves, by continuously monitoring forecast and actual cash flows.

The Company’s financial liabilities are not significant and therefore no maturity analysis has been presented.

Foreign exchange risk and foreign currency risk management

The Company holds a large portion of its monetary assets in the US Dollars and Euro, mitigating the exchange risk between the US Dollars and Euro and monetary liability in the US Dollars. More information on the foreign exchange risk and foreign currency risk management is disclosed in note 26 to the Consolidated Financial Statements.

38.  Related parties

Amounts due from subsidiaries

The Company has entered into a number of unsecured related party transactions with its subsidiary undertakings. The most significant transactions carried out between the Company and its subsidiary undertakings are mainly for short and long-term financing. Amounts owed from these entities are detailed below:

Refer to note 32 for details on the Company’s receivables due from subsidiaries.

The remuneration of the Directors, who are the key management personnel of the Group, is set out below in aggregate for each of the categories specified in IAS 24Related Party Disclosures. In 2021 there were no other employees in the Company. Further information about the remuneration of individual Directors is provided in the audited part of the Annual Report on Remuneration 2021 on pages 45 to 52.

The total remuneration of the highest paid Director was $0.6 million in the year (2019: $0.6 million).

39.      Events after the balance sheet date

Events after the balance sheet date are disclosed in note 29 to the Consolidated Financial Statements.

Glossary

Shareholder Information

Enquiries relating to the following administrative matters should be addressed to the Company’s registrars: Link Group, 10th Floor, Central Square, 29 Wellington Street, Leeds LS1 4DL.

Telephone: 0371 664 0300. Calls are charged at the standard geographic rate and will vary by provider. Calls outside the United Kingdom will be charged at the applicable international rate. Lines are open between 09:00 – 17:30, Monday to Friday excluding public holidays in England and Wales.

Loss of share certificates.Notification of change of address.Transfers of shares to another person.Amalgamation of accounts: if you receive more than one copy of the Annual Financial Report, you may wish to amalgamate your accounts on the share register.

You can access your shareholding details and a range of other services at the Shareholder Portal[*http://www.signalshares.com*](http://www.signalshares.com).

Information concerning the day-to-day movement of the share price of the Company can be found on the Group’s website[*http://www.cadoganpetroleum.comor*](http://www.cadoganpetroleum.comor) that of the London Stock exchange[*http://www.prices.londonstockexchange.com*](http://www.prices.londonstockexchange.com).

Unsolicited mail

As the Company’s share register is, by law, open to public inspection, shareholders may receive unsolicited mail from organisations that use it as a mailing list. To reduce the amount of unsolicited mail you receive, contact: The Mailing Preference Service, FREEPOST 22, London W1E 7EZ. Telephone: 0845 703 4599. Website:[*http://www.mpsonline.org.uk*](http://www.mpsonline.org.uk).

Financial calendar 2021/2022

Investor relations

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References to page numbers throughout this announcement relates to the page numbers within the Annual Report of the Company for the year ended 31st December 2021.  In addition all graphs and graphics have been removed for the purposes of the announcement.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[1] Gross revenues of $8.8 million (2020: $5.1 million) included $1.8 million (2020: $1.6 million) from trading of natural gas, $7.0 million (2020: $3.5 million) from exploration and production

[2] Administrative expenses (“G&A”)

[3] Astroservice LLC used its rig for the workover campaign on the Blazhiv license

[4] LTI: Lost Time Incidents; TRI: Total Recordable Incidents

[5] Taxable benefits include life and medical insurance provided to the executive and leased car.

[6] Amount includes catchup payment for two months 2019.

[7] 2015 CEO’s salary is the sum of Mr. des Pallieres' salary for the period January to June and of Mr. Michelotti's salary for the period July to December.

[8] In relation to performance in 2016 and 2015, the CEO used the entire amount of the bonus to buy at market price newly issued company shares on 22 September 2017.

[9] 2019 Annual bonus is a sum of Mr Michelotti’s bonus of $112,140 and welcome bonus for Mr Khallouf equivalent in value of 5,500,000 ordinary shares based on share’s price of £0.0525. Welcome bonus for Mr Khallouf was provided in May 2020 based on share’s price of £0.03. Respective correction of the bonus reserve equivalent to $185 thousand was recognised through share premium account in 2020.

[10] Includes a welcome bonus for Mr Khallouf equivalent in value of 5,500,000 ordinary shares based on share’s price of £0.0525.

[11] Mr Michelotti undertook to use the entire bonus to buy company’s share at market price in order to leave the Company cash neutral.

[12] Year-end performance-based bonus was an alternative to an up-front sign-on bonus. Mr Michelotti use the entire bonus to buy company’s share at market price on 22 September 2017.

[13] $280,298 paid as fees, pension and loss of office.

[14] From 1 August, 2011.

[15] From 19 March 2009.

[16] All employees mean all employees of the Group, including CEO and other Directors (note 11, page 98).

[17] Includes taxable benefits for 2019.

[18] Please note that the salary of the CEO for 2022 remain at €440,000.

[19] Included in retained earnings, loss for the financial year ended 31 December 2021 was $3.7 million (2020: profit $0.2 million).

**Load-Date:** April 29, 2022

**End of Document**



[***Australia politics live news update: Victoria lockdown restrictions to ease in September; NSW records 1,116 Covid cases, four deaths; ACT 23 cases***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:63H1-03P1-JBNF-W3W5-00000-00&context=1516831)

The Guardian (London)

August 31, 2021 Tuesday 10:41 PM GMT

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**Section:** AUSTRALIA NEWS; Version:20

**Length:** 44562 words

**Byline:** Nino Bucci (now) and Amy Remeikis (earllier)

**Highlight:** Victoria announces lockdown changes for 23 September, after reporting 120 new cases and confirming two deaths ; NSW records 1,164 cases and four deaths, with state to open to international Australians at 80% vaccination ; June quarter economic growth revealed. Follow the latest updates liveRestrictions: NSW ; Vic ; Qld ; borders. Hotspots: NSW ; Vic ; QldRevealed: what Morrison told John Frewen when he gave him vaccine roleHealth authorities warn against mixing Covid vaccine typesAustralia's reopening: can our leaders reach consensus?Vaccine rollout tracker ; get our free news app ; get our morning email briefing

**Body**

block-time published-time 8.25am BST

Thank you Amy Remeikis, who has once again proven she truly belongs in the pantheon of live bloggers.

block-time published-time 8.20am BST

The parliament is winding down - but there is one day left before the six-week break and given how tempers are already fraying, you should probably prepare for it to be a mess.

Before I hand over to the wonderful Nino Bucci to take you through the evening, I wanted to say a very big thank you to all our readers. I know I keep saying this, but the knocks keep coming. And they are piling on when you are already stressed, or exhausted, or at the end of your capacity. My oma used to say we are all just like cups filling with drips of water when we are under pressure, and you never know what drip is going to be the one which causes your cup to overflow.

There have been a lot of those drips lately. For those in lockdown particularly, but also for those missing loved ones, missing key support networks, missing freedom and missing making plans. Not being able to plan is demoralising. And we all know we are in for another rough month or two before anything starts to become clear and sometimes seeing the light is ahead makes getting through it all even worse.

So take care of yourself. You're not alone in feeling over absolutely everything. That doesn't make it easier, I know. But there are people who get it. And if you can, if you have the space, make sure you see if those around you are doing OK. It doesn't have to be an "are you ok?". Because we know the answer. But a "this is pretty shit, thinking of you" can work wonders at times.

We'll be back with Politics Live tomorrow. In the meantime, Nino has you in very good hands. Please - take care of you.

block-time updated-timeUpdated at 8.29am BST

block-time published-time 8.04am BST

Queensland has updated its exposure site list after a Covid-positive truck driver passed through parts of the state. [*You can find the list here*](https://www.qld.gov.au/health/conditions/health-alerts/coronavirus-covid-19/current-status/contact-tracing).

block-time updated-timeUpdated at 8.07am BST

block-time published-time 8.01am BST

Josh Frydenberg also walks back Karen Andrews comments from a little earlier that it is the "view of the federal government that Queensland should be open".

Frydenberg tells Afternoon Briefing it's the view of the federal government that premiers should stick to the national plan. Asked if he thinks Queensland should open its border to NSW or Vic when there are such high case numbers, he says:

Decisions should be based on the medical advice at the time but the view expressed very explicitly in the Doherty Institute modelling is that the country can open up when it [reaches] double dose vaccination rates of 70 to 80% in individual jurisdictions as well as the 70% to 80% across the nation as a whole and this is the key point, Patricia.

The country needs to learn to live with Covid. And the admission and acknowledgement in Victoria today is very significant. Patrick McGorry, former Australian of the year and psychiatrist says it is a game-changer because it means that the government that the state level are recognising they cannot eliminate the virus.

They can suppress it and buy time, but they cannot eliminate it and Queensland and Western Australia also need that mentality to know that they cannot keep Covid out indefinitely.

block-time updated-timeUpdated at 8.05am BST

block-time published-time 7.56am BST

Josh Frydenberg won't confirm ongoing support for future lockdowns

The treasurer is pushed by Patricia Karvelas into explaining why he won't say whether or not the federal government will provide financial support for any future lockdowns. The national plan includes targeted lockdowns, in areas where test, trace, isolate, quarantine systems fail. So will those people, who may find themselves locked down in the future if TTIQ fails - which is in the national plan - receive financial support?

Frydenberg wont say because (and this is a throwback to just before lockdown five in Victoria) he does not want to "incentivise" the states to lockdown:

We have supported people right throughout the pandemic and of course our focus is ensuring that they can get back their lives in a Covid-safe way.

I'm not about to incentivise state premiers or chief ministers to go and have lockdowns.

What I want to do is focus on getting out of the lockdowns which means getting vaccination rates up but holding the states and territories to account for the agreement they have reached at national cabinet, and that's the key point.

Today we have seen 80 of our largest business organisations around the country employing a million people, go out publicly and call upon federal, state and territory governments to actually stick to the plan. And that is critical. We have to stick to the plan. Why? Because people need hope. Why? Because people need certainty to plan.

Our agency and economic support has seen debt burden rise rapidly and we have committed more than $300bn in health and economic support, a lot more than what the states and territories ever committed to, and that is effectively borrowing from future generations, so I will be prudent.

I will focus on the situation at hand and we will make decisions based on those circumstances when they arrive.

block-time updated-timeUpdated at 7.59am BST

block-time published-time 7.51am BST

We've spoken a bit about different experiences shaping different viewpoints - for example, not just assuming everyone has a family doctor, or even access to regular healthcare.

Different experiences also shape reporting. Here is SBS's Rashida Yosufzai detailing her own life experience, and how that has impacted her, as she is watching what is happening in Afghanistan as a journalist - but also a human with the most personal of connections to the nation:

enltrSBS News journalist Rashida Yosufzai, [*@Rashidajourno*](https://twitter.com/Rashidajourno?ref_src=twsrc%5Etfw) left Afghanistan as a refugee with her family in the 90s. Now, she shares what the Taliban takeover means for her family still in the country. [*pic.twitter.com/BkUq8WHuuY*](https://t.co/BkUq8WHuuY)

- SBS News (@SBSNews) [*September 1, 2021*](https://twitter.com/SBSNews/status/1432930865693138946?ref_src=twsrc%5Etfw)

block-time updated-timeUpdated at 8.08am BST

block-time published-time 7.48am BST

There wasn't a big update on the Parklea prison Covid outbreak today (or any prison updates) but it is worrying for a lot of people.

The CEO of Jesuit Social Services Julie Edwards had a bit to say - the JSS wants more done to protect vulnerable prisoners:

We call on the NSW Government to immediately find alternatives to prison, both in the community and in supported accommodation, for vulnerable groups including Aboriginal and Torres Strait Islander people, people with disabilities and the elderly.

Men and women exiting the prison system, who Jesuit Social Services works with every day, often report personal experience of complex health issues including cardiovascular disease and diabetes. These marginalised people are particularly vulnerable to COVID-19 - and at the same time prisons are not environments that are generally conducive to the type of important health measures to prevent the spread.

block-time updated-timeUpdated at 7.53am BST

block-time published-time 7.44am BST

The two sides of the national plan debate, represented by Tim Wilson and Anne Aly :

Wilson : (on Afternoon Briefing)

If everybody thinks some of these states will be able to keep Covid-19 and its variants out of their jurisdiction forever, then they have taken departure from reality.

This isn't because any others want to live with it, it is just a reality that you can't give a virus out forever. We don't keep the flu out every season.

If we could, we would, but we recognise there are significant consequences from the decisions we made, the obligations required, and of course we can buy ourselves time, which is what Australia's has pursued.

It is buying ourselves time to get the population vaccinated, build up the health system to respond, but I don't think anybody, if they were being honest and mature or, as you put it, real with the public that they can live free of the virus forever.

Aly: (also on Afternoon Briefing)

It is great to come to talk to you from my cave in WA. Nobody wants to be in lockdown forever. And Labor, [knows] the national plan is based on modelling that makes a number of assumptions, including assumptions about the number of community cases of Covid before we get to a certain level of vaccinations, and whether or not it is safe to open up at that level of vaccination.

... I think those people need to be prepared for the consequences of what that means to accept Covid in the community. I have one son who lives in Melbourne, one in Sydney. Yes, I would love to see them, I would love to be able to hold them and give them a hug, celebrate their birthdays. I have one who is planning to get married next March. I hope I am able to celebrate with him. But, I am not prepared to put my elderly mother or put anybody's elderly parent at risk in order to do that.

block-time updated-timeUpdated at 7.54am BST

block-time published-time 7.38am BST

Remember the aged care royal commission report?

Rex Patrick does. He just wants to see some of its recommendations implemented sooner. So he introduced a bill in the Senate to mandate aged care facilities to have at least one registered nurse present at all times. (That is planned to occur from July 2024 at the moment)

From his statement:

Currently in Australia, there is no nationwide requirement for nursing homes to have a registered nurse on duty at all times.

I'm concerned aged care residents are not getting the care they need, and the care is varied depending on where they are located across Australia. The inconsistent approach leads to variations in the level of care and quality provided to residents. Proper care for our elderly is critical and it requires aged care homes to have registered nurses on site at all times.

block-time updated-timeUpdated at 7.39am BST

block-time published-time 7.35am BST

The Greens senator Mehreen Faruqi introduced a bill to the Senate to ban the export of greyhounds from Australian for commercial purposes - which would include breeding and racing.

Between 2016 and 2021, we exported 1,313 greyhounds from Australia. We don't always think about where they are going.

In her statement Faruqi said:

A ban on commercial greyhound export is long overdue.

Greyhounds from Australia are routinely being sent overseas to race, and often end up in countries where there isn't a semblance of animal welfare protection for these poor dogs.

Greyhound export might make a buck for the industry in Australia, but the welfare of the dogs is routinely sacrificed at the altar of profitability and gambling revenue.

This is a simple reform and an important one. It will put a stop to a completely inhumane practice that has caused far too much suffering for far too many dogs. I hope other politicians can support this important step for animal welfare.

block-time updated-timeUpdated at 7.40am BST

block-time published-time 7.32am BST

I know it doesn't feel like it, but things also happened in the parliament today. Let's take a quick look

block-time published-time 7.24am BST

Jim Chalmers is seemingly trying out Labor's new line against the Coalition that Australians are "paying the price" for the federal government's pandemic missteps:

We said that consistently and the most important part of the national plan is fixing the mess that the prime minister has made of vaccines. Australians are paying the price for his mistakes. We saw that in the national accounts today and we will see yet more prominently in September that will come through in December

... The reason they are closed and we are having these outbreaks and these lockdowns is because the prime minister didn't do his job on vaccines and quarantine. Let's focus on the real problem here, which is the prime minister's failures. Let's fix that up. We've made some constructive suggestions about vaccine incentives and trying to be helpful because there are industries in parts of Australia doing especially tough as a consequence of the prime minister's incompetence.

block-time updated-timeUpdated at 7.32am BST

block-time published-time 7.19am BST

Jim Chalmers continues on that theme, after being asked about Victoria now admitting it can't beat Delta:

It is new territory and that has been a feature all along and there has been some sense of uncertainty and unpredictability but one of the things we now have to be certain of, one of the things that has been entirely predictable is that the economics is a direct consequence of the government inability to get the vaccine rollout right and to some extent the failure to do purpose-built quarantining.

Some of the other things that have been missing and when you think about the slowing economy and shrinking economy in the September quarter, this is the price people are paying when it comes to Scott Morrison and his government when it comes to vaccines and quarantining until we fix that, we will continue to have lockdowns and we will continue to have the social dislocation and the economic carnage we have seen in the last year especially.

block-time published-time 7.17am BST

Jim Chalmers is on Afternoon Briefing where he is asked about the national accounts (Australia's economy grew by 0.7%)

The economy was slowing in the ***data*** that we received today but we know that the economy is actually is shrinking this quarter and we got the numbers today for the June quarter and we know the economy was slow.

It is now shrinking in this quarter and it's important to get that perspective and the economy is growing more slowly than the US, UK, OECD average and that's another important piece of perspective but the other important thing is that for Australians doing it especially tough, particularly but not just in lockdown communities, I think the digits in the decimal places on these quarterly numbers are not the most important thing.

I think for many Australians it already feels like they are in recession and they are who we should focus on.

block-time updated-timeUpdated at 7.20am BST

block-time published-time 7.11am BST

I also hear it makes you about 72% more attractive. I don't make the rules.

enltrThere are 70,000 AstraZeneca appointments available in Victoria right now. It is a safe vaccine. It is an effective vaccine. It the vaccine that is available now. And that means - for the vast majority of people - it is the best vaccine right now.

- Dan Andrews (@DanielAndrewsMP) [*September 1, 2021*](https://twitter.com/DanielAndrewsMP/status/1432928173449043970?ref_src=twsrc%5Etfw)

block-time published-time 7.08am BST

20 exposure sites in South Australia

South Australian authorities have updated the exposure site list for the state, after confirming a fifth Covid-positive truck driver has passed through the state over the past six days. Areas include Nundroo and Ceduna in the west, to Port Augusta, Port Wakefield, Adelaide and Tailem Bend.

[*The exposure sites list has been updated here*](https://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/conditions/infectious+diseases/covid-19/testing+and+tracing/contact+tracing/contact+tracing).

Queensland has also reported a Covid-positive truck driver had entered from NSW.

There is no evidence of any community transmission (as yet).

block-time updated-timeUpdated at 7.12am BST

block-time published-time 6.58am BST

'The federal government is of the view that Queensland should be open'

Scott Morrison said yesterday that each state was at a different point. Karen Andrews now says 'the federal government is of the view Queensland should be open'.

Queensland doesn't have any restrictions (at the moment) so open to what is unclear - I can't see anyone opening to NSW or Victoria at the moment. And Morrison has been trying very hard not to pick a fight with either Queensland or WA (or any of the lockout states) because well, he needs them for the coming election.

Andrews:

It is difficult to understand what the Queensland premier is trying to achieve. We have had a range of statements from her over the last couple of days, if not weeks, if not months, that quite frankly have not made a lot of sense. The Queensland premier is quite clearly doubling down on her 'let's keep Queensland closed' and the federal government is of the view that Queensland should be open.

block-time updated-timeUpdated at 7.04am BST

block-time published-time 6.56am BST

How is a number a security risk?

Karen Andrews:

Because we are not prepared to give any details that would potentially lead to a security issue for those individuals. We know that the Taliban and others are very focused on how many Westerners are in Afghanistan at the moment and we are not prepared to feed into that.

Quite frankly, what we need to be focused on, and what we are focused on as a government, is doing all that we can to support those people who are there to give their loved ones in Australia for those that have them, the support that they need to manage the situation as best that we can.

There is no easy route out of Afghanistan at the moment. I have spoken previously about the opportunity for commercial flights to start. We don't have a time for that at this point in time. We are working with our allies, we are working on the ground with a number of different agencies to look at opportunities for people to exit Afghanistan as and when they can.

block-time updated-timeUpdated at 7.07am BST

block-time published-time 6.55am BST

How many people with Australian visas did we leave behind in Afghanistan?

Karen Andrews:

I am not going to give the details in relation to those people for a whole range of issues, including the security of those individuals.

It would be very unwise for us to be talking about the numbers that are currently there, but I can say that that number is also increasing on a daily basis as people are coming forward and identifying to our officials either on the ground in Dubai that they have family members that are looking to come to Australia or they are identifying to home affairs or Dfat in Australia that they are wishing to come to Australia.

So that number is increasing. We are looking at what the opportunities are to allow people to come here through our humanitarian program.

Of course those people who are Australian citizens seeking to come here, we will do whatever we can to support them. I think it is important that we understand that the environment in Afghanistan remains critical. The terrorist threat is alarmingly high and there are threatened attacks.

So we are aware of that diabolical situation in which people are remaining at the moment. We are doing all that we can to provide a level of support to those people and we will assist them as and when we can.

block-time updated-timeUpdated at 7.02am BST

block-time published-time 6.54am BST

Q: Can you confirm there is another flight arriving in Darwin this evening? How many people are aboard that and what is the breakup of Afghan [visas]?

Karen Andrews:

There are flights coming in on a daily basis now into various airports across Australia. We are looking at how we are reconciling the status of those individuals coming in, in terms of the visa classification, the subclass that those individuals might have, the Australian residents.

We are working through that process and finalising details as we go. But what we should all be very proud of is that Australia uplifted 4,100 people out of Afghanistan and those people are now safe either in Dubai or are on their way here to Australia or are in Australia.

Q: How many people in Afghanistan with valid Australian visas have been in contact with the Australian government to say they weren't able to make it out in time?

Andrews:

We are on a daily basis receiving further applications from people who wish to come here to Australia. I'm not going to give a figure, simply because that is changing on a daily basis.

block-time updated-timeUpdated at 6.58am BST

block-time published-time 6.52am BST

Queensland is taking quite a few Afghan refugees though.

Karen Andrews won't go into the visas she is issuing.

Q: How many unaccompanied children, children without their parents, are currently quarantining in Australia or on their way in from Afghanistan?

Andrews:

That number is actually varying at the moment. It is less than 10 are here at the moment. We all witnessed the scenes in Afghanistan where people were - adults were passing their children through the gates. There are some unaccompanied minors here in Australia at the moment who are being well cared for. We will continue to do that and then there will be others that come into our country over the coming days as well.

block-time updated-timeUpdated at 6.55am BST

block-time published-time 6.51am BST

Karen Andrews is holding a doorstop interview where she deploys the grati-sult - thanking Annastacia Palaszczuk for opening up hotel quarantine for 50 families, while also slamming Palaszczuk for the NRL family decision:

This is great news that the premier has started listening to Queensland who were rightly outraged when NRL players and their wives were flown into Queensland at the same time that Queenslanders were locked out of their own state.

Queenslanders are very concerned at the premier's hypocrisy. On one hand she has said that quarantine in hotels does not work.

And yet she allows a planeload of people to come in - NRL players and wives - to come in from Sydney, the hottest of the hotspots in Australia and to go into hotel quarantine in Queensland, while at the same time making it clear that she will not allow people to cross the Queensland border even if they live in Queensland.

block-time updated-timeUpdated at 6.56am BST

block-time published-time 6.43am BST

Australia Post has sent in a statement on parcel deliveries in locked down areas:

Due to the ongoing impacts of Covid in NSW, ACT and Vic we are temporarily pausing Parcel Post ***collections*** for eCommerce retailers in those jurisdictions from 7am Saturday 4 September until 7am Tuesday 7 September, to help manage the record volumes in parts of our network and return them to a safe and manageable level.

Australia Post currently has 500 people in necessary self-isolation, placing increased pressure on our network, while we also manage flight restrictions, temporary facility closures, and parcel volumes as high as our Christmas peak period.

Deliveries will continue across the weekend, post offices will remain open as usual, and parcel processing continues, as our people deliver record amounts of parcels to Australians. Similarly, services provided for Express Post, Premium, Startrack Express and letters remain unchanged across our network. Lodgements at post offices and standard post boxes will also continue to be ***collected*** and ***collections*** in all other states remain the same.

We sincerely apologise to our customers for the inconvenience.

block-time updated-timeUpdated at 6.47am BST

block-time published-time 6.41am BST

Here is how Mike Bowers saw question time:

Prime minister Scott Morrison talks to Speaker Tony Smith during question time. Photograph: Mike Bowers/The Guardian

Tfw a joke you made about having false teeth becomes part of your parliamentary record:

Minister for defence industry Melissa Price. Photograph: Mike Bowers/The Guardian

Peter Dutton played peek-a-boo:

Defence minister Peter Dutton... Photograph: Mike Bowers/The Guardian ... proves he can still smile. Photograph: Mike Bowers/The Guardian

block-time updated-timeUpdated at 6.44am BST

block-time published-time 6.25am BST

Choice has [*published a sign-up sheet for an open letter*](https://action.choice.com.au/page/88671/-/1) calling on the federal ***agriculture*** minister, David Littleproud, to introduce mandatory standards for pet food in Australia, [*after dozens of dogs in Victoria died after eating toxic meat*](https://www.theguardian.com/australia-news/2021/aug/09/protect-these-animals-calls-grow-for-tougher-australian-pet-food-standards-after-21-dog-deaths). The meat, sold through the Maffra knackery in Victoria, came from horses from the Northern Territory which had eaten indigofera plants, which contains the deadly indospicine toxin. The knackery said it was not aware the meat was contaminated and posted a recall. A Senate inquiry in 2018, after another series of dog deaths linked to the megaoesophagus condition, recommended the pet food industry be subject to mandatory standards. But those recommendations have not been adopted.

block-time updated-timeUpdated at 6.30am BST

block-time published-time 6.19am BST

Well. That has certainly been a whirlwind five or so hours.

Take a moment to catch your breathe. I'm going to have a read over everything and see what I might have missed while I was focused on all those press conferences and I will be right back with you.

block-time updated-timeUpdated at 6.23am BST

block-time published-time 6.19am BST

Question time ends.

One more left for the week and then there is a six-week break.

block-time updated-timeUpdated at 6.23am BST

block-time published-time 6.17am BST

Scott Morrison includes this in an answer:

When you talk about young children... the opportunity for them to sit with a local GP who has helped them with every other sneeze and sniffle, or even more serious things over time, to be able to see a face they know to get that injection and have that assurance from a health professional is extremely important and I want to thank GPs as they go about the job of vaccinating our children

Which is great, if you have a family doctor. A lot of people don't. A lot of people rely on bulk billing centres where they see whomever is available.

There is a lot of privilege being assumed at times in the vaccine discussions. Not everyone has their own doctor. That needs to be remembered too.

block-time published-time 6.13am BST

Nicolle ***Flint*** asks if she can asks the dixer Jason Falinski was supposed to ask, but can't, because of technological issues with his virtual link.

She can. And does. So the member for Boothby asks a question on behalf of the constituents of the member for Mackellar.

Just another example of just how completely ridiculous dixers are.

block-time published-time 6.11am BST

If you haven't received a package, it might be because there is a bit of a backlog in the locked down states.

enltrAustralia Post is pausing parcel post ***collection*** for NSW, Victoria and ACT from 4 September to 7 September because of a backlog [*pic.twitter.com/oXU0ysd1Xl*](https://t.co/oXU0ysd1Xl)

- Amy Remeikis (@AmyRemeikis) [*September 1, 2021*](https://twitter.com/AmyRemeikis/status/1432929951993384966?ref_src=twsrc%5Etfw)

block-time updated-timeUpdated at 6.18am BST

block-time published-time 6.10am BST

Tony Zappia to Scott Morrison :

My question is to the prime minister. Yesterday the prime minister said, ultimately everything is a matter for the states. Was it the states or the prime minister who said the vaccination program was not a race?

Peter Dutton is on his feet:

The prime minister made clear the statement made as a preamble to that question is not accurate, it related to a response the prime minister gave when asked about the closure of state borders. It has been repeated since the prime minister has raised this, and, it is very clear, this misleading statement regardless of how it is repeated is factually not correct, and it should not be allowed.

I'm sorry. I'm just need a moment to go find my eyebrows. I think they might have hit Sarina with how high they just raised, hearing Dutton speak about how factually incorrect statements shouldn't be allowed. (If someone in north Qld could pop them back in the post for me, that would be great.)

Tony Smith is also not having Dutton's hubris:

I can't agree with the Leader of the House, the practice was made very clear, since 1901, it is not for the Speaker to vouch for the accuracy of statements, questions or indeed answers, or indeed answers, which is, if someone claims to have been misrepresented, the standing orders are so organised there is official capacity for them to do that at the end of question time. Or at the end of when a comment is being made. The question is in order.

So Morrison has to answer:

I would encourage the member to go and have a chat to Senator Kitching (sidenote: Tveeder transcribed Kitching as senator Gucci, which for anyone who has seen the House of Gucci preview will find very, very amusing).

Morrison:

The next time they are at caucus, go and have a chat with the senator for Victoria about the progress of the vaccination rollout which she has made very clear is the reason Australia is moving away from lockdowns in this country, and I welcome her acknowledgement of that.

Those here who sit opposite may come in here and seek to undermine that program, they may wish to engage in the usual politicisation of Covid-19 pandemic.

They may wish to choose that they reinforce only one thing to the Australian people, that they are only engaged in negativity, they are only engaged in running down the country, even here yesterday, the leader of the opposition...

Smith interjects:

The question was asked by the member for Makin. The prime minister needs to be relevant to the question that was asked by the Member, it's not an opportunity to begin a political debate on yesterday or two days ago.

Morrison:

What I can confirm is as the minister of health and aged care said today, we are likely to go past the milestone of 20 million doses of vaccine being administered around the country. 20 million, Mr Speaker, 20 million doses, and that means almost 60% of the eligible population, aged over 16, will have had - around 60% of them - will have had their first dose in this country.

That's around 35% have had a second dose, and for those over 50, it is almost now 80% who have had their first dose and 52.9% who have had their second dose and importantly, 87.8% of those aged over 70, the most vulnerable, have had their first dose and 63.8% have had their second dose. And I can update House on my earlier response as further information has been brought to me after my morning briefing this morning, with aged care workers first dose is 82.9% and second dose is 61.3%.

So, the vaccination program is a central part to the government's national plan, to get Australia beyond these lockdowns which are doing such terrible damage to people in this country, that we need to get past these lockdowns, and the vaccination program is liberating Australians from those lockdowns, which is the objective of the national plan.

Not to keep Australians shut in, not to keep them locked out of states round this country, the national plan is opening up Australia, the national plan is about connecting Australians to other Australians, and connecting the economy to the world. So Australian businesses can continue to go forward and have confidence to invest and employ ... (he runs out of time).

block-time updated-timeUpdated at 6.22am BST

block-time published-time 6.01am BST

Melissa Price stumbled in a dixer and says:

Excuse me, I will put my teeth back in.

She then adds "not yet" (as in she doesn't have false teeth yet" but Tony Smith points out that it is too late and "will probably get a run".

Yes. Yes it will.

block-time published-time 6.00am BST

Anne Stanley to Scott Morrison:

Yesterday the prime minister said ultimately everything is a state matter. Was it to the states or was it the prime minister who failed to establish a system of safe national quarantine?

Morrison:

Again, Mr Speaker, the question from Labor is misrepresenting the statements of yesterday, Mr Speaker. I made it very clear that the border measures which were put in place by the states related to public health orders and they are key responsibilities of the states, when it comes to people moving from one state to another, so Mr Speaker, I would ask the Labor party cease misrepresenting that\*. [This is the same person who won't stop saying Anthony Albanese wanted to see worse case scenarios with Covid.]

But Mr Speaker, I am asked about the quarantine, and the most important challenge for quarantine right now is to ensure that home quarantine trials are successful, so home quarantine becomes the norm that enables Australians who are overseas to be able to return, that enables Australians who are here now and have been vaccinated, so they can go overseas, Mr Speaker, as they used to, and be able to return in quarantine at home.

... It is so important to enable international travel to start again, and home quarantine, Mr Speaker, is the answer to that.

That is what is set out in the national plan. That is what is agreed and the national plan. That is what is being led by the commonwealth, Mr Speaker, in moving us into a home quarantine phase that will enable Australians to travel again.

It will enable more people to be able to come into the country, be they students or be they skilled workers that are so necessary to Australia's economic performance, and that they, Mr Speaker, can take advantage of a range of different quarantine arrangements, both commercially provided and otherwise provided, which will enable the national plan to gear up and strengthen our economy into the future.

So Mr Speaker, home quarantine is what is needed\*. Home quarantine is what is going to release Australians, out of the lockouts, Mr Speaker, out of the lockdowns, and to ensure that safely, Australia can live with this virus.

I would urge all members of this chamber to support be moved to go now to home quarantine, but will see Australians being able to return home, who are vaccinated, and vaccinated Australians being able to travel again, to be reunited with their families overseas, Mr Speaker.

That is the challenge which is now before us. That is what is set out in the national cabinet plan which was agreed to and that is what I look forward to working with closely, whether it is South Australia whether trial is already under way, whether the trials will be done New South Wales, and I encourage all other states, be it Queensland or Western Australia or Tasmania, Mr Speaker, to get on board with those initiatives.

I know they are watching those trials closely and they will be very enthusiastic about taking it up because the national plan enables Australians to live with the virus and home quarantine enables Australians delivered the virus and connect again with each other and all around the world.

\*There will still be a need for dedicated quarantine for workers.

block-time updated-timeUpdated at 6.15am BST

block-time published-time 5.55am BST

Scott Morrison also repeats the line of lives saved, using the OECD averages:

More than 30,000 lives have been saved in this country because of the responses that the government, together with our partners around the country, has been putting in place now these many months, more than 18 months, and not just the 30,000 more lives that have been saved, Mr Speaker, but the million jobs, the million Australians who are back in jobs and can look forward to a future with confidence, Mr Speaker, because they have been living in a country whose Covid response has done both of those things. Saving lives and saving livelihoods.

Australia's vaccination program was delayed. It started in February, but it wasn't until Delta hit that there was any urgency from the federal government in regards to it. It previously was "not a race". The mRNA doses which are coming now were scheduled to come - it was part of the original plan. There are still massive failures, particularly for Indigenous communities, which are playing out before our eyes in real time.

block-time updated-timeUpdated at 6.00am BST

block-time published-time 5.50am BST

Scott Morrison is now claiming credit for saving "hundreds and hundreds and hundreds" of lives in aged care centres.

We have continued to work on what is a very difficult program in that sector, but we do know the decision taken by our government to ensure that we focus first and absolutely on getting to every single residential aged care facility in this country ... has saved hundreds and hundreds and hundreds of lives, Mr Speaker, and that is ultimately the outcome this is all about.

The vaccination program in aged care homes was delayed. Hundreds died in aged care homes in 2020.

And there still needed to be a massive push, which needed the states to get involved, to get aged care workers vaccinated.

Out of all the claims, the aged care vaccinations being a "success" is not one of them. It was forced, because of a complete failure at the beginning.

block-time updated-timeUpdated at 5.59am BST

block-time published-time 5.47am BST

Anthony Albanese has had enough and asks Scott Morriso n to withdraw his comments:

I'm asking prime minister to withdraw the comment he just made, he has made it repeatedly.

I have now lost seven of my constituents. They have died. No one, no one is Australia is hoping for the worst from this disease because that is the worst, a loss of life.

Tony Smith says the comments are not unparliamentary, so it is up to the prime minister.

He does not withdraw.

block-time updated-timeUpdated at 5.49am BST

block-time published-time 5.45am BST

Anthony Albanese to Scott Morrison:

Yesterday the prime minister said, ultimately everything is a matter for the the states. Was it the prime minister who failed to deliver enough vaccine supply?

Morrison (who gets quite personal and continues on his "Anthony Albanese is negative" theme, which you will see more and more of as the election approaches):

I was asked about state borders when that matter was raised yesterday.

That is a public health, social measure a border closure is done on the basis of a public health order.

That's exactly what it is, the leader of the opposition might want to freshen up on some of the facts, get across some of these issues if he wants to engage in these snide interjections that are a result of his own lack of knowledge and understanding of the challenges this country faces, what I do know is this, to date, I read that this is a very wide statement made by a member of the Senate, 'I think we're getting to the end of the era of lockdowns, partly because we are doing so well on vaccinations'.

Mr Speaker! The Labor senator Kimberley Kitching has had an outbreak of truth in the Labor party.

There has been an outbreak of truth, Mr Speaker, and I think the leader of the opposition is vaccinated against the truth.

There is no shortage of that when it comes to the leader of the opposition. To date, what we do know today, again more than 330,000 vaccine doses administered, right around the country, again.

Today, we will go close and reach the 20m doses that have been administered around the country.

This week, we announced the half a million of additional doses of hope coming for Pfizer with arrangements we put together with the government of Singapore.

The million doses and more we secured in our arrangement with the Polish government, working these issues, ensuring we leave no stone unturned\*[because not enough was ordered in the first place] to make sure we can continue to accelerate the vaccination program that has now achieved rates of weekly vaccination, that exceed those, even of the United States and the UK, at their biggest.

Those opposite may want to talk this down, I'm pleased Senator Kitching has decided to take a different approach, they may seek to underline and be negative but the government will continue to deliver for the best of this country and we are not only seeing that with the vaccination program, we see it with the economic supports that has enabled us to bring Australians to what is one of the biggest crises this country has ever seen. We will continue doing that while the opposition will continue to be negative.

block-time updated-timeUpdated at 5.53am BST

block-time published-time 5.37am BST

Daniel Hurst just pointed out to me that Peter Dutton appears to be making plans for this government to remain in power "for decades" given this part of his dixer answer:

"And for all of those leaders on both sides of the equation, who have given their commitment to, this compact for 70 years should know, that this government will continue to reinforce and Anzus treaty for many decades to come."

block-time updated-timeUpdated at 5.44am BST

block-time published-time 5.36am BST

Sharon Claydon to Scott Morrison:

Rachel is 24 weeks pregnant and in my electorate, she cannot get an appointment for the vaccine recommended for her until November 2, she is on a waitlist at five GP clinics and was turned away when she tried to get a vaccination at a walk-in clinic.

In Newcastle, another pregnant woman just like Rachel is in intensive care with Covid-19. How can the prime minister leave pregnant women so vulnerable?

Greg Hunt takes this one.

He goes through the advice that pregnant people should be vaccinated, and then he goes through the vaccination options.

We continue to encourage and provide practices to provide priority to pregnant women in line with the advice of Atagi issued on 1 June.

Which is great. Except pregnant people can't get priority and are waiting for their vaccinations, like anyone else where mRNA vaccines are the only recommended option.

block-time updated-timeUpdated at 5.45am BST

block-time published-time 5.30am BST

The US secretary of state, Antony Blinken, has mentioned climate change in a message marking the 70th anniversary of the Anzus treaty - another sign of the emphasis the Biden administration is placing on the issue in the lead-up to the critical climate talks in Glasgow in November.

The US embassy in Canberra has circulated statements from Blinken and the US defense secretary, Lloyd Austin, to mark the occasion. The pair is due to host an in-person meeting with Marise Payne and Peter Dutton in Washington DC this month.

In his statement, Blinken said the Anzus treaty was "a long-standing testament to the strength of our partnership" and was "as essential to the safety and prosperity of our countries today as it was 70 years ago".

" Our alliance is much more than a military pact. It helps underpin the stability of the region and democracy in the Indo-Pacific. It facilitates the movement of goods, services, and investment dollars, as well as ideas, research, technology, and people. It supports our joint efforts to advance human rights, promote the international rules-based order, assist our Pacific neighbors, and cooperate on issues of global concern, such as public health and climate change."

Blinken said Australia and the US had served side by side in Afghanistan for 20 years. "As President Biden said, 'We went in together and we're leaving together, and now we're working together to bring our people and our Afghan partners to safety.' We will always be grateful for the help and trust we find in Australia."

Austin said the United States would never forget that after the September 11 terrorist attacks, Australia invoked, for the first time in its history, the ***collective*** defence article of the Anzus Treaty. " Our Australian allies stood by with us to the very end of our presence in Afghanistan and the United States will be forever grateful."

Both Blinken and Austin said they looked forward to welcoming Payne and Dutton to Washington DC for meetings, including the annual Australia-United States Ministerial (Ausmin) consultations.

block-time updated-timeUpdated at 5.45am BST

block-time published-time 5.29am BST

Peter Dutton is taking a dixer on the Anzus relationship.

block-time updated-timeUpdated at 5.33am BST

block-time published-time 5.29am BST

Terri Butler asks Scott Morrison this question:

Why didn't the government put rules in place to require jobkeeper payments to profitable companies with rising revenue be returned to the taxpayer? The government makes welfare recipients and parents that receive the childcare subsidy return excess payments. Why would the same rules not put in place for profitable companies with rising revenue?

Morrison is now giving a running commentary on how amazing jobkeeper was (leaving out that the wage subsidy was originally Labor's idea). He is very cranky again today. He then moves on to Labor "flip flopping".

That is what we put in this place, we made that promise, and labour voted for it. Labour voted for it, Mr Speaker. We said we were going to stand by this economy and those businesses and we made that legal. We did that together. Mr Speaker, what I hear from those opposite now is that they want to change the rules afterwards. They want to change the goalposts. They want to shift the mark, Mr Speaker. They want to have it each way, Mr Speaker. They want to support jobkeeper and they want to oppose jobkeeper. This is a constant theme of the leader of the Labour party, Mr Speaker. A constant theme. We made that commitment.

Tony Burke has a point of order:

On direct relevance, the question does not go to the whole of the jobkeeper program. The question, sorry ... I've got the call for the moment. [ Peter Dutton interjected] The question does not go to the whole of the jobkeeper program. The question goes simply to those employers, those companies, but ended up with rising revenue, and turned a profit.

Dutton then gets up:

At some stage I probably should put a question to you about this continual conduct which you have commented on, and I think chastised, both the Leader of the Opposition under the manager of opposition business on a number of occasions, because it is an abuse of the standing orders. And they repeatedly get up and make statements...

Tony Smith cuts Dutton off and tells Morrison to stay relevant.

He does not:

The question put by the Labor member, the question put by the labour member betrays what we have seen from the Labor party in this place.

It betrays, Mr Speaker, because what was essential at that time was that what was committed to was followed through, Mr Speaker. And that is what gave the Australian business community the confidence to keep people on the payroll, to then put a million people back into work, and too insular, Mr Speaker, that under the national accounts, as we have just seen, but Australia's economy is now bigger at the end of June that it was before we went into the pandemic.

What we have seen, Mr Speaker, and the questions put by the Labor party, is that they will happily change the rules on business, Mr Speaker. They will happily flip it and they cannot be trusted. They cannot be trusted on anything they say.

Morrison's time is up, but he keeps yelling his answer. "Back in black" someone from Labor yells. Morrison is still going, and Smith repeats his time is up and the House moves on.

block-time updated-timeUpdated at 5.41am BST

block-time published-time 5.22am BST

Josh Frydenberg gets a dixer where he is asked to explain something "yet again" to the House.

That's what press releases are supposed to be for. Not "questions without notice".

block-time updated-timeUpdated at 5.31am BST

block-time published-time 5.21am BST

Adam Bandt to Scott Morrison :

Your job is to keep all people safe, not just some.

But even though you've set an 80% vaccination target for adults, there's no target for children, nor for at-risk communities like First Nations peoples or people with disabilities.

Everywhere from Wilcannia to the United States, we're seeing the virus rip through at-risk communities.

Prime Minister at national cabinet this Friday, will you ensure the national plan has separate vaccination targets for children, First Nations peoples, people with disabilities and other at-risk groups, so that they're vaccinated to at least the same levels as the broader population when restrictions are lifted?

Morrison:

Thank you, Mr Speaker, and I thank the member for his question and highlighting those very important groups within our community. All of which are encompassed in the national plan.

The member may not be familiar with the details of the national plan, Mr Speaker, and in particular, how it recognises that even within the overall vaccination targets of 70% and 80%, but there is a strong recognition in all the work that has been done going into that plan.

They will need to be careful management around vulnerable communities. Those vulnerable communities are CALD communities, Indigenous communities, a range of many other communities, Mr Speaker, where vaccination levels, for a range of reasons, those who are homeless, Mr Speaker, those who have issues with substance abuse, Mr Speaker.

There are a range of varying groups across the community which will require continued, careful management of our public health.

Now, the chief minister of the ACT has been making this point extremely well, he and I have discussed it on numerous occasions as we have been preparing plans to deal with the pandemic at post 70 and 80% vaccinations will require ongoing and careful public health plan that deals with disadvantaged communities.

Socio-economically disadvantaged communities. We have seen this and how the pandemic has played out not just here in Australia but all around the world, and there will be a very clear and cooperative national strategy that deals with the ongoing public health needs of disadvantaged communities.

But that plan will ensure that the broader community will also be able to go forward, and this is why it is a safe plan.

It is a safe plan that enables the broad spectrum of Australia to move ahead and to avoid these terrible lockdowns that are causing so much pain, and for Australians to move on from that and not live in fear of them either\*, but at the same time, ensure that we have very targeted and focused public health responses at a state and federal level, that understands the very serious needs of those communities, be they in remote places, this is a matter of the chief minister of the Northern Territory has consistently raised, and we have worked together with him from the outset, Mr Speaker, working closely with him as we are indeed now, because there is such a disparate, a disparate, Mr Speaker, performance on vaccinations.

That is exactly what the national plan provides for. I am sure the member will be pleased to hear that and if you would like to learn more about it, Mr Speaker, and we would be very happy to ensure he could be provided with further details, if he were so interested.

\*This is a new message as part of the national plan and is aimed at the states where lockouts, not lockdowns, have been the norm.

block-time updated-timeUpdated at 5.33am BST

block-time published-time 5.14am BST

Dugald Milton Dick asks the current deputy premier why Pauline Hanson announced a government grant, before the government MP had a chance to.

Paul Karp has the story here:

Related: [*Labor questions whether Coalition let Pauline Hanson take credit for $8m grant to Rockhampton hospice*](https://www.theguardian.com/australia-news/2021/sep/01/labor-questions-whether-coalition-let-pauline-hanson-take-credit-for-8m-grant-to-rockhampton-hospice)

The current deputy prime minister;

I would like to note that of course, we have Labor Party members who lobby us, for grants, especially in regional areas, yes we do. I can give you the letters. It goes very well. And of course we have senators who lobby us.

He then moves on to grants the Coalition MPs have.

He then comes up with this absolute garbled sentence:

I would say quite obviously that is the case that if we have an announcement, in a whole range of people, you know what they say, it is never about, you say about success and failure and the parentage of both, we can tell you that success is driven by government, announcements are driven by government, the government has the expenditure review committee, that approves the money. The government has the cabinet that approves the policy.

He's still going. I can not.

block-time published-time 5.08am BST

The current deputy prime minister refers to George Christensen as the "unassuming and quiet member for Dawson", perhaps proving TCDPM really does live in a completely different reality to the rest of the world.

block-time published-time 5.06am BST

Stephen Jones to Josh Frydenberg:

The treasurer said that our economy was the head of the pack, but new numbers show it is growing more slowly than the US, UK and the OECD average, and the current quarter has been extremely tough Australians. Was your claim ahead of the pack about as accurate as your claim to be back in black?

Frydenberg:

The reality is, it didn't contract. The reality is, it didn't. Reality is, at a 0.7% in the June we saw economic growth that was better than what the market was expecting, Mr Speaker.

He then goes through all the countries who have seen worse outcomes and federal government funding programs.

block-time updated-timeUpdated at 5.08am BST

block-time published-time 5.05am BST

Scott Morrison takes a dixer from Andrew Wallace, and thanks him for his "tireless advocacy" on mental health, particularly for young people.

"He has been an extraordinary advocate," Morrison says.

Wallace's most recent advocacy compared "children's fear of climate change with the threat of nuclear annihilation in the 1970s and 80s, and requested full funding for chaplains in every school to help ease concerns".

Related: [*Coalition MPs want more school chaplains to help children suffering mentally due to 'alarmist' climate activism*](https://www.theguardian.com/australia-news/2021/aug/31/coalition-mps-want-more-school-chaplains-to-help-children-suffering-mentally-due-to-climate-activism)

block-time updated-timeUpdated at 5.09am BST

block-time published-time 5.01am BST

Question time begins

And we are straight into it.

Anthony Albanese to Scott Morrison:

I refer to threats by the attorney general that states may face high court challenges to force their borders open? Can he confirm he spent $1m in taxpayer money to tear down the West Australian border and some of it went directly to Clive Palmer?

Morrison :

We did not pursue that matter and we are not pursuing those matters.

Labor laughs.

block-time updated-timeUpdated at 5.09am BST

block-time published-time 4.56am BST

Question time is in about five minutes or so.

But to be clear - Victoria is no longer going for Covid zero, or thinking it can see case numbers go down. Case numbers in Victoria WILL go UP. There will be a plateau, but the focus now is on suppressing the cases as much as possible, to buy time for people to get vaccinated.

Daniel Andrews says you cannot live with Covid now. The aim is 80% of the adult population double dosed vaccinated.

He says that is the national plan. Because then, once open, it will be about managing the pandemic of the unvaccinated.

"At 80% double-dosed, it is a fair fight," Andrews says. But the health system won't cope now.

block-time updated-timeUpdated at 4.58am BST

block-time published-time 4.51am BST

To the other state premiers, Josh Frydenberg says:

With respect to the premiers, my message is very clear. Stick to the plan. A plan that you agreed to at national cabinet. A plan that gives Australians hope. A plan that allows businesses to reopen and plan for their own future. A plan that will allow our kids to go back to school.

A plan that will allow us to attend the funerals and weddings of loved ones.

A plan that will allow families to be reunited across state and territory borders. A plan that takes Australia forward to living safely with the virus.

block-time published-time 4.51am BST

Josh Frydenberg is doing his national accounts presentation, and takes a moment to acknowledge the Victorian position:

I'm confident that now with those 70 to 80% vaccination targets in sight that we'll see an easing of restrictions, and I welcome the acknowledgement in Victoria today that eliminating the Delta variant is an impossibility.

It cannot be done. No country has done at and based on the best medical advice we have, we can't do it.

So we have to learn to live with a virus, that means rapidly vaccinating as many people as possible, bringing more supply online and then using those restrictions as we get to those targets.

block-time updated-timeUpdated at 4.52am BST

block-time published-time 4.49am BST

Daniel Andrews says specific restrictions for specific LGAs "don't work".

"They didn't work last year, and if they didn't work last year, they won't work. And I don't have advice to do it."

block-time published-time 4.46am BST

Is Melbourne under lockdown until at least the end of October?

Daniel Andrews doesn't say yes, but he says there will be significant restrictions until vaccination rates hit the levels where enough of the population can be protected.

He says the previous aim was to drive down cases, but that won't be possible, so with the new advice, the aim is to keep cases as low as possible in order to buy time for the vaccinations to take place.

"I want to keep the case rate growing... as slowly as possible. That won't be easy, but I think we can do it," he says.

For those wondering, Andrews also says there is no harder lockdown rule which could achieve any better outcomes.

block-time updated-timeUpdated at 4.51am BST

block-time published-time 4.41am BST

Victoria is still waiting on advice about whether or not it will be shortening the gap between AstraZeneca vaccines.

Daniel Andrews says he hopes to be able to say they can halve the interval between the doses.

block-time published-time 4.40am BST

Daniel Andrews will meet with Scott Morrison (virtually) tonight to discuss vaccine passports and the like - and what life looks like past 70% double dose.

block-time published-time 4.39am BST

Prof Brett Sutton says that Victoria is on track to reach its double dose 70% vaccinated target by mid-October.

He says "we will see the curve bend on this outbreak" - but that NSW is also showing "what the real world trend is doing, as well as the modelling".

block-time updated-timeUpdated at 4.40am BST

block-time published-time 4.38am BST

Here is the official release:

enltrOn the advice of the Chief Health Officer, Victoria's lockdown will be extended to slow the spread and keep Victorians safe. Due to the level of community transmission and number of unlinked cases, almost all restrictions will remain in place. [*pic.twitter.com/Gr3IG7N4b5*](https://t.co/Gr3IG7N4b5)

- Dan Andrews (@DanielAndrewsMP) [*September 1, 2021*](https://twitter.com/DanielAndrewsMP/status/1432899675682529283?ref_src=twsrc%5Etfw)

block-time published-time 4.35am BST

It wasn't just the case numbers, Daniel Andrews says, it is also the number of mystery cases.

People are also not getting tested when they have symptoms, and the nature of Covid means people can be infectious before they have symptoms.

Andrews says lockdown fatigue is real, and they recognise it but it is also something they have to deal with here.

He also acknowledges that insecure work plays a role, and that a person may be the only earner for their extended family, and they feel they have to go to work in order to provide for them.

He says human behaviour is "complex" and can't always be anticipated.

The advice is the numbers will go up. About 30% every 11 or 12 days at the moment. So the challenge is now to keep numbers low, in the circumstances as they are.

block-time updated-timeUpdated at 4.39am BST

block-time published-time 4.30am BST

What changed between yesterday's press conference with Daniel Andrews and today's?

The advice given to the government last night by the CHO.

Andrews:

The advice that has been provided to us and it was provided at critical point that this is not going to go down.

block-time updated-timeUpdated at 4.33am BST

block-time published-time 4.27am BST

Jeroen Weimar says it is all about managing now:

It means for all Victorians, it's really important now that we all maintain that vigilance, that we test on symptoms, not the day after or a couple of days later, we test immediately when we have symptoms. That we isolate if we're asked or told to do so and that we all play our part in getting these outbreaks as much under control as we need to in order to look forward in confidence to get some freedoms back over the days and weeks ahead. So we can still slow this one down. We can still protect our communities and if we keep working together, we can look forward to the confidence to the weeks ahead.

A person receives a Covid test at a pop-up site in Altona North in Melbourne. Photograph: Daniel Pockett/EPA

block-time updated-timeUpdated at 4.36am BST

block-time published-time 4.26am BST

Jeroen Weimar, the Victorian Covid commander, says the last two days have been rough.

Yesterday was a very sobering day in terms of our battle with coronavirus.

The two people who passed away, two Victorians have passed away, one woman in her 60s who was in the second week of her infection, and it was being supported by one of our health units passed away at home in Hume.

The second individual passed away, woman in her 40s, passed away in Darebin.

She was confirmed as a Covid case by the coroner. It's been the case that we haven't had a fatality here in Victoria with Covid since 18 October last year.

We have 120 new cases. It's 2 September last year that we got anywhere near that kind of number in term of daily caseloads in Victoria.

Now, 900 active cases in total, 895 local community cases active in Victoria. Two-thirds of those cases are under the age of 40 with 187 of those cases under the age of 9. This continues to be an outbreak impacting mostly younger Victorians and younger and more active Victorians. There are 58 people in hospital. Of those, half are under the age of 50, two are infants under a year old, and two are children aged 10 and 11. There are 21 people in ICU, 14 of those on a ventilator.

block-time updated-timeUpdated at 4.38am BST

block-time published-time 4.21am BST

He finishes with:

We've got to plan to ease restrictions but we do need to bend the curve. We need to get lower case numbers than we might otherwise get to. So, please, follow those rules. They are still the bedrock, they're still going to be doing the hard work of keeping numbers in check. If you do need support, it is available. Financial support in particular. If you have symptoms, please, please, get tested. And if you don't, and you have yet to receive your first or second dose of vaccine, please make that booking and get vaccinated.

People wait after receiving their Covid vaccine at the Royal Melbourne Showgrounds in Melbourne. Photograph: Daniel Pockett/AAP

block-time updated-timeUpdated at 4.28am BST

block-time published-time 4.21am BST

Brett Sutton says it will be a long three weeks, but the 70% target will be worth it:

When we get to 70% of eligible Victorians getting that first dose, as the premier said, we can look at expanding that 5km to a 10km radius from home for the purpose of exercise and shopping. In-home care like babysitters can be further extended to family. Primary age children, if one parent is an authorised worker and exercise for that additional hour, outdoor personal training, skate parks, private house inspections and the increase in our construction workforce.

Again, not dramatic changes but a step towards that more normal life that we are seeking to achieve. And it can make us feel a little bit closer to normal as we move by increments.

But it is about three weeks' away. We need to get there as fast as we can. We'll make those further assessments as we progress. It may follow the trajectory that we expect, but we could equally see better or more challenging conditions. So we just need to watch each and everyday and make those assessments.

block-time updated-timeUpdated at 4.30am BST

block-time published-time 4.19am BST

Prof Brett Sutton:

Absolutely it's tough and three weeks seems like an eternity. That light at the end of the tunnel is too dim and the tunnel is too long, but it is a light at the end of the tunnel.

It is the genuine pathway out of here that means that we can take those small steps forward, bit by bit, and not have to take backward steps again.

But it is such hard work for parents, for kids, for whole families and for single people.

For all of us who miss that human contact, for people we haven't seen in weeks and weeks and weeks.

I do want to recognise the sacrifices and the wonderful work that so many millions of Victorians have done to get us to this point to allow us to be position to be able to protect our Victorians and protect our health system at the same time.

It's taken a couple of weeks to get our case numbers from 50 to 100. That increase is slower, much, much slower, than it could have been otherwise but it is an increase and that's why my advice has changed.

It's not to say that the efforts aren't as substantial as they have always been. It's a recognition of the reality of Delta and of the fact that despite all of these extraordinary efforts between contact tracing and between millions of Victorians following the rules, we are still seeing a slow and steady increase.

So we have to move as fast as we can to get the highest possible vaccination coverage which will change how transmission occurs and will see us plateauing with our case numbers but we want to do it at a point where our health system is not overwhelmed where we don't have dozens and dozens of people dying in Victoria.

Flinders Street in Melbourne. Photograph: Daniel Pockett/Getty Images

block-time updated-timeUpdated at 4.32am BST

block-time published-time 4.11am BST

Victorian CHO Prof Brett Sutton continues the sombre tone of this press conference:

Today's number is not a great number. We know that. It shows us why we need to continue our very substantial efforts to slow the spread of the virus, to put a cap on the numbers that we might get to until enough of us have vaccinated. But 120 is still far less than we would have seen otherwise if we hadn't had the restrictions that we had in place and continue to have in place. It shows that applying the pressure avoids cases today that is avoiding dozens of cases next week, hundreds of cases next month, thousands of cases.

block-time updated-timeUpdated at 4.26am BST

block-time published-time 4.11am BST

'This is a race to 80', Daniel Andrews says

Daniel Andrews:

We have thrown everything at this, but it is now clear to us that we are not going to drive these numbers down, they're instead going to increase.

Now it's up to us to make sure they don't increase too fast and they don't increase too much relative to the number of people who are getting vaccinated every single day every single week. I much prefer to be here announce that we're opening up. There'll be a time for that, but it simply can't be before we get to 70% double dose and 80% double dose.

There are some things we can do along the way. I have announced some of them today.

We will look very carefully at whether there is more that we can do and if we can do that safely, then that will add to the list for the 22 or 23 September.

Until then, please get tested as soon as you have symptoms. Please follow these rules, they're about your safety as much as anyone else's.

They're about making sure our nurses and doctors don't have more work to do and, please, go online and book a vaccination appointment, talk to your pharmacist, talk to your GP. There's vaccines there available. Let's use up all those appointments.

This is a race to 80.

Victorian premier Daniel Andrews speaks to the media in Melbourne, Wednesday, 1 September 2021. Photograph: Diego Fedele/AAP

block-time updated-timeUpdated at 4.16am BST

block-time published-time 4.09am BST

In case it wasn't clear before, Daniel Andrews is repeating, Covid zero is not possible.

This is not the advice I wanted to receive. I'm sure it's not the advice of the chief health officer wanted to give us.

But none of us have a luxury of pretending that reality isn't just that. The difficult circumstances that are all too real that we face across our state. If we all look out for each other, if we all do as we have done before and find it in ourselves, with support, to get through this, then we can vaccinate faster than cases grow. If we opened up, that would not be the case.

In fact, cases would grow so much faster than we can vaccinate people. And that means our hospitals will be full and that means Covid patients and all patients, regardless of what you need, will have their care compromised.

As I said yesterday, we can, all of us, manage a pandemic of the unvaccinated if that number is quite small. That group of unvaccinated is quite small.

But at just 35% double dose in Victoria and across the nation, they are the numbers, the group of people who are yet to be vaccinated is just too big for our nurses and our doctors and our ambos to cope with.

We got to buy time to allow vaccinations to be undertaken all the while doing this very hard work, this very painful and difficult work, to keep a lid as much as we can on cases.

A person exercising at Albert Park Lake in Melbourne. Photograph: Daniel Pockett/Getty Images

block-time updated-timeUpdated at 4.20am BST

block-time published-time 4.08am BST

Daniel Andrews continues on AstraZeneca:

Of course, there is an informed consent process, speak to your GP or if you make a booking at a state clinic and you come to one of our state clinics, we have guaranteed that there will be a senior clinician either a doctor, a pharmacist or a senior nurse immuniser who will be able to talk to you about what AstraZeneca means for you and then you can make an informed decision as literally millions of other Victorians have made.

Those appointments are available right now.

We can't wait for stocks to arrive when promised in September, October, November. We cannot wait for deals albeit they're good deals to do but we can't bank on the next deal that's done with Poland or Singapore.

There is a good, effective safe vaccine available right now. We have always pushed this because it's always been true - it is a safe and effective product and it is on the shelves available in the warehouse right now.

The appointments are there, if you go online you can put your name beside one of those appointments and play your part.

More than 70,000 available right now over the next three weeks. If they're taken up we'll add more. We will add more. And we will be closer, sooner, to that 70% first dose target and all the other vaccination targets that are critical to us protecting our health system.

block-time updated-timeUpdated at 4.25am BST

block-time published-time 4.06am BST

Daniel Andrews then turns to people who are putting off getting vaccinated when they have access to AstraZeneca.

He has no time for it.

Andrews:

I just want to make it very clear - there are more than 70,000 AstraZeneca appointments that are available in state clinics right now.

There is, I think, a sense and it's not a criticism, just a sense that I think that has grown that people can wait.

People can afford to wait, they'll get a vaccine of some sort or another down the track, they can get it in a month or two. And that will be all fine.

My message to every Victorian is - no, we cannot wait.

You need to get vaccinated and you need to get vaccinated as soon as possible. And the best vaccine is the one that you can access today.

I don't have Pfizer for everybody and it is a long time off before we will have Pfizer for everybody who perhaps wants that. Again, I just make the point - 2.6m doses of AstraZeneca have been administered in our state over the last few months.

This is a choice that literally millions of Victorians are making. It is a safe vaccine, it is an effective vaccine. It is the vaccine that is available now and that means for the vast majority of people, it is the best vaccine right now.

People line up for Covid vaccines at the Sandown Racecourse Vaccination Centre in Melbourne. Photograph: Daniel Pockett/EPA

block-time updated-timeUpdated at 4.11am BST

block-time published-time 4.04am BST

Most of regional Victorian lockdown potentially ending next week

Turning to regional Victoria (other than Shepparton which is experiencing an outbreak).

Daniel Andrews says it is very possible the regional lockdown (possibly with the exception of Shepparton) could end in most regional areas, next week.

But no promises as yet. More detail will be coming next week. And there will still be "significant restrictions" and travel from metro Melbourne won't be allowed.

block-time updated-timeUpdated at 4.06am BST

block-time published-time 4.00am BST

Face-to-face learning is out for Victorian students for the rest of term three though.

Next week, there should be some guidance on what term four looks like.

block-time updated-timeUpdated at 4.06am BST

block-time published-time 4.00am BST

What does the school year look like for Victorian students?

From 7-17 September, schools will contact students and their families about vaccinations for VCE students. That will be done through state run hubs and will be open for students doing Year 12 exams (including Year 11 students doing Year 12 subjects).

That should mean Year 12 students will have at least one dose by 5 October.

You can go to a GP or pharmacist earlier, if you are able to make those appointments.

block-time updated-timeUpdated at 4.07am BST

block-time published-time 3.58am BST

Changes for 23 September or 70% vaccination for Victoria

Daniel Andrews then moves on to what life looks like with 70% of the adult population vaccinated in Victoria:

Everything else has to stay in place until on or about 23 September when we get first dose 70% across our state.

That's a significant milestone.

And it's at that point that the chief health officer had advised that it will be safe for us to do the following: expand the 5km radius to 10km for shopping and for exercise.

It will also be it safe for us to extend the time to exercise from two hours to three hours per day.

It will also be safe for outdoor communal gym equipment and skate parks and things of that nature to reopen.

Outdoor personal training will also be allowed with up to two people plus the trainer.

Child-minding for school-aged children will be permitted in terms of some further changes there, real estate, private inspections of unoccupied premises for a new purchase or end of a lease will be permitted.

There'll be rules applied to that. Construction sites will be able to increase to 50% of their capacity where 90% of their workforce have received at least one vaccine dose.

So, again, linked to the statewide achievement of 70% first dose, but also where industry can get themselves vaccinated through that program, we will be able to allow further expansions of that economic activity.

block-time updated-timeUpdated at 4.05am BST

block-time published-time 3.56am BST

Playgrounds to reopen in Victoria, changes to childcare

So what does the transition look like?

At first, not a lot.

Daniel Andrews:

So, firstly, from midnight tomorrow night, the chief health officer has advised that playgrounds can reopen.

He'll speak to the logic and the rationale behind that and also his expectations of how playgrounds will work and the rules that need to be followed in just a moment.

Also the chief health officer has advised that from midnight tomorrow night, some of the in-home child care arrangements that had been disrupted by rule changes will be able to tidy that up and have some of those what are principally long-standing arrangements reinstated where families have authorised workers in their household.

That's as far as we can go in terms of changes effective from midnight tomorrow night.

block-time updated-timeUpdated at 4.01am BST

block-time published-time 3.55am BST

Daniel Andrews continues:

We can, all of us, manage the growth in these cases. It will be hard. It will not be easy.

But we are confident that as we continue to vaccinate, by the time we reach 23 September, which is our 70% first dose target day, that is when we believe we perhaps may even be able to with some additional doses coming from Singapore and hopefully I'll come to - in a minute I'll come to the notion of people taking up empty AstraZeneca appointments right now, hopefully we can be even sooner than the 23rd, maybe a few days earlier, but if we can all play our part in getting vaccinated, if we can reach our 70% first dose target on or about 23 September, then there are some changes that we can make to these rules.

block-time updated-timeUpdated at 3.58am BST

block-time published-time 3.54am BST

Daniel Andrews:

This is very, very tough. But it is simply not possible to make wholesale changes, to have our freedom day if you like, or an opening up day in metropolitan Melbourne in the next few weeks.

That is going to require us to hit our vaccination targets because that's what gives us the protection against infection and most importantly it gives us the protection against hospitalisation.

Now, some people listening would say, what have these last four weeks been about if we can't drive these numbers down and instead they're going to grow?

Well the Burnett Institute have estimated that what we have all done, what we have all given these last four weeks, has basically prevented around 6,000 cases of this virus.

That means that every Victorian has also prevented around 600 people being admitted to hospital and no one gets admitted to hospital with coronavirus because they're mildly unwell.

They are all very unwell, some acutely unwell and, indeed, in need of intensive care.

Now, of course, having avoided 6,000 cases over four weeks and 600 hospitalisations over the same period, we have avoided thousands more because once we get to 6,000, the numbers just keep doubling and doubling and doubling again.

block-time updated-timeUpdated at 3.59am BST

block-time published-time 3.53am BST

'These numbers will not go down, these numbers will go up'

Daniel Andrews says Covid zero is over.

In just the last two days, the number of cases, the nature of those cases, the depth of the seeding of this outbreak has become clear and the chief health officer's advice to me and the government has changed - fundamentally changed.

None of us have the luxury of ignoring that, none of us have the luxury of shopping for the advice that we want.

When we get advice we follow it and the ***data*** and the evidence and the experts are very clear with us.

We will not see these case numbers go down. They are going to go up. The question is - by how many and how fast?

What we are all doing, the government, the public health team, nurses, doctors, people working in laboratories and testing clinics, people giving jabs, all of us as Victorians following the rules, all of us are trying to manage two peaks - the peak of those who are vaccinated and the peak of those who get infected with this Delta variant.

What we must do is suppress case numbers sufficient to buy us time, to buy us time, to get people vaccinated.

What that means is that we can't ease restrictions today in any profound way. I don't think anyone was expecting that, but it simply is not possible.

block-time updated-timeUpdated at 3.56am BST

block-time published-time 3.51am BST

In Victoria there are 58 people with Covid in hospital, 21 in the ICU and 14 of those people need a ventilator.

block-time updated-timeUpdated at 3.56am BST

block-time published-time 3.49am BST

Daniel Andrews says Victorians will most likely exceed the one million vaccine doses in five weeks target.

That is excellent news.

block-time updated-timeUpdated at 3.51am BST

block-time published-time 3.48am BST

Victorian press conference

It opens with condolences to the two women who died yesterday. Both had Covid and both died at their homes.

Daniel Andrews then moves to the day's cases:

64 of today's cases are linked to known outbreaks. 56 are under investigation by our public health team.

That takes us to a total of 900 active cases. 895 locally acquired and five overseas.

Everyday, of course that public health team makes linkages, solves some of the mysteries of this virus and we'll update the figures as we go forward.

There are some 122 cases, though, that remain open, if you like. They're still being investigated.

To give you a sense of how things have changed and changed very rapidly, of today's cases that have been fully interviewed and our contact tracers work as hard as they possibly can and as fast as they can, of these that have been fully interviewed, only 20 were in isolation during their infectious period.

These last few days have seen a dramatic shift in the nature and the number of cases coming forward.

block-time updated-timeUpdated at 3.53am BST

block-time published-time 3.45am BST

We are just waiting on the Victorian press conference to start.

We are going to be hearing the transitioning arrangements for Victoria, so stay tuned.

block-time updated-timeUpdated at 3.52am BST

block-time published-time 3.42am BST

Mark McGowan blasts the federal government

The Western Australian premier Mark McGowan has blasted federal attorney general, Michaelia Cash, for her suggestion the state could lose a high court challenge over borders now there is a vaccination for Covid-19.

McGowan told reporters in Perth:

I don't know why the federal government is doing this... What's gotten into them? We went to the high court last year, we had to defeat Clive Palmer. The Liberal party supported Clive Palmer during that then they withdrew half way through. They tried to get us to withdraw the case, they told me we'd lose, and they were wrong.

Why are they on this mission to bring Covid into Western Australia, to infect our public? To ensure we shut down parts of the economy? That we lose jobs? That people get sick and some people die? Haven't they seen what's happening in NSW?

I can't understand why they're doing this. It makes no sense. We are the strongest economy in Australia, we are the freest...we have a society that is totally open. We have no one in hospital with Covid. Yet they want all that to change - they don't seem to understand what's going on here in WA.

I just find it so incredible - they went through the Clive Palmer experience last year, and they want to do exactly the same thing again. It makes absolutely no sense.

McGowan said he was not concerned WA might lose, noting [*last year's victory*](https://www.theguardian.com/australia-news/2020/nov/06/clive-palmers-challenge-against-western-australias-border-ban-rejected-by-high-court) and telling the commonwealth government "if they want to bring on round two - let them".

McGowan did commit to eventually reopen the WA border. He said the state will "get to a high enough vaccination rate that we can bring down the border with infected states" but warned "that's a way away".

block-time updated-timeUpdated at 3.47am BST

block-time published-time 3.40am BST

Here is Gladys Berejiklian on welcoming home vaccinated Australians to NSW at 80% and home quarantine as a "definite".

enltrGladys Berejiklian on welcoming vaccinated overseas Australians to NSW at 80% - [*pic.twitter.com/X3QaX80WCf*](https://t.co/X3QaX80WCf)

- Amy Remeikis (@AmyRemeikis) [*September 1, 2021*](https://twitter.com/AmyRemeikis/status/1432895938020864000?ref_src=twsrc%5Etfw)

block-time updated-timeUpdated at 3.47am BST

block-time published-time 3.35am BST

NSW Health is working on giving pregnant people better access to the Pfizer vaccine (they are not recommended to have AstraZeneca) through antenatal settings.

But that is going to depend on vaccine supplies.

block-time updated-timeUpdated at 3.37am BST

block-time published-time 3.33am BST

Does Gladys Berejiklian think interstate borders should open to everyone, or just the vaccinated?

I think we get to a stage where you need to stick to the national plan.

...Well that's why it's 70%, double dose privileges and freedoms will extend to only those that are vaccinated.

Now at 80%, you will only be able to go, consider travelling internationally, if you're vaccinated.

But I say this many airlines will make those decisions for us, many airlines will say you can't jump on my plane, unless you're vaccinated, and they will have every right to do so.

So, I say irrespective of what government policies at any stage, private organisations are entitled to have policies to keep other customers safe to keep their workforce safe and to prevent the spread of the disease so don't assume it's only a government policy that's relevant.

It's also non-government business leaders will have a say on what they feel is the best way forward and for a business community that's been absolutely smashed for the last two years in NSW even longer if you had the drought.

If you read the bushfires, if you had the floods, we're talking about three years where many businesses across the state have been smashed.

The most important thing to you, understandably will be business continuity, business certainty not having to stop. Open and shut. Open and shut. And that's what the higher rates of vaccination insures against once you get to 80% double dose.

There should not be any circumstance under which there will be a lockdown of any description, but that's also up to businesses who want certainty and business continuity, to be able to say, well, it's up to us, we don't want to expose our customers or our workers and airlines themselves around the world. Some haven't.

Some airlines welcomed people who aren't vaccinated, but most airlines are welcoming people who are fully vaccinated.

block-time updated-timeUpdated at 3.40am BST

block-time published-time 3.26am BST

Gladys Berejiklian also said she is "expecting ***data***" later in the week on just how bad October will be for the NSW health system.

block-time published-time 3.25am BST

For those wondering what the federal government role would be in Gladys Berejiklian's announcement NSW will take international vaccinated Australians when the state hits 80%, Sarah Martin included this in her story from last night:

Scott Morrison:

In states that aren't locking others out ... there will be the opportunity for people to go and travel and return to Australia and quarantine at home, and that people in those states who are overseas can come back to Australia.

The caps that are on flights coming into those places ... that aren't locking others out, they will be able to receive more and more, and that will be a big change.

block-time updated-timeUpdated at 3.28am BST

block-time published-time 3.22am BST

The Victorian press conference will be held at 12.45pm.

block-time updated-timeUpdated at 3.25am BST

block-time published-time 3.08am BST

NSW to open to international Australians at 80% vaccination

Gladys Berejiklian says she will open to international travellers at 80% double dose vaccination - and they will take in Australians from other states as well, even if the other states aren't opening up their own borders.

Asked if NSW would welcome home vaccinated Australians who are overseas for Christmas, Berejiklian says:

If they are double dosed vaccinated, I think home quarantine is a definite. The traditional hotel quarantine system is no longer relevant when you have 80% of your population double vaccinated.

And it's no longer relevant when the key issue is rates of vaccination.

So things will look different.

And as I said if other states aren't ready to welcome home Aussies at 80% double dose New South Wales will be.

And if means more citizens come through to the Sydney airport so be it, the more flights, the better. But obviously we're working through those issues and discussing them at national cabinet and with the prime minister.

block-time updated-timeUpdated at 3.13am BST

block-time published-time 2.58am BST

The deputy ACT CHO, Dr Vanessa Johnston, has given a run down on the latest ACT cases - 23 today.

Fourteen are linked. Dr Johnston:

We know that 13 are either household contacts or close social contacts and the remaining one is linked to a known cluster. Nine are still under early investigation. Out of the 23, 11 were in quarantine during the whole infectious period. Of the 12 remaining, 11 of these were infectious in the community for at least part of their infectious period. And one is under assessment. Since our last update, we have had just over 1,100 self identified close contacts and over 3,900 casual contacts.

ACT deputy chief medical officer Vanessa Johnston speaks to the media in Canberra, Wednesday, 1 September 2021. Photograph: Lukas Coch/AAP

block-time updated-timeUpdated at 3.14am BST

block-time published-time 2.55am BST

Andrew Barr moves on to vaccinations:

Yesterday the prime minister announced 500,000 additional doses of Pfizer as part of a vaccine swap.

He also announced these vaccines will be distributed on a per capita basis around Australia, so we have been advised that the ACT will receive 8,344 vaccines.

To put this in perspective, this is roughly the equivalent of a big, single day of vaccination in the ACT across all our government clinics, GPs and pharmacies.

Every little bit helps. So the extra 8,344 will allow us to get through another day of vaccination more quickly. Today, bookings open for 16 to 29-year-olds to access Pfizer vaccines at ACT government clinics.

Already until about 11.30 this morning, 6,500 new appointments and bookings have been made, which is great. If you are waiting for Pfizer, please register with the health record system and book your vaccination as soon as possible.

We acknowledge though that the demand is incredibly high and we are making bookings now in November. So, as always, the AstraZeneca vaccine is more readily available now through GPs and pharmacies. Being vaccinated is the best way that you can avoid serious illness and hospitalisation.

block-time updated-timeUpdated at 2.58am BST

block-time published-time 2.54am BST

The ACT is also going to be concentrating on compliance.

Our Covid-19 business compliance teams were incredibly active yesterday, right across Canberra.

Nearly 100 businesses were visited. Around one-third were found to be not compliant with the public health directions. The overwhelming issue was staff not wearing masks properly, or not wearing them at all.

Wearing a mask is critical. It reduces the risk of you spreading the virus. And what we are seeing in our daily numbers is a small number of cases each day who are people who have been working while they are infectious.

They do not know they are infectious, but they have been at work while infectious. And that is how the virus is transmitting outside of the household and close contacts. So if you are not wearing a mask properly, it increases the risk of you transmitting the virus to a work colleague.

ACT police, Access Canberra and WorkSafe ACT will be active in the next two weeks to ensure compliance and public health directions, with a particular eye on people wearing masks in workplace settings. You need to do it. It is absolutely essential to keeping your businesses operating safely and to protect the community.

A resident rides his bike over Commonwealth bridge near Parliament House in Canberra. Photograph: Lukas Coch/AAP

block-time updated-timeUpdated at 2.59am BST

block-time published-time 2.49am BST

ACT chief minister Andrew Barr is giving a little more clarity about the easing of restrictions which are coming for ACT residents at the end of this week:

Non-organised recreational activity includes things like walking, jogging, cycling, going for a picnic in the park.

It does not include organised boot camps, sporting competitions, organised team training, golf, tennis, those sorts of more organised sporting activities. Informal small groups and conducted within your household of no more than five people.

The reason for five people, it could be five people from five separate households, is to give singles and couples some opportunity to interact with others.

But this needs to be done outside, wearing masks, for up to two hours, and the advice for everyone is that outside of these interactions keep as far away from other people as you possibly can, all of the time.

block-time updated-timeUpdated at 2.52am BST

block-time published-time 2.47am BST

ACT records 23 new cases

14 are linked as mostly household contacts.

11 were in quarantine for their infectious period.

ACT Chief Minister Andrew Barr speaks to the media during a COVID-19 update in Canberra, Wednesday, September 1, 2021. Photograph: Lukas Coch/AAP

block-time updated-timeUpdated at 2.56am BST

block-time published-time 2.47am BST

And then there is a small little swipe at Victoria:

Gladys Berejiklian:

I know that people will not believe me when I say this, but we have done a lot to keep the case numbers where they are, given our population, given the spread, in fact if you look at the trajectory of where Victoria's case numbers are going, I will let people make those comparisons themselves, but having been through this, we know how quickly case numbers get up to where we are now. And had we not taken the measures we had, they would have been much higher.

block-time updated-timeUpdated at 2.55am BST

block-time published-time 2.45am BST

Gladys Berejiklian has also brought up a few times in this press conference about how she had been criticised for "not going hard enough" in the past.

I say this hand on heart, we know what it is is we have asked people to do in those areas of concern, it is onerous, it is difficult, it is stressful, and I will be the first one to go the other way as soon as we get the green light.

But I just say to everybody, Delta is evolving, and the questions I get today are very different to what I was getting just a few weeks ago when I was accused of not being hard enough.

block-time updated-timeUpdated at 2.56am BST

block-time published-time 2.43am BST

Gladys Berejiklian will not guarantee that she will meet with the mayors.

I have been doing it already, and I have already been talking with them on many occasions to community leaders.

But there was more than just a local government that is involved, there are community leaders who touch hundreds of thousands of people, the mayors will be involved in that process, but so will our religious leaders, so will our cultural leaders.

A person is seen in Fairfield, south-west of Sydney, Australia. Photograph: Dan Himbrechts/EPA

block-time updated-timeUpdated at 3.07am BST

block-time published-time 2.43am BST

Why hasn't Gladys Berejiklian met with the 12 hotspot LGA mayors?

Berejiklian says she has been engaging with community leaders.

I would always welcome meeting with community leaders, and I spoke virtually to hundreds of them, many of the conversations I've had those local mayors have been directly involved.

I am not certain about the invitation they're talking about, but certainly there have been numerous occasions where I have engaged, the minister has engaged, the members of our other agencies have directly engaged broader community leaders, and that is ongoing.

But please know, that all the advice we get about what we can do in those areas is based on the health advice, and it is to keep people safe and healthy, and as the doctor said eloquently, still a proportion of the community unfortunately do not appreciate how serious this disease is, and we want to make sure that everybody is.

I am deeply grateful to the vast majority of our citizens across the state, no matter where they live, about how well they have responded to what we have asked them to do, and I will be the first to want to provide relief as soon as we get the green light.

block-time updated-timeUpdated at 2.47am BST

block-time published-time 2.40am BST

Gladys Berejiklian is going to use the national plan as a shield for as long as she needs to. Even if the other states don't budge at the 70% vaccination target.

Berejiklian:

I guess I'll just say to the other premiers...every single premier of the states, every chief minister signed up to the plan.

What I am doing is working towards the plan, as I hope every other state premier is. The only thing I will say, from experience in NSW, is that every state at some stage, if not at 80% double dose, then when? Every state is going to have to accept that you cannot live in a bubble forever, your citizens will want to travel interstate, your businesses will want to go interstate, citizens will want to go overseas, and come back from overseas, so if not at 80% double dose which is what our national plan says, then when?

block-time updated-timeUpdated at 2.49am BST

block-time published-time 2.37am BST

Gladys Berejiklian:

We all signed up to the national plan, we all signed up to the plan which has research based on the Doherty Institute, that is very important.

I also want to say, as confronting as this is, a lot of states who have not had any major outbreak during the pandemic, are going to have to appreciate that if we get to 80% double dose vaccination, and you open your borders, Delta will creep in.

But if your population is protected, and you have Covid safety plans into place, a good QR code system, good systems to monitor where the disease is circulating and what residence, take immediate action to take care of outbreaks that may or may not occur, that is the way we have to live with Covid.

As confronting as that is, that is the reality. I hope that every premier is signed up to the plan, and I hope you'll stick to the plan.

But all the conversation that I've had with the prime minister suggested the nation will continue to move forward, but I feel that Victoria is perhaps turning the corner in how they are dealing with Covid in terms of accepting what the Delta strain is like, and what it means for citizens, but I hope that we are in a position at least where the two large states are on the same page.

block-time updated-timeUpdated at 2.43am BST

block-time published-time 2.34am BST

Back to the NSW press conference.

It is all about NSW sticking to the national plan, but you can't know what the worst case scenario modelling is.

Health care workers are seen checking passengers arriving from Sydney at Perth Airport, Perth. Photograph: Richard Wainwright/AAP

block-time updated-timeUpdated at 2.39am BST

block-time published-time 2.34am BST

The Australian economy grew by just 0.7% in the June quarter, narrowly avoiding shrinking in the months before the Delta strain spread uncontrollably in NSW and Victoria.

The result, announced by the Australian Bureau of Statistics on Wednesday, means Australia has avoided a technical recession for now, before an expected massive contraction in the September quarter due to lockdowns in its two largest states by population.

At the end of 2020 and start of 2021 Australia's economy rebounded strongly from the initial phase of the Covid-19 pandemic, recording [*growth of 3.1% in the December quarter*](https://www.theguardian.com/business/2021/mar/03/australias-economic-recovery-continues-with-31-growth-in-december-quarter) and [*1.8% in March*](https://www.abs.gov.au/media-centre/media-releases/economic-activity-increased-18-march-quarter).

That momentum slammed to a halt in the June quarter, as the Delta strain was introduced to Australia and greater Sydney entered a lockdown in the final week of June that continues today, with thousands of new cases recorded daily.

Australia's hopes of avoiding a technical recession now rest on hopes of growth in the December quarter, after the national plan to reopen once vaccination rates reach 70% and 80% has softened or phased out lockdowns.

In per capita terms, Australia's economy grew by just 0.4% in the June quarter.

The terms of trade rose 7.0% on the back of high iron ore prices. The household saving ratio decreased to 9.7% from 11.6%.

block-time updated-timeUpdated at 2.40am BST

block-time published-time 2.33am BST

National accounts show 0.7% growth in June quarter

Just breaking in for a moment to bring you the national accounts - the GDP figure shows 0.7% growth.

That is good news, but of course, it is also in the past - it's for the June quarter, mostly before the lockdowns.

Everyone is focused on what is happening now, and even if we aren't in a technical recession, we seem to be in a manufactured one, in that it feels like it. At least if you are on the east coast. There are two economies in Australia at the moment, and people are feeling these impacts differently. And half the country is not feeling great.

block-time updated-timeUpdated at 2.36am BST

block-time published-time 2.29am BST

So Gladys Berejiklian knows what is in the national plan, she can tell you the positives for what happens in NSW when 70% of the adult population is vaccinated, and is keen to tell you what life "will look like at 70-80% double dose" but she can't tell you the flip side, or the worst case modelling, because that "varies and depends".

NSW Premier Gladys Berejiklian arrives to address media during a press conference in Sydney. Photograph: Dan Himbrechts/AAP

block-time updated-timeUpdated at 2.40am BST

block-time published-time 2.27am BST

How can she not recall it?

Gladys Berejiklian:

No. I'm saying various modelling is done. NSW Health provides modelling but there's modelling done by ex-personal organisations, which NSW Health is not part of and those organisations, as we've read have...

Q: What about the advice from NSW Health? The worst case scenario presented to you, you don't know that it is?

Berejiklian:

It varies and it varies and it depends on what the inputs might be and I wish...

Q: What was the worst one?

Berejiklian:

I wish I had a crystal ball to tell you. What I can tell you...

Q: They're modelling the worst case scenario. What is that?

Berejiklian:

The most recent advice I've received is that case numbers are likely to continue to rise for the next few weeks and the worst hospitalisation rate is likely to be in October and I can't tell you anymore more than that because that's the best advice I have.

block-time updated-timeUpdated at 2.35am BST

block-time published-time 2.25am BST

Gladys Berejiklian 'can't recall' worst case modelling

Gladys Berejiklian says she can't recall the worst case modelling, which is why she can't share it.

I've seen various versions of modelling and I can't recall all the numbers but I can tell you this much - that we know that the rate of hospitalisations is likely to peak some time in October.

We know there's ranges of predictions on what the case numbers will come up to. I've often said, as the doctors have said, we anticipate the worst will be in the next couple of weeks.

The worst will be the next couple of weeks because the impact of the vaccinations takes about two or three weeks and as we've said from the outset, lockdowns work in suppressing the spread of the virus but the best antidote, the best weapon in fighting the virus is the vaccine and once we know someone is vaccinated, it takes effect in two or three weeks' time and we know there's been a high concentration of vaccines administered in the last week and the upcoming two weeks. We still anticipate case numbers to rise in the next couple of weeks and then we anticipate and hope that they will start to come down.

Updated at 2.28am BST

2.24am BST

Why won't Gladys Berejiklian release the modelling which shows the worst case scenarios? Why is it only the positive cases being shared?

Berejiklian:

The best judgement is what the public health experts tell us and every day the modelling changes. Every day there's inputs put into the modelling and every day there's different models around.

There's many, many institutes across the nation that will provide input into what New South Wales looks like but that depends on a number of ***variables*** and we shouldn't be in the habit of providing information which is not certain because it depends on the inputs, on the rate of vaccination, on what people are doing. It depends on compliance. There's a whole range of issues that go into that.

What we do know - because the best case is the accumulation of test numbers, we know there is always a lag between when someone gets ill and when they end up in hospital and we anticipate, given where case numbers are and given the rate of vaccination that the highest rate of hospitalisation will occur at some stage in October. As soon as we see anything more certain than that, of course we'll provide that information.

Updated at 2.30am BST

2.22am BST

The national plan includes targeted lockdowns in areas where test, trace, isolate and quarantine systems are under pressure.

Which right now, includes those areas of greater Sydney.

Updated at 2.30am BST

2.21am BST

Does that mean equal freedoms? Will people in the greater Sydney LGAs who are in areas of concern get those same freedoms?

Gladys Berejiklian, who promised transparency yesterday, doesn't say:

We're obviously looking at those issues but no matter where you live, life will be much, much better, much freer, as long as you're vaccinated at 70%.

We'll provide details as soon as we can. We're obviously taking input from stakeholders, from our health experts and also comparing it to the national plan, which has already been released.

So the national plan is on the public recordand New South Wales would be adhering to that national plan and obviously we're really keen to see our nation moved forward but we appreciate that what is the most critical number for us to keep a close eye on it is the rate of hospitalisation and the rate of vaccination because at 70% double dose, life will be very different and life will be much better than it is today.

People are seen waiting to receive a Covid test in Lakemba.Photograph: Dan Himbrechts/AAP

Updated at 2.32am BST

2.20am BST

Does that mean everyone? Including people in the hotspots?

Gladys Berejiklian does not address the question.

Clearly we've had a concentrated effort to vaccinating our population in local government areas of concern and vaccination rates have not only come up from a very low base but now a lot of those areas have higher vaccination rates than other parts of Sydney and New South Wales.

The key issue for us moving forward is the rate of vaccination and how many people you can keep out of intensive care wards and hospitals and they're the figures that matter most.

Everybody should expect a level of freedom which they don't have today and in relation to those settings, we're going through the road map. We're getting health advice.

It will depend on a number of other factors but let me be clear - no matter where you live in New South Wales, please expect to have much more freedom than you do now as long as you're vaccinated fully and as long as 70% of residents are vaccinated and details will be provided in the next little while.

Updated at 2.26am BST

2.19am BST

Gladys Berejiklian is being asked about her comments this morning to the Nine network that at 70% double dosed vaccination, adults can expect to be able to go out for a drink, a meal, an event.

Obviously, New South Wales always takes a responsible approach but the national plan does say at 70% double dose vaccination that you can expect to go out and have a meal, you can expect to attend a public event, you can expect to go and get services that you can't expect now but obviously we'll take a very responsible approach. We know that indoor gatherings or people coming to your home is a high risk. But outside of that if there are many, many things we can't do now we should be expect to be able to do them when we have 70% of the adult population vaccinated.

That's what the national plan says. I'm not saying anything that other states have not signed up to. Of course at 70% there will be density requirements, QR code check-ins, validation that you're vaccinated, mask wearing in certain settings, so there will be obviously constraints and restrictions in place but compared to what we're going through now, life will be much better at 70% double dose than it is now and I'm calling out to businesses to say let's have September be the month we all get ready.

If you're an individual, get vaccinated. Get your loved ones vaccinated and if you're a business, dust off Covid plans and get ready to open your doors.

Updated at 2.24am BST

2.13am BST

Hospitalisations due to Covid are going to hit more than 1,000 soon.

There are 917 people in hospital with Covid, 150 are in intensive care and 66 of those people need ventilation.

Updated at 2.17am BST

2.09am BST

Three new Covid cases in Wilcannia

There are three new cases in Wilcannia.

There will now be 30 motorhomes set up in the community so people can isolate - which has been a massive issue for people, given the overcrowding in homes and lack of accommodation to move people.

An aerial view of the Outback NSW town of Wilcannia.Photograph: Chris Graham/New Matilda

Updated at 2.19am BST

2.05am BST

Gladys Berejiklian:

Once you hit 70% double dose numbers, hotel quarantine looks different. Quarantine looks different. The way we manage the disease is different. Tracking and tracing is different and I'm having these conversations now with everybody so we can get used to what life is like living with Covid.

Our position is the one we stated from the outset. It's impossible to eliminate the Delta strain. New South Wales has proved successful until this point in time of getting rid of other strains of Covid but the Delta strain is a game changer and every state in Australia, sooner or later, is going to have to live with Delta and that's why I'm calling on all my colleagues, other state premiers and first ministers to stick to the national plan to make sure we give our citizens not only the freedoms they deserve but also learning to live with Covid as soon as we can.

The national plan does not deal with border closures.

The Doherty Institute also points to the need for a strong test, trace, isolate and quarantine system, which NSW does not have at the moment. Other states are lending their resources to NSW and Victoria, but when the states are open, that won't happen - they'll need themselves.

NSW premier Gladys Berejiklian addresses media in Sydney, Wednesday, 1 September 2021.Photograph: Dan Himbrechts/AAP

Updated at 2.16am BST

2.02am BST

NSW records 1,116 Covid cases and four deaths

Gladys Berejiklian opens by celebrating the vaccination numbers, with 70% of adults having received at least one dose.

She says people need to "get ready" for September.

Four people have died.

Berejiklian:

Four females who, unfortunately, were not vaccinated and who did have underlying health conditions - a woman in her 50s, one in their 60s, one in their 70s and one in their 80s. We extend our deepest condolences to their loved ones.

Pharmacist Christine Kelly prepares doses of the AstraZeneca vaccinations.Photograph: Brook Mitchell/Getty Images

Updated at 2.16am BST

1.53am BST

Joe Biden may not have spoken to Scott Morrison as yet over Afghanistan (at least as of yesterday) but he has a message for all Australians and New Zealanders on the Anzus anniversary:

. [*@POTUS*](https://twitter.com/POTUS?ref_src=twsrc%5Etfw) Biden on the 70th anniversary of the ANZUS Treaty, highlighting the U.S.-Australia relationship: An enduring partnership to "strengthen the fabric of peace." [*pic.twitter.com/yFNzLmdQst*](https://t.co/yFNzLmdQst)

- Department of State (@StateDept) [*September 1, 2021*](https://twitter.com/StateDept/status/1432867252504829953?ref_src=twsrc%5Etfw)

1.43am BST

There will be a clash between the NSW and Victorian press conferences - as is usual these days.

We will probably head to Victoria after getting the NSW numbers though, as we know there are a lot of people waiting to hear the transition plan.

We'll also bring you the ACT updates - it will take a little bit, but I promise we will be able to cover it all.

Updated at 1.48am BST

1.37am BST

Just a note on the current deputy prime minister claiming he is not trying to be smart, because he's not (a paraphrase of his quote to the house).

TCDPM talks a big regular Joe game, and loves to wear the hat, but he is also an Old Ignatians from Riverview - the exclusive Sydney school which also counts Tony Abbott among its alum, has a university degree and worked as a practicing accountant.

He is also the current deputy prime minister of Australia.

Updated at 1.42am BST

1.34am BST

The deputy prime minister Barnaby Joyce also contributed during the Anzus debate.

He noted that shared values were the cement that bound Australia and the US together. So far, so good.

But then things became more ***variable***. Stay with me, I'll do my best.

There was a reflection on democracy slipping "through a form of quasi democracy, and quasi democracy slips back to autocracy, where autocracy is not tempered by the collegiate aspects of cabinet forms of government, or by referring to an executive, but goes out and parrots the mouthpiece of the supreme leader. Mr Speaker, without being smart, because I am not..." (at this point some Latin was invoked).. "if you want peace, then prepare for war. And we want peace, no-one ever encourages war, we want peace, but this is an essential component of what must happen if you want peace".

Then there was more Latin. Joyce noted "it was Latin, because it has been the same through history. There is nothing new about this. And a preparation needs mass, and mass needs allies. Looking forward requires a learned experience, a learned experience over the long term, a learned experience over 100 years, not a memory of the 1990s."

It kept rolling.

The world has changed, now the geopolitical circumstances of our region show an uncomfortable resemblance to the power jousting of Europe in a previous century. Mr Speaker, Anzus comes with costs.

Then there was a reference to bipartisanship and the requirement of parliament "to show to the Australian people why we were involved with Korea, why we were involved with Vietnam, why we were involved with Iraq, why we were involved for 20 years in Afghanistan."

Because friends have to understand that your heart is where your legs are as well.

I can only leave this with you.

Deputy PM Barnaby Joyce.Photograph: Mike Bowers/The Guardian

Updated at 2.17am BST

1.30am BST

No evidence face masks worsen asthma

The National Asthma Council Australia has urged health professionals to reassure patients with asthma that they should wear a face mask when outdoors or when they can't socially distance from others.

National Asthma Council Australia director and respiratory physician Professor Peter Wark said:

There is no evidence that wearing a mask worsens asthma, and [*an article published in the European Respiratory Journal*](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7525001/) states that any exemptions of respiratory patients on the compulsory use of face masks is not evidence based and may carry increased risk of personal infection from Covid-19.

People with asthma, or their friends or family looking for advice, should know that face masks are essential for the protection of the person with asthma, as well as any carers or guardians looking after children with asthma.

Face masks, hand hygiene and social distancing will all help prevent the spread of infection and in fact, not wearing a mask could put adults and children with asthma at a disproportionate risk of getting the Covid-19 virus.

Wark said wearing a mask can make someone with asthma and other lung diseases feel more breathless, especially if they are more active.

However we know from the World Health Organisation that face masks of breathable material, worn properly, will not lead to health problems, still provide protection and are more comfortable.

If someone does become breathless whilst wearing a face mask they will be helped by moving to an open area with good airflow if possible then briefly removing their mask until they have caught their breath. Reapplying their mask when they are able to will help their symptoms and reduce their risk of infection.

People exercising in Melbourne.Photograph: Michael Currie/Speed Media/REX/Shutterstock

Updated at 1.36am BST

1.06am BST

A minute ago I sent a post on Scott Morrison's contribution in the parliamentary debate about the 70th anniversary of Anzus. Before Covid, Morrison had hoped to be celebrating this milestone in the US, or to have been in a position to have invited Joe Bide n to Australia.

But obviously that's not possible. Anthony Albanese followed Morrison.

He used his speech to announce that Labor (if it wins the next election) will initiate a new defence force posture review to ensure arrangements are fit for purpose. The Labor leader also referenced the difficulties of the Trump period head on.

We welcome the return of American leadership in the rules based order under president Biden, and his dedicated effort in repairing alliances.

Even when the United States stepped back from its long-standing leadership on trade and other forms of multilateralism during the Trump administration, Australia held the line, and importantly, held the door open for the United States.

There was also a significant chunk on the security implications of climate change. The Biden administration has publicly criticised the Coalition's lack of ambition about climate action. Albanese's contribution ran along that faultline.

"Climate change remains beyond this government's grasp," the Labor leader said.

Albanese says if he wins the election, he would "immediately deepen US-Australian cooperation on climate change security issues".

Updated at 1.56am BST

1.04am BST

Queensland has not lifted its pause on domestic arrivals - but it has cleared spaces for 50 families to come into its hotel quarantine system.

That follows criticism over the families of NRL players being able to come into the state for the coming finals. Those families aren't taking the same places, but the optics are terrible when you have people just trying to get home or be with loved ones having their exemptions denied because of a lack of quarantine places, but the families of footballers being able to enter the state.

South Australia is trialing the home quarantine program the national cabinet is investigating. The plan is to roll that out more widely when vaccination rates increase.

Updated at 1.10am BST

12.59am BST

There is still some good in 2021:

Former Collingwood President and current commentator Eddie McGuire denied entry into WA for the [*@AFL*](https://twitter.com/AFL?ref_src=twsrc%5Etfw) Grand Final [*https://t.co/q4AE5RdqZj*](https://t.co/q4AE5RdqZj) via [*@westaustralian*](https://twitter.com/westaustralian?ref_src=twsrc%5Etfw) [*#AFLGF*](https://twitter.com/hashtag/AFLGF?src=hash&ref_src=twsrc%5Etfw)

- Jenna Clarke (@jennamclarke) [*August 31, 2021*](https://twitter.com/jennamclarke/status/1432851249636937729?ref_src=twsrc%5Etfw)

12.52am BST

We'll hear the transition plan from Daniel Andrews today. Victoria is no longer aiming for zero Covid cases and instead has switched to "as close to zero as possible".

120 new locally-acquired Covid cases reported today for Victoria - here's how the trend looks with the latest figures [*pic.twitter.com/C53z8QNMod*](https://t.co/C53z8QNMod)

- Nick Evershed (@NickEvershed) [*August 31, 2021*](https://twitter.com/NickEvershed/status/1432852389296361473?ref_src=twsrc%5Etfw)

Updated at 1.02am BST

12.51am BST

Good morning everyone. Parliament has kicked off today with speeches marking the 70th anniversary of the Anzus treaty. Scott Morrison has told parliament American leadership remains indispensable and "essential" to peace and security in the Indo-Pacific.

The prime minister said the treaty, managed by 14 prime ministers and presidents since it was signed, "breathes and adapts with each passing generation". Morrison said: "Together we share hope, we share burdens and we share vision."

As could be expected, there is much in the prime minister's speech about mateship, much about freedom, and much, inferentially rather than directly, about the challenges of China's rise and the importance of a world order that champions freedom.

The Labor leader Anthony Albanese is speaking too. I'll send a post on that contribution shortly.

Updated at 1.56am BST

12.42am BST

Rex Patrick pushes to refer ATO commissioner for contempt

The Senate has begun with a bang - independent senator Rex Patrick has sought to refer the ATO commissioner Chris Jordan to the privileges committee for refusing to produce documents revealing big business recipients of jobkeeper.

As Senate president Scott Ryan explained, the tax commissioner declined to respond to an order of production of documents on 4 August, citing public interest immunity. On 23 August the Senate explicitly rejected that - and insisted on the documents by 26 August.

The treasurer, Josh Frydenberg, then made a separate public interest immunity claim, and Jordan said he would wait til that claim was dealt with before he responded. Jordan missed the 26 August deadline.

Ryan said that it is clear that Jordan's actions "could substantially frustrate orders of the Senate", clearing the first hurdle to refer the matter to the privileges committee, and that he was satisfied that it "could warrant a contempt" of the Senate.

Ryan said that it is a matter for the Senate to determine if Jordan had a "reasonable excuse".

Ryan suggested it may not be necessary to refer the matter to the privileges committee because there are other remedies available - such as first dealing with Frydenberg's public interest immunity claim, or bringing amendments to legislation to force production of the jobkeeper information.

Patrick then gave a speech arguing that Frydenberg's additional public interest immunity had no power to countermand and order of the Senate, and Jordan therefore lacked a reasonable excuse.

He's given notice of a motion to refer Jordan, to be debated and decided on Thursday. We're now on to the Respect at Work bill.

Independent senator for South Australia Rex Patrick.Photograph: Mike Bowers/The Guardian

Updated at 12.47am BST

12.41am BST

Khal Asfour, the mayor of Canterbury-Bankstown continues with why the hotspot mayors want to meet with the premier:

We want to convey our concerns to her from the stories that we're hearing every day.

Secondly, we need more vaccination hubs and thirdly, we want more government support. It defies belief that the Premier just doesn't want to hear these concerns and she doesn't want to hear from the 12 mayors that are doing it tough and representing these two million people in western and south western Sydney.

$750 a week doesn't seem to cut it. We have people who are really struggling and are stuck at home obeying the health orders.

Our people are getting vaccinated. We are making sure the numbers are increasing so we can get out of this lock down and we are doing our bit but we are doing it tough and the lock down seems to roll on month after month and the $750 a week doesn't cut it for a lot of the members of the community.

...The Premier has referred us to the Local Government Minister. This is not a local government issue. This is a health issue and it is an all of New South Wales issue. We want the Premier to reverse her decision and give us one hour of her time to meet with us.

12.39am BST

Linda Scott says Greg Hunt has met with them.

But it is probably also worth pointing out that when Coag became the national cabinet, local government was left off the table.

Local government had representation in Coag, but despite lobbying, were not included in the rebranded national cabinet.

12.38am BST

Linda Scott continues that theme:

The mayors in the 12 local government areas in Sydney's hot spots are from every political stripe - Liberal mayors, independent mayors, Labor mayors.

This is not about politics. This is about the need for the premier to work with local governments, to solve problems that communities in a hard lockdown are experiencing.

The 12 mayors in these areas and the councillors are working day and night to support a locally led recovery from Covid. They are personally translating materials into languages other than English.

They are encouraging communities to get tested, stay home and be vaccinated. The mayors and councillors are providing facilities, local government facilities for use for testing and local government facilities for vaccinations.

They're supporting communities who are often out of work and struggling, supplying food and other basic essentials to ensure that communities are not faced with the impossible decision about breaching a health order or feeding their families. The least the NSW premier can do at this time is come out of hiding, meet with the elected local leaders in these 12 hotspots and support their efforts to ensure these communities are safe.

Updated at 12.43am BST

12.37am BST

Khal Asfour, the mayor of the City of Canterbury Bankstown, is one of the 12 mayors in Sydney's LGAs of concern.

He's holding a press conference with Linda Scott, the president of the NSW Local Government Association, about Gladys Berejiklian declining to meet with the mayors of the hotspot areas.

To say the mayors are pissed would be an understatement:

Asfour:

A few weeks ago we sought a meeting with the 12 mayors of the hotspot areas in greater Sydney.

Yesterday afternoon we received a response from the premier's office that she is refusing to meet with the 12 mayors of the hotspot areas.

The areas with the most Covid cases at the moment. This is a royal snub for our community and the over two million people we all represent.

I don't understand why the premier won't meet with us. She doesn't - she might not want to hear the concerns we are hearing every day.

Phone calls and emails, people crying on the phone, not knowing what they are going to be doing next with their businesses crumbling, with people out of work, with people in lockdown, mental health issues, with people not having any social connectivity to their family and loved ones.

The premier doesn't want to hear these stories and I don't know why. This is really unbelievable. I am furious that she is too busy to want to meet with us.

She can't spare an hour of her day to meet with the 12 mayors that represent over two million people and for communities that are really doing it tough in the harshest lockdowns for the communities.

She doesn't want to hear these stories. Our community wants surety, we want hope. We want some light at the end of the tunnel and we just don't know where that is going to come from when the premier refuses to meet with us.

Updated at 12.44am BST

12.33am BST

Parliament has just opened for the day. The morning speeches are dedicated to the Anzus alliance.

12.33am BST

It's the 70th anniversary of the Anzus alliance (Australia, New Zealand and US) so Scott Morrison and Peter Dutton laid a wreath at the US memorial at Defence HQ.

Prime minister Scott Morrison at Defence headquarters in Canberra lays a wreath during a ceremony marking the 70th anniversary of the Anzus alliance.Photograph: Mike Bowers/The GuardianScott Morrison (left) and defence minister Peter Dutton (centre).Photograph: Mike Bowers/The Guardian

Updated at 12.35am BST

12.27am BST

I'm just getting messages from some public servant staff about IT issues impacting several government departments, including the ***agricultural*** department.

Staff are reporting mass issues in being able to login to their IT systems.

We are told it is being worked on - but things might be a little slow this morning.

Updated at 12.29am BST

12.24am BST

That's not exactly coded there.

Gladys Berejiklian is all but pointing out the federal government failures. She just doesn't name them.

12.23am BST

Gladys Berejiklian, speaking to the Nine network, also made sure to send some blame in the federal government's direction. Asked if vaccines should be mandatory for clinical staff, given one in five clinical staff in the state system have not received one dose of the vaccine, Berejiklian says:

Well, firstly we weren't able to make the vaccines mandatory. It was actually not in our path to do that. The fact we've taken the step to say everybody has to get the vax is pretty major.

We have made sure that everybody who has access to the vaccine in our healthcare system does.

I was aghast because as you know at the beginning of the process there was a process where aged care workers would get vaccinated first. We had tens of thousands of them in NSW who hadn't been offered the vaccine. We're playing catch-up now. There have been supply issues. We're knocking on the door of the feds to give us more supply.

Remember the states weren't going to be involved in providing any vaccine. But I think I was the first premier to say some months ago let us help. I'm pleased we did. Now we're seeing hundreds and hundreds of thousands of people get the jab every week in NSW. I was shocked. We're approaching 850,000 jabs a week in NSW which is incredible. A lot of that is done by NSW Health system.

Remember, initially we were told we don't need you, you don't do it. We stepped up.

NSW premier Gladys Berejiklian.Photograph: Dan Himbrechts/EPA

Updated at 12.27am BST

12.19am BST

Victoria records 120 new Covid cases

Of the 120 new Covid cases announced today, 64 are linked.

Reported yesterday: 120 new local cases and no cases acquired overseas. - 33,455 vaccines doses were administered - 56,501 test results were received - Sadly, 2 people with COVID-19 have died More later: [*https://t.co/lIUrl1hf3W*](https://t.co/lIUrl1hf3W) [*#COVID19Vic*](https://twitter.com/hashtag/COVID19Vic?src=hash&ref_src=twsrc%5Etfw) [*#COVID19VicData*](https://twitter.com/hashtag/COVID19VicData?src=hash&ref_src=twsrc%5Etfw) [1/2] [*pic.twitter.com/UivzhlpHw9*](https://t.co/UivzhlpHw9)

- VicGovDH (@VicGovDH) [*August 31, 2021*](https://twitter.com/VicGovDH/status/1432845500521218053?ref_src=twsrc%5Etfw)

Updated at 12.20am BST

12.18am BST

Drinks, meals and events for vaccinated adults at 70% in NSW

Just catching up on some of the interviews this morning on commercial television and Gladys Berejiklian was on both the Seven and the Nine networks.

Here is her message on where NSW is at today - including what freedoms NSW residents who are vaccinated can get at 70% of the adult population meeting the vaccinated target:

I think if you compare the case numbers in NSW at the moment compared to what Victoria went through last year they didn't have a Delta strain. It was regular another strain of Covid. And tragically hundreds and hundreds of lives were lost over a couple of months.

In NSW we haven't seen that. Because the vaccines are working. The vaccines are the best weapon against fighting Covid.

Lockdowns will help us stop the exponential growth of a virus. What will allow us to live normally is the vaccine. The more of us that get vaccinated the sooner it reduces the spread. It puts downward pressure on case numbers. More importantly, it inches us that much closer to living life as we did previously.

At 70%, those that are fully vaccinate will be able to have a drink, a meal. Go out to an event.

And I'm really looking forward to that as I hope everyone is. Our opportunity now is to make sure we vaccinate older Australians. Make sure they're fully vaccinated. Vaccinate vulnerable people. To make sure when we do open up they're not exposed we do know how horrible the disease Covid is. It can affect anybody. Unexpectedly.

But we know that it can impact particularly parts of community more than others. We don't want people going through that horrible time.

Updated at 12.24am BST

12.04am BST

Queensland isn't afraid to play ball at the moment:

The LNP don't believe in border controls. Some of them don't even believe in COVID. [*#qldpol*](https://twitter.com/hashtag/qldpol?src=hash&ref_src=twsrc%5Etfw) [*#auspol*](https://twitter.com/hashtag/auspol?src=hash&ref_src=twsrc%5Etfw) [*pic.twitter.com/OnY6DLGEdw*](https://t.co/OnY6DLGEdw)

- Cameron Dick (@camerondickqld) [*August 31, 2021*](https://twitter.com/camerondickqld/status/1432598927677673472?ref_src=twsrc%5Etfw)

11.48pm BST

Anthony Albanese had a chat to Triple M Newcastle where he continued to hone Labor's national plan message when it comes to the premiers:

Well, they all signed up for the national plan. The national plan, of course, provides for various protections to be continued to be available at 70% and 80%. No one wants restrictions. Restrictions affect people's way of life and their capacity to get around and it hurts the economy. But to be fair to Queensland at the moment, South Australia also, I noticed Scott Morrison never talks about the Liberal states, South Australia and Tasmania and Queensland and Western Australia all have their borders closed to New South Wales, Victoria and the ACT at the moment. That's a decision that is perfectly understandable. WA is getting the Grand Final in the AFL. Brisbane will get the Grand Final in the Rugby League. And it's tough times, but these decisions have been made to keep their citizens safe.

Opposition leader Anthony Albanese.Photograph: Mike Bowers/The Guardian

Updated at 11.52pm BST

11.42pm BST

If you are thinking that the Victorian numbers are usually out by now, you would be right.

There is a delay this morning (we usually get them around 8.30am) but in the past, when there has been more complicated ***data*** to reconcile, it has taken a little longer.

We'll have them to you as soon as we can.

11.28pm BST

It is also national accounts day - when we learn whether the economy grew or not.

It is going to be a bit of a mixed bag, but it looks at the past when we are all looking at what is happening right now. This one won't take in the bulk of the lockdowns, but really, it is just about the feeling at the moment - confidence isn't high, and people are feeling the economic impacts themselves. It might not be a technical recession, but it feels like one.

And what's the main difference between these lockdowns and those major ones we saw last year? Government support. There is not as much of it. And well, that is being felt.

Which makes videos like this from the treasurer - who actually has the power to make a huge difference in the lives of the people he is talking about a little... you know.

I thought I'd share with you some heartfelt & heartbreaking letters I have received from members of my local community who have been doing it tough during the lockdowns. Their stories are powerful & reflect the hardships being faced my millions of families across Australia. [*pic.twitter.com/pAPlpra3pm*](https://t.co/pAPlpra3pm)

- Josh Frydenberg (@JoshFrydenberg) [*August 31, 2021*](https://twitter.com/JoshFrydenberg/status/1432600457768157185?ref_src=twsrc%5Etfw)

Updated at 11.33pm BST

11.22pm BST

Because the Australian government is still the Australian government, the Coalition party room is still a wild place at times.

Which is how Paul Karp learned of this story:

Coalition MPs have urged [*Scott Morrison*](https://www.theguardian.com/australia-news/scott-morrison) to increase funding to the government's school chaplaincy program to help address concerns that activism against global heating is causing mental health problems for Australian children.

In the Coalition party room on Tuesday, Liberal MP Andrew Wallace compared children's fear of climate change with the threat of nuclear annihilation in the 1970s and 80s, and requested full funding for chaplains in every school to help ease concerns.

The assistant youth minister, Luke Howarth, has backed the call to expand the program in comments to Guardian Australia, saying climate activism is "alarmist and does cause mental health problems for young people" that could be helped by chaplains.

Related: [*Coalition MPs want more school chaplains to help children suffering mentally due to 'alarmist' climate activism*](https://www.theguardian.com/australia-news/2021/aug/31/coalition-mps-want-more-school-chaplains-to-help-children-suffering-mentally-due-to-climate-activism)

Children working out the world around them, and what they are and aren't willing to accept is not causing mental health problems - not seeing a lot of action on identified problems in the world around them though, is a totally different story.

11.13pm BST

Liberal senator Jane Hume was also on ABC Breakfast this morning, where she was walking back Michaelia Cash's comments:

I think Michaelia Cash has been misinterpreted there. There's going to be no high court challenge to borders but what she was...

Q: She's leaving the way open for it the way I read. She's leaving the way open for high court challenges?

Hume:

No, I think she's saying the reasoning behind that high court challenge last year that was taken out by the reasoning behind that really be have diminished once we reach those vaccination rates. Again, while we're also urging people to go to the ATO website (for super information, her beat), we're also urging people to get themselves vaccinated so we can stick to the national plan and reopen our borders and get back to life as we knew it.

Updated at 11.16pm BST

11.07pm BST

Tanya Plibersek appeared on ABC News Breakfast this morning, where she was asked about the possibility border closures could be challenged in the high court again (which Michaelia Cash spoke about in an interview with the Australian, something Scott Morrison probably won't be too pleased about, given he has been distancing the government from a previous challenge this week).

Here is what Plibersek had to say:

Court challenges are ridiculous and you saw just how popular Clive Palmer's last effort, supported by Scott Morrison it is important to say.

When Clive Palmer wanted to take the West Australian government to court, I think he united every West Australian against him. We support the national plan to reopen Australia. People are sick of the lockdowns.

They are sick of seeing businesses that they have spent 20 or 30 years growing being destroyed by what is happening with the economy. They are tired of the kids being home from school. They are worried about their kids' education.

They are worried about their kids social and emotional wellbeing. Everybody wants things to get back to normal as quickly as possible and the reason this is dragging on so long is because our prime minister didn't order enough vaccine and he didn't establish purpose-built quarantine qualities when he was advised to do so and because Australia can't make the Pfizer-style mRNA vaccines here, despite the government saying months ago that we would embark on the process that would allow us to make mRNA vaccines here in Australia.

This is a failure that should be laid at Scott Morrison's door. We need to open up, we need to do that sensibly follow the roadmap to reopening but I can tell you, if I were a premier in a state with zero transmission, I would be looking at New South Wales now and I would be worried.

Labor MP Tanya Plibersek: 'If I were a premier in a state with zero [Covid] transmission, I would be looking at NSW now and I would be worried.'Photograph: Sam Mooy/Getty Images

Updated at 11.13pm BST

10.54pm BST

Murph has taken a look at the national plan mess; and what is actually going on:

If you tune in to the daily Covid briefings from [*Scott Morrison*](https://www.theguardian.com/australia-news/scott-morrison) and the premiers, the impression you'll get is the federation is at war about the national plan to reopen Australia once vaccination rates increase.

But is this really war?

Or is this dynamic more fluid than it seems?

If you are struggling to keep up with the slugfest in the federation about reopening: let me walk you through it. Here's an explainer ?? [*#auspol*](https://twitter.com/hashtag/auspol?src=hash&ref_src=twsrc%5Etfw) [*https://t.co/8zYG4Dza2r*](https://t.co/8zYG4Dza2r)

- Katharine Murphy (@murpharoo) [*August 31, 2021*](https://twitter.com/murpharoo/status/1432822295588794371?ref_src=twsrc%5Etfw)

10.50pm BST

Victoria recorded its first two deaths in this Covid outbreak late yesterday.

A woman in her 60s died in her home in Hume and a woman in her 40s died in her home in Darebin. Their deaths will be reported in today's figures.

You may have seen on social media from those with leaked figures (we have no confirmation) the number of cases will be over 100 today. Victoria did lockdown early, and it locked down hard. It's an indication of how contagious Delta is when it takes hold. The Victorian strategy now seems to be to keep the outbreak as under control as possible, rather than reach for zero. And of course, vaccinate.

Two people take a walk for their hour of exercise in Melbourne on Tuesday.Photograph: Michael Currie/Speed Media/Rex/Shutterstock

Updated at 10.55pm BST

10.45pm BST

When the health department, the Australian defence force and the Prime Minister's Office wouldn't answer questions on Lt General John Frewen's appointment to lead the vaccine program, and what it meant, Daniel Hurst put in a bunch of FOIs.

He received the letter Scott Morrison sent when making the appointment, which finally answers some of those questions:

Scott Morrison assured the senior military figure Lt Gen John Frewen that "the necessary resources and assets will be put at your disposal" when he was appointed to boost confidence in the Australian government's vaccination rollout.

A letter obtained by Guardian Australia under freedom of information laws reveals the prime minister told Frewen a "direct command and control structure" should help speed up the vaccination program and if the goals were achieved it would allow a faster reopening of Australia's international borders.

PM assured Lt Gen Frewen "the necessary resources and assets will be put at your disposal" when he was appointed to role to boost confidence in govt's vaccine rollout. Letter obtained under FOI shows PM also outlined "direct command and control structure": [*https://t.co/RT1008RpFw*](https://t.co/RT1008RpFw)

- Daniel Hurst (@danielhurstbne) [*August 31, 2021*](https://twitter.com/danielhurstbne/status/1432810663248728069?ref_src=twsrc%5Etfw)

Updated at 10.49pm BST

10.41pm BST

Good morning

Welcome to parliament hump day, with just two days left in the parliamentary sitting before a six-week break.

That break was added in to give the government some flexibility for when it could hold the election. Given \*gestures to everything\* it's unlikely to be held in the next month. I know there are rumours, but with half the population in lockdown, bad polls, travel restrictions, the need for a virtual campaign, frustrations with the federal government and at best, ho-hum economic news coming, a government wanting to retain power would only hold an election right now if they absolutely had to. This government has until May. Don't be surprised if Australia Day passes and suddenly there is an Election Day announcement. But I think even with this break, you have time.

That doesn't mean things aren't moving though. The Australian has an interview with attorney general Michaelia Cash where she says border closures could be challenged when vaccination targets hit 80%. As my colleague Paul Karp has previously pointed out, that's always been a possibility because the Western Australia high court case was handed down at a time when there was no vaccine, something which was made clear in the judgement. Once 80% or so of adults are vaccinated there is every chance the high court could come up with a different decision. So while the national plan isn't explicit on border closures, the federal government has plans. It's just not pushing it right now because it needs Queensland and Western Australia to win the next election. That's where the seats are.

In Covid news, we'll hear the transition plan from Daniel Andrews today. That will include some restrictions easing a bit down the track. Andrews still wants numbers "as close to zero as possible" but seems resigned that Covid zero with Delta, once it has taken hold, is asking a bit much. Still, he has also been clear that he won't be opening up when numbers are high. And he has also been clear he won't be doing what NSW has been. We'll bring you that and the latest from NSW, where the regions are being watched closely.

You have Mike Bowers in the halls and Amy Remeikis on the blog, with Katharine Murphy, Sarah Martin, Paul Karp and Daniel Hurst.

You'll also hear from members of the wider Guardian team as the day unfolds.

It being Wednesday, I had a lollipop with my coffees. It just seemed right. So grab your breakfast treat and let's get started.

216802021-09-01T06:00:00Ztrue2021-08-31T21:41:14Zfalsefalse2021-09-01T07:29:30ZtrueAUStheguardian.com[*https://www.theguardian.com/p/tyfp6falsetruehttps://media.guim.co.uk/62db4e52f44d6a6253ac904c828288dd3b26dd7a/0\_233\_6970\_4184/500.jpgfalseentrueThank*](https://www.theguardian.com/p/tyfp6falsetruehttps://media.guim.co.uk/62db4e52f44d6a6253ac904c828288dd3b26dd7a/0_233_6970_4184/500.jpgfalseentrueThank) you Amy Remeikis, who has once again proven she truly belongs in the pantheon of live bloggers. The parliament is winding down - but there is one day left before the six-week break and given how tempers are already fraying, you should probably prepare for it to be a mess. Before I hand over to the wonderful Nino Bucci to take you through the evening, I wanted to say a very big thank you to all our readers. I know I keep saying this, but the knocks keep coming. And they are piling on when you are already stressed, or exhausted, or at the end of your capacity. My oma used to say we are all just like cups filling with drips of water when we are under pressure, and you never know what drip is going to be the one which causes your cup to overflow. There have been a lot of those drips lately. For those in lockdown particularly, but also for those missing loved ones, missing key support networks, missing freedom and missing making plans. Not being able to plan is demoralising. And we all know we are in for another rough month or two before anything starts to become clear and sometimes seeing the light is ahead makes getting through it all even worse. So take care of yourself. You're not alone in feeling over absolutely everything. That doesn't make it easier, I know. But there are people who get it. And if you can, if you have the space, make sure you see if those around you are doing OK. It doesn't have to be an "are you ok?". Because we know the answer. But a "this is pretty shit, thinking of you" can work wonders at times. We'll be back with Politics Live tomorrow. In the meantime, Nino has you in very good hands. Please - take care of you. Queensland has updated its exposure site list after a Covid-positive truck driver passed through parts of the state. You can find the list here. Josh Frydenberg also walks back Karen Andrews comments from a little earlier that it is the "view of the federal government that Queensland should be open". Frydenberg tells Afternoon Briefing it's the view of the federal government that premiers should stick to the national plan. Asked if he thinks Queensland should open its border to NSW or Vic when there are such high case numbers, he says: Decisions should be based on the medical advice at the time but the view expressed very explicitly in the Doherty Institute modelling is that the country can open up when it [reaches] double dose vaccination rates of 70 to 80% in individual jurisdictions as well as the 70% to 80% across the nation as a whole and this is the key point, Patricia. The country needs to learn to live with Covid. And the admission and acknowledgement in Victoria today is very significant. Patrick McGorry, former Australian of the year and psychiatrist says it is a game-changer because it means that the government that the state level are recognising they cannot eliminate the virus. They can suppress it and buy time, but they cannot eliminate it and Queensland and Western Australia also need that mentality to know that they cannot keep Covid out indefinitely. The treasurer is pushed by Patricia Karvelas into explaining why he won't say whether or not the federal government will provide financial support for any future lockdowns. The national plan includes targeted lockdowns, in areas where test, trace, isolate, quarantine systems fail. So will those people, who may find themselves locked down in the future if TTIQ fails - which is in the national plan - receive financial support? Frydenberg wont say because (and this is a throwback to just before lockdown five in Victoria) he does not want to "incentivise" the states to lockdown: We have supported people right throughout the pandemic and of course our focus is ensuring that they can get back their lives in a Covid-safe way. I'm not about to incentivise state premiers or chief ministers to go and have lockdowns. What I want to do is focus on getting out of the lockdowns which means getting vaccination rates up but holding the states and territories to account for the agreement they have reached at national cabinet, and that's the key point. Today we have seen 80 of our largest business organisations around the country employing a million people, go out publicly and call upon federal, state and territory governments to actually stick to the plan. And that is critical. We have to stick to the plan. Why? Because people need hope. Why? Because people need certainty to plan. Our agency and economic support has seen debt burden rise rapidly and we have committed more than $300bn in health and economic support, a lot more than what the states and territories ever committed to, and that is effectively borrowing from future generations, so I will be prudent. I will focus on the situation at hand and we will make decisions based on those circumstances when they arrive. We've spoken a bit about different experiences shaping different viewpoints - for example, not just assuming everyone has a family doctor, or even access to regular healthcare. Different experiences also shape reporting. Here is SBS's Rashida Yosufzai detailing her own life experience, and how that has impacted her, as she is watching what is happening in Afghanistan as a journalist - but also a human with the most personal of connections to the nation: There wasn't a big update on the Parklea prison Covid outbreak today (or any prison updates) but it is worrying for a lot of people. The CEO of Jesuit Social Services Julie Edwards had a bit to say - the JSS wants more done to protect vulnerable prisoners: We call on the NSW Government to immediately find alternatives to prison, both in the community and in supported accommodation, for vulnerable groups including Aboriginal and Torres Strait Islander people, people with disabilities and the elderly. Men and women exiting the prison system, who Jesuit Social Services works with every day, often report personal experience of complex health issues including cardiovascular disease and diabetes. These marginalised people are particularly vulnerable to COVID-19 - and at the same time prisons are not environments that are generally conducive to the type of important health measures to prevent the spread. The two sides of the national plan debate, represented by Tim Wilson and Anne Aly: Wilson: (on Afternoon Briefing) If everybody thinks some of these states will be able to keep Covid-19 and its variants out of their jurisdiction forever, then they have taken departure from reality. This isn't because any others want to live with it, it is just a reality that you can't give a virus out forever. We don't keep the flu out every season. If we could, we would, but we recognise there are significant consequences from the decisions we made, the obligations required, and of course we can buy ourselves time, which is what Australia's has pursued. It is buying ourselves time to get the population vaccinated, build up the health system to respond, but I don't think anybody, if they were being honest and mature or, as you put it, real with the public that they can live free of the virus forever. Aly: (also on Afternoon Briefing) It is great to come to talk to you from my cave in WA. Nobody wants to be in lockdown forever. And Labor, [knows] the national plan is based on modelling that makes a number of assumptions, including assumptions about the number of community cases of Covid before we get to a certain level of vaccinations, and whether or not it is safe to open up at that level of vaccination.... I think those people need to be prepared for the consequences of what that means to accept Covid in the community. I have one son who lives in Melbourne, one in Sydney. Yes, I would love to see them, I would love to be able to hold them and give them a hug, celebrate their birthdays. I have one who is planning to get married next March. I hope I am able to celebrate with him. But, I am not prepared to put my elderly mother or put anybody's elderly parent at risk in order to do that. Remember the aged care royal commission report? Rex Patrick does. He just wants to see some of its recommendations implemented sooner. So he introduced a bill in the Senate to mandate aged care facilities to have at least one registered nurse present at all times. (That is planned to occur from July 2024 at the moment) From his statement: Currently in Australia, there is no nationwide requirement for nursing homes to have a registered nurse on duty at all times. I'm concerned aged care residents are not getting the care they need, and the care is varied depending on where they are located across Australia. The inconsistent approach leads to variations in the level of care and quality provided to residents. Proper care for our elderly is critical and it requires aged care homes to have registered nurses on site at all times. The Greens senator Mehreen Faruqi introduced a bill to the Senate to ban the export of greyhounds from Australian for commercial purposes - which would include breeding and racing. Between 2016 and 2021, we exported 1,313 greyhounds from Australia. We don't always think about where they are going. In her statement Faruqi said: A ban on commercial greyhound export is long overdue. Greyhounds from Australia are routinely being sent overseas to race, and often end up in countries where there isn't a semblance of animal welfare protection for these poor dogs. Greyhound export might make a buck for the industry in Australia, but the welfare of the dogs is routinely sacrificed at the altar of profitability and gambling revenue. This is a simple reform and an important one. It will put a stop to a completely inhumane practice that has caused far too much suffering for far too many dogs. I hope other politicians can support this important step for animal welfare. I know it doesn't feel like it, but things also happened in the parliament today. Let's take a quick look Jim Chalmers is seemingly trying out Labor's new line against the Coalition that Australians are "paying the price" for the federal government's pandemic missteps: We said that consistently and the most important part of the national plan is fixing the mess that the prime minister has made of vaccines. Australians are paying the price for his mistakes. We saw that in the national accounts today and we will see yet more prominently in September that will come through in December... The reason they are closed and we are having these outbreaks and these lockdowns is because the prime minister didn't do his job on vaccines and quarantine. Let's focus on the real problem here, which is the prime minister's failures. Let's fix that up. We've made some constructive suggestions about vaccine incentives and trying to be helpful because there are industries in parts of Australia doing especially tough as a consequence of the prime minister's incompetence. Jim Chalmers continues on that theme, after being asked about Victoria now admitting it can't beat Delta: It is new territory and that has been a feature all along and there has been some sense of uncertainty and unpredictability but one of the things we now have to be certain of, one of the things that has been entirely predictable is that the economics is a direct consequence of the government inability to get the vaccine rollout right and to some extent the failure to do purpose-built quarantining. Some of the other things that have been missing and when you think about the slowing economy and shrinking economy in the September quarter, this is the price people are paying when it comes to Scott Morrison and his government when it comes to vaccines and quarantining until we fix that, we will continue to have lockdowns and we will continue to have the social dislocation and the economic carnage we have seen in the last year especially. Jim Chalmers is on Afternoon Briefing where he is asked about the national accounts (Australia's economy grew by 0.7%) The economy was slowing in the ***data*** that we received today but we know that the economy is actually is shrinking this quarter and we got the numbers today for the June quarter and we know the economy was slow. It is now shrinking in this quarter and it's important to get that perspective and the economy is growing more slowly than the US, UK, OECD average and that's another important piece of perspective but the other important thing is that for Australians doing it especially tough, particularly but not just in lockdown communities, I think the digits in the decimal places on these quarterly numbers are not the most important thing. I think for many Australians it already feels like they are in recession and they are who we should focus on. I also hear it makes you about 72% more attractive. I don't make the rules. South Australian authorities have updated the exposure site list for the state, after confirming a fifth Covid-positive truck driver has passed through the state over the past six days. Areas include Nundroo and Ceduna in the west, to Port Augusta, Port Wakefield, Adelaide and Tailem Bend. The exposure sites list has been updated here. Queensland has also reported a Covid-positive truck driver had entered from NSW. There is no evidence of any community transmission (as yet). Scott Morrison said yesterday that each state was at a different point. Karen Andrews now says 'the federal government is of the view Queensland should be open'. Queensland doesn't have any restrictions (at the moment) so open to what is unclear - I can't see anyone opening to NSW or Victoria at the moment. And Morrison has been trying very hard not to pick a fight with either Queensland or WA (or any of the lockout states) because well, he needs them for the coming election. Andrews: It is difficult to understand what the Queensland premier is trying to achieve. We have had a range of statements from her over the last couple of days, if not weeks, if not months, that quite frankly have not made a lot of sense. The Queensland premier is quite clearly doubling down on her 'let's keep Queensland closed' and the federal government is of the view that Queensland should be open. How is a number a security risk? Karen Andrews: Because we are not prepared to give any details that would potentially lead to a security issue for those individuals. We know that the Taliban and others are very focused on how many Westerners are in Afghanistan at the moment and we are not prepared to feed into that. Quite frankly, what we need to be focused on, and what we are focused on as a government, is doing all that we can to support those people who are there to give their loved ones in Australia for those that have them, the support that they need to manage the situation as best that we can. There is no easy route out of Afghanistan at the moment. I have spoken previously about the opportunity for commercial flights to start. We don't have a time for that at this point in time. We are working with our allies, we are working on the ground with a number of different agencies to look at opportunities for people to exit Afghanistan as and when they can. How many people with Australian visas did we leave behind in Afghanistan? Karen Andrews: I am not going to give the details in relation to those people for a whole range of issues, including the security of those individuals. It would be very unwise for us to be talking about the numbers that are currently there, but I can say that that number is also increasing on a daily basis as people are coming forward and identifying to our officials either on the ground in Dubai that they have family members that are looking to come to Australia or they are identifying to home affairs or Dfat in Australia that they are wishing to come to Australia. So that number is increasing. We are looking at what the opportunities are to allow people to come here through our humanitarian program. Of course those people who are Australian citizens seeking to come here, we will do whatever we can to support them. I think it is important that we understand that the environment in Afghanistan remains critical. The terrorist threat is alarmingly high and there are threatened attacks. So we are aware of that diabolical situation in which people are remaining at the moment. We are doing all that we can to provide a level of support to those people and we will assist them as and when we can. Q: Can you confirm there is another flight arriving in Darwin this evening? How many people are aboard that and what is the breakup of Afghan [visas]? Karen Andrews: There are flights coming in on a daily basis now into various airports across Australia. We are looking at how we are reconciling the status of those individuals coming in, in terms of the visa classification, the subclass that those individuals might have, the Australian residents. We are working through that process and finalising details as we go. But what we should all be very proud of is that Australia uplifted 4,100 people out of Afghanistan and those people are now safe either in Dubai or are on their way here to Australia or are in Australia. Q: How many people in Afghanistan with valid Australian visas have been in contact with the Australian government to say they weren't able to make it out in time? Andrews: We are on a daily basis receiving further applications from people who wish to come here to Australia. I'm not going to give a figure, simply because that is changing on a daily basis. Queensland is taking quite a few Afghan refugees though. Karen Andrews won't go into the visas she is issuing. Q: How many unaccompanied children, children without their parents, are currently quarantining in Australia or on their way in from Afghanistan? Andrews: That number is actually varying at the moment. It is less than 10 are here at the moment. We all witnessed the scenes in Afghanistan where people were - adults were passing their children through the gates. There are some unaccompanied minors here in Australia at the moment who are being well cared for. We will continue to do that and then there will be others that come into our country over the coming days as well. Karen Andrews is holding a doorstop interview where she deploys the grati-sult - thanking Annastacia Palaszczuk for opening up hotel quarantine for 50 families, while also slamming Palaszczuk for the NRL family decision: This is great news that the premier has started listening to Queensland who were rightly outraged when NRL players and their wives were flown into Queensland at the same time that Queenslanders were locked out of their own state. Queenslanders are very concerned at the premier's hypocrisy. On one hand she has said that quarantine in hotels does not work. And yet she allows a planeload of people to come in - NRL players and wives - to come in from Sydney, the hottest of the hotspots in Australia and to go into hotel quarantine in Queensland, while at the same time making it clear that she will not allow people to cross the Queensland border even if they live in Queensland. Australia Post has sent in a statement on parcel deliveries in locked down areas: Due to the ongoing impacts of Covid in NSW, ACT and Vic we are temporarily pausing Parcel Post ***collections*** for eCommerce retailers in those jurisdictions from 7am Saturday 4 September until 7am Tuesday 7 September, to help manage the record volumes in parts of our network and return them to a safe and manageable level. Australia Post currently has 500 people in necessary self-isolation, placing increased pressure on our network, while we also manage flight restrictions, temporary facility closures, and parcel volumes as high as our Christmas peak period. Deliveries will continue across the weekend, post offices will remain open as usual, and parcel processing continues, as our people deliver record amounts of parcels to Australians. Similarly, services provided for Express Post, Premium, Startrack Express and letters remain unchanged across our network. Lodgements at post offices and standard post boxes will also continue to be ***collected*** and ***collections*** in all other states remain the same. We sincerely apologise to our customers for the inconvenience. Here is how Mike Bowers saw question time: Tfw a joke you made about having false teeth becomes part of your parliamentary record: Peter Dutton played peek-a-boo: Choice has published a sign-up sheet for an open letter calling on the federal ***agriculture*** minister, David Littleproud, to introduce mandatory standards for pet food in Australia, after dozens of dogs in Victoria died after eating toxic meat. The meat, sold through the Maffra knackery in Victoria, came from horses from the Northern Territory which had eaten indigofera plants, which contains the deadly indospicine toxin. The knackery said it was not aware the meat was contaminated and posted a recall. A Senate inquiry in 2018, after another series of dog deaths linked to the megaoesophagus condition, recommended the pet food industry be subject to mandatory standards. But those recommendations have not been adopted. Well. That has certainly been a whirlwind five or so hours. Take a moment to catch your breathe. I'm going to have a read over everything and see what I might have missed while I was focused on all those press conferences and I will be right back with you. Question time ends. One more left for the week and then there is a six-week break. Scott Morrison includes this in an answer: When you talk about young children... the opportunity for them to sit with a local GP who has helped them with every other sneeze and sniffle, or even more serious things over time, to be able to see a face they know to get that injection and have that assurance from a health professional is extremely important and I want to thank GPs as they go about the job of vaccinating our children Which is great, if you have a family doctor. A lot of people don't. A lot of people rely on bulk billing centres where they see whomever is available. There is a lot of privilege being assumed at times in the vaccine discussions. Not everyone has their own doctor. That needs to be remembered too. Nicolle ***Flint*** asks if she can asks the dixer Jason Falinski was supposed to ask, but can't, because of technological issues with his virtual link. She can. And does. So the member for Boothby asks a question on behalf of the constituents of the member for Mackellar. Just another example of just how completely ridiculous dixers are. If you haven't received a package, it might be because there is a bit of a backlog in the locked down states. Tony Zappia to Scott Morrison: My question is to the prime minister. Yesterday the prime minister said, ultimately everything is a matter for the states. Was it the states or the prime minister who said the vaccination program was not a race? Peter Dutton is on his feet: The prime minister made clear the statement made as a preamble to that question is not accurate, it related to a response the prime minister gave when asked about the closure of state borders. It has been repeated since the prime minister has raised this, and, it is very clear, this misleading statement regardless of how it is repeated is factually not correct, and it should not be allowed. I'm sorry. I'm just need a moment to go find my eyebrows. I think they might have hit Sarina with how high they just raised, hearing Dutton speak about how factually incorrect statements shouldn't be allowed. (If someone in north Qld could pop them back in the post for me, that would be great.) Tony Smith is also not having Dutton's hubris: I can't agree with the Leader of the House, the practice was made very clear, since 1901, it is not for the Speaker to vouch for the accuracy of statements, questions or indeed answers, or indeed answers, which is, if someone claims to have been misrepresented, the standing orders are so organised there is official capacity for them to do that at the end of question time. Or at the end of when a comment is being made. The question is in order. So Morrison has to answer: I would encourage the member to go and have a chat to Senator Kitching (sidenote: Tveeder transcribed Kitching as senator Gucci, which for anyone who has seen the House of Gucci preview will find very, very amusing). Morrison: The next time they are at caucus, go and have a chat with the senator for Victoria about the progress of the vaccination rollout which she has made very clear is the reason Australia is moving away from lockdowns in this country, and I welcome her acknowledgement of that. Those here who sit opposite may come in here and seek to undermine that program, they may wish to engage in the usual politicisation of Covid-19 pandemic. They may wish to choose that they reinforce only one thing to the Australian people, that they are only engaged in negativity, they are only engaged in running down the country, even here yesterday, the leader of the opposition... Smith interjects: The question was asked by the member for Makin. The prime minister needs to be relevant to the question that was asked by the Member, it's not an opportunity to begin a political debate on yesterday or two days ago. Morrison: What I can confirm is as the minister of health and aged care said today, we are likely to go past the milestone of 20 million doses of vaccine being administered around the country. 20 million, Mr Speaker, 20 million doses, and that means almost 60% of the eligible population, aged over 16, will have had - around 60% of them - will have had their first dose in this country. That's around 35% have had a second dose, and for those over 50, it is almost now 80% who have had their first dose and 52.9% who have had their second dose and importantly, 87.8% of those aged over 70, the most vulnerable, have had their first dose and 63.8% have had their second dose. And I can update House on my earlier response as further information has been brought to me after my morning briefing this morning, with aged care workers first dose is 82.9% and second dose is 61.3%. So, the vaccination program is a central part to the government's national plan, to get Australia beyond these lockdowns which are doing such terrible damage to people in this country, that we need to get past these lockdowns, and the vaccination program is liberating Australians from those lockdowns, which is the objective of the national plan. Not to keep Australians shut in, not to keep them locked out of states round this country, the national plan is opening up Australia, the national plan is about connecting Australians to other Australians, and connecting the economy to the world. So Australian businesses can continue to go forward and have confidence to invest and employ ... (he runs out of time). Melissa Price stumbled in a dixer and says: Excuse me, I will put my teeth back in. She then adds "not yet" (as in she doesn't have false teeth yet" but Tony Smith points out that it is too late and "will probably get a run". Yes. Yes it will. Anne Stanley to Scott Morrison: Yesterday the prime minister said ultimately everything is a state matter. Was it to the states or was it the prime minister who failed to establish a system of safe national quarantine? Morrison: Again, Mr Speaker, the question from Labor is misrepresenting the statements of yesterday, Mr Speaker. I made it very clear that the border measures which were put in place by the states related to public health orders and they are key responsibilities of the states, when it comes to people moving from one state to another, so Mr Speaker, I would ask the Labor party cease misrepresenting that\*. [This is the same person who won't stop saying Anthony Albanese wanted to see worse case scenarios with Covid.] But Mr Speaker, I am asked about the quarantine, and the most important challenge for quarantine right now is to ensure that home quarantine trials are successful, so home quarantine becomes the norm that enables Australians who are overseas to be able to return, that enables Australians who are here now and have been vaccinated, so they can go overseas, Mr Speaker, as they used to, and be able to return in quarantine at home.... It is so important to enable international travel to start again, and home quarantine, Mr Speaker, is the answer to that. That is what is set out in the national plan. That is what is agreed and the national plan. That is what is being led by the commonwealth, Mr Speaker, in moving us into a home quarantine phase that will enable Australians to travel again. It will enable more people to be able to come into the country, be they students or be they skilled workers that are so necessary to Australia's economic performance, and that they, Mr Speaker, can take advantage of a range of different quarantine arrangements, both commercially provided and otherwise provided, which will enable the national plan to gear up and strengthen our economy into the future. So Mr Speaker, home quarantine is what is needed\*. Home quarantine is what is going to release Australians, out of the lockouts, Mr Speaker, out of the lockdowns, and to ensure that safely, Australia can live with this virus. I would urge all members of this chamber to support be moved to go now to home quarantine, but will see Australians being able to return home, who are vaccinated, and vaccinated Australians being able to travel again, to be reunited with their families overseas, Mr Speaker. That is the challenge which is now before us. That is what is set out in the national cabinet plan which was agreed to and that is what I look forward to working with closely, whether it is South Australia whether trial is already under way, whether the trials will be done New South Wales, and I encourage all other states, be it Queensland or Western Australia or Tasmania, Mr Speaker, to get on board with those initiatives. I know they are watching those trials closely and they will be very enthusiastic about taking it up because the national plan enables Australians to live with the virus and home quarantine enables Australians delivered the virus and connect again with each other and all around the world. \*There will still be a need for dedicated quarantine for workers. Scott Morrison also repeats the line of lives saved, using the OECD averages: More than 30,000 lives have been saved in this country because of the responses that the government, together with our partners around the country, has been putting in place now these many months, more than 18 months, and not just the 30,000 more lives that have been saved, Mr Speaker, but the million jobs, the million Australians who are back in jobs and can look forward to a future with confidence, Mr Speaker, because they have been living in a country whose Covid response has done both of those things. Saving lives and saving livelihoods. Australia's vaccination program was delayed. It started in February, but it wasn't until Delta hit that there was any urgency from the federal government in regards to it. It previously was "not a race". The mRNA doses which are coming now were scheduled to come - it was part of the original plan. There are still massive failures, particularly for Indigenous communities, which are playing out before our eyes in real time. Scott Morrison is now claiming credit for saving "hundreds and hundreds and hundreds" of lives in aged care centres. We have continued to work on what is a very difficult program in that sector, but we do know the decision taken by our government to ensure that we focus first and absolutely on getting to every single residential aged care facility in this country ... has saved hundreds and hundreds and hundreds of lives, Mr Speaker, and that is ultimately the outcome this is all about. The vaccination program in aged care homes was delayed. Hundreds died in aged care homes in 2020. And there still needed to be a massive push, which needed the states to get involved, to get aged care workers vaccinated. Out of all the claims, the aged care vaccinations being a "success" is not one of them. It was forced, because of a complete failure at the beginning. Anthony Albanese has had enough and asks Scott Morrison to withdraw his comments: I'm asking prime minister to withdraw the comment he just made, he has made it repeatedly. I have now lost seven of my constituents. They have died. No one, no one is Australia is hoping for the worst from this disease because that is the worst, a loss of life. Tony Smith says the comments are not unparliamentary, so it is up to the prime minister. He does not withdraw. Anthony Albanese to Scott Morrison: Yesterday the prime minister said, ultimately everything is a matter for the the states. Was it the prime minister who failed to deliver enough vaccine supply? Morrison (who gets quite personal and continues on his "Anthony Albanese is negative" theme, which you will see more and more of as the election approaches): I was asked about state borders when that matter was raised yesterday. That is a public health, social measure a border closure is done on the basis of a public health order. That's exactly what it is, the leader of the opposition might want to freshen up on some of the facts, get across some of these issues if he wants to engage in these snide interjections that are a result of his own lack of knowledge and understanding of the challenges this country faces, what I do know is this, to date, I read that this is a very wide statement made by a member of the Senate, 'I think we're getting to the end of the era of lockdowns, partly because we are doing so well on vaccinations'. Mr Speaker! The Labor senator Kimberley Kitching has had an outbreak of truth in the Labor party. There has been an outbreak of truth, Mr Speaker, and I think the leader of the opposition is vaccinated against the truth. There is no shortage of that when it comes to the leader of the opposition. To date, what we do know today, again more than 330,000 vaccine doses administered, right around the country, again. Today, we will go close and reach the 20m doses that have been administered around the country. This week, we announced the half a million of additional doses of hope coming for Pfizer with arrangements we put together with the government of Singapore. The million doses and more we secured in our arrangement with the Polish government, working these issues, ensuring we leave no stone unturned\*[because not enough was ordered in the first place] to make sure we can continue to accelerate the vaccination program that has now achieved rates of weekly vaccination, that exceed those, even of the United States and the UK, at their biggest. Those opposite may want to talk this down, I'm pleased Senator Kitching has decided to take a different approach, they may seek to underline and be negative but the government will continue to deliver for the best of this country and we are not only seeing that with the vaccination program, we see it with the economic supports that has enabled us to bring Australians to what is one of the biggest crises this country has ever seen. We will continue doing that while the opposition will continue to be negative. Daniel Hurst just pointed out to me that Peter Dutton appears to be making plans for this government to remain in power "for decades" given this part of his dixer answer: "And for all of those leaders on both sides of the equation, who have given their commitment to, this compact for 70 years should know, that this government will continue to reinforce and Anzus treaty for many decades to come." Sharon Claydon to Scott Morrison: Rachel is 24 weeks pregnant and in my electorate, she cannot get an appointment for the vaccine recommended for her until November 2, she is on a waitlist at five GP clinics and was turned away when she tried to get a vaccination at a walk-in clinic. In Newcastle, another pregnant woman just like Rachel is in intensive care with Covid-19. How can the prime minister leave pregnant women so vulnerable? Greg Hunt takes this one. He goes through the advice that pregnant people should be vaccinated, and then he goes through the vaccination options. We continue to encourage and provide practices to provide priority to pregnant women in line with the advice of Atagi issued on 1 June. Which is great. Except pregnant people can't get priority and are waiting for their vaccinations, like anyone else where mRNA vaccines are the only recommended option. The US secretary of state, Antony Blinken, has mentioned climate change in a message marking the 70th anniversary of the Anzus treaty - another sign of the emphasis the Biden administration is placing on the issue in the lead-up to the critical climate talks in Glasgow in November. The US embassy in Canberra has circulated statements from Blinken and the US defense secretary, Lloyd Austin, to mark the occasion. The pair is due to host an in-person meeting with Marise Payne and Peter Dutton in Washington DC this month. In his statement, Blinken said the Anzus treaty was "a long-standing testament to the strength of our partnership" and was "as essential to the safety and prosperity of our countries today as it was 70 years ago". "Our alliance is much more than a military pact. It helps underpin the stability of the region and democracy in the Indo-Pacific. It facilitates the movement of goods, services, and investment dollars, as well as ideas, research, technology, and people. It supports our joint efforts to advance human rights, promote the international rules-based order, assist our Pacific neighbors, and cooperate on issues of global concern, such as public health and climate change." Blinken said Australia and the US had served side by side in Afghanistan for 20 years. "As President Biden said, 'We went in together and we're leaving together, and now we're working together to bring our people and our Afghan partners to safety.' We will always be grateful for the help and trust we find in Australia." Austin said the United States would never forget that after the September 11 terrorist attacks, Australia invoked, for the first time in its history, the ***collective*** defence article of the Anzus Treaty. "Our Australian allies stood by with us to the very end of our presence in Afghanistan and the United States will be forever grateful." Both Blinken and Austin said they looked forward to welcoming Payne and Dutton to Washington DC for meetings, including the annual Australia-United States Ministerial (Ausmin) consultations. Peter Dutton is taking a dixer on the Anzus relationship. Terri Butler asks Scott Morrison this question: Why didn't the government put rules in place to require jobkeeper payments to profitable companies with rising revenue be returned to the taxpayer? The government makes welfare recipients and parents that receive the childcare subsidy return excess payments. Why would the same rules not put in place for profitable companies with rising revenue? Morrison is now giving a running commentary on how amazing jobkeeper was (leaving out that the wage subsidy was originally Labor's idea). He is very cranky again today. He then moves on to Labor "flip flopping". That is what we put in this place, we made that promise, and labour voted for it. Labour voted for it, Mr Speaker. We said we were going to stand by this economy and those businesses and we made that legal. We did that together. Mr Speaker, what I hear from those opposite now is that they want to change the rules afterwards. They want to change the goalposts. They want to shift the mark, Mr Speaker. They want to have it each way, Mr Speaker. They want to support jobkeeper and they want to oppose jobkeeper. This is a constant theme of the leader of the Labour party, Mr Speaker. A constant theme. We made that commitment. Tony Burke has a point of order: On direct relevance, the question does not go to the whole of the jobkeeper program. The question, sorry ... I've got the call for the moment. [Peter Dutton interjected] The question does not go to the whole of the jobkeeper program. The question goes simply to those employers, those companies, but ended up with rising revenue, and turned a profit. Dutton then gets up: At some stage I probably should put a question to you about this continual conduct which you have commented on, and I think chastised, both the Leader of the Opposition under the manager of opposition business on a number of occasions, because it is an abuse of the standing orders. And they repeatedly get up and make statements... Tony Smith cuts Dutton off and tells Morrison to stay relevant. He does not: The question put by the Labor member, the question put by the labour member betrays what we have seen from the Labor party in this place. It betrays, Mr Speaker, because what was essential at that time was that what was committed to was followed through, Mr Speaker. And that is what gave the Australian business community the confidence to keep people on the payroll, to then put a million people back into work, and too insular, Mr Speaker, that under the national accounts, as we have just seen, but Australia's economy is now bigger at the end of June that it was before we went into the pandemic. What we have seen, Mr Speaker, and the questions put by the Labor party, is that they will happily change the rules on business, Mr Speaker. They will happily flip it and they cannot be trusted. They cannot be trusted on anything they say. Morrison's time is up, but he keeps yelling his answer. "Back in black" someone from Labor yells. Morrison is still going, and Smith repeats his time is up and the House moves on. Josh Frydenberg gets a dixer where he is asked to explain something "yet again" to the House. That's what press releases are supposed to be for. Not "questions without notice". Adam Bandt to Scott Morrison: Your job is to keep all people safe, not just some. But even though you've set an 80% vaccination target for adults, there's no target for children, nor for at-risk communities like First Nations peoples or people with disabilities. Everywhere from Wilcannia to the United States, we're seeing the virus rip through at-risk communities. Prime Minister at national cabinet this Friday, will you ensure the national plan has separate vaccination targets for children, First Nations peoples, people with disabilities and other at-risk groups, so that they're vaccinated to at least the same levels as the broader population when restrictions are lifted? Morrison: Thank you, Mr Speaker, and I thank the member for his question and highlighting those very important groups within our community. All of which are encompassed in the national plan. The member may not be familiar with the details of the national plan, Mr Speaker, and in particular, how it recognises that even within the overall vaccination targets of 70% and 80%, but there is a strong recognition in all the work that has been done going into that plan. They will need to be careful management around vulnerable communities. Those vulnerable communities are CALD communities, Indigenous communities, a range of many other communities, Mr Speaker, where vaccination levels, for a range of reasons, those who are homeless, Mr Speaker, those who have issues with substance abuse, Mr Speaker. There are a range of varying groups across the community which will require continued, careful management of our public health. Now, the chief minister of the ACT has been making this point extremely well, he and I have discussed it on numerous occasions as we have been preparing plans to deal with the pandemic at post 70 and 80% vaccinations will require ongoing and careful public health plan that deals with disadvantaged communities. Socio-economically disadvantaged communities. We have seen this and how the pandemic has played out not just here in Australia but all around the world, and there will be a very clear and cooperative national strategy that deals with the ongoing public health needs of disadvantaged communities. But that plan will ensure that the broader community will also be able to go forward, and this is why it is a safe plan. It is a safe plan that enables the broad spectrum of Australia to move ahead and to avoid these terrible lockdowns that are causing so much pain, and for Australians to move on from that and not live in fear of them either\*, but at the same time, ensure that we have very targeted and focused public health responses at a state and federal level, that understands the very serious needs of those communities, be they in remote places, this is a matter of the chief minister of the Northern Territory has consistently raised, and we have worked together with him from the outset, Mr Speaker, working closely with him as we are indeed now, because there is such a disparate, a disparate, Mr Speaker, performance on vaccinations. That is exactly what the national plan provides for. I am sure the member will be pleased to hear that and if you would like to learn more about it, Mr Speaker, and we would be very happy to ensure he could be provided with further details, if he were so interested. \*This is a new message as part of the national plan and is aimed at the states where lockouts, not lockdowns, have been the norm. Dugald Milton Dick asks the current deputy premier why Pauline Hanson announced a government grant, before the government MP had a chance to. Paul Karp has the story here: The current deputy prime minister; I would like to note that of course, we have Labor Party members who lobby us, for grants, especially in regional areas, yes we do. I can give you the letters. It goes very well. And of course we have senators who lobby us. He then moves on to grants the Coalition MPs have. He then comes up with this absolute garbled sentence: I would say quite obviously that is the case that if we have an announcement, in a whole range of people, you know what they say, it is never about, you say about success and failure and the parentage of both, we can tell you that success is driven by government, announcements are driven by government, the government has the expenditure review committee, that approves the money. The government has the cabinet that approves the policy. He's still going. I can not. The current deputy prime minister refers to George Christensen as the "unassuming and quiet member for Dawson", perhaps proving TCDPM really does live in a completely different reality to the rest of the world. Stephen Jones to Josh Frydenberg: The treasurer said that our economy was the head of the pack, but new numbers show it is growing more slowly than the US, UK and the OECD average, and the current quarter has been extremely tough Australians. Was your claim ahead of the pack about as accurate as your claim to be back in black? Frydenberg: The reality is, it didn't contract. The reality is, it didn't. Reality is, at a 0.7% in the June we saw economic growth that was better than what the market was expecting, Mr Speaker. He then goes through all the countries who have seen worse outcomes and federal government funding programs. Scott Morrison takes a dixer from Andrew Wallace, and thanks him for his "tireless advocacy" on mental health, particularly for young people. "He has been an extraordinary advocate," Morrison says. Wallace's most recent advocacy compared "children's fear of climate change with the threat of nuclear annihilation in the 1970s and 80s, and requested full funding for chaplains in every school to help ease concerns". And we are straight into it. Anthony Albanese to Scott Morrison: I refer to threats by the attorney general that states may face high court challenges to force their borders open? Can he confirm he spent $1m in taxpayer money to tear down the West Australian border and some of it went directly to Clive Palmer? Morrison: We did not pursue that matter and we are not pursuing those matters. Labor laughs. Question time is in about five minutes or so. But to be clear - Victoria is no longer going for Covid zero, or thinking it can see case numbers go down. Case numbers in Victoria WILL go UP. There will be a plateau, but the focus now is on suppressing the cases as much as possible, to buy time for people to get vaccinated. Daniel Andrews says you cannot live with Covid now. The aim is 80% of the adult population double dosed vaccinated. He says that is the national plan. Because then, once open, it will be about managing the pandemic of the unvaccinated. "At 80% double-dosed, it is a fair fight," Andrews says. But the health system won't cope now. To the other state premiers, Josh Frydenberg says: With respect to the premiers, my message is very clear. Stick to the plan. A plan that you agreed to at national cabinet. A plan that gives Australians hope. A plan that allows businesses to reopen and plan for their own future. A plan that will allow our kids to go back to school. A plan that will allow us to attend the funerals and weddings of loved ones. A plan that will allow families to be reunited across state and territory borders. A plan that takes Australia forward to living safely with the virus. Josh Frydenberg is doing his national accounts presentation, and takes a moment to acknowledge the Victorian position: I'm confident that now with those 70 to 80% vaccination targets in sight that we'll see an easing of restrictions, and I welcome the acknowledgement in Victoria today that eliminating the Delta variant is an impossibility. It cannot be done. No country has done at and based on the best medical advice we have, we can't do it. So we have to learn to live with a virus, that means rapidly vaccinating as many people as possible, bringing more supply online and then using those restrictions as we get to those targets. Daniel Andrews says specific restrictions for specific LGAs "don't work". "They didn't work last year, and if they didn't work last year, they won't work. And I don't have advice to do it." Is Melbourne under lockdown until at least the end of October? Daniel Andrews doesn't say yes, but he says there will be significant restrictions until vaccination rates hit the levels where enough of the population can be protected. He says the previous aim was to drive down cases, but that won't be possible, so with the new advice, the aim is to keep cases as low as possible in order to buy time for the vaccinations to take place. "I want to keep the case rate growing... as slowly as possible. That won't be easy, but I think we can do it," he says. For those wondering, Andrews also says there is no harder lockdown rule which could achieve any better outcomes. Victoria is still waiting on advice about whether or not it will be shortening the gap between AstraZeneca vaccines. Daniel Andrews says he hopes to be able to say they can halve the interval between the doses. Daniel Andrews will meet with Scott Morrison (virtually) tonight to discuss vaccine passports and the like - and what life looks like past 70% double dose. Prof Brett Sutton says that Victoria is on track to reach its double dose 70% vaccinated target by mid-October. He says "we will see the curve bend on this outbreak" - but that NSW is also showing "what the real world trend is doing, as well as the modelling". Here is the official release: It wasn't just the case numbers, Daniel Andrews says, it is also the number of mystery cases. People are also not getting tested when they have symptoms, and the nature of Covid means people can be infectious before they have symptoms. Andrews says lockdown fatigue is real, and they recognise it but it is also something they have to deal with here. He also acknowledges that insecure work plays a role, and that a person may be the only earner for their extended family, and they feel they have to go to work in order to provide for them. He says human behaviour is "complex" and can't always be anticipated. The advice is the numbers will go up. About 30% every 11 or 12 days at the moment. So the challenge is now to keep numbers low, in the circumstances as they are. What changed between yesterday's press conference with Daniel Andrews and today's? The advice given to the government last night by the CHO. Andrews: The advice that has been provided to us and it was provided at critical point that this is not going to go down. Jeroen Weimar says it is all about managing now: It means for all Victorians, it's really important now that we all maintain that vigilance, that we test on symptoms, not the day after or a couple of days later, we test immediately when we have symptoms. That we isolate if we're asked or told to do so and that we all play our part in getting these outbreaks as much under control as we need to in order to look forward in confidence to get some freedoms back over the days and weeks ahead. So we can still slow this one down. We can still protect our communities and if we keep working together, we can look forward to the confidence to the weeks ahead. Jeroen Weimar, the Victorian Covid commander, says the last two days have been rough. Yesterday was a very sobering day in terms of our battle with coronavirus. The two people who passed away, two Victorians have passed away, one woman in her 60s who was in the second week of her infection, and it was being supported by one of our health units passed away at home in Hume. The second individual passed away, woman in her 40s, passed away in Darebin. She was confirmed as a Covid case by the coroner. It's been the case that we haven't had a fatality here in Victoria with Covid since 18 October last year. We have 120 new cases. It's 2 September last year that we got anywhere near that kind of number in term of daily caseloads in Victoria. Now, 900 active cases in total, 895 local community cases active in Victoria. Two-thirds of those cases are under the age of 40 with 187 of those cases under the age of 9. This continues to be an outbreak impacting mostly younger Victorians and younger and more active Victorians. There are 58 people in hospital. Of those, half are under the age of 50, two are infants under a year old, and two are children aged 10 and 11. There are 21 people in ICU, 14 of those on a ventilator. He finishes with: We've got to plan to ease restrictions but we do need to bend the curve. We need to get lower case numbers than we might otherwise get to. So, please, follow those rules. They are still the bedrock, they're still going to be doing the hard work of keeping numbers in check. If you do need support, it is available. Financial support in particular. If you have symptoms, please, please, get tested. And if you don't, and you have yet to receive your first or second dose of vaccine, please make that booking and get vaccinated. Brett Sutton says it will be a long three weeks, but the 70% target will be worth it: When we get to 70% of eligible Victorians getting that first dose, as the premier said, we can look at expanding that 5km to a 10km radius from home for the purpose of exercise and shopping. In-home care like babysitters can be further extended to family. Primary age children, if one parent is an authorised worker and exercise for that additional hour, outdoor personal training, skate parks, private house inspections and the increase in our construction workforce. Again, not dramatic changes but a step towards that more normal life that we are seeking to achieve. And it can make us feel a little bit closer to normal as we move by increments. But it is about three weeks' away. We need to get there as fast as we can. We'll make those further assessments as we progress. It may follow the trajectory that we expect, but we could equally see better or more challenging conditions. So we just need to watch each and everyday and make those assessments. Prof Brett Sutton: Absolutely it's tough and three weeks seems like an eternity. That light at the end of the tunnel is too dim and the tunnel is too long, but it is a light at the end of the tunnel. It is the genuine pathway out of here that means that we can take those small steps forward, bit by bit, and not have to take backward steps again. But it is such hard work for parents, for kids, for whole families and for single people. For all of us who miss that human contact, for people we haven't seen in weeks and weeks and weeks. I do want to recognise the sacrifices and the wonderful work that so many millions of Victorians have done to get us to this point to allow us to be position to be able to protect our Victorians and protect our health system at the same time. It's taken a couple of weeks to get our case numbers from 50 to 100. That increase is slower, much, much slower, than it could have been otherwise but it is an increase and that's why my advice has changed. It's not to say that the efforts aren't as substantial as they have always been. It's a recognition of the reality of Delta and of the fact that despite all of these extraordinary efforts between contact tracing and between millions of Victorians following the rules, we are still seeing a slow and steady increase. So we have to move as fast as we can to get the highest possible vaccination coverage which will change how transmission occurs and will see us plateauing with our case numbers but we want to do it at a point where our health system is not overwhelmed where we don't have dozens and dozens of people dying in Victoria. Victorian CHO Prof Brett Sutton continues the sombre tone of this press conference: Today's number is not a great number. We know that. It shows us why we need to continue our very substantial efforts to slow the spread of the virus, to put a cap on the numbers that we might get to until enough of us have vaccinated. But 120 is still far less than we would have seen otherwise if we hadn't had the restrictions that we had in place and continue to have in place. It shows that applying the pressure avoids cases today that is avoiding dozens of cases next week, hundreds of cases next month, thousands of cases. Daniel Andrews: We have thrown everything at this, but it is now clear to us that we are not going to drive these numbers down, they're instead going to increase. Now it's up to us to make sure they don't increase too fast and they don't increase too much relative to the number of people who are getting vaccinated every single day every single week. I much prefer to be here announce that we're opening up. There'll be a time for that, but it simply can't be before we get to 70% double dose and 80% double dose. There are some things we can do along the way. I have announced some of them today. We will look very carefully at whether there is more that we can do and if we can do that safely, then that will add to the list for the 22 or 23 September. Until then, please get tested as soon as you have symptoms. Please follow these rules, they're about your safety as much as anyone else's. They're about making sure our nurses and doctors don't have more work to do and, please, go online and book a vaccination appointment, talk to your pharmacist, talk to your GP. There's vaccines there available. Let's use up all those appointments. This is a race to 80. In case it wasn't clear before, Daniel Andrews is repeating, Covid zero is not possible. This is not the advice I wanted to receive. I'm sure it's not the advice of the chief health officer wanted to give us. But none of us have a luxury of pretending that reality isn't just that. The difficult circumstances that are all too real that we face across our state. If we all look out for each other, if we all do as we have done before and find it in ourselves, with support, to get through this, then we can vaccinate faster than cases grow. If we opened up, that would not be the case. In fact, cases would grow so much faster than we can vaccinate people. And that means our hospitals will be full and that means Covid patients and all patients, regardless of what you need, will have their care compromised. As I said yesterday, we can, all of us, manage a pandemic of the unvaccinated if that number is quite small. That group of unvaccinated is quite small. But at just 35% double dose in Victoria and across the nation, they are the numbers, the group of people who are yet to be vaccinated is just too big for our nurses and our doctors and our ambos to cope with. We got to buy time to allow vaccinations to be undertaken all the while doing this very hard work, this very painful and difficult work, to keep a lid as much as we can on cases. Daniel Andrews continues on AstraZeneca: Of course, there is an informed consent process, speak to your GP or if you make a booking at a state clinic and you come to one of our state clinics, we have guaranteed that there will be a senior clinician either a doctor, a pharmacist or a senior nurse immuniser who will be able to talk to you about what AstraZeneca means for you and then you can make an informed decision as literally millions of other Victorians have made. Those appointments are available right now. We can't wait for stocks to arrive when promised in September, October, November. We cannot wait for deals albeit they're good deals to do but we can't bank on the next deal that's done with Poland or Singapore. There is a good, effective safe vaccine available right now. We have always pushed this because it's always been true - it is a safe and effective product and it is on the shelves available in the warehouse right now. The appointments are there, if you go online you can put your name beside one of those appointments and play your part. More than 70,000 available right now over the next three weeks. If they're taken up we'll add more. We will add more. And we will be closer, sooner, to that 70% first dose target and all the other vaccination targets that are critical to us protecting our health system. Daniel Andrews then turns to people who are putting off getting vaccinated when they have access to AstraZeneca. He has no time for it. Andrews: I just want to make it very clear - there are more than 70,000 AstraZeneca appointments that are available in state clinics right now. There is, I think, a sense and it's not a criticism, just a sense that I think that has grown that people can wait. People can afford to wait, they'll get a vaccine of some sort or another down the track, they can get it in a month or two. And that will be all fine. My message to every Victorian is - no, we cannot wait. You need to get vaccinated and you need to get vaccinated as soon as possible. And the best vaccine is the one that you can access today. I don't have Pfizer for everybody and it is a long time off before we will have Pfizer for everybody who perhaps wants that. Again, I just make the point - 2.6m doses of AstraZeneca have been administered in our state over the last few months. This is a choice that literally millions of Victorians are making. It is a safe vaccine, it is an effective vaccine. It is the vaccine that is available now and that means for the vast majority of people, it is the best vaccine right now. Turning to regional Victoria (other than Shepparton which is experiencing an outbreak). Daniel Andrews says it is very possible the regional lockdown (possibly with the exception of Shepparton) could end in most regional areas, next week. But no promises as yet. More detail will be coming next week. And there will still be "significant restrictions" and travel from metro Melbourne won't be allowed. Face-to-face learning is out for Victorian students for the rest of term three though. Next week, there should be some guidance on what term four looks like. What does the school year look like for Victorian students? From 7-17 September, schools will contact students and their families about vaccinations for VCE students. That will be done through state run hubs and will be open for students doing Year 12 exams (including Year 11 students doing Year 12 subjects). That should mean Year 12 students will have at least one dose by 5 October. You can go to a GP or pharmacist earlier, if you are able to make those appointments. Daniel Andrews then moves on to what life looks like with 70% of the adult population vaccinated in Victoria: Everything else has to stay in place until on or about 23 September when we get first dose 70% across our state. That's a significant milestone. And it's at that point that the chief health officer had advised that it will be safe for us to do the following: expand the 5km radius to 10km for shopping and for exercise. It will also be it safe for us to extend the time to exercise from two hours to three hours per day. It will also be safe for outdoor communal gym equipment and skate parks and things of that nature to reopen. Outdoor personal training will also be allowed with up to two people plus the trainer. Child-minding for school-aged children will be permitted in terms of some further changes there, real estate, private inspections of unoccupied premises for a new purchase or end of a lease will be permitted. There'll be rules applied to that. Construction sites will be able to increase to 50% of their capacity where 90% of their workforce have received at least one vaccine dose. So, again, linked to the statewide achievement of 70% first dose, but also where industry can get themselves vaccinated through that program, we will be able to allow further expansions of that economic activity. So what does the transition look like? At first, not a lot. Daniel Andrews: So, firstly, from midnight tomorrow night, the chief health officer has advised that playgrounds can reopen. He'll speak to the logic and the rationale behind that and also his expectations of how playgrounds will work and the rules that need to be followed in just a moment. Also the chief health officer has advised that from midnight tomorrow night, some of the in-home child care arrangements that had been disrupted by rule changes will be able to tidy that up and have some of those what are principally long-standing arrangements reinstated where families have authorised workers in their household. That's as far as we can go in terms of changes effective from midnight tomorrow night. Daniel Andrews continues: We can, all of us, manage the growth in these cases. It will be hard. It will not be easy. But we are confident that as we continue to vaccinate, by the time we reach 23 September, which is our 70% first dose target day, that is when we believe we perhaps may even be able to with some additional doses coming from Singapore and hopefully I'll come to - in a minute I'll come to the notion of people taking up empty AstraZeneca appointments right now, hopefully we can be even sooner than the 23rd, maybe a few days earlier, but if we can all play our part in getting vaccinated, if we can reach our 70% first dose target on or about 23 September, then there are some changes that we can make to these rules. Daniel Andrews: This is very, very tough. But it is simply not possible to make wholesale changes, to have our freedom day if you like, or an opening up day in metropolitan Melbourne in the next few weeks. That is going to require us to hit our vaccination targets because that's what gives us the protection against infection and most importantly it gives us the protection against hospitalisation. Now, some people listening would say, what have these last four weeks been about if we can't drive these numbers down and instead they're going to grow? Well the Burnett Institute have estimated that what we have all done, what we have all given these last four weeks, has basically prevented around 6,000 cases of this virus. That means that every Victorian has also prevented around 600 people being admitted to hospital and no one gets admitted to hospital with coronavirus because they're mildly unwell. They are all very unwell, some acutely unwell and, indeed, in need of intensive care. Now, of course, having avoided 6,000 cases over four weeks and 600 hospitalisations over the same period, we have avoided thousands more because once we get to 6,000, the numbers just keep doubling and doubling and doubling again. Daniel Andrews says Covid zero is over. In just the last two days, the number of cases, the nature of those cases, the depth of the seeding of this outbreak has become clear and the chief health officer's advice to me and the government has changed - fundamentally changed. None of us have the luxury of ignoring that, none of us have the luxury of shopping for the advice that we want. When we get advice we follow it and the ***data*** and the evidence and the experts are very clear with us. We will not see these case numbers go down. They are going to go up. The question is - by how many and how fast? What we are all doing, the government, the public health team, nurses, doctors, people working in laboratories and testing clinics, people giving jabs, all of us as Victorians following the rules, all of us are trying to manage two peaks - the peak of those who are vaccinated and the peak of those who get infected with this Delta variant. What we must do is suppress case numbers sufficient to buy us time, to buy us time, to get people vaccinated. What that means is that we can't ease restrictions today in any profound way. I don't think anyone was expecting that, but it simply is not possible. In Victoria there are 58 people with Covid in hospital, 21 in the ICU and 14 of those people need a ventilator. Daniel Andrews says Victorians will most likely exceed the one million vaccine doses in five weeks target. That is excellent news. It opens with condolences to the two women who died yesterday. Both had Covid and both died at their homes. Daniel Andrews then moves to the day's cases: 64 of today's cases are linked to known outbreaks. 56 are under investigation by our public health team. That takes us to a total of 900 active cases. 895 locally acquired and five overseas. Everyday, of course that public health team makes linkages, solves some of the mysteries of this virus and we'll update the figures as we go forward. There are some 122 cases, though, that remain open, if you like. They're still being investigated. To give you a sense of how things have changed and changed very rapidly, of today's cases that have been fully interviewed and our contact tracers work as hard as they possibly can and as fast as they can, of these that have been fully interviewed, only 20 were in isolation during their infectious period. These last few days have seen a dramatic shift in the nature and the number of cases coming forward. We are just waiting on the Victorian press conference to start. We are going to be hearing the transitioning arrangements for Victoria, so stay tuned. The Western Australian premier Mark McGowan has blasted federal attorney general, Michaelia Cash, for her suggestion the state could lose a high court challenge over borders now there is a vaccination for Covid-19. McGowan told reporters in Perth: I don't know why the federal government is doing this... What's gotten into them? We went to the high court last year, we had to defeat Clive Palmer. The Liberal party supported Clive Palmer during that then they withdrew half way through. They tried to get us to withdraw the case, they told me we'd lose, and they were wrong. Why are they on this mission to bring Covid into Western Australia, to infect our public? To ensure we shut down parts of the economy? That we lose jobs? That people get sick and some people die? Haven't they seen what's happening in NSW? I can't understand why they're doing this. It makes no sense. We are the strongest economy in Australia, we are the freest...we have a society that is totally open. We have no one in hospital with Covid. Yet they want all that to change - they don't seem to understand what's going on here in WA. I just find it so incredible - they went through the Clive Palmer experience last year, and they want to do exactly the same thing again. It makes absolutely no sense. McGowan said he was not concerned WA might lose, noting last year's victory and telling the commonwealth government "if they want to bring on round two - let them". McGowan did commit to eventually reopen the WA border. He said the state will "get to a high enough vaccination rate that we can bring down the border with infected states" but warned "that's a way away". Here is Gladys Berejiklian on welcoming home vaccinated Australians to NSW at 80% and home quarantine as a "definite". NSW Health is working on giving pregnant people better access to the Pfizer vaccine (they are not recommended to have AstraZeneca) through antenatal settings. But that is going to depend on vaccine supplies. Does Gladys Berejiklian think interstate borders should open to everyone, or just the vaccinated? I think we get to a stage where you need to stick to the national plan....Well that's why it's 70%, double dose privileges and freedoms will extend to only those that are vaccinated. Now at 80%, you will only be able to go, consider travelling internationally, if you're vaccinated. But I say this many airlines will make those decisions for us, many airlines will say you can't jump on my plane, unless you're vaccinated, and they will have every right to do so. So, I say irrespective of what government policies at any stage, private organisations are entitled to have policies to keep other customers safe to keep their workforce safe and to prevent the spread of the disease so don't assume it's only a government policy that's relevant. It's also non-government business leaders will have a say on what they feel is the best way forward and for a business community that's been absolutely smashed for the last two years in NSW even longer if you had the drought. If you read the bushfires, if you had the floods, we're talking about three years where many businesses across the state have been smashed. The most important thing to you, understandably will be business continuity, business certainty not having to stop. Open and shut. Open and shut. And that's what the higher rates of vaccination insures against once you get to 80% double dose. There should not be any circumstance under which there will be a lockdown of any description, but that's also up to businesses who want certainty and business continuity, to be able to say, well, it's up to us, we don't want to expose our customers or our workers and airlines themselves around the world. Some haven't. Some airlines welcomed people who aren't vaccinated, but most airlines are welcoming people who are fully vaccinated. Gladys Berejiklian also said she is "expecting ***data***" later in the week on just how bad October will be for the NSW health system. For those wondering what the federal government role would be in Gladys Berejiklian's announcement NSW will take international vaccinated Australians when the state hits 80%, Sarah Martin included this in her story from last night: Scott Morrison: In states that aren't locking others out ... there will be the opportunity for people to go and travel and return to Australia and quarantine at home, and that people in those states who are overseas can come back to Australia. The caps that are on flights coming into those places ... that aren't locking others out, they will be able to receive more and more, and that will be a big change. The Victorian press conference will be held at 12.45pm. Gladys Berejiklian says she will open to international travellers at 80% double dose vaccination - and they will take in Australians from other states as well, even if the other states aren't opening up their own borders. Asked if NSW would welcome home vaccinated Australians who are overseas for Christmas, Berejiklian says: If they are double dosed vaccinated, I think home quarantine is a definite. The traditional hotel quarantine system is no longer relevant when you have 80% of your population double vaccinated. And it's no longer relevant when the key issue is rates of vaccination. So things will look different. And as I said if other states aren't ready to welcome home Aussies at 80% double dose New South Wales will be. And if means more citizens come through to the Sydney airport so be it, the more flights, the better. But obviously we're working through those issues and discussing them at national cabinet and with the prime minister. The deputy ACT CHO, Dr Vanessa Johnston, has given a run down on the latest ACT cases - 23 today. Fourteen are linked. Dr Johnston: We know that 13 are either household contacts or close social contacts and the remaining one is linked to a known cluster. Nine are still under early investigation. Out of the 23, 11 were in quarantine during the whole infectious period. Of the 12 remaining, 11 of these were infectious in the community for at least part of their infectious period. And one is under assessment. Since our last update, we have had just over 1,100 self identified close contacts and over 3,900 casual contacts. Andrew Barr moves on to vaccinations: Yesterday the prime minister announced 500,000 additional doses of Pfizer as part of a vaccine swap. He also announced these vaccines will be distributed on a per capita basis around Australia, so we have been advised that the ACT will receive 8,344 vaccines. To put this in perspective, this is roughly the equivalent of a big, single day of vaccination in the ACT across all our government clinics, GPs and pharmacies. Every little bit helps. So the extra 8,344 will allow us to get through another day of vaccination more quickly. Today, bookings open for 16 to 29-year-olds to access Pfizer vaccines at ACT government clinics. Already until about 11.30 this morning, 6,500 new appointments and bookings have been made, which is great. If you are waiting for Pfizer, please register with the health record system and book your vaccination as soon as possible. We acknowledge though that the demand is incredibly high and we are making bookings now in November. So, as always, the AstraZeneca vaccine is more readily available now through GPs and pharmacies. Being vaccinated is the best way that you can avoid serious illness and hospitalisation. The ACT is also going to be concentrating on compliance. Our Covid-19 business compliance teams were incredibly active yesterday, right across Canberra. Nearly 100 businesses were visited. Around one-third were found to be not compliant with the public health directions. The overwhelming issue was staff not wearing masks properly, or not wearing them at all. Wearing a mask is critical. It reduces the risk of you spreading the virus. And what we are seeing in our daily numbers is a small number of cases each day who are people who have been working while they are infectious. They do not know they are infectious, but they have been at work while infectious. And that is how the virus is transmitting outside of the household and close contacts. So if you are not wearing a mask properly, it increases the risk of you transmitting the virus to a work colleague. ACT police, Access Canberra and WorkSafe ACT will be active in the next two weeks to ensure compliance and public health directions, with a particular eye on people wearing masks in workplace settings. You need to do it. It is absolutely essential to keeping your businesses operating safely and to protect the community. ACT chief minister Andrew Barr is giving a little more clarity about the easing of restrictions which are coming for ACT residents at the end of this week: Non-organised recreational activity includes things like walking, jogging, cycling, going for a picnic in the park. It does not include organised boot camps, sporting competitions, organised team training, golf, tennis, those sorts of more organised sporting activities. Informal small groups and conducted within your household of no more than five people. The reason for five people, it could be five people from five separate households, is to give singles and couples some opportunity to interact with others. But this needs to be done outside, wearing masks, for up to two hours, and the advice for everyone is that outside of these interactions keep as far away from other people as you possibly can, all of the time. 14 are linked as mostly household contacts. 11 were in quarantine for their infectious period. And then there is a small little swipe at Victoria: Gladys Berejiklian: I know that people will not believe me when I say this, but we have done a lot to keep the case numbers where they are, given our population, given the spread, in fact if you look at the trajectory of where Victoria's case numbers are going, I will let people make those comparisons themselves, but having been through this, we know how quickly case numbers get up to where we are now. And had we not taken the measures we had, they would have been much higher. Gladys Berejiklian has also brought up a few times in this press conference about how she had been criticised for "not going hard enough" in the past. I say this hand on heart, we know what it is is we have asked people to do in those areas of concern, it is onerous, it is difficult, it is stressful, and I will be the first one to go the other way as soon as we get the green light. But I just say to everybody, Delta is evolving, and the questions I get today are very different to what I was getting just a few weeks ago when I was accused of not being hard enough. Gladys Berejiklian will not guarantee that she will meet with the mayors. I have been doing it already, and I have already been talking with them on many occasions to community leaders. But there was more than just a local government that is involved, there are community leaders who touch hundreds of thousands of people, the mayors will be involved in that process, but so will our religious leaders, so will our cultural leaders. Why hasn't Gladys Berejiklian met with the 12 hotspot LGA mayors? Berejiklian says she has been engaging with community leaders. I would always welcome meeting with community leaders, and I spoke virtually to hundreds of them, many of the conversations I've had those local mayors have been directly involved. I am not certain about the invitation they're talking about, but certainly there have been numerous occasions where I have engaged, the minister has engaged, the members of our other agencies have directly engaged broader community leaders, and that is ongoing. But please know, that all the advice we get about what we can do in those areas is based on the health advice, and it is to keep people safe and healthy, and as the doctor said eloquently, still a proportion of the community unfortunately do not appreciate how serious this disease is, and we want to make sure that everybody is. I am deeply grateful to the vast majority of our citizens across the state, no matter where they live, about how well they have responded to what we have asked them to do, and I will be the first to want to provide relief as soon as we get the green light. Gladys Berejiklian is going to use the national plan as a shield for as long as she needs to. Even if the other states don't budge at the 70% vaccination target. Berejiklian: I guess I'll just say to the other premiers...every single premier of the states, every chief minister signed up to the plan. What I am doing is working towards the plan, as I hope every other state premier is. The only thing I will say, from experience in NSW, is that every state at some stage, if not at 80% double dose, then when? Every state is going to have to accept that you cannot live in a bubble forever, your citizens will want to travel interstate, your businesses will want to go interstate, citizens will want to go overseas, and come back from overseas, so if not at 80% double dose which is what our national plan says, then when? Gladys Berejiklian: We all signed up to the national plan, we all signed up to the plan which has research based on the Doherty Institute, that is very important. I also want to say, as confronting as this is, a lot of states who have not had any major outbreak during the pandemic, are going to have to appreciate that if we get to 80% double dose vaccination, and you open your borders, Delta will creep in. But if your population is protected, and you have Covid safety plans into place, a good QR code system, good systems to monitor where the disease is circulating and what residence, take immediate action to take care of outbreaks that may or may not occur, that is the way we have to live with Covid. As confronting as that is, that is the reality. I hope that every premier is signed up to the plan, and I hope you'll stick to the plan. But all the conversation that I've had with the prime minister suggested the nation will continue to move forward, but I feel that Victoria is perhaps turning the corner in how they are dealing with Covid in terms of accepting what the Delta strain is like, and what it means for citizens, but I hope that we are in a position at least where the two large states are on the same page. Back to the NSW press conference. It is all about NSW sticking to the national plan, but you can't know what the worst case scenario modelling is. The Australian economy grew by just 0.7% in the June quarter, narrowly avoiding shrinking in the months before the Delta strain spread uncontrollably in NSW and Victoria. The result, announced by the Australian Bureau of Statistics on Wednesday, means Australia has avoided a technical recession for now, before an expected massive contraction in the September quarter due to lockdowns in its two largest states by population. At the end of 2020 and start of 2021 Australia's economy rebounded strongly from the initial phase of the Covid-19 pandemic, recording growth of 3.1% in the December quarter and 1.8% in March. That momentum slammed to a halt in the June quarter, as the Delta strain was introduced to Australia and greater Sydney entered a lockdown in the final week of June that continues today, with thousands of new cases recorded daily. Australia's hopes of avoiding a technical recession now rest on hopes of growth in the December quarter, after the national plan to reopen once vaccination rates reach 70% and 80% has softened or phased out lockdowns. In per capita terms, Australia's economy grew by just 0.4% in the June quarter. The terms of trade rose 7.0% on the back of high iron ore prices. The household saving ratio decreased to 9.7% from 11.6%. Just breaking in for a moment to bring you the national accounts - the GDP figure shows 0.7% growth. That is good news, but of course, it is also in the past - it's for the June quarter, mostly before the lockdowns. Everyone is focused on what is happening now, and even if we aren't in a technical recession, we seem to be in a manufactured one, in that it feels like it. At least if you are on the east coast. There are two economies in Australia at the moment, and people are feeling these impacts differently. And half the country is not feeling great. So Gladys Berejiklian knows what is in the national plan, she can tell you the positives for what happens in NSW when 70% of the adult population is vaccinated, and is keen to tell you what life "will look like at 70-80% double dose" but she can't tell you the flip side, or the worst case modelling, because that "varies and depends". How can she not recall it? Gladys Berejiklian: No. I'm saying various modelling is done. NSW Health provides modelling but there's modelling done by ex-personal organisations, which NSW Health is not part of and those organisations, as we've read have... Q: What about the advice from NSW Health? The worst case scenario presented to you, you don't know that it is? Berejiklian: It varies and it varies and it depends on what the inputs might be and I wish... Q: What was the worst one? Berejiklian: I wish I had a crystal ball to tell you. What I can tell you... Q: They're modelling the worst case scenario. What is that? Berejiklian: The most recent advice I've received is that case numbers are likely to continue to rise for the next few weeks and the worst hospitalisation rate is likely to be in October and I can't tell you anymore more than that because that's the best advice I have. Gladys Berejiklian says she can't recall the worst case modelling, which is why she can't share it. I've seen various versions of modelling and I can't recall all the numbers but I can tell you this much - that we know that the rate of hospitalisations is likely to peak some time in October. We know there's ranges of predictions on what the case numbers will come up to. I've often said, as the doctors have said, we anticipate the worst will be in the next couple of weeks. The worst will be the next couple of weeks because the impact of the vaccinations takes about two or three weeks and as we've said from the outset, lockdowns work in suppressing the spread of the virus but the best antidote, the best weapon in fighting the virus is the vaccine and once we know someone is vaccinated, it takes effect in two or three weeks' time and we know there's been a high concentration of vaccines administered in the last week and the upcoming two weeks. We still anticipate case numbers to rise in the next couple of weeks and then we anticipate and hope that they will start to come down. Why won't Gladys Berejiklian release the modelling which shows the worst case scenarios? Why is it only the positive cases being shared? Berejiklian: The best judgement is what the public health experts tell us and every day the modelling changes. Every day there's inputs put into the modelling and every day there's different models around. There's many, many institutes across the nation that will provide input into what New South Wales looks like but that depends on a number of ***variables*** and we shouldn't be in the habit of providing information which is not certain because it depends on the inputs, on the rate of vaccination, on what people are doing. It depends on compliance. There's a whole range of issues that go into that. What we do know - because the best case is the accumulation of test numbers, we know there is always a lag between when someone gets ill and when they end up in hospital and we anticipate, given where case numbers are and given the rate of vaccination that the highest rate of hospitalisation will occur at some stage in October. As soon as we see anything more certain than that, of course we'll provide that information. The national plan includes targeted lockdowns in areas where test, trace, isolate and quarantine systems are under pressure. Which right now, includes those areas of greater Sydney. Does that mean equal freedoms? Will people in the greater Sydney LGAs who are in areas of concern get those same freedoms? Gladys Berejiklian, who promised transparency yesterday, doesn't say: We're obviously looking at those issues but no matter where you live, life will be much, much better, much freer, as long as you're vaccinated at 70%. We'll provide details as soon as we can. We're obviously taking input from stakeholders, from our health experts and also comparing it to the national plan, which has already been released. So the national plan is on the public record and New South Wales would be adhering to that national plan and obviously we're really keen to see our nation moved forward but we appreciate that what is the most critical number for us to keep a close eye on it is the rate of hospitalisation and the rate of vaccination because at 70% double dose, life will be very different and life will be much better than it is today. Does that mean everyone? Including people in the hotspots? Gladys Berejiklian does not address the question. Clearly we've had a concentrated effort to vaccinating our population in local government areas of concern and vaccination rates have not only come up from a very low base but now a lot of those areas have higher vaccination rates than other parts of Sydney and New South Wales. The key issue for us moving forward is the rate of vaccination and how many people you can keep out of intensive care wards and hospitals and they're the figures that matter most. Everybody should expect a level of freedom which they don't have today and in relation to those settings, we're going through the road map. We're getting health advice. It will depend on a number of other factors but let me be clear - no matter where you live in New South Wales, please expect to have much more freedom than you do now as long as you're vaccinated fully and as long as 70% of residents are vaccinated and details will be provided in the next little while. Gladys Berejiklian is being asked about her comments this morning to the Nine network that at 70% double dosed vaccination, adults can expect to be able to go out for a drink, a meal, an event. Obviously, New South Wales always takes a responsible approach but the national plan does say at 70% double dose vaccination that you can expect to go out and have a meal, you can expect to attend a public event, you can expect to go and get services that you can't expect now but obviously we'll take a very responsible approach. We know that indoor gatherings or people coming to your home is a high risk. But outside of that if there are many, many things we can't do now we should be expect to be able to do them when we have 70% of the adult population vaccinated. That's what the national plan says. I'm not saying anything that other states have not signed up to. Of course at 70% there will be density requirements, QR code check-ins, validation that you're vaccinated, mask wearing in certain settings, so there will be obviously constraints and restrictions in place but compared to what we're going through now, life will be much better at 70% double dose than it is now and I'm calling out to businesses to say let's have September be the month we all get ready. If you're an individual, get vaccinated. Get your loved ones vaccinated and if you're a business, dust off Covid plans and get ready to open your doors. Hospitalisations due to Covid are going to hit more than 1,000 soon. There are 917 people in hospital with Covid, 150 are in intensive care and 66 of those people need ventilation. There are three new cases in Wilcannia. There will now be 30 motorhomes set up in the community so people can isolate - which has been a massive issue for people, given the overcrowding in homes and lack of accommodation to move people. Gladys Berejiklian: Once you hit 70% double dose numbers, hotel quarantine looks different. Quarantine looks different. The way we manage the disease is different. Tracking and tracing is different and I'm having these conversations now with everybody so we can get used to what life is like living with Covid. Our position is the one we stated from the outset. It's impossible to eliminate the Delta strain. New South Wales has proved successful until this point in time of getting rid of other strains of Covid but the Delta strain is a game changer and every state in Australia, sooner or later, is going to have to live with Delta and that's why I'm calling on all my colleagues, other state premiers and first ministers to stick to the national plan to make sure we give our citizens not only the freedoms they deserve but also learning to live with Covid as soon as we can. The national plan does not deal with border closures. The Doherty Institute also points to the need for a strong test, trace, isolate and quarantine system, which NSW does not have at the moment. Other states are lending their resources to NSW and Victoria, but when the states are open, that won't happen - they'll need themselves. Gladys Berejiklian opens by celebrating the vaccination numbers, with 70% of adults having received at least one dose. She says people need to "get ready" for September. Four people have died. Berejiklian: Four females who, unfortunately, were not vaccinated and who did have underlying health conditions - a woman in her 50s, one in their 60s, one in their 70s and one in their 80s. We extend our deepest condolences to their loved ones. Joe Biden may not have spoken to Scott Morrison as yet over Afghanistan (at least as of yesterday) but he has a message for all Australians and New Zealanders on the Anzus anniversary: There will be a clash between the NSW and Victorian press conferences - as is usual these days. We will probably head to Victoria after getting the NSW numbers though, as we know there are a lot of people waiting to hear the transition plan. We'll also bring you the ACT updates - it will take a little bit, but I promise we will be able to cover it all. Just a note on the current deputy prime minister claiming he is not trying to be smart, because he's not (a paraphrase of his quote to the house). TCDPM talks a big regular Joe game, and loves to wear the hat, but he is also an Old Ignatians from Riverview - the exclusive Sydney school which also counts Tony Abbott among its alum, has a university degree and worked as a practicing accountant. He is also the current deputy prime minister of Australia. The deputy prime minister Barnaby Joyce also contributed during the Anzus debate. He noted that shared values were the cement that bound Australia and the US together. So far, so good. But then things became more ***variable***. Stay with me, I'll do my best. There was a reflection on democracy slipping "through a form of quasi democracy, and quasi democracy slips back to autocracy, where autocracy is not tempered by the collegiate aspects of cabinet forms of government, or by referring to an executive, but goes out and parrots the mouthpiece of the supreme leader. Mr Speaker, without being smart, because I am not..." (at this point some Latin was invoked).. "if you want peace, then prepare for war. And we want peace, no-one ever encourages war, we want peace, but this is an essential component of what must happen if you want peace". Then there was more Latin. Joyce noted "it was Latin, because it has been the same through history. There is nothing new about this. And a preparation needs mass, and mass needs allies. Looking forward requires a learned experience, a learned experience over the long term, a learned experience over 100 years, not a memory of the 1990s." It kept rolling. The world has changed, now the geopolitical circumstances of our region show an uncomfortable resemblance to the power jousting of Europe in a previous century. Mr Speaker, Anzus comes with costs. Then there was a reference to bipartisanship and the requirement of parliament "to show to the Australian people why we were involved with Korea, why we were involved with Vietnam, why we were involved with Iraq, why we were involved for 20 years in Afghanistan." Because friends have to understand that your heart is where your legs are as well. I can only leave this with you. The National Asthma Council Australia has urged health professionals to reassure patients with asthma that they should wear a face mask when outdoors or when they can't socially distance from others. National Asthma Council Australia director and respiratory physician Professor Peter Wark said: There is no evidence that wearing a mask worsens asthma, and an article published in the European Respiratory Journal states that any exemptions of respiratory patients on the compulsory use of face masks is not evidence based and may carry increased risk of personal infection from Covid-19. People with asthma, or their friends or family looking for advice, should know that face masks are essential for the protection of the person with asthma, as well as any carers or guardians looking after children with asthma. Face masks, hand hygiene and social distancing will all help prevent the spread of infection and in fact, not wearing a mask could put adults and children with asthma at a disproportionate risk of getting the Covid-19 virus. Wark said wearing a mask can make someone with asthma and other lung diseases feel more breathless, especially if they are more active. However we know from the World Health Organisation that face masks of breathable material, worn properly, will not lead to health problems, still provide protection and are more comfortable. If someone does become breathless whilst wearing a face mask they will be helped by moving to an open area with good airflow if possible then briefly removing their mask until they have caught their breath. Reapplying their mask when they are able to will help their symptoms and reduce their risk of infection. A minute ago I sent a post on Scott Morrison's contribution in the parliamentary debate about the 70th anniversary of Anzus. Before Covid, Morrison had hoped to be celebrating this milestone in the US, or to have been in a position to have invited Joe Biden to Australia. But obviously that's not possible. Anthony Albanese followed Morrison. He used his speech to announce that Labor (if it wins the next election) will initiate a new defence force posture review to ensure arrangements are fit for purpose. The Labor leader also referenced the difficulties of the Trump period head on. We welcome the return of American leadership in the rules based order under president Biden, and his dedicated effort in repairing alliances. Even when the United States stepped back from its long-standing leadership on trade and other forms of multilateralism during the Trump administration, Australia held the line, and importantly, held the door open for the United States. There was also a significant chunk on the security implications of climate change. The Biden administration has publicly criticised the Coalition's lack of ambition about climate action. Albanese's contribution ran along that faultline. "Climate change remains beyond this government's grasp," the Labor leader said. Albanese says if he wins the election, he would "immediately deepen US-Australian cooperation on climate change security issues". Queensland has not lifted its pause on domestic arrivals - but it has cleared spaces for 50 families to come into its hotel quarantine system. That follows criticism over the families of NRL players being able to come into the state for the coming finals. Those families aren't taking the same places, but the optics are terrible when you have people just trying to get home or be with loved ones having their exemptions denied because of a lack of quarantine places, but the families of footballers being able to enter the state. South Australia is trialing the home quarantine program the national cabinet is investigating. The plan is to roll that out more widely when vaccination rates increase. There is still some good in 2021: We'll hear the transition plan from Daniel Andrews today. Victoria is no longer aiming for zero Covid cases and instead has switched to "as close to zero as possible". Good morning everyone. Parliament has kicked off today with speeches marking the 70th anniversary of the Anzus treaty. Scott Morrison has told parliament American leadership remains indispensable and "essential" to peace and security in the Indo-Pacific. The prime minister said the treaty, managed by 14 prime ministers and presidents since it was signed, "breathes and adapts with each passing generation". Morrison said: "Together we share hope, we share burdens and we share vision." As could be expected, there is much in the prime minister's speech about mateship, much about freedom, and much, inferentially rather than directly, about the challenges of China's rise and the importance of a world order that champions freedom. The Labor leader Anthony Albanese is speaking too. I'll send a post on that contribution shortly. The Senate has begun with a bang - independent senator Rex Patrick has sought to refer the ATO commissioner Chris Jordan to the privileges committee for refusing to produce documents revealing big business recipients of jobkeeper. As Senate president Scott Ryan explained, the tax commissioner declined to respond to an order of production of documents on 4 August, citing public interest immunity. On 23 August the Senate explicitly rejected that - and insisted on the documents by 26 August. The treasurer, Josh Frydenberg, then made a separate public interest immunity claim, and Jordan said he would wait til that claim was dealt with before he responded. Jordan missed the 26 August deadline. Ryan said that it is clear that Jordan's actions "could substantially frustrate orders of the Senate", clearing the first hurdle to refer the matter to the privileges committee, and that he was satisfied that it "could warrant a contempt" of the Senate. Ryan said that it is a matter for the Senate to determine if Jordan had a "reasonable excuse". Ryan suggested it may not be necessary to refer the matter to the privileges committee because there are other remedies available - such as first dealing with Frydenberg's public interest immunity claim, or bringing amendments to legislation to force production of the jobkeeper information. Patrick then gave a speech arguing that Frydenberg's additional public interest immunity had no power to countermand and order of the Senate, and Jordan therefore lacked a reasonable excuse. He's given notice of a motion to refer Jordan, to be debated and decided on Thursday. We're now on to the Respect at Work bill. Khal Asfour, the mayor of Canterbury-Bankstown continues with why the hotspot mayors want to meet with the premier: We want to convey our concerns to her from the stories that we're hearing every day. Secondly, we need more vaccination hubs and thirdly, we want more government support. It defies belief that the Premier just doesn't want to hear these concerns and she doesn't want to hear from the 12 mayors that are doing it tough and representing these two million people in western and south western Sydney. $750 a week doesn't seem to cut it. We have people who are really struggling and are stuck at home obeying the health orders. Our people are getting vaccinated. We are making sure the numbers are increasing so we can get out of this lock down and we are doing our bit but we are doing it tough and the lock down seems to roll on month after month and the $750 a week doesn't cut it for a lot of the members of the community....The Premier has referred us to the Local Government Minister. This is not a local government issue. This is a health issue and it is an all of New South Wales issue. We want the Premier to reverse her decision and give us one hour of her time to meet with us. Linda Scott says Greg Hunt has met with them. But it is probably also worth pointing out that when Coag became the national cabinet, local government was left off the table. Local government had representation in Coag, but despite lobbying, were not included in the rebranded national cabinet. Linda Scott continues that theme: The mayors in the 12 local government areas in Sydney's hot spots are from every political stripe - Liberal mayors, independent mayors, Labor mayors. This is not about politics. This is about the need for the premier to work with local governments, to solve problems that communities in a hard lockdown are experiencing. The 12 mayors in these areas and the councillors are working day and night to support a locally led recovery from Covid. They are personally translating materials into languages other than English. They are encouraging communities to get tested, stay home and be vaccinated. The mayors and councillors are providing facilities, local government facilities for use for testing and local government facilities for vaccinations. They're supporting communities who are often out of work and struggling, supplying food and other basic essentials to ensure that communities are not faced with the impossible decision about breaching a health order or feeding their families. The least the NSW premier can do at this time is come out of hiding, meet with the elected local leaders in these 12 hotspots and support their efforts to ensure these communities are safe. Khal Asfour, the mayor of the City of Canterbury Bankstown, is one of the 12 mayors in Sydney's LGAs of concern. He's holding a press conference with Linda Scott, the president of the NSW Local Government Association, about Gladys Berejiklian declining to meet with the mayors of the hotspot areas. To say the mayors are pissed would be an understatement: Asfour: A few weeks ago we sought a meeting with the 12 mayors of the hotspot areas in greater Sydney. Yesterday afternoon we received a response from the premier's office that she is refusing to meet with the 12 mayors of the hotspot areas. The areas with the most Covid cases at the moment. This is a royal snub for our community and the over two million people we all represent. I don't understand why the premier won't meet with us. She doesn't - she might not want to hear the concerns we are hearing every day. Phone calls and emails, people crying on the phone, not knowing what they are going to be doing next with their businesses crumbling, with people out of work, with people in lockdown, mental health issues, with people not having any social connectivity to their family and loved ones. The premier doesn't want to hear these stories and I don't know why. This is really unbelievable. I am furious that she is too busy to want to meet with us. She can't spare an hour of her day to meet with the 12 mayors that represent over two million people and for communities that are really doing it tough in the harshest lockdowns for the communities. She doesn't want to hear these stories. Our community wants surety, we want hope. We want some light at the end of the tunnel and we just don't know where that is going to come from when the premier refuses to meet with us. Parliament has just opened for the day. The morning speeches are dedicated to the Anzus alliance. It's the 70th anniversary of the Anzus alliance (Australia, New Zealand and US) so Scott Morrison and Peter Dutton laid a wreath at the US memorial at Defence HQ. I'm just getting messages from some public servant staff about IT issues impacting several government departments, including the ***agricultural*** department. Staff are reporting mass issues in being able to login to their IT systems. We are told it is being worked on - but things might be a little slow this morning. That's not exactly coded there. Gladys Berejiklian is all but pointing out the federal government failures. She just doesn't name them. Gladys Berejiklian, speaking to the Nine network, also made sure to send some blame in the federal government's direction. Asked if vaccines should be mandatory for clinical staff, given one in five clinical staff in the state system have not received one dose of the vaccine, Berejiklian says: Well, firstly we weren't able to make the vaccines mandatory. It was actually not in our path to do that. The fact we've taken the step to say everybody has to get the vax is pretty major. We have made sure that everybody who has access to the vaccine in our healthcare system does. I was aghast because as you know at the beginning of the process there was a process where aged care workers would get vaccinated first. We had tens of thousands of them in NSW who hadn't been offered the vaccine. We're playing catch-up now. There have been supply issues. We're knocking on the door of the feds to give us more supply. Remember the states weren't going to be involved in providing any vaccine. But I think I was the first premier to say some months ago let us help. I'm pleased we did. Now we're seeing hundreds and hundreds of thousands of people get the jab every week in NSW. I was shocked. We're approaching 850,000 jabs a week in NSW which is incredible. A lot of that is done by NSW Health system. Remember, initially we were told we don't need you, you don't do it. We stepped up. Of the 120 new Covid cases announced today, 64 are linked. Just catching up on some of the interviews this morning on commercial television and Gladys Berejiklian was on both the Seven and the Nine networks. Here is her message on where NSW is at today - including what freedoms NSW residents who are vaccinated can get at 70% of the adult population meeting the vaccinated target: I think if you compare the case numbers in NSW at the moment compared to what Victoria went through last year they didn't have a Delta strain. It was regular another strain of Covid. And tragically hundreds and hundreds of lives were lost over a couple of months. In NSW we haven't seen that. Because the vaccines are working. The vaccines are the best weapon against fighting Covid. Lockdowns will help us stop the exponential growth of a virus. What will allow us to live normally is the vaccine. The more of us that get vaccinated the sooner it reduces the spread. It puts downward pressure on case numbers. More importantly, it inches us that much closer to living life as we did previously. At 70%, those that are fully vaccinate will be able to have a drink, a meal. Go out to an event. And I'm really looking forward to that as I hope everyone is. Our opportunity now is to make sure we vaccinate older Australians. Make sure they're fully vaccinated. Vaccinate vulnerable people. To make sure when we do open up they're not exposed we do know how horrible the disease Covid is. It can affect anybody. Unexpectedly. But we know that it can impact particularly parts of community more than others. We don't want people going through that horrible time. Queensland isn't afraid to play ball at the moment: Anthony Albanese had a chat to Triple M Newcastle where he continued to hone Labor's national plan message when it comes to the premiers: Well, they all signed up for the national plan. The national plan, of course, provides for various protections to be continued to be available at 70% and 80%. No one wants restrictions. Restrictions affect people's way of life and their capacity to get around and it hurts the economy. But to be fair to Queensland at the moment, South Australia also, I noticed Scott Morrison never talks about the Liberal states, South Australia and Tasmania and Queensland and Western Australia all have their borders closed to New South Wales, Victoria and the ACT at the moment. That's a decision that is perfectly understandable. WA is getting the Grand Final in the AFL. Brisbane will get the Grand Final in the Rugby League. And it's tough times, but these decisions have been made to keep their citizens safe. If you are thinking that the Victorian numbers are usually out by now, you would be right. There is a delay this morning (we usually get them around 8.30am) but in the past, when there has been more complicated ***data*** to reconcile, it has taken a little longer. We'll have them to you as soon as we can. It is also national accounts day - when we learn whether the economy grew or not. It is going to be a bit of a mixed bag, but it looks at the past when we are all looking at what is happening right now. This one won't take in the bulk of the lockdowns, but really, it is just about the feeling at the moment - confidence isn't high, and people are feeling the economic impacts themselves. It might not be a technical recession, but it feels like one. And what's the main difference between these lockdowns and those major ones we saw last year? Government support. There is not as much of it. And well, that is being felt. Which makes videos like this from the treasurer - who actually has the power to make a huge difference in the lives of the people he is talking about a little... you know. Because the Australian government is still the Australian government, the Coalition party room is still a wild place at times. Which is how Paul Karp learned of this story: Coalition MPs have urged Scott Morrison to increase funding to the government's school chaplaincy program to help address concerns that activism against global heating is causing mental health problems for Australian children. In the Coalition party room on Tuesday, Liberal MP Andrew Wallace compared children's fear of climate change with the threat of nuclear annihilation in the 1970s and 80s, and requested full funding for chaplains in every school to help ease concerns. The assistant youth minister, Luke Howarth, has backed the call to expand the program in comments to Guardian Australia, saying climate activism is "alarmist and does cause mental health problems for young people" that could be helped by chaplains. Children working out the world around them, and what they are and aren't willing to accept is not causing mental health problems - not seeing a lot of action on identified problems in the world around them though, is a totally different story. Liberal senator Jane Hume was also on ABC Breakfast this morning, where she was walking back Michaelia Cash's comments: I think Michaelia Cash has been misinterpreted there. There's going to be no high court challenge to borders but what she was... Q: She's leaving the way open for it the way I read. She's leaving the way open for high court challenges? Hume: No, I think she's saying the reasoning behind that high court challenge last year that was taken out by the reasoning behind that really be have diminished once we reach those vaccination rates. Again, while we're also urging people to go to the ATO website (for super information, her beat), we're also urging people to get themselves vaccinated so we can stick to the national plan and reopen our borders and get back to life as we knew it. Tanya Plibersek appeared on ABC News Breakfast this morning, where she was asked about the possibility border closures could be challenged in the high court again (which Michaelia Cash spoke about in an interview with the Australian, something Scott Morrison probably won't be too pleased about, given he has been distancing the government from a previous challenge this week). Here is what Plibersek had to say: Court challenges are ridiculous and you saw just how popular Clive Palmer's last effort, supported by Scott Morrison it is important to say. When Clive Palmer wanted to take the West Australian government to court, I think he united every West Australian against him. We support the national plan to reopen Australia. People are sick of the lockdowns. They are sick of seeing businesses that they have spent 20 or 30 years growing being destroyed by what is happening with the economy. They are tired of the kids being home from school. They are worried about their kids' education. They are worried about their kids social and emotional wellbeing. Everybody wants things to get back to normal as quickly as possible and the reason this is dragging on so long is because our prime minister didn't order enough vaccine and he didn't establish purpose-built quarantine qualities when he was advised to do so and because Australia can't make the Pfizer-style mRNA vaccines here, despite the government saying months ago that we would embark on the process that would allow us to make mRNA vaccines here in Australia. This is a failure that should be laid at Scott Morrison's door. We need to open up, we need to do that sensibly follow the roadmap to reopening but I can tell you, if I were a premier in a state with zero transmission, I would be looking at New South Wales now and I would be worried. Murph has taken a look at the national plan mess; and what is actually going on: If you tune in to the daily Covid briefings from Scott Morrison and the premiers, the impression you'll get is the federation is at war about the national plan to reopen Australia once vaccination rates increase. But is this really war? Or is this dynamic more fluid than it seems? Victoria recorded its first two deaths in this Covid outbreak late yesterday. A woman in her 60s died in her home in Hume and a woman in her 40s died in her home in Darebin. Their deaths will be reported in today's figures. You may have seen on social media from those with leaked figures (we have no confirmation) the number of cases will be over 100 today. Victoria did lockdown early, and it locked down hard. It's an indication of how contagious Delta is when it takes hold. The Victorian strategy now seems to be to keep the outbreak as under control as possible, rather than reach for zero. And of course, vaccinate. When the health department, the Australian defence force and the Prime Minister's Office wouldn't answer questions on Lt General John Frewen's appointment to lead the vaccine program, and what it meant, Daniel Hurst put in a bunch of FOIs. He received the letter Scott Morrison sent when making the appointment, which finally answers some of those questions: Scott Morrison assured the senior military figure Lt Gen John Frewen that "the necessary resources and assets will be put at your disposal" when he was appointed to boost confidence in the Australian government's vaccination rollout. A letter obtained by Guardian Australia under freedom of information laws reveals the prime minister told Frewen a "direct command and control structure" should help speed up the vaccination program and if the goals were achieved it would allow a faster reopening of Australia's international borders. Welcome to parliament hump day, with just two days left in the parliamentary sitting before a six-week break. That break was added in to give the government some flexibility for when it could hold the election. Given \*gestures to everything\* it's unlikely to be held in the next month. I know there are rumours, but with half the population in lockdown, bad polls, travel restrictions, the need for a virtual campaign, frustrations with the federal government and at best, ho-hum economic news coming, a government wanting to retain power would only hold an election right now if they absolutely had to. This government has until May. Don't be surprised if Australia Day passes and suddenly there is an Election Day announcement. But I think even with this break, you have time. That doesn't mean things aren't moving though. The Australian has an interview with attorney general Michaelia Cash where she says border closures could be challenged when vaccination targets hit 80%. As my colleague Paul Karp has previously pointed out, that's always been a possibility because the Western Australia high court case was handed down at a time when there was no vaccine, something which was made clear in the judgement. Once 80% or so of adults are vaccinated there is every chance the high court could come up with a different decision. So while the national plan isn't explicit on border closures, the federal government has plans. It's just not pushing it right now because it needs Queensland and Western Australia to win the next election. That's where the seats are. In Covid news, we'll hear the transition plan from Daniel Andrews today. That will include some restrictions easing a bit down the track. Andrews still wants numbers "as close to zero as possible" but seems resigned that Covid zero with Delta, once it has taken hold, is asking a bit much. Still, he has also been clear that he won't be opening up when numbers are high. And he has also been clear he won't be doing what NSW has been. We'll bring you that and the latest from NSW, where the regions are being watched closely. You have Mike Bowers in the halls and Amy Remeikis on the blog, with Katharine Murphy, Sarah Martin, Paul Karp and Daniel Hurst. You'll also hear from members of the wider Guardian team as the day unfolds. It being Wednesday, I had a lollipop with my coffees. It just seemed right. So grab your breakfast treat and let's get started.124022falsefalseNino Bucci (now) and Amy Remeikis (earllier)Prime minister Scott Morrison talks to Speaker Tony Smith during question time.Minister for defence industry Melissa Price.Defence minister Peter Dutton...... proves he can still smile.A person receives a Covid test at a pop-up site in Altona North in Melbourne.People wait after receiving their Covid vaccine at the Royal Melbourne Showgrounds in Melbourne.Flinders Street in Melbourne.Victorian premier Daniel Andrews speaks to the media in Melbourne, Wednesday, 1 September 2021.A person exercising at Albert Park Lake in Melbourne.People line up for Covid vaccines at the Sandown Racecourse Vaccination Centre in Melbourne.ACT deputy chief medical officer Vanessa Johnston speaks to the media in Canberra, Wednesday, 1 September 2021.A resident rides his bike over Commonwealth bridge near Parliament House in Canberra.ACT Chief Minister Andrew Barr speaks to the media during a COVID-19 update in Canberra, Wednesday, September 1, 2021.A person is seen in Fairfield, south-west of Sydney, Australia.Health care workers are seen checking passengers arriving from Sydney at Perth Airport, Perth.NSW Premier Gladys Berejiklian arrives to address media during a press conference in Sydney.People are seen waiting to receive a Covid test in Lakemba.An aerial view of the Outback NSW town of Wilcannia.NSW premier Gladys Berejiklian addresses media in Sydney, Wednesday, 1 September 2021.Pharmacist Christine Kelly prepares doses of the AstraZeneca vaccinations.Deputy PM Barnaby Joyce.People exercising in Melbourne.Independent senator for South Australia Rex Patrick.Prime minister Scott Morrison at Defence headquarters in Canberra lays a wreath during a ceremony marking the 70th anniversary of the Anzus alliance.Scott Morrison (left) and defence minister Peter Dutton (centre).NSW premier Gladys Berejiklian.Opposition leader Anthony Albanese.Labor MP Tanya Plibersek: 'If I were a premier in a state with zero [Covid] transmission, I would be looking at NSW now and I would be worried.'Two people take a walk for their hour of exercise in Melbourne on Tuesday.

**Load-Date:** September 1, 2021

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[***Command Agriculture and Food Security: An Interrogation of State Intervention in the Post-Fast Track Land Redistribution Era in Zimbabwe***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:6BH2-VXY1-JBMY-H4F0-00000-00&context=1516831)

Journal of Asian and African Studies

November 2021

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**Section:** Pg. 1626-1643; Vol.56; No.7; ISSN: 0021-9096, 1745-2538

**Length:** 9650 words

**Byline:** Langton Makuwerere Dube

**Body**

**ABSTRACT**

Command ***agriculture*** is a contract farming scheme necessitated by land redistribution that ruptured Zimbabwe’s sources of resilience, distorted credit access, heightened tenure insecurity, and spiked vulnerability to droughts. Using qualitative analysis of extant literature, this article rationalizes the program’s nobility of cause but argues that the program alone cannot revamp ***agriculture***. Notwithstanding how the program has evolved, revamping ***agriculture*** also encompasses policies that address fiscal prudence and macroeconomic resilience. Equally important is ***agricultural*** training that fosters skills and technologies that are not only climate-responsive but also meet the demands of the constantly evolving agrarian value chain.

**FULL TEXT**

**Introduction**

Since independence in 1980, Zimbabwe has pursued land reform which envisioned large-scale resettlement through land acquisitions and redistribution aimed at decimating the racially skewed land distribution and fostering poverty alleviation. The most recent phase, dubbed the Fast Track Land Redistribution Program (FTLRP), which forms the foundation of this study, was implemented in July 2000 with a huge goal of redistributing at least 5 million hectares of arable land for resettlement and to resettle 150,000 families in five years (Masiiwa, 2005; Zikhali, 2008). According to Moyo (2011: 497), by 2010, approximately 9.2 million hectares (ha) of land were acquired for resettlement for 168,671 families (composed of 145,775 landless families and 22,896 commercial black farmers). The farms were classified either as A1 or A2 model farms, with the classifications being determined by considerations of equity and growth (Moyo, 1995; Prosterman and Riediger, 1987; World Bank, 2009). As a result, this remains one of the largest-scale and enduring resettlement exercises in the contemporary world (Food ***Agriculture*** Organization and World Food Program [FAO and WFP], 2009).

The FTLRP undermined the logic of colonial settlerism (Moyo, 2011: 944) and de-racialized the bimodal agrarian system (Nkomo, 2001). However, conducting redistributive land reform in an era of neo-liberalism is fraught with many challenges of an institutional and political character (Borras, 2005). As a consequence of its radical nature: [t]he FTLRP triggered an imperial backlash, with the European Union (led by Britain) and the United States imposing so-called targeted sanctions on Zimbabwe. This led to its isolation from international financial markets and [a] lack of foreign direct investments which forced the country to adopt a “Look East” policy and a heterodox macro-economic policy in order to address the after effects of spiralling inflation and economic stagnation. (Mkodzongi and Lawrence, 2019: 2)

Drawing multiple sources (the imperial backlash, the FTLRP, droughts, and so forth), ***agricultural*** production plummeted with mixed shifts in production and a 30% drop in production by 2004 (Hammer et al., 2003; Richardson, 2004). ***Agricultural*** production tumbled as a result of the macroeconomic instability notwithstanding the effects of reduced commercial farmland, perennial droughts, economic sanctions, international isolation, and the cutting of lines of credit (Altana and Kojo, 2008: 73). The post-FTLRP witnessed food shortages making Zimbabwe more reliant on donor benevolence. Food became elusive in the market, the lack of various supplies and shortages from one season to another, unaffordability, and poor quality of the available food was common. According to the United Nations Development Fund (UNDP), the post-FTLRP era was a threat to national ***agricultural*** production and food security in the short term and made the provision of essential public infrastructure for settlers impossible within a reasonable time frame (United Nations Development Program [UNDP], 2002).

Therefore, while the FTLRP redressed a historical injustice, it created a chain reaction that had the consequence of disrupting the fundamentals of the Zimbabwean economy. Zimbabwe underwent a sustained economic contraction much deeper than the one which followed China’s Great Leap Forward between 1958 and 1961 or the one that occurred following the “perestroika and glasnost” reforms that dismantled the former Union of Soviet Socialist Republics (USSR) from a command to a market economy (Maddison, 2007; World Bank, 2009; World Bank and Government of Zimbabwe, 2019). The World Bank Public Expenditure Review on Zimbabwe noted that GDP per capita more than halved between 2000 and 2008, which could be attributed to changing ***agricultural*** production post-FTLRP as well as the imposition of economic sanctions (World Bank and Government of Zimbabwe, 2019). Because of the highly contested and politically charged nature of FTLRP as an affront to white capital and the neo-liberal façades of property rights, rule of law, and good governance, Zimbabwe suffered international isolation and denigration, the imposition of economic sanctions by the British government, the European Union, and the United States Congress, which meant that ***agricultural*** finance and markets were severely undercut.

Before FTLRP, the state provided support to communal farmers through the then ***Agricultural*** Finance Corporation (AFC) while commercial farmers accessed finance through state loans and private commercial facilities (Mazwi et al., 2019; Moyo, 1995). The disruption to the ***agricultural*** value chain and agribusiness coupled with international condemnation resulted in domestic and foreign capital flight critical to ***agricultural*** financing. Besides contract farming arrangements in the production of tobacco, cotton, sugarcane, and myriad horticultural and cash crop commodities, cereal production suffered capital apathy. Against a background of the worsening food security and volatile macroeconomic fundamentals which severely compromised Zimbabwe’s sources of resilience and compounded the country’s vulnerability to shocks, the Government of Zimbabwe (GoZ) embarked on massive quasi-fiscal spending to finance ***agriculture***. These dirigiste and heterodox policies were meant to structurally capacitate resettled farmers exposed to land reform which was still evolving as a result of the complete restructuring of the agrarian system. The resulting environment was and still is characterized by resettled farmers being both the producers and the consumers that face imperfect markets and idiosyncratic as well as covariate ***variable*** shocks. It is, therefore, not surprising that post-FTLRP Zimbabwe relied more on maize imports and food aid to augment its grain deficit, which spiked the import bill (Mazwi et al., 2019).

To ameliorate the declining economic fortunes, the GoZ rolled out massive spending on ***agriculture*** in 2004 financed by Reserve Bank of Zimbabwe (RBZ) credit. These heterodox and dirigiste economic policies (Mazwi et al., 2019) involved the RBZ, the Ministry of Finance, and the ***Agriculture*** Development Bank (AGRIBANK). These subsidy programs included Operation Maguta/Taguta/Inala/Sisuthi (food security), the Presidential Well Wishers Special ***Agricultural*** Inputs Scheme (inputs and fertilizer support to communal farmers), and the ***Agricultural*** Sector Productive Enhancement Facility (ASPEF) (Chisango and Tichakunda, 2018; Mazwi et al., 2019; Pazvakavambwa, 2009; World Bank and Government of Zimbabwe, 2019). The ASPEF facility provided loans at affordable interest rates to farmers for input procurement and a host of on-the-farm investment to boost land utilization and farm productivity. Like many of these programs, they suffered poor funding as a result of warped fiscal and budgetary constraints, poor compliance concerning loan repayments, patronage, and a host of other implementation shortcomings (Chisango and Tichakunda, 2018; Solidarity Peace Trust, 2006).

Critically, programs like Operation Maguta/Inala and the ASPEF suffered from the contradictions of the market in which the Grain Marketing Board (GMB) had a monopoly that crowded out the competition and other private players. The marketing side of the equation compounded by the GMB’s monopoly played a huge constraining factor especially on the availability of maize and wheat on the market. This led to serious food shortages because farmers opted to sell on the black/parallel market, which raised the cost of the staple cereal and created serious price distortions. While there was optimism between the 2009 and 2013 era of the Government of National Unity (GNU) and the associated dollarization of the economy after almost a decade of record hyperinflation and socioeconomic stress, the fundamentals of the economy were far from being revitalized. Zimbabwe remained vulnerable to shocks such that the 2015 drought forced the government to introduce the Targeted Command ***Agriculture*** Program (TCAP) to ramp up efforts at maize production and by extension guaranteeing food security.

This article begins by rationalizing and locating state intervention or command ***agriculture*** as a consequence of the contradictions of the FTLRP. Land redistribution ruptured the sources of the resilience of Zimbabwe’s agrarian economy, which subsequently dented farm productivity and exacerbated food insecurity. This contraction of productivity depleted grain reserves and led to a ballooning import bill (Mazwi et al., 2019) which made the country highly dependent on donor benevolence. Such a decline in ***agricultural*** fortunes gave birth to the first round of quasi-fiscal activities by the government meant to provide inputs, farm mechanization, and, most importantly, financial stimulus to newly resettled farmers (World Bank and Government of Zimbabwe, 2019). A similar decline in ***agricultural*** productivity gave birth to command ***agriculture*** in 2016, which will be the focus of this study.

The article proceeds to interrogate the current command ***agricultural*** scheme noting that despite significant government spending on ***agriculture***, the country remains vulnerable to droughts and food security remains precarious. Furthermore, the article notes that heavy quasi-fiscal expenditures have spiked inflation and promoted fiscal and budgetary stress, which has dented the country’s macroeconomic resilience. Also, the article posits that the “***agricultural*** surplus” has been skimmed off (Powelson and Stock, 1990) because government officials have reserved for themselves decision-making powers on ***agricultural*** inputs, outputs, and timing which undercut the peasant incentive. This has not only distorted implementation and opened up avenues for patronage and rents but has also created a farmer heavily reliant on state bailouts. More so, because the current program is a mirror image of the preceding schemes, it has refracted the same shortcomings that proscribed the initial programs. The article concludes by analyzing the program’s relationship to agrarian capital and how it endangers class struggles and prospects for accumulation from below, because it mimics the state’s bowing down to neo-liberal orthodoxy.

The article is predominantly a policy discourse wherein the discussion critically reflects on “what had to be done, what had to be changed and most importantly what had to be avoided” (World Bank and Government of Zimbabwe, 2019) if sustainability in food security is to be realized. In that regard, the core theses of this article is that command ***agriculture*** in and of itself cannot revamp ***agricultural*** productivity and foster sustainable food security. While there has been tremendous progress in optimizing the cost implications of the program, the targeting of beneficiaries, and provision of inputs under command ***agriculture***, attention should also be directed at aggressively investing in ***agricultural*** infrastructure and promoting ***agricultural*** training and skills to strengthen the program. The study is largely descriptive and based on an analysis of extant literature and secondary sources of ***data*** like journal articles, think tank Working Papers, newspaper articles, governmental and parliamentary reports as well as annual reports from multi-lateral institutions.

**Special maize program for import substitution/command *agriculture***

***Agriculture*** accounts for approximately 20% of GDP and 66% of the national labor force, but post-FTLRP it now accounts for 10% of GDP (World Bank and Government of Zimbabwe, 2019). Besides, ***agricultural*** production post-FTLRP, in general, continues to be affected by myriad challenges which include poor input access and availability, vulnerability to weather-related shocks like droughts and floods, pests, poor soil quality (especially in communal areas), and a lack of credit lines. Traditionally private contractors focused more on the financing of tobacco, sugar cane, cotton, and other horticultural commodities (Mazwi et al., 2019). Therefore, the TCAP was designed to fill the vacuum in the financing of the production of cereal grains. The actors involved in the TCAP include, on the one hand, the GoZ through the Treasury, the Ministry of ***Agriculture***, Lands and Rural Development, and its specialized ***Agricultural*** Extension department (AGRITEX), the government parastatal the GMB, and most importantly the Cabinet Committee on Food and Nutrition. On the other were private financiers like Sakunda Holdings, contractors tasked with the supply of ***agricultural*** inputs which also involved seed houses, ***agricultural*** chemical manufacturing companies like SeedCo. Mazwi et al. (2019) notes that the involvement of the private partners gave the program a tripartite identity tinge which was a major departure from the previous command ***agricultural*** facilities which were predominantly state-driven and state-dominated.

Under the TCAP, the GoZ provides collateral security to a private company that is contracted to provide various inputs to farmers, while farmers in turn are duty-bound to deliver their produce to the GMB. In the same vein, the GoZ through the Treasury, “entered into a facility arrangement with a private party to supply inputs securitized by Treasury Bills” (World Bank and Government of Zimbabwe, 2019: 23), which has been referred to in some quarters as monetized debt. This arrangement is a form of the contract farming system that has historically been made available to cotton and tobacco farmers in Zimbabwe and hence its novelty is that it is the first to be made available to cereal and grain production with government funding. Of interest is the role of the Zimbabwe Defense Forces (ZDF) in providing logistical support. The involvement of the uniformed sector into the program has been touted as the “next logical step for government in the militarization of the state, and in furtherance of the patronage of the army” (Solidarity Peace Trust, 2006: 6). However, it is important to note that the involvement of the ZDF falls within its constitutional obligation of providing Military Assistance to Civil Power (MACP), which is broadly within the purview of the security matrix. The concept of security has become fluid and multi-dimensional in the 21st century from simply being matters of high politics and territorial defense against aggressors to encompassing the softer space of human security. Therefore, food security and the broader concept of socio-economic issues pose a huge threat to national security in the same manner that foreign aggression does to statehood and territorial sanctity.

The Ministry of ***Agriculture*** through the AGRITEX department is responsible for technical extension and advisory support to farmers concerning inputs, timing, quantities, and also the signing of the contract form. The state-run GMB is tasked with the modalities of buying grains and cereals for storage in the Strategic Grain Reserve and also selling to millers for onward processing and value addition to satisfy the domestic market. It is important to note that government financing in ***agriculture*** aims to address four areas that are deemed key to the revival of ***agriculture*** in Zimbabwe. Public funding aims to increase spending on existing presidential support schemes, the creation of a revolving tobacco and cotton fund, the special Maize Program at the core of command ***agriculture*** for inputs, and increase farm mechanization with government collateral backing. It also creates the subsidy system that sustains the price wedge between the GMB’s procurement and sales prices which are supposed to attract farmers to sell their grains to the parastatal.

Under the program, the GoZ financing has been exponentially increasing from US$105 million (2016–17 season), US$439 million (2017–18 season), and US$238, 3 million (2018–19 season). Notwithstanding other extenuating factors between the 2014–16 season, maize production under the TCAP increased by 321% and, in the same vein, the 2016–17 season witnessed a historic maize production that surpassed the national human consumption requirement by 139% and that of human and livestock by 119% respectively (Mazwi et al., 2019: 247–248). However, while the prospects were promising, the lingering vulnerability of Zimbabwe’s ***agriculture*** to droughts resulted in a rupture in the food security fundamentals as the 2018–19 season was negatively affected. According to the Zimbabwe Vulnerability Assessment Committee 2019 Report (ZimVac, 2019), macroeconomic volatility and the poor ***agricultural*** season remain the main drivers of food insecurity in Zimbabwe. The main catalysts are droughts (the El Nino effect), which compounded productivity, and hyperinflation, which has seen a sharp rise in the prices of basic goods affecting the purchasing power of the citizenry. ZimVac noted that households highlighted challenges of cash shortages (82%) and cereal price fluctuations (79%) as some of the predominant manifestations of insecurity. In their rural livelihood assessment, ZimVac estimated that 59% (5,529,000 people) were at risk of food insecurity, of which 38% (3,550,851 people) were in urgent need of emergency food assistance. The fact that food insecurity remains precarious is not in itself an indictment on command ***agriculture*** per se; however, such revelations point to the theses proposed by this article that command ***agriculture*** in and of itself is not adequate to the revamping of ***agriculture*** in Zimbabwe, as will be explored later in the article.

**Analysis of the TCAP salient features**

**Debt repayment analysis**

Despite the nobility of cause, that of promoting indisputable food security, the government program has faced many challenges. It was expected that lessons learned from the preceding state-led schemes were going to be taken into consideration to avoid repeating the same mistakes that negatively impacted their viability. Those programs suffered from a high default rate in repayment; hence, the fact that the government offered collateral to cushion farmers who benefited meant that the same mistakes that affected previous schemes simply recurred. While the contract form stipulated that farmers had to repay the government for the inputs rendered by selling their produce to the GMB, there was no enforcement mechanism or presumably lack of political will to allow the government to recoup their investments if the farmer defaulted. This can be inferred because, “up to 2019, the phenomenon of attaching assets in the event of default has not been reported in the two seasons the TCAP has been in operation” (Mazwi et al., 2019: 243). Hence, according to the World Bank and Government of Zimbabwe (2019), the high rates of default that severely compromised fiscal and budgetary planning with actual spending during 2016 and 2017 is five times higher than the budgeted threshold.

It is vital to recap that: Assuming that there were no payments defaults by the farmers, under the Special Maize Program, Treasury would not incur any costs in paying back what has been paid to the private company. However, most farmers failed to pay back for the support received—which was the same case under previous input support facilities in 2004–2007 and 2009–2014. (World Bank and Government of Zimbabwe, 2019: 23)

For example, the report goes on to note that debt repayment or recovery was US$47 million against state financing of US$105 million in 2017, and US$81.3 million against state financing of US$238.3 million in 2018. This depicts a worrying and increasing level of non-repayment of 54% in 2017 rising to 81% in 2018. Hence the GoZ needs to be frugal with the national purse by promoting the viability of its financial investments in ***agriculture*** (in this case command ***agriculture*** or TCAP) which alleviate the “the moral hazard” or budgetary and fiscal implications implicit in poor or non-existent debt recovery and result in “loans being converted into grants” or public debt (*Big Saturday Read*, 18 July 2020).

Be that as it may, collateral to farmers remains appropriate not only because Zimbabwe’s ***agricultural*** sector has been in a perpetual state of vulnerability from idiosyncratic and covariate sources but because of the need to engender the implied accumulation from below or a “re-peasantization” of the agrarian sector, which is the primary and often missed goal of agrarian reform (Mkodzongi and Lawrence, 2019; Moyo, 2011). In such circumstances, governments enjoy the prerogative to exercise their sovereign responsibility or “right to intervene” on such matters that are cardinal to national interests. Critically, the TCAP has evolved in that aspect because of, currently, the involvement of private-sector financial institutions like Stanbic Bank, Commercial Bank of Zimbabwe (CBZ), and AGRIBANK. Private financiers will be responsible for conducting due diligence under Know Your Customer (KYC) principles for the determination of the creditworthiness of beneficiaries of this equipment. Unlike the previous arrangements, whereby the GoZ through the Ministry of ***Agriculture*** would distribute the farm equipment, under the current facility, the partnering banks will oversee the redistribution of the items subject to standard loaning best practices. In the long run, “the financial sector (such as banks, microcredit companies, and leasing companies) should eventually take over the role of private ***agriculture*** finance” (World Bank and Government of Zimbabwe, 2019: 50). Such measures foster the creation of a robust ***agricultural*** sector capable of attracting investment and financing its working capital across the value chain through credit facilities with banks and other private players. The fact that the state has been providing everything from inputs, equipment, and even markets is retrogressive to the development of the farmer who over the years has become a habitual recipient of state bailouts. Hence, the private sector is a critical enabler in the development of the vibrant farmer. Accommodating the private sector reaps dividends not only through innovation and diversity but also through the nurturing of business culture in the farmer. According to Powelson and Stock (1990: 5), an omnipresent bureaucracy skims off the farmer’s incentive, strips their decision-making initiative, and makes them ever dependent on state benefaction. The private sector pushes the farmer to be responsible and to make sound economic decisions on a cost-benefit analysis. Therefore, opening up to the private sector will allow the optimization of land use, which drives productivity in the long term and allows the most productive farmers to benefit (Zikhali, 2008).

**Skimming off the peasant incentive**

Under the TCAP, the Ministry of ***Agriculture*** through AGRITEX is responsible for the provisioning of inputs, chemicals, and fertilizers and the requisite technical support. However, the contract grants the ministry through AGRITEX and members of the Defense Forces “unlimited right to inspect land where maize is grown and also giving instructions to the farmer” and that “all instructions and guidance given during such inspections shall be religiously followed by the farmer” (Mazwi et al., 2019: 242). This creates a scenario whereby the farmer is stripped of autonomy and initiative in the whole exercise. In their seminal contribution entitled *The Peasant Betrayed:* ***Agriculture*** *and Land Reform in the Third World*, Powelson and Stock (1990) noted that if bureaucrats determine what will be planted, when, and how, what fertilizers and seeds will be used, and where and how the product will be sold, farmers become as good “as low level state employees” (Powelson and Stock, 1990: 5). These draws from extensive research across the developing world in countries like Tanzania, Egypt, Algeria, Somalia, Bolivia, The Philippines, and India. These arguments gain traction from studies that posit that governments in the developing countries are more inclined to aggregate their private interests rather than maximizing social welfare (Bates, 1983; Bauer, 1972; Lipton, 1977). Besides, government intervention in rural credits negatively affects ***agriculture*** by making credit a political weapon, depriving those farmers who need it the most or those with the best capabilities (Adam et al., 1984).

Also, an assessment of the contract reveals that it specifies the production requirement of the state like the provisioning of inputs, fertilizers, chemicals, and extension service support while the farmer is obliged to produce 5 tonnes per hectare. Also, the cost for the inputs rendered is deducted from the farmer’s produce while the farmer receives the balance. However, while the contract is very clear on the production requirements of the state, it is ambiguous on the price to be earned by the farmer, which consequently “exposes the farmer to prejudice for example during seasons of grain surpluses” (Mazwi et al., 2019: 242). These highly ambivalent contractual clauses severely work against the farmer while protecting the state from any consequences in the event of failure to satisfy their contractual obligations by “transferring the risks of production, such as severe weather patterns and crop failure, to the [farmers] who end up in debt in the event of drought and crop failure” (Mkodzongi and Lawrence, 2019: 4).

**Extension support analysis**

Extension support is very critical for the success of the TCAP because of the invaluable technical expertise that it offers to farmers. The post-FTLRP era created a huge spike in demand for extension services because farm restructuring increased the number of resettled farmers. For example, in 2004, Mazowe District had 37 extension workers against an establishment of 116 (Matondi, 2012), while in 2006 the ratio of extension workers to farmers was 1:800 as opposed to the standard 1:250 (Pazvakavambwa and Hakutangwi, 2006). These figures depict a perennial problem of extension service support and such a scenario remained intractable even during the first years of the TCAP. A key informant corroborated this noting that while the extension of personnel strength had improved marginally, the issue of mobility remained a huge challenge, citing that in some instances farmers had to organize transport for the extension worker. The Agritex has 4,790 extension workers and 505 extension supervisors while the veterinary department establishment was 1,563 with 1,312 posts under occupation. It was also cited as having 620 serviceable motorbikes with 900 beyond economic serviceability while the veterinary department had 315 motorcycles, of which 254 were functional and 61 were non-runners (*The Herald*, 16 July 2020). Such a scenario inhibits mobility and makes extension service support invisible to the farmer at a time when ***agriculture*** productivity is in retreat.

According to the late Minister of ***Agriculture***, Air Chief Marshal (retired) Perrance Shiri: A sound, technically aware and robust extension services is a critical touch point in the ***agriculture*** transformation jigsaw. Technical backstopping and coaching of farmers is pivotal in boosting ***agricultural*** productivity, ensuring climate change adaptation, ensuring food security, improving rural livelihoods and promoting ***agriculture*** as an engine of pro-poor and inclusive economic growth. (*The Herald*, 16 July 2020)

The donation of 5,000 motorbikes by Fertilisers, Seed, and Grain (FSG), and Valley Seeds to the Ministry of ***Agriculture*** on 16 July 2020 (*The Herald*, 16 July 2020) is expected to ameliorate some of these challenges through the facilitation of extension service mobility. However, while this is a welcome development, it is imperative to point out that government investment in ***agriculture*** should not only be directed at extension support but also at farmer training because it is pivotal to ***agricultural*** resilience.

Also, Zimbabwe’s ***agricultural*** sector training continues to face multiple challenges in terms of funding which is critical towards the nurturing of the skills required to address Zimbabwe’s current ***agricultural*** challenges and the success of the command ***agriculture*** program (*The Hansard*, 25 July 2017). While the infrastructure is there, the education sector faces systemic resource constraints which have been further compounded by the obtaining macroeconomic instability. In 2017, a Parliament of Zimbabwe delegation committee toured the eight ***agricultural*** colleges and concluded that budgetary constraints impacted negatively on the ability of colleges to carry out their mandate resulting in the production of half-baked human resources. The committee’s major findings cited poor or inadequate budgetary allocations as the chief constraint to college operations (*The Hansard*, 25 July 2017). Some of the ancillary training aids in short supply included, but are not limited to, computers, photocopiers, projectors, textbooks, and other office hardware notwithstanding the economically unserviceable farm machinery which hinders the pedagogy of practical lessons.

As a result, students or graduates from the colleges were only getting exposed to the latest technologies, modern farming machinery, and innovation systems either during attachment or when they became employed. In the end, “the training received by extension officers did not match the requirements and demands of some of the . . . farmers, . . . extension workers did not know much, were challenged by farmers, or regarded as not useful” (Matondi, 2012: 152). Such an acute dearth in the training system is very retrogressive to the success of initiatives like the TCAP which rely more on the effectiveness and efficiency of the extension service support. The positive development is that the Parliament of Zimbabwe tour implies that the GoZ is now aware of the challenges, whose effects by extension can encompass the prospects of the TCAP in particular and the general revamping of ***agriculture*** in general. Because of that, this article proposes that investment into private-public partnerships (triple Ps) is vital to unlocking the potential that is dormant within the ***agricultural*** education system. In that regard, “there is [a] need to strengthen cooperation between the private sector (agribusiness) and public education to enhance [the] relevance of the training programs, to build links between students and potential employers and source funding” (World Bank and Government of Zimbabwe, 2019: 56).

Because command ***agriculture*** is diversifying into fisheries, livestock, and so forth, it is imperative that funding be also critically directed at the research and development aspects or what is referred to as the ***Agricultural*** Knowledge and Innovation Systems (AKIS). Funding for AKIS activities comes from various sources which include, but are not limited to, public sector budgets, private sector sources, and international ***agricultural*** research organizations. However, the viability of these institutions has been negatively affected by funding and budgetary constraints. The aspect of research and development is not “breaking new ground” for Zimbabwe because in terms of infrastructure, the country has the requisite research and development stations, such as Henderson (diverse crops and veterinary science), Matopos (small grains, and livestock and animal husbandry), Blackfordby and Kutsaga (specially designed for tobacco), and Chibero, Mlezu, and Gwebi colleges (***agricultural*** education). One of the milestones of this research and development policy was “the breeding of local maize hybrids that resulted in Southern Rhodesia (now Zimbabwe) becoming the second country after the United States of America to market certified hybrid maize seed in 1949” (Rukuni et al., 2006). The World Bank GoZ PER (2019) notes that two features impinge upon the effectiveness of these approved budgets. These include staff costs which absorb a significant share at the expense of the maintenance of research stations, education, and general ***agricultural*** extension activities. For example, “nearly 85% of the 2017 extension budget was allocated for staff costs, leaving under US$4 million for all other activities; while 53% of the research budget [was] intended for salaries, while the balance of US$6 million [was] left for non wage research activities” (World Bank and Government of Zimbabwe, 2019: 14).

**Legislative oversight**

The command ***agriculture*** scheme was implemented in an environment in which the parliamentary oversight role was limited. The involvement of parliament on matters that involve government spending or financial commitments is cast in stone. It is conventionally agreed that parliamentary oversight promotes and safeguards transparency, which engenders fiscal discipline and guards against the scourge of corruption (Hameed, 2005). A feasibility evaluation of the program has been difficult to establish because of the scarcity of ***data*** on performance indicators, the number of beneficiaries, average yields, and so forth. It could have assisted in creating a cost-benefit analysis of public funds. Unanswered questions remain, for example relating to, “how much output was paid per unit spent under command ***agriculture***,” or in the case of the GMB, the degree to which “higher procurement prices incentivized production” (World Bank and Government of Zimbabwe, 2019: 13).

Also, the quashing in Parliament of the Ministry of ***Agriculture***’s proposal to criminalize loan repayment defaults was regrettable considering that the august house is supposed to a bastion of public accountability and the protection of public funds. This has fuelled allegations of patronage and conflicts of interest since most of the legislators in the house are resettled farmers who have benefitted from the equipment distribution (*Big Saturday Read*, 18 July 2020). In that regard, the program is being attacked as a project by the “black bourgeoisie within the state that has sought through . . . farm ownership to commandeer state resources for its accumulation through command farming” (Mkodzongi and Lawrence, 2019: 5). The involvement of the private sector in the selection and redistribution of equipment to beneficiaries based on creditworthiness is a huge step forward that is expected to prove the patronage of the TCAP.

**The TCAP and allegations of patronage**

In light of the above, patronage narratives have seen the program described in some circles as attempts by the government of the day to hedge political legitimacy by fixating rural populations or certain segments of the society into certain spaces where political capital is expropriated through patronage and rents (Albertus, 2015; Levine, 1998; Smith, 2005). Because the threat to ruling elites emanates from within rather than from the outside (Geddes, 2003; Haber, 2006; Svolik, 2009), such programs are viewed in some quarters as attempts at pacifying the countryside because they “undercut the threat of instability from below” (Albertus, 2015: 17), which reduces the costs of the ruling (Scott, 1985). Hence, Huntington (1968: 292) noted that “he who controls the countryside controls the country”.

Allegations about the political partisan identity of the program will always follow the land discourse in Zimbabwe because of its epistemological foundations and the trajectory of contestations that define it. These allegations may have traction depending on one’s “locus of enunciation” (Ndlovu-Gatsheni, 2013), which denotes that scholarly work or any other world view emanates from a particular location of power (Mignolo, 2000) or it is highly contingent on the “geo-political and body political location of the subject that speaks” (Grosfoguel, 2000: 213). Because of that, such political and power-centered perspectives stem from northern, neo-liberal capitalist narratives that posture the agency of the land redistribution as a political gambit for power retention, patronage, and elite accumulation purposes alone (Albertus, 2015; Blair, 2002; Laurie, 2016). These claims stem from allegations that depict the beneficiaries of the FTLRP as political cronies (Alexander, 2003; Chavunduka and Bromley, 2010; Hammer et al., 2003; Zamchiya, 2011). The agency of the FTLRP as a continuation of the struggles of the South for postcolonial and liberational transformation for restitution and socio-economic mobility of the formerly disenfranchised is downplayed (Dube, 2019; Moyo, 1995; Moyo and Yeros, 2005). While such allegations have been debunked of substance to a considerable extent, the “corpse obstinately persists in getting up again every time it is buried and, year in year out, everyday language and much ostensibly scholarly writing remain largely in thrall to this presupposition” (Mbembe, 2001: 3). However, while programs like command ***agriculture*** may foster peasant dependencies and hedge political power, subscribing to that assertion in toto is problematic and grossly misses the nuance of the complexities surrounding not only the FTLRP but also the rationale of the GoZ’s legitimate sovereign prerogative to resuscitate ***agriculture*** given the attenuating circumstances. Therefore, there is a need to guard against these binaries propagated by a highly polarized and partisan media and academia (Masiiwa, 2004; Zamchiya, 2011).

While mindful of the program’s shortcomings, the trajectory of Zimbabwe’s ***agriculture*** after the FTLRP has been a perpetual state of vulnerability which has exacerbated food insecurity and, therefore, legitimizes government intervention. Besides, in light of the post-FTLRP agrarian investment capital flight, the novelty of the contemporary command ***agriculture*** scheme cannot be dismissed. Contract farming in Zimbabwe was generally funded by private companies and was not generally devoted to grains and cereals but more to cash crops (Mazwi et al., 2019). The current scheme has evolved to include private partners and financiers, which is a huge departure from the preceding state initiatives giving the current program a tripartite identity (Mazwi et al., 2019). However, the recurrence of the same systemic shortcomings that circumscribed the success of initial state-financed schemes is worrisome and points to the fact that they learned nothing and forgot nothing.

**The TCAP and macroeconomic resilience**

The sharp drop in ***agricultural*** production meant that considerable public and private resources were needed to revamp the sector in addition to rebuilding the institutions that make up the value chain. While the GoZ was in a financial *cul de sac* because of the decay of the key sources of resilience, the resort to monetized debt resulted in massive macroeconomic dislocations whose effects continue to encompass the viability of ***agriculture*** and other efforts at economic stabilization. The state’s “quasi fiscal activities in 2004/5 and 2016/17 contributed to significant macroeconomic imbalances—including high or hyper inflation” (World Bank and Government of Zimbabwe, 2019: 6). During the 2017 and 2018 seasons, the Strategic Grain Reserve improved substantially but at a huge cost which manifested through inflation. Because most farmers defaulted on their repayments and public debt rose exponentially, the government resorted to debt monetization. Debt monetization occurs when governments resort to the central bank to cover its financing needs through invoking seigniorage and the printing of money as a source of revenue (De Fiore, 2000). Monetary seigniorage can be a source of revenue through inflation tax; however, if it is not supported by economic growth it can result in the rise of inflationary pressures (Calvo and Leiderman, 1992). Between 2016 and 2018, Zimbabwe suffered from the effects of drought and a banking crisis, and while “seigniorage may have appeared attractive especially in light of the economic boost from high ***agricultural*** spending” (World Bank and Government of Zimbabwe, 2019: 44), it accelerated inflation and massive macroeconomic dislocations.

Also, reservations have been expressed about the “moral hazard” that is inevitable when government programs lead to a rise in public debt (*Big Saturday Read*, 18 July 2020). The ***conversion*** of the initial state financed ***agriculture*** loans into grants put a huge strain on the taxpayer and the national purse while the huge default rate by farmers on the current scheme has led to budgetary complications. Currently, seigniorage or an implicit tax on consumers in Zimbabwe appears not very sustainable. Against the backdrop of the elusive external lines of credit and suppressed revenue sources, Zimbabwe’s fiscal consolidation requires not only structural reforms that go beyond ***agriculture*** but also frugal spending of public funds. This is notwithstanding the need to improve the efficiency and effectiveness of the command ***agriculture*** scheme in terms of inputs provision, the selection of beneficiaries, and the creation of a robust project monitoring culture that promotes effectiveness and weeds out non-performers and defaulters.

**Command *agriculture* and infrastructure resilience**

Infrastructural resilience is derived from the efficiency and effectiveness of physical endowments, especially on-the-farm infrastructure (Hughes, 2006; Muzari et al., 2014). These sources of resilience are vital in hedging the vitality of ***agricultural*** production against climatic volatility and also in promoting optimum farm productivity. This includes, but is not limited to, the construction of dams, and the installation of irrigation systems and various other farm machinery. The FTLRP and its associated farm size restructuring stretched the capacity of the physical sources of resilience, hence there was a huge disjuncture between the existing infrastructure vis à vis their capacity and compatibility with the new order. Land administration continues to grapple with the issue of stretched farm infrastructure (Matondi, 2012) manifesting in conflicts over boundaries and access to infrastructure like water pumps, dams, and other vital irrigation machinery. At a dinner held in honor of the United Nations Development Program Administrator (UNDP), Mark Malloch Brown on November 30, 2000, the then Minister of Foreign Affairs, Stan Mudenge opined that: We cannot hide the fact that the FTLRP has room for improvements. For example, the settlers require access to roads, water supplies, schools, clinics, dip tanks, draught power, initial seeds and fertilizers, extension services, training and many more. (Matondi, 2012: 169)

The FTLRP stretched Zimbabwe’s ***agricultural*** physical sources of resilience, which severely undercut productivity. Charles Laurie documents the degeneration of ***agricultural*** infrastructure during the tumultuous era of farm invasions attributed to alleged general lawlessness and the combative character of the whole exercise (Laurie, 2016). Also, the general retreat of domestic and foreign capital investment in the agrarian sector meant that infrastructural decay was not arrested, which subsequently affected productivity. Farm restructuring compromised access and user rights to communally shared infrastructure like dams, barns, irrigation equipment, and other conveyances (Matondi, 2012). Resettled farmers without infrastructure on their farms have continued to struggle to enjoy access and user rights to infrastructure that fell under the custodianship of their neighbors during farm restructuring (Moyo, 2006). Such infrastructural resilience relates to the effectiveness, efficiency, and general serviceability of mechanized infrastructure as well as to other on-the-farm physical endowments (Hughes, 2006; Muzari et al., 2014). Notwithstanding other extenuating circumstances to the viability of ***agriculture***, infrastructural challenges had the combined effect of not only complicating acclimatization for the resettled farmers but compounding the productivity challenges. Investments in public goods that strengthen markets, improve water access, and promote the development of new technologies have a positive impact on growth and productivity (Goyal and Nash, 2017).

Investments in irrigation systems are guided by the draft national irrigation development plan recommendations covering conveyance technologies like center pivots, linear pivots, horse reels or traveling guns, semi-portable sprinklers, flood irrigation systems, and so forth (World Bank and Government of Zimbabwe, 2019). Through the National Infrastructure Development Master Plan on irrigation, the GoZ complemented the TCAP by improving national irrigable hectarage to ramp up farm productivity and optimization. The GoZ entered into partnerships with private contractors for the supply of farm mechanization and irrigation equipment under the John Deer facility, the Belarus program, and the Pedistock program respectively. Under the John Deere facility, the GoZ signed a US$50 million contract with John Deere ***Agriculture*** Worldwide for the supply of 1,300 tractors (*The Herald*, 11 March 2020). Similarly, the GoZ also contracted Pedistock Investments in Zimbabwe for the supply of 80 center pivots at selected farms across the country, which are expected to improve the number of irrigable lands (*The Herald*, 11 January 2019).

Such investments will go a long way in complementing previous and other parallel investment arrangements in ***agriculture*** by the state and other players. However, while not downplaying government efforts under the TCAP, the state needs to hedge ***agriculture*** against climatic ***variables*** like droughts and other complexities associated with global warming. According to the ZimVac Report (2019), drought was one of the main catalysts of food insecurity in Zimbabwe through the El Nino effects. As a result, Zimbabwe’s ***agricultural*** sector continues to be “highly exposed to the adverse effects of climate change . . . losing annually on average 7.3% of its ***agriculture*** GDP due to drought” (World Bank, 2019; World Bank and Government of Zimbabwe, 2019: 53). Because of the inevitability of climate change, Zimbabwe’s climatic projections are that it “will become hotter and drier—with average temperature increasing and rainfall declining” (World Bank and Government of Zimbabwe, 2019: 53). The point to be made is that while the government increases its investment via the TCAP through the provision of inputs, fertilizer, chemicals, extension support, and mechanized equipment, it is imperative that efforts be made to climate proof ***agriculture*** from the effects of droughts and so forth. Zimbabwe’s ***agriculture*** has shown a perpetual vulnerability to drought and without an aggressive investment in that realm, programs like the TCAP will be severely undercut. Given the foregoing, the GoZ should seriously invest in public goods that strengthen robustness and resilience to climatic volatility in areas like ***agriculture*** research and development (R&D), geospatial technologies, and climate information systems, the harvesting and access to water among other critical aspects. This is rightly so, because climate change poses another huge risk to the vitality of ***agriculture*** especially in struggling economies; therefore, mitigation climate-smart technologies should be promoted because they improve the resilience of ***agriculture*** and the economy to vulnerabilities.

**Command *agriculture*, agrarian capital, and accumulation from below**

Despite its honorable intention the command ***agriculture*** scheme has been viewed as favoring capitalist ***agriculture*** because it signals a kind of collusion between the government and agrarian capital under the guise of the TCAP. The argument is that agrarian capital has influenced government policy (Mkodzongi and Lawrence, 2019) and that the state has become the local expression of the capitalist society (Moyo and Yeros, 2012: 231) by bowing to pressure from global and local capital to return to the neo-liberal orthodoxy (Mkodzongi and Lawrence, 2019; Moyo and Yeros, 2007). According to Moyo and Yeros (2005), such a scenario risks reversing the trajectory of re-peasantization and accumulation from below that has characterized the new agrarian structure, which can result in “the process of compradorization and recolonization under a dictatorship of the bourgeoisie, and ultimately the failure to fulfill the developmental potential of the new agrarian structure” (Mkodzongi and Lawrence, 2019: 7; Moyo and Yeros, 2012: 242).

It has been viewed as a manifestation of the petty bourgeoisie seeking consolidation which severely undercuts the prospects of agrarian transformation by rupturing the class struggles inherent in agrarian reforms. In that regard, a program like the TCAP or their hybrid public-private financing partnerships “creates a springboard for land concentration, extroverted production and exploitation” because it promotes “the re-insertion of peasants into the global commodity circuits” as “hewers of wood and fetchers of growth water” as it were (Mkodzongi and Lawrence, 2019; Moyo and Chambati, 2013; Moyo and Yeros, 2012). From a leftist vantage point, such programs mimic the subordination of the state to the altar of political expediency via “supra-national imperial systems that seek to undermine sovereignty in favor of the empire” (Hardt and Negri, 2000; Mkodzongi and Lawrence, 2019: 5). In that regard, for example, the signing of the Global Compensation Deed on July 29, 2020 between the GoZ and representatives of former white commercial farmers signifies an elite consensus with the empire and a sacralization of private property and inequality (Picketty, 2020). It signifies the shortcomings of doing land reform in a neo-liberal age wherein there is “a historical sanctification of private property and inequality” through a capitulation to the empire’s neocolonial capitalist matrices of power by converting “colonial injustice into public debt” (Zhangazha, 2020). From a philosophical vantage point (Moyo, 2011) argues that initiatives like these stem from the belief that Zimbabwe’s ***agricultural*** woes are rooted in the displacement of white farmers and the related misgovernance. The land redistribution exercise is labeled as a an exercise in theft (*The Economist*, 7 August 2020), a politically deceptive and elite opportunist land exercise (Laurie, 2016), and most importantly, as an affront to property rights, the rule of law, and good governance (Meredith, 2002; Raftopoulos and Phimister, 2004; Ranger, 2004). This assumption is without an empirical basis and detaches the analysis of land reform and the broader questions of agrarian transformation (Moyo, 2011: 494).

In a sense, black people, especially farmworkers, deserve compensation because their efforts sustained white commercial farming despite being made “invisible” (Hughes, 2006), by what Blair Rutherford termed the “domestic government” (Rutherford, 2001). This was characterized by servile master-servant relations that kept farmworkers cordoned off from the rest of society, pauperized, and hugely indebted to white farm owners (Rutherford, 2001). While this narrative has considerable traction within leftist discourse in the South, it is important to note that Zimbabwe may be trying to settle the political implications as a result of taking back its land under the FTLRP. While this can be misconstrued as weakness and capitulation to the empire, it can also be deconstructed as a desire by the GoZ to unlock other critical drivers of economic production and development that have been lying dormant and were being suppressed by this contested legacy. Hence President Emmerson Mnangagwa lauded the compensation package as a milestone in bringing closure to the national land question while affirming the GoZ’s commitment to constitutionalism and the rule of law (*The Herald*, 30 July 2020).

Be that as it may, despite the attendant challenges that can be ascribed to the TCAP, it is imperative to highlight that Zimbabwe’s ***agriculture*** post-FTLRP has remained in a state of vulnerability that has called for a government mandate to resuscitate the sector. In such circumstances, the GoZ retains a prerogative right to intervene on matters of national interest not only because of the precarious state of food insecurity but also by extension the macroeconomic implications for socio-political cohesion and national sovereignty. While mindful of the program’s shortcomings, it is important to highlight that the TCAP has evolved with regards to farmer targeting, debt repayment, and the capacitating of the agencies charged with implementation. However, in light of the interrelatedness of things, command ***agriculture*** in and of itself cannot revamp ***agricultural*** fortunes in Zimbabwe and therefore a multi-pronged approach is a prerequisite to promoting ***agricultural*** productivity. To effectively promote productivity and ultimately sustainable food security, command ***agriculture*** should be complemented by policies that promote research and development, farm mechanization, and so forth. Zimbabwean spending on ***agriculture***, “has become reactive, resulting in second and third best policy choices” (World Bank and Government of Zimbabwe, 2019: 48); thus policies to boost ***agricultural*** fortunes should not be divorced from other interventions geared at reinvigorating fiscal viability.

It is important to recall that resettled farmers have been blamed for being the architects of ***agricultural*** decline because of poor land utilization. They are seen as: [b]eing involved in “kurima soragrass” (meaning farming grass, although in this phrase grass is replaced by soya) . . . or have been caricatured as . . .. “vana Museyamwa” (a term derived from the eland totem and humorously used to depict some inefficient black businessman who could not pay farm workers unlike the former white large scale farmers. (Matondi, 2012: 133)

However, the failure by farmers to be productive or to be as efficient as the former white large-scale commercial farmers can be attributed to various issues. It can be a result of a lack of capital to procure inputs, poor ***agricultural*** infrastructure, or more succinctly as a result of inadequate or misplaced farmer and extension worker training. While the government is the first target of interrogation, the onus is also on resettled farmers to graduate from being alleged *tabula rasa* and to complement government bailouts through a demonstration of intelligence, initiative, hard work, thrift, ingenuity, and sound business acumen.

**Conclusion**

In summary this article has located Zimbabwe’s dirigiste intervention to revamp ***agriculture*** within the ensuing contradictions emanating from the post-FTLRP era. While not vindicating the unpalatable realities that land redistribution engendered, the combination of international apathy, the rupturing of sources of resilience, and the perennial vulnerability to droughts pushed the GoZ into a *cul de sac*. Because production plummeted, the Strategic Grain Reserve was depleted, and food insecurity became inevitable, the state invoked its “right to intervene” through funding mainly focused on cereal and grain production through the provision of inputs, farm machinery, and other related services to resettled farmers.

Epistemologically, the land discourse in Zimbabwe has generated a lot of contestations because it refracts issues of race, nativity, the empire, liberation, and the pitfalls of the African post-colony. It follows that, despite government efforts at resuscitating ***agriculture***, the discussion on command ***agriculture*** remains embroiled in a contested space wherein concepts of patronage, populism, elitism, and a rent-seeking culture continue to obscure rational analysis. While the article interrogated the program’s shortcomings, its main theses were that command ***agriculture*** in and of itself cannot revamp ***agricultural*** productivity in Zimbabwe. To foster sustainable food security and self-sufficiency, efforts should be directed at complementing the TCAP on ***agricultural*** training, ***agricultural*** mechanization, and adaptability to climate change notwithstanding policies that promote macroeconomic resilience. While significant strides are being made to improve ***agricultural*** infrastructure, the GoZ needs to step up efforts to improve farm mechanization and to train farmers so that they are weaned off state benefits. While cognizant of various challenges, some natural and others man-made, it is prudent to accept the reality that demonization diminishes informed criticisms and that the land discourse in Zimbabwe has become a theater where reason and rationality are abused, where the underlying animations, opportunism, and responses continue to be masked by generalized condemnation. The land discourse has become a theater in which “the true and the false become inextricable . . . there is a remarkable freedom and total abdication of responsibility, that allows people, again and again, to conveniently end up with a tale with which we are already familiar” (Mbembe, 2017: x), that is not only problematic but one that misses nuance. Be that as it may, it is also pertinent to emphasize that ***agriculture*** in Zimbabwe post-FTLRP is undergoing an evolutionary process requiring a significant degree of adaptation to suit the evolving conditions (Masiiwa, 2004; Moyo, 2005).

**Notes**

FundingThe author received no financial support for the research, authorship, and/or publication of this article.; ORCID iDLangton Makuwerere Dube [*https://orcid.org/0000-0001-7820-4642*](https://orcid.org/0000-0001-7820-4642)

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Apr 28, 2022( Proactive Investors: [*http://www.proactiveinvestors.com*](http://www.proactiveinvestors.com) Delivered by Newstex)

Mountain Valley MD Holdings Inc (CSE:MVMD, OTCQB:MVMDF) has provided a sweeping update on how it is rapidly advancing its patented Quicksome oral drug formulation and Quicksol solubility formulation technologies through key initiatives. The Toronto-based company is building a world-class organization centered around the implementation and licensing of its key technologies to global pharmaceutical, vaccine, and nutraceutical third parties. The company sees 'significant potential' in treating mycobacterium-based infections in humans and animals with its solubilized format of Selactosol 1.5% and it plans to start pre-clinical studies with the drug in the 'latter half of 2022.' The firm also told investors it expects to have information on formulation developments and to complete testing of formulations in a Type 1 diabetes model in the second half of 2022. Nextleaf Solutions Ltd (CSE:OILS, OTCQB:OILFF) announced that it will launch Glacial Gold softgels for the consumer market this summer, which the company said will provide unparalleled value in quality and price per milligram compared to other regulated capsules and edible products.

The Canadian cannabis vapes, and oils producer noted the new softgel product launch signifies the company's expansion into the 'Capsules' category. It added that Glacial Gold softgels will be made with high-purity cannabis distillate in a base of organic coconut medium-chain triglycerides (MCT) oil expertly encapsulated for a premium consumption experience, without premium pricing. Ridgeline Minerals (TSX-V:RDG, OTCQB:RDGMF) said it is pleased with early drilling at its Swift project located in the Cortez mining district in Nevada, which is currently under option to Nevada Gold Mines. Ridgeline CEO Chad Peters said the company was encouraged to see the initial assay results in SW21-001 return a near surface gold intersection in historically poor host rocks of the upper plate. Peters told investors that the results "further support the widespread gold and trace element footprint at Swift and highlight the potential strength of the Carlin-Type gold target at depth." Equity Metals Corporation (TSX-V:EQTY, OTCQB:EQMEF) revealed several new intersections of high-grade gold and silver from the NG-3 target area on its Silver Queen property in British Columbia. The Vancouver-based junior said that its drilling has confirmed the extension of the NG-3 vein to over 300 metres of strike, and up to 240 metres below surface. Highlights from the latest batch of results include a 1.5 metre interval grading 14.5 grams per ton (g/t) gold equivalent or 1,089 g/t silver equivalent within a 3.7 metre interval averaging 6.3 g/t gold equivalent or 472 g/t silver equivalent. Boosh Plant-Based Brands Inc (CSE:VEGI, OTC:VGGIF) said its recently-acquired Beanfields brand has been awarded two stock-keeping units (SKUs) across 250 stores by the Northern California Division of Safeway for its Nacho and Black Bean Sea Salt. HEB grocery stores has also awarded an additional SKU for Beanfields' Black Bean Sea Salt, giving it three SKUs at the chain. Beanfields will be sold in approximately 200 of the 300 HEB stores throughout the US, Boosh added. Additionally, Boosh said it is launching its shelf-stable Mac & Cheese nationally with UNFI, one of North America's largest food brokers, and has completed completes a seamless launch into Save On Foods with reorders already in place. Boosh also announced that it has retained Marsham International to represent Boosh products in Canada. Nevada Silver Corporation (TSX-V:NSC) revealed that ithas commenced the first exploration in more than 100 years at Belmont silver camp in Nevada having seen potential in thehistoric mining site which once dominated Nye County's silver production. The junior companycontrols patented and unpatented claims covering numerous historic silver mines located near the town of Belmont, including the majority of older silver mine workings at the Belmont silver camp. 'Belmont is among the earliest and richest silver mining camps in the Tonapah district and had an estimated average silver ore head grade of 25 ounces per tonne of silver,' Nevada Silver said in a statement. PlantX Life Inc. (CSE:VEGA) has announced the expansion of its multi-brand pop-up retail initiative at its brick-and-mortar location in Venice Beach, California. The Vancouver, British Columbia-based company said the launch of the pop-up initiative was inspired by the success of pilot pop-up initiatives, which promoted the company's partner brands Matthew Kenney Cuisine Global LLC (MKC) and BESTIES Vegan Paradise. The pop-up initiative aims to support both new and established plant-based brands by offering PlantX's brick-and-mortar retail space in Venice Beach as a pop-up installation space designed to promote selected brands' popularity and growth and empower the plant-based community, noted the company. The pop-up initiative demonstrates the company's leadership in the plant-based space by expanding and diversifying its partnerships with impactful plant-based brands, it added. Minto Metals Corp (TSX-V:MNTO) has released updated drill results from its Minto mine property in Yukon, Canada, which show promising potential for the company to expand the copper resource. Highlights from the results include an intercept of 1.34% of copper over 25.97 metres, including 2.72% copper over 9.32 metres, according to Minto. Another drill hole revealed 3.83% copper over 2.05 metres and 0.79% copper over 15.10 metres, including 2.71% over 3.58 metres. Marble Financial Inc. (CSE:MRBL, OTC:MRBLF) said it has entered into a binding Letter of Intent (LOI) to acquire eBunch ***Data*** and Development Ltdfor $550,000 in cash and shares.eBunch is an innovative Canadian digital marketing firm that specializes in generating more qualified leads per dollar spent for retailers, with a focus on the automotive sector. The company has developed proprietary intellectual property (IP) and artificial intelligence (AI) driven technology to help internal marketing teams reach their ideal and opportunistic audience with targeted digital ads across all platforms and industries."This acquisition allows Marble to exponentially expand its reach and partnerships. With access to a broad range of industries, we will be able take on new markets that were previously inaccessible," said Doug Tanner, Marble's vice presidentof business development said in a statement. CleanSpark Inc (NASDAQ:CLSK) has announced that it is now a partner ofSustainable Bitcoin Standard(SBS), an organization that incentivizes clean bitcoin mining. The Nevada-based bitcoin mining and energy technology company said SBS provides miners and investors with transparent and verifiable 'Proof of Sustainable Mining' certificates. 'CleanSpark has been focused on using clean energy since day one. In fact, this focus pre-dates our bitcoin mining operations,' CleanSpark executive chairman Matt Schultz said in a statement. Gold Resource Corporation (NYSE-A:GORO, ETR:GIH) said it has declared its quarterly dividend of $0.01 per common share for the second quarter of 2022 payable on June 30, 2022, to shareholders of record as of June 15, 2022. The company noted that dividends may vary in amount and consistency or be discontinued at the board of directors' discretion depending on ***variables*** including but not limited to operational cash flows, company development requirements and strategies, construction, spot gold and silver prices, taxation, general market conditions and other factors described in the company's public filings with the US Securities and Exchange Commission. Gold Resource Corporation (NYSE-A:GORO, ETR:GIH) also said it will issue a news release providing a summary of its financial and operating results and file its Form 10-Q with the financial and operating results on EDGAR for the period ended March 31, 2022, on Monday, May 9, 2022, after the market closes. The company will host a conference call on Tuesday, May 10, 2022, at 11:00 a.m. Eastern Time. The conference call will be recorded and posted to the company's website later in the day following the conclusion of the call. Following prepared remarks, Allen Palmiere, the company's president and chief executive officer, Alberto Reyes, chief operating officer and Kim Perry, chief financial officer will host a live question and answer (Q&A) session. To join the conference via webcast, please click on the following link: [*https://app.webinar.net/DG5l9rQ3r7X*](https://app.webinar.net/DG5l9rQ3r7X). To join the call via telephone, please use the following dial-in details: Participant Toll Free: (888) 440-2094; International: (438) 803-0544; Conference ID: 2818458 GR Silver Mining (TSX-V:GRSL) has released wide and high-grade silver results from its surface infill drilling program at the Plomosas project in Mexico's Sinaloa state that suggest the potential to significantly increase grade in some areas of the resource model - and improve the average silver grades for its next resource estimation. The company said the infill drilling program initially focused on unmined areas close to surface when it began in December 2021 and is now progressing with a focus on underground infill drilling with three drill rigs. "From the time of the release of the technical report for the Plomosas project in October 2021, it was clear that new infill drilling could offer the opportunity to improve the grade of the mineral resource estimate by addressing unsampled or under-sampled areas in the block model,' the company's chairman and CEO Eric Zaunscherb said in a statement. 'In addition to the expansion of mineralization to depth and along strike at San Marcial, it is GR Silver's priority to address the questions about grade at the Plomosas Mine. CULT Food Science said it has made a strategic investment into Unicorn Biotechnologies Limited, a biotech company developing a cell manufacturing system aiming to produce cheaper and more efficient animal cell products. Cambridge, UK-based UBL's fit-for-purpose, high-density adherent cell manufacturing system improves process development timelines by 90%, achieves a 10-fold cost reduction and lowers the labour component by 75% through automated workflows as compared to current processes, the company said. 'CULT is excited to add its investment in UBL to its cellular ***agriculture*** ecosystem. We are keenly interested in the growth trajectory of UBL based on the early prospects of its potentially game-changing new bioreactor solution,' Lejjy Gafour, chief executive officer of CULT said in a statement. Cabral Gold Inc (TSX-V:CBR)has told investors that the latest drill results from its Cuiú Cuiú project suggest the presence of another primary gold deposit at the property in Brazil. The assays come from nine diamond-drill holes, which tested the new hard-rock discovery beneath the gold-in-oxide blanket at the PDM target. Highlight results include an intercept of eight metres (m) grading 6.7 grams per ton (g/t) gold from a depth of 114m in one hole, which included a length of 2m at a grade of 23.2 g/t of the yellow metal. Wellbeing Digital Sciences (NEO:MEDI.AQN, OTCQB:KONEF) said its subsidiary, IRP Health Ltd, has been approved as part of the coveted Chronic Pain Centre of Excellence for Canadian veterans (CPCoE). It also announced that IRP Health's clinic in Ottawa, Ontario has been approved by Veterans Affair Canada (VAC) for its multi-disciplinary reactivation-branded therapy program. After meeting strict criteria, IRP Health's four Canadian locations will now be listed and recommended as part of the national network of clinics. The clinics will contribute towards the national ***collection*** of ***data*** to help further research and innovation with respect to the treatment of military veterans. "Being recognised by Canada's leader in chronic pain research and services for military veterans is both a privilege and an honour,' Steven Inglefield, CEO of IRP Health and COO of Wellbeing said in a statement. PowerTap Hydrogen Capital Corp. (NEO:MOVE.AQN, OTC:MOTNF) hassaid zoning applicationfor its first Andretti station located in Fortuna in Humboldt County, California is moving forward, with the initial public hearing scheduled for May 2022. The company said in an update of the zoning approval process that the Powertap team is gearing up for full participation in the hearing following some delays due to COVID-19 constraints. Powertap expects construction of the station, which incorporates a Powertap Gen3 modular blue hydrogen production and dispensing unit (MHPDU), to follow soon after permits are granted in Q3/Q4 2022. Kodiak Copper Corp. (TSX-V:KDK) has announced the mobilization of a second drill rig to its 100%-owned MPD copper-gold porphyry project in Southern British Columbia, where the company is executing a fully funded drill program of up to 25,000 metres (m) in 2022. The company said drilling so far this year has focused on the Gate Zone where it made a high-grade copper-gold discovery. The Gate Zone remains open in multiple directions and it has identified high-priority drill targets for potential extensions of mineralization which are now being systematically drilled. 'We believe there is significant potential to further extend the Gate Zone and this has been the focus of our drill program in the first months of this year,' president and CEO Claudia Tornquist said in a statement. 'We are now looking forward to accelerating the program with a second drill rig to start testing additional targets, which have equally as much discovery potential as Gate.' Burcon NutraScience Corp (TSX:BU, NASDAQ:BRCN)hassaid it expects its joint venture partner Merit Functional Foods Corporation to secure sales contracts with leading food and beverage customers that will 'reap long term benefits' for the company. Burcon, a global technology company involved in the development of plant-based proteins for food and beverages, is a joint venture partner and licensor of Merit's pea and canola technologies. In an update to shareholders, Vancouver-based Burcon said that Merit has fulfilled new and repeat purchase orders from consumer packaged goods (CPG) companies looking to incorporate Merit's best-in-class pea and canola protein ingredients into food and beverage products. Skye Bioscience inc (OTCQB:SKYE) said it has hired experienced Australian clinical trial operator CMAX to run its phase 1 study of lead candidate SBI-100 OE to treat glaucoma in Adelaide with final ***data*** expected in the fourth quarter this year. CMAX will conduct Skye's first-in-human single ascending dose (SAD) and multiple ascending dose (MAD) phase 1 study in healthy volunteers, evaluating safety and pharmacokinetics of SBI-100 OE under good clinical practice (GCP). "CMAX, along with our principal investigator, Professor Shakib, are highly capable with decades of experience in conducting first-in-human clinical trials," said Tu Diep, the chief development officer of Skye, in a statement. Canada Rare Earth Corp (TSX-V:LL) revealed that it has forged an agreement in principle on April 24, 2022, to purchase an existing rare earth refinery situated in South East Asia. Canada Rare Earth COO Peter Shearing said the refinery is based on technology and processes already deployed and in production at a dozen other rare earth processing plants and can produce approximately 3,000 metric tonnes, or 3 million kilograms (kg) of the complete spectrum of rare earth oxides. 'The capability to produce high-profile neodymium (Nd), praseodymium (Pr), dysprosium (Dy) and terbium (Tb) oxides is of critical importance to the rapidly developing and growing electrification and electric vehicle (EV) market sectors. These valuable elements are trading at strong price levels and demand is not fully satisfied by current output levels of existing facilities,' noted Shearing. 'For example, Nd and Pr are currently selling for approximately US$135 per kg and Dy and Tb for US$397 and US$2,200 per kg respectively, according to Baiinfo.' Minto Metals Corp (TSX-V:MNTO)has released updated drill results from its Minto mine property in Yukon, Canada, which show promising potential for the company to expand the copper resource. Highlights from the results include an intercept of 1.34% of copper over 25.97 metres, including 2.72% copper over 9.32 metres, according to Minto. Another drill hole revealed 3.83% copper over 2.05 metres and 0.79% copper over 15.10 metres, including 2.71% over 3.58 metres. Aurelius Minerals Inc (TSX-V:AUL, OTCQB:AURQF) has announced results from an underground channel sampling program at its flagship Aureus East project in Nova Scotia, which included 168.0 grams per tonne (g/t) gold over 1.5 metres (m). The gold exploration company said significant gold mineralization was identified in each of the three areas of channel sampling, with 11 of 23 channels producing samples grading over 30 g/t gold. Trust Stamp (NASDAQ:IDAI, EURONEXT:AIID) has announced the launch of its first-of-a-kind Biometric Multi-Factor Authentication (Biometric MFATM) solution. Built on the tech group's advanced biometric tokenization, Biometric MFATM is spoof-resistant, verifies liveness, and replaces or supplements vulnerable one-time passcodes (OTP). "Device-based multi-factor authentication is vulnerable,' said Kinny Chan, Trust Stamp (NASDAQ:IDAI, EURONEXT:AIID)'s chief commercial officer (COO) in a statement. Therma Bright Inc (TSX-V:THRM, OTC:TBRIF) has announced that the initial order of its updated Venowave product has been shipped to its US distributor, DME Authority, LLC, from its Chinese contract manufacturer, despite the challenges of material and component shortages, logistics and shipping delays and lockdowns in various parts of China. The company reminded investors that the initial order consists of 2,500 units, each consisting of two Venowave devices, of which 500 units have been shipped by air, with the balance being shipped by sea. "It has been a frustrating process with all of the shortages and delays, but we are now poised to increase production and availability of the product as demand grows,' the company's CEO Rob Fia said in a statement. 'We are excited to be able to deliver products to customers in the US who have been patiently waiting for this potential life saving technology." Nextech AR Solutions Corp. (CSE:NTAR, OTCQB:NEXCF, NEO:NTAR) said major auto parts distributor, Genuine Parts Companyhas signed up for its ARitize 3D technology, expanding the company's offering into auto parts which provides a substantial revenue opportunity. 'This 3D modeling contract for the auto parts industry is a big win as we are always competing with other 3D solutions providers on businesses when it comes to a big brand,' Nextech CEO Evan Gappleberg said in a statement. 'This is just the start of what we believe is a long-term relationship. Being able to provide scalable 3D/AR solutions for this trillion dollar industry at what we believe is the lowest cost and highest quality, the most scalable solution sets the stage for tremendous upside in this category," he added. American Manganese Inc. (TSX-V:AMY, OTCQB:AMYZF) said it has been selected as 1 of 15 finalists, among more than 120 companies, to meet with decision-makers of different business lines at Evonik Industries AG, a leading specialty chemicals company. American Manganese will be presenting its patented lithium-ion battery recycling technology, RecycLiCo, at the upcoming Evonik Battery Solutions Day hosted by the Massachusetts Institute of Technology (MIT). Evonik, in collaboration with Blumorpho, is exploring potential collaboration and investment opportunities with organizations that demonstrate a high level of differentiation and strong value proposition across multiple battery solutions. Evonik is facilitating round table meetings on business discussions that will take place at MIT on May 4and 5, 2022. "We are proud to be selected as 1 of 15 finalists focused on battery solutions, and we are told that American Manganese's application has raised high interest from multiple teams within Evonik," said Larry Reaugh, president and CEO of American Manganese in a statement. SPYR (OTCQB:SPYR), doing business as SPYR Technologies, told investors that its subsidiary Applied Magix Inc is investigating possible acquisition targets to add essential intellectual property (IP) to its line of products, as well as new product lines. The Texas-based technology group explained that Applied Magix develops and resells Apple ecosystem compatible products in the growing multibillion-dollar smart home and connected car markets. "I'm always looking for new and innovative technologies, and as a result, have come across several potentially awesome IP targets that might be worth acquiring," Applied Magix CEO Harald Zink said in a statement. "Some of these are AI-based and would complement and expand some of our existing product lines really well. Others represent some significantly innovative technologies that could be at the core of new product lines." Real Luck Group Ltd (TSX-V:LUCK, OTCQB:LUKEF), which along with its subsidiaries conducts business as Luckbox,has publishedfull-year results, which showed that the company had cash balances of $14.4 million on December 31, 2021.With no debt, the company is 'in a strong position to deliver on our growth goals in 2022 and beyond', said CEOThomas Rosanderin a statement.Luckbox is a wagering platform built for a new generation of players, offering betting on esports, sports and casino games."During fiscal 2021, our team worked to enhance and extend both our proprietary platform and infrastructure, positioning us to launch our player acquisition efforts in 2022,' the CEO said in a statement. American Resources Corporation (NASDAQ:AREC)said it has secured the exclusive worldwide rights for a new provisional patent filed by the company's technology and research partner, Purdue University, for the isolation and purification of battery-grade materials using multi-mode chromatography for all feedstocks. The provisional patent was filed on March 25, 2022, by the Purdue Research Foundation to establish and protect the company's"versatile multi-dimension and multi-mode chromatography methods for producing high-purity lithium, cobalt, nickel, and manganese salts with high yields from all feedstocks including end-of-life batteries," the company said. "This particular patent further enhances our ability to be the lowest cost provider for the final stage of producing isolated and purified, battery-grade materials that can be used to manufacture new lithium-ion batteries,'Mark LaVerghetta, the company's head of Corporate Finance and Communicationssaid in a statement. PyroGenesis Canada Inc. (TSX:PYR) has confirmed that the company's Drosrite dross recovery technology has again been successfully commissioned, this time at an existing North American automobile parts manufacturer client. The Montreal-based provider of advanced plasma technologies said site acceptance testing (SAT) has also been completed at the client, who it didn't name due to confidentiality reasons.PyroGenesis explained that the system, which was part of a two-system order, was originally intended for delivery to an Asian client and was subsequently fully paid for. Due to significant delays in the client's ability to expand their facility, PyroGenesis sold the two units to an existing client who assumed the contract. The contract was for two Drosrite systems, each with a capacity of 5,000 tons/year. Both systems were completed and delivered to the client's facility, it added. AEX Gold Inc (AIM:AEXG, TSX-V:AEX) has announced the appointment of Liane Kelly as Senior Independent Director with immediate effect. An exploration geophysicist by background, Kelly was appointed as an Independent Director in August 2021 and has brought a wealth of ESG experience to the Board. Liane, who has considerable experience in the mining sector, has enjoyed a successful career advising companies on sustainability and CSR initiatives in recent years. In particular, Liane specialises in advising companies on community engagement and social impact, both of which are vital for AEX as the corporation continues to build on its strong engagement with its. Greenlandic stakeholders. Graham Stewart, the chair of AEX, commented: "Liane's appointment as Senior Independent Director represents another clear step in making sure AEX has the right systems of corporate governance in place, which will support the future of the Corporation through good decision making". AEX also announced that it has granted 73,333 on-hire stock option awards to an employee under its Stock Option Plan. The options have an exercise price of C$0.75 per share, vested immediately on the date of grant, and will expire if they remain unexercised five years from the date of the award. Delta 9 Cannabis Inc. (TSX:DN)said it has completed a private placement of 2,038,217 common shares of the company, for a deemed price of 31.4 cents per common share, to Oak Hill Financial Inc, in satisfaction of a success fee payable to Oak Hill under an advisory services agreement dated October 27, 2021, between Oak Hill and the company in connection with the closing of the company's new credit facilities with Connect First Credit Union Ltd on March 31, 2022. The final closing of the offering remains subject to the approval of the Toronto Stock Exchange. Newrange Gold Corp. (TSX-V:NRG, OTCQB:NRGOF) said the TSX Venture Exchange has accepted for filing documentation with respect to a non-brokered private placement announced on February 24, 2022, March 14, 2022, and April 20, 2022, which will see the issue of 2,002,356 flow-through shares and 7.27 million non-flow-through shares both with a purchase price of 8.5 cents each, together with 4,636,178 share purchase warrants with an exercise price of 12 cents for a two-year period with 20 placees. Southern Energy Corp (TSX-V:SOU, AIM:SOUC, OTC:MAXMD) said it has issued 125,000 new common shares in the company to satisfy an exercise of warrants at an exercise price of C$0.32 per common share. In addition, the company has issued 1,250 new common shares to satisfy the Convertible Debenture ***conversion*** rights at a price of C$0.80 per common share. Arrow Exploration Corp (TSX-V:AXL, AIM:AXL, OTC:CSTPF) said it has appointed Canaccord Genuity Limited as its new Nominated Adviser and Joint Broker for AIM with immediate effect, following the announcements by Arden Partners in April 2022, regarding the loss of its nominated adviser status upon the completion of its recommended takeover. The appointment is subject to initial due diligence being undertaken. Canaccord Genuity has until 5.00pm on 27 July 2022, to complete its full due diligence. ARMM (OTCQB:ARMM) said it has retained Hayden IR, LLC to provide investor relations services to the company. HIR will assist ARMM with its overall investor relations strategy and broaden the awareness of ARMM within the investor and financial community. Mark Lawson, founder and CEO of ARMM commented: 'The addition of Hayden IR adds another strategic component to ARMM's evolution as we continue to expand our team of professionals. We look forward to working with Brett and his team which we believe will add additional expertise, outreach, and exposure for ARMM.' The ARMM platform, includes an app that is available to download for no cost from the Apple App Store and Google Play. Brett Maas, managing partner at Hayden IR added: 'We are very excited to introduce ARMM to our extensive network of investment professionals. We look forward to working with the team at ARMM as they broaden their reach into the $51 Billion consumer firearms and rugged outdoor recreational market, with a safety, training and educational focused platform that encompasses a growing and expansive set of products and services for outdoor enthusiasts.' Los Andes Copper Ltd (TSX-V:LA) said it has been advised that RCF VI CAD LLC has entered into a definitive agreement to sell the 2% NSR royalty on the company's Vizcachitas Copper Project owned by RCF under certain Royalty Purchase Agreement dated May 27, 2020. If the proposed sale is consummated, then RCF will owe the company a contingent purchase price payment of US$5,000,000 under the terms of the Royalty Purchase Agreement. R. Michael Jones, CEO of Los Andes, said: "We are very pleased to see the proposed sale by RCF to a company planning to complete a direct listing on the TSX-V in the near future. The Royalty Sale and future listing of a new base metal royalty company mark the growing recognition of our copper asset as a rare world-class copper deposit at a time of growing interest in copper globally." ACME Lithium Inc. (CSE:ACME, OTCQB:ACLHF) has announced that its president and CEO Steve Hanson will be meeting and presenting to investors at Mines and Money Connect London on May 4 and 5, 2022. Hanson will be presenting an overview of ACME's projects in the United States and Canada. The company also announced commencing May 1, 2022, the engagement of Red Cloud Securities Inc and Red Cloud Financial Services Inc to provide ACME with capital markets advisory and marketing services to potential retail investment advisors, institutional investors, fund managers, high net worth individuals, as well as potential strategic corporate investors. Under the engagement, Red Cloud will be paid a fee of C$10,000 per month for the services it will render for a 12-month period, and the arrangement can renew month-to-month thereafter at ACME's option. ACME has, subject to regulatory approval, granted Red Cloud stock options to purchase 225,000 common shares at an exercise price of $1.30 per share for a period of three years. Red Cloud does not have, either directly or indirectly, an interest in ACME or its securities, and does not have a right to acquire any such interest other than the options. Red Cloud has no other relationship with ACME other than as set out in the engagement letter. Valeo Pharma Inc. (TSX:VPH, OTCQB:VPHIF) has announced the results of the proposals submitted to shareholders at its annual meeting of shareholders held on April 27, 2022. Among other resolutions, Valeo shareholders overwhelmingly voted to re-elect the company's directors and, in addition, the board has announced the appointment of Marc Leger as director of the company. "I am pleased to welcome Marc to our Board of Directors. Marc had a long career as a senior executive in the Canadian pharmaceutical industry including 12 years with Valeo, the last three as Senior Vice-President and Chief Commercial Officer", said Steve Saviuk, Valeo's chief executive officer. "We look forward to benefiting from his strategic insight and guidance as Valeo continues to pursue its ambitious growth objectives". Leger is a seasoned pharmaceutical executive with pan-Canadian and US experience in both the prescription pharmaceutical and consumer healthcare businesses. He has extensive experience in building and leading organizations and has an excellent track record of developing best-in-class brands. In February 2009, Leger joined Valeo Pharma, leading the Commercial Operations where he was directly involved with the development of both the dermatology and specialty products businesses, which were in part sold to Valeant Pharmaceuticals Inc. (now Bausch Health) in 2014. Prior to his retirement from Valeo in 2021, Leger was acting as Senior VP and Chief Commercial Officer for Valeo. The company also announced that it has granted an aggregate of 175,926 restricted share units (RSUs), vesting one year from grant and 387,500 stock options to certain officers, directors and management team members of the company in accordance with its incentive compensation plan. The options will be exercisable at an exercise price of $0.66 per Class A common share of the company until April 27, 2027, and will vest annually from 1 to 3 years. BioPorto (NASDAQ COPENHAG:BIOPOR) said it has held its Annual General Meeting which was conducted in English without simultaneous interpretation into Danish. Subsequently, the report on the company's activities was noted and the 2021 Annual Report was adopted, including the proposed allocation of the results. Discharge of liability was granted to the Board of Directors and the Executive Management, and the 2021 Remuneration Report was approved by advisory vote. The remuneration for the Board of Directors for the financial year 2022 and a related amendment to the Remuneration Policy was also approved. Christopher Lindop, John McDonough, Jan Leth Christensen, Peter Mørch Eriksen, Dr. Michael S. Singer and Don M. Hardison were re-elected as members of the Board of Directors. The proposals from the Board of Directors under item 9 of the agenda were all adopted and included: a) Renewal of the authorisation to increase the share capital, subject to a limit of DKK 125,000,000 for pre-emptive issues and a limit of DKK 37,500,000 for issues without pre-emptive rights with the option of an additional DKK 87,500,000 for offerings where the new shares are admitted to trading on a stock exchange, etc. other than Nasdaq Copenhagen, b) Authorisation to hold general meetings as either partly or fully electronic general meetings, c) Authorisation for general meetings to be conducted in English, d) Inclusion of the name of the Company's keeper of the register of shareholders in the Articles of Association, and e) Authorisation to the Chairman of the general meeting. PricewaterhouseCoopers Statsautoriseret Revisionspartnerselskab was re-elected as the company's auditor. Immediately following the Annual General Meeting, the Board of Directors elected Christopher Lindop as Chairman and John McDonough as Vice Chairman. Phunware Inc (NASDAQ:PHUN)has said it will hold a conference call on Thursday, May 12, 2022, at 4.30pm Eastern time (1.30pm Pacific time) to discuss its financial results for the first quarter ended March 31, 2022. Financial results will be issued in a press release prior to the call. Dial-in details: US 877-545-0523; International 973-528-0016; Access Code: 588640. The conference call will be broadcast live and available for replay here and via the investor relations section of the company's website at investors.phunware.com. A telephonic replay of the conference call will be available after 8.00pm Eastern time on the same day through May 26, 2022. Toll-free replay number: 877-481-4010; International replay number: 919-882-2331; Replay ID: 45314 Co-Diagnostics (NASDAQ:CODX) has said it will release its first-quarter 2022 results on Thursday, May 12, 2022, after the market close. The company will also host a conference call and webcast on the same day at 4.30pm EDT to discuss its financial results with analysts and institutional investors. Management on the call will include Dwight Egan, CEO, Brian Brown, CFO, and Andrew Benson, Head of Investor Relations. The call and webcast will be available via: ir.codiagnostics.com on the Events & Webcasts page; Conference Call: 877-317-6789 (domestic) or 412-317-6789 (international). For those unable to participate during the live webcast, the call will be recorded and later made available on the company's website. Harbor Custom Development Inc. (NASDAQ:HCDI) has said it will host a live conference call on Thursday, May 12, 2022, at 9.30am. PT (12.30pm ET) to elaborate on the first quarter 2022 financial results and the company's outlook. The public may access the conference call through a live audio webcast available at [*https://investors.harborcustomhomes.com/events*](https://investors.harborcustomhomes.com/events). Harbor will be answering questions live during the webcast. For those who would like to submit written questions in advance, they may do so by emailing: [*ir@harborcustomdev.com*](mailto:ir@harborcustomdev.com) . The conference call will be available by telephone at 1-877-407-0789 (for international callers, dial 1-201-689-8562), conference ID: 13729493. A replay of the conference call will be available for two weeks at 1-844-512-2921 (for international callers, dial 1-412-317-6671) using the replay PIN: 13729493. Harbor will issue its first quarter 2022 earnings presentation prior to the call on the morning of Thursday, May 12, 2022, in the Investor Relations section of the Harbor website at [*https://harborcustomhomes.com*](https://harborcustomhomes.com). The Valens Company (TSX:VLNS, OTCQX:VLNCF) has announced that Tyler Robson, its chief executive officer and chair will participate in the AGP Spring Consumer Cannabis Conference being held on May 3, 2022. Robson is scheduled to join Aaron Gray, managing director Equity Research for AGP, in a panel to discuss "State of the Canadian Cannabis Market" on Tuesday, May 3, 2022, at 10.00am ET. Investors are encouraged to register for the event via the following registration link:[*https://bit.ly/38wau72*](https://bit.ly/38wau72) OTC Markets Group Inc. (OTCQX:OTCM), the operator of regulated markets for 12,000 US and international securities, has announced that MiniLuxe Holding Corp, a digital-first, socially-responsible lifestyle brand and talent empowerment platform for the nail and waxing industry, has qualified to trade on the OTCQX Best Market under the symbol MNLXF. Trading on the OTCQX Market offers companies efficient, cost-effective access to the US capital markets. For companies listed on a qualified international exchange, streamlined market standards enable them to utilize their home market reporting to make their information available in the US. To qualify for OTCQX, companies must meet high financial standards, follow best practice corporate governance, and demonstrate compliance with applicable securities laws. "We are excited by this partnership with OTC Markets Group and the opportunity to expand our reach of prospective investors to the US," said Tony Tjan, chairman and co-founder of MiniLuxe.;

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**End of Document**



[***Federal Register: Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Coastal Distinct Population Segment of the Pacific Marten Pages 58831 - 58858 [FR DOC #2021-22994]***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:63XV-XDC1-JDG9-Y334-00000-00&context=1516831)

Impact News Service

October 25, 2021 Monday

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**Length:** 26545 words

**Body**

Washington: Office of the Federal Register has issued the following notice:DEPARTMENT OF THE INTERIORFish and Wildlife Service50 CFR Part 17[Docket No. FWS-R8-ES-2020-0151; FF09E21000 FXES1111090FEDR 223]RIN 1018-BE33Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Coastal Distinct Population Segment of the Pacific MartenAGENCY: Fish and Wildlife Service, Interior.ACTION: Proposed rule.-----------------------------------------------------------------------SUMMARY: We, the U.S Fish and Wildlife Service (Service), propose critical habitat for the coastal distinct population segment of Pacific marten (coastal marten) (Martes caurina), a mammal species from coastal California and Oregon, under the Endangered Species Act of 1973, as amended (Act). In total, approximately 1,413,305 acres (571,965 hectares) in northwestern California and southwestern Oregon fall within the boundaries of the proposed critical habitat designation. If we finalize this rule as proposed, it would extend the Act's protections to this entity's critical habitat.DATES: We will accept comments received or postmarked on or before December 27, 2021. Comments submitted electronically using the Federal eRulemaking Portal (see ADDRESSES below) must be received by 11:59 p.m Eastern Time on the closing date. We must receive requests for public hearings, in writing, at the address shown in FOR FURTHER INFORMATION CONTACT by December 9, 2021.ADDRESSES: You may submit comments by one of the following methods: (1) Electronically: Go to the Federal eRulemaking Portal: [*http://www.regulations.gov*](http://www.regulations.gov). In the Search box, enter the docket number or RIN for this rulemaking (presented above in the document headings). For best results, do not copy and paste either number; instead, type the docket number or RIN into the Search box using hyphens. Then, click on the Search button. On the resulting page, in the Search panel on the left side of the screen, under the Document Type heading, check the Proposed Rule box to locate this document. You may submit a comment by clicking on ``Comment.'' (2) By hard copy: Submit by U.S mail to: Public Comments Processing, Attn: FWS-R8-ES-2020-0151; U.S Fish and Wildlife Service, MS: PRB/3W, 5275 Leesburg Pike, Falls Church, VA 22041-3803. We request that you send comments only by the methods described above. We will post all comments on [*http://www.regulations.gov*](http://www.regulations.gov). This generally means that we will post any personal information you provide us (see Information Requested, below, for more information). Availability of supporting materials: The coordinates from which the critical habitat maps are generated will be included in the decisional record materials for this rulemaking and are available at [*http://www.regulations.gov*](http://www.regulations.gov) under Docket No. FWS-R8-ES-2020-0151, and at the Arcata Ecological Services Field Office at [*https://www.fws.gov/arcata*](https://www.fws.gov/arcata) (see FOR FURTHER INFORMATION CONTACT). Any additional tools or supporting information that we may develop for this critical habitat designation will also be available at the Service website and field office set out above, and may also be included in the preamble of this rule at [*http://www.regulations.gov.FOR*](http://www.regulations.gov.FOR) FURTHER INFORMATION CONTACT: Jenny Ericson, Acting Field Supervisor, U.S Fish and Wildlife Service, Arcata Ecological Services Field Office, 1655 Heindon Road, Arcata, California 95521, or by telephone 707-822-7201. If you use a telecommunications device for the deaf (TDD), call the Federal Relay Service (FRS) at 800-877-8339.SUPPLEMENTARY INFORMATION:Executive Summary Scope of this rule. The information presented in this proposed rule pertains only to the coastal distinct population segment (DPS) of Pacific marten (coastal marten). Any reference to the ``species'' within this document only applies to the DPS and not to the Pacific marten as a whole unless specifically expressed. A complete description of the DPS and area associated with the DPS is contained in the 12-month finding and the final listing rule for the coastal marten published in the Federal Register (80 FR 18742, April 7, 2015, and 85 FR 63806, October 8, 2020). Why we need to publish a rule. Under the Act, to the maximum extent prudent and determinable, we must designate critical habitat for any species that we determine to be an endangered or threatened species. Designations and revisions of critical habitat can only be completed by issuing a rule. On October 8, 2020, we finalized listing the coastal marten as a threatened species in the Federal Register (85 FR 63806). What this document does. This is a proposed rule to designate critical habitat for the coastal marten in 5 units in the States of Oregon and California totaling approximately 1,413,305 acres (ac) (571,965 hectares (ha)). In this proposed designation, we have identified a total of approximately 76,544 ac (30,975 ha) of private land and 26,126 ac (10,573 ha) of Tribal land that we are considering for exclusion from the final designation (see Consideration of Impacts Under Section 4(b)(2) of the Act). The basis for our action. Section 4(a)(3) of the Act requires the Secretary of the Interior (Secretary) to designate critical habitat concurrent with listing to the maximum extent prudent and determinable. Section 3(5)(A) of the Act defines critical habitat as (i) the specific areas within the geographical area occupied by the species, at the time it is listed, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protections; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination by the Secretary that such areas are essential for the conservation of the species. Section 4(b)(2) of the Act states that the Secretary must make the designation on the basis of the best scientific ***data*** available and after taking into consideration the economic impact, the impact on national security, and any other relevant impacts of specifying any particular area as critical habitat. Draft economic analysis. Section 4(b)(2) of the Act states that the Secretary shall designate critical habitat, and make revisions thereto, on the basis of the best scientific ***data*** available and after taking into consideration the economic impact. In order to consider the economic impacts of critical habitat for the coastal marten, we drafted information pertaining to the potential incremental economic impacts for this proposed critical habitat designation. The information we used in determining the economic impacts of the proposed critical habitat is summarized in this proposed rule (see Consideration of Economic Impacts) and is available at [*http://www.regulations.gov*](http://www.regulations.gov) at Docket No. FWS-R8-ES-2020-0151 and at the Arcata Fish and Wildlife Office at [*http://www.fws.gov/arcata*](http://www.fws.gov/arcata) (see FOR FURTHER INFORMATION CONTACT). We are soliciting public comments on the economic information provided and any other potential economic impact of the proposed designation. We will continue to reevaluate the potential economic[[Page 58832]]impacts between this proposal and our final designation. Peer review. In accordance with our peer review policy published in the Federal Register on July 1, 1994 (59 FR 34270), and our August 22, 2016, memorandum updating and clarifying the role of peer review of listing actions under the Act, we sought the expert opinions of 8 appropriate and independent knowledgeable individuals on our Species Status Assessment (SSA) for the coastal marten (Service 2019a, entire). We received responses from two peer reviewers and two technical reviewers relating to the habitat and habitat needs of coastal marten, which informed the development of this proposed designation. We reviewed the comments we received for substantive issues and new information regarding habitat needs for the coastal marten. The specialists generally concurred with our description of habitat needs for the coastal marten and provided additional information, clarifications, and suggestions to improve the description. We used the SSA and specialists' comments on the SSA to inform our description and selection of areas we are proposing as critical habitat for the coastal marten. The peer and technical reviewers' comments are available at [*http://www.regulations.gov*](http://www.regulations.gov) at Docket No. FWS-R8-ES-2018-0076, which was the docket for the listing rule (85 FR 63806, October 8, 2020). The purpose of peer review is to ensure that our critical habitat designations are based on scientifically sound ***data***, assumptions, and analyses. The peer reviewers have expertise in the biology, habitat, and threats to the species. We will solicit additional peer review of this proposed rule and respond to any peer review comments on the proposed designation in the final rule as appropriate.Information Requested We intend that any final action resulting from this proposed rule will be based on the best scientific and commercial ***data*** available and be as accurate and as effective as possible. Therefore, we request comments or information from other concerned governmental agencies, Native American Tribes, the scientific community, industry, or any other interested parties concerning this proposed rule. We particularly seek comments concerning: (1) The coastal marten's biology and range; habitat requirements for feeding, breeding, and sheltering; and the locations of any additional populations. (2) Specific information on: (a) The amount and distribution of coastal marten habitat; (b) What areas that were occupied at the time of listing and that contain the physical or biological features essential to the conservation of the coastal marten should be included in the designation and why; (c) Special management considerations or protection that may be needed in critical habitat areas we are proposing, including managing for the potential effects of climate change; (d) What areas not occupied at the time of listing are essential for the conservation of the species. We particularly seek comments: (i) Regarding whether occupied areas are adequate for the conservation of the species; and (ii) Providing specific information regarding whether or not unoccupied areas would, with reasonable certainty, contribute to the conservation of the species and contain at least one physical or biological feature essential to the conservation of the species. (e) Land ownership information, including land conservation status or management status. We particularly seek information on Tribal lands. Our spatial ***data*** information did not show any other Tribal lands within proposed critical habitat units beyond the ownership acreages listed below. (3) Land use designations and current or planned activities in the subject areas and their possible impacts on proposed critical habitat. (4) Any probable economic, national security, or other relevant impacts of designating any area that may be included in the final designation, and the related benefits of including or excluding specific areas. (5) Information on the extent to which the description of probable economic impacts in the draft economic analysis is a reasonable estimate of the likely economic impacts. (6) Whether any specific areas we are proposing for critical habitat designation should be considered for exclusion under section 4(b)(2) of the Act, and whether the benefits of potentially excluding any specific area outweigh the benefits of including that area under section 4(b)(2) of the Act. In particular, provide information for areas with management plans or other mechanisms in place that identify measures to protect and conserve the coastal marten or its habitat, such as the areas managed by Green Diamond Resource Company and the Yurok Tribe. (7) If you request exclusion from the designation of critical habitat of any areas under section 4(b)(2) of the Act, the Secretary will consider credible information regarding the existence of a meaningful economic or other relevant impact supporting a benefit of exclusion for that particular area, as provided in 50 CFR 17.90(c)(2)(i). (8) As provided in our regulations, we are to identify in a proposed designation of critical habitat those areas that we are considering for exclusion. In this proposed rule under the section entitled Exclusions, we have indicated that we are considering areas managed by the Green Diamond Resource Company and by the Yurok Tribe for possible exclusion and explain why. Please provide information regarding Green Diamond Resource Company and the Yurok Tribe lands considered for exclusion. (9) Information on the projected and reasonably likely impacts of climate change on the coastal marten's habitat. (10) Whether we could improve or modify our approach to designating critical habitat in any way to provide for greater public participation and understanding, or to better accommodate public concerns and comments. (11) Information relating to species distribution or habitat modeling which is currently underway. Please include sufficient documentation with your submission (such as scientific journal articles or other publications) to allow us to verify any scientific or commercial information you present. Please note that submissions merely stating support for, or opposition to, the action under consideration without providing supporting information, although noted, do not provide substantial information necessary to support our determination, as section 4(b)(2) of the Act directs that critical habitat designations must be made ``on the basis of the best scientific ***data*** available and after taking into consideration the economic impact, the impact on national security, and any other relevant impact.'' You may submit your comments and materials concerning this proposed rule by one of the methods listed in ADDRESSES. We request that you send comments only by the methods described in ADDRESSES. If you submit information via [*http://www.regulations.gov*](http://www.regulations.gov), your entire submission--including any personal identifying information--will be posted on the website. If your submission is made via a hardcopy that includes personal identifying information, you may request at the top of your document that we withhold this information from public review. However, we cannot guarantee that we will be able to do so.[[Page 58833]]We will post all hardcopy submissions on [*http://www.regulations.gov*](http://www.regulations.gov). Comments and materials we receive, as well as supporting documentation we used in preparing this proposed rule, will be available for public inspection on [*http://www.regulations.gov*](http://www.regulations.gov) (see FOR FURTHER INFORMATION CONTACT). Because we will consider all comments and information we receive during the comment period, our final determinations may differ from this proposal. Based on the new information we receive (and any comments on that new information), our final critical habitat designation may not include all areas proposed, may include some additional areas that meet the definition of critical habitat, and may exclude some areas if we find the benefits of exclusion outweigh the benefits of inclusion.Public Hearing Section 4(b)(5) of the Act provides for a public hearing on this proposal, if requested. Requests must be received by the date specified in DATES. Such requests must be sent to the address shown in FOR FURTHER INFORMATION CONTACT. We will schedule a public hearing on this proposal, if requested, and announce the date, time, and place of the hearing, as well as how to obtain reasonable accommodations, in the Federal Register and local newspapers at least 15 days before the hearing. For the immediate future, we will provide these public hearings using webinars that will be announced on the Service's website, in addition to the Federal Register. The use of these virtual public hearings is consistent with our regulation at 50 CFR 424.16(c)(3).Previous Federal Actions On October 9, 2018, we proposed the coastal marten (83 FR 50574) as a threatened species under the Act and published our proposed rule in the Federal Register. On October 8, 2020, we published our final determination in the Federal Register (85 FR 63806), and added the coastal marten as threatened to the List of Endangered and Threatened Wildlife at 50 CFR 17.11(h). All other previous Federal actions are described in the proposed rule to list the coastal marten as a threatened species under the Act (83 FR 50574, October 9, 2018). Please see that document for actions leading to this proposed designation of critical habitat. In the final listing rule published in the Federal Register on October 8, 2020 (85 FR 63806), we erroneously listed the range of the coastal marten in Oregon as ``OR (south-western)'' in the List at 50 CFR 17.11(h). We are now proposing to correct the actual range of the DPS, which includes the entire coastal region of Oregon, and the change would appear in the List of Endangered and Threatened Wildlife as ``OR (western)'' (see Proposed Regulation Promulgation).BackgroundSupporting Documents A species status assessment team prepared a SSA report for the coastal marten (Service 2019a, entire). The SSA team was composed of Service biologists, in consultation with other species experts. The SSA report represents a compilation of the best scientific and commercial ***data*** available concerning the status of the species, including the impacts of past, present, and future factors (both negative and beneficial) affecting the species, as well as habitat needs for the species, which informed this critical habitat proposal. Information regarding peer review of the SSA is in our October 8, 2020, final listing determination (85 FR 63806). We also conducted an economic analysis on the incremental impacts of the proposed critical habitat designation (see Service 2019b, entire; IEc 2020, entire). Although published too late to be included in our final listing determination (85 FR 63806, October 8, 2020), we are aware of research indicating that martens in coastal Oregon are of the Humboldt subspecies (M. c. humboldtensis), as are the martens in coastal northern California, and not the caurina subspecies (M. c. caurina), as previously classified (Schwartz et al. 2020, p. 179). While this research may result in a name change to the subspecific taxon of martens in coastal Oregon, it does not change our listable entity or DPS analysis. In essence, our coastal DPS of the Pacific marten remains valid, but in its entirety is now synonymous with the Humboldt marten subspecies. The change in nomenclature also does not affect our analysis of the status of and threats to the coastal marten, nor our analysis of critical habitat. We evaluated all available ***data***, published and unpublished, for Pacific martens within the coastal DPS. Where information gaps exist, we rely on Pacific marten information from outside the DPS, and occasionally from American martens (Martes americana) elsewhere in North America. We use the general term ``marten'' when speaking about martens in general or applying information gleaned from martens across their range in North America. We reserve the term ``coastal marten'' for when we are referring exclusively to martens within the coastal DPS. We are aware of species distribution modeling that is underway but was not available for inclusion in the analysis for this proposed rule. If this new information becomes available, it will be considered in the final determination of critical habitat.Species Information The marten is a medium-sized carnivore related to weasels (Mustela sp.), minks (Neovison sp.), otters (Lontra sp.), and fishers (Pekania sp.). Martens have brown fur with distinctive coloration on the throat and upper chest that varies from orange to yellow to cream. They have proportionally large and distinctly triangular ears and a bushy long tail. Martens are territorial, and dominant males maintain home ranges that encompass one or more female's home ranges. Martens have a generalist diet dominated by small mammals, but birds, insects, and fruits are also seasonally important. Martens across North America generally select older forest stands that are structurally complex (e.g , late-successional, old-growth, large-conifer, mature, late-seral). These forests generally have a mixture of old and large trees, multiple canopy layers, snags and other decay elements, dense understory, and have a biologically complex structure and composition. A thorough review and assessment of the taxonomy, life history, and ecology, including limiting factors and species resource needs of the coastal marten is presented in the SSA report (Service 2019a, entire) (available at [*https://www.fws.gov/arcata*](https://www.fws.gov/arcata)/ and at [*http://www.regulations.gov*](http://www.regulations.gov) under Docket No. FWS-R8-ES-2018-0076).Critical Habitat Critical habitat is defined in section 3 of the Act as: (1) The specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (a) Essential to the conservation of the species, and (b) Which may require special management considerations or protection; and (2) Specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. Our regulations at 50 CFR 424.02 define the geographical area occupied by the species as: An area that may generally be delineated around species' occurrences, as determined by the[[Page 58834]]Secretary (i.e , range). Such areas may include those areas used throughout all or part of the species' life cycle, even if not used on a regular basis (e.g , migratory corridors, seasonal habitats, and habitats used periodically, but not solely by vagrant individuals). Conservation, as defined under section 3 of the Act, means to use and the use of all methods and procedures that are necessary to bring an endangered or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and translocation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking. Critical habitat receives protection under section 7 of the Act through the requirement that Federal agencies ensure, in consultation with the Service, that any action they authorize, fund, or carry out is not likely to result in the destruction or adverse modification of critical habitat. The designation of critical habitat does not affect land ownership or establish a refuge, wilderness, reserve, preserve, or other conservation area. Designation also does not allow the government or public to access private lands, nor does designation require implementation of restoration, recovery, or enhancement measures by non-Federal landowners. Where a landowner requests Federal agency funding or authorization for an action that may affect a listed species or critical habitat, the Federal agency would be required to consult with the Service under section 7(a)(2) of the Act. However, even if the Service were to conclude that the proposed activity would result in destruction or adverse modification of the critical habitat, the Federal action agency and the landowner are not required to abandon the proposed activity, or to restore or recover the species; instead, they must implement ``reasonable and prudent alternatives'' to avoid destruction or adverse modification of critical habitat. Under the first prong of the Act's definition of critical habitat, areas within the geographical area occupied by the species at the time it was listed are included in a critical habitat designation if they contain physical or biological features: (1) Which are essential to the conservation of the species and (2) which may require special management considerations or protection. For these areas, critical habitat designations identify, to the extent known using the best scientific and commercial ***data*** available, those physical or biological features that are essential to the conservation of the species (such as space, food, cover, and protected habitat). In identifying those physical or biological features that occur in specific occupied areas, we focus on the specific features that are essential to support the life-history needs of the species, including but not limited to, water characteristics, soil type, geological features, prey, vegetation, symbiotic species, or other features. A feature may be a single habitat characteristic, or a more complex combination of habitat characteristics. Features may include habitat characteristics that support ephemeral or dynamic habitat conditions. Features may also be expressed in terms relating to principles of conservation biology, such as patch size, distribution distances, and connectivity. Under the second prong of the Act's definition of critical habitat, we can designate critical habitat in areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. When designating critical habitat, the Secretary will first evaluate areas occupied by the species. The Secretary will only consider unoccupied areas to be essential where a critical habitat designation limited to geographical areas occupied by the species would be inadequate to ensure the conservation of the species. In addition, for an unoccupied area to be considered essential, the Secretary must determine that there is a reasonable certainty both that the area will contribute to the conservation of the species and that the area contains one or more of those physical or biological features essential to the conservation of the species. Section 4 of the Act requires that we designate critical habitat on the basis of the best scientific ***data*** available. Further, our Policy on Information Standards Under the Endangered Species Act (published in the Federal Register on July 1, 1994 (59 FR 34271)), the Information Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Pub. L. 106-554; H.R 5658)), and our associated Information Quality Guidelines, provide criteria, establish procedures, and provide guidance to ensure that our decisions are based on the best scientific ***data*** available. They require our biologists, to the extent consistent with the Act and with the use of the best scientific ***data*** available, to use primary and original sources of information as the basis for recommendations to designate critical habitat. When we are determining which areas should be designated as critical habitat, our primary source of information is generally the information from the SSA report and information developed during the listing process for the species. Additional information sources may include any generalized conservation strategy, criteria, or outline that may have been developed for the species, the recovery plan for the species, articles in peer-reviewed journals, conservation plans developed by States and counties, scientific status surveys and studies, biological assessments, other unpublished materials, or experts' opinions or personal knowledge. Habitat is dynamic, and species may move from one area to another over time. We recognize that critical habitat designated at a particular point in time may not include all of the habitat areas that we may later determine are necessary for the recovery of the species. For these reasons, a critical habitat designation does not signal that habitat outside the designated area is unimportant or may not be needed for recovery of the species. Areas that are important to the conservation of the species, both inside and outside the critical habitat designation, will continue to be subject to: (1) Conservation actions implemented under section 7(a)(1) of the Act, (2) regulatory protections afforded by the requirement in section 7(a)(2) of the Act for Federal agencies to ensure their actions are not likely to jeopardize the continued existence of any endangered or threatened species, and (3) the prohibitions found in section 9 of the Act. Federally funded or permitted projects affecting listed species outside their designated critical habitat areas may still result in jeopardy findings in some cases. These protections and conservation tools will continue to contribute to recovery of this species. Similarly, critical habitat designations made on the basis of the best available information at the time of designation will not control the direction and substance of future recovery plans, habitat conservation plans (HCPs), or other species conservation planning efforts if new information available at the time of these planning efforts calls for a different outcome.Prudency Determination Section 4(a)(3) of the Act, as amended, and implementing regulations[[Page 58835]](50 CFR 424.12), require that, to the maximum extent prudent and determinable, the Secretary shall designate critical habitat at the time the species is determined to be an endangered or threatened species. Our regulations (50 CFR 424.12(a)(1)) state that the Secretary may, but is not required to, determine that a designation would not be prudent in the following circumstances: (i) The species is threatened by taking or other human activity and identification of critical habitat can be expected to increase the degree of such threat to the species; (ii) The present or threatened destruction, modification, or curtailment of a species' habitat or range is not a threat to the species, or threats to the species' habitat stem solely from causes that cannot be addressed through management actions resulting from consultations under section 7(a)(2) of the Act; (iii) Areas within the jurisdiction of the United States provide no more than negligible conservation value, if any, for a species occurring primarily outside the jurisdiction of the United States; (iv) No areas meet the definition of critical habitat; or (v) The Secretary otherwise determines that designation of critical habitat would not be prudent based on the best scientific ***data*** available. As discussed in the final listing rule (85 FR 63806, October 8, 2020), there is currently no imminent threat of take attributed to ***collection*** or vandalism identified under Factor B (16 U.S.C 1533(a)(1)(B)) for this species, and identification and mapping of critical habitat is not expected to initiate any such threat. In our SSA and final listing rule for the coastal marten, we determined that the present or threatened destruction, modification, or curtailment of habitat or range is a threat to the coastal marten and that those threats in some way can be addressed by section 7(a)(2) consultation measures. The species occurs wholly in the jurisdiction of the United States, and we are able to identify areas that meet the definition of critical habitat. Therefore, because none of the circumstances enumerated in our regulations at 50 CFR 424.12(a)(1) have been met and because there are no other circumstances the Secretary has identified for which this designation of critical habitat would be not prudent, we have determined that the designation of critical habitat is prudent for the coastal marten.Critical Habitat Determinability Having determined that designation is prudent, under section 4(a)(3) of the Act we must find whether critical habitat for the coastal marten is determinable. Our regulations at 50 CFR 424.12(a)(2) state that critical habitat is not determinable when one or both of the following situations exist: (i) ***Data*** sufficient to perform required analyses are lacking, or (ii) The biological needs of the species are not sufficiently well known to identify any area that meets the definition of ``critical habitat.'' When critical habitat is not determinable, the Act allows the Service an additional year to publish a critical habitat designation (16 U.S.C 1533(b)(6)(C)(ii)). In our proposed listing rule (83 FR 50574, October 9, 2018), we stated that critical habitat was not determinable because the assessment of the economic impacts of the designation were still ongoing and we were in the process of acquiring the complex information needed to perform that assessment. We have now obtained that information and completed an economic analysis of the proposed critical habitat. In addition, we reviewed the available information pertaining to the biological needs of the species and habitat characteristics where these species are located. This and other information represent the best scientific ***data*** available and led us to conclude that the designation of critical habitat is determinable for the coastal marten.Physical or Biological Features Essential to the Conservation of the Species In accordance with section 3(5)(A)(i) of the Act and regulations at 50 CFR 424.12(b), in determining which areas we will designate as critical habitat from within the geographical area occupied by the species at the time of listing, we consider the physical or biological features that are essential to the conservation of the species and that may require special management considerations or protection. The regulations at 50 CFR 424.02 define ``physical or biological features essential to the conservation of the species'' as the features that occur in specific areas and that are essential to support the life-history needs of the species, including, but not limited to, water characteristics, soil type, geological features, sites, prey, vegetation, symbiotic species, or other features. A feature may be a single habitat characteristic or a more complex combination of habitat characteristics. Features may include habitat characteristics that support ephemeral or dynamic habitat conditions. Features may also be expressed in terms relating to principles of conservation biology, such as patch size, distribution distances, and connectivity. For example, physical features essential to the conservation of the species might include gravel of a particular size required for spawning, alkali soil for seed germination, protective cover for migration or predator avoidance, or susceptibility to flooding or fire that maintains necessary early-successional habitat characteristics. Biological features might include prey species, forage grasses, specific kinds or ages of trees for roosting or nesting, symbiotic fungi, or a particular level of nonnative species consistent with conservation needs of the listed species. The features may also be combinations of habitat characteristics and may encompass the relationship between characteristics or the necessary amount of a characteristic essential to support the life history of the species. In considering whether features are essential to the conservation of the species, the Service may consider an appropriate quality, quantity, and spatial and temporal arrangement of habitat characteristics in the context of the life-history needs, condition, and status of the species. These characteristics include but are not limited to space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, or rearing (or development) of offspring; and habitats that are protected from disturbance. Details on habitat characteristics for the Pacific marten can be found in the SSA (Service 2019a, pp. 24-35) and Slauson et al. (2019a, pp. 47-63). We summarize below the more important habitat characteristics, particularly those that support the description of physical and biological features essential to the conservation of the coastal marten DPS. We also describe habitat features relative to the scale at which coastal martens use these features, allowing us to more logically organize the physical and biological features. Greater detail can be found elsewhere (Slauson et al. 2019a, pp. 47-59; Service 2019a, pp. 24-34), but we summarize these scales as follows: At the site scale, coastal martens look for structures and surrounding features that accommodate activities such as denning and resting (see Cover or Shelter). At the stand scale, coastal martens select forest stands with the structural features that[[Page 58836]]provide one or more life-history requirements (e.g , features that support marten prey populations, allow prey to be vulnerable to martens, provide structures for denning and resting, and provide cover). At the home range scale, coastal martens position their home ranges to include enough high-quality habitat to provide for life-history needs (e.g , foraging, reproduction, and cover) and access to mates, while avoiding other coastal martens of the same sex, as well as avoiding competitors and predators. The distribution of suitable habitat at the landscape scale influences coastal marten dispersal, location of coastal marten home ranges, and population density. Coastal marten dispersal across the landscape allows for gene flow and maintains adjacent populations (or metapopulation structure where it exists); dispersing individuals select suitable portions of the landscape that are unoccupied by individuals of the same sex to establish home ranges (Slauson et al. 2019a, p. 48).Space for Individual and Population Growth and for Normal Behavior Coastal martens are solitary animals except during mating and when females are raising young. They establish home ranges in areas that provide enough habitat to support their life-history needs (Table 1), allow access to mates, and avoid individuals of the same sex (Slauson et al. 2019a, pp. 47-48). Coastal marten home ranges typically include a high proportion (greater than or equal to 70 percent) of older forest habitat, and both males and females appear to spend a majority of their time in this habitat (Service 2019, p. 30). The older forest habitats used by coastal martens typically have large amounts of the features necessary for cover, foraging, resting, and denning (see descriptions of specific features under the headings immediately below), such as large trees or snags with decay elements, down wood, and dense ericaceous shrub understories. Table 1--Life History and Resource Needs of the Coastal Marten---------------------------------------------------------------------------------------------------------------- Resources and/or circumstances needed for individuals to Life stage complete each life stage----------------------------------------------------------------------------------------------------------------Kit (birth to dispersal, ~6 months)................. Female provides food, thermal source, and protection from predators. (Markley and Bassett 1942, pp. 606-607). Den sites are enclosed areas to shelter from weather and predators and are most often large diameter trees (live or dead) with cavities, but also include hollow logs, crevices under rocks, log piles, and squirrel nests. (Slauson and Zielinski 2009, p. 40; Thompson et al. 2012, pp. 223-224; Moriarty 2017a, pp. 82- 88).Juvenile and Adults 2+ years........................ Dispersal habitat is an area that supports movement from natal area to a location where home range can be established. (Chapin et al. 1998, pp. 1334-1336; Johnson et al. 2009, p. 3365). Resting sites include cavities, brooms, hollow logs, large limbs, rock crevices, and debris piles and are used to conserve energy and avoid predators. (Taylor and Buskirk 1994, pp. 253-255; Shumacher 1999, pp. 26-58; Slauson and Zielinski 2009, pp. 39-40; 223-224; Thompson et al. 2012, pp. 223-224; Early et al. 2017, entire). Food consists primarily of squirrels and chipmunks, birds, berries and insects seasonally. (Slauson and Zielinski 2017, entire; Slauson and Zielinski 2019, entire; Eriksson et al. 2019, entire). Understory consists of dense shrub layer and decayed wood structures providing prey habitat. Shrub layer also provides protection from predators. (Andruskiw et al. 2008, pp. 2275-2277; Slauson and Zielinski 2009, pp. 39-42; Eriksson 2016, pp. 19-23). Forest canopy cover provides protection from aerial and terrestrial predators. Unfragmented habitat excludes bobcats, the primary predator of coastal marten, which are found in more fragmented landscapes (Slauson and Zielinski 2001, entire; Powell et al. 2003, entire; Linnell et al. 2018, p. 10; Slauson et al., in prep). Home range is habitat that provides an adequate mix of resting and foraging habitat and overlap with opposite sex individuals to provide breeding season encounters. (Ellis 1998 pp. 35-41; Bull and Heater 2001, p. 1; Self and Kerns 2001, p. 5; Slauson 2003, pp. 49-54; Moriarty et al. 2017b, pp. 684-686; Linnell et al. 2018, p. 10; Slauson et al. 2019a, entire).---------------------------------------------------------------------------------------------------------------- Martens occupying shore pine (Pinus contorta spp. contorta) habitat in coastal Oregon have the smallest home ranges recorded in North America, with average sizes of 0.32 square miles (mi\2\) (0.84 square kilometers (km\2\)) and 1.18 mi\2\ (3.06 km\2\) for females and males, respectively (Moriarty et al. 2017b, p. 685). Limited ***data*** from martens in northern California (3 adult males) show home range sizes from 1.2 to 1.5 mi\2\ (3 to 4 km\2\), which is similar to home range sizes of Pacific martens in the Sierra Nevada Range elsewhere in California (Slauson et al. 2019a, p. 56). Dispersal is the means by which marten populations maintain and expand their distribution and population size. Successful dispersal requires functional connections between habitat patches capable of supporting reproduction across the landscape. Hence, individual martens disperse by selecting portions of the landscape that facilitate movement and searching for an area in which to select a home range that does not overlap with same-sex individuals. Where landscapes are heavily disturbed through intensive logging, juvenile dispersal may be especially costly, as evidenced by lower survival and poorer body condition of martens dispersing through regenerating vs uncut landscapes (Johnson et al. 2009, pp. 3364-3366). Little else is known about what constitutes dispersal habitat for martens, but the combination of reduced foraging efficiency and increased predation risk in predominantly clearcut landscapes may strongly influence dispersal dynamics of martens. (Service 2019a, pp. 22, 33, 58).Food, Water, Air, Light, Minerals, or Other Nutritional or Physiological Requirements Martens are dietary generalists. Small mammals dominate their diet year round, with some mammal species varying by season. Birds, insects, and fruits are also seasonally important. Habitat characteristics associated with marten prey are important to provide a food source for martens. Many of the small mammal species that martens prey on reach their highest densities in forest stands with mature and late-successional structural features; in these stands, the food resources used by marten prey species, such as conifer seeds and truffles, are most abundant. In addition, other features associated with increased densities or abundances of marten prey species include increased density and complexity of ericaceous shrub layers, increased amounts of coarse woody debris, and density of large snags. Structural complexity on the forest floor improves predation success for martens. In the shore pine forest community of the central coastal Oregon population, areas with an[[Page 58837]]ericaceous understory had a significantly higher relative abundance of marten prey species, and had a significantly more diverse assemblage of prey species compared to nearby interior forests (Eriksson 2016, p. 16). Many of the bird species found in marten diets are also associated with shrub understories, and these birds feed on the fruits of ericaceous shrub species (Service 2019a, pp. 22-24; Slauson et al. 2019a, pp. 33-36).Cover or Shelter Bobcats (Lynx rufus) and other felids are the primary predators documented for coastal martens (Slauson et al. 2014, p. 2; Slauson et al. 2019a, p. 40). Other large-bodied mammalian (e.g , coyotes (Canis latrans)) and avian (e.g , raptors and owls) predators co-occur with and prey upon martens across North America (Clark et al. 1987, p. 4; Buskirk and Ruggiero 1994, p. 28). Avoiding these predators has shaped marten behavior and likely influences their selection of highly complex forest structure for cover and shelter while avoiding areas lacking overhead or escape cover that are more typically occupied by generalist predators such as bobcats and coyotes (Slauson et al. 2019a, pp. 38-40). Cover and shelter also provide protection from the physical elements and allow martens to maintain their body temperature (thermoregulation). Martens seek out cover and shelter at several scales. At the site scale, they look for structures and surrounding features that accommodate denning and resting. Denning sites are used by females for birthing and raising their kits (see Sites for Breeding, Reproduction, or Rearing (or Development) of Offspring). Resting sites are used by both sexes on a daily basis, and martens seek them out between foraging bouts to provide thermoregulatory benefits and protection from predators (Taylor and Buskirk 1994, p. 255; Slauson et al. 2019a, p. 48). Martens need many resting structures distributed across their home range to meet seasonal changes in thermoregulatory needs. Martens primarily use large-diameter live trees, snags, and down logs, which are typically the largest available structures in the area. Within these structures, martens commonly rest either in cavities, formations caused by forest pathogens such as dwarf mistletoe (Arceuthobium spp.), or on platforms such as broken-top snags or large live branches. Cavities may become more important during the winter when conditions are wetter and colder. Less-frequented but still important resting structures include large slash piles with large-diameter logs, natural rock piles, and shrub clumps (Slauson et al. 2019a, pp. 48-50). In less productive shore pine communities in coastal Oregon, where large down wood and large standing trees and snags are not as common, martens have been most commonly found resting in squirrel nests, but also use bare branches and hollows at the base of overturned trees (Service 2019a, p. 25). At larger scales (stand, home range, and landscape), martens need sufficient habitat, such as overhead and escape cover, to minimize their exposure to predators as they move through their home range or disperse across the landscape. Martens tend to avoid forest openings and landscapes with large areas of forest openings. An analysis of martens across North America found that individual home ranges typically contain a large proportion (greater than or equal to 70 percent) of suitable habitat; furthermore, marten density declines when the area of suitable habitat across the landscape is reduced to less than 70 percent as a result of wildfire, forest management, or other stand-replacing disturbance (Thompson et al. 2012, pp. 209, 217, 228). Within the coastal marten DPS, on sites with highly productive soil conditions, martens select old-growth and late-mature stands dominated by Douglas-fir overstories; these stands have dense (greater than 70 percent cover) shrub layers that are spatially extensive and dominated by ericaceous species, including but not limited to evergreen huckleberry (Vaccinium ovatum), salal (Gaultheria shallon), and Rhododendron sp. (Slauson et al. 2019a, p. 51). On less productive sites, (e.g , serpentine soils and coastal shore pine communities), the amount of overstory cover may be more ***variable***, but the dense understory characteristics remain similar to productive sites (Slauson et al. 2019a, pp. 51-53). Martens favor shrub communities that comprise shade-tolerant, long-lived, mast-producing species that maintain site dominance, rather than early-seral shrub communities that are dominant only for short periods after a disturbance (e.g , Ceanothus sp.) (Slauson et al. 2019a, p. 9). Occupying home ranges with large amounts of overhead cover provided by shrub or forest canopy is thought to reduce marten exposure to predators. In addition, occupying landscapes with similarly large amounts of mature or old forest cover with complex understory minimizes their distributional overlap with generalist predators that are typically associated with younger forests or more open habitats (Slauson et al. 2019a, p. 40). Mature and old-forest characteristics differ across the DPS depending on the site and plant association. Old-forest characteristics of example plant series are provided in Table 2; however, old-forest conditions in other plant series within critical habitat units may also provide sufficient habitat. Table 2--Characteristics of Old-Growth Stands in a Sample of Different Plant Series That Occur Within the DPS------------------------------------------------------------------------ ------------------------------------------------------------------------Stand feature........ Douglas-fir on Douglas-fir Tanoak plant western plant series.\b\ hemlock series.\b\ Mean old- sites.\a\ Mean old- growth values. Minimum old- growth values. growth values.Live trees........... >=2 species. Wide range of Wide range of Wide range of size classes: size classes. ages and Softwood trees Softwood trees sizes. Douglas- 8/ac 30- to 8/ac 30- to fir >=8/ac >32- 39.9-in 39.9-in in diameter diameter (>=20/ diameter (>=20/ (>=20/ha >81 ha 76 to 101.5 ha 76 to 101.5 cm) or >200 cm), and 9/ac cm), and 2/ac years old. >40'' diameter >40'' diameter (22/ha >101.5 (5/ha >101.5 cm). cm).Canopy............... deep, multi- layered canopy.Snags................ Conifers >=4/ac 2.4/ac >20'' 1.6/ac >20'' >20'' diameter diameter (5.9/ diameter (4.0/ (10/ha >51 cm) ha >51 cm) and ha >51 cm) and and >15 ft >50 ft (4.5 m) >50 ft (4.5 m) (4.5 m) tall. tall. tall.[[Page 58838]] Logs................. >=15 tons/ac 24.2 tons/ac 23.8 tons/ac (34 metric (54.5 metric (53.5 metric tons/ha) tons/ha) of tons/ha) of including 4 logs >10 in logs >10 in pieces/ac (25 cm) (25 cm) >=24'' diameter and diameter and diameter (10/ >1 ft (0.3 m) >1 ft (0.3 m) ha >= 61 cm) long. 6.9 logs/ long. 6.5 logs/ and >50 ft (15 ac (17.0 logs/ ac (16.1 logs/ m) long. ha) >20 in (51 ha) >20 in (51 cm) and <30 in cm) and <30 in (76 cm) (76 cm) diameter; 3.8 diameter; 3.9 logs/ac (9.4 logs/ac (9.6 logs/ha) >30 logs/ha) >30 in (76 cm) in (76 cm) diameter. diameter.------------------------------------------------------------------------\a\ Minimum old-growth definitions found in Franklin et al. (1986, p. 4).\b\ Mean old-growth definitions found in Jimerson et al. (1996, pp. E-16 to E-23).Sites for Breeding, Reproduction, or Rearing (or Development) of Offspring Females give birth to kits in forest structures called natal dens. Subsequent structures used to raise young kits are called maternal dens. The most common den structures used by martens across North America are cavities in large-diameter live and dead trees, and known coastal marten dens also correspond to this pattern. Trees containing marten den sites are structurally complex, with large limbs, broken tops, hollow bases, complex crowns, or multiple cavities. Martens appear to be more selective of habitat conditions at den sites than at rest sites; this tendency likely reflects a need for foraging habitat to be within close proximity of a den site, allowing females to minimize energy expenditure for foraging and minimize time spent away from kits (Service 2019a, pp. 26-27; Slauson et al. 2019a, p. 50).Habitats Protected From Disturbance As noted above in the Cover or Shelter section, mature and old forests are important to martens, and marten density declines when landscape amounts are reduced to less than 70 percent of the area, regardless of the disturbance type (Thompson et al. 2012, pp. 209, 217, 228). Marten habitat is lost or degraded through natural disturbances and human-induced changes. Such disturbances can remove habitat components necessary for marten fitness (e.g , canopy cover, denning and resting structures, habitat for marten prey). In California, habitat disturbances that remove escape cover and create extensive openings are associated with increased predation risk by increasing the abundance of habitat generalist carnivores that prey on martens (Slauson et al. 2019a, pp. 40, 57). Forest management is the human disturbance that has the greatest effect on marten habitat in terms of scale and severity. The loss of marten habitat as a result of timber harvest is considered the likely cause of the continued low population levels in California since the State banned trapping in 1946. Vegetation management, such as timber harvest, thinning, fuels reduction, and non-forest habitat restoration can result in temporary or permanent loss, degradation, or fragmentation of suitable coastal marten habitat (Service 2019a, p. 55). Human development also results in permanent habitat ***conversion***, but is generally limited in scope to the area around established communities and existing developments. Within the DPS, wildfire is the natural disturbance that affects by far the greatest area of habitat. Fires are a necessary disturbance feature as they create or facilitate the development of structural features used by martens, such as snags, hollow trees, and down logs. However, fires can also remove large areas of suitable marten habitat that can take many decades to recover (Service 2019a, pp. 48-51). Other natural disturbances that affect marten habitat to a much lesser degree than wildfire include windstorms, landslides, and forest insects and pathogens. These events generally degrade or remove habitat in localized areas. Similar to wildfire, however, they are also important processes for developing forest structures used by coastal martens, such as broken top trees, cavities, and down wood.Summary of Physical or Biological Features for the Coastal Marten We derive the specific physical or biological features (PBFs) essential to the conservation of the coastal marten from studies of this species' habitat, ecology, and life history as described in the SSA report for the coastal marten (Service 2019a, entire). We have determined that the following PBFs are essential to the conservation of the coastal marten: Physical or Biological Feature 1--Habitat that supports a coastal marten home range by providing for breeding, denning, resting, or foraging. This habitat provides cover and shelter to facilitate thermoregulation and reduce predation risk, foraging sources for marten prey, and structures that provide resting and denning sites. To provide cover and support denning, resting, and foraging, coastal martens require a mature forest overstory, dense understory development, and biologically complex structure that contains snags, logs, other decay elements, or other structures that support denning, resting, or marten prey. Stands meeting the conditions for PBF 1 would also function as meeting PBF 2 (facilitating movement within and between coastal marten home ranges). Stands meeting the condition for PBF 1 contain each of the following three components: (1) Mature, conifer-dominated forest overstory. Overstory canopy cover provides protection to coastal martens from aerial and terrestrial predators, as well as shelter from physical elements such as sun or storms. It also is the source of structural features that coastal martens use for denning and resting, and provides suitable coastal marten prey. Suitable overstory conditions vary depending on the productivity of the site as follows: a. For areas with relatively low productivity (e.g , areas where growing conditions are harsher, such as serpentine sites or coastal shore pine forests, compared to other areas), suitable forest overstory conditions are highly ***variable***. They may contain a sparse conifer overstory, such as in some serpentine areas, or a dense conifer overstory composed mainly of trees smaller than the typical older forest conditions described below in (1)b (e.g , the dense shore pine overstory found in areas occupied by marten along the Oregon coast). b. For other areas with higher productivity, martens tend to favor forest stands in the old-growth or late-mature seral stages. The specific forest composition and structure conditions found in higher productivity areas will vary by plant series and site class. Structural and composition descriptions of old-growth or late-mature seral stages for local plant community series should be used where available. In general these stands exhibit high levels of canopy cover and structural diversity in the form of: (1) A wide range of tree sizes, including trees with large[[Page 58839]]diameter and height; (2) deep, dense tree canopies with multiple canopy layers and irregular tree crowns; (3) high numbers of snags, including large-diameter snags; and (4) abundant down wood, including large logs, ideally in a variety of decay stages. (2) Dense, spatially extensive shrub layer. The shrub layer should be greater than 70 percent of the area, comprising mainly shade-tolerant, long-lived, mast-producing species (primarily ericaceous species such as salal, huckleberry, or rhododendron, as well as shrub oaks). An extensive layer of dense shrubs provides protection and cover from coastal marten predators. In addition, ericaceous and mast-producing shrubs provide forage for marten prey. (3) Stands with structural features. Structural features that support denning or resting, such as large down logs, rock piles with interstitial spaces, and large snags or live trees with decay elements or suitable resting structures (e.g , hollows and cavities, forked or broken tops, dead tops, brooms from mistletoe or other tree pathogens, or large platforms including abandoned nests). These features provide cover and thermal protection for kits and denning females, and for all animals when they are resting between foraging bouts. Hence, these features need to be distributed throughout a coastal marten home range. They also tend to be among the largest structures in the stand. Many of these features, such as down logs and snags or live trees with decayed elements, also support coastal marten prey. Physical or Biological Feature 2--Habitat that allows for movement within home ranges among stands that meet PBF 1, or supports individuals dispersing between home ranges. Habitat within PBF 2 includes: (1) Stands that meet all three conditions of PBF1; (2) forest stands that only meet the first two components of PBF 1 (mature, conifer-dominated forest overstory and a dense, spatially extensive shrub layer); or (3), habitats with some lesser amounts of shrub, canopy, forest cover, or lesser amounts of smaller structural features as described in PBF 1, and while not meeting the definition of PBF 1, would still provide forage and cover from predators that would allow coastal martens to traverse the landscape to areas of higher quality habitat.Special Management Considerations or Protection When designating critical habitat, we assess whether the specific areas within the geographical area occupied by the species at the time of listing contain features which are essential to the conservation of the species and which may require special management considerations or protection. The features essential to the conservation of this species may require special management considerations or protection to reduce the following direct or indirect threats: Incidents of roadkill; inadvertent poisoning from rodenticides; predation; disease; impacts from wildfire; and vegetation management actions. A detailed discussion of activities influencing the coastal marten and its habitat can be found in the final listing rule (85 FR 63806, October 8, 2020). Special management considerations or protection that may be required within critical habitat areas to address these threats include (but are not limited to) the following: Development of wildlife crossings on major roadways; monitoring and patrolling for unauthorized use of rodenticides in ***agricultural*** settings including cannabis operations; maintaining adequate cover and connectivity of habitats to provide cover from predation; implementation of forest management practices that prevent or reduce risk of catastrophic wildfire; reducing indirect impacts to coastal marten habitat from activities adjacent to critical habitat units; and minimizing habitat disturbance, fragmentation, and destruction through use of best management practices for vegetation management activities and providing appropriate buffers around coastal marten habitat.Conservation Strategy and Selection Criteria Used To Identify Critical HabitatConservation Strategy As required by section 4(b)(2) of the Act, we use the best scientific ***data*** available to designate critical habitat. In accordance with the Act and our implementing regulations at 50 CFR 424.12(b), we review available information pertaining to the habitat requirements of the species and identify specific areas within the geographical area occupied by the species at the time of listing and any specific areas outside the geographical area occupied by the species to be considered for designation as critical habitat. We are not currently proposing to designate any areas outside the geographical area occupied by the species because we have not identified any unoccupied areas that meet the definition of critical habitat. The occupied areas identified encompass the varying habitat types and distribution of the species and provide sufficient habitat to allow for maintaining and potentially expanding the populations. To determine and select appropriate occupied areas that contain the physical or biological features essential to the conservation of the species or areas otherwise essential for the conservation of the coastal marten, we developed a conservation strategy for the species. The goal of our conservation strategy for the coastal marten is to recover the species to the point where the protections of the Act are no longer necessary. The role of critical habitat in achieving this conservation goal is to identify the specific areas within the coastal marten's range that provide essential physical and biological features without which the coastal marten's range-wide resiliency, redundancy, and representation could not be achieved. This, in turn, requires an understanding of the fundamental parameters of the species' biology and ecology based on well-accepted conservation-biology and ecological principles for conserving species and their habitats, such as those described by Carroll et al. 1996 (pp. 1-12); Shaffer and Stein 2000 (pp. 301-321); Natural Resources Conservation Service (NRCS) 2004 (entire); Tear et al. 2005 (pp. 835-849); Groom et al. 2006 (pp. 419-551); Redford et al. 2011 (pp. 39-48); and Wolf et al. 2015 (pp. 200-207); and more specific coastal marten habitat information such as that described in Moriarty et al. 2016 (pp. 71-81); Delheimer et al. 2018 (pp. 510-517); Linnell et al. 2018 (pp. 1-21); Moriarty et al. 2019 (pp. 1-25); and Slauson et al. (2019a, entire). In developing our conservation strategy, we focused on increasing the resiliency, representation, and redundancy of coastal marten populations by maintaining and improving extant marten populations and suitable habitat. Because coastal marten occur in small and isolated populations, the primary focus of the conservation strategy is to maintain and expand extant populations and suitable habitat within those population areas. Suitable habitat includes areas for cover, resting, denning and foraging and also provides for dispersal habitat when breeding or food resources may not be optimal. To maintain redundancy of coastal marten populations, the conservation strategy also focuses on providing for areas in the diversity of habitats that coastal martens have been documented to use. This includes mesic serpentine, coastal shore pine, and late-seral coniferous forests. These habitats are spread across the species' range and typically provide the physical and biological features essential to the[[Page 58840]]conservation of the species without which range-wide resiliency, redundancy, and representation of the species could not be achieved. As explained further below, this focus led to the inclusion of suitable habitat within the ecological settings where the species occurs as part of the conservation strategy.Selection Criteria and Methodology Used To Determine Critical Habitat As discussed above, to assist in determining which areas to identify as critical habitat for the coastal marten, we focused our selection on extant populations in the diversity of habitats represented by coastal marten. We define the proposed critical habitat as sites that contain the physical or biological features essential to the conservation of the species within the geographical area occupied by the species at the time of listing. To define the areas we consider to be the areas occupied at the time of listing, we started with a set of detection points and grouped detections into extant population areas (EPAs). The EPAs and the habitat areas adjacent to and within dispersal distance between the EPAs encompass the core areas we consider to be occupied at the time of listing. All current verifiable coastal marten detections were used to delineate EPAs within the historical home range. If the total number of detections in an area was less than five or they were separated by greater than 3 mi (5 km) from other verifiable detections, the combined detections were not designated as an EPA due to the insufficient level of information to suggest a likely self-sustaining population (Service 2019a, p. 84). EPAs were considered separate from each other if they were not within 4.6 mi (7.5 km) of each other, which is based on half of the average dispersal distance of a coastal marten. This distance assumes that animals are not regularly moving between EPAs and the EPAs are functioning as separate populations. To better focus the areas occupied at the time of listing and considered to be essential to the conservation of the species, we refined the boundaries of the EPAs using a 60 percent concave hull method to select those areas with a higher prevalence of coastal marten detections. Because the EPAs are based on occurrence records and not habitat, we also used two different habitat models specific to coastal marten to incorporate the habitat used by the coastal marten detections associated with each EPA. These modeled areas are considered occupied by the species based on the continuous nature of the habitat and are within the dispersal distance and home ranges of the species. The first model we used found that coastal martens were positively associated with Old-Growth Structural Index (OGSI), precipitation, and serpentine soils, and negatively with elevation (Slauson et al. 2019b, entire). OGSI is a spatial ***data*** layer developed by the U.S Forest Service (USFS) and Oregon State University and is an index of one to four measurable old-growth structure elements including (1) density of large live trees, (2) diversity of live-tree size classes, (3) density of large snags, and (4) percentage cover of down woody material (Davis et al. 2015, p. 16). OGSI serves as a surrogate for the late-seral structural features that are important to coastal marten survival and, in conjunction with the serpentine soil layer, incorporates several of the PBFs defined above. The inclusion of precipitation in the model accounts for the association of the mesic shrub layer that marten depend on for cover, resting, and foraging. We also used a habitat connectivity model developed by the Service that incorporates OGSI ***data*** along with a minimum patch size of habitat to create `cores' of suitable habitat (Schrott and Shinn 2020, entire). We used our model in conjunction with the Slauson et al. 2019b model because the Slauson model does not include low elevation areas known to be occupied by coastal martens. The Service model includes modeled output in lower elevation coastal regions of California and Oregon where we know coastal marten occur. Because the entire combined modeled extent of habitat overestimates the amount of habitat used by and needed for coastal marten conservation, we eliminated any modeled areas that were not adjacent to EPAs and eliminated modeled output in arid environments east of the Klamath River in California where suitable habitat is more scarce and localized to moist ravines. In addition, we trimmed the polygons where there were long tendrils displaying high edge-to-interior ratio that were generally artifacts of roads, modeled output, or misaligning of ownership projections and, thus, did not contain the PBFs considered essential to the conservation of the species. We further evaluated the polygons based on the PBFs for coastal marten and current land management practices under the Northwest Forest Plan (NWFP). We prioritized inclusion of Federal reserve lands and State lands occupied by the species at the time of listing because these lands contribute most to the conservation of the species, but also included those private lands that contain the PBFs essential to coastal marten conservation and which may require special management. When determining proposed critical habitat boundaries, we made every effort to avoid including developed areas such as lands covered by buildings, pavement, and other structures because such lands lack physical or biological features necessary for the coastal marten. The scale of the maps we prepared under the parameters for publication within the Code of Federal Regulations may not reflect the exclusion of such developed lands. Any such lands inadvertently left inside critical habitat boundaries shown on the maps of this proposed rule have been excluded by text in the proposed rule and are not proposed for designation as critical habitat. Due to unverifiable ownership and mapping information, some small portions of private or unclassified lands may occur within the mapping of Units 1, 2 and 3, but which were not intended for inclusion within the designation. These areas are extremely small artifacts of mapping discrepancies and potential overlapping ***data*** information, do not contain the PBFs considered essential to the conservation of the species, and are not intended to be included as critical habitat as defined in this rule. Accordingly, any private lands in Units 1, 2, or 3 inadvertently included in the proposed designation are not considered critical habitat because they are part of inadvertent overlap or undeterminability and are too small to be significant for coastal marten conservation. Therefore, if the critical habitat is finalized as proposed, a Federal action involving these lands would not trigger section 7 consultation with respect to critical habitat and the requirement of no adverse modification unless the specific action would affect the physical or biological features in the adjacent critical habitat. We propose to designate as critical habitat lands that we have determined are occupied at the time of listing (i.e , currently occupied) and that contain one or more of the physical or biological features that are essential to support life-history processes of the species. Units are proposed for designation based on one or more of the physical or biological features being present to support the coastal marten's life-history processes. Some units contain all of the identified physical or biological features and support multiple life-history processes. Some units contain only some of the physical or biological[[Page 58841]]features necessary to support the coastal marten's particular use of that habitat. The proposed critical habitat designation is defined by the map or maps, as modified by any accompanying regulatory text, presented at the end of this document under Proposed Regulation Promulgation. We include more detailed information on the boundaries of the critical habitat designation in the preamble of this document. We will make the coordinates or plot points or both on which each map is based available to the public on [*http://www.regulations.gov*](http://www.regulations.gov) at Docket No. FWS-R8-ES-2020-0151 and on our internet site, [*https://www.fws.gov/arcata.Proposed*](https://www.fws.gov/arcata.Proposed) Critical Habitat Designation We are proposing five units as critical habitat for the coastal marten. The critical habitat areas we describe below constitute our current best assessment of areas that meet the definition of critical habitat for the coastal marten. Table 3 below identifies all of the units within the geographical area occupied at the time of listing that contain the physical or biological features that support multiple life-history processes for the coastal marten and are thus essential to the conservation of the species. Table 3--Proposed Critical Habitat Units for Pacific Marten (Coastal DPS) [Area (acres (hectares)) reflects all land within critical habitat unit boundaries and includes area that may not contain PBFs.]-------------------------------------------------------------------------------------------------------------------------------------------------------- Ownership (in acres (hectares)) Unit No. and name --------------------------------------------------------------------------------- Total Federal State Tribal Other--------------------------------------------------------------------------------------------------------------------------------------------------------Unit 1: OR-1 Siuslaw.............................. 94,094 (37,673) 2,124 (859) 0 0 95,218 (38,534)Unit 2: OR-2 Siltcoos............................. 8,582 (3,472) 249 (101) 0 0 8,830 (3,574)Unit 3: OR-3 Coos Bay............................. 14,934 (6,044) 648 (262) 0 0 15,582 (6,306)Unit 4: OR-4 Cape Blanco.......................... 1,021 (413) 3,025 (1,224) 0 0 4,046 (1,637)Unit 5: OR- CA-5 Klamath Mountains................ 1,154,197 (467,103) 19,829 (8,024) 26,126 (10,573) 89,475 (36,210) 1,289,627 (521,913) Totals........................................ 1,271,828 (514,708) 25,875 (10,471) 26,126 (10,573) 89,475 (36,210) 1,413,305 (571,965)--------------------------------------------------------------------------------------------------------------------------------------------------------Note: Area sizes may not sum due to rounding. ``Other'' represents, city, county, private or otherwise unidentified land ownership areas. We present brief descriptions of all units, and reasons why they meet the definition of critical habitat for the coastal marten, below.Unit 1: Siuslaw Unit. Lincoln and Lane Counties, Oregon This unit consists of approximately 95,218 ac (38,534 ha) and encompasses the northern portion of the central coastal Oregon population of coastal martens. Almost all of the unit is within Lane County, north of Oregon Highway 126, but a small portion extends north into Lincoln County, Oregon, on lands managed by the Siuslaw National Forest. The unit mostly borders the Pacific Ocean from just south of the town of Yachats, south to near Sea Lion Caves; further inland, the unit extends as far south as Mercer Lake. Portions of the unit extend inland from the coast as much as 18 mi (29 km), but most of the unit is within 12 mi (19 km) of the coast. The unit is almost entirely in Federal ownership (94,094 ac (37,675 ha)) (99 percent), specifically the Siuslaw National Forest, with approximately 74,899 ac (30,311 ha) in Late-Successional Reserve (LSR) land use allocation under the NWFP (USFS 1994, entire). Rock Creek and Cummins Creek Wilderness Areas make up much of the rest of the Federal lands. Oregon State Park lands along the coast comprise most of the remainder of the unit (2,124 ac (859 ha)), including Neptune, Heceta Head, Washburne, and Ponsler State Parks. Recreation is a principal land use in this unit. Because the Federal lands are in an LSR allocation, forest management is limited to activities that are neutral or beneficial to the retention or development of late-successional forest conditions. This unit was occupied at the time of listing (2020), is currently occupied by coastal martens, and contains one or more of the physical or biological features essential to the conservation of the species. This unit represents the northernmost distribution of coastal martens in Oregon (based on contemporary detections), as well as relatively unfragmented old forest compared to other forests near the ocean within the DPS. This area may facilitate movement of coastal martens inland. This unit provides all of the features described in PBFs 1 and 2. Overstory conditions as described in PBF 1 are mostly associated with high-productivity sites across much of this unit, characteristic of the mature forests of the Sitka spruce vegetation zone as described in Franklin and Dyrness (1988, pp. 58-59). The habitat-based threats in this unit that may require special management include removal of forest vegetation, primarily through vegetation management such as timber harvest. Approximately 80 percent of the Federal portion of this unit is managed as a Late Successional Reserve, which requires retaining or developing late-successional conditions that could be suitable for coastal martens. However, some treatments that meet LSR standards and guidelines, such as thinning to increase tree size or stand complexity, can result in loss of dense understories that are valuable to coastal martens to escape from predators and provide suitable prey habitat. We have not identified potential exclusions at this time, but may consider information regarding potential exclusions provided during the comment period for this proposal.Unit 2: Siltcoos Unit. Lane and Douglas Counties, Oregon This unit consists of approximately 8,830 ac (3,574 ha) and encompasses the central portion of the central coastal Oregon population of coastal martens in coastal Lane and Douglas Counties, Oregon. The unit occurs along the coastline west of Highway 101 and extends from near the city of Florence, Oregon, south approximately 12 mi (19 km) to the vicinity of Tahkenitch Creek, west of Tahkenitch Lake. Land ownership within the unit includes approximately 8,582 ac (3,472 ha) of Federal and 249 ac (101 ha) of State land. The Federal portion is within the Oregon Dunes National Recreation Area, managed by the Siuslaw National Forest. The State portion comprises Honeyman State Park. Recreation is the principal land use in this unit, primarily All-Terrain Vehicle (ATV) use on the open dunes and forested trails within the recreation area and surrounding areas.[[Page 58842]] This unit was occupied at the time of listing (2020) and is currently occupied by coastal martens. Coastal martens in this unit and Unit 3 exhibit the highest densities and smallest home ranges documented in North America (Linnell et al. 2018, p. 13), indicating that the physical and biological features coastal martens require are widely available in this unit. The unit contains all of the components described in PBFs 1 and 2. For the forest overstory component of PBF 1, this unit falls into the less productive site category, due to the harsher growing conditions along the Oregon coast. Forest vegetation in this unit generally comprises dense strands of shore pine with extremely dense shrub understories, as described in Franklin and Dyrness (1988, pp. 291-294). This unit encompasses one of four known coastal marten populations, allowing for maintaining redundancy across the DPS. Coastal martens in this unit and Unit 3 are generally isolated from coastal martens in the rest of the DPS, with limited ability to connect populations across the landscape. The habitat-based threats in this unit that may require special management include possible loss of shore pine and understory shrub habitat in an effort to restore movement of coastal sand dunes or increase open areas for recreation vehicles. An additional threat is the invasion of nonnative shrub species (e.g , Scotch broom (Cytisus scoparius)) that may preclude the development of ericaceous shrubs and shore pine that are known components of suitable coastal marten habitat. We have not identified potential exclusions at this time, but may consider information regarding potential exclusions provided during the comment period for this proposal.Unit 3: Coos Bay Unit. Douglas and Coos Counties, Oregon This unit consists of approximately 15,582 ac (6,306 ha) and encompasses the southern portion of the central coastal Oregon population of coastal martens in coastal Douglas and Coos Counties, Oregon. The unit extends from Winchester Bay south to the north spit of Coos Bay proper, and lies west of U.S Highway 101. Land ownership includes 14,934 ac (6,044 ha) of Federal and 648 ac (262 ha) of State land. The Federal portion is within the Oregon Dunes National Recreation Area, managed by the Siuslaw National Forest. The State portion comprises Umpqua Lighthouse State Park. This unit is otherwise similar to Unit 2 in terms of primary land use, coastal marten occupancy, presence of physical and biological features, vegetation description, essentiality of conservation, and habitat based threats. Recreation is the principal land use in this unit, primarily ATV use on the open dunes and forested trails within the recreation area and surrounding areas. This unit was occupied at the time of listing (2020) and is currently occupied by coastal martens. Coastal martens in this unit, along with Unit 2, exhibit the highest densities and smallest home ranges in North America (Linnell et al. 2018, p. 13), indicating that the physical and biological features coastal martens require are widely available in this unit. The unit contains all of the components described in PBFs 1 and 2. For the forest overstory component of PBF 1, this unit falls into the less productive site category, due to the harsher growing conditions along the Oregon coast. Forest vegetation in this unit generally comprises dense strands of shore pine with extremely dense shrub understories, as described in Franklin and Dyrness (1988, pp. 291-294). This unit encompasses one of four known coastal marten populations, allowing for maintaining redundancy across the DPS. Coastal martens in this unit and Unit 2 are generally isolated from coastal martens in the rest of the DPS, with limited ability to connect populations across the landscape. The habitat-based threats in this unit that may require special management include addressing the possible loss of shore pine and understory shrub habitat in an effort to restore movement of coastal sand dunes or increase open areas for recreation vehicles. An additional threat is the invasion of nonnative shrub species (e.g , Scotch broom) that may preclude the development of ericaceous shrubs and shore pine that are known components of suitable coastal marten habitat. Loss of habitat adjacent to the unit as a result of the Jordan Cove liquefied natural gas project will reduce connection capacity with coastal martens detected on the north spit to the south (Service 2020, pp. 46-50). We have not identified potential exclusions at this time in this unit, but may consider information regarding potential exclusions provided during the comment period for this proposal.Unit 4: Cape Blanco Unit. Coos and Curry Counties, Oregon This unit consists of approximately 4,046 ac (1,637 ha) and encompasses the immediate coastal portion of the southern coastal Oregon population of coastal martens in coastal Coos and Curry Counties, Oregon. The unit extends from just south of the Bandon State Natural Area, south to Cape Blanco State Park, and lies west of U.S Highway 101. Land ownership includes 1,021 ac (413 ha) of Federal and 3,025 ac (1,224 ha) of State land. The Federal portion is managed by the Bureau of Land Management (BLM) as a District Designated Reserve with no programmed timber harvest; portions of the reserve are managed for recreation, while other portions are managed as the New River Area of Critical Environmental Concern to protect and conserve natural resources. The State portion comprises Cape Blanco State Park and Floras Lake State Natural Area. Recreation is the principal land use in this unit. This unit was occupied at the time of listing (2020) and is currently occupied by coastal martens and contains one or more of the components described in PBFs 1 and 2 that are essential to the conservation of the species. The unit is a mix of shore pine dominated forests in the lowlands near the ocean, and more mature Sitka spruce forest in the higher bluffs around Cape Blanco. This unit encompasses occupied coastal forest that is known to be suitable habitat for coastal martens. The habitat-based threats in this unit that may require special management are the prevalence of invasive shrub species that may preclude the development of ericaceous shrubs and shore pine that are known components of suitable coastal marten habitat. We have not identified potential exclusions at this time, but may consider information regarding potential exclusions provided during the comment period for this proposal.Unit 5: Klamath Mountains Unit. Coos, Curry, Douglas, and Josephine Counties, Oregon. Del Norte, Humboldt, and Siskiyou Counties, California This unit consists of approximately 1,289,627 ac (521,913 ha) and occurs mostly within the Klamath Mountains of southwestern Oregon and northwestern California. Within Oregon, the unit occurs in the southern part of Coos County, just south of Powers, Oregon, and extends south through eastern Curry and western Josephine Counties, with the northeastern fringe of the unit extending into Douglas County. The northwestern portion of this unit consists of a non-contiguous portion that encompasses Humbug Mountain State Park. The unit extends south into California, occupying much of the eastern portion of Del Norte County, extending south into Humboldt County and east into Siskiyou County. In California, the unit lies west of U.S Highway 96 and extends all the way to the Pacific Ocean in northern Humboldt[[Page 58843]]County, encompassing Redwood National and State Parks. The unit is 89 percent federally owned (1,154,197 ac (467,103 ha)), with an additional 19,829 ac (8,024 ha) of State lands, 26,126 ac (10,573 ha) of Tribal lands, and the remainder (89,475 ac (36,210 ha)) owned by private or local governments. The USFS is the principal Federal land manager (Rogue River-Siskiyou, Six Rivers, and Klamath National Forests), with the BLM managing additional lands in Oregon, and the National Park Service in California. LSRs account for 46 percent of the Federal ownership. In addition, several Wilderness Areas are within this unit, including Grassy Knob, Wild Rogue, Copper Salmon, and Kalmiopsis in Oregon, and the Siskiyou Wilderness in California. This unit was occupied at the time of listing (2020) and is currently occupied by coastal martens and contains one or more of the physical or biological features essential to the conservation of the species. This unit represents the southernmost distribution of coastal martens in the DPS and encompasses the majority of known coastal marten detections. Outside of the northern portion of Unit 1, it also is the only source of non-shore pine habitat, and includes a variety of vegetation conditions that coastal martens use, enhancing representation. This unit contains key connectivity areas for coastal martens to move either north or south in the DPS, as well as inland or towards the coast. This unit provides all of the features described in PBFs 1 and 2. Overstory conditions as described in PBF 1 are associated with high productivity sites across much of the unit, but low-productivity serpentine sites also occur across this unit. The habitat-based threats in this unit that may require special management include removal of forest vegetation, primarily through vegetation management such as timber harvest. Fuels management to reduce the risk of fire is also a regular activity throughout much of this unit. We have identified potential exclusions for some private and Tribal lands in this unit (see Exclusions). These potential exclusions include 76,544 ac (30,975 ha) of private land and 26,126 ac (10,573 ha) of Tribal land in the California portion of the unit.Effects of Critical Habitat DesignationSection 7 Consultation Section 7(a)(2) of the Act requires Federal agencies, including the Service, to ensure that any action they fund, authorize, or carry out is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat of such species. In addition, section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any agency action which is likely to jeopardize the continued existence of any species proposed to be listed under the Act or result in the destruction or adverse modification of proposed critical habitat. We published a final rule revising the definition of destruction or adverse modification on August 27, 2019 (84 FR 44976). Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency (action agency) must enter into consultation with us. Examples of actions that are subject to the section 7 consultation process are actions on State, Tribal, local, or private lands that require a Federal permit (such as a permit from the U.S Army Corps of Engineers under section 404 of the Clean Water Act (33 U.S.C 1251 et seq.) or a permit from the Service under section 10 of the Act) or that involve some other Federal action (such as funding from the Federal Highway Administration, Federal Aviation Administration, or the Federal Emergency Management Agency). Federal actions not affecting listed species or critical habitat--and actions on State, Tribal, local, or private lands that are not federally funded or authorized, or carried out by a Federal agency--do not require section 7 consultation. Compliance with the requirements of section 7(a)(2) is documented through our issuance of: (1) A concurrence letter for Federal actions that may affect, but are not likely to adversely affect, listed species or critical habitat; or (2) A biological opinion for Federal actions that may affect and are likely to adversely affect listed species or critical habitat. When we issue a biological opinion concluding that a project is likely to jeopardize the continued existence of a listed species and/or destroy or adversely modify critical habitat, we provide reasonable and prudent alternatives to the project, if any are identifiable, that would avoid the likelihood of jeopardy and/or destruction or adverse modification of critical habitat. We define ``reasonable and prudent alternatives'' (at 50 CFR 402.02) as alternative actions identified during consultation that: (1) Can be implemented in a manner consistent with the intended purpose of the action, (2) Can be implemented consistent with the scope of the Federal agency's legal authority and jurisdiction, (3) Are economically and technologically feasible, and (4) Would, in the Service Director's opinion, avoid the likelihood of jeopardizing the continued existence of the listed species and/or avoid the likelihood of destroying or adversely modifying critical habitat. Reasonable and prudent alternatives can vary from slight project modifications to extensive redesign or relocation of the project. Costs associated with implementing a reasonable and prudent alternative are similarly ***variable***. Regulations at 50 CFR 402.16 set forth requirements for Federal agencies to reinitiate formal consultation on previously reviewed actions. These requirements apply when the Federal agency has retained discretionary involvement or control over the action (or the agency's discretionary involvement or control is authorized by law) and, subsequent to the previous consultation, we have listed a new species or designated critical habitat that may be affected by the Federal action, or the action has been modified in a manner that affects the species or critical habitat in a way not considered in the previous consultation. In such situations, Federal agencies sometimes may need to request reinitiation of consultation with us, but the regulations also specify some exceptions to the requirement to reinitiate consultation on specific land management plans after subsequently listing a new species or designating new critical habitat. See the regulations for a description of those exceptions.Application of the ``Destruction or Adverse Modification'' Standard The key factor related to the destruction or adverse modification determination is whether implementation of the proposed Federal action directly or indirectly alters the designated critical habitat in a way that appreciably diminishes the value of the critical habitat as a whole for the conservation of the listed species. As discussed above, the role of critical habitat is to support physical or biological features essential to the conservation of a listed species and provide for the conservation of the species.[[Page 58844]] Section 4(b)(8) of the Act requires us to briefly evaluate and describe, in any proposed or final regulation that designates critical habitat, activities involving a Federal action that may violate section 7(a)(2) of the Act by destroying or adversely modifying such habitat, or that may be affected by such designation. The scale and context of activities are particularly important in evaluating the potential effects on coastal marten habitat. The degree to which management activities are likely to affect the capability of critical habitat to support coastal martens will vary depending on factors such as the scope and location of the action, and the quantity of critical habitat affected. Activities that the Service may, during a consultation under section 7(a)(2) of the Act, be considered likely to destroy or adversely modify critical habitat include, but are not limited to: (1) Actions that would remove, manipulate, degrade, or destroy coastal marten habitat at such a magnitude that the entirety of the designated critical habitat would no longer serve its intended value of providing for conservation of the species. Activities that could result in such an impact could include very large-scale mechanical (including controlled fire), chemical, or biological (biocontrol agents) actions that may cause significant reductions in the amount, extent, or quality of habitat available to coastal martens for resting, denning, feeding, breeding, sheltering, and dispersing. While we are currently unaware of any planned activities involving Federal actions that could reach this magnitude of impact to the essential physical or biological features, known activities that have the potential to impact components of these features include timber sales, vegetation management, hazard tree removal, salvage of large areas of trees killed by fire or other mortality source, noxious weed treatments, forest pest and disease management, fire management including fire suppression and fuel reduction treatments, forest and aquatic restoration projects, activities conducted under mining permits, activities conducted under travel management plans (e.g , road maintenance, construction, and decommissioning), cleaning up and restoring unauthorized cannabis cultivation sites, recreation and visitor services projects and site development, communication projects and other infrastructure projects. Federal agencies likely to engage with the Service on these activities include the USFS, BLM, National Park Service, and Bureau of Indian Affairs. (2) Actions in relation to the Federal highway system, as regulated by the U.S Department of Transportation, that would remove, fragment, manipulate, degrade, or destroy coastal marten habitat at such a magnitude that the entirety of the designated critical habitat would no longer serve its intended value of providing for conservation of the species. While we are currently unaware of any planned activities involving the Federal highway system that could reach this magnitude of impact to the essential physical or biological features, known activities that have the potential to impact components of these features include very large-scale road and bridge construction and right-of-way designation, maintenance or improvements of existing highways, and other infrastructure projects. These activities could remove, fragment, or reduce the amount, extent, or quality of habitat needed by coastal martens for resting, denning, feeding, breeding, sheltering, and dispersing. (3) Actions regulated by the Federal Energy Regulatory Commission, which are energy development projects that would remove, manipulate, degrade, or destroy coastal marten habitat at such a magnitude that the entirety of the designated critical habitat would no longer serve its intended value of providing for conservation of the species. While we are currently unaware of any planned activities involving Federal actions that could reach this magnitude of impact to the essential physical or biological features, known energy development projects that have the potential to impact components of these features could include, but are not limited to, very large-scale powerlines, liquefied natural gas pipelines and terminals, and solar and wind farms. These activities could remove or reduce the amount, extent, or quality of habitat needed by coastal martens for resting, denning, feeding, breeding, sheltering, and dispersing.ExemptionsApplication of Section 4(a)(3) of the Act Section 4(a)(3)(B)(i) of the Act (16 U.S.C 1533(a)(3)(B)(i)) provides that: ``The Secretary shall not designate as critical habitat any lands or other geographical areas owned or controlled by the Department of Defense, or designated for its use, that are subject to an integrated natural resources management plan (INRMP) prepared under section 101 of the Sikes Act (16 U.S.C 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation.'' There are no Department of Defense (DoD) lands with a completed INRMP within the proposed critical habitat designation.Consideration of Exclusions Under Section 4(b)(2) of the Act Section 4(b)(2) of the Act states that the Secretary shall designate and make revisions to critical habitat on the basis of the best available scientific ***data*** after taking into consideration the economic impact, national security impact, and any other relevant impact of specifying any particular area as critical habitat. The Secretary may exclude an area from critical habitat if she determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless she determines, based on the best scientific ***data*** available, that the failure to designate such area as critical habitat will result in the extinction of the species. In making the determination to exclude a particular area, the statute on its face, as well as the legislative history, are clear that the Secretary has broad discretion regarding which factor(s) to use and how much weight to give to any factor. We describe below the process that we undertook for taking into consideration each category of impacts and our analyses of the relevant impacts.Consideration of Economic Impacts Section 4(b)(2) of the Act and its implementing regulations require that we consider the economic impact that may result from a designation of critical habitat. To assess the probable economic impacts of a designation, we must first evaluate specific land uses or activities and projects that may occur in the area of the critical habitat. We then must evaluate the impacts that a specific critical habitat designation may have on restricting or modifying specific land uses or activities for the benefit of the species and its habitat within the areas proposed. We then identify which conservation efforts may be the result of the species being listed under the Act versus those attributed solely to the designation of critical habitat for this particular species. The probable economic impact of a proposed critical habitat designation is analyzed by comparing scenarios both ``with critical habitat'' and ``without critical habitat.'' The ``without critical habitat'' scenario represents the baseline for the analysis, which includes the existing regulatory and socio-economic burden imposed on landowners, managers, or other resource users potentially affected[[Page 58845]]by the designation of critical habitat (e.g , under the Federal listing as well as other Federal, State, and local regulations). The baseline, therefore, represents the costs of all efforts attributable to the listing of the species under the Act (i.e , conservation of the species and its habitat incurred regardless of whether critical habitat is designated). The ``with critical habitat'' scenario describes the incremental impacts associated specifically with the designation of critical habitat for the species. The incremental conservation efforts and associated impacts would not be expected without the designation of critical habitat for the species. In other words, the incremental costs are those attributable solely to the designation of critical habitat, above and beyond the baseline costs. These are the costs we use when evaluating the benefits of inclusion and exclusion of particular areas from the final designation of critical habitat should we choose to conduct a discretionary section 4(b)(2) exclusion analysis. For this particular designation, we developed an incremental effects memorandum (IEM) (Service 2019b, entire) considering the probable incremental economic impacts that may result from this proposed designation of critical habitat. The information contained in our IEM was then used to develop a screening analysis of the probable effects of the designation of critical habitat for the coastal marten (Industrial Economics (IEc) 2020, entire). We began by conducting a screening analysis of the proposed designation of critical habitat in order to focus our analysis on the key factors that are likely to result in incremental economic impacts. The purpose of the screening analysis is to filter out particular geographic areas of critical habitat that are already subject to such protections and are, therefore, unlikely to incur incremental economic impacts. In particular, the screening analysis considers baseline costs (i.e , absent critical habitat designation) and includes probable economic impacts where land and water use may be subject to conservation plans, land management plans, best management practices, or regulations that protect the habitat area as a result of the Federal listing status of the species. Ultimately, the screening analysis allows us to focus our analysis on evaluating the specific areas or sectors that may incur probable incremental economic impacts as a result of the designation. If there are any unoccupied units in the proposed critical habitat designation, the screening analysis assesses whether any additional management or conservation efforts may incur incremental economic impacts. This screening analysis combined with the information contained in our IEM are what we consider our draft economic analysis (DEA) of the proposed critical habitat designation for the coastal marten; our DEA is summarized in the narrative below. Executive Orders (E.O.s) 12866 and 13563 direct Federal agencies to assess the costs and benefits of available regulatory alternatives in quantitative (to the extent feasible) and qualitative terms. Consistent with the E.O regulatory analysis requirements, our effects analysis under the Act may take into consideration impacts to both directly and indirectly affected entities, where practicable and reasonable. If sufficient ***data*** are available, we assess to the extent practicable the probable impacts to both directly and indirectly affected entities. As part of our screening analysis, we considered the types of economic activities that are likely to occur within the areas likely affected by the critical habitat designation. In our evaluation of the probable incremental economic impacts that may result from the proposed designation of critical habitat for the coastal marten, first we identified, in the IEM dated October 22, 2019, probable incremental economic impacts associated with the following categories of activities: (1) Timber harvest activities; (2) wildfire or wildfire suppression activities; (3) road construction activities; (4) remediation of unauthorized cannabis cultivation sites; and (5) habitat restoration activities. We considered each industry or category individually. Additionally, we considered whether their activities have any Federal involvement. Critical habitat designation generally will not affect activities that do not have any Federal involvement; under the Act, designation of critical habitat only affects activities conducted, funded, permitted, or authorized by Federal agencies. In areas where the coastal marten is present, Federal agencies already are required to consult with the Service under section 7 of the Act on activities they fund, permit, or implement that may affect the species. If we finalize this proposed critical habitat designation, consultations to avoid the destruction or adverse modification of critical habitat would be incorporated into the existing consultation process. In our IEM, we attempted to clarify the distinction between the effects that would result from the species being listed and those attributable to the critical habitat designation (i.e , difference between the jeopardy and adverse modification standards) for the coastal marten's critical habitat. Because the designation of critical habitat for coastal marten is being proposed nearly concurrently with the listing, it has been our experience that it is more difficult to discern which conservation efforts are attributable to the species being listed and those which will result solely from the designation of critical habitat. However, the following specific circumstances in this case help to inform our evaluation: (1) The essential physical or biological features identified for critical habitat are the same features essential for the life requisites of the species, and (2) any actions that would result in sufficient harm or harassment to constitute jeopardy to the coastal marten may also be likely to adversely affect the essential physical or biological features of critical habitat. The IEM outlines our rationale concerning this limited distinction between baseline conservation efforts and incremental impacts of the designation of critical habitat for this species. This evaluation of the incremental effects has been used as the basis to evaluate the probable incremental economic impacts of this proposed designation of critical habitat. The proposed critical habitat designation for the coastal marten is made up of five units, four within Oregon and one along the Oregon border extending south into California. All of the units are occupied by the coastal marten. The amount of area being proposed within each unit along with ownership information is summarized in Table 3 (see Proposed Critical Habitat Designation). Federal land makes up 90 percent of the total proposed designation (Table 3). As a result, a large percentage of the designation would be subject to a Federal nexus and section 7 consultation. Approximately 81 percent of the Federal lands are specifically managed by the USFS. A number of existing land use and management plans exist within proposed critical habitat that may provide benefits to coastal marten critical habitat. In particular, USFS lands proposed as critical habitat are managed under the Northwest Forest Plan, which entails a network of late-successional reserve land-use allocations to be managed for the retention and development of late-successional forest that may benefit habitat for coastal martens. In addition, most proposed BLM lands are included in reservation allocations where programmed timber harvest does not occur.[[Page 58846]] Because the proposed units are occupied, any actions that may affect the species or its habitat would also affect designated critical habitat, and it is unlikely that any additional conservation efforts would be recommended to address the adverse modification standard over and above those recommended as necessary to avoid jeopardizing the continued existence of the coastal marten. Therefore, only administrative costs associated with an adverse modification analysis are expected in approximately 90 percent of the proposed critical habitat designation. While this additional analysis will require time and resources by both the Federal action agency and the Service, it is believed that, in most circumstances, these costs would predominantly be administrative in nature and would not be significant. In addition, nearly 48 percent of the proposed designation for coastal marten overlaps with existing critical habitat for the endangered marbled murrelet (Brachyramphus marmoratus), threatened northern spotted owl (Strix occidentalis caurina), threatened Oregon silverspot butterfly (Speyeria zerene hippolyta), and the threatened Pacific coast population of the western snowy plover (Charadrius nivosus nivosus) (IEc 2020, Exhibit A-1, p. 18). Although the western snowy plover's and Oregon silverspot butterfly's habitat needs are distinctly different than the coastal marten's, the overall habitat needs of both the marbled murrelet and northern spotted owl would provide at least some overlap in maintaining appropriate forested habitat. The overlap between the murrelet and northern spotted owl make up the majority (42 percent) of critical habitat overlap with the coastal marten As a result, any consultation requirements for listed species and resulting costs would be at least partially split between each overlapped species with not one species being the sole source of the entire costs. The entities most likely to incur incremental costs are parties to section 7 consultations, including Federal action agencies and, in some cases, third parties, most frequently State agencies or Tribes. Because the proposed critical habitat designation includes other lands not owned by Federal, State, or Tribal governments, incremental costs arising from public perception of the designation have some potential to arise; however, these non-governmental lands make up only a small portion (6.3 percent) of the proposed designation. Further, there do not appear to be significant development pressures in the area. We are not aware of any Tribal, State, or local government regulations or requirements that could be triggered by the designation of critical habitat for the coastal marten and attribute any change in behavior from private entities to be associated with public perception or attitudes rather than any specific requirements. Based on coordination efforts with Tribal partners and State and local agencies, the cost to private entities within these sectors is expected to be relatively minor (administrative costs of less than $10,000 per consultation effort); they, therefore, would not be significant. Our analysis of economic costs estimates that considering adverse modification of coastal marten critical habitat during section 7 consultation will result in incremental costs of approximately $280,000 (2018 dollars) per year. The incremental administrative burden resulting from the designation of critical habitat for the coastal marten will not reach $100 million in a given year based on the estimated annual number of consultations and per-unit consultation costs. The designation is unlikely to trigger additional requirements under State or local regulations and is not expected to have perceptional effects to third parties. We are soliciting ***data*** and comments from the public on the DEA discussed above, as well as all aspects of this proposed rule and our required determinations. During the development of a final designation, we will consider the information presented in the DEA and any additional information on economic impacts received during the public comment period to determine whether any specific areas should be excluded from the final critical habitat designation under authority of section 4(b)(2) and our implementing regulations at 50 CFR 424.19 In particular, we may exclude an area from critical habitat if we determine that the benefits of excluding the area outweigh the benefits of including the area, provided the exclusion will not result in the extinction of this species.Consideration of National Security Impacts In preparing this proposal, we have determined that the lands within the proposed designation of critical habitat for the coastal marten are not owned, managed, or used by the Department of Defense or Department of Homeland Security; therefore, we anticipate no impact on national security or homeland security as a result of the designation. However, during the development of a final designation, we will consider any additional information received through the public comment period on the impacts of the proposed designation on national security or homeland security to determine whether any specific areas should be excluded from the final critical habitat designation under authority of section 4(b)(2) of the Act and our implementing regulations at 50 CFR 424.19 Consideration of Other Relevant Impacts Under section 4(b)(2) of the Act, we consider any other relevant impacts, in addition to economic impacts and impacts on national security discussed above. We consider a number of factors including whether there are permitted conservation plans covering the species in the area such as HCPs, safe harbor agreements (SHAs), or candidate conservation agreements with assurances (CCAAs), or whether there are non-permitted conservation agreements and partnerships that would be encouraged by designation of, or exclusion from, critical habitat. In addition, we look at the existence of Tribal conservation plans and partnerships and consider the government-to-government relationship of the United States with Tribal entities. We also consider any social impacts that might occur because of the designation. When identifying the benefits of inclusion for an area, we consider the additional regulatory benefits that area would receive due to the protection from destruction or adverse modification as a result of actions with a Federal nexus, the educational benefits of mapping essential habitat for recovery of the listed species, and any benefits that may result from a designation due to State or Federal laws that may apply to critical habitat. When considering the benefits of exclusion, we consider, among other things, whether exclusion of a specific area is likely to result in conservation, or in the continuation, strengthening, or encouragement of partnerships. In the case of the coastal marten, the benefits of critical habitat include public awareness of the presence of the coastal marten and the importance of habitat protection, and, where a Federal nexus exists, increased habitat protection for the coastal marten due to protection from destruction or adverse modification of critical habitat. Additionally, continued implementation of an ongoing management or conservation plan that provides equal to or more conservation than a critical habitat designation would reduce the benefits of including that[[Page 58847]]specific area in the critical habitat designation. We evaluate the existence of a management or conservation plan when considering the benefits of inclusion. We consider a variety of factors, including, but not limited to, whether the plan is finalized; how it provides for the conservation of the essential physical or biological features; whether there is a reasonable expectation that the conservation management strategies and actions contained in a management plan will be implemented into the future; whether the conservation strategies in the plan are likely to be effective; and whether the plan contains a monitoring program or adaptive management to ensure that the conservation measures are effective and can be adapted in the future in response to new information or changing conditions. After identifying the benefits of inclusion and the benefits of exclusion, we carefully weigh the two sides to evaluate whether the benefits of exclusion outweigh those of inclusion. If our analysis indicates that the benefits of exclusion outweigh the benefits of inclusion, we then determine whether exclusion would result in extinction of the species. If exclusion of an area from critical habitat will result in extinction, we will not exclude it from the designation.Private or Other Non-Federal Conservation Plans or Agreements and Partnerships, in General We sometimes exclude specific areas from critical habitat designations based in part on the existence of private or other non-Federal conservation plans or agreements and their attendant partnerships. A conservation plan or agreement describes actions that are designed to provide for the conservation needs of a species and its habitat, and may include actions to reduce or mitigate negative effects on the species caused by activities on or adjacent to the area covered by the plan. Conservation plans or agreements can be developed by private entities with no Service involvement, or in partnership with the Service. We evaluate a variety of factors to determine how the benefits of any exclusion and the benefits of inclusion are affected by the existence of private or other non-Federal conservation plans or agreements and their attendant partnerships when we undertake a discretionary section 4(b)(2) exclusion analysis. A non-exhaustive list of factors that we will consider for non-permitted plans or agreements is shown below. These factors are not required elements of plans or agreements, and all items may not apply to every plan or agreement. (i) The degree to which the plan or agreement provides for the conservation of the species or the essential physical or biological features (if present) for the species. (ii) Whether there is a reasonable expectation that the conservation management strategies and actions contained in a management plan or agreement will be implemented. (iii) The demonstrated implementation and success of the chosen conservation measures. (iv) The degree to which the record of the plan supports a conclusion that a critical habitat designation would impair the realization of benefits expected from the plan, agreement, or partnership. (v) The extent of public participation in the development of the conservation plan. (vi) The degree to which there has been agency review and required determinations (e.g , State regulatory requirements), as necessary and appropriate. (vii) Whether National Environmental Policy Act (NEPA; 42 U.S.C 4321 et seq.) compliance was required. (viii) Whether the plan or agreement contains a monitoring program and adaptive management to ensure that the conservation measures are effective and can be modified in the future in response to new information.Green Diamond Resource Company Lands; Unit 5 Klamath Mountains The Green Diamond Resource Company (GDRC) owns and manages approximately 76,544 ac (30,976 ha) of lands included in the proposed designation for the coastal marten in California. Using the criteria described under Criteria Used To Identify Critical Habitat, we have determined that these lands are essential to the conservation of the species. The GDRC has developed an MOU with the Service (GDRC-Service 2020, entire) and a State Safe Harbor Agreement (SHA) with the California Department of Fish and Wildlife (CDFW 2018, entire) to assist in conservation of the coastal marten and its habitat. Conservation measures identified for the coastal marten and its habitat in the MOU and State SHA include: Engage in survey, monitoring, reporting, and coordination efforts for coastal marten. Provide funding and technical support for assisted coastal marten dispersal actions. Develop and implement a coastal marten training program. Establish a 127,217 ac ``Marten Special Management Area'' with a 2,098 ac reserve. Create slash piles to benefit coastal marten and provide habitat around natal dens. Implement avoidance and minimization measures for GDRC actions in coastal marten habitat. Discourage and prevent unauthorized cannabis cultivation and use of pesticides. Implement adaptive management strategies for conservation of coastal marten and its habitat. Designate an internal compliance team and MOU Coordinator to oversee coastal marten conservation through the MOU and SHA. Provide access to GDRC lands to State and Service staff to verify compliance of agreements. Retain live and snag tree habitat components to benefit coastal marten (Retention Scorecard) and their habitat. In addition, the GDRC has been and continues to be a member of a multi-agency management group for conservation of the coastal marten in California and Oregon. The group has developed a conservation strategy and management plan for conserving the coastal marten in California (Slauson et al. 2019a, entire). The conservation strategy was developed to address coastal marten declines and synthesizes current knowledge on the species and identifies current threats, management goals, and outlines numerous conservation actions and information needs. The implementation of the conservation measures outlined in the strategy would assist in conserving the species and its habitat. We have determined that the conservation measures and management actions identified above being undertaken by GDRC will conserve and manage coastal marten habitat including the species' PBFs and that these actions meet our criteria for exclusion under section 4(b)(2) of the Act. Based on GDRC working with the Service and the CDFW on development and implementation of the MOU and State SHA that benefit coastal marten habitat, involvement and development of the conservation strategy, and its continued partnership with us in coastal marten conservation, we are considering excluding GDRC lands from the final designation. We will continue to work with the GDRC throughout the public comment period and during development of the final designation of critical habitat for the coastal marten and are seeking comment on whether[[Page 58848]]the existing management and conservation efforts of GDRC meet our criteria for exclusion from the final designation under section 4(b)(2) of the Act.Tribal Lands Several Executive Orders, Secretarial Orders, and policies concern working with Tribes. These guidance documents generally confirm our trust responsibilities to Tribes, recognize that Tribes have sovereign authority to control Tribal lands, emphasize the importance of developing partnerships with Tribal governments, and direct the Service to consult with Tribes on a government-to-government basis. A joint Secretarial Order that applies to both the Service and the National Marine Fisheries Service (NMFS), Secretarial Order 3206, American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act (June 5, 1997) (S.O 3206), is the most comprehensive of the various guidance documents related to our relationships with Tribes and Act implementation, and it provides the most detail directly relevant to the designation of critical habitat. In addition to the general direction discussed above, S.O 3206 explicitly recognizes the right of Tribes to participate fully in the listing process, including designation of critical habitat. The Order also states: ``Critical habitat shall not be designated in such areas unless it is determined essential to conserve a listed species. In designating critical habitat, the Services shall evaluate and document the extent to which the conservation needs of the listed species can be achieved by limiting the designation to other lands.'' In light of this instruction, when we undertake a discretionary section 4(b)(2) exclusion analysis, we will always consider exclusions of Tribal lands under section 4(b)(2) of the Act prior to finalizing a designation of critical habitat, and will give great weight to Tribal concerns in analyzing the benefits of exclusion. However, S.O 3206 does not preclude us from designating Tribal lands or waters as critical habitat, nor does it state that Tribal lands or waters cannot meet the Act's definition of ``critical habitat.'' We are directed by the Act to identify areas that meet the definition of ``critical habitat'' (i.e , areas occupied at the time of listing that contain the essential physical or biological features that may require special management or protection and unoccupied areas that are essential to the conservation of a species), without regard to landownership. While S.O 3206 provides important direction, it expressly states that it does not modify the Secretaries' statutory authority.Yurok Tribal Lands; Unit 5 Klamath Mountains Approximately 26,126 ac (10,573 ha) of Yurok Tribal lands are included in the proposed designation of critical habitat for the coastal marten in Unit 5 in California. Using the criteria described under Criteria Used To Identify Critical Habitat, we have determined that these Tribal lands are occupied by the coastal marten and contain the features essential to the conservation of the species. The Yurok Tribe has a demonstrated track record of maintaining its lands for natural resources through implementation of their Yurok Forest Management Plan (FMP) (Yurok 2012, entire) and the Blue Creek Interim Management Plan (BCIMP) (Yurok Tribe and Western Rivers Conservancy 2018, entire). The FMP and BCIMP identify management guidance for specific forest types to enhance and restore healthy, resilient riparian and old growth forests on Yurok Tribal lands. The FMP and BCIMP identify actions that contribute to the conservation of coastal forest habitat important to coastal marten including: Establishment of the Humboldt Marten Special Management Area (currently 10,906 ac). Surveys for coastal marten in and around project areas. Retention and enhancement of suitable reproductive habitat. Strategic habitat management to improve connectivity. Population monitoring combined with adaptive management to evaluate management effectiveness and prevent disease and predation. When appropriate, use of timber harvest, thinning, fuels reduction, and prescribed fire methods that avoid or minimize alteration of dense understory shrubs that are beneficial to coastal marten. Identification of stand management alternative to restore and enhance shrub cover where it has been lost or reduced. Maintenance of spatial database of coastal marten distribution. Nonnative and invasive species control and eradication. Fire and fuels management (including ***variable*** density thinning, shaded fuel breaks, cultural burning, and emergency rehabilitation). Development, testing, and creation of surrogate structures that meet key life-history needs for resting and denning to increase habitat suitability in the short term. Additionally, we have begun coordination with the Yurok Tribe to assist in identifying additional management actions that may benefit the coastal marten or its habitat. The intent of the discussions is to ultimately develop an MOU with the Tribe to further solidify our partnership with the Tribe in developing and implementing land management practices beneficial to the Tribe and the coastal marten. The current draft MOU identifies habitat management practices, habitat restoration, fuels reduction, and research opportunities that will benefit the coastal marten. The Yurok Tribe has also been and continues to be a member of a multi-agency management group for the conservation of coastal marten in California and Oregon. The group has developed a conservation strategy and management plan for conserving the coastal marten in California (Slauson et al. 2019a, entire). We will continue to work with the Tribe throughout the public comment period and during development of the final designation of critical habitat for the coastal marten to further develop and finalize the MOU and build on our existing partnership in implementing specific conservation measures for the coastal marten. Based on existing conservation and management actions for natural resources by the Yurok Tribe, maintaining and strengthening our working relationship with the Tribe, and preliminary development of the coastal marten MOU with the Tribe, we are considering excluding the Yurok Tribal lands from the final designation. We are seeking comment on whether the Yurok Tribal lands are appropriate for exclusion from the final critical habitat designation to the extent consistent with the requirements of section 4(b)(2) of the Act.Summary of Exclusions Considered Under 4(b)(2) of the Act Based on the information provided by entities whose lands we are considering for exclusion, as well as any additional public comments we receive, we will evaluate whether certain lands in Unit 5 of the proposed critical habitat are appropriate for exclusion from the final designation under section 4(b)(2) of the Act. If the analysis indicates that the benefits of excluding lands from the final designation outweigh the benefits of designating those lands as critical habitat, then the Secretary may exercise her discretion to exclude the lands from the final designation. We may also consider areas not identified above for exclusion from the final critical habitat designation based on information we[[Page 58849]]may receive during the public comment period. We are considering whether to exclude the following areas under section 4(b)(2) of the Act from the final critical habitat designation for the coastal marten. Table 4 below provides approximate areas (ac, ha) of lands that meet the definition of critical habitat but for which we are considering possible exclusion under section 4(b)(2) of the Act from the final critical habitat rule. These areas include lands owned and managed by the Green Diamond Resource Company and the Yurok Tribe in California in Unit 5. Table 4--Areas Considered for Exclusion by Critical Habitat Unit [Ac (ha)]---------------------------------------------------------------------------------------------------------------- Areas meeting the definition of Areas considered for Rationale for Unit Name critical habitat in possible exclusion proposed ac (Ha) in ac (Ha) exclusion----------------------------------------------------------------------------------------------------------------5.................. Klamath Mountains............ 1,290,604 (573,058) 76,544 (30,975) Existing Land Management, State Safe Harbor, MOU, Maintaining Partnership. 26,126 (10,573) Existing Land Management, Draft MOU, Maintaining Partnership.----------------------------------------------------------------------------------------------------------------Required DeterminationsClarity of the Rule We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must: (1) Be logically organized; (2) Use the active voice to address readers directly; (3) Use clear language rather than jargon; (4) Be divided into short sections and sentences; and (5) Use lists and tables wherever possible. If you feel that we have not met these requirements, send us comments by one of the methods listed in ADDRESSES. To better help us revise the rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that are unclearly written, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.Regulatory Planning and Review (Executive Orders 12866 and 13563) Executive Order 12866 provides that the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget will review all significant rules. OIRA has determined that this rule is not significant. Executive Order 13563 reaffirms the principles of E.O 12866 while calling for improvements in the nation's regulatory system to promote predictability, to reduce uncertainty, and to use the best, most innovative, and least burdensome tools for achieving regulatory ends. The executive order directs agencies to consider regulatory approaches that reduce burdens and maintain flexibility and freedom of choice for the public where these approaches are relevant, feasible, and consistent with regulatory objectives. E.O 13563 emphasizes further that regulations must be based on the best available science and that the rulemaking process must allow for public participation and an open exchange of ideas. We have developed this proposed rule in a manner consistent with these requirements.Regulatory Flexibility Act (5 U.S.C 601 et seq.) Under the Regulatory Flexibility Act (RFA; 5 U.S.C 601 et seq.) as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996 (5 U.S.C 801 et seq.), whenever an agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effects of the rule on small entities (i.e , small businesses, small organizations, and small government jurisdictions). However, no regulatory flexibility analysis is required if the head of the agency certifies the rule will not have a significant economic impact on a substantial number of small entities. The SBREFA amended the RFA to require Federal agencies to provide a certification statement of the factual basis for certifying that the rule will not have a significant economic impact on a substantial number of small entities. According to the Small Business Administration, small entities include small organizations such as independent nonprofit organizations; small governmental jurisdictions, including school boards and city and town governments that serve fewer than 50,000 residents; and small businesses (13 CFR 121.201). Small businesses include manufacturing and mining concerns with fewer than 500 employees, wholesale trade entities with fewer than 100 employees, retail and service businesses with less than $5 million in annual sales, general and heavy construction businesses with less than $27.5 million in annual business, special trade contractors doing less than $11.5 million in annual business, and ***agricultural*** businesses with annual sales less than $750,000. To determine whether potential economic impacts to these small entities are significant, we considered the types of activities that might trigger regulatory impacts under this designation as well as types of project modifications that may result. In general, the term ``significant economic impact'' is meant to apply to a typical small business firm's business operations. Under the RFA, as amended, and as understood in light of recent court decisions, Federal agencies are required to evaluate the potential incremental impacts of rulemaking on those entities directly regulated by the rulemaking itself; in other words, the RFA does not require agencies to evaluate the potential impacts to indirectly regulated entities. The regulatory mechanism through which critical habitat protections are realized is section 7 of the Act, which requires Federal agencies, in consultation with the Service, to ensure that any action authorized, funded, or carried out by the agency is not likely to destroy or adversely modify critical habitat. Therefore, under section 7, only Federal action agencies are directly subject to the specific regulatory requirement (avoiding destruction and adverse modification) imposed by critical habitat designation. Consequently, it is our position that only Federal action agencies would be directly regulated if we adopt the proposed critical habitat designation. There is no requirement under the RFA to evaluate the potential impacts to entities not directly[[Page 58850]]regulated. Moreover, Federal agencies are not small entities. Therefore, because no small entities would be directly regulated by this rulemaking, the Service certifies that, if made final as proposed, the proposed critical habitat designation will not have a significant economic impact on a substantial number of small entities. In summary, we have considered whether the proposed designation would result in a significant economic impact on a substantial number of small entities. For the above reasons and based on currently available information, we certify that, if made final, the proposed critical habitat designation will not have a significant economic impact on a substantial number of small business entities. Therefore, an initial regulatory flexibility analysis is not required.Energy Supply, Distribution, or Use--Executive Order 13211 Executive Order 13211 (Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use) requires agencies to prepare Statements of Energy Effects when undertaking certain actions. In our economic analysis, we did not find that this proposed critical habitat designation would significantly affect energy supplies, distribution, or use, because these types of activities are not occurring and not expected to occur in areas being proposed as critical habitat. Therefore, this action is not a significant energy action, and no Statement of Energy Effects is required.Unfunded Mandates Reform Act (2 U.S.C 1501 et seq.) In accordance with the Unfunded Mandates Reform Act (2 U.S.C 1501 et seq.), we make the following finding: (1) This proposed rule would not produce a Federal mandate. In general, a Federal mandate is a provision in legislation, statute, or regulation that would impose an enforceable duty upon State, local, or tribal governments, or the private sector, and includes both ``Federal intergovernmental mandates'' and ``Federal private sector mandates.'' These terms are defined in 2 U.S.C 658(5)-(7). ``Federal intergovernmental mandate'' includes a regulation that would impose an enforceable duty upon State, local, or Tribal governments with two exceptions. It excludes ``a condition of Federal assistance.'' It also excludes ``a duty arising from participation in a voluntary Federal program,'' unless the regulation ``relates to a then-existing Federal program under which $500,000,000 or more is provided annually to State, local, and Tribal governments under entitlement authority,'' if the provision would ``increase the stringency of conditions of assistance'' or ``place caps upon, or otherwise decrease, the Federal Government's responsibility to provide funding,'' and the State, local, or Tribal governments ``lack authority'' to adjust accordingly. At the time of enactment, these entitlement programs were: Medicaid; Aid to Families with Dependent Children work programs; Child Nutrition; Food Stamps; Social Services Block Grants; Vocational Rehabilitation State Grants; Foster Care, Adoption Assistance, and Independent Living; Family Support Welfare Services; and Child Support Enforcement. ``Federal private sector mandate'' includes a regulation that ``would impose an enforceable duty upon the private sector, except (i) a condition of Federal assistance or (ii) a duty arising from participation in a voluntary Federal program.'' The designation of critical habitat does not impose a legally binding duty on non-Federal Government entities or private parties. Under the Act, the only regulatory effect is that Federal agencies must ensure that their actions do not destroy or adversely modify critical habitat under section 7. While non-Federal entities that receive Federal funding, assistance, or permits, or that otherwise require approval or authorization from a Federal agency for an action, may be indirectly impacted by the designation of critical habitat, the legally binding duty to avoid destruction or adverse modification of critical habitat rests squarely on the Federal agency. Furthermore, to the extent that non-Federal entities are indirectly impacted because they receive Federal assistance or participate in a voluntary Federal aid program, the Unfunded Mandates Reform Act would not apply, nor would critical habitat shift the costs of the large entitlement programs listed above onto State governments. (2) We do not believe that this rule would significantly or uniquely affect small governments. The lands being proposed for critical habitat designation are owned by cities, Tribes, the State of California or Oregon, and the National Park Service, Bureau of Land Management, or the U.S Forest Service. None of these government entities fits the definition of a ``small governmental jurisdiction.'' Therefore, a Small Government Agency Plan is not required.Takings--Executive Order 12630 In accordance with E.O 12630 (Government Actions and Interference with Constitutionally Protected Private Property Rights), we have analyzed the potential takings implications of designating critical habitat for the coastal marten in a takings implications assessment. The Act does not authorize the Service to regulate private actions on private lands or confiscate private property as a result of critical habitat designation. Designation of critical habitat does not affect land ownership, or establish any closures, or restrictions on use of or access to the designated areas. Furthermore, the designation of critical habitat does not affect landowner actions that do not require Federal funding or permits, nor does it preclude development of habitat conservation programs or issuance of incidental take permits to permit actions that do require Federal funding or permits to go forward. However, Federal agencies are prohibited from carrying out, funding, or authorizing actions that would destroy or adversely modify critical habitat. A takings implications assessment has been completed for the proposed designation of critical habitat for coastal marten, and it concludes that, if adopted, this designation of critical habitat does not pose significant takings implications for lands within or affected by the designation.Federalism--Executive Order 13132 In accordance with E.O 13132 (Federalism), this proposed rule does not have significant Federalism effects. A federalism summary impact statement is not required. In keeping with Department of the Interior and Department of Commerce policy, we requested information from, and coordinated development of this proposed critical habitat designation with, appropriate State resource agencies. From a federalism perspective, the designation of critical habitat directly affects only the responsibilities of Federal agencies. The Act imposes no other duties with respect to critical habitat, either for State and local governments, or for anyone else. As a result, the proposed rule does not have substantial direct effects either on the States, or on the relationship between the national government and the States, or on the distribution of powers and responsibilities among the various levels of government. The proposed designation may have some benefit to these governments because the areas that contain the features essential to the conservation of the species are more clearly defined, and the physical or biological features of the habitat necessary for the conservation of the species are specifically identified. This information does not alter where and[[Page 58851]]what federally sponsored activities may occur. However, it may assist State and local governments in long-range planning because they no longer have to wait for case-by-case section 7 consultations to occur. Where State and local governments require approval or authorization from a Federal agency for actions that may affect critical habitat, consultation under section 7(a)(2) of the Act would be required. While non-Federal entities that receive Federal funding, assistance, or permits, or that otherwise require approval or authorization from a Federal agency for an action, may be indirectly impacted by the designation of critical habitat, the legally binding duty to avoid destruction or adverse modification of critical habitat rests squarely on the Federal agency.Civil Justice Reform--Executive Order 12988 In accordance with Executive Order 12988 (Civil Justice Reform), the Office of the Solicitor has determined that the rule would not unduly burden the judicial system and that it meets the requirements of sections 3(a) and 3(b)(2) of the Order. We have proposed designating critical habitat in accordance with the provisions of the Act. To assist the public in understanding the habitat needs of the species, this proposed rule identifies the elements of physical or biological features essential to the conservation of the species. The proposed areas of designated critical habitat are presented on maps, and the proposed rule provides several options for the interested public to obtain more detailed location information, if desired.Paperwork Reduction Act of 1995 (44 U.S.C 3501 et seq.) This rule does not contain information ***collection*** requirements, and a submission to the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (44 U.S.C 3501 et seq.) is not required. We may not conduct or sponsor and you are not required to respond to a ***collection*** of information unless it displays a currently valid OMB control number.National Environmental Policy Act (42 U.S.C 4321 et seq.) It is our position that, outside the jurisdiction of the U.S Court of Appeals for the Tenth Circuit, we do not need to prepare environmental analyses pursuant to the National Environmental Policy Act (NEPA; 42 U.S.C 4321 et seq.) in connection with designating critical habitat under the Act. We published a notice outlining our reasons for this determination in the Federal Register on October 25, 1983 (48 FR 49244). This position was upheld by the U.S Court of Appeals for the Ninth Circuit (Douglas County v. Babbitt, 48 F.3d 1495 (9th Cir. 1995), cert. denied 516 U.S 1042 (1996)).Government-to-Government Relationship With Tribes In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we readily acknowledge our responsibilities to work directly with Tribes in developing programs for healthy ecosystems, to acknowledge that Tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to Tribes. The Yurok Tribe has lands identified in the proposed designation. We have coordinated with the Tribe in development of the SSA and will continue to work with the Yurok Tribe throughout the process of designating critical habitat for the coastal marten.References Cited A complete list of references cited in this rulemaking is available on the internet at [*http://www.regulations.gov*](http://www.regulations.gov) and upon request from the Arcata Fish and Wildlife Office (see FOR FURTHER INFORMATION CONTACT).Authors The primary authors of this proposed rule are the staff members of the Fish and Wildlife Service's Species Assessment Team and the Arcata Fish and Wildlife Field Office and Oregon State Fish and Wildlife Service Office.List of Subjects in 50 CFR Part 17 Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.Proposed Regulation Promulgation Accordingly, we propose to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:PART 17--ENDANGERED AND THREATENED WILDLIFE AND PLANTS01. The authority citation for part 17 continues to read as follows: Authority: 16 U.S.C 1361-1407; 1531-1544; 4201-4245, unless otherwise noted.02. Amend Sec. 17.11(h) by revising the entry for ``Marten, Pacific [Coastal DPS]'' under MAMMALS in the List of Endangered and Threatened Wildlife to read as follows:Sec. 17.11 Endangered and threatened wildlife.\* \* \* \* \* (h) \* \* \*---------------------------------------------------------------------------------------------------------------- Listing citations Common name Scientific name Where listed Status and applicable rules---------------------------------------------------------------------------------------------------------------- Mammals \* \* \* \* \* \* \*Marten, Pacific [coastal DPS].... Martes caurina..... U.S.A (CA (north- T 85 FR 63806, 10/8/ western), OR 2020; 50 CFR (western)). 17.40(s).\4d\ 50 CFR 17.95(a).\CH\ \* \* \* \* \* \* \*----------------------------------------------------------------------------------------------------------------03. In Sec. 17.95, amend paragraph (a) by adding an entry for ``Pacific Marten (Martes caurina), Coastal DPS'' after the entry for ``Florida Manatee (Trichechus manatus)'' to read as follows:Sec. 17.95 Critical habitat--fish and wildlife. (a) Mammals.\* \* \* \* \*[[Page 58852]]Pacific Marten (Martes caurina), Coastal DPS (1) Critical habitat units are depicted for California and Oregon, on the maps below in this entry. (2) Within these areas, the physical or biological features (PBFs) essential to the conservation of the Pacific marten (Coastal DPS) consist of the following components: (i) Habitat that supports a coastal marten home range by providing for breeding, denning, resting, or foraging. This habitat provides cover and shelter to facilitate thermoregulation and reduce predation risk, foraging sources for marten prey, and structures that provide resting and denning sites. To provide cover and support denning, resting, and foraging, coastal martens require a mature forest overstory, dense understory development, and biologically complex structure that contains snags, logs, other decay elements, or other structures that support denning, resting, or marten prey. Stands meeting the conditions for PBF 1 would also function as meeting PBF 2 (facilitating movement within and between coastal marten home ranges). Stands meeting the condition for PBF 1 contain each of the following three components: (A) Mature, conifer-dominated forest overstory. Overstory canopy cover provides protection to coastal martens from aerial and terrestrial predators, as well as shelter from physical elements such as sun or storms. It also is the source of structural features that coastal martens use for denning and resting, and provides suitable marten prey. Suitable overstory conditions vary depending on the productivity of the site as follows: (1) For areas with relatively low productivity (e.g , areas where growing conditions are harsher, such as serpentine sites or coastal shore pine forests, compared to other areas), suitable forest overstory conditions are highly ***variable***. They may contain a sparse conifer overstory, such as in some serpentine areas, or a dense conifer overstory composed mainly of trees smaller than the typical older forest conditions described below in paragraph (2)(i)(B)(2) of this entry (e.g , the dense shore pine overstory found in areas occupied by marten along the Oregon coast). (2) For other areas with higher productivity, martens tend to favor forest stands in the old-growth or late-mature seral stages. The specific forest composition and structure conditions found in higher productivity areas will vary by plant series and site class. Structural and composition descriptions of old-growth or late-mature seral stages for local plant community series should be used where available. In general these stands exhibit high levels of canopy cover and structural diversity in the form of: (i) A wide range of tree sizes, including trees with large diameter and height; (ii) Deep, dense tree canopies with multiple canopy layers and irregular tree crowns; (iii) High numbers of snags, including large-diameter snags; and (iv) Abundant down wood, including large logs, ideally in a variety of decay stages. (B) Dense, spatially extensive shrub layer. The shrub layer should be greater than 70 percent of the area, comprising mainly shade-tolerant, long-lived, mast-producing species (primarily ericaceous species such as salal, huckleberry, or rhododendron, as well as shrub oaks). An extensive layer of dense shrubs provides protection and cover from coastal marten predators. In addition, ericaceous and mast-producing shrubs provide forage for marten prey. (C) Stands with structural features. Structural features that support denning or resting, such as large down logs, rock piles with interstitial spaces, and large snags or live trees with decay elements or suitable resting structures (e.g , hollows and cavities, forked or broken tops, dead tops, brooms from mistletoe or other tree pathogens, or large platforms including abandoned nests). These features provide cover and thermal protection for kits and denning females, and for all animals when they are resting between foraging bouts. Hence, these features need to be distributed throughout a coastal marten home range. They also tend to be among the largest structures in the stand. Many of these features, such as down logs and snags or live trees with decayed elements, also support coastal marten prey. (ii) Habitat that allows for movement within home ranges among stands that meet PBF 1 or that supports individuals dispersing between home ranges. Habitat within PBF 2 includes: (A) Stands that meet all three conditions of PBF1; (B) Forest stands that meet only the first two components of PBF 1 (mature, conifer-dominated forest overstory and a dense, spatially extensive shrub layer); or (C) Habitats with lesser amounts of shrub, canopy, or forest cover, or lesser amounts of smaller structural features as described in PBF 1, and while not meeting the definition of PBF 1, would still provide forage and cover from predators that would allow a coastal marten to traverse the landscape to areas of higher quality habitat. (3) Critical habitat does not include manmade structures (such as buildings, aqueducts, runways, roads, and other paved or hardened areas as a result of development) and the land on which they are located existing within the legal boundaries of the critical habitat units for the species on [EFFECTIVE DATE OF THE FINAL RULE]. Due to the scale on which the critical habitat boundaries are developed, some areas within these legal boundaries may not contain the physical or biological features and therefore are not considered critical habitat. (4) Critical habitat map units. In the critical habitat map units, ***data*** layers defining map units were created using ArcGIS Pro 2.5.2 (Environmental Systems Research Institute, Inc. (ESRI)), a Geographic Information Systems (GIS) program. ESRI base maps of world topographic, world imagery, and the program's world imagery USGS Imagery were used. Base map service was last refreshed April 2020. Critical habitat units were then mapped using North American Datum (NAD) 1983, Albers. The maps in this entry, as modified by any accompanying regulatory text, establish the boundaries of the critical habitat designation. The coordinates or plot points or both on which each map is based are available to the public at the Service's Arcata Fish and Wildlife Office's internet site at [*http://www.fws.gov/arcata*](http://www.fws.gov/arcata), or on [*http://www.regulations.gov*](http://www.regulations.gov) at Docket No. FWS-R8-ES-2020-0151, and at the field office responsible for this designation. You may obtain field office location information by contacting one of the Service regional offices, the addresses of which are listed at 50 CFR 2.2 [[Page 58853]] (5) Note: Index map for California and Oregon follows:BILLING CODE 4333-15-P[GRAPHIC] [TIFF OMITTED] TP25OC21.000[[Page 58854]] (6) Unit 1: Siuslaw Unit, Lincoln and Lane Counties, Oregon. (i) General description: Unit 1 consists of 95,218 ac (38,543 ha) and comprises Federal (94,094 ac (37,673 ha)), State (2,124 ac (859 ha)), and less than 1 ac (1 ha) other lands. (ii) Map of Unit 1 follows: [GRAPHIC] [TIFF OMITTED] TP25OC21.001 [[Page 58855]] (7) Unit 2: Siltcoos Unit. Lane and Douglas Counties, Oregon. (i) General description: Unit 2 consists of 8,830 ac (3,574 ha) and comprises Federal (8,582 ac (3,472 ha)) and State (249 ac (101 ha)) lands. (ii) Map of Unit 2 follows: [GRAPHIC] [TIFF OMITTED] TP25OC21.002 [[Page 58856]] (8) Unit 3: Coos Bay Unit. Douglas and Coos Counties, Oregon. (i) General description: Unit 3 consists of 15,582 ac (6,306 ha) and comprises Federal (14,934 ac (6,044 ha)) and State (648 ac (262 ha)) lands. (ii) Map of Unit 3 follows: [GRAPHIC] [TIFF OMITTED] TP25OC21.003 [[Page 58857]] (9) Unit 4: Cape Blanco Unit. Coos and Curry Counties, Oregon. (i) General description: Unit 4 consists of 4,046 ac (1,637 ha) and comprises Federal (1,021 ac (413 ha)) and State (3,025 ac (1,224 ha)) lands. (ii) Map of Unit 4 follows: [GRAPHIC] [TIFF OMITTED] TP25OC21.004 [[Page 58858]] (10) Unit 5: Klamath Mountains Unit. Coos, Curry, Douglas, and Josephine Counties, Oregon. Del Norte, Humboldt, and Siskiyou Counties, California. (i) General description: Unit 5 consists of 1,289,627 ac (521,913 ha) and comprises Federal (1,154,197 ac (467,103 ha)), State (19,829 ac (8,024 ha)), Tribal (26,126 ac (10,573 ha)), and private or undefined (89,475 ac (36,210 ha)) lands. (ii) Map of Unit 5 follows: [GRAPHIC] [TIFF OMITTED] TP25OC21.005 \* \* \* \* \*Martha Williams,Principal Deputy Director, Exercising the Delegated Authority of the Director, U.S Fish and Wildlife Service.[FR Doc. 2021-22994 Filed 10-22-21; 8:45 am]BILLING CODE 4333-15-C

**Load-Date:** October 26, 2021

**End of Document**



[***Federal Register: Protection of Stratospheric Ozone: Listing of HFO-1234yf Under the Significant New Alternatives Policy Program for Motor Vehicle Air Conditioning in Nonroad Vehicles and Servicing Fittings for Small Refrigerant Cans Pages 26276 - 26295 [FR DOC #2022-08923]***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:65D1-KHP1-JDG9-Y1MC-00000-00&context=1516831)

Impact News Service

May 6, 2022 Friday

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**Length:** 23761 words

**Body**

Washington: Office of the Federal Register has issued the following notice:ENVIRONMENTAL PROTECTION AGENCY40 CFR Part 82[EPA-HQ-OAR-2021-0347; FRL-8470-01-OAR]RIN 2060-AV25Protection of Stratospheric Ozone: Listing of HFO-1234yf Under the Significant New Alternatives Policy Program for Motor Vehicle Air Conditioning in Nonroad Vehicles and Servicing Fittings for Small Refrigerant CansAGENCY: Environmental Protection Agency (EPA).ACTION: Final rule.-----------------------------------------------------------------------SUMMARY: Pursuant to the EPA's Significant New Alternatives Policy program, this action lists the refrigerant 2,3,3,3-tetrafluoroprop-1-ene, also known as HFO-1234yf or R-1234yf, as acceptable, subject to use conditions, in the motor vehicle air conditioning end-use for certain types of newly manufactured nonroad (also called off-road) vehicles, which includes some vehicles that are also considered heavy-duty vehicles. EPA is also adopting the current versions of the industry safety standards SAE J639, SAE J1739, and SAE J2844 by incorporating them by reference into the use conditions for the listings in nonroad vehicles and previous listings for certain onroad vehicles covered in final rules issued separately in March 2011 and December 2016. In addition, EPA is requiring unique servicing fittings for use with small refrigerant cans (two pounds or less) of 2,3,3,3-tetrafluoroprop-1-ene that are used to service onroad and nonroad vehicles. Finally, EPA is adding a reference to the Agency's regulations under the Toxic Substances Control Act for 2,3,3,3-tetrafluoroprop-1-ene for the listings in nonroad vehicles and previous listings for certain onroad vehicles.DATES: This final rule is effective on June 3, 2022. The incorporation by reference of certain publications listed in the rule is approved by the Director of the Federal Register as of June 3, 2022.ADDRESSES: EPA has established a docket for this action under Docket ID No. EPA-HQ-OAR-2021-0347. All documents in the docket are listed on the [*www.regulations.gov*](http://www.regulations.gov) website. Although listed in the index, some information is not publicly available, e.g , CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the internet and will be publicly available only in hard copy form. Publicly available docket materials are available electronically through [*www.regulations.gov.FOR*](http://www.regulations.gov.FOR) FURTHER INFORMATION CONTACT: Chenise Farquharson, Stratospheric Protection Division, Office of Atmospheric Programs (Mail Code 6205 T), Environmental Protection Agency, 1200 Pennsylvania Ave. NW, Washington, DC 20460; telephone number: 202-564-7768; email address: [*farquharson.chenise@epa.gov*](mailto:farquharson.chenise@epa.gov) Notices and rulemakings under EPA's Significant New Alternatives Policy program are available on EPA's Stratospheric Ozone website at [*www.epa.gov/snap/snap-regulations.SUPPLEMENTARY*](http://www.epa.gov/snap/snap-regulations.SUPPLEMENTARY) INFORMATION: Table of ContentsI. General Information A. Executive Summary and Background B. SNAP Program Background 1. Rulemaking 2. Listing of Unacceptable/Acceptable Substitutes 3. Petition Process 4. 90-Day Notification C. Does this action apply to me? D. 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Executive Summary and Background As proposed, EPA is listing 2,3,3,3-tetrafluoroprop-1-ene, also known as hydrofluoroolefin (HFO)-1234yf or R-1234yf, hereafter referred to as ``HFO-1234yf,'' as acceptable, subject to use conditions, under the Significant New Alternatives Policy (SNAP) program, as of 30 days after publication of this final rule, for motor vehicle air conditioning (MVAC) systems \1\ in the following types[[Page 26277]]of newly manufactured (hereafter ``new'') \2\ nonroad vehicles,\3\ including some vehicles that are also considered heavy-duty (HD) \4\ vehicles:--------------------------------------------------------------------------- \1\ Under the SNAP program, MVAC systems are those systems that provide passenger comfort cooling for light-duty cars and trucks, heavy-duty vehicles (large pickups, delivery trucks, recreational vehicles, and semi-trucks), nonroad vehicles, buses, and rail vehicles. See final rules published on March 29, 2011 (76 FR 17488) and on December 1, 2016 (81 FR 86778). For informational purposes, we note that this includes systems that are also included in the definitions that apply under other provisions of EPA's regulations under title VI of the CAA. In this regard, we note that EPA's subpart F regulations at 40 CFR 82.152 define MVAC-like appliance to mean a mechanical vapor compression, open-drive compressor appliance with a full charge of 20 pounds or less of refrigerant used to cool the driver's or passenger's compartment of off-road vehicles or equipment. This includes, but is not limited to, the air-conditioning equipment found on ***agricultural*** or construction vehicles. This definition is not intended to cover appliances using R-22 refrigerant. By contrast, EPA's subpart F regulations at 40 CFR 82.152 define Motor vehicle air conditioner (MVAC) as ``any appliance that is a motor vehicle air conditioner as defined in 40 CFR part 82, subpart B. The subpart B regulations at 40 CFR 82.32 provide that: Motor vehicle air conditioners means mechanical vapor compression refrigeration equipment used to cool the driver's or passenger's compartment of any motor vehicle. This definition is not intended to encompass the hermetically sealed refrigeration systems used on motor vehicles for refrigerated cargo and the air conditioning systems on passenger buses using HCFC-22 refrigerant. Further, the subpart B regulations at 40 CFR 82.32 provide that: Motor vehicle as used in this subpart means any vehicle which is self-propelled and designed for transporting persons or property on a street or highway, including but not limited to passenger cars, light duty vehicles, and heavy duty vehicles. This definition does not include a vehicle where final assembly of the vehicle has not been completed by the original equipment manufacturer. \2\ This is intended to mean a completely new refrigeration circuit containing a new compressor, evaporator, condenser, and refrigerant tubing. \3\ In the past, EPA has referred to these vehicles as ``off-road vehicles'' under the SNAP program. In this action, we are aligning our terminology with that of other EPA programs and using the term ``nonroad vehicle,'' which is defined under CAA section 216 to mean ``a vehicle that is powered by a nonroad engine and that is not a motor vehicle or a vehicle used solely for competition.'' EPA's regulations issued under that section of the Act defining a nonroad engine are codified at subpart A of 40 CFR part 1068. \4\ Heavy-duty vehicles are often subdivided by vehicle weight classifications, as defined by the vehicle's gross vehicle weight rating (GVWR), which is a measure of the combined curb (empty) weight and cargo carrying capacity of the truck. Heavy-duty vehicles have GVWRs above 8,500. See [*https://www.epa.gov/emission-standards-reference-guide/vehicle-weight-classifications-emission-standards-reference-guide.---------------------------------------------------------------------------*](https://www.epa.gov/emission-standards-reference-guide/vehicle-weight-classifications-emission-standards-reference-guide.---------------------------------------------------------------------------) ***Agricultural*** tractors with greater than 40 horsepower (HP); Self-propelled ***agricultural*** machinery; Compact equipment; Construction, forestry, and mining equipment; and Commercial utility vehicles. EPA received four comments on the proposed rule from refrigerant suppliers and equipment manufacturers, and all commenters strongly supported finalizing the rule as proposed. The comment summaries and EPA's responses to the comments are below in section II.F EPA has previously listed HFO-1234yf as acceptable, subject to use conditions, in new light-duty (LD) passenger cars and trucks (76 FR 17488; March 29, 2011) and new medium-duty passenger vehicles (MDPV), HD pickup trucks, and complete HD vans (81 FR 86778; December 1, 2016). The use conditions for those prior listings, which are intended to mitigate flammability and toxicity risks, require that MVAC systems designed to use HFO-1234yf meet the requirements of three technical safety standards developed by SAE International (SAE) (i.e , SAE J639, SAE J1739, and SAE J2844). In this action, EPA is requiring the same use conditions, with certain updates discussed below, for MVAC systems designed to use HFO-1234yf in certain new nonroad vehicles. EPA is listing HFO-1234yf as acceptable, subject to use conditions, after its evaluation of human health and environmental information on various substitutes submitted to the SNAP program. In listing HFO-1234yf as acceptable, subject to use conditions, this action provides additional flexibility for industry stakeholders by expanding the list of acceptable substitutes for certain types of nonroad vehicles. EPA is also adopting the current versions of SAE J639, SAE J1739, and SAE J2844 by incorporating them by reference into the use conditions for the nonroad vehicles addressed in this action. EPA is also modifying the use conditions for the previous listings of HFO-1234yf in certain onroad vehicles to replace the references to older versions of the three SAE standards with references to the current versions. The current versions of the three standards are SAE J639 (revised November 2020), ``Safety and Design Standards for Motor Vehicle Refrigerant Vapor Compression Systems;'' SAE J1739 (revised January 2021), ``Potential Failure Mode and Effects Analysis (FMEA) Including Design FMEA, Supplemental FMEA-MSR, and Process FMEA;'' and SAE J2844 (revised January 2013), ``R-1234yf (HFO-1234yf) New Refrigerant Purity and Container Requirements for Use in Mobile Air-Conditioning Systems.'' In addition, EPA is including a use condition, which requires unique servicing fittings, to provide for servicing MVAC systems in the nonroad vehicles addressed in this action, including use of small refrigerant cans (two pounds or less). For the previous listings of HFO-1234yf in certain onroad vehicles, EPA is revising the use conditions to require unique servicing fittings for use with small cans (two pounds or less). Finally, EPA is including a reference to the Agency's Significant New Use Rule (SNUR) for HFO-1234yf under the Toxic Substances Control Act (80 FR 37166, June 30, 2015) in Appendix B subpart G of part 82, under the `Comments' column, for the listings of HFO-1234yf for the nonroad vehicles addressed in this action, as well as for all the previous listings of HFO-1234yf in certain onroad vehicles. The SNUR states that commercial users or consumers can only recharge MVAC systems with HFO-1234yf where the original charging of the system with HFO-1234yf was done by the Original Equipment Manufacturer (OEM). The Agency is not modifying regulations promulgated under section 608 of the Clean Air Act (CAA). EPA notes that there are additional requirements that concern the sale or offer for sale of refrigerants, including a sales restriction under the regulations implementing CAA section 608, which can be found at 40 CFR part 82 subpart F. These regulations collectively comprise the national recycling and emissions reduction program and may be commonly referred to as the stationary refrigeration and air conditioning management program. The general sales restriction provisions are codified at 40 CFR 82.154(c) and the specifications for self-sealing valves relevant to an exemption to the sales restriction for small cans of MVAC refrigerant are codified at 40 CFR 82.154(c)(2). This action does not modify the provisions under 40 CFR 82.154, including the restriction on the sale of substitute refrigerants and requirements for self-sealing valves.B. SNAP Program Background The SNAP program implements CAA section 612. Several major provisions of section 612 are:1. Rulemaking Section 612 requires EPA to promulgate rules making it unlawful to replace any class I (chlorofluorocarbon (CFC), halon, carbon tetrachloride, methyl chloroform, methyl bromide fluorocarbon, and chlorobromomethane) or class II (hydrochlorofluorocarbon (HCFC)) ozone-depleting substances (ODS) with any substitute that the Administrator determines may present adverse effects to human health or the environment where the Administrator has identified an alternative that (1) reduces the overall risk to human health and the environment and (2) is currently or potentially available.2. Listing of Unacceptable/Acceptable Substitutes Section 612(c) requires EPA to publish a list of the substitutes that it finds to be unacceptable for specific uses and to publish a corresponding list of acceptable substitutes for specific uses.3. Petition Process Section 612(d) grants the right to any person to petition EPA to add a substance to, or delete a substance from, the lists published in accordance with section 612(c).4. 90-Day Notification Section 612(e) directs EPA to require any person who produces a chemical substitute for a class I substance to notify the Agency not less than 90 days before a new or existing chemical is introduced into interstate commerce for significant new use as a substitute for a class I substance.\5\ The producer must[[Page 26278]]also provide the Agency with the producer's unpublished health and safety studies on such substitutes.--------------------------------------------------------------------------- \5\ EPA's SNAP regulations at 40 CFR 82.176 extend this requirement to substitutes for class II substances, providing that ``[a]ny producer of a new substitute must submit a notice of intent to introduce a substitute into interstate commerce 90 days prior to such introduction.''--------------------------------------------------------------------------- The regulations for the SNAP program are promulgated at 40 CFR part 82, subpart G, and the Agency's process for reviewing SNAP submissions is described in regulations at 40 CFR 82.180 Under these rules, the Agency has identified five types of listing decisions: Acceptable; acceptable subject to use conditions; acceptable subject to narrowed use limits; unacceptable; and pending (40 CFR 82.180(b)). Use conditions and narrowed use limits are both considered ``use restrictions,'' as described below. Substitutes that are deemed acceptable with no use restrictions (no use conditions or narrowed use limits) can be used for all applications within the relevant end-uses in the sector. After reviewing a substitute, the Agency may determine that a substitute is acceptable only if certain conditions in the way that the substitute is used are met to minimize risks to human health and the environment. EPA describes such substitutes as ``acceptable subject to use conditions.'' (40 CFR 82.180(b)(2)). For some substitutes, the Agency may permit a narrowed range of use within an end-use or sector. For example, the Agency may limit the use of a substitute to certain end-uses or specific applications within an industry sector. EPA describes these substitutes as ``acceptable subject to narrowed use limits.'' Under the narrowed use limit, users intending to adopt these substitutes ``must ascertain that other alternatives are not technically feasible.'' (40 CFR 82.180(b)(3)). In making decisions regarding whether a substitute is acceptable or unacceptable, and whether substitutes present risks that are lower than or comparable to risks from other substitutes that are currently or potentially available in the end-uses under consideration, EPA examines the criteria in 40 CFR 82.180(a)(7): (i) Atmospheric effects and related health and environmental impacts; (ii) general population risks from ambient exposure to compounds with direct toxicity and to increased ground-level ozone; (iii) ecosystem risks; (iv) occupational risks; (v) consumer risks; (vi) flammability; and (vii) cost and availability of the substitute. Many SNAP listings include ``comments'' or ``further information'' to provide additional information on substitutes. Since this additional information is not part of the regulatory decision, these statements are not binding for use of the substitute under the SNAP program. However, regulatory requirements so listed are binding as applicable under other regulatory programs (e.g , worker protection regulations promulgated by the U.S Occupational Safety and Health Administration (OSHA)). The ``further information'' classification does not necessarily include all other legal obligations pertaining to the use of the substitute. While the items listed are not legally binding under the SNAP program, EPA encourages users of substitutes to apply all statements in the ``further information'' column in their use of these substitutes. In many instances, the information simply refers to sound operating practices that have already been identified in existing industry and/or building codes or standards. Thus, many of the statements, if adopted, would not require the affected user to make significant changes in existing operating practices. For additional information on the SNAP program, visit the SNAP portion of EPA's Ozone Layer Protection website at [*https://www.epa.gov/snap*](https://www.epa.gov/snap). Copies of the full lists of acceptable substitutes for ODS in all industrial sectors are available at [*https://www.epa.gov/snap/snap-substitutes-sector*](https://www.epa.gov/snap/snap-substitutes-sector). For more information on the Agency's process for administering the SNAP program or criteria for evaluation of substitutes, refer to the initial SNAP rulemaking published March 18, 1994 (59 FR 13044), codified at 40 CFR part 82, subpart G. SNAP decisions and the appropriate Federal Register citations are found at: [*https://www.epa.gov/snap/snap-regulations*](https://www.epa.gov/snap/snap-regulations). Substitutes listed as unacceptable; acceptable, subject to narrowed use limits; or acceptable, subject to use conditions, are also listed in the appendices to 40 CFR part 82, subpart G. In this action, EPA refers to listings made in a final rule issued on December 1, 2016, at 81 FR 86778 (``2016 Rule'') in which the Agency listed HFO-1234yf as acceptable, subject to use conditions, in new MDPV, HD pickup trucks, and complete HD vans. The 2016 Rule also changed the listings for certain hydrofluorocarbons (HFCs) and blends from acceptable to unacceptable in various end-uses in the refrigeration and air conditioning, foam blowing, and fire suppression sectors. After a challenge to the 2016 Rule, the United States Court of Appeals for the District of Columbia Circuit (``the court'') issued a partial vacatur of the 2016 Rule ``only to the extent it requires manufacturers to replace HFCs that were previously and lawfully installed as substitutes for ozone-depleting substances.'' \6\ The court's decision on the 2016 Rule did not vacate the listing of HFO-1234yf for certain types of vehicles, and this final rule is not EPA's response to the court's decision on the 2016 Rule.--------------------------------------------------------------------------- \6\ Mexichem Fluor, Inc. v. EPA, No. 17-1024, 760 Fed. Appx. 6, 9 (D.C Cir., April 5, 2019).---------------------------------------------------------------------------C. Does this action apply to me? The following list identifies types of regulated entities that may be affected by this action and their respective North American Industrial Classification System (NAICS) codes: All Other Basic Organic Chemical Manufacturing (NAICS 325199) All Other General Merchandise Stores (NAICS 452990) All Other Miscellaneous Chemical Product and Preparation Manufacturing (NAICS 325998) Automotive Parts and Accessories Stores (NAICS 441310) Automotive Repair Shops Not Elsewhere Classified, Including Air Conditioning and Radiator Specialty Shops (NAICS 811198) Gasoline Stations with Convenience Stores (NAICS 447110) General automotive repair shops (NAICS 811111) Heavy Duty Truck Manufacturing (NAICS 336120) Industrial Gas Manufacturing (NAICS 32512) Motor Vehicle Body Manufacturing (NAICS 336211) Motor Vehicle Parts Manufacturing (NAICS 3363) Other Automotive Repair and Maintenance (NAICS 81119) Other Motor Vehicle Parts Manufacturing (NAICS 336390) Recyclable Material Merchant Wholesalers (NAICS 423930) Refrigeration Equipment and Supplies Merchant Wholesalers (NAICS 423740) This list is not intended to be exhaustive but provides a guide for readers regarding types of entities likely to be regulated by this action. This list includes the types of entities that EPA is now aware could potentially be regulated by this action. Other types of entities not listed above could also be regulated. To determine whether your facility, company, business, or organization could be affected by this action, you should carefully examine the regulations at 40 CFR part 82, subpart G. If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the FOR FURTHER INFORMATION CONTACT section.[[Page 26279]]D. What acronyms and abbreviations are used in the preamble? Below is a list of acronyms and abbreviations used in the preamble of this document:AIHA--American Industrial Hygiene AssociationAC--Air ConditioningACH--Air Changes Per HourAEM--Association of Equipment ManufacturersANSI--American National Standards InstituteASHRAE--American Society of Heating, Refrigerating and Air-Conditioning EngineersASTM--American Society for Testing and MaterialsATEL--Acute Toxicity Exposure LimitCAA--Clean Air ActCAS Reg. No.--Chemical Abstracts Service Registry Identification NumberCBI--Confidential Business InformationCFC--ChlorofluorocarbonCFD--Computational Fluid DynamicsCFR--Code of Federal RegulationsCGA--Compressed Gas AssociationCO2--Carbon DioxideCRP--Cooperative Research ProjectDIY--Do-It-YourselfE.O --Executive OrderEPA--United States Environmental Protection AgencyFCL--Flammability Concentration LimitFMEA--Failure Mode and Effects AnalysisFR--Federal RegisterGHG--Greenhouse GasGWP--Global Warming PotentialGVWR--Gross Vehicle Weight RatingHCFC--HydrochlorofluorocarbonHD--Heavy-DutyHD GHG--Heavy-Duty Greenhouse GasHF--Hydrogen FluorideHFC--HydrofluorocarbonHFO--HydrofluoroolefinHP--HorsepowerICF--ICF International, Inc.IPCC--Intergovernmental Panel on Climate ChangeLD--Light-DutyLD GHG--Light-Duty Greenhouse GasLFL--Lower Flammability LimitMDPV--Medium-Duty Passenger VehicleMVAC--Motor Vehicle Air ConditioningMY--Model YearNAAQS--National Ambient Air Quality StandardsNAICS--North American Industrial Classification SystemNOAEL--No Observed Adverse Effect LevelNRC--National Research CouncilOEM--Original Equipment ManufacturerODP--Ozone Depletion PotentialODS--Ozone-depleting SubstanceOMB--Office of Management and BudgetOSHA--Occupational Safety and Health AdministrationPPE--Personal Protective Equipmentppm--Parts Per MillionPRA--Paperwork Reduction ActRCL--Reference Concentration LimitRFA--Regulatory Flexibility ActSAE--SAE InternationalSDS--Safety ***Data*** SheetSIP--State Implementation PlanSNAP--Significant New Alternatives PolicySNUN--Significant New Use NoticeSNUR--Significant New Use RuleSTEL--Short-term Exposure LimitTFA--Trifluoroacetic AcidTLV--Threshold Limit ValueTSCA--Toxic Substances Control ActTWA--Time Weighted AverageUFL--Upper Flammability LimitUMRA--Unfunded Mandates Reform ActUSGCRP--U.S Global Change Research ProgramVOC--Volatile Organic CompoundsWEEL--Workplace Environmental Exposure LimitII. What is EPA finalizing in this action?A. Listing of HFO-1234yf as Acceptable, Subject to use Conditions, for MVAC Systems in Certain new Nonroad Vehicles As proposed, (86 FR at 68968; December 6, 2021), EPA is listing HFO-1234yf as acceptable, subject to use conditions, for MVAC systems in several types of new nonroad vehicles, specifically: ***Agricultural*** tractors greater than 40 HP; self-propelled ***agricultural*** machinery; compact equipment; construction, forestry, and mining equipment; and commercial utility vehicles. All MVAC refrigerants listed as acceptable are subject to use conditions requiring labeling and the use of unique fittings as described in Appendix B to subpart G of part 82--Substitutes Subject to Use Restrictions and Unacceptable Substitutes. EPA is listing HFO-1234yf as acceptable, subject to use conditions, in the five nonroad vehicle types. The use conditions require that MVAC systems designed to use HFO-1234yf meet the requirements of SAE J639, SAE J1739, and SAE J2844 to help ensure that use of HFO-1234yf does not have a significantly greater overall impact on human health and the environment than other alternatives for use in those vehicles. EPA is updating the existing use conditions that are currently required for the use of HFO-1234yf in MVAC systems in new LD vehicles, MDPVs, HD pickup trucks, and complete HD vans and applying them to all the MVAC systems addressed in this action. The use conditions are detailed below in section II.A.4, ``What are the use conditions?''1. What is the affected end-use? Under SNAP, MVAC systems cool the passenger compartment of LD passenger vehicles and trucks, HD vehicles (e.g , large pickups, delivery trucks, and semi-trucks), off[hyphen]road vehicles, buses, and passenger rail vehicles. These systems are typically charged during vehicle manufacture, and the main components are connected by flexible refrigerant lines. Nonroad vehicles can be grouped into several categories (i.e , ***agriculture***, construction, recreation, and many other purposes).\7\ The vehicle types addressed in this action include certain types of new nonroad vehicles, specifically:--------------------------------------------------------------------------- \7\ EPA, 2021. Basic Information about the Emission Standards Reference Guide for On-road and Nonroad Vehicles and Engines. Available online at [*https://www.epa.gov/emission-standards-reference-guide/basic-information-about-emission-standards-reference-guide-road*](https://www.epa.gov/emission-standards-reference-guide/basic-information-about-emission-standards-reference-guide-road) and in the docket for this rulemaking at [*https://nepis.epa.gov/Exe/ZyPDF.cgi/P100K5U2.PDF?Dockey=P100K5U2.PDF.---------------------------------------------------------------------------*](https://nepis.epa.gov/Exe/ZyPDF.cgi/P100K5U2.PDF?Dockey=P100K5U2.PDF.---------------------------------------------------------------------------) ***Agricultural*** tractors greater than 40 HP (including two-wheel drive (2WD), mechanical front-wheel drive (MFD), four-wheel drive (4WD), and track tractors) that are used for a number of ***agricultural*** applications such as farm work, planting, landscaping, and loading; 8 9--------------------------------------------------------------------------- \8\ Wagner, 2021. May 24, 2021, email from John Wagner of the Association of Equipment Manufacturers to EPA. Available in the docket for this rulemaking. \9\ AEM, 2021. Appendix A: Machine Forms as Classified by AEM Membership. Available in the docket for this rulemaking.--------------------------------------------------------------------------- Self-propelled ***agricultural*** machinery (including combines, grain and corn harvesters, sprayers, windrowers, and floaters) that are primarily used for harvesting, fertilizer, and herbicide operations; \10\--------------------------------------------------------------------------- \10\ Ibid.--------------------------------------------------------------------------- Compact equipment (including mini excavators, turf mowers, skid-steer loaders, and tractors less than 40 HP) that are primarily used for ***agricultural*** operations and residential, commercial, and ***agricultural*** landscaping; \11\--------------------------------------------------------------------------- \11\ Ibid.--------------------------------------------------------------------------- Construction, forestry, and mining equipment (including excavators, bulldozers, wheel loaders, feller bunchers, log skidders, road graders, articulated trucks, sub-surface machines, horizontal directional drill, trenchers, and tracked crawlers) that are primarily used to excavate surface and subsurface materials during construction, landscaping, and road maintenance and building; \12\ and--------------------------------------------------------------------------- \12\ Ibid.--------------------------------------------------------------------------- Commercial utility vehicles that are primarily used for ranching, farming, hunting/fishing, construction, landscaping, property maintenance, railroad maintenance, forestry, and mining.\13\--------------------------------------------------------------------------- \13\ Ibid.--------------------------------------------------------------------------- These nonroad vehicles are almost exclusively used and operated by professionals (e.g , ***agricultural*** owners or skilled employees/operators) and vary by size, weight, use, and/or[[Page 26280]]horsepower.\14\ For example, commercial utility vehicles typically weigh between 1,200 and 2,400 pounds, while ***agricultural*** tractors >40 HP typically weigh between 39,000 and 50,000 pounds.15 16 MVAC systems in these nonroad vehicles can have charge sizes ranging from 650 grams (23 ounces) to 3,400 grams (120 ounces) depending on the manufacturer and cab size, compared to a range of 390 grams (14 ounces) to 1,600 grams (56 ounces) for MVAC systems in light and medium duty passenger vehicles, HD pickups, and complete HD vans.\17\ Additionally, unlike onroad passenger vehicles, for example, nonroad vehicles are limited to non-highway terrain (e.g , fields, construction sites, forests, and mines), have more robust components, are operated at low working speeds, and there are typically a limited number of vehicles in the same location.--------------------------------------------------------------------------- \14\ EPA, 2021. Basic Information about the Emission Standards Reference Guide for On-road and Nonroad Vehicles and Engines. Available online at [*https://www.epa.gov/emission-standards-reference-guide/basic-information-about-emission-standards-reference-guide-road*](https://www.epa.gov/emission-standards-reference-guide/basic-information-about-emission-standards-reference-guide-road) and in the docket for this rulemaking. \15\ Heavy-duty vehicles are often subdivided by vehicle weight classifications, as defined by the vehicle's gross vehicle weight rating (GVWR), which is a measure of the combined curb (empty) weight and cargo carrying capacity of the truck. Heavy-duty vehicles have GVWRs above 8,500. See [*https://www.epa.gov/emission-standards-reference-guide/vehicle-weight-classifications-emission-standards-reference-guide*](https://www.epa.gov/emission-standards-reference-guide/vehicle-weight-classifications-emission-standards-reference-guide). \16\ Wagner, 2021. May 24, 2021, email from John Wagner of the Association of Equipment Manufacturers to EPA. Available in the docket for this rulemaking. \17\ ICF, 2016. Technical Support Document for Acceptability Listing of HFO-1234yf for Motor Vehicle Air Conditioning in Limited Heavy-Duty Applications. Available in the public docket for this rulemaking.---------------------------------------------------------------------------2. What are the ANSI/ASHRAE classifications for refrigerant flammability? The American National Standards Institute/American Society of Heating, Refrigerating and Air Conditioning Engineers (ANSI/ASHRAE) Standard 34-2019 assigns a safety group classification for each refrigerant which consists of two to three alphanumeric characters (e.g , A2L or B1). The initial capital letter indicates the toxicity, and the numeral denotes the flammability. ASHRAE classifies Class A refrigerants as refrigerants for which toxicity has not been identified at concentrations less than or equal to 400 ppm by volume, based on ***data*** used to determine threshold limit value-time-weighted average (TLV-TWA) or consistent indices. Class B signifies refrigerants for which there is evidence of toxicity at concentrations below 400 ppm by volume, based on ***data*** used to determine TLV-TWA or consistent indices. Refrigerants are also assigned a flammability classification of 1, 2, 2L, or 3. Tests for flammability are conducted in accordance with American Society for Testing and Materials (ASTM) E681 using a spark ignition source at 140 [deg]F (60 [deg]C) and 14.7 psia (101.3 kPa) \18\ . The flammability classification ``1'' is given to refrigerants that, when tested, show no flame propagation. The flammability classification ``2'' is given to refrigerants that, when tested, exhibit flame propagation, have a heat of combustion less than 19,000 kJ/kg (8,169 Btu/lb.), and have a lower flammability limit (LFL) greater than 0.10 kg/m\3\. The flammability classification ``2L'' is given to refrigerants that, when tested, exhibit flame propagation, have a heat of combustion less than 19,000 kJ/kg (8,169 BTU/lb.), have an LFL greater than 0.10 kg/m\3\, and have a maximum burning velocity of 10 cm/s or lower when tested in dry air at 73.4 [deg]F (23.0 [deg]C) and 14.7 psia (101.3 kPa). The flammability classification ``3'' is given to refrigerants that, when tested, exhibit flame propagation and that either have a heat of combustion of 19,000 kJ/kg (8,169 BTU/lb.) or greater or have an LFL of 0.10 kg/m\3\ or lower. Using these safety group classifications, ANSI/ASHRAE Standard 34-2019 categorizes HFO-1234yf in the A2L Safety Group.--------------------------------------------------------------------------- \18\ ASHRAE, 2019. ANSI/ASHRAE Standard 34-2019: Designation and Safety Classification of Refrigerants.[GRAPHIC] [TIFF OMITTED] TR04MY22.0013. How does HFO-1234yf compare to other refrigerants for these MVAC applications with respect to SNAP criteria? When reviewing a substitute under SNAP, EPA compares the risk posed by that substitute to the risks posed by other alternatives and considers whether that specific substitute under review poses significantly more risk than other available or potentially available alternatives for the same use. In the proposed rule (86 FR 68962; December 6, 2021), EPA provided information on the environmental and health properties of HFO-1234yf and other substitutes in these MVAC applications and described the Agency's comparative risk analysis, based on our criteria for review, including an[[Page 26281]]evaluation of environmental impacts, flammability, and toxicity. Redacted submissions that do not include information claimed as CBI by the submitter and supporting documentation for HFO-1234yf are provided in the docket for this rulemaking (EPA-HQ-OAR-2021-0347 at [*https://www.regulations.gov*](https://www.regulations.gov)). EPA's assessments to examine the health and environmental risks of HFO-1234yf in each equipment type are also available in the docket for this rulemaking.19 20 21 22 23--------------------------------------------------------------------------- \19\ ICF, 2021a. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles--***Agricultural*** Tractors Greater than 40 Horsepower) (New Equipment). \20\ ICF, 2021b. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles--Self-Propelled ***Agricultural*** Machinery) (New Equipment). \21\ ICF, 2021c. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles--Compact Equipment) (New Equipment). \22\ ICF, 2021d. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles--Construction, Forestry, and Mining Equipment) (New Equipment). \23\ ICF, 2021e. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles--Commercial Utility Vehicles) (New Equipment).--------------------------------------------------------------------------- As explained more fully below, to help evaluate environmental, flammability, and toxicity risks resulting from the use of HFO-1234yf in certain types of new nonroad vehicles, EPA considered the Agency's analyses 24 25 26 27 28 29 30 31 32 conducted in support of the 2011 (76 FR 17488; March 29, 2011) and 2016 (81 FR 86778; December 1, 2016) listing decisions for HFO-1234yf in MVAC systems, including information submitted during the public comment period of the proposal for the 2011 final decision (October 19, 2009; 74 FR 53445), such as the SAE Cooperative Research Project's (CRP) risk assessments.33 34 35 36 37 These risk assessments are available in the docket for this rulemaking. The refrigerants to which HFO-1234yf was compared in the 2011 action for LD vehicles are the same refrigerants available for use in the nonroad vehicle types included in this action. In addition, EPA considered risk assessments 38 39 40 41 42 conducted by the Association of Equipment Manufacturers (AEM), an industry consortium of construction and ***agriculture*** equipment manufacturers, and found these were consistent with the Agency's assessments to examine the health and environmental risks of HFO-1234yf in each vehicle type.--------------------------------------------------------------------------- \24\ EPA, 2005. Risk Analysis for Alternative Refrigerant in Motor Vehicle Air Conditioning. \25\ ICF, 2008a. Air Conditioning Refrigerant Charge Size to Passenger Compartment Volume Ratio Analysis. \26\ ICF, 2008b. Revised Characterization of U.S Hybrid and Small Car Sales (Historical and Predicted) and Hybrid Vehicle Accidents. \27\ ICF, 2009a. Revised Final Draft Assessment of the Potential Impacts of HFO-1234yf and the Associated Production of TFA on Aquatic Communities and Local Air Quality. \28\ ICF, 2009b. Risk Screen on Substitutes for CFC-12 in Motor Vehicle Air Conditioning: Substitute: HFO-1234yf. \29\ ICF, 2010a. Summary of HFO-1234yf Emissions Assumptions. \30\ ICF, 2010b. Summary of Updates to the Vintaging Model that Impacted HFO-1234yf Emissions Estimates. \31\ ICF, 2010c. Revised Assessment of the Potential Impacts of HFO-1234yf and the Associated Production of TFA on Aquatic Communities, Soil and Plants, and Local Air Quality. \32\ ICF, 2010d. Sensitivity Analysis CMAQ results on projected maximum TFA rainwater concentrations and maximum 8-hr ozone concentrations. \33\ CRP, 2008. Risk Assessment for Alternative Refrigerants HFO-1234yf Phase II. Prepared for SAE International Cooperative Research Program 1234 by Gradient Corporation. \34\ CRP, 2009. Risk Assessment for Alternative Refrigerants HFO-1234yf and R-744 (CO2) Phase III. Prepared for SAE International Cooperative Research Program 1234 by Gradient Corporation. \35\ DuPont and Honeywell. Guidelines for Use and Handling of HFO-1234yf (v8.0). \36\ Exponent. 2008. HFO-1234yf Refrigerant Concentration and Ignition Tests in Full-Scale Vehicle Passenger Cabin and Engine Compartment. \37\ CRP, 2013.SAE International Cooperative Research Project CRP1234-4 on R-1234yf Safety, Finishes Work and Presents Conclusions. Available online at: [*http://www.sae.org/servlets/pressRoom?OBJECT\_TYPE=PressReleases&PAGE=showRelease&RELEASE\_ID=2146*](http://www.sae.org/servlets/pressRoom?OBJECT_TYPE=PressReleases&PAGE=showRelease&RELEASE_ID=2146). \38\ AEM, 2019. Risk Assessment for HFO-1234yf in ***Agricultural*** Tractors >= 40 HP including 2WD, MFD, 4WD and Track Type Equipment. \39\ AEM, 2020a. Risk Assessment for HFO-1234yf in Self-Propelled ***Agricultural*** Machinery including Combines, Forage Harvesters, Sprayers, and Windrowers. \40\ AEM, 2020b. Risk Assessment for HFO-1234yf in Compact Equipment (Examples include Tractors <40HP, Turf Equipment, Skid Steer, Mini-Excavators and Track Loaders) \41\ AEM, 2020c. Risk Assessment for HFO-1234yf in Construction, Forestry and Mining Equipment. \42\ AEM, 2020d. Risk Assessment for HFO-1234yf in Commericial Utility Vehicles.---------------------------------------------------------------------------a. Environmental Impacts The SNAP program considers a number of environmental criteria when evaluating substitutes: Ozone depleting potential (ODP); climate effects, primarily based on global warming potential (GWP); local air quality impacts, particularly potential impacts on smog formation from emissions of volatile organic compounds (VOC); and ecosystem effects, particularly from negative impacts on aquatic life. These and other environmental and health risks are discussed below. HFO-1234yf is chemical substance identified as 2,3,3,3-tetrafluoroprop-1-ene (CAS Reg. No. 754-12-1). HFO-1234yf has a GWP of four, 43 44 which is similar to or lower than the GWP of other alternatives for the nonroad vehicles addressed in this final rule. For example, its GWP is significantly lower than that of HFC-134a, the refrigerant most widely used in these vehicles today, which has a GWP of 1,430. As shown in Table 1, two other alternatives, HFC-152a \45\ and CO2,\46\ have GWPs of 124 and 1, respectively.--------------------------------------------------------------------------- \43\ Nielsen et al., 2007. Atmospheric chemistry of CF3CF=CH2: Kinetics and mechanisms of gas-phase reactions with Cl atoms, OH radicals, and O3. Chemical Physics Letters 439, 18-22. Available online at: [*http://www.cogci.dk/network/OJN\_174\_CF3CF=CH2.pdf*](http://www.cogci.dk/network/OJN_174_CF3CF=CH2.pdf). \44\ Papadimitriou et al., 2007. CF3CF=CH2 and (Z)-CF3CF=CHF: temperature dependent OH rate coefficients and global warming potentials. Phys. Chem. Chem. Phys., 2007, Vol. 9, p. 1-13. Available online at: [*http://pubs.rsc.org/en/Content/ArticleLanding/2008/CP/b714382f*](http://pubs.rsc.org/en/Content/ArticleLanding/2008/CP/b714382f). \45\ HFC-152a is listed as acceptable, subject to use conditions, for new vehicles only at 40 CFR part 82 subpart G; final rule published June 12, 2008 (73 FR 33304). \46\ CO2is listed as acceptable, subject to use conditions, for new vehicles only at 40 CFR part 82 subpart G; final rule published June 6, 2012 (77 FR 33315).--------------------------------------------------------------------------- Other acceptable refrigerants for the nonroad vehicles addressed in this action have GWPs ranging from 933 to 3,337. These include several blend refrigerants that are listed as acceptable, subject to use conditions, for these nonroad vehicles, including the HFC blends SP34E and R-426A (also known as RS-24) and the HCFC blends R-416A (also known as HCFC Blend Beta or FRIGC FR12), R-406A, R-414A (also known as HCFC Blend Xi or GHG-X4), R-414B (also known as HCFC Blend Omicron), HCFC Blend Delta (also known as Free Zone), Freeze 12, GHG-X5, and HCFC Blend Lambda (also known as GHG-HP). In a final rule issued July 20, 2015, at 80 FR 42870 (``2015 Rule''),\47\ EPA listed the use of certain refrigerant blends, including the ones mentioned above, as unacceptable in new LD vehicles starting in MY 2017. EPA did not propose and is not finalizing a change of status for use of these refrigerant blends in MVACs in nonroad vehicles. Although EPA is not aware of the use of these refrigerant blends, they remain acceptable, subject to use conditions, for the nonroad vehicles addressed in this action. Also,[[Page 26282]]although they are listed as acceptable, subject to use conditions, EPA is not aware of the use or development of HFC-152a, CO2, or any of the refrigerant blends above in new nonroad vehicles.\48\ Additionally, all MVAC refrigerants are subject to use conditions requiring labeling and the use of unique fittings, and the two lower-GWP alternatives currently approved for use in nonroad vehicles (i.e , HFC-152a and CO2) are subject to additional use conditions mitigating flammability and toxicity as appropriate to the alternative.--------------------------------------------------------------------------- \47\ The 2015 Rule, among other things, changed the listings for certain HFCs and blends from acceptable to unacceptable in various end-uses in the aerosols, refrigeration and air conditioning, and foam blowing sectors. After a challenge to the 2015 Rule, the United States Court of Appeals for the District of Columbia Circuit (``the court'') issued a partial vacatur of the 2015 Rule ``to the extent it requires manufacturers to replace HFCs with a substitute substance'' (see Mexichem Fluor, Inc. v. EPA, 866 F.3d 451, 462 (D.C Cir. 2017) and remanded the rule to the Agency for further proceedings. The court also upheld EPA's listing changes as being reasonable and not ``arbitrary and capricious.'' See Mexichem Fluor, 866 F.3d at 462-63. \48\ The CAA and EPA's ODS regulations restrict the permissible uses of virgin HCFCs. With respect to refrigerants, virgin HCFC-22, HCFC-142b and blends containing HCFC-22 or HCFC-142b may now only be used to service existing appliances. Consequently, virgin HCFC-22, HCFC-142b and blends containing virgin HCFC-22 or HCFC-142b may no longer be used as a refrigerant to manufacture new pre-charged appliances or appliance components or to charge new appliances assembled onsite. Table 1: GWP, ODP, and VOC Status of HFO-1234yf Compared to Other Refrigerants in MVAC Systems of Nonroad Vehicles \1\---------------------------------------------------------------------------------------------------------------- Refrigerants GWP ODP VOC status Final decision----------------------------------------------------------------------------------------------------------------HFO-1234yf........................ 4 0 No................... Acceptable, subject to use conditions.CO2, HFC-152a, HFC-134a........... 1-1,430 0 No................... No change.Other refrigerants, including IKON 933-3,337 0-0.098 Yes \2\.............. No change. A, R-414B, R-416A, R-426A, SP34E.----------------------------------------------------------------------------------------------------------------\1\ The table does not include not-in-kind technologies listed as acceptable for the stated end-use.\2\ One or more constituents of the blend are VOC. HFO-1234yf does not deplete the ozone layer. Similarly, HFC-134a, HFC-152a, CO2, and the HFC blends SP34E and R-426A do not deplete the ozone layer; however, the HCFC blends have ODPs ranging from 0.012 to 0.056 HFO-1234yf, HFC-134a, HFC-152a, and CO2are exempt from the EPA's regulatory definition of VOC (see 40 CFR 51.100(s)) addressing the development of state implementation plans (SIPs) to attain and maintain the National Ambient Air Quality Standards (NAAQS). The HFC blends and some of the HCFC blends have one or more components that are VOC. Another potential environmental impact of HFO-1234yf is its atmospheric decomposition to trifluoroacetic acid (TFA, CF3COOH). TFA is a strong acid that may accumulate in soil, plants, and aquatic ecosystems over time and may have the potential to adversely impact plants, animals, and ecosystems.\49\ For information on recent analyses and research that has been conducted on TFA, including EPA's 2011 analysis, which was based on conservative emissions assumptions and a transition from HFC-134a to HFO-1234yf for all MVAC systems (not limited to LD vehicles), see section II.A.3.a of the proposed rule (86 FR at 68968; December 6, 2021). Taking into consideration the 2011 analysis and the research that has been conducted since, as discussed in section II.A.3.a in the proposed rule, EPA concludes that the use of HFO-1234yf in the nonroad vehicles addressed in this action does not pose a significant risk to the environment from atmospheric decomposition to TFA.--------------------------------------------------------------------------- \49\ Other fluorinated compounds also decompose into TFA, including HFC-134a.--------------------------------------------------------------------------- Therefore, based on the consideration of all of these environmental impacts, EPA concludes that HFO-1234yf does not pose significantly greater risk to the environment than the other alternatives for use in new nonroad vehicles addressed in this action, and it poses significantly less risk than several of the alternatives with higher GWPs and ODPs.b. Flammability HFO-1234yf is a flammable refrigerant classified as A2L under ASHRAE 34-2013. HFC-134a, CO2,and the refrigerant blends SP34E and R-426A (also known as RS-24) and the HCFC blends R-416A (also known as HCFC Blend Beta or FRIGC FR12), R-414A (also known as HCFC Blend Xi or GHG-X4), R-414B (also known as HCFC Blend Omicron), HCFC Blend Delta (also known as Free Zone), Freeze 12, GHG-X5, and HCFC Blend Lambda (also known as GHG-HP) are nonflammable refrigerants, while HFC-152a and R-406A are slightly more flammable than HFO-1234yf with an ASHRAE classification of A2. HFO-1234yf is flammable when its concentration in air is in the range of 6.2 percent to 12.3 percent by volume (62,000 ppm to 123,000 ppm).\50\ In the presence of an ignition source (e.g , static electricity, a spark resulting from a switch malfunction, or a cigarette), an explosion or a fire could occur when the concentration of HFO-1234yf exceeds its LFL of 62,000 ppm, posing a significant safety concern for workers and consumers if it is not handled carefully. However, HFO-1234yf is difficult to ignite and, in the event of ignition, the flames would propagate slowly.\51\--------------------------------------------------------------------------- \50\ Chemours, 2019. HFO-1234yf for Use as a Refrigerant. Significant New Alternatives Policy Program Submission to the U.S Environmental Protection Agency. \51\ HFO-1234yf has a high minimum ignition energy of 5,000-10,000 mJ and a low burning velocity of 1.5 cm/s (Koban, 2011).--------------------------------------------------------------------------- With regards to flammability risks to workers, EPA's risk screens evaluated the potential for a fire from release and ignition in workplace situations and work-site operations, such as during equipment manufacture, servicing and disposal or recycling of vehicle end-of-life for the five nonroad vehicles. EPA considered the characteristics that could be different from LD and other HD vehicles, such as differences in the engine compartment size, passenger cabins, and operating conditions, and how those might impact risks. In order to determine the potential flammability risks during servicing of the vehicle or in case of a release of refrigerant into the cab, concentrations of HFO-1234yf immediately following a 60 percent release of refrigerant over a period of one minute into the cab were compared to the LFL and upper flammability limit (UFL) for HFO-1234yf reported by ASHRAE Standard 34 (i.e , 62,000 ppm and 123,000 ppm, respectively). The one-minute time duration is most appropriate for determining the risks of flammable refrigerants because the potential maximum instantaneous concentration can be estimated and compared to the LFL. Two key inputs to the models were the cab volume (i.e , the space into which the refrigerant would leak) and the refrigerant charge size. Because passenger compartment volumes and refrigerant charge sizes can vary widely from model to model, the highest ratio of charge size to[[Page 26283]]compartment volume identified was used as the input into the models. In the event of a leak, SAE Standard J2772 specifies that nonroad vehicles be manufactured such that the pressure differential between the air conditioning system and the cab allows only up to 60 percent of the refrigerant charge to be released into the cab.\52\ Independent testing of refrigerant releases from nonroad vehicles, according to SAE Standard J2772, found that the amount of refrigerant released following a line leak was much lower than 60 percent.--------------------------------------------------------------------------- \52\ SAE, 2019. Standard J2772: Measurement of Passenger Compartment Refrigerant Concentrations Under System Refrigerant Leakage Conditions. SAE International.--------------------------------------------------------------------------- To represent a plausible worst-case scenario, EPA's box modeling assumed that 60 percent of the charge of the air conditioning systems for the five nonroad vehicles is released into the cab of the vehicles over a period of one minute. EPA's worst-case scenario box modeling resulted in the concentration of HFO-1234yf in the cab exceeding the LFL of 62,000 ppm by 2,100 ppm at the typical charge size (i.e , 1.3 kilograms) and exceeding both the LFL (by 95,900 ppm) and the UFL (by 34,900 ppm) at the maximum charge size (i.e , 3.2 kilograms), for the five nonroad vehicles. However, the estimated exposures were derived using conservative assumptions and represent worst-case scenarios with a low probability of occurrence, as the analyses assume a rapid release of refrigerant (i.e , one minute), assume the minimum required fresh air intake, and do not consider the air recirculation rate for the nonroad vehicles or other ***variables*** that would potentially reduce the concentration levels in the air to below the flammable range for HFO-1234yf. Additionally, flammability concerns are further reduced due to the design of MVAC systems for the five vehicle types as described above in section II.A.1 and the low probability of collisions for these nonroad vehicles. MVAC systems in the nonroad vehicles are robust and made to withstand strenuous operation, which lowers the potential for line leaks due to wear. According to AEM, 53 54 55 56 57 the operator's compartment in ***agricultural*** tractors greater than 40 HP; self-propelled ***agricultural*** machinery; compact equipment; and construction, forestry, and mining equipment is a completely self-contained unit which provides an additional level of safety in a collision event. For commercial utility vehicles, which are smaller than the other four nonroad vehicle types, AEM noted that the engine compartment is contained in the rear of the vehicle, under the cargo bed, with the main components of the MVAC system in the front of the cabin with only the compressor and two lines near the engine. The potential for collisions is also less likely because most of the vehicles are operated by trained professionals, typically at low speed, and are only driven on the highway to move from one site or nonroad location to another.--------------------------------------------------------------------------- \53\ AEM, 2019. Risk Assessment for HFO-1234yf in ***Agricultural*** Tractors >= 40 HP including 2WD, MFD, 4WD and Track Type Equipment. \54\ AEM, 2020a. Risk Assessment for HFO-1234yf in Self-Propelled ***Agricultural*** Machinery including Combines, Forage Harvesters, Sprayers, and Windrowers. \55\ AEM, 2020b. Risk Assessment for HFO-1234yf in Compact Equipment (Examples include Tractors <40HP, Turf Equipment, Skid Steer, Mini-Excavators and Track Loaders). \56\ AEM, 2020c. Risk Assessment for HFO-1234yf in Construction, Forestry, and Mining Equipment. \57\ AEM, 2020d. Risk Assessment for HFO-1234yf in Commercial Utility Vehicles.--------------------------------------------------------------------------- In addition to the plausible worst-case scenario analysis, which employs a simple box model, EPA's risk screens reference modeling conducted by AEM in the flammability assessments. The AEM consortium used two different models in its assessments: (1) A box model to examine worst-case scenarios for a wide variety of nonroad vehicles addressed in this proposal and (2) a computational fluid dynamics (CFD) 58 59 60 61 62 63 model to more realistically represent the behavior of the leaked refrigerant in an nonroad vehicle. The AEM box model modeled the release of 60 percent of the refrigerant charge in the vehicles with varying charge and cab sizes and assumed a near-instantaneous leak of refrigerant over a period of 10 seconds. Six of the scenarios modeled in the box model resulted in the concentration of HFO-1234yf in the cab being equal to or exceeding the LFL; the concentrations from the remaining six scenarios were below the LFL. Similar to EPA's box modeling, the estimated exposures were derived using conservative assumptions and represent worst-case scenarios with a low probability of occurrence, as the analyses assume a rapid release of refrigerant, assume the minimum required fresh air intake (i.e , 43 m\3\/hour), and do not consider the air recirculation rate for the nonroad vehicles or other ***variables*** that would potentially reduce the concentration levels in the air to below the flammable range for HFO-1234yf.--------------------------------------------------------------------------- \58\ AEM, 2019. Risk Assessment for HFO-1234yf in ***Agricultural*** Tractors >= 40 HP including 2WD, MFD, 4WD and Track Type Equipment. \59\ AEM, 2020a. Risk Assessment for HFO-1234yf in Self-Propelled ***Agricultural*** Machinery including Combines, Forage Harvesters, Sprayers, and Windrowers. \60\ AEM, 2020b. Risk Assessment for HFO-1234yf in Compact Equipment (Examples include Tractors <40HP, Turf Equipment, Skid Steer, Mini-Excavators and Track Loaders). \61\ AEM, 2020c. Risk Assessment for HFO-1234yf in Construction, Forestry, and Mining Equipment. \62\ AEM, 2020d. Risk Assessment for HFO-1234yf in Commercial Utility Vehicles. \63\ AEM, 2020e. CFD Leak Modeling-Supplemental Information to Compliment AEM Machine Form RAs.--------------------------------------------------------------------------- Conversely, the maximum concentration reached in the AEM CFD model, which models a realistic leak scenario with the release of 60 percent of the refrigerant charge released in the nonroad vehicles for 1000 seconds of simulation, was significantly below the LFL for HFO-1234yf of 62,000 ppm. Construction, forestry, and mining vehicles were modeled to represent the five nonroad vehicles as they had the highest ratio of refrigerant charge to cabin volume among the five nonroad vehicles. AEM found that the maximum concentration of HFO-1234yf reached in the cab (i.e , 25,700 ppm) is not likely to exceed the LFL for the five nonroad vehicles. The AEM CFD model reflects the real-world behavior of refrigerant in the cab given a worst-case leak scenario because it considers the refrigerant entry and exit points and assumes worst-case scenario conditions, including the most likely scenario where an operator is likely to ignite a cigarette, the highest charge-to-cab ratio, minimal fresh air flow, and maximum air velocity and refrigerant penetration. Additionally, the CFD modeling demonstrates the conservativeness of the worst-case scenario box modeling and how unlikely its results are; therefore, the worst-case scenario box models may be overstating the true risks associated with the use of HFO-1234yf in MVAC systems in the nonroad vehicles compared to real-world conditions as presented in the CFD model. For these reasons, EPA concludes that the currently available assessments on the use of HFO-1234yf in new nonroad vehicles addressed in this action are sufficiently conservative to account for all probable flammability risks from the use of HFO-1234yf. Relying on a similar analysis considered in support of the 2011 and 2016 SNAP listings of HFO-1234yf in certain MVAC systems, verifying that more recent information is consistent with that analysis, and considering unique factors for the nonroad vehicle types, EPA concludes that the use of HFO-1234yf in the new nonroad vehicles addressed in this action does not pose significantly greater flammability risk than the other alternatives when used in accordance with the use conditions described below[[Page 26284]]in section II.A.4, which are intended to mitigate flammability risks, and recommendations in the safety ***data*** sheet (SDS) and EPA's risk screens.c. Toxicity Potential health effects of exposure to HFO-1234yf include drowsiness or dizziness. HFO-1234yf may also irritate the skin or eyes or cause frostbite, and at sufficiently high concentrations, HFO-1234yf may cause irregular heartbeat. HFO-1234yf could cause asphyxiation if air is displaced by vapors in a confined space. These potential health effects are common to many refrigerants. The American Industrial Hygiene Association (AIHA) has established a Workplace Environmental Exposure Level (WEEL) of 500 ppm as an 8-hr TWA for HFO-1234yf. HFO-1234yf also has an acute toxicity exposure limit (ATEL) of 100,000 ppm and a refrigerant concentration limit (RCL) of 16,000 ppm, which are both established by ASHRAE. EPA anticipates that users will be able to meet the AIHA WEEL and ASHRAE ATEL and RCL, limits intended to reduce the risks of flammability in normally occupied, enclosed spaces, and address potential health risks by following requirements and recommendations in the manufacturer's SDSs and other safety precautions common to the refrigerant industry. To evaluate human health and safety impacts, including asphyxiation and toxicity risks, from the use of HFO-1234yf in the five types of nonroad vehicles, the Agency estimated the potential exposures to HFO-1234yf in the event of a 60 percent release of refrigerant from the vehicles under reasonable worst-case scenarios described in the risk screens. In the event of a leak, SAE Standard J2772 specifies that nonroad vehicles be manufactured such that the pressure differential between the air conditioning system and the cab allows only up to 60 percent of the refrigerant charge to be released into the cab.\64\ The analysis of asphyxiation risks considered whether a worst-case release of refrigerant under the cab would result in oxygen concentrations of 12 percent or less. The analysis found that impacts on oxygen concentrations did not present a significant risk of asphyxiation at the typical charge sizes, and that a 60 percent leak of refrigerant at the maximum charge sizes could result in an oxygen concentration below 19.5 percent but above 12 percent. The estimated exposures were derived using conservative assumptions, however, and conditions resulting in oxygen levels under 12 percent \65\ are only predicted to occur with charge sizes that are significantly larger than the maximum charge sizes provided by the submitter or cab sizes that are unlikely for the applications. Additionally, the worst-case scenarios did not consider conditions that are likely to occur that would increase oxygen levels to which individuals would be exposed, such as fresh air flow into the cab.--------------------------------------------------------------------------- \64\ SAE, 2019. Standard J2772: Measurement of Passenger Compartment Refrigerant Concentrations Under System Refrigerant Leakage Conditions. SAE International. \65\ Twelve percent oxygen in air (i.e , 120,000 ppm) is the No-Observed-Adverse-Effect-Level (NOAEL) for hypoxia (ICF, 1997).--------------------------------------------------------------------------- To assess the toxicity risks to end-users, 15-minute and 30-minute TWA exposures were estimated and compared to the standard toxicity limits. The estimated TWA exposures were fairly conservative as the analyses assume a rapid release of refrigerant (i.e , one minute and 10 seconds for EPA's and AEM's box models, respectively), assume the minimum required ventilation rate (i.e , 43 m\3\/hour), and do not consider the air recirculation rate for the vehicles or other ***variables*** that would potentially reduce the concentration levels in the air. EPA found that the estimated 15-minute and 30-minute TWA exposures for HFO-1234yf in MVAC systems in the nonroad vehicles are not likely to exceed the ATEL for HFO-1234yf of 100,000 ppm in a one-minute release scenario under EPA's worst-case scenario modeling assumptions. The end-use exposures estimated by AEM across all scenarios were also well below the ATEL for HFO-1234yf. Furthermore, these exposure estimates were derived using conservative assumptions that do not necessarily reflect a real-world leak scenario or the larger cab size where MVAC systems using HFO-1234yf would typically be installed. Additionally, the estimated TWA exposure for HFO-1234yf determined from AEM's CFD modeling, which models a realistic leak scenario for the nonroad vehicles, was significantly below the ATEL for HFO-1234yf of 100,000 ppm. Construction, forestry, and mining vehicles were modeled to represent the five nonroad vehicles. As noted above, these vehicles are a more conservative and an approximately equivalent proxy for the other four nonroad vehicle types because they have the highest ratio of refrigerant charge to cabin volume among the five nonroad vehicles. Therefore, the toxicity risks from using HFO-1234yf in the five nonroad vehicles is not likely to exceed the ATEL for the five nonroad vehicles. Concerning workplace exposure during charging, servicing, and disposal of the nonroad vehicles addressed in this proposal, we expect that professional technicians have proper training and certification and have the proper equipment and knowledge to minimize their risks due to exposure to refrigerant from an MVAC system. Thus, worker exposure to HFO-1234yf is expected to be low. The vehicles are typically charged by the OEM. During air conditioning system manufacture (i.e , charging at OEM location), points of release would be from connection/disconnection of temporary lines for charging and recovery equipment, although exposure during these activities is expected to be minimal due to the use of left-hand threaded fittings on storage cylinders, as specified in SAE Standard J2844, intended to help mitigate any releases and restrict the possibility of cross-contamination with other refrigerants.\66 67 68 69 70\ Furthermore, equipment containing HFO-1234yf is expected to be equipped with unique fittings for the low-side and high-side service ports of the MVAC system, according to SAE Standard J639, also intended to help mitigate any releases and restrict the possibility of cross-contamination with other refrigerants.\71\--------------------------------------------------------------------------- \66\ ICF, 2021a. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles--***Agricultural*** Tractors Greater than 40 Horsepower) (New Equipment). \67\ ICF, 2021b. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles--Self-Propelled ***Agricultural*** Machinery) (New Equipment). \68\ ICF, 2021c. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles--Compact Equipment) (New Equipment). \69\ ICF, 2021d. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles--Construction, Forestry, and Mining Equipment) (New Equipment). \70\ ICF, 2021e. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles--Commercial Utility Vehicles) (New Equipment). \71\ Ibid.--------------------------------------------------------------------------- Servicing of the vehicles is expected to take place in high-bays and/or outside (e.g , out in the field or other outdoor site) \72\ rather than at a typical servicing center for LD vehicles, for example; therefore, exposure during servicing is expected to be less than during charging the MVAC system during manufacture. Therefore, occupational exposure during these activities was conservatively modeled based on charging. The modeled maximum 15-minute TWA exposures[[Page 26285]]for HFO-1234yf during charging were compared to the short-term exposure limit (STEL) of 1,500 ppm. EPA's modeling indicated that the short-term (15-minute) worker exposure concentrations of HFO-1234yf are not likely to exceed its STEL for the typical or maximum charge size in the vehicles during charging or servicing. Additionally, these exposure estimates are significantly lower than the RCL and ATEL of 16,000 ppm and 100,000 ppm, respectively, for HFO-1234yf, which are limits intended to reduce the risks of asphyxiation and acute toxicity hazards in normally occupied, enclosed spaces according to ASHRAE Standard 34.--------------------------------------------------------------------------- \72\ Chemours, 2019. HFO-1234yf for Use as a Refrigerant. Significant New Alternatives Policy Program Submission to the U.S Environmental Protection Agency.--------------------------------------------------------------------------- EPA also determined that occupational exposure during disposal of all the vehicles, except for construction, forestry, and mining equipment, at the typical and maximum charge sizes is not likely to exceed the long-term (8-hour) WEEL for HFO-1234yf (i.e , 500 ppm). Under the disposal release scenarios for construction, forestry, and mining equipment, the modeling showed that occupational exposure during disposal of MVAC systems containing HFO-1234yf at the maximum charge size (i.e , 3.4 kilograms (120 ounces)) could potentially exceed the 8-hour long-term exposure limit by 10 ppm. The estimated exposures, however, were well below the RCL of 16,000 ppm for HFO-1234yf and were derived using conservative assumptions and represent a worst-case scenario with a low probability of occurrence. These MVAC systems are also disposed of by CAA section 608-certified personnel using proper industrial hygiene techniques while wearing PPE to maximize recovery efficiency and limit releases. EPA concludes that the manufacture, use, servicing, or disposal of HFO-1234yf MVAC systems in the new nonroad vehicles addressed in this action does not pose greater toxicity risk to workers than the other alternatives when used in accordance with the use conditions. Additionally, EPA's review of potential toxicity risks of HFO-1234yf to the general population indicated that HFO-1234yf is not expected to pose significantly greater toxicity risk than other alternatives for the MVAC systems in the new nonroad vehicles addressed in this action. The general population is defined as non-personnel who are subject to exposure of the substitute near industrial facilities, including manufacturing or equipment production factories, equipment operating locations, or recycling centers, rather than personnel at end-use. EPA concludes that the use of HFO-1234yf in the new nonroad vehicles addressed in this action does not pose significantly greater toxicity risk than the other alternatives when used in accordance with the use conditions described below in section II.A.4, which are intended to mitigate toxicity risks, and recommendations in the SDS and EPA's risk screens.4. What are the use conditions? All MVAC refrigerants listed as acceptable are subject to use conditions requiring labeling and the use of unique fittings. HFC-152a and CO2are subject to additional use conditions mitigating flammability and toxicity as appropriate to the alternative. Neither HFC-152a nor CO2can simply be ``dropped'' into existing MVAC systems because they are listed as acceptable only for new vehicles. EPA is listing HFO-1234yf as acceptable, subject to use conditions, in MVAC systems in certain new nonroad vehicles because the use conditions are necessary to ensure that use of HFO-1234yf will not have a significantly greater overall impact on human health and the environment than other alternatives. EPA is updating the existing use conditions that are currently required for the use of HFO-1234yf in MVAC systems in new LD passenger cars and trucks, MDPVs, HD pickup trucks, and complete HD vans and then applying them to all the MVAC systems addressed in this action. Manufacturing and service personnel or consumers may not be familiar with refrigeration or AC equipment containing a flammable refrigerant. These use conditions will be sufficiently protective to ensure use of HFO-1234yf in these nonroad vehicles does not pose significantly greater risk than use of other alternatives. The first use condition requires that HFO-1234yf may be used only in new MVAC systems which have been designed to address concerns unique to flammable refrigerants--i.e , HFO-1234yf may not be used as a ***conversion*** or ``retrofit'' refrigerant for existing MVACs designed for other refrigerants. HFO-1234yf was not submitted under the SNAP program for use in retrofitted MVAC systems, and no information was provided on how to address hazards if HFO-1234yf were to be used in MVAC systems that were not designed for a flammable refrigerant. Therefore, under this use condition, HFO-1234yf may be used only in new MVACs that have been properly designed for its use. The second use condition requires that MVAC systems designed to use HFO-1234yf in new ***agricultural*** tractors greater than 40 HP; self-propelled ***agricultural*** machinery; compact equipment; construction, forestry, and mining equipment; and commercial utility vehicles must meet the requirements of SAE J639 (revised November 2020), ``Safety Standards for Motor Vehicle Refrigerant Vapor Compression Systems.'' This standard sets safety standards that include unique fittings; a warning label indicating the refrigerant's identity and that it is a flammable refrigerant; and requirements for engineering design strategies that include a high-pressure compressor cutoff switch and pressure relief devices. This use condition also requires that for connections with refrigerant containers for use in professional servicing, use fittings must be consistent with SAE J2844 (revised January 2013), ``R-1234yf (HFO-1234yf) New Refrigerant Purity and Container Requirements for Use in Mobile Air-Conditioning Systems,'' which specifies quick-connect fittings that are different from those for any other refrigerant. The low-side service port and connections will have an outside diameter of 14 mm (0.551 inches), and the high-side service port will have an outside diameter of 17 mm (0.669 inches), both accurate to within 2 mm. Under SAE J2844 (revised January 2013), containers of HFO-1234yf for use in professional servicing of MVAC systems must have a left-handed screw valve with a diameter of 0.5 inches and Acme (trapezoidal) thread with 16 threads per inch. HFO-1234yf is mildly flammable (A2L classification) and, like other fluorinated refrigerants, can decompose to form the toxic compound hydrogen fluoride (HF) when exposed to flame or to sufficient heat. Consistent with the conclusion EPA drew at the time of the Agency's listing decision for HFO-1234yf in LD vehicles, EPA believes that the safety requirements that are included in SAE J639 sufficiently mitigate risks of both HF generation and refrigerant ignition (March 29, 2011; 76 FR 17488) for the nonroad vehicles addressed in this action. For example, SAE J639 provides for a pressure relief device designed to minimize direct impingement of the refrigerant and oil on hot surfaces and for design of the refrigerant circuit and connections to avoid refrigerant entering the passenger cabin. The pressure release device ensures that pressure in the system will not reach an unsafe level that might cause an uncontrolled leak of refrigerant, such as if the MVAC system is overcharged. The pressure release device will reduce the likelihood that refrigerant leaks would reach hot surfaces that might lead to either[[Page 26286]]ignition or formation of HF. These elements of the refrigerant circuit and connections are designed to prevent refrigerant from entering the passenger cabin if there is a leak. Keeping refrigerant out of the passenger cabin minimizes the possibility that there would be sufficient levels of refrigerant to reach flammable concentrations or that HF would be formed and transported where passengers might be exposed. The third use condition requires the manufacturer of MVAC systems and vehicles to conduct Failure Mode and Effects Analysis (FMEA) as provided in SAE J1739 (revised January 2021), ``Potential Failure Mode and Effects Analysis (FMEA) Including Design FMEA, Supplemental FMEA-MSR, and Process FMEA,'' and keep records of the FMEA on file for three years from the date of creation. SAE J1739 (revised January 2021) describes a FMEA as ``a systematic group of activities intended to: (a) Recognize and evaluate the potential failure of a product/process and the effects and causes of that failure, (b) identify actions that could eliminate or reduce the change of the potential failure occurring, and (c) document the process.'' Through the FMEA, OEMs determine the appropriate protective strategies necessary to ensure the safe use of HFO-1234yf across their vehicle fleet. It is standard industry practice to perform the FMEA and to keep it on file while the vehicle is in production and for several years afterwards. As with the previous use condition, this use condition is intended to ensure that ***agricultural*** tractors greater than 40 HP; self-propelled ***agricultural*** machinery; compact equipment; construction, forestry, and mining equipment; and commercial utility vehicles manufactured with HFO-1234yf MVACs are specifically designed to minimize release of the refrigerant into the passenger cabin or onto hot surfaces that might result in ignition or in generation of HF.B. Modifications to Use Conditions for MVAC Systems in Other Vehicle Types For the previous listings of HFO-1234yf in the March 29, 2011 (76 FR 17488), and December 1, 2016 (81 FR 86778), final rules for MVAC systems in certain new vehicles, EPA is modifying the use conditions to replace the reference to older versions of SAE J639, SAE J1739, and SAE J2844. First, EPA is replacing the reference to SAE J639 (revised 2011) in the March 2011 and December 2016 final rules with a reference to the 2020 version of the standard, ``Safety and Design Standards for Motor Vehicle Refrigerant Vapor Compression Systems.'' This is the most recent version of the SAE J639 standard, which was updated to include system design and safety-related requirements for secondary loop HFC-152a MVAC systems and to make general improvements for clarity. Second, EPA is replacing the reference to SAE J1739 (adopted 2009) in the March 2011 and December 2016 final rules with a reference to the 2021 version of the standard, ``Potential Failure Mode and Effects Analysis (FMEA) Including Design FMEA, Supplemental FMEA-MSR, and Process FMEA.'' The 2021 version is the most recent version of the SAE J1739 standard; it was revised to emphasize the process of FMEA selection, creation, documentation, reporting, and change management. Finally, EPA is replacing the reference to SAE J2844 (revised 2011) in the March 2011 final rule with a reference to the 2013 version of the standard, ``R-1234yf (HFO-1234yf) New Refrigerant Purity and Container Requirements for Use in Mobile Air-Conditioning Systems.'' This is the most recent version of the SAE J2844 standard; it was updated to add the requirements for certification according to SAE J2911, ``Procedure for Certification that Requirements for Mobile Air Conditioning System Components, Service Equipment, and Service Technician Training Meet SAE J Standards.''C. Servicing Fittings for Small Cans of HFO-1234yf EPA is including a use condition for HFO-1234yf to provide for servicing air conditioning systems. The use condition would require unique servicing fittings for use with small cans (two pounds or less) for servicing of MVAC systems containing HFO-1234yf in the nonroad vehicles addressed in this action, as well as servicing of the MVAC systems in the vehicles for which HFO-1234yf has already been listed as acceptable, subject to use conditions (i.e , new LD passenger cars and trucks and new MDPVs, HD pickup trucks, and complete HD vans). The use condition is discussed below in section II.C.3, ``What is the use condition?'' EPA previously listed HFO-1234yf as acceptable, subject to use conditions, for large containers of HFO-1234yf for professional servicing of MVAC systems (76 FR 17488, March 29, 2011; 77 FR 17344, March 26, 2012). Redacted submissions and supporting documentation for HFO-1234yf in small cans are provided in the docket for this rulemaking (EPA-HQ-OAR-2021-0347) at [*https://www.regulations.gov*](https://www.regulations.gov). As explained in the proposed rule (86 FR 68962; December 6, 2021) and below, to help evaluate environmental, flammability, and toxicity risks resulting from the use of HFO-1234yf in small cans for MVAC servicing, EPA conducted a risk screen which is available in the docket for this rulemaking.\73\--------------------------------------------------------------------------- \73\ ICF, 2021f. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Small Cans). Substitute: HFO-1234yf.--------------------------------------------------------------------------- Servicing of MVAC systems containing HFO-1234yf with small refrigerant cans is expected to take place in a variety of locations, including professional and residential garages with differing sizes and ventilation rates. As discussed below in section II.C.3 regarding the use condition, small refrigerant cans must be equipped with a Standard Compressed Gas Association (CGA) 166 left-hand thread outlet connection valve in accordance with SAE Standard J2844.\74\ The hose connected to the vehicle must also use the low side service port per SAE J639.--------------------------------------------------------------------------- \74\ SAE J2844 container valve requirements are for HFO-1234yf service cylinders with a volume less than or equal to 23 kilograms.--------------------------------------------------------------------------- For additional context, we further note that separate from the requirements in this action, the sale of such small refrigerant cans would be subject to the regulatory requirements under CAA section 608, codified at 40 CFR 82.154 These regulations restrict the sale, distribution, and offer for sale or distribution of refrigerants, including non-exempt substitute refrigerants, like HFO-1234yf, to circumstances where certain requirements are met. Specific to the sale of small cans of refrigerant, 40 CFR 82.154(c)(1)(ix) provides that non-exempt substitute refrigerant for use in an MVAC, e.g , HFO-1234yf, may be sold, including to DIYers, if it is in a container designed to hold two pounds or less of refrigerant which has a unique fitting, and, if manufactured or imported on or after January 1, 2018, has a self-sealing valve that complies with the self-sealing valve specifications codified at 40 CFR 82.154(c)(2). EPA is not modifying the existing CAA section 608 provisions under 40 CFR 82.154, including the restriction on sale of substitute refrigerants and requirements for self-sealing valves. For additional information, EPA directs readers to 40 CFR 82.152, where EPA defines a self-sealing valve as ``a valve affixed to a container of refrigerant that automatically seals when not actively dispensing refrigerant and that meets or exceeds established performance criteria as identified in Sec. 82.154(c)(2).''[[Page 26287]]1. What is the affected end-use? As proposed, EPA is listing HFO-1234yf as acceptable, subject to a use condition, in small cans (two pounds or less) for servicing of MVAC systems in the nonroad vehicles addressed in this action, as well as in MVAC systems in the vehicles for which HFO-1234yf has already been listed as acceptable, subject to use conditions. For the existing listings in the March 29, 2011 (76 FR 17488), and December 1, 2016 (81 FR 86778), final rules, EPA is revising the use conditions to require unique servicing fittings for use with small cans.2. How does HFO-1234yf compare to other refrigerants for these MVAC applications with respect to SNAP criteria?a. Environmental Impacts HFO-1234yf has a GWP of four,75 76 which is similar to or lower than the GWP of the other acceptable alternatives for use in small cans (i.e , HFC-134a and CO2). HFO-1234yf, HFC-134a, and CO2do not deplete the ozone layer, and are all exempt from the regulatory definition of VOC (see 40 CFR 51.100(s)) addressing the development of SIPs to attain and maintain the NAAQS. For additional information on the environmental impacts of HFO-1234yf, see the discussion above in section II.A.3.a --------------------------------------------------------------------------- \75\ Nielsen et al., 2007. Atmospheric chemistry of CF3CF=CH2: Kinetics and mechanisms of gas-phase reactions with Cl atoms, OH radicals, and O3. Chemical Physics Letters 439, 18-22. Available online at: [*http://www.cogci.dk/network/OJN\_174\_CF3CF=CH2.pdf*](http://www.cogci.dk/network/OJN_174_CF3CF=CH2.pdf). \76\ Papadimitriou et al., 2007. CF3CF=CH2 and (Z)-CF3CF=CHF: temperature dependent OH rate coefficients and global warming potentials. Phys. Chem. Chem. Phys., 2007, Vol. 9, p. 1-13. Available online at: [*http://pubs.rsc.org/en/Content/ArticleLanding/2008/CP/b714382f.---------------------------------------------------------------------------b*](http://pubs.rsc.org/en/Content/ArticleLanding/2008/CP/b714382f.---------------------------------------------------------------------------b). Flammability As discussed above in section II.A.3.b, HFO-1234yf is classified as A2L under ASHRAE 34-2013, while HFC-134a and CO2are nonflammable refrigerants. HFO-1234yf is flammable when its concentration in air is in the range of 6.2 percent and 12.3 percent by volume (62,000 ppm to 123,000 ppm). Due to its flammability, small cans of HFO-1234yf for MVAC system servicing could pose a safety concern for workers and service personnel or consumers if they are not properly handled. Servicing of MVAC systems with small refrigerant cans containing HFO-1234yf is expected to take place in either a professional garage bay or a residential garage. To determine the potential flammability risks of a catastrophic release of refrigerant during professional and DIY MVAC system servicing using a small refrigerant can, EPA analyzed plausible worst-case scenarios to model a catastrophic release of HFO-1234yf \77\ compared with the LFL of 62,000 ppm for HFO-1234yf.\78\ Under these plausible worst-case scenarios, the full charge of the refrigerant can is assumed to be emitted into the professional garage bay and residential garage with 4.0 and 3.1 air changes per hour (ACH),\79\ respectively, over the course of 15 minutes, which represents the approximate amount of time required to charge the MVAC system.\80\ EPA found that the maximum instantaneous concentrations of HFO-1234yf in the lower 0.4 meters of the room did not exceed the LFL for HFO-1234yf (i.e , 62,000 ppm) for small refrigerant cans (charge size of around 1kg (2 pounds) or less). \81\ EPA also found that the maximum instantaneous concentration exceeded 25 percent (15,500 ppm) of the LFL for HFO-1234yf for DIY servicing under one of the scenarios.\82\ However, the scenario was derived using conservative assumptions (e.g , minimum room volume, vertical concentration gradient). Furthermore, small refrigerant cans are not likely to be used in spaces significantly smaller than those modeled in EPA's assessment, which are expected to be large enough to accommodate a vehicle and adequate space surrounding the vehicle for the user to access the MVAC unit. Finally, HFO-1234yf is difficult to ignite and, in the event of ignition, the flames would propagate slowly.\83\ Therefore, the risk of fire is minimal if small refrigerant cans containing HFO-1234yf meet and are used to service vehicles in rooms with volumes in accordance with relevant safety standards as described below in section II.C.3 --------------------------------------------------------------------------- \77\ In order to simulate the vertical concentration gradient of refrigerant following release, it is assumed that 95 percent of the leaked refrigerant mixes evenly into the lower 0.4 meters (1.3 feet) of the room, and the rest of the refrigerant mixes evenly in the remaining volume (Kataoka 2000). \78\ ICF, 2021f. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Small Cans). Substitute: HFO-1234yf. \79\ The air exchange rates were derived from the requirements in ANSI/ASHRAE Standard 62.1-2019, Table 6.1 (ANSI/ASHRAE 2019c). Ventilation requirements (presented as cubic feet per minute in the standard) were converted to ACH using the assumed room size in the residential garage scenario. \80\ Perrin Quarles Associates, Inc. (2007) suggests charging for up to 15 minutes to fully empty the contents of the refrigerant can is a best practice for DIY servicing of an MVAC system. This study also indicates that the transfer procedure used for a small refrigerant can (e.g , holding upright, rotation method, and other flow control methods) influences the transfer time and resulting heel remaining in the can. \81\ ICF, 2021f. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Small Cans). Substitute: HFO-1234yf. \82\ Ibid. \83\ HFO-1234yf has a high minimum ignition energy of 5,000-10,000 mJ and a low burning velocity of 1.5 cm/s (Koban, 2011).--------------------------------------------------------------------------- Additionally, EPA considered the submitters' detailed assessments of the probability of events that might create a fire and approaches to mitigate risks. A CFD modeling was conducted by a submitter to simulate a severe refrigerant line leak from a 600-gram MVAC system in a garage bay of 84 m\3\ without forced ventilation and found that the flammable region of the refrigerant plume under the hood of the vehicle was small, ranging from 2 inches to a maximum of 10 inches, which quickly dispersed. Similarly, leaks from a small refrigerant can containing HFO[hyphen]1234yf during MVAC servicing are not expected to accumulate under the vehicle hood in concentrations above the LFL for HFO[hyphen]1234yf. EPA concludes that the currently available assessments on the use of HFO[hyphen]1234yf in small cans for professional and DIY servicing of MVAC systems are sufficiently conservative to account for all probable flammability risks from the use of HFO[hyphen]1234yf. Therefore, the use of HFO[hyphen]1234yf in small cans does not pose significantly greater flammability risk than the other alternatives when used in accordance with the use condition described below in section II.C.3, which is intended to mitigate flammability risks, and recommendations in the SDS and EPA's risk screen.c. Toxicity For a discussion of the potential health effects of HFO[hyphen]1234yf, see the section II.A.3.c above. In evaluating potential asphyxiation and toxicity impacts of HFO[hyphen]1234yf in small cans on human health, EPA considered both occupational risk and risk to the general population. EPA investigated the risk of asphyxiation and of exposure to toxic levels of HFO[hyphen]1234yf for plausible worst-case scenarios. According to the results of EPA's asphyxiation assessment, the use of HFO[hyphen]1234yf in small refrigerant cans does not present a significant risk of asphyxiation.\84\ Conditions resulting in oxygen levels under 12 percent \85\ would only occur with charge sizes that are significantly larger than the maximum charge size for[[Page 26288]]small refrigerant cans or room sizes that are unlikely for the application. In addition, the charge sizes at which an asphyxiation concern would exist are also significantly larger (about 18 times) than the average charge size of an MVAC system.\86\--------------------------------------------------------------------------- \84\ ICF, 2021f. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Small Cans). Substitute: HFO[hyphen]1234yf. \85\ Twelve percent oxygen in air (i.e , 120,000 ppm) is the NOAEL for hypoxia (ICF 1997). \86\ EPA's Vintaging Model (EPA 2020) assumes the refrigerant charge size for MVACs to be 0.555-1 kilograms in light-duty vehicles and 0.79-1.14 kilograms in light-duty trucks.--------------------------------------------------------------------------- To evaluate toxicity risks, EPA estimated 15-minute TWA exposures for HFO[hyphen]1234yf in small cans and compared them to the standard toxicity limits. The estimated TWA values were conservative as the analysis did not consider opened windows or doors, fans operating, conditioned airflow (either heated or cooled), or other ***variables*** that would reduce the levels to which individuals would be exposed. The modeling results showed that the estimated 15-minute TWA exposures ranging from 3,100 ppm to 11,080 ppm are all lower than the RCL (i.e , 16,000 ppm) and ATEL (i.e , 100,000 ppm) for HFO[hyphen]1234yf. EPA also considered testing and air sampling conducted by a submitter to determine potential refrigerant exposure to professional servicing technicians or DIY users due to leakage of refrigerant cans in a small, closed garage with the condenser fan off and the vehicle hood partly open.\87\ The various scenarios investigated included releases of 170 grams to 680 grams of refrigerant from both an inverted and upright can.\88\ Refrigerant samples were taken under the vehicle at 0.15 meters above the floor (representing the potential breathing area of a technician present in that space) and in the engine compartment. The experimentally derived exposure estimates are also significantly lower than the RCL (i.e , 16,000 ppm) and ATEL (i.e , 100,000 ppm) for HFO[hyphen]1234yf.--------------------------------------------------------------------------- \87\ Honeywell International, Inc. 2012. Refrigerant exposure to service personnel or DIYers due to leakage of 12 oz charging cans or ``small cans.'' Experiments Conducted at Honeywell's Research Laboratory in Buffalo, NY USA. January 2012. \88\ The orientation of the can during servicing determines the phase (i.e , liquid or gas) of the refrigerant that is being transferred into the MVAC system. When the can is upright, the refrigerant transfers as a gas and when the can is inverted, the refrigerant transfers as a liquid (Perrin Quarles Associates, Inc., 2007). Refrigerant can instructions often direct users to hold the can upright or rotate its position during servicing.--------------------------------------------------------------------------- Additionally, EPA assessed the potential exposures to workers during disposal (e.g , ***collection***, transportation) of small refrigerant cans containing HFO[hyphen]1234yf.\89\ EPA determined that if proper handling and disposal guidelines are followed in accordance with good industrial hygiene practices and the SDS for HFO[hyphen]1234yf, there is no significant risk to workers during the disposal of HFO[hyphen]1234yf from MVAC systems or HFO[hyphen]1234yf small refrigerant cans.--------------------------------------------------------------------------- \89\ ICF, 2021f. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Small Cans). Substitute: HFO[hyphen]1234yf.--------------------------------------------------------------------------- For potential toxicity risks of HFO[hyphen]1234yf to the general population, EPA's analysis indicated that HFO[hyphen]1234yf is not expected to present an unreasonable risk to human health in the general population when used as a refrigerant in small cans for MVAC servicing. Based upon EPA's analysis, workplace and general population exposure to HFO[hyphen]1234yf in small cans when used according to the use condition is not expected to exceed relevant exposure limits. Therefore, EPA concludes that the use of HFO[hyphen]1234yf in small cans does not pose significantly greater toxicity risks than other acceptable refrigerants when used in accordance with the use condition described below in section II.C.3, which is intended to mitigate toxicity risks, and recommendations in the SDS and EPA's risk screen.3. What is the use condition? EPA's SNAP program has a longstanding approach of requiring unique fittings for use with each refrigerant substitute in MVAC systems. This is intended to prevent cross contamination of different refrigerants, to preserve the purity of recycled refrigerants, and ultimately to avoid venting of refrigerant consistent with requirements under CAA section 608(c), codified at 40 CFR 82.154(a). In the 1996 SNAP rule requiring the use of fittings on all refrigerants submitted for use in MVAC systems, EPA urged industry to develop mechanisms to ensure that the refrigerant venting prohibition under CAA section 608 and the implementing regulations at 40 CFR 82.154 are observed (61 FR 54032; October 16, 1996). EPA has issued multiple SNAP rules codified in the CFR requiring the use of fittings unique to a refrigerant for use on ``containers of the refrigerant, on can taps, on recovery, recycling, and charging equipment, and on all [motor vehicle] air conditioning system service ports.'' (See appendices C and D to subpart G of 40 CFR part 82). In this rule, EPA is establishing a use condition requiring that for connections with small cans (two pounds or less) of HFO[hyphen]1234yf use fittings must be consistent with SAE J2844 (revised January 2013), which specifies quick-connect fittings that are different from those for any other refrigerant. The low-side service port and connections will have an outside diameter of 14 mm (0.551 inches), and the high-side service port will have an outside diameter of 17 mm (0.669 inches), both accurate to within 2 mm. Under SAE J2844 (revised January 2013), small cans of HFO[hyphen]1234yf (e.g , for use in DIY servicing of MVAC systems) must have a left-handed screw valve with a diameter of 0.5 inches and Acme (trapezoidal) thread with 16 threads per inch.D. Incorporation by Reference As proposed, EPA is adopting the current versions of three technical safety standards developed by SAE by incorporating them by reference into the use conditions for the nonroad vehicles addressed in this action. EPA is also modifying the use conditions for the previous listings of HFO[hyphen]1234yf in certain MVAC systems to incorporate by reference the most current versions of the three standards. The three standards are SAE J639 (revised November 2020), ``Safety and Design Standards for Motor Vehicle Refrigerant Vapor Compression Systems;'' SAE J1739 (revised January 2021), ``Potential Failure Mode and Effects Analysis (FMEA) Including Design FMEA, Supplemental FMEA-MSR, and Process FMEA;'' and SAE J2844 (revised January 2013), ``R[hyphen]1234yf (HFO[hyphen]1234yf) New Refrigerant Purity and Container Requirements for Use in Mobile Air-Conditioning Systems.'' Section II.A.4 of this preamble discusses these standards in greater detail. EPA finds, as in past rules, that it is appropriate to reference consensus standards that set conditions to reduce risk. As in past listings of flammable refrigerants, we find that such standards have already gone through a development phase that incorporates the latest findings and research. Likewise, such standards have gone through a vetting and refinement process that provides the affected parties an opportunity to comment. For the U.S MVAC industry, EPA sees SAE standards in general as a pervasively used body of work to address risks, and these standards are the most applicable and recognized by the U.S market. Incorporation by reference allows federal agencies to comply with the requirement to publish rules in the Federal Register and the Code of Federal Regulations by referring to material already published elsewhere. The legal effect of incorporation by reference is that the material is treated as if it were published in the Federal Register and Code of Federal Regulations. SAE J639, J1739, and J2844 are available for purchase by mail at: SAE[[Page 26289]]Customer Service, 400 Commonwealth Drive, Warrendale, PA 15096-0001; Telephone: 1-877-606-7323 in the U.S or Canada (other countries dial 1-724-776-4970); internet address for SAE J639: [*https://www.sae.org/standards/content/j639\_201112/;*](https://www.sae.org/standards/content/j639_201112/;) internet address for SAE J1739: [*https://www.sae.org/standards/content/j1739\_202101/;*](https://www.sae.org/standards/content/j1739_202101/;) internet address for SAE J2844: [*https://www.sae.org/standards/content/j2844\_201301/*](https://www.sae.org/standards/content/j2844_201301/). The cost of SAE J639, J1739, and J2844 is $85 each for an electronic or hard copy. The cost of obtaining these standards is not a significant financial burden for manufacturers of MVAC systems, and purchase is not required for those selling, installing, or servicing the MVAC systems covered by these standards. Therefore, the EPA concludes that SAE J639, J1739, and J2844 are reasonably available.E. What is the relationship between this SNAP rule and other federal rules?1. Significant New Use Rule for HFO[hyphen]1234yf Under the Toxic Substances Control Act In a final rule published on March 29, 2011 (76 FR 17488), EPA noted that the listing of HFO[hyphen]1234yf as acceptable, subject to use conditions, in new passenger cars and trucks did not apply to small cans. EPA stated that the Agency ``would require additional information on consumer risk and a set of unique fittings from the refrigerant manufacturer for use with small cans or containers of HFO[hyphen]1234yf before we would be able to issue a revised rule that allows for consumer filling, servicing, or maintenance of MVAC systems with HFO[hyphen]1234yf'' \90\ and that use of small cans would need to be consistent with EPA's final SNUR for HFO[hyphen]1234yf under TSCA (October 27, 2010; 75 FR 65987). EPA has since revised the SNUR (80 FR 37166, June 30, 2015) to require the submission of a significant new use notice (SNUN) for commercial use of HFO[hyphen]1234yf other than in passenger cars and vehicles in which the original charging of MVAC systems with HFO[hyphen]1234yf was done by the OEM and use of HFO[hyphen]1234yf in consumer products other than products used to recharge the MVAC systems in passenger cars and vehicles in which the original charging of MVAC systems with HFO[hyphen]1234yf was done by the OEM, among other things. Manufacturers of small cans of HFO[hyphen]1234yf have also submitted a unique fitting specifically for use with small can taps and small refrigerant cans for EPA's review. Today's listing of HFO[hyphen]1234yf would apply to small cans, weighing two pounds or less, for DIY or professional use. Consistent with the revised June 2015 SNUR for HFO[hyphen]1234yf, commercial use or use in consumer products to recharge MVAC systems with HFO[hyphen]1234yf in passenger cars and vehicles may only occur without submission of a SNUN and review by EPA if the OEM originally charged the system with HFO[hyphen]1234yf.--------------------------------------------------------------------------- \90\ EPA, 2011. Protection of Stratospheric Ozone: New Substitute in the Motor Vehicle Air Conditioning Sector Under the Significant New Alternatives Policy (SNAP) Program; Final Rule. March 29, 2011 (76 FR 17488). Available online at: [*https://www.govinfo.gov/content/pkg/FR-2011-03-29/pdf/2011-6268.pdf.---------------------------------------------------------------------------*](https://www.govinfo.gov/content/pkg/FR-2011-03-29/pdf/2011-6268.pdf.---------------------------------------------------------------------------) EPA is including a reference to the June 2015 SNUR (80 FR 37166) in Appendix B subpart G of part 82, under the `Comments' column, for the listings of HFO[hyphen]1234yf for the nonroad vehicles addressed in this action. EPA is also modifying the existing listings of HFO[hyphen]1234yf as acceptable, subject to use conditions, for various vehicle types, by including the reference to the June 2015 SNUR in the Comments column in Appendix B subpart G of part 82.2. CAA Sections 608 and 609 Today's action will not have any impact on EPA's regulations under sections 608 or 609 of the Clean Air Act. Among other things, CAA section 608 prohibits individuals from knowingly venting or otherwise releasing into the environment any refrigerants except those specifically exempted in certain end uses, while maintaining, servicing, repairing, or disposing of air conditioning or refrigeration equipment. HFO[hyphen]1234yf is not exempt from the venting prohibition in any application; therefore, knowing release of HFO[hyphen]1234yf from MVAC systems in the nonroad vehicles addressed in this action, or any other MVAC system, by any person maintaining, servicing, repairing, or disposing of such systems is prohibited. MVAC end-of-life disposal and recycling specifications are also covered under CAA section 608 and EPA's regulations issued under that section of the Act, which are codified at subpart F of 40 CFR part 82. In addition, as mentioned above in sections I.A and II.C, there are additional requirements that concern the sale or offer for sale of refrigerants, including a sales restriction under 40 CFR subpart F and specifically at 82.154(c)(1) and related specifications for self-sealing valves at 82.154(c)(2). This action does not modify the provisions under 40 CFR 82.154, including the restriction on sale of substitute refrigerants and requirements for self-sealing valves. The Agency is not revising regulations promulgated under CAA section 608 in this action. CAA section 609 establishes standards and requirements regarding the servicing or repair of MVAC systems. EPA has issued regulations implementing this statutory requirement and those regulations are codified at subpart B of 40 CFR part 82. Under section 609 and its implementing regulations, no person repairing or servicing motor vehicles for consideration \91\ may perform any service on an MVAC that involves the refrigerant without properly using approved refrigerant recovery or recovery and recycling equipment, and no such person may perform such service unless such person has been properly trained and certified. Refrigerant handling equipment must be certified by EPA or an independent organization approved by EPA. The statutory and regulatory provisions regarding MVAC servicing apply to all refrigerants, including HFO[hyphen]1234yf.--------------------------------------------------------------------------- \91\ Service for consideration means receiving something of worth or value to perform service, whether in money, credit, goods, or services.---------------------------------------------------------------------------3. Will this action affect EPA's HD greenhouse gas standards? The Phase 1 HD Greenhouse Gas (GHG) rule (76 FR 57106; September 15, 2011) set GHG standards for the HD industry in three discrete categories--combination tractors, HD pickups and vans, and vocational vehicles. The Phase 1 rule also set separate standards for engines that power vocational vehicles and combination tractors--based on the relative degree of homogeneity among vehicles within each category. As part of the Phase 1 HD GHG standards, EPA finalized a low leakage standard of 1.50 percent leakage per year for AC systems installed in HD pickup trucks and vans and combination tractors for model years 2014 and later. On October 25, 2016, EPA finalized Phase 2 HD GHG standards that built on the existing Phase 1 HD GHG standards (81 FR 73478). The nonroad vehicles for which EPA is listing HFO[hyphen]1234yf are not regulated under the Phase 1 or Phase 2 HD GHG standards. Additionally, today's action does not have a direct impact on the HD GHG standards, either for Phase 1 or Phase 2.F. Response to Comments EPA received four comments on the proposed rule from refrigerant suppliers and equipment manufacturers. All commenters strongly supported finalizing the rule as proposed, particularly the proposal to list[[Page 26290]]HFO[hyphen]1234yf as acceptable, subject to use conditions, in certain nonroad vehicle air conditioning systems. One commenter noted that the similarities between the proposed use conditions for the nonroad vehicles and those required for certain onroad vehicles ``will prevent confusion and help harmonize the industry as [HFO-]1234yf usage expands to nonroad vehicles.'' Another commenter stated that the proposed listings of HFO[hyphen]1234yf in the nonroad vehicles would ``provide manufacturers with regulatory certainty so they can design and manufacture new equipment using HFO[hyphen]1234yf and transition to lower GWP solutions.'' EPA acknowledges the support for the proposed rule and is finalizing the listings and changes as proposed. In the proposed rule, EPA requested information on the development of HFO[hyphen]1234yf MVAC systems for types of nonroad or onroad HD vehicles not covered by this rulemaking, particularly onroad trucks (i.e , Class 4-8 trucks between 14,001 and 33,000 or greater pounds). Two commenters supported the expanded use of HFO[hyphen]1234yf in HD onroad trucks greater than 14,000 pounds. One commenter estimated that manufacturers would need at least five to ten years to fully transition from HFC-134a to HFO[hyphen]1234yf and noted a few potential technical challenges. However, the commenter stated that ``medium- and heavy-duty truck manufacturers are addressing the challenge with urgency,'' and encouraged EPA to initiate rulemaking to list HFO[hyphen]1234yf for HD onroad trucks greater than 14,000 pounds. EPA acknowledges the commenters' support for the listing of HFO[hyphen]1234yf in additional onroad vehicles and will consider these comments as it evaluates possible future actions.III. Statutory and Executive Order ReviewsA. Executive Order 12866: Regulatory Planning and Review and Executive Order 13563: Improving Regulation and Regulatory Review This action is not a significant regulatory action and was therefore not submitted to the Office of Management and Budget (OMB) for review.B. Paperwork Reduction Act (PRA) This action does not impose any new information ***collection*** burden under the PRA. OMB has previously approved the information ***collection*** activities contained in the existing regulations and has assigned OMB control number 2060-0226. The approved Information ***Collection*** Request includes five types of respondent reporting and recordkeeping activities pursuant to SNAP regulations: Submission of a SNAP petition, filing a TSCA/SNAP Addendum, notification for test marketing activity, recordkeeping for substitutes acceptable subject to use restrictions, and recordkeeping for small volume uses. This rule contains no new requirements for reporting or recordkeeping.C. Regulatory Flexibility Act (RFA) I certify that this action will not have a significant economic impact on a substantial number of small entities under the RFA. In making this determination, EPA concludes that the impact of concern for this rule is any significant adverse economic impact on small entities and that the agency is certifying that this rule will not have a significant economic impact on a substantial number of small entities if the rule has no net burden on the small entities subject to the rule. Because the use conditions are consistent with industry consensus standards, no change in business practice is required to meet the use conditions, resulting in no adverse impact compared to the absence of this final rule. Thus, the rule would not impose new costs on small entities.D. Unfunded Mandates Reform Act (UMRA) This action does not contain any unfunded mandate as described in UMRA, 2 U.S.C 1531-1538, and does not significantly or uniquely affect small governments. The action imposes no enforceable duty on any state, local or tribal governments or the private sector.E. Executive Order 13132: Federalism This action does not have federalism implications. It will not have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government.F. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments This action does not have tribal implications as specified in Executive Order 13175. It will not have substantial direct effects on tribal governments, on the relationship between the Federal government and Indian tribes, or on the distribution of power and responsibilities between the Federal government and Indian tribes, as specified in Executive Order 13175. Thus, Executive Order 13175 does not apply to this action.G. Executive Order 13045: Protection of Children From Environmental Health and Safety Risks This action is not subject to Executive Order 13045 because it is not economically significant as defined in Executive Order 12866, and because EPA does not believe the environmental health or safety risks addressed by this action present a disproportionate risk to children. This action's health and risk assessments are contained in the comparisons of toxicity for HFO[hyphen]1234yf, as well as in the risk screens for HFO[hyphen]1234yf. The risk screens are in the docket for this rulemaking.H. Executive Order 13211: Actions That Significantly Affect Energy Supply, Distribution, or Use This action is not subject to Executive Order 13211, because it is not a significant regulatory action under Executive Order 12866.I. National Technology Transfer and Advancement Act This action involves technical standards. EPA is adopting the current versions of three technical safety standards developed by SAE by incorporating them by reference into the use conditions for the nonroad vehicles addressed in this action. EPA is also modifying the use conditions for the previous listings of HFO[hyphen]1234yf in MVAC systems to incorporate by reference the most current versions of the three standards. The use conditions ensure that HFO[hyphen]1234yf does not present significantly greater risk to human health or the environment than other alternatives available for use in MVAC. Specifically, the three standards are: 1. SAE J639: Safety and Design Standards for Motor Vehicle Refrigerant Vapor Compression Systems (revised November 2020). This document establishes safety standards for HFO[hyphen]1234yf MVAC systems that include unique fittings; a warning label indicating the refrigerant's identity and that it is a flammable refrigerant; and requirements for engineering design strategies that include a high-pressure compressor cutoff switch and pressure relief devices. This standard is available at [*https://www.sae.org/standards/content/j639\_201112/*](https://www.sae.org/standards/content/j639_201112/). 2. SAE J1739: Potential Failure Mode and Effects Analysis (FMEA) Including Design FMEA, Supplemental FMEA-MSR, and Process FMEA (revised January 2021). This standard describes potential FMEA in design and potential[[Page 26291]]FMEA in manufacturing and assembly processes. It requires manufacturers of MVAC systems and vehicles to conduct a FMEA and assists users in the identification and mitigation of risk by providing appropriate terms, requirements, ranking charts, and worksheets. This standard is available at [*https://www.sae.org/standards/content/j1739\_202101/*](https://www.sae.org/standards/content/j1739_202101/). 3. SAE J2844: R[hyphen]1234yf (HFO[hyphen]1234yf) New Refrigerant Purity and Container Requirements for Use in Mobile Air-Conditioning Systems (revised January 2013). This standard sets purity standards and describes container requirements, including fittings for refrigerant cylinders. For connections with refrigerant containers for use in professional servicing, use fittings must be consistent with SAE J2844 (revised January 2013). For connections with small refrigerant cans for consumer or professional use, use fittings must have a diameter of 0.5 inches, a thread pitch of 16 thread per inch, and a left thread direction, consistent with SAE J2844. This standard is available at [*https://www.sae.org/standards/content/j2844\_201301/*](https://www.sae.org/standards/content/j2844_201301/). These standards may be purchased by mail at: SAE Customer Service, 400 Commonwealth Drive, Warrendale, PA 15096-0001; by telephone: 1-877-606-7323 in the United States or 724-776-4970 outside the United States or in Canada. The cost of SAE J639, SAE J1739, and SAE J2844 is $85 each for an electronic or hardcopy. The cost of obtaining these standards is not a significant financial burden for manufacturers of MVAC systems and purchase is not required for those selling, installing, and servicing the systems. Therefore, EPA concludes that the use of SAE J639, SAE J1739, and SAE J2844 are reasonably available.J. Executive Order 12898: Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations A regulatory action may involve potential environmental justice concerns if it could: (1) Create new disproportionate impacts on people of color, communities of low-income, and/or indigenous peoples; (2) exacerbate existing disproportionate impacts on people of color, communities of low-income, and/or indigenous peoples; or (3) present opportunities to address existing disproportionate impacts on people of color, communities of low-income, and/or indigenous peoples through the action under development. EPA believes that this action does not have disproportionately high and adverse human health or environmental effects on people of color, communities of low-income and/or indigenous peoples, as specified in Executive Order 12898 (59 FR 7629, February 16, 1994). The listings for HFO[hyphen]1234yf in the vehicle types addressed in this action would provide additional lower-GWP alternatives for the MVAC end-use. By providing a lower-GWP alternative for this end-use, this final rule is also anticipated to reduce the use and eventual emissions of potent GHGs in this end-use, which could help to reduce the effects of climate change, including the public health and welfare effects on people of color, communities of low-income and/or indigenous peoples. This action's health and environmental risk assessments are contained in the comparison of health and environmental risks for HFO[hyphen]1234yf, as well as in the risk screens that are available in the docket for this rulemaking. EPA's analysis indicates that other environmental impacts and human health impacts of HFO[hyphen]1234yf are comparable to or less than those of other substitutes that are listed as acceptable for the same end-use. Based on these considerations, EPA expects that the effects on people of color, communities of low-income and/or indigenous peoples would not be disproportionately high and adverse.K. Congressional Review Act (CRA) This action is subject to the CRA, and EPA will submit a rule report to each House of the Congress and to the Comptroller General of the United States. This action is not a ``major rule'' as defined by 5 U.S.C 804(2).IV. References Unless specified otherwise, all documents are available electronically through the Federal Docket Management System, Docket number EPA-HQ-OAR-2021-0347.AEM, 2019. Risk Assessment for HFO[hyphen]1234yf in ***Agricultural*** Tractors >= 40 HP including 2WD, MFD, 4WD and Track Type Equipment.AEM, 2020a. Risk Assessment for HFO[hyphen]1234yf in Self-Propelled ***Agricultural*** Machinery including Combines, Forage Harvesters, Sprayers, and Windrowers.AEM, 2020b. Risk Assessment for HFO[hyphen]1234yf in Compact Equipment (Examples include Tractors <40HP, Turf Equipment, Skid Steer, Mini-Excavators and Track Loaders)AEM, 2020c. Risk Assessment for HFO[hyphen]1234yf in Construction, Forestry, and Mining Equipment.AEM, 2020d. Risk Assessment for HFO[hyphen]1234yf in Commercial Utility Vehicles.AEM, 2020e. CFD Leak Modeling-Supplemental Information to Compliment AEM Machine Form RAs.AEM, 2021. Appendix A: Machine Forms as Classified by AEM Membership.ASHRAE, 2019. ANSI/ASHRAE Standard 34-2019: Designation and Safety Classification of Refrigerants.Chemours, 2019. HFO[hyphen]1234yf for Use as a Refrigerant. Significant New Alternatives Policy Program Submission to the U.S Environmental Protection Agency.CRP, 2008. Risk Assessment for Alternative Refrigerants HFO[hyphen]1234yf Phase II. Prepared for SAE International Cooperative Research Program 1234 by Gradient Corporation.CRP, 2009. 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Available online at: [*https://www.govinfo.gov/content/pkg/FR-2011-03-29/pdf/2011-6268.pdf.EPA*](https://www.govinfo.gov/content/pkg/FR-2011-03-29/pdf/2011-6268.pdf.EPA), 2016. Protection of Stratospheric Ozone: Update to the Refrigerant Management Requirements Under the Clean Air Act. November 18, 2016. 81 FR 82272. Available online at: [*https://www.regulations.gov/document?D=EPA-HQ-OAR-2015-0453-0125.EPA*](https://www.regulations.gov/document?D=EPA-HQ-OAR-2015-0453-0125.EPA), 2021. Basic Information about the Emission Standards Reference Guide for On-road and Nonroad Vehicles and Engines. Available online at [*https://www.epa.gov/emission-standards-reference-guide/basic-information-about-emission-standards-reference-guide-road.Exponent*](https://www.epa.gov/emission-standards-reference-guide/basic-information-about-emission-standards-reference-guide-road.Exponent), 2008. HFO[hyphen]1234yf Refrigerant Concentration and Ignition Tests in Full-Scale Vehicle Passenger Cabin and Engine Compartment.ICF, 1997. Physiological Effects of Alternative Fire Protection Agents--Hypoxic Atmospheres Conference. Stephanie Skaggs prepared the proceedings of the conference held May 22, 1997 in New London, CT.ICF, 2008a. Air Conditioning Refrigerant Charge Size to Passenger Compartment Volume Ratio Analysis.ICF, 2008b. Revised Characterization of U.S Hybrid and Small Car Sales (Historical and Predicted) and Hybrid Vehicle Accidents.ICF, 2009a. Revised Final Draft Assessment of the Potential Impacts of HFO[hyphen]1234yf and the Associated Production of TFA on Aquatic Communities and Local Air Quality.ICF, 2009b. Risk Screen on Substitutes for CFC-12 in Motor Vehicle Air Conditioning: Substitute: HFO[hyphen]1234yf.ICF, 2010a. Summary of HFO[hyphen]1234yf Emissions Assumptions.[[Page 26292]]ICF, 2010b. Summary of Updates to the Vintaging Model that Impacted HFO[hyphen]1234yf Emissions Estimates.ICF, 2010c. Revised Assessment of the Potential Impacts of HFO[hyphen]1234yf and the Associated Production of TFA on Aquatic Communities, Soil and Plants, and Local Air Quality.ICF, 2010d. Sensitivity Analysis CMAQ results on projected maximum TFA rainwater concentrations and maximum 8-hr ozone concentrations.ICF, 2016. Technical Support Document for Acceptability Listing of HFO[hyphen]1234yf for Motor Vehicle Air Conditioning in Limited Heavy-Duty Applications.ICF, 2021a. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles ***Agricultural*** Tractors Greater than 40 Horsepower) (New Equipment).ICF, 2021b. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles Self-Propelled ***Agricultural*** Machinery) (New Equipment).ICF, 2021c. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles Compact Equipment) (New Equipment).ICF, 2021d. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles--Construction, Forestry, and Mining Equipment) (New Equipment).ICF, 2021e. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Nonroad Vehicles Commercial Utility Vehicles) (New Equipment).ICF, 2021f. Risk Screen on Substitutes in Motor Vehicle Air Conditioning (Small Cans). Substitute: HFO[hyphen]1234yf.Kataoka, O., Yoshizawa, M., & Hirakawa, T., 2000. Allowable Charge Limit of Flammable Refrigerants and Ventilation Requirements. Daikin Industries. International Refrigeration and Air Conditioning Conference. Paper 506. Available online at: [*http://docs.lib.purdue.edu/iracc/506.Nielsen*](http://docs.lib.purdue.edu/iracc/506.Nielsen), et al., 2007. Atmospheric chemistry of CF3CF=CH2: Kinetics and mechanisms of gas-phase reactions with Cl atoms, OH radicals, and O3. 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Standard J2772: Measurement of Passenger Compartment Refrigerant Concentrations Under System Refrigerant Leakage Conditions. SAE International. (Revised September 2019).SAE, 2020. Standard J639: Safety and Design Standards for Motor Vehicle Refrigerant Vapor Compression Systems. (Revised November 2020).SAE, 2021. Standard J1739: Potential Failure Mode and Effects Analysis (FMEA) Including Design FMEA, Supplemental FMEA-MSR, and Process FMEA. (Revised January 2021).Wagner, J., 2021. Email from John Wagner, Association of Equipment Manufacturers to Chenise Farquharson, EPA.List of Subjects in 40 CFR Part 82 Environmental protection, Administrative practice and procedure, Air pollution control, Incorporation by reference, Recycling, Reporting and recordkeeping requirements, Stratospheric ozone layer, Motor vehicle air conditioning.Michael S. Regan,Administrator. For the reasons set forth in the preamble, EPA amends 40 CFR part 82 as follows:PART 82--PROTECTION OF STRATOSPHERIC OZONE01. The authority citation for part 82 continues to read as follows: Authority: 42 U.S.C 7414, 7601, 7671-7671q.Subpart G--Significant New Alternatives Policy Program02. Appendix B to subpart G of part 82 is amended by0a. In the table titled ``Refrigerants--Acceptable Subject to Use Conditions'',0i. Revising the entries for ``CFC-12 Automobile Motor Vehicle Air Conditioning (New equipment in passenger cars and light-duty trucks only)'', ``Motor vehicle air conditioning (newly manufactured medium-duty passenger vehicles)'', ``Motor vehicle air conditioning (newly manufactured heavy-duty pickup trucks)'', and ``Motor vehicle air conditioning (newly manufactured complete heavy-duty vans only)''; and0ii. Adding entries, in the following order at the end of the table, for ``Motor vehicle air conditioning (newly manufactured nonroad ***agricultural*** tractors with greater than 40 horsepower)'', ``Motor vehicle air conditioning (newly manufactured nonroad self-propelled ***agricultural*** machinery)'', ``Motor vehicle air conditioning (newly manufactured nonroad compact equipment)'', ``Motor vehicle air conditioning (newly manufactured nonroad construction, forestry, and mining equipment)'', and ``Motor vehicle air conditioning (newly manufactured nonroad commercial utility vehicles)''; and0b. Removing ``Note 1''. The revisions and additions read as follows:[[Page 26293]] Appendix B to Subpart G of Part 82--Substitutes Subject to Use Restrictions and Unacceptable Substitutes Refrigerants--Acceptable Subject to Use Conditions---------------------------------------------------------------------------------------------------------------- Application Substitute Decision Conditions Comments---------------------------------------------------------------------------------------------------------------- \* \* \* \* \* \* \*CFC-12 Automobile Motor HFO[hyphen]1234y Acceptable As of June 3, 2022:.. Additional training Vehicle Air Conditioning (New f as a subject to use (1) HFO[hyphen]1234yf for service equipment in passenger cars substitute for conditions. MVAC systems must technicians and light-duty trucks only). CFC-12. adhere to all of the recommended. safety requirements HFO[hyphen]1234yf is of SAE J639,4 7 also known as including 2,3,3,3-tetrafluoro- requirements for a prop-1-ene (CAS. flammable Reg. No. 754-12-1). refrigerant warning Consistent with EPA's label, high-pressure Significant New Use compressor cutoff Rule for switch and pressure HFO[hyphen]1234yf relief devices, and under the Toxic unique fittings. For Substances Control connections with Act, commercial refrigerant users or consumers containers for use can only recharge in professional MVAC systems with servicing, use HFO[hyphen]1234yf fittings must be where the original consistent with SAE charging of the J2844.6 7 For system with connections with HFO[hyphen]1234yf small refrigerant was done by the cans for consumer or original equipment professional use, manufacturer. use fittings must Refrigerant have a diameter of containers of 0.5 inches, a thread HFO[hyphen]1234yf pitch of 16 thread for use in per inch, and a left professional thread direction, servicing are from 5 consistent with SAE lbs. (2.3 L) to 50 J2844.. lbs. (23 L) in size. (2) Manufacturers Requirements for must conduct Failure handling, storage, Mode and Effect and transportation Analysis (FMEA) as of compressed gases provided in SAE apply to this J1739.5 7 refrigerant, such as Manufacturers must regulations of the keep the FMEA on Occupational Safety file for at least and Health three years from the Administration at 29 date of creation. CFR 1910.101 and the Department of Transportation's requirements at 49 CFR 171-179. Requirements for handling, storage, and transportation of compressed gases apply to this refrigerant, such as regulations of the Occupational Safety and Health Administration at 29 CFR 1910.101 and the Department of Transportation's requirements at 49 CFR 171-179. \* \* \* \* \* \* \*Motor vehicle air conditioning HFO[hyphen]1234y Acceptable As of June 3, 2022: Additional training (newly manufactured medium- f. subject to use (1) HFO[hyphen]1234yf for service duty passenger vehicles). conditions. MVAC systems must technicians adhere to all of the recommended. safety requirements HFO[hyphen]1234yf is of SAE J639,4 7 also known as including 2,3,3,3-tetrafluoro- requirements for a prop-1-ene (CAS. flammable Reg. No. 754-12-1). refrigerant warning Consistent with EPA's label, high-pressure Significant New Use compressor cutoff Rule for switch and pressure HFO[hyphen]1234yf relief devices, and under the Toxic unique fittings. 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MVAC systems must technicians adhere to all of the recommended. safety requirements HFO[hyphen]1234yf is of SAE J639,4 7 also known as including 2,3,3,3-tetrafluoro- requirements for a prop-1-ene (CAS No. flammable 754-12-1). refrigerant warning Consistent with EPA's label, high-pressure Significant New Use compressor cutoff Rule for switch and pressure HFO[hyphen]1234yf relief devices, and under the Toxic unique fittings. For Substances Control connections with Act, commercial refrigerant users or consumers containers for use can only recharge in professional MVAC systems with servicing, use HFO[hyphen]1234yf fittings must be where the original consistent with SAE charging of the J2844.6 7 For system with connections with HFO[hyphen]1234yf small refrigerant was done by the cans for consumer or original equipment professional use, manufacturer. use fittings must have a diameter of 0.5 inches, a thread pitch of 16 thread per inch, and a left thread direction, consistent with SAE J2844. (2) Manufacturers must conduct Failure Mode and Effect Analysis (FMEA) as provided in SAE J1739.5 7 Manufacturers must keep the FMEA on file for at least three years from the date of creation.[[Page 26294]] Motor vehicle air conditioning HFO[hyphen]1234y Acceptable As of June 3, 2022: Additional training (newly manufactured complete f. subject to use (1) HFO[hyphen]1234yf for service heavy-duty vans only). conditions. MVAC systems must technicians adhere to all of the recommended. safety requirements HFO[hyphen]1234yf is of SAE J639,4 7 also known as including 2,3,3,3-tetrafluoro- requirements for a prop-1-ene (CAS No. flammable 754-12-1). refrigerant warning HFO[hyphen]1234yf is label, high-pressure acceptable for compressor cutoff complete heavy-duty switch and pressure vans. Complete heavy- relief devices, and duty vans are not unique fittings. For altered by a connections with secondary or refrigerant tertiary containers for use manufacturer. in professional Consistent with EPA's servicing, use Significant New Use fittings must be Rule for consistent with SAE HFO[hyphen]1234yf J2844.6 7 For under the Toxic connections with Substances Control small refrigerant Act, commercial cans for consumer or users or consumers professional use, can only recharge use fittings must MVAC systems with have a diameter of HFO[hyphen]1234yf 0.5 inches, a thread where the original pitch of 16 thread charging of the per inch, and a left system with thread direction, HFO[hyphen]1234yf consistent with SAE was done by the J2844. original equipment (2) Manufacturers manufacturer. must conduct Failure Mode and Effect Analysis (FMEA) as provided in SAE J1739.5 7 Manufacturers must keep the FMEA on file for at least three years from the date of creation.Motor vehicle air conditioning HFO[hyphen]1234y Acceptable As of June 3, 2022: Additional training (newly manufactured nonroad f. subject to use (1) Systems must for service ***agricultural*** tractors with conditions. adhere to all of the technicians greater than 40 horsepower). safety requirements recommended. of SAE J639,4 7 HFO[hyphen]1234yf is including also known as requirements for a 2,3,3,3-tetrafluoro- flammable prop-1-ene (CAS No. refrigerant warning 754-12-1). label, high-pressure Consistent with EPA's compressor cutoff Significant New Use switch and pressure Rule for relief devices, and HFO[hyphen]1234yf unique fittings. For under the Toxic connections with Substances Control refrigerant Act, commercial containers for use users or consumers in professional can only recharge servicing, use MVAC systems with fittings must be HFO[hyphen]1234yf consistent with SAE where the original J2844.6 7 For charging of the connections with system with small refrigerant HFO[hyphen]1234yf cans for consumer or was done by the professional use, original equipment use fittings must manufacturer. have a diameter of 0.5 inches, a thread pitch of 16 thread per inch, and a left thread direction, consistent with SAE J2844. 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MVAC systems must technicians adhere to all of the recommended. safety requirements HFO[hyphen]1234yf is of SAE J639,4 7 also known as including 2,3,3,3-tetrafluoro- requirements for a prop-1-ene (CAS No. flammable 754-12-1). refrigerant warning Consistent with EPA's label, high-pressure Significant New Use compressor cutoff Rule for switch and pressure HFO[hyphen]1234yf relief devices, and under the Toxic unique fittings. For Substances Control connections with Act (80 FR 37166, refrigerant June 30, 2015), containers for use commercial users or in professional consumers can only servicing, use recharge MVAC fittings must be systems with consistent with SAE HFO[hyphen]1234yf J2844.6 7 For where the original connections with charging of the small refrigerant system with cans for consumer or HFO[hyphen]1234yf professional use, was done by the use fittings must original equipment have a diameter of manufacturer. 0.5 inches, a thread pitch of 16 thread per inch, and a left thread direction, consistent with SAE J2844). 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MVAC systems must technicians adhere to all of the recommended. safety requirements HFO[hyphen]1234yf is of SAE J639,4 7 also known as including 2,3,3,3-tetrafluoro- requirements for a prop-1-ene (CAS No. flammable 754-12-1). refrigerant warning Consistent with EPA's label, high-pressure Significant New Use compressor cutoff Rule for switch and pressure HFO[hyphen]1234yf relief devices, and under the Toxic unique fittings. For Substances Control connections with Act, commercial refrigerant users or consumers containers for use can only recharge in professional MVAC systems with servicing, use HFO[hyphen]1234yf fittings must be where the original consistent with SAE charging of the J2844.6 7 For system with connections with HFO[hyphen]1234yf small refrigerant was done by the cans for consumer or original equipment professional use, manufacturer. use fittings must have a diameter of 0.5 inches, a thread pitch of 16 thread per inch, and a left thread direction, consistent with SAE J2844. (2) Manufacturers must conduct Failure Mode and Effect Analysis (FMEA) as provided in SAE J1739.5 7 Manufacturers must keep the FMEA on file for at least three years from the date of creation.----------------------------------------------------------------------------------------------------------------\4\ SAE, J639 NOV2020, Safety and Design Standards for Motor Vehicle Refrigerant Vapor Compression Systems, Revised November 2020.\5\ SAE, J1739 JAN2021, Potential Failure Mode and Effects Analysis (FMEA) Including Design FMEA, Supplemental FMEA-MSR, and Process FMEA, Revised January 2021.\6\ SAE, J2844 JAN2013, R-1234yf (HFO[hyphen]1234yf) New Refrigerant Purity and Container Requirements for Use in Mobile Air-Conditioning Systems, Revised January 2013.\7\ The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C 552(a) and 1 CFR part 51. It is available for inspection at the EPA and at the National Archives and Records Administration (NARA). Contact EPA at: U.S EPA's Air and Radiation Docket; EPA West Building, Room 3334, 1301 Constitution Ave. NW, Washington DC, 202-566-1742. For information on the availability of this material at NARA, email [*fr.inspection@nara.gov*](mailto:fr.inspection@nara.gov), or go to: [*www.archives.gov/federal-register/cfr/ibr-locations.html*](http://www.archives.gov/federal-register/cfr/ibr-locations.html). Available from SAE International (SAE): SAE Customer Service, 400 Commonwealth Drive, Warrendale, PA 15096- 0001; 1-877-606-7323 in the United States or 724-776-4970 outside the United States or in Canada; website: [*https://www.sae.org/standards*](https://www.sae.org/standards).\* \* \* \* \*[FR Doc. 2022-08923 Filed 5-3-22; 8:45 am]BILLING CODE 6560-50-P

**Load-Date:** May 7, 2022

**End of Document**



[***Federal Register: Endangered and Threatened Wildlife and Plants; Threatened Species Status With Section 4(d) Rule for Sand Dune Phacelia and Designation of Critical Habitat Pages 16320 - 16363 [FR DOC #2022-05326]***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:652D-90F1-F0YC-N4M7-00000-00&context=1516831)

Impact News Service

March 22, 2022 Tuesday

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**Length:** 34360 words

**Body**

Washington: Office of the Federal Register has issued the following notice:Department of the Interior-----------------------------------------------------------------------Fish and Wildlife Service-----------------------------------------------------------------------50 CFR Part 17Endangered and Threatened Wildlife and Plants; Threatened Species Status With Section 4(D) Rule for Sand Dune Phacelia and Designation of Critical Habitat; Proposed RuleFederal Register / Vol. 87, No. 55 / Tuesday, March 22, 2022 / Proposed Rules[[Page 16320]]-----------------------------------------------------------------------DEPARTMENT OF THE INTERIORFish and Wildlife Service50 CFR Part 17[Docket No. FWS-R1-ES-2021-0070; FF09E21000 FXES1111090FEDR 223]RIN 1018-BF89Endangered and Threatened Wildlife and Plants; Threatened Species Status With Section 4(d) Rule for Sand Dune Phacelia and Designation of Critical HabitatAGENCY: Fish and Wildlife Service, Interior.ACTION: Proposed rule.-----------------------------------------------------------------------SUMMARY: We, the U.S Fish and Wildlife Service (Service), propose to list the sand dune phacelia (Phacelia argentea), a plant species from coastal southern Oregon and northern California, as a threatened species and designate critical habitat under the Endangered Species Act of 1973, as amended (Act). This determination also serves as our 12-month finding on a petition to list the sand dune phacelia. After a review of the best available scientific and commercial information, we find that listing the species is warranted. Accordingly, we propose to list the sand dune phacelia as a threatened species with a rule issued under section 4(d) of the Act (``4(d) rule''). If we finalize this rule as proposed, it would add this species to the List of Endangered and Threatened Plants and extend the Act's protections to the species. We also propose to designate critical habitat for the sand dune phacelia under the Act. In total, approximately 252 acres (102 hectares) in Coos and Curry Counties in Oregon, and Del Norte County in California, fall within the boundaries of the proposed critical habitat designation. We also announce the availability of a draft economic analysis of the proposed designation of critical habitat for sand dune phacelia.DATES: We will accept comments received or postmarked on or before May 23, 2022. Comments submitted electronically using the Federal eRulemaking Portal (see ADDRESSES, below) must be received by 11:59 p.m Eastern Time on the closing date. We must receive requests for a public hearing, in writing, at the address shown in FOR FURTHER INFORMATION CONTACT by May 6, 2022.ADDRESSES: You may submit comments by one of the following methods: (1) Electronically: Go to the Federal eRulemaking Portal: [*https://www.regulations.gov*](https://www.regulations.gov). In the Search box, enter the docket number or RIN for this rulemaking (presented above in the document headings). For best results, do not copy and paste either number; instead, type the docket number or RIN into the Search box using hyphens. Then, click on the Search button. On the resulting page, in the panel on the left side of the screen, under the Document Type heading, check the Proposed Rule box to locate this document. You may submit a comment by clicking on ``Comment.'' (2) By hard copy: Submit by U.S mail to: Public Comments Processing, Attn: FWS-R1-ES-2021-0070, U.S Fish and Wildlife Service, MS: PRB/3W, 5275 Leesburg Pike, Falls Church, VA 22041-3803. We request that you send comments only by the methods described above. We will post all comments on [*https://www.regulations.gov*](https://www.regulations.gov). This generally means that we will post any personal information you provide us (see Information Requested, below, for more information). Availability of supporting materials: For the critical habitat designation, the draft economic analysis and the coordinates or plot points or both from which the maps are generated are included in the decision file and are available at the Oregon Ecological Services website ([*https://www.fws.gov/oregonfwo/*](https://www.fws.gov/oregonfwo/)) and at [*https://www.regulations.gov*](https://www.regulations.gov) under Docket No. FWS-R1-ES-2021-0070. Additional supporting information that we developed for this critical habitat designation will be available at the Service's website set out above, at [*https://www.regulations.gov*](https://www.regulations.gov), or both.FOR FURTHER INFORMATION CONTACT: Paul Henson, State Supervisor, Oregon Fish and Wildlife Office, 2600 SE 98th Avenue, Suite 100, Portland, OR 97266; telephone (503) 231-6179. Individuals in the United States who are deaf, deafblind, hard of hearing, or have a speech disability may dial 711 (TTY, TDD, or TeleBraille) to access telecommunications relay services. Individuals outside the United States should use the relay services offered within their country to make international calls to the point-of-contact in the United States.SUPPLEMENTARY INFORMATION:Executive Summary Why we need to publish a rule. Under the Act, if we determine that a species warrants listing, we are required to promptly publish a proposal in the Federal Register, unless doing so is precluded by higher-priority actions and expeditious progress is being made to add and remove qualified species to or from the List of Endangered and Threatened Wildlife and Plants. The Service will make a determination on our proposal within 1 year. If there is substantial disagreement regarding the sufficiency and accuracy of the available ***data*** relevant to the proposed listing, we may extend the final determination for not more than six months. To the maximum extent prudent and determinable, we must designate critical habitat for any species that we determine to be an endangered or threatened species under the Act. Listing a species as an endangered or threatened species and designation of critical habitat can only be completed by issuing a rule. What this document does: Proposes to list sand dune phacelia as a threatened species under the Act. Proposes a rule issued under section 4(d) of the Act (``4(d) rule'') that would make it unlawful to remove and reduce to possession the species from areas under Federal jurisdiction; maliciously damage or destroy the species on areas under Federal jurisdiction; or remove, cut, dig up, or damage or destroy the species on any other area in knowing violation of any law or regulation of any State or in the course of any violation of a State criminal trespass law; import or export; sell; or involve in interstate or foreign commerce. Proposes to designate critical habitat for the species on approximately 252 acres (ac) (102 hectares (ha)) in Coos and Curry Counties in Oregon, and Del Norte County in California. The basis for our action. Under the Act, we may determine that a species is an endangered or threatened species because of any of five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. We have determined that stressors related to Factors A and E (invasive species encroachment and competition, climate change, and small population size) are causing sand dune phacelia to be threatened. Section 4(a)(3) of the Act requires the Secretary of the Interior (Secretary) to designate critical habitat concurrent with listing to the maximum extent prudent and determinable. Section 3(5)(A) of the Act defines critical habitat as (i) the specific areas within the[[Page 16321]]geographical area occupied by the species, at the time it is listed, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protections; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination by the Secretary that such areas are essential for the conservation of the species. Section 4(b)(2) of the Act states that the Secretary must make the designation on the basis of the best scientific ***data*** available and after taking into consideration the economic impact, the impact on national security, and any other relevant impacts of specifying any particular area as critical habitat.Information Requested We intend that any final action resulting from this proposed rule will be based on the best scientific and commercial ***data*** available and be as accurate and as effective as possible. Therefore, we request comments or information from other governmental agencies, Native American Tribes, the scientific community, industry, or any other interested parties concerning this proposed rule. We particularly seek comments concerning: (1) The species' biology, range, and population trends, including: (a) Biological or ecological requirements of the species, including habitat requirements; (b) Genetics and taxonomy; (c) Historical and current range, including distribution patterns; (d) Historical and current population levels, and current and projected trends; and (e) Past and ongoing conservation measures for the species, its habitat, or both. (2) Factors that may affect the continued existence of the species, which may include habitat modification or destruction, overutilization, disease, predation, the inadequacy of existing regulatory mechanisms, or other natural or manmade factors. (3) Biological, commercial trade, or other relevant ***data*** concerning any threats (or lack thereof) to this species and existing regulations that may be addressing those threats. (4) Additional information concerning the historical and current status, range, distribution, and population size of this species, including the locations of any additional populations of this species. (5) Information on regulations that are necessary and advisable to provide for the conservation of the sand dune phacelia and that the Service can consider in developing a 4(d) rule for the species. In particular, information concerning the extent to which we should include any of the Act's section 9 prohibitions in the 4(d) rule or whether we should consider any additional exceptions from the prohibitions in the 4(d) rule. (6) The reasons why we should or should not designate habitat as ``critical habitat'' under section 4 of the Act (16 U.S.C 1531 et seq.), including information to inform the following factors that the regulations identify as reasons why designation of critical habitat may be not prudent: (a) The species is threatened by taking or other human activity and identification of critical habitat can be expected to increase the degree of such threat to the species; (b) The present or threatened destruction, modification, or curtailment of a species' habitat or range is not a threat to the species, or threats to the species' habitat stem solely from causes that cannot be addressed through management actions resulting from consultations under section 7(a)(2) of the Act; (c) Areas within the jurisdiction of the United States provide no more than negligible conservation value, if any, for a species occurring primarily outside the jurisdiction of the United States; or (d) No areas meet the definition of critical habitat. (7) Specific information on: (a) The amount and distribution of sand dune phacelia habitat; (b) What areas, that were occupied at the time of listing and that contain the physical or biological features essential to the conservation of the species, should be included in the designation and why; (c) Any additional areas occurring within the range of the species (in Coos or Curry County in Oregon, or Del Norte County in California) that should be included in the designation because they (1) are occupied at the time of listing and contain the physical or biological features that are essential to the conservation of the species and that may require special management considerations, or (2) are unoccupied at the time of listing and are essential for the conservation of the species; (d) Special management considerations or protection that may be needed in critical habitat areas we are proposing, including managing for the potential effects of climate change; and (e) What areas not occupied at the time of listing are essential for the conservation of the species. We particularly seek comments: (i) Regarding whether occupied areas are adequate for the conservation of the species; (ii) Providing specific information regarding whether or not unoccupied areas would, with reasonable certainty, contribute to the conservation of the species and contain at least one physical or biological feature essential to the conservation of the species; and (iii) Explaining whether or not unoccupied areas fall within the definition of ``habitat'' at 50 CFR 424.02 and why. (8) Land use designations and current or planned activities in the subject areas and their possible impacts on proposed critical habitat. (9) Any probable economic, national security, or other relevant impacts of designating any area that may be included in the final designation, and the related benefits of including or excluding specific areas. (10) Information on the extent to which the description of probable economic impacts in the draft economic analysis is a reasonable estimate of the likely economic impacts and any additional information regarding probable economic impacts that we should consider. (11) Whether any specific areas we are proposing for critical habitat designation should be considered for exclusion under section 4(b)(2) of the Act, and whether the benefits of potentially excluding any specific area outweigh the benefits of including that area under section 4(b)(2) of the Act. (12) Whether we could improve or modify our approach to designating critical habitat in any way to provide for greater public participation and understanding, or to better accommodate public concerns and comments. Please include sufficient information with your submission (such as scientific journal articles or other publications) to allow us to verify any scientific or commercial information you include. Please note that submissions merely stating support for, or opposition to, the action under consideration without providing supporting information, although noted, will not be considered in making a determination, as section 4(b)(1)(A) of the Act directs that determinations as to whether any species is an endangered or a threatened species must be made ``solely on the basis of the best scientific and commercial ***data*** available.'' You may submit your comments and materials concerning this proposed rule by one of the methods listed in ADDRESSES. We request that you send[[Page 16322]]comments only by the methods described in ADDRESSES. If you submit information via [*https://www.regulations.gov*](https://www.regulations.gov), your entire submission--including any personal identifying information--will be posted on the website. If your submission is made via a hardcopy that includes personal identifying information, you may request at the top of your document that we withhold this information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on [*https://www.regulations.gov*](https://www.regulations.gov). Comments and materials we receive, as well as supporting documentation we used in preparing this proposed rule, will be available for public inspection on [*https://www.regulations.gov*](https://www.regulations.gov). Because we will consider all comments and information we receive during the comment period, our final determinations may differ from this proposal. Based on the new information we receive (and any comments on that new information), we may conclude that the species is endangered instead of threatened, or we may conclude that the species does not warrant listing as either an endangered species or a threatened species. For critical habitat, our final designation may not include all areas proposed, may include some additional areas that meet the definition of critical habitat, and may exclude some areas if we find the benefits of exclusion outweigh the benefits of inclusion. In addition, we may change the parameters of the prohibitions or the exceptions to those prohibitions in the 4(d) rule if we conclude it is appropriate in light of comments and new information received. For example, we may expand the prohibitions to include prohibiting additional activities if we conclude that those additional activities are not compatible with conservation of the species. Conversely, we may establish additional exceptions to the prohibitions in the final rule if we conclude that the activities would facilitate or are compatible with the conservation and recovery of the species.Public Hearing Section 4(b)(5) of the Act provides for a public hearing on this proposal, if requested. Requests must be received by the date specified in DATES. Such requests must be sent to the address shown in FOR FURTHER INFORMATION CONTACT. We will schedule a public hearing on this proposal, if requested, and announce the date, time, and place of the hearing, as well as how to obtain reasonable accommodations, in the Federal Register and local newspapers at least 15 days before the hearing. For the immediate future, we will provide these public hearings using webinars that will be announced on the Service's website, in addition to the Federal Register. The use of these virtual public hearings is consistent with our regulations at 50 CFR 424.16(c)(3).Previous Federal Actions On March 7, 2014, the Service received a petition requesting that sand dune phacelia be listed as an endangered or threatened species and, if applicable, critical habitat be designated for this species under the Act (Center for Biological Diversity et al. 2014, entire). Our subsequent 90-day finding (80 FR 37568, July 1, 2015) concluded that the petition provided substantial information, and that the status of sand dune phacelia warranted further review.Supporting Documents A species status assessment (SSA) team prepared an SSA report for the sand dune phacelia. The SSA team was composed of Service biologists, in consultation with other species experts. The SSA report represents a compilation of the best scientific and commercial ***data*** available concerning the status of the species, including the impacts of past, present, and future factors (both negative and beneficial) affecting the species. In accordance with our joint policy on peer review published in the Federal Register on July 1, 1994 (59 FR 34270), and our August 22, 2016, memorandum updating and clarifying the role of peer review of listing actions under the Act, we sought the expert opinions of three appropriate specialists regarding the SSA. We received three responses. We also sent the SSA report to seven partners, including scientists with expertise in botany and coastal native dune plant conservation, for review. We received review from three partners: Oregon Department of ***Agriculture***'s Native Plant Conservation Program, the California Department of Parks and Recreation, and the Tolowa Dunes Stewards.I. Proposed Listing DeterminationBackground Sand dune phacelia (Phacelia argentea), also known as silvery phacelia, is an evergreen, herbaceous, flowering perennial in the forget-me-not family (Boraginaceae), and its status as a taxonomically valid species is well-accepted (Nelson and MacBride 1916, p. 34). It is found only on coastal dune habitat in southern Oregon (Coos and Curry Counties) and far northern California (Del Norte County) coasts. A rangewide survey conducted in 2017 documented 26 occupied sites (including 1 entirely introduced population), with 16 sites in Oregon and the remaining 10 in California (Brown 2020a database). Sand dune phacelia occurs on the open sand above the high tide line, further inland on semi-stabilized and open dunes, and on coastal bluffs (Kalt 2008, p. 2). It has been described as occurring at elevations ranging from 10 to 40 feet (3 to 12 meters) and on slopes less than 30 percent composed of sand or (rarely) gravel (Rodenkirk 2019, p. 7). Sand dune phacelia exhibits multiple adaptations for living in drought-like, nutrient-poor areas with high winds, blowing sand, and salt spray. It forms mats that reduce its exposure to wind and spray and has silvery hairs on its leaves, which allow it to resist desiccation in its harsh environment of blowing sand. Its tap root may be extensive, facilitating life in an environment of shifting sands and maximizing the plant's ability to uptake water (Rodenkirk 2019, p. 12). Sand dune phacelia occurs in sandy habitats that are sufficiently free of competing vegetation to provide space and a high light environment to allow for seedling establishment and growth (Kalt 2008, p. 4; Meinke 2016, p. 2). Reproductively mature plants begin to bloom in late April and May, with flowers persisting through August (Meinke 1982, p. 282). Sand dune phacelia appears to be largely incapable of significant self-pollination (Meinke 2016, p. 3), relying upon pollination by bees (Rittenhouse 1995, p. 8). A thorough review of the taxonomy, life history, and ecology of the sand dune phacelia (Phacelia argentea) is presented in the SSA report (Service 2021, pp. 7-20).Regulatory and Analytical FrameworkRegulatory Framework Section 4 of the Act (16 U.S.C 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species is an endangered species or a threatened species. The Act defines an ``endangered species'' as a species that is in danger of extinction throughout all or a significant portion of its range, and a ``threatened species'' as a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether any species is an endangered species or a threatened species because of any of the following factors:[[Page 16323]] (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence. These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species' continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects. We use the term ``threat'' to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term ``threat'' includes actions or conditions that have a direct impact on individuals (direct impacts), as well as those that affect individuals through alteration of their habitat or required resources (stressors). The term ``threat'' may encompass--either together or separately--the source of the action or condition or the action or condition itself. However, the mere identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an ``endangered species'' or a ``threatened species.'' In determining whether a species meets either definition, we must evaluate all identified threats by considering the expected response by the species, and the effects of the threats--in light of those actions and conditions that will ameliorate the threats--on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species, such as any existing regulatory mechanisms or conservation efforts. The Secretary determines whether the species meets the definition of an ``endangered species'' or a ``threatened species'' only after conducting this cumulative analysis and describing the expected effect on the species now and in the foreseeable future. The Act does not define the term ``foreseeable future,'' which appears in the statutory definition of ``threatened species.'' Our implementing regulations at 50 CFR 424.11(d) set forth a framework for evaluating the foreseeable future on a case-by-case basis. The term ``foreseeable future'' extends only so far into the future as the Service can reasonably determine that both the future threats and the species' responses to those threats are likely. In other words, the foreseeable future is the period of time in which we can make reliable predictions. ``Reliable'' does not mean ``certain''; it means sufficient to provide a reasonable degree of confidence in the prediction. Thus, a prediction is reliable if it is reasonable to depend on it when making decisions. It is not always possible or necessary to define foreseeable future as a particular number of years. Analysis of the foreseeable future uses the best scientific and commercial ***data*** available and should consider the timeframes applicable to the relevant threats and to the species' likely responses to those threats in view of its life-history characteristics. ***Data*** that are typically relevant to assessing the species' biological response include species-specific factors such as lifespan, reproductive rates or productivity, certain behaviors, and other demographic factors.Analytical Framework The SSA report documents the results of our comprehensive biological review of the best scientific and commercial ***data*** regarding the status of the species, including an assessment of the potential threats to the species. The SSA report does not represent a decision by the Service on whether the species should be proposed for listing as an endangered or threatened species under the Act. However, it does provide the scientific basis that informs our regulatory decisions, which involve the further application of standards within the Act and its implementing regulations and policies. The following is a summary of the key results and conclusions from the SSA report; the full SSA report can be found at Docket FWS-R1-ES-2021-0070 on [*https://www.regulations.gov*](https://www.regulations.gov) and at [*https://www.fws.gov/oregonfwo*](https://www.fws.gov/oregonfwo). To assess sand dune phacelia viability, we used the three conservation biology principles of resiliency, redundancy, and representation (Shaffer and Stein 2000, pp. 306-310). Briefly, resiliency supports the ability of the species to withstand environmental and demographic stochasticity (for example, wet or dry, warm or cold years), redundancy supports the ability of the species to withstand catastrophic events (for example, droughts, large pollution events), and representation supports the ability of the species to adapt over time to long-term changes in the environment (for example, climate changes). In general, the more resilient and redundant a species is and the more representation it has, the more likely it is to sustain populations over time, even under changing environmental conditions. Using these principles, we identified the species' ecological requirements for survival and reproduction at the individual, population, and species levels, and described the beneficial and risk factors influencing the species' viability. The SSA process can be categorized into three sequential stages. During the first stage, we evaluated the individual species' life-history needs. The next stage involved an assessment of the historical and current condition of the species' demographics and habitat characteristics, including an explanation of how the species arrived at its current condition. The final stage of the SSA involved making predictions about the species' responses to positive and negative environmental and anthropogenic influences. Throughout all of these stages, we used the best available information to characterize viability as the ability of a species to sustain populations in the wild over time. We use this information to inform our regulatory decision.Summary of Biological Status and Threats In this discussion, we review the biological condition of the species and its resources, and the threats that influence the species' current and future condition, in order to assess the species' overall viability and the risks to that viability.Individual Needs Sand dune phacelia occurs in sandy habitats that are sufficiently free of competing vegetation to allow for seedling establishment and growth (Kalt 2008, p. 4; Meinke 2016, p. 2). Drought has been implicated in low seedling recruitment and adult mortality (Rodenkirk 2019, p. 17), but precise moisture requirements are unknown. Nutritional needs are evidently low, as sand is nutrient poor. Whether sand dune phacelia is mycorrhizal (like many other dune species) is unknown. A high light environment is important for sand dune phacelia to complete its life cycle and reproduce. There is evidence that high light exposure is needed for seed germination (Meinke 2016, p. 5) as well as for seedling establishment and growth (Rodenkirk 2019, p. 19; Jacobs 2019, p. 92).[[Page 16324]]Population Needs To be adequately resilient, populations of sand dune phacelia need sufficient numbers of reproductive individuals to withstand stochastic events. Sufficient annual seed production and seedling establishment is necessary to offset mortality of mature sand dune phacelia plants within a population. Because large individuals produce the most seed (Meinke 2016, p. 3), their loss is likely to have the greatest impact on the overall population. However, no quantitative analyses have been completed to determine minimum viable population size for sand dune phacelia. Sandy habitat that is relatively free of vegetative competition is important for population persistence (Rodenkirk 2019, p. 16; Rittenhouse 1995, p. 8). Historically, sand dunes shifted as dictated by prevailing winds, tides, and storm surge, and these forces maintained and supported native dune plant communities adapted to highly dynamic environments. In the absence of sand-disturbing forces, dune habitats are susceptible to rapid colonization by nonnative species such as European beachgrass (Ammophila arenaria) and gorse (Ulex europaea), as well as encroachment by native successional species like shore pine (Pinus contorta ssp. contorta) (Meinke 2016, p. 2). Sand dune phacelia is largely dependent upon pollination by bees. In coastal dune habitats, bee abundance and species richness are positively correlated with the presence of sand dune phacelia (Julian 2012, p. 3), and negatively correlated with cover of European beachgrass and other invasive vegetation (Julian 2012, p. 21).Species Needs To maintain viability, sand dune phacelia should have a sufficient number of sustainable populations that are well-distributed throughout its geographic range and throughout the variety of ecological settings in which the species is known to exist. Suitable habitat must be available, and the number and distribution of adequately resilient populations must be sufficient for the species to withstand catastrophic events. No quantitative analysis exists upon which to determine the minimum number of populations or the quantity of suitable habitat necessary for sand dune phacelia to maintain viability as a species. The historical extent and distribution of sand dune phacelia across the southern Oregon and far northern California coasts is not precisely known. The species may have been more abundant, widespread, and contiguously distributed on the landscape prior to the loss and stabilization of sand dune habitats, off-highway vehicle use, and the introduction of invasive species (particularly European beachgrass) (Meinke 2016, p. 2). Due to its specialized adaptations to the sand dune environment, it is unlikely that sand dune phacelia ever occurred in a diverse range of ecological environments, and no information exists on the genetics of sand dune phacelia that would allow an assessment of whether populations demonstrate sufficient genetic variability to persist under changing environmental conditions. In summary, individual sand dune phacelia plants require sandy substrate with limited vegetative competition for light, moisture, and growing space. Populations must be sufficiently large and sustainable to withstand stochastic events, have sufficient annual seed production, and an adequate pollinator community. For species viability, sand dune phacelia must have sufficiently resilient populations that are well distributed across its range and sufficient genetic diversity to adapt to changing conditions (table 1). Table 1--Individual, Population, and Species Needs of Sand Dune Phacelia---------------------------------------------------------------------------------------------------------------- Individuals Populations Species----------------------------------------------------------------------------------------------------------------Bare sandy substrate............... Sufficiently large number of reproductive Sufficient number of individuals per population to withstand adequately resilient stochastic events. populations well distributed across the rangeHigh light environment............. Sufficient annual seed production to offset Sufficient genetic mortality. diversity to adapt to change over time (no information on genetics)Water.............................. Dune/sandy habitat with low degree of invasive species.Pollinators........................ Sufficient abundance and diversity of pollinators for outcrossing/optimal seed production.----------------------------------------------------------------------------------------------------------------Threats We considered a comprehensive set of sand dune phacelia stressors that have been cited in the literature (Rodenkirk 2019, entire), in the ***data*** provided from our partners (Brown 2020a database), and in the petition (Center for Biological Diversity et al. 2014, entire). For each stressor we assessed whether there was sufficient evidence that the influence of the stressor rose to the scope and magnitude necessary to impact sand dune phacelia populations, and thus be carried forward in our analysis of current and future condition. We also examined positive influence factors (conservation efforts) in a similar manner.Invasive Plants Invasive, introduced plant species are considered one of the most influential stressors to sand dune phacelia and its habitat (Kalt 2008, p. 7; Rodenkirk 2019, p. 6). European beachgrass, gorse, and other invasive plant species outcompete sand dune phacelia throughout its range (Rodenkirk 2019, p. 6). Introduced to the Pacific Northwest region of the United States and California in the 1800s, European beachgrass is an aggressive, perennial, rhizomatous grass. It was extensively planted to stabilize sand and build dunes parallel to the ocean shore to protect infrastructure from the effects of ocean storms and tides (Hacker et al. 2011, p. 2; Oregon Department of Fish and Wildlife (ODFW) 2016, pp. 67). Colonizing European beachgrass captures sand with its deep roots and spreading shoots, forming dense monocultures of grass that outcompete many native dune species, including sand dune phacelia, for growing space, sunlight, and moisture (Rittenhouse 1996, p. 3). The steep, heavily vegetated foredunes seen today along much of the Oregon, and to a lesser extent California, coastlines are the result of European beachgrass colonization (Rittenhouse 1995, p. 9; Zarnetske et al. 2010, pp. 12). Dune stabilization by European beachgrass also facilitates the establishment and succession of native trees and shrubs that proliferate in the absence of natural disturbance regimes,[[Page 16325]]thereby resulting in the ***conversion***, and ultimate loss, of native dune habitat (Rittenhouse 1996, p. 3; Brown 2020a database). According to population surveys conducted in California, European beachgrass poses the most consequential threat to sand dune phacelia populations in that State (Jacobs 2019, p. 9; Imper 1987, p. 1; Kalt 2008, p. 7). In Oregon, the expansion of European beachgrass was a likely factor in the extirpation of two sand dune phacelia populations near Bandon (Christy 2007, p. 15), and adverse effects to sand dune phacelia populations from European beachgrass have been documented at multiple locations throughout its range (Rittenhouse 1995, p. 9; Kagan and Titus 1998a, p. 10; Kagan and Titus 1998b, p. 3; Titus 1998, p. 12; Rodenkirk 2019, entire; Brown 2020a database). We are also aware that under certain ocean shore alteration permits in Oregon, landowners are required to stabilize the dune against erosion in order to protect properties and shoreline. European beachgrass is often used because it is readily available and effective for that purpose (Bacheller 2021, pers. comm.). This permitting requirement may promote the spread of European beachgrass, although to our knowledge this is not currently occurring within the range of sand dune phacelia. Gorse is an introduced spiny shrub that forms impenetrable thickets that overtake dune habitats. It is widely recognized as a threat to native plant species and dune habitats (Christy 2007, entire; ODFW 2016, p. 7). Widespread in the Bandon, Oregon, area, it poses a threat to sand dune phacelia populations in the northern region of its range (Kagan and Christy 1998, p. 14; Christy 2007, p. 17; Kalt 2008 p. 8; Rodenkirk 2019, p. 6; Brown 2020a database). Gorse is also highly flammable and produces copious amounts of seed that can persist in the environment for 30 years or more (Goodwin 2018, p. 119). There is broad consensus in the scientific literature and available ***data*** that invasive species presently pose a population-level threat to sand dune phacelia rangewide and will continue to do so into the future, so we included this threat in our analysis of current and future condition.Recreational Impacts Legal and illegal off-highway vehicle (OHV) use can damage or kill sand dune phacelia. While widely perceived as a potential threat (Kalt 2008, p. 9; Brown 2020a database; Rodenkirk 2019, p. 6), documented impacts from OHVs are limited to individuals at a small number of sites throughout its range, most notably in California (Imper, 1987, p. 1; Gedik 2009, p. 7; Tolowa Dune Stewards 2013, p. 18; Jacobs 2019, pp. 15, 102). Impacts of OHV use to sand dune phacelia in Oregon are thought to be minimal and localized (Rittenhouse 1995, p. 9), with most OHV use occurring in areas unoccupied by sand dune phacelia (Kalt 2008, p. 9). Trampling by pedestrians and equestrians is noted in the literature as a concern throughout the range of sand dune phacelia. Trampling can both decrease the size of sand dune phacelia mats and destroy individuals (Rodenkirk 2019, p. 6). However, light levels of disturbance can also partially destabilize dunes and reduce invasive species proliferation, thus benefitting sand dune phacelia habitat (Kalt 2008, p. 10). Additional study is needed to investigate the effects of human traffic on sand dune phacelia populations (Jacobs 2019, pp. 113-114). In general, while noted as a stressor and documented as destructive to individuals at some sites, lack of available ***data*** on population-level effects of recreational use on sand dune phacelia precluded us from carrying forward the influence of recreation in our analysis of current and future condition. However, we do acknowledge that recreational impacts, primarily from OHV use, are damaging sand dune phacelia habitat at some sites, and may be especially deleterious to small populations.Coastal Development Coastal development may directly damage sand dune phacelia plants or result in habitat loss due to ***conversion*** of sand dunes to other uses (Kalt 2008, p. 9). Coastal development may be more consequential in Oregon, where State-listed plants receive no protection on private lands. In California, the California Environmental Quality Act, the Native Plant Protection Act, and the California Coastal Act regulate development to minimize impacts to coastal dunes and other Environmentally Sensitive Habitat Areas. Most extant populations of sand dune phacelia occur on public lands where protections are in place that safeguard against direct mortality or habitat loss, and we found insufficient ***data*** to support the claim that development is currently impacting the remaining extant populations on private land. For example, the two primary private land parcels that currently support sand dune phacelia are the Pacific Shores Subdivision in California and the sites at the Bandon Dunes Golf Resort in Oregon. Seventy-five percent of the undeveloped, privately owned lots at Pacific Shores have been acquired by the California Department of Fish and Wildlife for inclusion into a conservation area, and efforts are underway to purchase the remaining undeveloped private holdings (Jerabek 2020, pers. comm.). At the Bandon Dunes Golf Resort, a stated goal of the conservation-minded owner is to protect and enhance the sand dune phacelia population there, which after heavy infestations of gorse were cleared (Gunther 2012, no pagination) now represents the largest population rangewide (Brown 2020a database). It is possible that coastal development had impacts on sand dune phacelia historically, leading to its present-day condition of small and fragmented populations. However, based on our assessment of current land ownership and population condition, the best available ***data*** does not indicate that development is presently a population-level threat to sand dune phacelia. This stressor may have had historical impacts but no longer appears influential, and, based on land ownership of extant population sites, it seems unlikely to become influential in the future.Livestock Grazing Livestock grazing occurs throughout the range of sand dune phacelia on some private lands; however, it usually occurs on well-stabilized (vegetated) dunes and coastal meadows, which are not suitable sand dune phacelia habitat. Furthermore, in some cases grazing may actually benefit sand dune phacelia by reducing competition from invasive species (Rodenkirk 2019, p. 22). Negative effects of livestock grazing on sand dune phacelia populations have not been documented, and grazing was not listed as a threat to any of the populations in the most recent rangewide survey (Brown 2020a database). Given current land ownership, we do not expect grazing to impact populations in the future. Therefore, we did not include livestock grazing in our threat analysis.Overutilization Because of sand dune phacelia's attractive foliage, illegal removal of it for horticultural purposes has been cited as a threat (Rodenkirk 2019, p. 6; Oregon Department of ***Agriculture*** (ODA) 2020, no pagination). We could find no information with which to validate this claim or assess its impacts on sand dune phacelia populations. As such, we do not consider overutilization to be a threat influencing populations of sand[[Page 16326]]dune phacelia currently or into the future.Sea Level Rise The best available ***data*** does not indicate that sea level rise is currently influencing sand dune phacelia, and it is unknown how changes in sea levels may have affected the species in the past. However, because sea level rise is expected to increase in the future with climate change, and near-shore species could be affected by sea level rise and associated erosion and storm surge (IPCC 2014, p. 67), we consider the impact of projected sea level rise on sand dune phacelia in our analysis of future conditions.Small Population Size We acknowledge that, prior to habitat fragmentation, many of the populations, especially those south of the town of Bandon, Oregon, and near Crescent City, California, were most likely functionally continuous (Brown 2020b, pers. comm.). Our assessment of population abundance and habitat quality from recent surveys indicates that the number of populations of sand dune phacelia is reduced compared to documented historical occurrences. Many of the remaining populations are very small in size, and most populations are isolated from one another by large tracts of unsuitable habitat, making genetic exchange and dispersal among most populations unlikely without human intervention. No information exists on the minimum number of individuals required to support a sand dune phacelia population. However, a population size of about 25 individuals appears to be biologically relevant given the best available ***data***. Specifically, the current abundance of nearly every extant population falls either below 25 (1 to 24 individuals) or well above 25 (100 or more individuals), with all populations with fewer than 25 individuals also undergoing population decline (Brown 2020a database). Therefore, in the absence of any existing minimum viable population analysis to draw upon, we assume that at least 25 individuals are necessary for sand dune phacelia population viability. As such, low abundance was a factor in our analysis of current condition, and we considered small populations that currently support fewer than 25 individuals as unlikely to persist in our future condition analysis.Pollinator Decline Because sand dune phacelia is largely reliant upon pollination to successfully reproduce, pollinator decline is cited as a potential threat to sand dune phacelia (ODA 2020; no pagination). Furthermore, bee abundance and diversity were found to be positively correlated with the presence of sand dune phacelia in one study in California (Julian 2012, p. iii). While we recognize the important role pollinators play in the needs of sand dune phacelia, we found no ***data*** with which to assess the status of pollinator communities at extant sand dune phacelia sites, nor to indicate that pollinator decline was affecting sand phacelia populations. Therefore, we acknowledge the importance of a healthy and diverse pollinator community but were unable to include this factor in our analysis of current and future conditions.Summary of Threats The primary threat currently acting upon sand dune phacelia populations is that of invasive species, which is expected to continue impacting the species into the future and was therefore included in our analysis of current and future condition. In addition, our current and future condition analysis included the consideration of sea level rise and small population size. Other stressors mentioned above may act on sand dune phacelia individuals, or have highly localized impacts, but do not rise to the level of impacting populations. However, we acknowledge that all stressors may exacerbate the effects of other ongoing threats.Regulatory Conservation Efforts Sand dune phacelia is listed as threatened by the Oregon Department of ***Agriculture*** (ODA) and has a State listing status of 1, indicating that it is threatened or endangered throughout its range (Oregon Biodiversity Information Center 2019, p. 33). Native plant species that are listed as threatened or endangered in Oregon are protected on all non-federal public lands (Oregon Revised Statutes (ORS) 564.105). Any land action on Oregon public lands that results, or might result, in the ***collection*** or disturbance of a threatened or endangered species requires either a permit or a consultation with ODA staff. The State consultation process for public land managers requires a written evaluation of projects that impact listed plant species, and the ODA may recommend alternatives to avoid or minimize impacts to those species; a formal consultation or permit may be required. Prohibitions for listed plant species in the State of Oregon are provided by ORS 603-073-0003, which states ``Willful or negligent cutting, digging, trimming, picking, removing, mutilating, or in any manner injuring, or subsequently selling, transporting, or offering for sale any plant, flower, shrub, bush, fruit, or other vegetation growing on the right of way of any public highway within this state, within 500 feet of the center of any public highway, upon any public lands, or upon any privately owned lands is prohibited without the written permission of the owner or authorized agent of the owner.'' Additionally, ORS 564.105(3) calls for the State to establish programs for the protection and conservation of plant species, and the State participates in conservation management actions as staffing and funding allows. In practice, however, resource limitations often prevent implementation of the full suite of affirmative management actions required to achieve the recovery of State listed plants. As an example, the eradication or control of widespread invasive species such as gorse, one of the primary threats to sand dune phacelia, would pose enormous resource requirements that far exceed the State's capacity. Oregon State Parks contain nearly 50 percent of all sand dune phacelia populations rangewide. Under the master-plan level designation for Oregon State parks, sites that contain listed species are automatically placed in a category of administrative conservation designation, which provides sand dune phacelia populations with protection from development. While no formal conservation plans to benefit sand dune phacelia are in place, invasive control actions at several parks improve sand dune habitat and may assist with restoring or maintaining suitable conditions for sand dune phacelia in the future (Bacheller 2020, pers. comm.). Oregon State Parks are not supported by tax dollars, as are other State agencies, but are supported by a combination of State Park user fees, recreational vehicle license fees, and a portion of State lottery revenues. As a result, Oregon State Park budgets can be subject to significant fluctuations in revenue and are often limited, which can affect their capacity to implement management actions for conservation, such as habitat restoration for rare plants on State Park lands. In California, sand dune phacelia is designated as a California Rare Plant with a rank of 1B.1, meaning that it is rare, threatened, or endangered in California and elsewhere, and is seriously endangered in California. Impacts to species of this rank or their habitat must be analyzed during preparation of environmental documents relating to the California Environmental Quality Act (CEQA).[[Page 16327]]Under CEQA, state public agencies (including State Parks) must provide measures to reduce or avoid adverse environmental impacts of proposed projects, including impacts to designated rare plants such as sand dune phacelia. Designation as a California Rare Plant generally reduces negative impacts to sand dune phacelia caused by development or other land use programs and actions but does not ameliorate the primary threat to the species, which is that of invasive species encroachment. All of the plants constituting California Rare Plant Rank 1B meet the definitions of the California Endangered Species Act of the California Fish and Game Code, and are eligible for State listing, however, sand dune phacelia is not listed under the California Endangered Species Act. The Federal Lands Policy and Management Act of 1976, as amended (FLPMA; 43 U.S.C 1701 et seq.) governs the management of public lands administered by the Bureau of Land Management (BLM). Under FLPMA, the BLM administers a special status species policy that calls for the conservation of BLM special status species and the ecosystems upon which they depend on BLM-administered lands. BLM special status species are any species listed or proposed for listing under the Endangered Species Act, or species designated as ``Bureau sensitive'' by the State Director(s). Sand dune phacelia is designated as a Bureau sensitive special status plant species and is thus the recipient of proactive conservation efforts on BLM lands as staffing and resources allow. On Federal lands in Oregon, the BLM regularly restores sand dune phacelia habitat through the removal or control of invasive species at Lost Lake, Floras Lake, and Storm Ranch (Rodenkirk 2019; entire). BLM is updating its management plan for the New River Area of Critical Environmental Concern, where the majority of sand dune phacelia populations on BLM land occurs (Wright, pers. comm. 2020). The new plan will include an emphasis on restoring native dune plant communities, including those with sand dune phacelia.Voluntary Conservation Efforts Rangewide, the largest sand dune phacelia population is located on private land at the Bandon Dunes Golf Resort, and while no formal conservation agreements or commitments exist, the private land owner has been actively maintaining sand dune phacelia habitat through ongoing removal of European beachgrass and gorse (Gunther 2012, no pagination). In California, the South Lake Tolowa Restoration effort has removed European beachgrass from approximately 25 ac (10 ha) at Tolowa Dunes State Park and the Lake Earl Wildlife Area (Jacobs 2019, pp. 24-25). Conducted by California State Parks and a volunteer group called the Tolowa Dunes Stewards (Jacobs 2019, p. 10), restoration efforts initiated in 2010 increased the sand dune phacelia population from approximately 2,300 plants to 5,936 plants in 2017 (Brown 2020a database). The South Lake Tolowa population is now the largest in California, and the second largest rangewide. Volunteers from the Tolowa Dunes Stewards have also restored 30 ac of habitat (12 hectares) at the nearby East Dead Lake population via the removal of European beachgrass (Jerabek 2020, pers. comm.). However, in the absence of committed funding or agreements associated with these restoration efforts, they are almost entirely reliant on grant funding and volunteer efforts (Jerabek 2020, pers. comm.). The significant gains made for sand dune phacelia at these sites could quickly be lost without continuous maintenance efforts, given the aggressive nature of European beachgrass and other invasive species. Rangewide, actions to control invasive species have demonstrated success in maintaining or increasing populations of sand dune phacelia (Gunther 2012, no pagination; Meinke 2016, p. 25; Jacobs 2019, p. 10; Rodenkirk 2019; entire). Sand dune phacelia is a management-dependent species, as restoration of dune habitat through ongoing control of invasive species is essential to the continuing viability of sand dune phacelia rangewide. Therefore, we considered the contribution of habitat management actions, and in particular control of invasive species, in our analysis of future conditions. We also considered whether or not our Policy for the Evaluation of Conservation Efforts (68 FR 15100, March 28, 2003) applies to sand dune phacelia habitat management efforts, but we determined that it does not apply because no formalized agreements exist to ensure the future mitigation of the threat posed by invasive species. In addition to habitat restoration activities, augmentation of sand dune phacelia populations using transplants has been carried out at several sites by BLM in partnership with Oregon State University (Meinke 2016, entire) and the Oregon Department of ***Agriculture*** (Brown 2017, entire). While transplant efforts appear to be beneficial initially, transplant mortality over time tends to be high as outplanted individuals succumb to environmental conditions (Meinke 2016, p. 18). Refinements to sand dune phacelia cultivation protocols are necessary to improve transplanting success (Meinke 2016, entire; Brown 2017, p. 5). Attempts are also underway by BLM to enhance or establish populations by directly seeding sand dune phacelia into suitable habitat (Wright 2020, pers. comm.). The recently introduced population at Storm Ranch is the largest population that occurs on Federal lands (Rodenkirk 2019, p. 28). Attempts to establish the Storm Ranch population began in 2012 with a seeding of 2 ac (0.8 ha) (Rodenkirk 2019, p. 28). Initial seedings were unsuccessful, but eventually a population was established, with 1,596 plants counted in 2018. The population drastically declined in 2019, with only 620 plants observed (Rodenkirk 2019, p. 29). Long-term monitoring will assess whether this seeded population can maintain viability. Because of the high levels of plant mortality observed following transplantation efforts, and the significant uncertainty as to whether augmented or introduced populations may be capable of contributing to the maintenance or enhancement of sand dune phacelia populations over time, we did not include the seeded population at Storm Ranch, or outplanted individuals at other sites, in our analysis of current and future conditions. We determined that habitat restoration in the form of invasive species removal is the primary conservation effort influencing sand dune phacelia at the population level, and therefore carried it through our analysis of future condition. Augmentation and reintroduction are likely having a positive influence on sand dune phacelia, but we lack evidence that these conservation efforts are having population-level effects at this time.Current ConditionMethodology We delineated three representation units (Oregon-North, Oregon-South, and California) based on geographic breaks in the distribution of the species, because they could not otherwise be characterized by marked differences in genetic makeup, phenotypic variation, habitats, or ecological niches. No population viability assessment models exist to inform the categorization of population condition for sand dune phacelia. Therefore, we used the best[[Page 16328]]available science to score the overall current condition of each population qualitatively as high, moderate, or low, based upon our assessment of habitat condition, population abundance, and population trend over time. The average score was then used to rate the overall current condition of each population. Sand dune phacelia populations were surveyed rangewide in Oregon and California in 2017 by the Oregon Department of ***Agriculture***'s Plant Conservation Program (Brown 2020a database). The 2017 survey enumerated current population size, examined historical ***data*** to discern population trends, delineated the area occupied, briefly described the habitat, and identified stressors at each site. This effort provides the most current ***data*** available on nearly every extant population of sand dune phacelia. We excluded sites consisting of Phacelia species with intermediate morphology (those that appear hybridized). These plants were determined to most likely be crosses between sand dune phacelia and P. nemoralis ssp. oregonensis (Brown 2020a database; Meinke 1982, p. 260). In addition to different morphological attributes, the intermediate plants occur in rockier habitats as compared to areas occupied by sand dune phacelia, and rockier habitat is more indicative of P. nemoralis. While we suspect that these plants are most likely hybrids and not representatives of sand dune phacelia, no genetic information is available upon which to base this conclusion. Whether the presumed intergrades affect sand dune phacelia population viability is unknown. More information on intermediate populations, as well as on all populations, is included in the SSA (Service 2021, entire). Abundance categories were defined as ``Low'' (100 or fewer plants), ``Moderate'' (101,500 plants), and ``High'' (over 500 plants). These rating categories were derived to reflect relative abundance between populations only, or an index of population size, because there is no information available on the minimum number of individuals necessary to maintain a viable population. Habitat condition was scored based on the most recently available observations at sand dune phacelia population sites. Because sand dune phacelia habitat quality is highly influenced by invasive species, the scores reflect the relative encroachment of invasive species at a given site as reported by the 2017 rangewide survey (Brown 2020a database) and by BLM. Quantitative ***data*** on invasive species in sand dune phacelia populations, such as percent cover of invasive species, are not available. Population trend ***data*** were derived from the 2017 rangewide survey (Brown 2020a database) and reflect documented abundance ***data*** across historical records. Trend ***data*** are necessarily coarse, as many populations were rarely or sporadically monitored prior to 2017. Increasing trends were rated as ``High,'' stable trends as ``Moderate,'' and decreasing trends as ``Low.'' The overall condition scores for all known extant populations of sand dune phacelia are presented in table 2.Current Resiliency, Redundancy, and Representation Resiliency refers to the ability of populations to withstand stochastic events, and we assessed the resiliency of each population using the current habitat condition, population abundance, and population trend. Of the 25 naturally occurring (we did not include the 1 entirely introduced population) extant sand dune phacelia populations we assessed, 4 are currently in high condition, 4 are in moderate condition, and 17 are in low condition (table 2). Therefore, resiliency is low for most populations rangewide, with 68 percent of all populations rated with low overall condition (figure 1).[[Page 16329]][GRAPHIC] [TIFF OMITTED] TP22MR22.000 Redundancy is a species' ability to withstand catastrophic events and is determined by the number of its populations and their distribution across the landscape. Currently, approximately 33,858 naturally occurring sand dune phacelia plants exist in 25 populations along roughly 100 miles (161 kilometers (km)) of coastline. Our analysis of current redundancy concludes that, although most extant populations exhibit low resiliency, it is unlikely that a single catastrophic event could eliminate all extant populations, which are well distributed throughout all representation units, with the most robust populations located at either end of the range (figure 1).[[Page 16330]][GRAPHIC] [TIFF OMITTED] TP22MR22.001 Representation refers to the ability of a species to adapt to change and is based upon considerations of phenotypic, genetic, and ecological diversity, as well as the species' ability to colonize new areas. There is little evidence of phenotypic variation among individuals of sand dune phacelia, and no ***data*** are available on potential genetic diversity. As a narrow endemic, sand dune phacelia is highly specialized and restricted in its ecological niche, with all occupied sites sharing similar features, and differences being largely related to the population's distance from the ocean and position in relation to the dune (e.g , foredune, backdune). As such, sand dune phacelia demonstrates little ecological diversity. However, the ability of a species to adapt is gauged not only by diversity among[[Page 16331]]individuals, but also by its ability to colonize new areas. Currently, populations of sand dune phacelia are patchy and dispersed, often isolated by large tracts of intervening habitat made unsuitable by human development or invasive species. The lack of available and unoccupied suitable habitat leaves less opportunity for a species to exploit new resources outside of the area it currently occupies and to adapt to changing conditions. Further, the lack of connectivity between populations may result in reduced gene flow and genetic diversity, rendering the species less able to adapt to novel conditions. The low level of phenotypic and ecological diversity demonstrated within this species, as well as restricted opportunity for colonization into new areas, indicates some limitations in representation for sand dune phacelia. However, sand dune phacelia continues to be represented by multiple populations distributed throughout the known historical range of the species, although the resiliency of most of these populations is low.Future Condition The intent of this analysis is to assess the viability of sand dune phacelia into the future under various plausible future scenarios. Further explanation on our methodology and assumptions for our future condition analysis can be found in our SSA report (Service 2021, Chapter 6). We assessed the future condition of sand dune phacelia by considering how invasive species competition, the effects of climate change, small population size, and habitat management efforts may affect populations over time. We considered the impacts of both habitat management (invasive species removal) and climate change on the extent of invasive species cover expected to occur in the future at each site. Climate change is also projected to affect sea levels; thus, we assessed each site for potential effects of inundation due to sea level rise. In addition to the overall current condition categories of ``high,'' ``moderate,'' and ``low'' that were based on current habitat and demographic factors, we included for the future condition analysis the additional categories of ``very high,'' ``very low,'' and ``extirpated'' for populations where the overall condition was already high but projected to improve, was already low but projected to deteriorate further, or where the population (with fewer than 25 individuals) was expected to become extirpated, respectively.Future Timeframe We considered a timeframe for this analysis based upon the extent into the future we could reasonably forecast the impact of the threats on the species, given the ***data*** and models available to us. Global climate models project changes in global temperature and other associated climatic changes based on potential future scenarios of greenhouse gas concentrations in the atmosphere (i.e , Representative Concentration Pathways, or RCPs). RCP 4.5 assumes major near-future cuts to carbon dioxide emissions, and RCP 8.5 assumes that current emissions practices continue with no significant change (Terando et al. 2020, p. 10). Thus, these RCPs represent conditions in the upper and lower ends of the range of what can reasonably be expected for the future effects of climate change (Terando et al. 2020, p. 17). Climate model projections are fairly aligned until about mid-century when they start to diverge more, as this is the timeframe during which our near-future carbon emissions begin to manifest in projections of future climate. Although all projections into the future show global temperature and sea level rise increasing, the variability or uncertainty in the magnitude of changes expected becomes much greater at this point. Therefore, we determined that the period of time from the present to about mid-century to be the timeframe over which we could most reliably project the future condition of sand dune phacelia. As such, the timeframe for our analysis of the future condition of sand dune phacelia extends to approximately the year 2060, which is the mid-century timeframe available for the sea level rise projections we used to assess inundation at sand dune phacelia populations (Service 2021, p. 43).Climate Change Warming temperatures have already been documented and are expected to continue in the Pacific Northwest, though changes will be somewhat muted in coastal areas (Mote et al. 2019, summary p. 1). There have been no clear discernible trends in annual precipitation, though there will likely be modest increases in the winter and decreases of similar scale in the summer (Mote et al. 2019, summary p. 1). Warming summer temperatures paired with decreased summer precipitation may lead to increased drought risk, which has the potential to cause stress, desiccation, and even mortality in plant communities. Although increased temperatures and decreased precipitation during the summer growing season are likely to have negative effects on sand dune phacelia, whether these changes will result in population-level impacts in the next 40 years is unclear given the available ***data***. Therefore, we were unable to analyze the impacts of drought in our future scenarios. Sea level rise projections in 1-foot increments were available at three locations that span the entire range of sand dune phacelia (Coos Bay and Port Orford in Oregon, and Crescent City in California). One foot (0.3 meter) of sea level rise is projected to occur under RCP 8.5 by 2060 in Oregon and by 2070 in northern California but is not projected to occur within this timeframe under RCP 4.5 (Climate Central 2020, no pagination). According to the sea level rise modeling tool we used (National Oceanographic and Atmospheric Administration 2020, no pagination), this amount of sea level rise under RCP 8.5 is not projected to inundate the areas currently occupied by sand dune phacelia. Further details of the sea level rise analysis we conducted, including potential indirect effects such as erosion and storm surge that we were unable to project, are available in the SSA (Service 2021, Chapter 6, Appendix 2).Invasive Species As described previously in this report, invasive plant species, in particular European beachgrass and gorse, unequivocally represent the primary driver of sand dune phacelia's status presently and into the future. Though some uncertainty remains as to how climate change will impact biological invasions into the future, it is widely agreed that changing climate, especially temperature and precipitation regimes, will exacerbate the invasions of many alien species under future conditions (Gervais et al. 2020, p. 1). Although relatively few in number, some studies have demonstrated the impacts of climate change on invasive species by modeling the abundance, distribution, spread, and impact of invasive species in the Pacific Northwest relative to climate model projections (Gervais et al. 2020, p. 1). Further, there is evidence that climate-induced expansions of invasive species are already underway in this region (Gervais et al. 2020, p. 1). The best available information at this time does not allow us to quantify the magnitude of these expansions, nor does it allow us to predict how the population dynamics of sand dune phacelia at occupied sites may be affected. However, we expect that the pressure currently exerted upon sand dune phacelia populations due to encroachment by invasive plant species[[Page 16332]]is likely to increase into the future in response to climate change. We expect the negative impacts to sand dune phacelia from climate-related invasive species expansion to be most evident under the higher emissions scenario (RCP 8.5).Small Population Size We considered populations with fewer than 25 individuals likely to become extirpated in the future. While small population size does not appear to be a threat at the species level because there are multiple adequately-sized populations found throughout the range of the species, very small populations are at elevated risk for local extirpation, and thus small population size is a threat at the population level. None of the sites with very small populations currently have habitat management practices to remove invasive species, and we did not assume new efforts would be initiated but acknowledge that extirpation of very small populations could be prevented with management intervention.Habitat Management As previously described, the removal of invasive species has been shown to be the most effective strategy for maintaining and increasing populations of sand dune phacelia. Because there are no management plans in place at any of the population sites that would ensure the continuation of or initiate new habitat management practices, and funding for these practices is tenuous, we assumed that either habitat management currently in place would continue or cease, but that management efforts would not increase. We also assumed that populations with current management practices in place would improve in condition into the future with continued management, and those without management currently in place would decline in condition into the future.Future Scenarios We considered two plausible future scenarios in our analysis of future viability of sand dune phacelia. Scenario 1 assumes that current habitat management actions to control invasive species will continue to occur and will continue to benefit sand dune phacelia into the future. Thus, the condition of populations of sand dune phacelia at sites that are currently receiving habitat management will continue to improve into the future. Conversely, under this scenario we assume that if no actions to control invasive species are currently being implemented in or adjacent to sand dune phacelia populations, no new efforts are likely to be initiated, and habitat conditions will subsequently worsen over time. Scenario 1 also assumes that RCP 4.5 is in effect, with associated effects to sea level rise and a moderate increase in invasive species expansion. Scenario 2 assumes that any habitat management actions that are presently occurring will be discontinued over time, and therefore no habitat management actions to control invasive species are in effect in the future. Scenario 2 also assumes that RCP 8.5 is in effect, with the associated effects to sea level rise and a greater increase in invasive species expansion. Therefore, these two scenarios represent our best understanding of the most optimistic and the least optimistic of plausible futures we can expect for sand dune phacelia.Future Resiliency, Redundancy, and Representation Rangewide, we conclude that under Scenario 1, nearly half (12 of 25) of all sand dune phacelia populations would become extirpated by 2060, and many of the remaining populations (7 of 13) would deteriorate to Low or Very Low condition. However, the condition of those populations that currently benefit from the active control of invasive species would increase over time due to improved habitat conditions, such that five populations would be in High or Very High condition under Scenario 1. Future population resiliency fares worse under Scenario 2, with well over half of all populations (68 percent) becoming extirpated, and all remaining populations projected to be in Low or Very Low condition (table 3). Thus, under either future scenario we considered, many populations will become extirpated, and future resiliency will be low among most remaining populations.[[Page 16333]][GRAPHIC] [TIFF OMITTED] TP22MR22.002 Future redundancy of sand dune phacelia declines under both future scenarios we considered. Under Scenario 1, only 13 of the 25 extant populations would exist rangewide by 2060, with about half of those in Low or Very Low condition. However, five populations would remain in High or Very High condition, with at least one population considered in Very High condition in each representation unit. In the event of a catastrophe in a part of its range, sand dune phacelia would likely continue to exist in other parts of its range, albeit in low numbers and condition. Under Scenario 2, only eight populations are estimated to remain extant in 2060 and would be evenly split between Low and Very Low condition. Due to the greatly reduced number of remaining populations (mostly with low resiliency) under either future scenario, sand dune phacelia redundancy will be low, rendering the species vulnerable to catastrophic events within the future timeframe we considered. Representation is not expected to change significantly under either future scenario we considered. All representation units will retain populations, and each will have at least one population in Very High condition under Scenario 1. However, only 13 populations are projected to exist rangewide, with over half (54 percent) being in Very Low or Low condition. Under Scenario 2, all populations are in Very Low or Low condition, with very few populations existing in any of the representation units. Fewer populations in the future would provide less opportunity for diversity among individuals, with fewer individuals available to contribute to the adaptive capacity of the species. Isolation is also expected to increase in the future with the expected reduction in size and number of populations on the landscape, further decreasing the likelihood of genetic exchange. These factors may result in a modest reduction in representation into the future, but overall, populations (though fewer) will still be distributed across the range of the species providing adequate representation. Overall, we expect the viability of the species to decline by varying degrees under the future scenarios considered. Persistence of the two populations that contain 89 percent of known individuals, even under the more[[Page 16334]]favorable future scenario considered, appears to depend upon continued removal of introduced, invasive species. By mid-century (roughly 2060), we expect sand dune phacelia will still occur on the landscape, but likely with a significantly reduced number of sufficiently resilient populations that are even more sparsely distributed across the historical range of the species. We note that, by using the SSA framework to guide our analysis of the scientific information documented in the SSA report, we have not only analyzed individual effects on the species, but we have also analyzed their potential cumulative effects. We incorporate the cumulative effects into our SSA analysis when we characterize the current and future condition of the species. To assess the current and future condition of the species, we undertake an iterative analysis that encompasses and incorporates the threats individually and then accumulates and evaluates the effects of all the factors that may be influencing the species, including threats and conservation efforts. Because the SSA framework considers not just the presence of the factors, but to what degree they collectively influence risk to the entire species, our assessment integrates the cumulative effects of the factors and replaces a standalone cumulative effects analysis.Determination of Sand Dune Phacelia Status Section 4 of the Act (16 U.S.C 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species meets the definition of an ``endangered species'' or a ``threatened species.'' The Act defines an ``endangered species'' as a species in danger of extinction throughout all or a significant portion of its range, and a ``threatened species'' as a species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether a species meets the definition of an ``endangered species'' or a ``threatened species'' because of any of the following factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence.Status Throughout All of Its Range We carefully assessed the best scientific and commercial information available regarding the past, present, and future stressors to sand dune phacelia. The potential stressors we considered were: Invasive species encroachment and competition (Factors A and E); recreational impacts from OHV use and trampling (Factor A); coastal development (Factor A); livestock grazing (Factor A); regulatory and voluntary conservation efforts (Factor D); climate change impacts including sea level rise and drought (Factor E); small population size (Factor E); and pollinator decline (Factor E). There is no evidence that overutilization (Factor B) or disease and predation (Factor C) are impacting sand dune phacelia. We evaluated each potential stressor to determine which stressors were likely to be drivers of the species' current and future condition, and found that invasive species, climate change, and small population size are the primary threats to the species. There are 25 naturally occurring, extant populations of sand dune phacelia. Nearly 70 percent (17) of these populations are currently in low condition according to our assessment, and nearly half (12) of the populations have fewer than 25 individuals. However, extant populations are distributed across the historical range of the species, and there remains at least one highly resilient population and one moderately resilient population in each of the three representative areas (in the northern, middle, and southern regions of the range). Populations that are currently in poor condition, many of which have fewer than 25 individuals, are at risk of extirpation without management intervention. Many of these populations, especially those with very low abundance, may never be likely to contribute meaningfully to the species' viability. However, even without the very small (fewer than 25 individuals) populations on the landscape, the species would still maintain 13 populations across the range, with 8 of those populations being in moderate or high condition and evenly distributed across all 3 representation units. The distribution and maintenance of sufficiently resilient populations, albeit few of them, across the historical range of the species indicates an adequate degree of redundancy, making it unlikely that a single catastrophic event would lead to the extirpation of all extant populations. While we have little evidence of diversity among members of the species, sand dune phacelia is a relatively localized endemic inhabiting a narrow ecological niche, so broad diversity is not necessarily expected. Populations of sand dune phacelia remain distributed across the three representation units and throughout its known historical range, and therefore the species is currently represented across the breadth of any ecological diversity that exists within its range. We know that the most influential threat to sand dune phacelia, encroachment by invasive species (Factors A and E), can be successfully mitigated with active habitat management. Effective habitat management is currently ongoing at several population sites, including at the largest population strongholds at the northern and southern extents of the species' range (Bandon Preserve and Golf Course in Oregon and Tolowa Dunes in California). It is also possible that if management efforts continue or increase, they could promote the increase and expansion of populations into the future. Because of the presence of multiple populations in moderate to high condition (or with adequate resiliency) distributed across all regions of the species' historical range (redundancy) and across the breadth of ecological conditions inhabited by the species (representation), as well as the success of current conservation efforts to mitigate the primary threat (invasive species) at population strongholds, we determined that sand dune phacelia is not currently in danger of extinction throughout its range. Upon determining that sand dune phacelia is not at risk of extinction now, we consider whether it is likely to become endangered in the foreseeable future. According to our assessment of plausible future scenarios, we conclude that the species is likely to become endangered within the foreseeable future throughout all of its range through decreased resiliency, redundancy, and representation. For the purposes of this determination, the foreseeable future is considered to be approximately 40 years from now (or approximately 2060), based on the timeframe with which we could most reliably project the impacts of climate change and the species' response to those impacts. As previously noted, the primary driver of the sand dune phacelia's status is habitat loss due to encroachment and competition by invasive species (Factors A and E). This species is considered management-dependent, relying on active and continuous removal of invasive species such as European beachgrass and gorse to maintain habitat[[Page 16335]]conditions to support sand dune phacelia. Invasive species removal, especially that which is effective and consistent enough to maintain sand dune phacelia populations over time, is costly and labor-intensive, and requires a significant commitment of resources. Currently, while invasive species removal efforts are responsible for maintaining the few (8 of 25) sand dune phacelia populations that are in moderate to high condition, no formal commitments or agreements are in place to continue these efforts, and many of these efforts are dependent upon the will and resources of volunteer groups or private landowners. The remaining strongholds of sand dune phacelia would likely decline quickly in the absence of effective habitat management efforts that are currently ongoing. Specifically, in the most severe future scenario we considered, which includes the cessation of all management efforts into the future, our analysis projects the extirpation of most (17) populations in the future, with those remaining (8) declining to low or very low condition. Climate change (Factor E) may elevate the risk of drought, lead to increased erosion caused by sea level rise and the increased frequency and magnitude of storm surge, or potentially result in other negative influences to sand dune phacelia, but we were unable to reliably project how these influences would impact the species in our future analysis. Climate change is expected to exacerbate the threat of invasive species into the future, regardless of which emissions scenarios we consider. Given the severity of the threat of invasive species and the tenuous nature of habitat management into the future, the synergistic effects of climate change and invasive species on sand dune phacelia could be significant regardless of the magnitude of climate change impacts on their own. Small population size (Factor E) is a threat that affects nearly half of the extant sand dune phacelia populations. These 12 populations have fewer than 25 individuals and have no programs in place or conservation efforts ongoing to ameliorate the threat of invasive species, which is the primary cause of low sand dune phacelia abundance at these sites. Without the implementation of habitat management practices at these sites, we expect these very small populations to become extirpated in the future. Regulatory mechanisms (Factor D) and voluntary conservation efforts by the States of Oregon and California, BLM, volunteer groups, and private landowners, provide benefit to sand dune phacelia at the affected population sites, mostly through invasive species removal efforts and to some degree augmentation and reintroduction efforts. However, while these efforts have helped reduce the impacts of invasive species and small population size locally at certain populations, these influences remain prominent threats to sand dune phacelia and continue to affect the species as a whole. Due to the continuation of threats at increasing levels into the future, we anticipate a significant reduction in the distribution of sand dune phacelia as the result of the extirpation of multiple populations. Even in the most optimistic future scenario we considered, nearly half of the extant populations of sand dune phacelia would likely become extirpated, with only six populations remaining with moderate to high/very high resiliency. The less optimistic future projection would result in most populations becoming extirpated, and any remaining populations would be in low or very low condition. These types of declines illustrate a loss of resiliency among most populations, as well as a significant reduction in redundancy and representation, with fewer populations on the landscape to withstand catastrophic events and maintain adaptive capacity. Remaining populations in either future scenario will have lower resiliency, leading to lower overall redundancy and representation. Even in the most optimistic future scenario, the species will have low viability and is therefore at risk of becoming endangered within the foreseeable future. Thus, after assessing the best available information, we conclude that sand dune phacelia is likely to become in danger of extinction within the foreseeable future throughout all of its range.Status Throughout a Significant Portion of Its Range Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. The court in Center for Biological Diversity v. Everson, 2020 WL 437289 (D.D.C Jan. 28, 2020) (Center for Biological Diversity), vacated the aspect of the Final Policy on Interpretation of the Phrase ``Significant Portion of Its Range'' in the Endangered Species Act's Definitions of ``Endangered Species'' and ``Threatened Species'' (79 FR 37578; July 1, 2014) that provided that the Service does not undertake an analysis of significant portions of a species' range if the species warrants listing as threatened throughout all of its range. Therefore, we proceed to evaluating whether the species is endangered in a significant portion of its range--that is, whether there is any portion of the species' range for which both (1) the portion is significant; and (2) the species is in danger of extinction in that portion. Depending on the case, it might be more efficient for us to address the ``significance'' question or the ``status'' question first. We can choose to address either question first. Regardless of which question we address first, if we reach a negative answer with respect to the first question that we address, we do not need to evaluate the other question for that portion of the species' range. Following the court's holding in Center for Biological Diversity, we now consider whether there are any significant portions of the species' range where the species is in danger of extinction now (i.e , endangered). In undertaking this analysis for sand dune phacelia, we choose to address the status question first--we consider information pertaining to the geographic distribution of both the species and the threats that the species faces to identify any portions of the range where the species is endangered. For sand dune phacelia, we considered whether the threats are geographically concentrated in any portion of the species' range at a biologically meaningful scale. We examined the threats of invasive species and of climate change, including cumulative effects. The threat of invasive species is pervasive throughout the range of sand dune phacelia. The type of invasive species may vary regionally (gorse, for example, is more prevalent in the northern extent of the range), but the threat of invasive species encroachment in general is equal in severity throughout the range. Similarly, both the efficacy of mitigating the threat of invasive species through habitat restoration, and the uncertainty related to funding availability to do so, appear consistent throughout the species' range. The effects of climate change appear to be similar across the historical range of sand dune phacelia. Increases in temperature and changes in seasonal precipitation that could increase the risk of drought in the future are expected to occur to a similar magnitude across the range of the species. Storm surge, which can lead to flooding and erosion at coastal sites, is also expected to increase with climate change, and we have no ***data*** to indicate that these impacts would not be approximately equivalent across the range of sand dune phacelia.[[Page 16336]]Sea level rise projections are also nearly identical across the coastal habitat occupied by sand dune phacelia. Specifically, RCP 8.5 indicates that the impacts of sea level rise are essentially equal across all sites: Within the foreseeable future all sites will experience a 1-foot (0.3 m) or less increase in sea level rise, which will not inundate any of the population sites. The synergistic effects of climate change and invasive species, with biological invasions being facilitated by climate change, are also expected to occur in approximately equal magnitude throughout the range of sand dune phacelia and likely represent the more influential effect of climate change on the species given that sea level rise is not projected to inundate any extant population sites. The threat of small population size also appears to be distributed throughout the range, with low-abundance populations throughout the range and distributed across all three representation units. While there may be some variation in the source and intensity of each individual threat at each population location, we found no concentration of threats in any portion of the sand dune phacelia's range at a biologically meaningful scale. Thus, there are no portions of the species' range where the threats facing the species are concentrated to a degree where the species in that portion would have a different status from its rangewide status. Therefore, no portion of the species' range provides a basis for determining that the species is in danger of extinction in a significant portion of its range, and we determine that the species is likely to become in danger of extinction within the foreseeable future throughout all of its range. This does not conflict with the courts' holdings in Desert Survivors v. Department of the Interior, 331 F.Supp.3d 1131, 1136 (N.D Cal. 2018), and Center for Biological Diversity v. Jewell, 248 F. Supp. 3d, 946, 959 (D. Ariz. 2017) because, in reaching this conclusion, we did not need to consider whether any portions are significant and therefore did not apply the aspects of the Final Policy's definition of ``significant'' that those court decisions held were invalid.Determination of Status Our review of the best available scientific and commercial information indicates that the sand dune phacelia meets the definition of a threatened species. Therefore, we propose to list the sand dune phacelia as a threatened species in accordance with sections 3(20) and 4(a)(1) of the Act.Available Conservation Measures Conservation measures provided to species listed as endangered or threatened species under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness, and conservation by Federal, State, Tribal, and local agencies, private organizations, and individuals. The Act encourages cooperation with the States and other countries and calls for recovery actions to be carried out for listed species. The protection required by Federal agencies and the prohibitions against certain activities are discussed, in part, below. The primary purpose of the Act is the conservation of endangered and threatened species and the ecosystems upon which they depend. The ultimate goal of such conservation efforts is the recovery of these listed species, so that they no longer need the protective measures of the Act. Section 4(f) of the Act calls for the Service to develop and implement recovery plans for the conservation of endangered and threatened species. The recovery planning process involves the identification of actions that are necessary to halt or reverse the species' decline by addressing the threats to its survival and recovery. The goal of this process is to restore listed species to a point where they are secure, self-sustaining, and functioning components of their ecosystems. Recovery planning consists of preparing draft and final recovery plans, beginning with the development of a recovery outline and making it available to the public within 30 days of a final listing determination. The recovery outline guides the immediate implementation of urgent recovery actions and describes the process to be used to develop a recovery plan. Revisions of the plan may be done to address continuing or new threats to the species, as new substantive information becomes available. The recovery plan also identifies recovery criteria for review of when a species may be ready for reclassification from endangered to threatened (``downlisting'') or removal from protected status (``delisting''), and methods for monitoring recovery progress. Recovery plans also establish a framework for agencies to coordinate their recovery efforts and provide estimates of the cost of implementing recovery tasks. Recovery teams (composed of species experts, Federal and State agencies, nongovernmental organizations, and stakeholders) are often established to develop recovery plans. When completed, the recovery outline, draft recovery plan, and the final recovery plan will be available on our website ([*https://www.fws.gov/endangered*](https://www.fws.gov/endangered)), or from our Oregon Fish and Wildlife Office (see FOR FURTHER INFORMATION CONTACT). Implementation of recovery actions generally requires the participation of a broad range of partners, including other Federal agencies, States, Tribes, nongovernmental organizations, businesses, and private landowners. Examples of recovery actions include habitat restoration (e.g , restoration of native vegetation), research, captive propagation and reintroduction, and outreach and education. The recovery of many listed species cannot be accomplished solely on Federal lands because their range may occur primarily or solely on non-Federal lands. To achieve recovery of these species requires cooperative conservation efforts on private, State, and Tribal lands. If this species is listed, funding for recovery actions will be available from a variety of sources, including Federal budgets, State programs, and cost-share grants for non-Federal landowners, the academic community, and nongovernmental organizations. In addition, pursuant to section 6 of the Act, the States of Oregon and California would be eligible for Federal funds to implement management actions that promote the protection or recovery of the sand dune phacelia. Information on our grant programs that are available to aid species recovery can be found at: [*https://www.fws.gov/grants*](https://www.fws.gov/grants). Although the sand dune phacelia is only proposed for listing under the Act at this time, please let us know if you are interested in participating in recovery efforts for this species. Additionally, we invite you to submit any new information on this species whenever it becomes available and any information you may have for recovery planning purposes (see FOR FURTHER INFORMATION CONTACT). Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as an endangered or threatened species and with respect to its critical habitat, if any is designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any action that is likely to jeopardize the continued existence of a species proposed for listing or result in destruction or adverse modification of proposed critical habitat. If a species is listed subsequently, section 7(a)(2) of[[Page 16337]]the Act requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of the species or destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into consultation with the Service. Federal agency actions within the species' habitat that may require conference or consultation or both as described in the preceding paragraph include management and any other landscape-altering activities on Federal lands administered by the Bureau of Land Management. It is our policy, as published in the Federal Register on July 1, 1994 (59 FR 34272), to identify to the maximum extent practicable at the time a species is listed, those activities that would or would not constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of a proposed listing on proposed and ongoing activities within the range of the species proposed for listing. The discussion below regarding protective regulations under section 4(d) of the Act complies with our policy.II. Proposed Rule Issued Under Section 4(d) of the ActBackground Section 4(d) of the Act contains two sentences. The first sentence states that the Secretary shall issue such regulations as she deems necessary and advisable to provide for the conservation of species listed as threatened. The U.S Supreme Court has noted that statutory language like ``necessary and advisable'' demonstrates a large degree of deference to the agency (see Webster v. Doe, 486 U.S 592 (1988)). Conservation is defined in the Act to mean the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Additionally, the second sentence of section 4(d) of the Act states that the Secretary may by regulation prohibit with respect to any threatened species any act prohibited under section 9(a)(1), in the case of fish or wildlife, or section 9(a)(2), in the case of plants. Thus, the combination of the two sentences of section 4(d) provides the Secretary with wide latitude of discretion to select and promulgate appropriate regulations tailored to the specific conservation needs of the threatened species. The second sentence grants particularly broad discretion to the Service when adopting the prohibitions under section 9. The courts have recognized the extent of the Secretary's discretion under this standard to develop rules that are appropriate for the conservation of a species. For example, courts have upheld rules developed under section 4(d) as a valid exercise of agency authority where they prohibited take of threatened wildlife, or include a limited taking prohibition (see Alsea Valley Alliance v. Lautenbacher, 2007 U.S Dist. Lexis 60203 (D. Or. 2007); Washington Environmental Council v. National Marine Fisheries Service, 2002 U.S Dist. Lexis 5432 (W.D Wash. 2002)). Courts have also upheld 4(d) rules that do not address all of the threats a species faces (see State of Louisiana v. Verity, 853 F.2d 322 (5th Cir. 1988)). As noted in the legislative history when the Act was initially enacted, ``once an animal is on the threatened list, the Secretary has an almost infinite number of options available to him [or her] with regard to the permitted activities for those species. He [or she] may, for example, permit taking, but not importation of such species, or he [or she] may choose to forbid both taking and importation but allow the transportation of such species'' (H.R Rep. No. 412, 93rd Cong., 1st Sess. 1973). Exercising this authority under section 4(d), we have developed a proposed rule that is designed to address sand dune phacelia conservation needs. Although the statute does not require us to make a ``necessary and advisable'' finding with respect to the adoption of specific prohibitions under section 9, we find that this rule as a whole satisfies the requirement in section 4(d) of the Act to issue regulations deemed necessary and advisable to provide for the conservation of sand dune phacelia. As discussed above under Summary of Biological Status and Threats, we have concluded that sand dune phacelia is likely to become in danger of extinction within the foreseeable future primarily due to encroachment by invasive species, small population size, and the effects of climate change. The provisions of this proposed 4(d) rule would promote conservation of sand dune phacelia by encouraging management of the landscape in ways that meet the conservation needs of the sand dune phacelia. The provisions of this proposed rule are one of many tools that we would use to promote the conservation of sand dune phacelia. This proposed 4(d) rule would apply only if and when we make final the listing of the sand dune phacelia as a threatened species. Section 7(a)(2) of the Act requires Federal agencies, including the Service, to ensure that any action they fund, authorize, or carry out is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat of such species. In addition, section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any agency action which is likely to jeopardize the continued existence of any species proposed to be listed under the Act or result in the destruction or adverse modification of proposed critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency (action agency) must enter into consultation with us. Examples of actions that are subject to the section 7 consultation process are actions on State, Tribal, local, or private lands that require a Federal permit (such as a permit from the U.S Army Corps of Engineers under section 404 of the Clean Water Act (33 U.S.C 1251 et seq.) or a permit from the Service under section 10 of the Act) or that involve some other Federal action (such as funding from the Federal Highway Administration, Federal Aviation Administration, or the Federal Emergency Management Agency). Federal actions not affecting listed species or critical habitat--and actions on State, Tribal, local, or private lands that are not federally funded, authorized, or carried out by a Federal agency--do not require section 7 consultation. This obligation does not change in any way for a threatened species with a species-specific 4(d) rule. Actions that result in a determination by a Federal agency of ``not likely to adversely affect'' continue to require the Service's written concurrence and actions that are ``likely to adversely affect'' a species require formal consultation and the formulation of a biological opinion.Provisions of the Proposed 4(d) Rule This proposed 4(d) rule would provide for the conservation of the sand dune phacelia by prohibiting the following activities applicable to an endangered plant, except as otherwise authorized or permitted: Import or export; certain acts related to removing, damaging, and destroying on areas under Federal jurisdiction; delivery, receipt, transport, or shipment in interstate or foreign commerce in the course of commercial activity; and sale[[Page 16338]]or offering for sale in interstate or foreign commerce. As discussed above under Summary of Biological Status and Threats, encroachment by native and nonnative invasive species (Factors A and E), small population size (Factor E), and climate change (Factor E) affect the status of sand dune phacelia. Additionally, a range of activities have the potential to negatively affect individual sand dune phacelia, including recreational impacts such as off-road vehicle use and inadvertent trampling through pedestrian or equestrian activities. To protect the species from these stressors, in addition to the protections that apply to Federal lands, the 4(d) rule would prohibit a person from removing, cutting, digging up, or damaging or destroying the species on non-Federal lands in knowing violation of any law or regulation of any State or in the course of any violation of a State criminal trespass law. As most populations of sand dune phacelia occur off Federal land, these protections in the 4(d) rule are key to its effectiveness. For example, any damage to the species on non-Federal land in violation of a State off-highway vehicle law would be prohibited by the 4(d) rule. Additionally, any damage incurred by the species due to criminal trespass on non-Federal lands would similarly violate the proposed 4(d) rule. Regulating these activities will help preserve the species' remaining populations, slow their rate of decline, and decrease synergistic, negative effects from other stressors. As a whole, the proposed 4(d) rule would help in the efforts to recover sand dune phacelia by limiting specific actions that damage individual populations. We may issue permits to carry out otherwise prohibited activities, including those described above, involving threatened plants under certain circumstances. Regulations governing permits for threatened plants are codified at 50 CFR 17.72, which states that the Director may issue a permit authorizing any activity otherwise prohibited with regard to threatened species. That regulation also states that the permit shall be governed by the provisions of 50 CFR 17.72 unless a special rule applicable to the plant is provided in 50 CFR 17.73 to 17.78 We interpret that second sentence to mean that permits for threatened species are governed by the provisions of 50 CFR 17.72 unless a special rule, which we have defined to mean a species-specific 4(d) rule, provides otherwise. We recently promulgated revisions to 50 CFR 17.71 providing that 50 CFR 17.71 will no longer apply to plants listed as threatened in the future. We did not intend for those revisions to limit or alter the applicability of the permitting provisions in 50 CFR 17.72, or to require that every species-specific 4(d) rule spell out any permitting provisions that apply to that species and species-specific 4(d) rule. To the contrary, we anticipate that permitting provisions would generally be similar or identical for most species, so applying the provisions of 50 CFR 17.72 unless a species-specific 4(d) rule provides otherwise would likely avoid substantial duplication. Moreover, this interpretation brings 50 CFR 17.72 in line with the comparable provision for wildlife at 50 CFR 17.32, in which the second sentence states that the permit shall be governed by the provisions of 50 CFR 17.32 unless a special rule applicable to the wildlife, appearing in 50 CFR 17.40 to 17.48, provides otherwise. Under 50 CFR 17.72 with regard to threatened plants, a permit may be issued for the following purposes: for scientific purposes, to enhance propagation or survival, for economic hardship, for botanical or horticultural exhibition, for educational purposes, or for other purposes consistent with the purposes and policy of the Act. Additional statutory exemptions from the prohibitions are found in sections 9 and 10 of the Act. We recognize the special and unique relationship with our State natural resource agency partners in contributing to conservation of listed species. State agencies often possess scientific ***data*** and valuable expertise on the status and distribution of endangered, threatened, and candidate species of wildlife and plants. State agencies, because of their authorities and their close working relationships with local governments and landowners, are in a unique position to assist the Service in implementing all aspects of the Act. In this regard, section 6 of the Act provides that the Service shall cooperate to the maximum extent practicable with the States in carrying out programs authorized by the Act. Therefore, any qualified employee or agent of a State conservation agency that is a party to a cooperative agreement with the Service in accordance with section 6(c) of the Act, who is designated by his or her agency for such purposes, would be able to conduct activities designed to conserve sand dune phacelia that may result in otherwise prohibited activities without additional authorization. Nothing in this proposed 4(d) rule would change in any way the recovery planning provisions of section 4(f) of the Act, the consultation requirements under section 7 of the Act, or the ability of the Service to enter into partnerships for the management and protection of sand dune phacelia. However, interagency cooperation may be further streamlined through planned programmatic consultations for the species between Federal agencies and the Service, where appropriate. We ask the public, particularly State agencies and other interested stakeholders that may be affected by the proposed 4(d) rule, to provide comments and suggestions regarding additional guidance and methods that the Service could provide or use, respectively, to streamline the implementation of this proposed 4(d) rule (see Information Requested, above).III. Critical HabitatBackground Critical habitat is defined in section 3 of the Act as: (1) The specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (a) Essential to the conservation of the species, and (b) Which may require special management considerations or protection; and (2) Specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. Our regulations at 50 CFR 424.02 define the geographical area occupied by the species as an area that may generally be delineated around species' occurrences, as determined by the Secretary (i.e , range). Such areas may include those areas used throughout all or part of the species' life cycle, even if not used on a regular basis (e.g , migratory corridors, seasonal habitats, and habitats used periodically, but not solely by vagrant individuals). Additionally, our regulations at 50 CFR 424.02 define the word ``habitat,'' for the purposes of designating critical habitat only, as the abiotic and biotic setting that currently or periodically contains the resources and conditions necessary to support one or more life processes of a species. Conservation, as defined under section 3 of the Act, means the use of all methods and procedures that are necessary to bring an endangered or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Such[[Page 16339]]methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking. Critical habitat receives protection under section 7 of the Act through the requirement that Federal agencies ensure, in consultation with the Service, that any action they authorize, fund, or carry out is not likely to result in the destruction or adverse modification of critical habitat. The designation of critical habitat does not affect land ownership or establish a refuge, wilderness, reserve, preserve, or other conservation area. Such designation also does not allow the government or public to access private lands. Such designation does not require implementation of restoration, recovery, or enhancement measures by non-Federal landowners. Where a landowner requests Federal agency funding or authorization for an action that may affect a listed species or critical habitat, the Federal agency would be required to consult with the Service under section 7(a)(2) of the Act. However, even if the Service were to conclude that the proposed activity would result in destruction or adverse modification of the critical habitat, the Federal action agency and the landowner are not required to abandon the proposed activity, or to restore or recover the species; instead, they must implement ``reasonable and prudent alternatives'' to avoid destruction or adverse modification of critical habitat. Under the first prong of the Act's definition of critical habitat, areas within the geographical area occupied by the species at the time it was listed are included in a critical habitat designation if they contain physical or biological features (1) which are essential to the conservation of the species and (2) which may require special management considerations or protection. For these areas, critical habitat designations identify, to the extent known using the best scientific and commercial ***data*** available, those physical or biological features that are essential to the conservation of the species (such as space, food, cover, and protected habitat). In identifying those physical or biological features that occur in specific occupied areas, we focus on the specific features that are essential to support the life-history needs of the species, including, but not limited to, water characteristics, soil type, geological features, prey, vegetation, symbiotic species, or other features. A feature may be a single habitat characteristic or a more complex combination of habitat characteristics. Features may include habitat characteristics that support ephemeral or dynamic habitat conditions. Features may also be expressed in terms relating to principles of conservation biology, such as patch size, distribution distances, and connectivity. Under the second prong of the Act's definition of critical habitat, we can designate critical habitat in areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. The implementing regulations at 50 CFR 424.12(b)(2) further delineate unoccupied critical habitat by setting out three specific parameters: (1) When designating critical habitat, the Secretary will first evaluate areas occupied by the species; (2) the Secretary will only consider unoccupied areas to be essential where a critical habitat designation limited to geographical areas occupied by the species would be inadequate to ensure the conservation of the species; and (3) for an unoccupied area to be considered essential, the Secretary must determine that there is a reasonable certainty both that the area will contribute to the conservation of the species and that the area contains one or more of those physical or biological features essential to the conservation of the species. Section 4 of the Act requires that we designate critical habitat on the basis of the best scientific ***data*** available. Further, our Policy on Information Standards Under the Endangered Species Act (published in the Federal Register on July 1, 1994 (59 FR 34271)), the Information Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Pub. L. 106-554; H.R 5658)), and our associated Information Quality Guidelines provide criteria, establish procedures, and provide guidance to ensure that our decisions are based on the best scientific ***data*** available. They require our biologists, to the extent consistent with the Act and with the use of the best scientific ***data*** available, to use primary and original sources of information as the basis for recommendations to designate critical habitat. When we are determining which areas should be designated as critical habitat, our primary source of information is generally the information from the SSA report and information developed during the listing process for the species. Additional information sources may include any generalized conservation strategy, criteria, or outline that may have been developed for the species; the recovery plan for the species; articles in peer-reviewed journals; conservation plans developed by States and counties; scientific status surveys and studies; biological assessments; other unpublished materials; or experts' opinions or personal knowledge. As the regulatory definition of ``habitat'' reflects (50 CFR 424.02), habitat is dynamic, and species may move from one area to another over time. We recognize that critical habitat designated at a particular point in time may not include all of the habitat areas that we may later determine are necessary for the recovery of the species. For these reasons, a critical habitat designation does not signal that habitat outside the designated area is unimportant or may not be needed for recovery of the species. Areas that are important to the conservation of the species, both inside and outside the critical habitat designation, will continue to be subject to: (1) Conservation actions implemented under section 7(a)(1) of the Act; (2) regulatory protections afforded by the requirement in section 7(a)(2) of the Act for Federal agencies to ensure their actions are not likely to jeopardize the continued existence of any endangered or threatened species; and (3) the prohibitions found in section 9 of the Act. Federally funded or permitted projects affecting listed species outside their designated critical habitat areas may still result in jeopardy findings in some cases. These protections and conservation tools will continue to contribute to recovery of the species. Similarly, critical habitat designations made on the basis of the best available information at the time of designation will not control the direction and substance of future recovery plans, habitat conservation plans (HCPs), or other species conservation planning efforts if new information available at the time of those planning efforts calls for a different outcome.Prudency Determination Section 4(a)(3) of the Act, as amended, and implementing regulations (50 CFR 424.12) require that, to the maximum extent prudent and determinable, the Secretary shall designate critical habitat at the time the species is determined to be an endangered or threatened species. Our regulations (50 CFR 424.12(a)(1)) state that the Secretary may, but is not[[Page 16340]]required to, determine that a designation would not be prudent in the following circumstances: (i) The species is threatened by taking or other human activity and identification of critical habitat can be expected to increase the degree of such threat to the species; (ii) The present or threatened destruction, modification, or curtailment of a species' habitat or range is not a threat to the species, or threats to the species' habitat stem solely from causes that cannot be addressed through management actions resulting from consultations under section 7(a)(2) of the Act; (iii) Areas within the jurisdiction of the United States provide no more than negligible conservation value, if any, for a species occurring primarily outside the jurisdiction of the United States; (iv) No areas meet the definition of critical habitat; or (v) The Secretary otherwise determines that designation of critical habitat would not be prudent based on the best scientific ***data*** available. As discussed earlier in this document, there is currently no imminent threat of ***collection*** or vandalism identified under Factor B for this species, and identification and mapping of critical habitat is not expected to initiate any such threat. In our SSA report and proposed listing determination for sand dune phacelia, we determined that the present or threatened destruction, modification, or curtailment of habitat or range is a threat to sand dune phacelia and that those threats in some way can be addressed by section 7(a)(2) consultation measures. The species occurs wholly in the jurisdiction of the United States, and we are able to identify areas that meet the definition of critical habitat. Therefore, because none of the circumstances enumerated in our regulations at 50 CFR 424.12(a)(1) have been met and because the Secretary has not identified other circumstances for which this designation of critical habitat would be not prudent, we have determined that the designation of critical habitat is prudent for sand dune phacelia.Critical Habitat Determinability Having determined that designation is prudent, under section 4(a)(3) of the Act we must find whether critical habitat for the sand dune phacelia is determinable. Our regulations at 50 CFR 424.12(a)(2) state that critical habitat is not determinable when one or both of the following situations exist: (i) ***Data*** sufficient to perform required analyses are lacking, or (ii) the biological needs of the species are not sufficiently well known to identify any area that meets the definition of ``critical habitat.'' When critical habitat is not determinable, the Act allows the Service an additional year to publish a critical habitat designation (16 U.S.C 1533(b)(6)(C)(ii)). We reviewed the available information pertaining to the biological needs of the species and habitat characteristics where this species is located. This and other information represent the best scientific ***data*** available and led us to conclude that the designation of critical habitat is determinable for the sand dune phacelia.Physical or Biological Features Essential to the Conservation of the Species In accordance with section 3(5)(A)(i) of the Act and regulations at 50 CFR 424.12(b), in determining which areas we will designate as critical habitat from within the geographical area occupied by the species at the time of listing, we consider the physical or biological features that are essential to the conservation of the species and that may require special management considerations or protection. The regulations at 50 CFR 424.02 define ``physical or biological features essential to the conservation of the species'' as the features that occur in specific areas and that are essential to support the life-history needs of the species, including, but not limited to, water characteristics, soil type, geological features, sites, prey, vegetation, symbiotic species, or other features. A feature may be a single habitat characteristic or a more complex combination of habitat characteristics. Features may include habitat characteristics that support ephemeral or dynamic habitat conditions. Features may also be expressed in terms relating to principles of conservation biology, such as patch size, distribution distances, and connectivity. For example, physical features essential to the conservation of the species might include gravel of a particular size required for spawning, alkaline soil for seed germination, protective cover for migration, or susceptibility to flooding or fire that maintains necessary early-successional habitat characteristics. Biological features might include prey species, forage grasses, specific kinds or ages of trees for roosting or nesting, symbiotic fungi, or a particular level of nonnative species consistent with conservation needs of the listed species. The features may also be combinations of habitat characteristics and may encompass the relationship between characteristics or the necessary amount of a characteristic essential to support the life history of the species. In considering whether features are essential to the conservation of the species, we may consider an appropriate quality, quantity, and spatial and temporal arrangement of habitat characteristics in the context of the life-history needs, condition, and status of the species. These characteristics include, but are not limited to, space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, or rearing (or development) of offspring; and habitats that are protected from disturbance. The following features are essential to the conservation of sand dune phacelia:Sandy Coastal Dune Habitat With Adequate Light Exposure, Water, and Growing Space Sandy coastal dune habitat above the high tide line that provides a high light environment, room for growth, and adequate moisture is required to support sand dune phacelia populations. Sandy areas must have open (unvegetated) space within them to accommodate population expansion. The physical features of sunlight, space, and water are essential for seedling establishment and growth, and facilitate the development of large, mature plants that produce copious amounts of seed. While we lack information on specific quantities associated with this need (such as maximum percent canopy cover that the species can tolerate), it is clear that sandy habitats that provide the essential features of sunlight, space, and water for sand dune phacelia tend to have lower cover of competitive invasive species, particularly European beachgrass and gorse.Adequate Pollinator Community A sufficient abundance of pollinators, particularly leafcutter bees (Family: Megachilidae), are required for genetic exchange among sand dune phacelia individuals. Sand dune phacelia appears to be largely incapable of significant self-pollination (Meinke 2016, p. 3), relying primarily on leafcutter bees (Anthidium palliventre) and bumblebees (Bombus spp.) for pollination. Ants (Formica spp.) and beetles (unidentified spp.) have also been observed in association with sand dune phacelia flowers, but it is unclear how effective they are at pollination (Rittenhouse 1995, p. 8).[[Page 16341]]Summary of Essential Physical or Biological Features We derive the specific physical or biological features essential to the conservation of sand dune phacelia from studies of the species' habitat, ecology, and life history as described below. Additional information can be found in the SSA report (Service 2021, entire, available on [*https://www.regulations.gov*](https://www.regulations.gov) under Docket No. FWS-R1-ES-2021-0070). We have determined that the following physical or biological features are essential to the conservation of sand dune phacelia: Sandy coastal dune habitat above the high tide line that provides a high light environment, room for growth, and adequate moisture; A sufficiently abundant pollinator community (which may include leafcutter bees and bumble bees) for pollination and reproduction;Special Management Considerations or Protection When designating critical habitat, we assess whether the specific areas within the geographical area occupied by the species at the time of listing contain features which are essential to the conservation of the species and which may require special management considerations or protection. In the case of sand dune phacelia, these essential features include sandy dune habitat with high light exposure and adequate moisture and unvegetated space, as well as a sufficiently large and diverse pollinator community, and a minimum of 25 reproductively mature sand dune phacelia plants within dispersal distance of one another to sustain a population. These features essential to sand dune phacelia conservation may require special management considerations or protection to reduce the threat of invasive species encroachment, and to withstand climate change effects such as drought and sea level rise. In addition, localized stressors related to recreational activity, such as off-road vehicle use and pedestrian or equestrian trampling, may also need to be mitigated by special management practices to maintain viable sand dune phacelia populations. Management activities that could ameliorate these threats include, but are not limited to: (1) Habitat restoration activities in sand dune habitat that include the removal of invasive species such as nonnative European beachgrass and gorse, or native successional species such as shore pine; (2) efforts to restore a diverse and abundant pollinator community, such as through restricting land management practices that harm pollinator species, or through support of a diverse native nectar plant community; (3) access restrictions and enforcement for off-road vehicle use in areas occupied by sand dune phacelia; (4) recreational restrictions to prevent trampling of sand dune phacelia by pedestrians or equestrians; and (5) augmentation and reintroduction programs to expand phacelia populations. These management activities will protect the physical and biological features (PBFs) essential for the conservation of sand dune phacelia by providing native sandy dune habitat that allows for sand dune phacelia population growth and expansion, supporting the pollinator community that enables sand dune phacelia reproduction, protecting sand dune phacelia populations from trampling and crushing, and maintaining an adequate number of sand dune phacelia individuals necessary to sustain viable populations.Criteria Used To Identify Critical Habitat As required by section 4(b)(2) of the Act, we use the best scientific ***data*** available to designate critical habitat. In accordance with the Act and our implementing regulations at 50 CFR 424.12(b), we review available information pertaining to the habitat requirements of the species and identify specific areas within the geographical area occupied by the species at the time of listing and any specific areas outside the geographical area occupied by the species to be considered for designation as critical habitat. We are not currently proposing to designate any areas outside the geographical area occupied by the species because we have not identified any unoccupied areas that meet the definition of critical habitat. We determined that the areas currently occupied by populations of sand dune phacelia made up of at least 25 individuals, if recovered, would be sufficient to conserve the species. The extant populations with at least 25 individuals are distributed across the three representation units and across the historical range of the species and, therefore, also span any ecological diversity that may exist within the species' range. Therefore, if these populations were recovered to sufficient resiliency, they would provide adequate redundancy and representation for the species. Because currently occupied areas are sufficient to recover the species, we conclude that currently unoccupied areas do not meet the definition of critical habitat because they are not essential to the conservation of the species. In summary, for areas within the geographic area occupied by the species at the time of listing, we delineated critical habitat unit boundaries using the following criteria: Across the representation units, there are 25 naturally occurring sand dune phacelia populations consisting of a total of 94 polygons (patches of sand dune phacelia). We developed critical habitat units within each representation unit by joining patches of sand dune phacelia within each population to form discrete units; this was accomplished by joining patch vertices and creating minimum convex polygons. We considered patches to be part of the same population if they are within 0.30 miles (0.48 km) of each other in Oregon (as defined by Oregon Natural Heritage Information Center) or 0.25 miles (0.4 km) of each other in California (as defined by the California Natural Diversity Database). A minimum of 25 reproductively mature plants are required for breeding purposes to maintain viability in a population. Extant sand dune phacelia populations are isolated from one another on the landscape, with no possibility of natural dispersal between populations. As such, each individual population relies on having an adequate number of its own members to sustain itself and avoid extirpation. Although there are no ***data*** related to the minimum number of individuals necessary to sustain the viability of a sand dune phacelia population, we assume that at least 25 reproductively mature plants are needed for sufficient reproduction to allow the population to withstand stochastic events. Because we consider populations comprising fewer than 25 plants as being in low condition and unlikely to contribute meaningfully to recovery, we designated critical habitat only around populations with equal to or greater than 25 individuals. This consideration resulted in the creation of 13 critical habitat units. Some patches within the same population were separated by habitat that was unsuitable (i.e , does not contain PBFs). We avoided including unsuitable habitat within the critical habitat units by joining patches only if the intervening habitat contained at least one PBF. We further limited the inclusion of unsuitable habitat by removing areas from the unit that were clearly unsuitable (e.g , forest, water bodies) to the maximum extent possible given the scale of mapping. When determining proposed critical habitat boundaries, we made every[[Page 16342]]effort to avoid including developed areas such as lands covered by buildings, pavement, and other structures because such lands lack physical or biological features necessary for sand dune phacelia. The scale of the maps we prepared under the parameters for publication within the Code of Federal Regulations may not reflect the exclusion of such developed lands. Any such lands inadvertently left inside critical habitat boundaries shown on the maps of this proposed rule have been excluded by text in the proposed rule and are not proposed for designation as critical habitat. Therefore, if the critical habitat is finalized as proposed, a Federal action involving these lands would not trigger section 7 consultation with respect to critical habitat and the requirement of no adverse modification unless the specific action would affect the physical or biological features in the adjacent critical habitat. We propose to designate as critical habitat lands that we have determined are occupied at the time of listing (i.e , currently occupied). Thirteen critical habitat units are proposed for designation based on the physical or biological features being present to support sand dune phacelia's life-history processes. All of the critical habitat units contain all of the identified physical or biological features and support multiple life-history processes necessary to support the sand dune phacelia's use of that habitat. The proposed critical habitat designation is defined by the map or maps, as modified by any accompanying regulatory text, presented at the end of this document under Proposed Regulation Promulgation. We include more detailed information on the boundaries of the critical habitat designation in the preamble of this document. We will make the coordinates or plot points or both on which each map is based available to the public on [*https://www.regulations.gov*](https://www.regulations.gov) at Docket No. FWS-R1-ES-2021-0070, and on our internet site at [*https://www.fws.gov/oregonfwo.Proposed*](https://www.fws.gov/oregonfwo.Proposed) Critical Habitat Designation We are proposing to designate approximately 252 ac (102 ha) in 13 units as critical habitat for sand dune phacelia. The critical habitat areas we describe below constitute our current best assessment of areas that meet the definition of critical habitat for sand dune phacelia. The 13 critical habitat units we propose are: (1) North Bandon 1, (2) North Bandon 2, (3) Lost Lake, (4) Floras Lake, (5) Cape Blanco, (6) Paradise Point, (7) Pistol River North, (8) Pistol River South, (9) Lone Ranch, (10) Pacific Shores, (11) Tolowa Dunes, (12) Point St. George, and (13) Pebble Beach. All 13 critical habitat units are occupied by the species. Table 4 shows the proposed critical habitat units and the approximate area, broken down by land ownership, for each unit. We present brief descriptions of all critical habitat units below. Note that all units of critical habitat described below meet the definition of critical habitat for sand dune phacelia because all of the units are occupied by sand dune phacelia, and all units contain all of the physical and biological features essential to the species. Table 4--Proposed Critical Habitat Units for Sand Dune Phacelia---------------------------------------------------------------------------------------------------------------- Private (ac Federal (ac State (ac County (ac Total (ac (ha)) (ha)) (ha)) (ha)) (ha))---------------------------------------------------------------------------------------------------------------- Oregon----------------------------------------------------------------------------------------------------------------North Bandon 1.................. 0.6 (0.2) 0 0 0 0.6 (0.2)North Bandon 2.................. 54.4 (22) 0 6.9 (2.8) 0 61.3 (24.8)Lost Lake....................... 2.8 (1.1) 0.8 (0.3) 0.1 (0.04) 0 3.7 (1.5)Floras Lake..................... 0 5.8 (2.3) 0 0 5.8 (2.3)Cape Blanco..................... 0 0 2.0 (0.8) 0 2.0 (0.8)Paradise Point.................. 3.7 (1.5) 0 0 0 3.7 (1.5)Pistol River North.............. 0 0 3.2 (1.3) 0 3.2 (1.3)Pistol River South.............. 0 0 0.7 (0.3) 0 0.7 (0.3)Lone Ranch...................... 0 0 6.5 (2.6) 0 6.5 (2.6)---------------------------------------------------------------------------------------------------------------- California----------------------------------------------------------------------------------------------------------------Pacific Shores.................. 54.4 (22) 0 37.9 (15.3) 0 92.3 (37.4)Tolowa Dunes.................... 0 0 69.6 (28.2) 0 69.6 (28.2)Pt. St. George.................. 0.1 (0.4) 0 0 1.0 (0.4) 1.1 (0.4)Pebble Beach.................... 0 0 1.3 (0.5) 0.4 (0.2) 1.7 (0.7) ------------------------------------------------------------------------------- Totals...................... 116 (46.9) 6.6 (2.8) 128.2 (51.9) 1.4 (0.6) 252.2 (102.1)----------------------------------------------------------------------------------------------------------------Note: Area estimates reflect suitable habitat within critical habitat unit boundaries, with non-habitat (as identified by textual description) excluded. Area sizes may not sum due to rounding.Unit 1: North Bandon 1 Unit 1 consists of 0.6 ac (0.2 ha) in Coos County, Oregon. It is at the northernmost limit of the sand dune phacelia's range in Coos County and is located on the privately owned Bandon Dunes Golf Resort. Invasive species are an ongoing threat at this site, and therefore invasive species management may be required. A stated goal of the conservation-minded owner is to protect and enhance sand dune phacelia at the site, and the population here has flourished due to the removal of heavy infestations of gorse (Gunther 2012, no pagination).Unit 2: North Bandon 2 Unit 2 consists of 61.3 ac (24.8 ha) in Coos County, Oregon, and currently supports the largest population of sand dune phacelia rangewide. The majority (54.4 ac (22 ha)) of the habitat at this site is on the privately owned Bandon Dunes Golf Resort. The population here is now the largest rangewide, with over 24,000 individuals (Brown 2020a database). Invasive species are the primary threat, and therefore invasive species management may be required. Conservation and restoration implemented by the golf resort are largely responsible for the high[[Page 16343]]condition of this population and its habitat. While there are no formal agreements in place to protect sand dune phacelia at the resort, we have no evidence at this time that management efforts at this site will be discontinued. Part of the population (6.9 ac (2.8 ha)) is in State park ownership (Bullard's Beach) and implementation of invasive species control, particularly gorse, could result in an expanded sand dune phacelia population in the park.Unit 3: Lost Lake Unit 3 consists of 3.7 ac (1.5 ha) in Coos County, Oregon. The Lost Lake unit contains land within the Coos Bay New River Area of Critical Environmental Concern (ACEC) (0.8 ac (0.3 ha)) that is federally managed by BLM, State-managed land (0.1 ac (0.04 ha)) within the Bandon State Natural Area (BSNA), and undeveloped private land (2.8 ac (1.1 ha)). Stressors in Unit 3 include illegal off-highway vehicle (OHV) use and the persistent threat of invasive species. As such, managing OHV use may benefit the unit, and invasive species management may be required to maintain it. Sand dune phacelia has greatly benefited from BLM's efforts to remove invasive species in the Lost Lake area, and it is likely that there is room for expansion of this population provided that annual, or nearly annual, vegetation management continues. Augmentation efforts, including transplanting and seeding, have also occurred at Lost Lake on the ACEC.Unit 4: Floras Lake Unit 4 consists of 5.8 ac (2.3 ha) in Curry County, Oregon. Like Unit 3, Floras Lake is a part of BLM's New River ACEC. BLM monitors and regularly manages the habitat to maintain the open sand conditions that the sand dune phacelia requires, contributing to the fact that the population of sand dune phacelia at Floras Lake is the largest naturally occurring (i.e , not introduced) population on Federal land. BLM has augmented populations in this subunit with transplants. In addition to the threat of invasive species, other stressors include trampling by hikers and wintertime flooding from Floras Lake. Dependent upon the intensity, these activities could also be beneficial as they mobilize sand and clear habitat of invasive species. As such, mitigating the impacts of pedestrian use, flooding, and invasive species, may be required. Sea level rise may pose an additional threat. As determined by our future condition analysis, a 1-foot rise in sea level by 2060 would barely reach the seaward boundary of the unit; however, other accompanying effects of climate change, like increased storm surge, may also affect sand dune phacelia habitat in this unit.Unit 5: Cape Blanco Unit 5 consists of 2.0 ac (0.8 ha) in Curry County, Oregon. The unit is State-managed by the Oregon Parks and Recreation Department (OPRD) and consists of sandy bluffs above the high tide line. A naturally occurring population was augmented with transplants in 2018. Invasive species are a threat at this site, and therefore invasive species management may be required.Unit 6: Paradise Point Unit 6 consists of 3.7 ac (1.5 ha) in Curry County, Oregon. It is separated from Unit 5 by the Elk River and bounded to the east by private ranchlands. Unit 6 is made up of undeveloped private land, limited to sandy bluffs between the high tide line and adjacent pastureland. Although it is privately owned, the State (OPRD) has jurisdiction over the land in Unit 6 as well as some adjacent State-owned land. In addition to the threat of invasive species, other factors influencing the population at this site include OHV use, erosion, and storm surge associated with sea level rise. As such, invasive species management may be required, and other management associated with mitigating the impacts of OHV use, erosion, and flooding may also be beneficial.Unit 7: Pistol River North Unit 7 consists of 3.2 ac (1.3 ha) in Curry County, Oregon. The land on Unit 7 lies southwest of the Pistol River and is State-managed by OPRD (Pistol River State Park) and the Oregon Department of Transportation. As with all other units, invasive species are a threat, and therefore invasive species management may be required. Another stressor affecting Unit 7 is erosion, as the mouth of the Pistol River changes location annually, scouring the dunes and carrying sand out to sea.Unit 8: Pistol River South Unit 8 consists of 0.7 ac (0.3 ha) in Curry County, Oregon. The land is south of Unit 7 and also located on Pistol River State Park. Invasive species are a threat here, and the site is surrounded by European beachgrass and encroaching shore pine. As such, invasive species management may be required.Unit 9: Lone Ranch Unit 9 consists of 6.5 ac (2.6 ha) in Curry County, Oregon, and currently supports the third largest population of sand dune phacelia throughout its range. It is composed entirely of land managed by the State (OPRD; Boardman State Park). There is an imminent threat to the population at this site posed by a number of invasive species. As such, invasive species management may be required. Existing control of weedy species for recreational trail access may be maintaining existing suitable habitat.Unit 10: Pacific Shores Unit 10 consists of 92.3 ac (37.4 ha) in Del Norte County, California. State lands make up 37.9 ac (15.3 ha) of this site, with the remaining 54.4 acres (22 ha) in private ownership at this time. This area represents an abandoned real estate venture, where lands were subdivided into 0.5-ac (0.20-ha) lots in the 1960s for residential development. Over 1,500 lots were sold and approximately 27 miles of road and electric transmission line were constructed. However, the area remains undeveloped due to permitting issues, and the empty lots are now being acquired for conservation by a coalition of entities for inclusion into the State's Lake Earl Wildlife Area. Approximately 430 lots remain in private ownership. Invasive species are a threat here, and therefore invasive species management may be required. In addition, because much of the sand dune phacelia population in the unit occurs adjacent to roadways or other readily accessible areas, the unit is considered heavily impacted by human activities that include OHV use. Special management considerations to mitigate the impact to sand dune phacelia habitat from these activities may be required.Unit 11: Tolowa Dunes Unit 11 consists of 69.6 ac (28.2 ha) in Del Norte County, California, and currently supports the second largest population of sand dune phacelia rangewide. The unit is State-managed in part by California State Parks (on Tolowa Dunes State Park) and the California Department of Fish and Wildlife (on Lake Earl Wildlife Area). Invasive species are a threat here and OHV use also impacts this site. As such, managing OHV use and invasive species may be required. The relatively high abundance of sand dune phacelia in Unit 11 is attributed to a concerted restoration program that has removed invasive species, particularly European beachgrass. These efforts have made this population the stronghold for the[[Page 16344]]species in California and an important contributor to sand dune phacelia resiliency and redundancy rangewide. However, much of the restoration at this site has been conducted by volunteers, and funding to continue maintaining restored habitat is uncertain.Unit 12: Point Saint George Unit 12 consists of 1.1 ac (0.4 ha) in Del Norte County, California. The vast majority of the land (1 ac (0.4 ha)) is county-managed by Del Norte County Parks, and the other 0.1 ac (0.04 ha) is privately owned. Invasive species, particularly annual grasses, are prolific in this unit and therefore invasive species management may be required. However, a large proportion of the sand dune phacelia population at this site occurs near a hiking trail where disturbance has kept the area relatively free of invasive species.Unit 13: Pebble Beach Unit 13 consists of 1.7 ac (0.7 ha) in Del Norte County, California. While 0.4 ac (0.2 ha) of the land here is county land, the rest (1.3 ac (0.5 ha)) is State-managed by the California Department of Transportation. Invasive species pose a substantial threat at this site, primarily Hottentot fig or iceplant (Carpobrotus edulis), and therefore invasive species management may be required. Additionally, much of this unit is located within a road right-of-way, and therefore road development or maintenance activities could impact sand dune phacelia individuals, some of which are quite large and productive. As such, special management to mitigate the impact to sand dune phacelia habitat from these activities may be required.Effects of Critical Habitat DesignationSection 7 Consultation Section 7(a)(2) of the Act requires Federal agencies, including the Service, to ensure that any action they fund, authorize, or carry out is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat of such species. In addition, section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any agency action which is likely to jeopardize the continued existence of any species proposed to be listed under the Act or result in the destruction or adverse modification of proposed critical habitat. We published a final rule revising the definition of destruction or adverse modification on August 27, 2019 (84 FR 44976). Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency (action agency) must enter into consultation with us. Examples of actions that are subject to the section 7 consultation process are actions on State, Tribal, local, or private lands that require a Federal permit (such as a permit from the U.S Army Corps of Engineers under section 404 of the Clean Water Act (33 U.S.C 1251 et seq.) or a permit from the Service under section 10 of the Act) or that involve some other Federal action (such as funding from the Federal Highway Administration, Federal Aviation Administration, or the Federal Emergency Management Agency). Federal actions not affecting listed species or critical habitat--and actions on State, Tribal, local, or private lands that are not federally funded, authorized, or carried out by a Federal agency--do not require section 7 consultation. Compliance with the requirements of section 7(a)(2) is documented through our issuance of: (1) A concurrence letter for Federal actions that may affect, but are not likely to adversely affect, listed species or critical habitat; or (2) A biological opinion for Federal actions that may affect, and are likely to adversely affect, listed species or critical habitat. When we issue a biological opinion concluding that a project is likely to jeopardize the continued existence of a listed species and/or destroy or adversely modify critical habitat, we provide reasonable and prudent alternatives to the project, if any are identifiable, that would avoid the likelihood of jeopardy and/or destruction or adverse modification of critical habitat. We define ``reasonable and prudent alternatives'' (at 50 CFR 402.02) as alternative actions identified during consultation that: (1) Can be implemented in a manner consistent with the intended purpose of the action, (2) Can be implemented consistent with the scope of the Federal agency's legal authority and jurisdiction, (3) Are economically and technologically feasible, and (4) Would, in the Service Director's opinion, avoid the likelihood of jeopardizing the continued existence of the listed species and/or avoid the likelihood of destroying or adversely modifying critical habitat. Reasonable and prudent alternatives can vary from slight project modifications to extensive redesign or relocation of the project. Costs associated with implementing a reasonable and prudent alternative are similarly ***variable***. Regulations at 50 CFR 402.16 set forth requirements for Federal agencies to reinitiate formal consultation on previously reviewed actions. These requirements apply when the Federal agency has retained discretionary involvement or control over the action (or the agency's discretionary involvement or control is authorized by law) and, subsequent to the previous consultation: (1) If the amount or extent of taking specified in the incidental take statement is exceeded; (2) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or (4) if a new species is listed or critical habitat designated that may be affected by the identified action. In such situations, Federal agencies sometimes may need to request reinitiation of consultation with us, but the regulations also specify some exceptions to the requirement to reinitiate consultation on specific land management plans after subsequently listing a new species or designating new critical habitat. See the regulations for a description of those exceptions.Application of the ``Destruction or Adverse Modification'' Standard The key factor related to the destruction or adverse modification determination is whether implementation of the proposed Federal action directly or indirectly alters the designated critical habitat in a way that appreciably diminishes the value of the critical habitat as a whole for the conservation of the listed species. As discussed above, the role of critical habitat is to support physical or biological features essential to the conservation of a listed species and provide for the conservation of the species. Section 4(b)(8) of the Act requires us to briefly evaluate and describe, in any proposed or final regulation that designates critical habitat, activities involving a Federal action that may violate section 7(a)(2) of the Act by destroying or adversely modifying such habitat, or that may be affected by such designation.[[Page 16345]] Activities that the Service may, during a consultation under section 7(a)(2) of the Act, consider likely to destroy or adversely modify critical habitat include, but are not limited to: (1) Actions that would destroy, alter, or convert sand dune habitat. Such activities could include, but are not limited to, the construction of new roads or utility lines, dune breaching or breaching of water bodies for flood control, bridge work, and the use of heavy equipment for regular maintenance activities (such as roadway maintenance). These activities could eliminate or reduce the sandy dune habitat necessary for sand dune phacelia growth and reproduction. (2) Actions that would inhibit or reduce native plant communities and the pollinator communities they support. Such activities could include, but are not limited to, herbicide or insecticide application. These activities could limit the ability of sand dune phacelia to reproduce by inhibiting pollinator communities. (3) Actions that would introduce or promote the proliferation of invasive or successional species plant species into sand dune habitat. Such activities could include, but are not limited to, vegetation management that encourages growth of competing native and nonnative species. These activities could increase competition for space for growth, sunlight, and nutrients between sand dune phacelia and nonnative or successional competitors such as European beachgrass and shore pine, respectively.ExemptionsApplication of Section 4(a)(3) of the Act Section 4(a)(3)(B)(i) of the Act (16 U.S.C 1533(a)(3)(B)(i)) provides that the Secretary shall not designate as critical habitat any lands or other geographical areas owned or controlled by the Department of Defense (DoD), or designated for its use, that are subject to an integrated natural resources management plan (INRMP) prepared under section 101 of the Sikes Act (16 U.S.C 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation. No DoD lands with a completed INRMP are within the proposed critical habitat designation.Consideration of Impacts Under Section 4(b)(2) of the Act Section 4(b)(2) of the Act states that the Secretary shall designate and make revisions to critical habitat on the basis of the best available scientific ***data*** after taking into consideration the economic impact, national security impact, and any other relevant impact of specifying any particular area as critical habitat. The Secretary may exclude an area from designated critical habitat based on economic impacts, impacts on national security, or any other relevant impacts. In considering whether to exclude a particular area from the designation, we identify the benefits of including the area in the designation, identify the benefits of excluding the area from the designation, and evaluate whether the benefits of exclusion outweigh the benefits of inclusion. If the analysis indicates that the benefits of exclusion outweigh the benefits of inclusion, the Secretary may exercise discretion to exclude the area only if such exclusion would not result in the extinction of the species. In making the determination to exclude a particular area, the statute on its face, as well as the legislative history, are clear that the Secretary has broad discretion regarding which factor(s) to use and how much weight to give to any factor. We describe below the process that we undertook for taking into consideration each category of impacts and our analyses of the relevant impacts.Consideration of Economic Impacts Section 4(b)(2) of the Act and its implementing regulations require that we consider the economic impact that may result from a designation of critical habitat. To assess the probable economic impacts of a designation, we must first evaluate specific land uses or activities and projects that may occur in the area of the critical habitat. We then must evaluate the impacts that a specific critical habitat designation may have on restricting or modifying specific land uses or activities for the benefit of the species and its habitat within the areas proposed. We then identify which conservation efforts may be the result of the species being listed under the Act versus those attributed solely to the designation of critical habitat for this particular species. The probable economic impact of a proposed critical habitat designation is analyzed by comparing scenarios both ``with critical habitat'' and ``without critical habitat.'' The ``without critical habitat'' scenario represents the baseline for the analysis, which includes the existing regulatory and socio-economic burden imposed on landowners, managers, or other resource users potentially affected by the designation of critical habitat (e.g , under the Federal listing as well as other Federal, State, and local regulations). Therefore, the baseline represents the costs of all efforts attributable to the listing of the species under the Act (i.e , conservation of the species and its habitat incurred regardless of whether critical habitat is designated). The ``with critical habitat'' scenario describes the incremental impacts associated specifically with the designation of critical habitat for the species. The incremental conservation efforts and associated impacts would not be expected without the designation of critical habitat for the species. In other words, the incremental costs are those attributable solely to the designation of critical habitat, above and beyond the baseline costs. These are the costs we use when evaluating the benefits of inclusion and exclusion of particular areas from the final designation of critical habitat should we choose to conduct a discretionary 4(b)(2) exclusion analysis. For this particular designation, we developed an incremental effects memorandum (IEM) considering the probable incremental economic impacts that may result from this proposed designation of critical habitat. The information contained in our IEM was then used to develop a screening analysis of the probable effects of the designation of critical habitat for the sand dune phacelia (Industrial Economics, Inc. 2021). We began by conducting a screening analysis of the proposed designation of critical habitat in order to focus our analysis on the key factors that are likely to result in incremental economic impacts. The purpose of the screening analysis is to filter out particular geographic areas of critical habitat that are already subject to such protections and are, therefore, unlikely to incur incremental economic impacts. In particular, the screening analysis considers baseline costs (i.e , absent critical habitat designation) and includes any probable incremental economic impacts where land and water use may already be subject to conservation plans, land management plans, best management practices, or regulations that protect the habitat area as a result of the Federal listing status of the species. Ultimately, the screening analysis allows us to focus our analysis on evaluating the specific areas or sectors that may incur probable incremental economic impacts as a result of the designation. If the proposed critical habitat designation contains any unoccupied units, the screening analysis assesses whether those units require additional management or conservation efforts that may incur incremental economic impacts. This screening analysis combined with the information contained in our IEM[[Page 16346]]constitute what we consider to be our draft economic analysis (DEA) of the proposed critical habitat designation for the sand dune phacelia; our DEA is summarized in the narrative below. Executive Orders (E.O.s) 12866 and 13563 direct Federal agencies to assess the costs and benefits of available regulatory alternatives in quantitative (to the extent feasible) and qualitative terms. Consistent with the E.O regulatory analysis requirements, our effects analysis under the Act may take into consideration impacts to both directly and indirectly affected entities, where practicable and reasonable. If sufficient ***data*** are available, we assess to the extent practicable the probable impacts to both directly and indirectly affected entities. As part of our screening analysis, we considered the types of economic activities that are likely to occur within the areas likely affected by the critical habitat designation. In our evaluation of the probable incremental economic impacts that may result from the proposed designation of critical habitat for the sand dune phacelia, first we identified, in the IEM dated April 14, 2021, probable incremental economic impacts associated with the following categories of activities: (1) Federal lands management (U.S Bureau of Land Management) for recreational use, western snowy plover management, dune breaching, salt spray meadow restoration, and management plan updates; (2) bridge work; (3) breaching of water bodies for flood control purposes; and (4) road development and maintenance. We considered each industry or category individually. Additionally, we considered whether their activities have any Federal involvement. Critical habitat designation generally will not affect activities that do not have any Federal involvement; under the Act, designation of critical habitat only affects activities conducted, funded, permitted, or authorized by Federal agencies. If we list the species, in areas where the sand dune phacelia is present, Federal agencies would be required to consult with the Service under section 7 of the Act on activities they fund, permit, or implement that may affect the species. If, when we list the species, we also finalize this proposed critical habitat designation, our consultation would include an evaluation of measures to avoid the destruction or adverse modification of critical habitat. In our IEM, we attempted to clarify the distinction between the effects that would result from the species being listed and those attributable to the critical habitat designation (i.e , difference between the jeopardy and adverse modification standards) for sand dune phacelia's critical habitat. Because the designation of critical habitat for sand dune phacelia was proposed concurrently with the listing, it has been our experience that it is more difficult to discern which conservation efforts are attributable to the species being listed and those which will result solely from the designation of critical habitat. However, the following specific circumstances in this case help to inform our evaluation: (1) The essential physical or biological features identified for critical habitat are the same features essential for the life requisites of the species, and (2) any actions that would result in sufficient harm or harassment to constitute jeopardy to sand dune phacelia would also likely adversely affect the essential physical or biological features of critical habitat. The IEM outlines our rationale concerning this limited distinction between baseline conservation efforts and incremental impacts of the designation of critical habitat for this species. This evaluation of the incremental effects has been used as the basis to evaluate the probable incremental economic impacts of this proposed designation of critical habitat. We are proposing to designate approximately 252 ac (102 ha) of critical habitat for sand dune phacelia across Coos and Curry Counties in Oregon and Del Norte County in California. The designation is divided into 13 units, and all units are occupied by sand dune phacelia. We are not proposing to designate any units of unoccupied habitat. Approximately 51 percent of the proposed designation is located on State-owned lands, 46 percent is on privately owned lands, 3 percent is on Federal lands, and less than 1 percent is on county-owned lands. Any actions that may affect the species or its habitat would also affect critical habitat, and it is unlikely that any additional conservation efforts would be recommended to address the adverse modification standard over and above those recommended as necessary to avoid jeopardizing the continued existence of sand dune phacelia. Therefore, only administrative costs are expected with the proposed critical habitat designation. While this additional analysis will require time and resources by both the Federal action agency and the Service, it is believed that, in most circumstances, these costs would predominantly be administrative in nature and would not be significant. The probable incremental economic impacts of the sand dune phacelia critical habitat designation are expected to be limited to additional administrative effort resulting from an estimated 3 programmatic consultations, 10 formal consultations, 3 informal consultations, and 7 technical assistance efforts related to section 7 consultation over the next 10 years. Because all of the proposed critical habitat units are occupied by the species, incremental economic impacts of critical habitat designation, other than administrative costs, are unlikely. The incremental costs for each programmatic, formal, informal, and technical assistance effort are estimated to be $9,800, $5,300, $2,600, and $420, respectively. These estimates assume that consultation actions will occur even in the absence of critical habitat due to the presence of the sand dune phacelia, and the amount of administrative effort needed to address the critical habitat during this process is relatively minor. Applying these unit cost estimates, this analysis estimates that considering adverse modification of sand dune phacelia critical habitat during section 7 consultation will result in incremental costs of no more than $9,300 (2021 dollars) per year, which is well below the annual administrative burden threshold of $100 million of incremental administrative impacts in a single year. We are soliciting ***data*** and comments from the public on the DEA discussed above, as well as on all aspects of this proposed rule and our required determinations. During the development of a final designation, we will consider the information presented in the DEA and any additional information on economic impacts we receive during the public comment period to determine whether any specific areas should be excluded from the final critical habitat designation under authority of section 4(b)(2) and our implementing regulations at 50 CFR 17.90 If we receive credible information regarding the existence of a meaningful economic or other relevant impact supporting a benefit of exclusion, we will conduct an exclusion analysis for the relevant area or areas. We may also exercise the discretion to evaluate any other particular areas for possible exclusion. Furthermore, when we conduct an exclusion analysis based on impacts identified by experts in, or sources with firsthand knowledge about, impacts that are outside the scope of the Service's expertise, we will give weight to those impacts consistent with the expert or firsthand information unless we have rebutting information. We may exclude an area from critical habitat if we determine that the benefits of excluding[[Page 16347]]the area outweigh the benefits of including the area, provided the exclusion will not result in the extinction of this species.Consideration of National Security Impacts Section 4(a)(3)(B)(i) of the Act may not cover all DoD lands or areas that pose potential national-security concerns (e.g , a DoD installation that is in the process of revising its INRMP for a newly listed species or a species previously not covered). If a particular area is not covered under section 4(a)(3)(B)(i), then national-security or homeland-security concerns are not a factor in the process of determining what areas meet the definition of ``critical habitat.'' However, the Service must still consider impacts on national security, including homeland security, on those lands or areas not covered by section 4(a)(3)(B)(i), because section 4(b)(2) requires the Service to consider those impacts whenever it designates critical habitat. Accordingly, if DoD, Department of Homeland Security (DHS), or another Federal agency has requested exclusion based on an assertion of national-security or homeland-security concerns, or we have otherwise identified national-security or homeland-security impacts from designating particular areas as critical habitat, we generally have reason to consider excluding those areas. However, we cannot automatically exclude requested areas. When DoD, DHS, or another Federal agency requests exclusion from critical habitat on the basis of national-security or homeland-security impacts, we must conduct an exclusion analysis if the Federal requester provides credible information, including a reasonably specific justification of an incremental impact on national security that would result from the designation of that specific area as critical habitat. That justification could include demonstration of probable impacts, such as impacts to ongoing border-security patrols and surveillance activities, or a delay in training or facility construction, as a result of compliance with section 7(a)(2) of the Act. If the agency requesting the exclusion does not provide us with a reasonably specific justification, we will contact the agency to recommend that it provide a specific justification or clarification of its concerns relative to the probable incremental impact that could result from the designation. If we conduct an exclusion analysis because the agency provides a reasonably specific justification or because we decide to exercise the discretion to conduct an exclusion analysis, we will defer to the expert judgment of DoD, DHS, or another Federal agency as to: (1) Whether activities on its lands or waters, or its activities on other lands or waters, have national-security or homeland-security implications; (2) the importance of those implications; and (3) the degree to which the cited implications would be adversely affected in the absence of an exclusion. In that circumstance, in conducting a discretionary section 4(b)(2) exclusion analysis, we will give great weight to national-security and homeland-security concerns in analyzing the benefits of exclusion. Under section 4(b)(2) of the Act, we also consider whether a national-security or homeland-security impact might exist on lands not owned or managed by DoD or DHS. In preparing this proposal, we have determined that the lands within the proposed designation of critical habitat for sand dune phacelia are not owned or managed by DoD or DHS. Therefore, we anticipate no impact on national security or homeland security. However, if through the public comment period we receive credible information regarding impacts on national security or homeland security from designating particular areas as critical habitat, then as part of developing the final designation of critical habitat, we will conduct a discretionary exclusion analysis to determine whether to exclude those areas under authority of section 4(b)(2) and our implementing regulations at 50 CFR 17.90 Consideration of Other Relevant Impacts Under section 4(b)(2) of the Act, we consider any other relevant impacts, in addition to economic impacts and impacts on national security discussed above. Other relevant impacts may include, but are not limited to, impacts to Tribes, States, local governments, public health and safety, community interests, the environment (such as increased risk of wildfire or pest and invasive species management), Federal lands, and conservation plans, agreements, or partnerships. To identify other relevant impacts that may affect the exclusion analysis, we consider a number of factors, including whether there are permitted conservation plans covering the species in the area--such as HCPs, safe harbor agreements, or candidate conservation agreements with assurances--or whether there are non-permitted conservation agreements and partnerships that may be impaired by designation of, or exclusion from, critical habitat. In addition, we look at whether Tribal conservation plans or partnerships, Tribal resources, or government-to-government relationships of the United States with Tribal entities may be affected by the designation. We also consider any State, local, public-health, community-interest, environmental, or social impacts that might occur because of the designation. We have not identified any areas to consider for exclusion from critical habitat based on other relevant impacts. In preparing this proposal, we have determined that there are currently no permitted conservation plans or other management plans for sand dune phacelia. There are no partnerships, management, or protection afforded by cooperative management efforts sufficient to provide for the conservation of the species. There are no areas for which exclusion would result in conservation, or in the continuation, strengthening, or encouragement of partnerships. However, during the development of a final designation, we will consider all information currently available or received during the public comment period. If we receive credible information regarding the existence of a meaningful impact supporting a benefit of excluding any areas, we will undertake an exclusion analysis and determine whether those areas should be excluded from the final critical habitat designation under the authority of section 4(b)(2) and our implementing regulations at 50 CFR 17.90 We may also exercise the discretion to undertake exclusion analyses for other areas as well, and we will describe all of our exclusion analyses as part of a final critical habitat determination.Summary of Exclusions Considered Under Section 4(b)(2) of the Act At this time, we are not considering any exclusions from the proposed designation based on economic impacts, national security impacts, or other relevant impacts--such as partnerships, management, or protection afforded by cooperative management efforts--under section 4(b)(2) of the Act. In preparing this proposal, we have determined that no HCPs or other management plans for sand dune phacelia currently exist, and the proposed designation does not include any Tribal lands or trust resources. Therefore, we anticipate no impact on Tribal lands, partnerships, or HCPs from this proposed critical habitat designation and thus, as described above, we are not considering excluding any particular areas on the basis of the presence of conservation agreements or impacts to trust resources.[[Page 16348]] During the development of a final designation, we will consider any additional information received through the public comment period to determine whether any specific areas should be excluded from the final critical habitat designation under authority of section 4(b)(2) and our implementing regulations at 50 CFR 17.90 Required DeterminationsClarity of the Rule We are required by Executive Orders 12866 and 12988 and by the Presidential Memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must: (1) Be logically organized; (2) Use the active voice to address readers directly; (3) Use clear language rather than jargon; (4) Be divided into short sections and sentences; and (5) Use lists and tables wherever possible. If you feel that we have not met these requirements, send us comments by one of the methods listed in ADDRESSES. To better help us revise the rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that are unclearly written, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.Regulatory Planning and Review (Executive Orders 12866 and 13563) Executive Order 12866 provides that the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget will review all significant rules. OIRA has determined that this rule is not significant. Executive Order 13563 reaffirms the principles of E.O 12866 while calling for improvements in the nation's regulatory system to promote predictability, to reduce uncertainty, and to use the best, most innovative, and least burdensome tools for achieving regulatory ends. The executive order directs agencies to consider regulatory approaches that reduce burdens and maintain flexibility and freedom of choice for the public where these approaches are relevant, feasible, and consistent with regulatory objectives. E.O 13563 emphasizes further that regulations must be based on the best available science and that the rulemaking process must allow for public participation and an open exchange of ideas. We have developed this proposed rule in a manner consistent with these requirements.Regulatory Flexibility Act (5 U.S.C 601 et seq.) Under the Regulatory Flexibility Act (RFA; 5 U.S.C 601 et seq.), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA; 5 U.S.C 801 et seq.), whenever an agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effects of the rule on small entities (i.e , small businesses, small organizations, and small government jurisdictions). However, no regulatory flexibility analysis is required if the head of the agency certifies the rule will not have a significant economic impact on a substantial number of small entities. The SBREFA amended the RFA to require Federal agencies to provide a certification statement of the factual basis for certifying that the rule will not have a significant economic impact on a substantial number of small entities. According to the Small Business Administration, small entities include small organizations such as independent nonprofit organizations; small governmental jurisdictions, including school boards and city and town governments that serve fewer than 50,000 residents; and small businesses (13 CFR 121.201). Small businesses include manufacturing and mining concerns with fewer than 500 employees, wholesale trade entities with fewer than 100 employees, retail and service businesses with less than $5 million in annual sales, general and heavy construction businesses with less than $27.5 million in annual business, special trade contractors doing less than $11.5 million in annual business, and ***agricultural*** businesses with annual sales less than $750,000. To determine whether potential economic impacts to these small entities are significant, we considered the types of activities that might trigger regulatory impacts under this designation as well as types of project modifications that may result. In general, the term ``significant economic impact'' is meant to apply to a typical small business firm's business operations. Under the RFA, as amended, and as understood in light of recent court decisions, Federal agencies are required to evaluate the potential incremental impacts of rulemaking on those entities directly regulated by the rulemaking itself; in other words, the RFA does not require agencies to evaluate the potential impacts to indirectly regulated entities. The regulatory mechanism through which critical habitat protections are realized is section 7 of the Act, which requires Federal agencies, in consultation with the Service, to ensure that any action authorized, funded, or carried out by the agency is not likely to destroy or adversely modify critical habitat. Therefore, under section 7, only Federal action agencies are directly subject to the specific regulatory requirement (avoiding destruction and adverse modification) imposed by critical habitat designation. Consequently, it is our position that only Federal action agencies would be directly regulated if we adopt the proposed critical habitat designation. The RFA does not require evaluation of the potential impacts to entities not directly regulated. Moreover, Federal agencies are not small entities. Therefore, because no small entities would be directly regulated by this rulemaking, the Service certifies that, if made final as proposed, the proposed critical habitat designation will not have a significant economic impact on a substantial number of small entities. In summary, we have considered whether the proposed designation would result in a significant economic impact on a substantial number of small entities. For the above reasons and based on currently available information, we certify that, if made final, the proposed critical habitat designation would not have a significant economic impact on a substantial number of small business entities. Therefore, an initial regulatory flexibility analysis is not required.Energy Supply, Distribution, or Use--Executive Order 13211 Executive Order 13211 (Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use) requires agencies to prepare Statements of Energy Effects when undertaking certain actions. In our economic analysis, we did not find that this proposed critical habitat designation would significantly affect energy supplies, distribution, or use. We are not aware of any energy-related activities or facilities within the boundaries of the proposed critical habitat designation. Therefore, this action is not a significant energy action, and no Statement of Energy Effects is required.Unfunded Mandates Reform Act (2 U.S.C 1501 et seq.) In accordance with the Unfunded Mandates Reform Act (2 U.S.C 1501 et seq.), we make the following finding: (1) This proposed rule would not produce a Federal mandate. In general,[[Page 16349]]a Federal mandate is a provision in legislation, statute, or regulation that would impose an enforceable duty upon State, local, or Tribal governments, or the private sector, and includes both ``Federal intergovernmental mandates'' and ``Federal private sector mandates.'' These terms are defined in 2 U.S.C 658(5)-(7). ``Federal intergovernmental mandate'' includes a regulation that ``would impose an enforceable duty upon State, local, or Tribal governments'' with two exceptions. It excludes ``a condition of Federal assistance.'' It also excludes ``a duty arising from participation in a voluntary Federal program,'' unless the regulation ``relates to a then-existing Federal program under which $500,000,000 or more is provided annually to State, local, and Tribal governments under entitlement authority,'' if the provision would ``increase the stringency of conditions of assistance'' or ``place caps upon, or otherwise decrease, the Federal Government's responsibility to provide funding,'' and the State, local, or Tribal governments ``lack authority'' to adjust accordingly. At the time of enactment, these entitlement programs were: Medicaid; Aid to Families with Dependent Children work programs; Child Nutrition; Food Stamps; Social Services Block Grants; Vocational Rehabilitation State Grants; Foster Care, Adoption Assistance, and Independent Living; Family Support Welfare Services; and Child Support Enforcement. ``Federal private sector mandate'' includes a regulation that ``would impose an enforceable duty upon the private sector, except (i) a condition of Federal assistance or (ii) a duty arising from participation in a voluntary Federal program.'' The designation of critical habitat does not impose a legally binding duty on non-Federal Government entities or private parties. Under the Act, the only regulatory effect is that Federal agencies must ensure that their actions do not destroy or adversely modify critical habitat under section 7. While non-Federal entities that receive Federal funding, assistance, or permits, or that otherwise require approval or authorization from a Federal agency for an action, may be indirectly impacted by the designation of critical habitat, the legally binding duty to avoid destruction or adverse modification of critical habitat rests squarely on the Federal agency. Furthermore, to the extent that non-Federal entities are indirectly impacted because they receive Federal assistance or participate in a voluntary Federal aid program, the Unfunded Mandates Reform Act would not apply, nor would critical habitat shift the costs of the large entitlement programs listed above onto State governments. (2) We do not believe that this rule would significantly or uniquely affect small governments because it will not produce a Federal mandate of $100 million or greater in any year, that is, it is not a ``significant regulatory action'' under the Unfunded Mandates Reform Act. The designation of critical habitat imposes no obligations on State or local governments. Therefore, a Small Government Agency Plan is not required.Takings--Executive Order 12630 In accordance with E.O 12630 (Government Actions and Interference with Constitutionally Protected Private Property Rights), we have analyzed the potential takings implications of designating critical habitat for sand dune phacelia in a takings implications assessment. The Act does not authorize the Service to regulate private actions on private lands or confiscate private property as a result of critical habitat designation. Designation of critical habitat does not affect land ownership, or establish any closures, or restrictions on use of or access to the designated areas. Furthermore, the designation of critical habitat does not affect landowner actions that do not require Federal funding or permits, nor does it preclude development of habitat conservation programs or issuance of incidental take permits to permit actions that do require Federal funding or permits to go forward. However, Federal agencies are prohibited from carrying out, funding, or authorizing actions that would destroy or adversely modify critical habitat. A takings implications assessment has been completed for the proposed designation of critical habitat for sand dune phacelia and it concludes that, if adopted, this designation of critical habitat does not pose significant takings implications for lands within or affected by the designation.Federalism--Executive Order 13132 In accordance with E.O 13132 (Federalism), this proposed rule does not have significant Federalism effects. A federalism summary impact statement is not required. In keeping with Department of the Interior and Department of Commerce policy, we requested information from, and coordinated development of this proposed critical habitat designation with, appropriate State resource agencies. From a federalism perspective, the designation of critical habitat directly affects only the responsibilities of Federal agencies. The Act imposes no other duties with respect to critical habitat, either for States and local governments, or for anyone else. As a result, the proposed rule does not have substantial direct effects either on the States, or on the relationship between the national government and the States, or on the distribution of powers and responsibilities among the various levels of government. The proposed designation may have some benefit to these governments because the areas that contain the features essential to the conservation of the species are more clearly defined, and the physical or biological features of the habitat necessary for the conservation of the species are specifically identified. This information does not alter where and what federally sponsored activities may occur. However, it may assist State and local governments in long-range planning because they no longer have to wait for case-by-case section 7 consultations to occur. Where State and local governments require approval or authorization from a Federal agency for actions that may affect critical habitat, consultation under section 7(a)(2) of the Act would be required. While non-Federal entities that receive Federal funding, assistance, or permits, or that otherwise require approval or authorization from a Federal agency for an action, may be indirectly impacted by the designation of critical habitat, the legally binding duty to avoid destruction or adverse modification of critical habitat rests squarely on the Federal agency.Civil Justice Reform--Executive Order 12988 In accordance with Executive Order 12988 (Civil Justice Reform), the Office of the Solicitor has determined that the rule would not unduly burden the judicial system and that it meets the requirements of sections 3(a) and 3(b)(2) of the Order. We have proposed designating critical habitat in accordance with the provisions of the Act. To assist the public in understanding the habitat needs of the species, this proposed rule identifies the physical or biological features essential to the conservation of the species. The proposed areas of critical habitat are presented on maps, and the proposed rule provides several options for the interested public to obtain more detailed location information, if desired.Paperwork Reduction Act of 1995 (44 U.S.C 3501 et seq.) This rule does not contain information ***collection*** requirements, and a submission to the Office of[[Page 16350]]Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (44 U.S.C 3501 et seq.) is not required. We may not conduct or sponsor and you are not required to respond to a ***collection*** of information unless it displays a currently valid OMB control number.National Environmental Policy Act (42 U.S.C 4321 et seq.) It is our position that, outside the jurisdiction of the U.S Court of Appeals for the Tenth Circuit, we do not need to prepare environmental analyses pursuant to the National Environmental Policy Act (NEPA; 42 U.S.C 4321 et seq.) in connection with regulations adopted pursuant to section 4(a) of the Act. We published a notice outlining our reasons for this determination in the Federal Register on October 25, 1983 (48 FR 49244). This position was upheld by the U.S Court of Appeals for the Ninth Circuit (Douglas County v. Babbitt, 48 F.3d 1495 (9th Cir. 1995), cert. denied 516 U.S 1042 (1996)).Government-to-Government Relationship With Tribes In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we readily acknowledge our responsibilities to work directly with Tribes in developing programs for healthy ecosystems, to acknowledge that Tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to Tribes. We have determined that no Tribal lands fall within the boundaries of the proposed critical habitat for sand dune phacelia, so no Tribal lands would be affected by the proposed designation.References Cited A complete list of references cited in this rulemaking is available on the internet at [*https://www.regulations.gov*](https://www.regulations.gov) and upon request from the Oregon Ecological Services Field Office (see FOR FURTHER INFORMATION CONTACT).Authors The primary authors of this proposed rule are the staff members of the Fish and Wildlife Service's Species Assessment Team and the Oregon Ecological Services Field Office.List of Subjects in 50 CFR Part 17 Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.Proposed Regulation Promulgation Accordingly, we propose to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:PART 17--ENDANGERED AND THREATENED WILDLIFE AND PLANTS01. The authority citation for part 17 continues to read as follows: Authority: 16 U.S.C 1361-1407; 1531-1544; and 4201-4245, unless otherwise noted.02. Amend Sec. 17.12 paragraph (h) by adding an entry for ``Phacelia argentea (Sand dune phacelia)'' to the List of Endangered and Threatened Plants in alphabetical order under FLOWERING PLANTS to read as set forth below:Sec. 17.12 Endangered and threatened plants.\* \* \* \* \* (h) \* \* \*---------------------------------------------------------------------------------------------------------------- Listing citations and Scientific name Common name Where listed Status applicable rules---------------------------------------------------------------------------------------------------------------- Flowering Plants \* \* \* \* \* \* \*Phacelia argentea................ Sand dune phacelia. Wherever found..... T [Federal Register citation when published as a final rule]; 50 CFR 17.73(j); \4d\ 50 CFR 17.96(a).CH \* \* \* \* \* \* \*----------------------------------------------------------------------------------------------------------------03. Revise Sec. 17.73 to read as follows:Sec. 17.73 Special rules--flowering plants. (a)-(i) [Reserved] (j) Phacelia argentea (sand dune phacelia).--(1) Prohibitions. The following prohibitions that apply to endangered plants also apply to sand dune phacelia. Except as provided under paragraph (k)(2) of this section, it is unlawful for any person subject to the jurisdiction of the United States to commit, to attempt to commit, to solicit another to commit, or cause to be committed, any of the following acts in regard to this species: (i) Import or export, as set forth at Sec. 17.61(b) for endangered plants. (ii) Remove and reduce to possession the species from areas under Federal jurisdiction as set forth at Sec. 17.61(c)(1) for endangered plants. (iii) Maliciously damage or destroy the species on any areas under Federal jurisdiction, or remove, cut, dig up, or damage or destroy the species on any other area in knowing violation of any law or regulation of any State or in the course of any violation of a State criminal trespass law, as set forth at section 9(a)(2)(B) of the Act. (iv) Interstate or foreign commerce in the course of commercial activity, as set forth at Sec. 17.61(d) for endangered plants. (v) Sale or offer for sale, as set forth at Sec. 17.61(e) for endangered plants. (2) Exceptions from prohibitions. In regard to Phacelia argentea, you may: (i) Conduct activities, including activities prohibited under paragraph (k)(1) of this section, if they are authorized by a permit issued in accordance with the provisions set forth at Sec. 17.72 (ii) Remove and reduce to possession from areas under Federal jurisdiction, as set forth at Sec. 17.71(b). (iii) Remove, cut, dig up, damage or destroy on areas not under Federal jurisdiction by any qualified employee or agent of the Service or State conservation agency which is a party to a Cooperative Agreement with the Service in accordance with section 6(c) of the Act, who is designated by that agency for such purposes, when acting in the course of official duties.04. Amend Sec. 17.96 paragraph (a) by adding an entry for ``Family Boraginaceae: Phacelia argentea (sand[[Page 16351]]dune phacelia)'' after the entry for ``Family Boraginaceae: Amsinckia grandiflora (large-flowered fiddleneck)'', to read as set forth below:Sec. 17.96 Critical habitat--plants. (a) Flowering plants.\* \* \* \* \*Family Boraginaceae: Phacelia argentea (sand dune phacelia) (1) Critical habitat units are depicted for Coos and Curry Counties, Oregon, and Del Norte County, California, on the maps in this entry. (2) Within these areas, the physical or biological features essential to the conservation of sand dune phacelia consist of the following components: (i) Sandy coastal dune habitat above the high tide line that provides a high light environment, room for growth, and adequate moisture. (ii) A sufficiently abundant pollinator community (which may include leafcutter bees and bumble bees) for pollination and reproduction. (3) Critical habitat does not include manmade structures (such as buildings, aqueducts, runways, roads, and other paved areas) and the land on which they are located existing within the legal boundaries on [EFFECTIVE DATE OF THE FINAL RULE]. (4) ***Data*** layers defining map units were created using Geographic Information Systems (GIS) feature classes from known extant populations. Critical habitat units were defined by applying the minimum convex polygon approach in GIS, thereby creating a single polygon from occupied habitat patches within each population consisting of 25 or more individuals. In a few cases, the unit boundaries were modified to align with the coastal boundary based on current National ***Agriculture*** Imagery Program natural color imagery. The maps in this entry, as modified by any accompanying regulatory text, establish the boundaries of the critical habitat designation. The coordinates or plot points or both on which each map is based are available to the public at the Service's internet site at [*https://www.fws.gov/oregonfwo*](https://www.fws.gov/oregonfwo), at [*https://www.regulations.gov*](https://www.regulations.gov) at Docket No. FWS-R1-ES-2021-0070, and at the field office responsible for this designation. You may obtain field office location information by contacting one of the Service regional offices, the addresses of which are listed at 50 CFR 2.2 [[Page 16352]] (5) Note: Index map follows: [GRAPHIC] [TIFF OMITTED] TP22MR22.003 (6) Unit 1: North Bandon 1, Coos County, Oregon; Unit 2: North Bandon 2, Coos County, Oregon. (i) Unit 1 consists of 0.6 acres (ac) (0.2 hectares (ha)) in Coos County, Oregon, and is composed of land in private ownership. Unit 2 consists of 61.3 ac (24.8 ha) in Coos County, Oregon, and is composed of land in State (6.9 ac (2.8 ha)) and private ownership (54.4 ac (22 ha)).[[Page 16353]] (ii) Map of Unit 1 and Unit 2 follows: [GRAPHIC] [TIFF OMITTED] TP22MR22.004 (7) Unit 3: Lost Lake, Coos County, Oregon. (i) Unit 3 consists of 3.7 ac (1.5 ha) in Coos County, Oregon, and is composed of land in State (0.1 ac (0.04 ha)), Federal (0.8 ac (0.3 ha)), and private ownership (2.8 ac (1.1 ha)).[[Page 16354]] (ii) Map of Unit 3 follows: [GRAPHIC] [TIFF OMITTED] TP22MR22.005 (8) Unit 4: Floras Lake, Curry County, Oregon (i) Unit 4 consists of 5.8 ac (2.3 ha) in Curry County, Oregon, and is composed of land in Federal ownership.[[Page 16355]] (ii) Map of Unit 4 follows: [GRAPHIC] [TIFF OMITTED] TP22MR22.006 (9) Unit 5: Cape Blanco, Curry County, Oregon (i) Unit 5 consists of 2 ac (0.8 ha) in Curry County, Oregon, and is composed of land in State ownership.[[Page 16356]] (ii) Map of Unit 5 follows: [GRAPHIC] [TIFF OMITTED] TP22MR22.007 (10) Unit 6: Paradise Point, Curry County, Oregon. (i) Unit 6 consists of 3.7 ac (1.5 ha) in Curry County, Oregon, and is composed of land in private ownership.[[Page 16357]] (ii) Map of Unit 6 follows: [GRAPHIC] [TIFF OMITTED] TP22MR22.008 (11) Unit 7: Pistol River North, Curry County, Oregon. (i) Unit 7 consists of 3.2 ac (1.3 ha) in Curry County, Oregon, and is composed of land in State ownership.[[Page 16358]] (ii) Map of Unit 7 follows: [GRAPHIC] [TIFF OMITTED] TP22MR22.009 (12) Unit 8: Pistol River South, Curry County, Oregon (i) Unit 8 consists of 0.7 ac (0.3 ha) in Curry County, Oregon, and is composed of land in State ownership.[[Page 16359]] (ii) Map of Unit 8 follows: [GRAPHIC] [TIFF OMITTED] TP22MR22.010 (13) Unit 9: Lone Ranch, Curry County, Oregon (i) Unit 9 consists of 6.5 ac (2.6 ha) in Curry County, Oregon, and is composed of land in State ownership.[[Page 16360]] (ii) Map of Unit 9 follows: [GRAPHIC] [TIFF OMITTED] TP22MR22.011 (14) Unit 10: Pacific Shores, Del Norte County, California; Unit 11: Tolowa Dunes, Del Norte County, California. (i) Unit 10 consists of 92.3 ac (37.4 ha) in Del Norte County, California, and is composed of land in State (37.9 ac (15.3 ha)) and private ownership (54.4 ac (22 ha)). Unit 11 consists of 69.6 ac (28.2 ha) in Del Norte County, California, and is composed of land in State ownership.[[Page 16361]] (ii) Map of Unit 10 and Unit 11 follows: [GRAPHIC] [TIFF OMITTED] TP22MR22.012 (15) Unit 12: Point Saint George, Del Norte County, California. (i) Unit 12 consists of 1.1 ac (0.4 ha) in Del Norte County, California, and is composed of land in county (1 ac (0.4 ha)) and private ownership (0.1 ac (0.04 ha)).[[Page 16362]] (ii) Map of Unit 12 follows: [GRAPHIC] [TIFF OMITTED] TP22MR22.013 (16) Unit 13: Pebble Beach, Del Norte County, California. (i) Unit 13 consists of 1.7 ac (0.7 ha) in Del Norte County, California, and is composed of land in State (1.3 ac (0.5 ha)) and county ownership (0.4 ac (0.2 ha)).[[Page 16363]] (ii) Map of Unit 13 follows: [GRAPHIC] [TIFF OMITTED] TP22MR22.014 \* \* \* \* \*Martha Williams,Director, U.S Fish and Wildlife Service.[FR Doc. 2022-05326 Filed 3-21-22; 8:45 am]BILLING CODE 4333-15-P

**Load-Date:** March 23, 2022

**End of Document**



[***Federal Register: Renewable Fuel Standard (RFS) Program: RFS Annual Rules Pages 72436 - 72501 [FR DOC #2021-26839]***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:64C7-CFY1-F0YC-N4FY-00000-00&context=1516831)

Impact News Service

December 22, 2021 Wednesday

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**Length:** 44990 words

**Body**

Washington: Office of the Federal Register has issued the following notice:Environmental Protection Agency-----------------------------------------------------------------------40 CFR Parts 80 and 1090Renewable Fuel Standard (RFS) Program: RFS Annual Rules; Proposed RuleFederal Register / Vol. 86 , No. 242 / Tuesday, December 21, 2021 / Proposed Rules[[Page 72436]]-----------------------------------------------------------------------ENVIRONMENTAL PROTECTION AGENCY40 CFR Parts 80 and 1090[EPA-HQ-OAR-2021-0324; FRL-8521-02-OAR]RIN 2060-AV11Renewable Fuel Standard (RFS) Program: RFS Annual RulesAGENCY: Environmental Protection Agency (EPA).ACTION: Proposed rule.-----------------------------------------------------------------------SUMMARY: Under section 211 of the Clean Air Act, the Environmental Protection Agency (EPA) is required to set standards every year to implement nationally applicable renewable fuel volume targets. This action proposes to modify the 2021 and 2022 statutory volume targets for cellulosic biofuel, advanced biofuel, and total renewable fuel, as well as to establish the 2022 volume target for biomass-based diesel. This action also proposes to modify the previously established cellulosic biofuel, advanced biofuel, and total renewable fuel volume requirements for 2020. In addition, this action proposes the 2020, 2021, and 2022 renewable fuel standards for all four of the above biofuel categories. Finally, this action also proposes to address the remand of the 2016 standard-setting rulemaking, as well as several regulatory changes to the Renewable Fuel Standard (RFS) program including regulations for the use of biointermediates to produce qualifying renewable fuel, flexibilities for regulated parties, and clarifications of existing regulations.DATES: Comments. Comments must be received on or before February 4, 2022. Public hearing. EPA announced information regarding the public hearing for this proposal in a Federal Register document published on December 10, 2021, at 86 FR 70426.ADDRESSES: Comments. You may send your comments, identified by Docket ID No. EPA-HQ-OAR-2021-0324, by any of the following methods: Federal eRulemaking Portal: [*https://www.regulations.gov*](https://www.regulations.gov) (our preferred method). Follow the online instructions for submitting comments. Email: [*a-and-r-Docket@epa.gov*](mailto:a-and-r-docket@epa.gov) Include Docket ID No. EPA-HQ-OAR-2021-0324 in the subject line of the message. Mail: U.S Environmental Protection Agency, EPA Docket Center, Air Docket, Mail Code 28221T, 1200 Pennsylvania Avenue NW, Washington, DC 20460. Hand Delivery or Courier (by scheduled appointment only): EPA Docket Center, WJC West Building, Room 3334, 1301 Constitution Avenue NW, Washington, DC 20004. The Docket Center's hours of operations are 8:30 a.m -4:30 p.m , Monday-Friday (except Federal Holidays). Instructions: All submissions received must include the Docket ID No. for this rulemaking. Comments received may be posted without change to [*https://www.regulations.gov*](https://www.regulations.gov), including any personal information provided. For the full EPA public comment policy, information about confidential business information (CBI) or multimedia submissions, and general guidance on making effective comments, please visit [*https://www.epa.gov/dockets/commenting-epa-dockets*](https://www.epa.gov/dockets/commenting-epa-dockets). Out of an abundance of caution for members of the public and our staff, the EPA Docket Center and Reading Room are closed to the public, with limited exceptions, to reduce the risk of transmitting COVID-19. Our Docket Center staff will continue to provide remote customer service via email, phone, and webform. We encourage the public to submit comments via [*https://www.regulations.gov*](https://www.regulations.gov) or email, as there may be a delay in processing mail and faxes. Hand deliveries and couriers may be received by scheduled appointment only. For further information on EPA Docket Center services and the current status, please visit us online at [*https://www.epa.gov/dockets*](https://www.epa.gov/dockets). EPA continues to carefully and continuously monitor information from the Centers for Disease Control and Prevention (CDC), local area health departments, and our Federal partners so that we can respond rapidly as conditions change regarding COVID-19.FOR FURTHER INFORMATION CONTACT: Dallas Burkholder, Office of Transportation and Air Quality, Assessment and Standards Division, Environmental Protection Agency, 2000 Traverwood Drive, Ann Arbor, MI 48105; telephone number: 734-214-4766; email address: [*RFS-Rulemakings@epa.gov*](mailto:RFS-Rulemakings@epa.gov) Comments on this proposal should not be submitted to this email address, but rather through [*https://www.regulations.gov*](https://www.regulations.gov) as discussed in the ADDRESSES section.SUPPLEMENTARY INFORMATION: Entities potentially affected by this proposed rule are those involved with the production, distribution, and sale of transportation fuels, including gasoline and diesel fuel, as well as renewable fuels such as ethanol, biodiesel, renewable diesel, and biogas. Potentially affected categories include:------------------------------------------------------------------------ Examples of Category NAICS \1\ potentially affected codes entities------------------------------------------------------------------------Industry.......................... 324110 Petroleum refineries.Industry.......................... 325193 Ethyl alcohol manufacturing.Industry.......................... 325199 Other basic organic chemical manufacturing.Industry.......................... 424690 Chemical and allied products merchant wholesalers.Industry.......................... 424710 Petroleum bulk stations and terminals.Industry.......................... 424720 Petroleum and petroleum products merchant wholesalers.Industry.......................... 221210 Manufactured gas production and distribution.Industry.......................... 454319 Other fuel dealers.------------------------------------------------------------------------\1\ North American Industry Classification System (NAICS). This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be affected by this proposed action. This table lists the types of entities that EPA is now aware could potentially be affected by this proposed action. Other types of entities not listed in the table could also be affected. To determine whether your entity would be affected by this proposed action, you should carefully examine the applicability criteria in 40 CFR parts 80 and 1090. If you have any questions regarding the applicability of this proposed action to a particular entity, consult the person listed in the FOR FURTHER INFORMATION CONTACT section.Outline of This PreambleI. Executive Summary A. Legal Authorities To Modify and Establish Renewable Fuel Volumes B. 2020 Volumes C. 2021 Volumes D. 2022 Volumes E. Response to the ACE Remand F. Annual Percentage Standards[[Page 72437]] G. Biointermediates H. Other Changes I. Environmental Justice J. 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Statutory Authority A red-line version of the regulatory language that incorporates the proposed changes in this action is available in the docket for this action.I. Executive Summary The Renewable Fuel Standard (RFS) program began in 2006 pursuant to the requirements of the Energy Policy Act of 2005 (EPAct), which were codified in Clean Air Act (CAA) section 211(o). The statutory requirements were subsequently amended by the Energy Independence and Security Act of 2007 (EISA). The statute sets forth annual, nationally applicable volume targets for each of the four categories of renewable fuel. It also directs EPA to modify or establish volume targets in certain circumstances. EPA must then translate the volume targets into compliance obligations that obligated parties must meet every year. In this action we are proposing the applicable volumes for cellulosic biofuel, advanced biofuel, and total renewable fuel for 2021 and 2022, and the biomass-based diesel (BBD) applicable volume for 2022,\1\ as well as to modify the applicable volumes that EPA previously established for cellulosic biofuel, advanced biofuel, and total renewable fuel for 2020.2 3 We are also proposing the annual percentage standards (also known as ``percent standards'') for cellulosic biofuel, BBD, advanced biofuel, and total renewable fuel that would apply to gasoline and diesel produced or imported by obligated parties in 2020, 2021, and 2022. In addition, we are also proposing to address the remand of the 2014-2016 annual rule by the D.C Circuit Court of Appeals, in Americans for Clean Energy v. EPA, 864 F.3d 691 (2017) (hereafter ``ACE'') by proposing a supplemental volume of 250 million gallons in 2022, and we intend to propose an additional supplemental volume of 250 million gallons for 2023 in a subsequent action.--------------------------------------------------------------------------- \1\ The 2021 BBD volume requirement was established in the 2020 final rule. 85 FR 7016 (February 6, 2020). \2\ 85 FR 7016 (February 6, 2020). \3\ As explained in Section II, we did not trigger the reset authority for BBD. Thus, we are not proposing to reset the previously finalized 2020 and 2021 BBD volumes. In addition, actual BBD use in both 2020 and 2021 is projected to exceed the previously finalized volumes, so we see no need to retroactively reconsider the BBD volumes in any event. As discussed in Section III.E, we are proposing to set the 2022 BBD volume pursuant our ``set'' authority under CAA section 211(o)(2)(B)(ii)). Table I-1--Proposed Volume Requirements [Billion RINs] \a\---------------------------------------------------------------------------------------------------------------- Category 2020 2021 2022----------------------------------------------------------------------------------------------------------------Cellulosic Biofuel.............................................. 0.51 0.62 0.77Biomass-Based Diesel \b\........................................ \c\ 2.43 \d\ 2.43 2.76Advanced Biofuel................................................ 4.63 5.20 5.77[[Page 72438]] Total Renewable Fuel............................................ 17.13 18.52 20.77Supplemental Standard........................................... n/a n/a 0.25----------------------------------------------------------------------------------------------------------------\a\ One Renewable Identification Number (RIN) is equivalent to one ethanol-equivalent gallon of renewable fuel. Throughout this preamble, RINs are generally used to describe total volumes in each of the four categories shown above, while gallons are generally used to describe volumes for individual types of biofuel such as ethanol, biodiesel, renewable diesel, etc. Exceptions include BBD, which is always given in physical volumes, and biogas and electricity, which are always given in RINs.\b\ The BBD volumes are in physical gallons (rather than RINs).\c\ Established in the 2019 RFS annual rule (83 FR 63704, December 11, 2018).\d\ Established in the 2020 RFS annual rule (85 FR 7016, February 6, 2020). Finally, we are proposing several regulatory changes to the RFS program, including regulations for the use of biointermediates to produce qualifying renewable fuel, flexibilities for regulated parties, and clarifications of existing regulations.A. Legal Authorities To Modify and Establish Renewable Fuel Volumes For the 2020, 2021, and 2022 cellulosic biofuel, advanced biofuel, and total renewable fuel volumes, EPA is fulfilling our statutory obligation to ``reset'' the statutory volumes in accordance with CAA section 211(o)(7)(F). This provision, entitled ``Modification of Applicable Volumes,'' provides that, if a waiver of any statutory volume target exceeds specified thresholds, EPA shall modify or ``reset'' the statutory volume targets for all years following the year that the threshold was exceeded. This obligation has been triggered by EPA actions waiving volumes in previous annual standard-setting rulemakings. Under this statutory provision, we are proposing new volume targets for cellulosic biofuel, advanced biofuel, and total renewable fuel for 2020, 2021, and 2022.\4\--------------------------------------------------------------------------- \4\ As we explain further in Section II, we are also independently justifying the 2020, 2021, and 2022 cellulosic biofuel volumes and the 2022 advanced biofuel and total renewable fuel volumes under the cellulosic waiver authority.--------------------------------------------------------------------------- When resetting the statutory targets, EPA must comply with the processes, criteria, and standards set forth in CAA section 211(o)(2)(B)(ii). In addition to reviewing the implementation of the program during previous years and coordinating with the Secretary of Energy and the Secretary of ***Agriculture***, EPA must also analyze several factors: The impact of the production and use of renewable fuels on the environment, including on air quality, climate change, ***conversion*** of wetlands, ecosystems, wildlife habitat, water quality, and water supply; The impact of renewable fuels on the energy security of the U.S ; The expected annual rate of future commercial production of renewable fuels, including advanced biofuels in each category (cellulosic biofuel and BBD); The impact of renewable fuels on the infrastructure of the U.S , including deliverability of materials, goods, and products other than renewable fuel, and the sufficiency of infrastructure to deliver and use renewable fuel; The impact of the use of renewable fuels on the cost to consumers of transportation fuel and on the cost to transport goods; and The impact of the use of renewable fuels on other factors, including job creation, the price and supply of ***agricultural*** commodities, rural economic development, and food prices. With respect to the 2022 BBD volume, we are setting this volume under CAA section 211(o)(2)(B)(ii). The requirement to reset the statutory volume targets does not apply to BBD. However, CAA section 211(o)(2)(B)(ii) separately requires that EPA set the BBD volume for years including 2022 based on an analysis of the same statutory factors as the reset authority. In addition to these statutory provisions, the D.C Circuit has also established principles that EPA must follow when promulgating RFS rulemakings after the statutory deadline as well as retroactive RFS rulemakings.\5\ Namely, EPA has authority to promulgate such RFS rules, but EPA must reasonably consider and mitigate the burdens on obligated parties. Several aspects of this rulemaking are either retroactive or will be finalized after the statutory deadline, or both. Therefore we consider this caselaw as required by the court. We further discuss all our legal authorities to modify or establish volumes in Section II.--------------------------------------------------------------------------- \5\ See, e.g , Americans for Clean Energy v. EPA, 864 F.3d 691 (D.C Cir. 2017); Monroe Energy, LLC v. EPA, 750 F.3d 909 (D.C Cir. 2014); Nat'l Petrochemical & Refiners Ass'n v. EPA, 630 F.3d 145, 154-58 (D.C Cir. 2010).---------------------------------------------------------------------------B. 2020 Volumes EPA established the applicable 2020 volume requirements and percentage standards in late 2019.\6\ Since we promulgated those standards, several significant and unanticipated events occurred that affected the fuels markets in 2020. The two most prominent of these events were:--------------------------------------------------------------------------- \6\ 85 FR 7016 (February 6, 2020).--------------------------------------------------------------------------- The COVID-19 pandemic and the ensuing fall in transportation fuel demand, especially the disproportionate fall in gasoline demand relative to diesel demand, which significantly reduced the production and use of biofuels in 2020 below the volumes we anticipated could be achieved, and The potential that the volume of gasoline and diesel exempted from 2020 RFS obligations through small refinery exemption (SREs) will be far lower than projected in the 2020 final rule. These events are expected to adversely affect the ability of obligated parties to comply with the applicable standards and to achieve the intended volumes in the 2020 final rule.\7\ As a result, we are proposing to retroactively adjust the 2020 volumes and standards to reflect the actual volumes of renewable fuels and transportation fuel consumed in the U.S As we discuss further in Sections III and IV, these revised volumes are supported by our analysis of the statutory factors that we must consider when resetting RFS volumes.--------------------------------------------------------------------------- \7\ EPA extended the 2020 compliance deadline for obligated parties to January 31, 2022 (86 FR 17073, April 1, 2021). We have proposed to further extend that deadline in a separate action (86 FR 67419, November 26, 2021).---------------------------------------------------------------------------C. 2021 Volumes We are proposing volumes for 2021 that are equal to our projection of the volume of cellulosic biofuel, advanced biofuel, and total renewable fuel that will be used in the U.S in 2021. Much like our proposed volumes for 2015,\8\ which were similarly retroactive and promulgated after the statutory[[Page 72439]]deadline, these volume projections are based on actual renewable fuel use for months in 2021 where ***data*** are available and projections of renewable fuel use for the remainder of the year. These volumes include both renewable fuel that is produced domestically as well as imported renewable fuel that is used in the U.S As discussed in further detail in Sections III and IV of this proposal, we believe this approach for 2021 is appropriate based on our analysis of the statutory factors EPA must analyze when resetting the RFS volumes, including our finding that this retroactive rulemaking has limited ability to incentivize increased production and use of renewable fuel in 2021.--------------------------------------------------------------------------- \8\ 80 FR 33100 (June 10, 2015).---------------------------------------------------------------------------D. 2022 Volumes The proposed volumes for 2022 are significantly higher than the proposed volumes for 2020 and 2021. As we discuss further in Sections III and IV, these volumes are based on our analysis of the statutory factors, including our assessment of the ability for the RFS program to incentivize increased production and use of renewable fuel in 2022, the statutory intent to support increasing production and use of renewable fuels, and the potential positive impacts of renewable fuels on several of the statutory factors such as climate change and energy security. The proposed volumes for 2022 also reflect the adverse impacts of biofuels on some statutory factors, including market and infrastructure constraints to the ability of RFS annual volume requirements to incentivize increased production and use of renewable fuel in the near term. These constraints include the commercial availability of cellulosic biofuel, the price and availability of feedstocks, and the availability of infrastructure to distribute higher level blends of ethanol.E. Response to the ACE Remand In 2015, EPA established the total renewable fuel standard for 2016. As part of that rule, we relied upon the general waiver authority under a finding of inadequate domestic supply to reduce the total renewable fuel volume target by 500 million gallons.\9\ Several parties challenged that action, and in ACE the U.S Court of Appeals for the D.C Circuit vacated EPA's use of the general waiver authority, finding that such use exceeded EPA's authority under the CAA. Specifically, EPA had impermissibly considered demand-side factors in its assessment of inadequate domestic supply, rather than limiting that assessment to supply-side factors. The court remanded the rule back to EPA for further consideration.--------------------------------------------------------------------------- \9\ See 80 FR 77420 (December 14, 2015); CAA section 211(o)(7)(A)(ii).--------------------------------------------------------------------------- We now intend to restore the full 500 million gallons that we improperly waived in the 2016 rule but to do so over two years. Specifically, as we discuss further in Section V, we are proposing to add a supplemental volume obligation of 250 million gallons to the proposed 2022 standards. We also intend to propose an additional supplemental volume of 250 million gallons for 2023 in a subsequent action.F. Annual Percentage Standards The statute directs EPA to establish annual standards that translate the nationally applicable volume targets into compliance obligations on obligated parties. In this action, EPA is proposing annual standards for 2020, 2021, and 2022 for all four categories of renewable fuel. We are also proposing a supplemental standard to address the ACE remand, which will apply in the 2022 compliance year. The renewable fuel standards are expressed as a volume percentage and are used by each refiner and importer of fossil-based gasoline or diesel to determine their renewable fuel volume obligations. The specific formulas we use in calculating the renewable fuel percentage standards are found in 40 CFR 80.1405 Four separate percentage standards are required under the RFS program, corresponding to the four separate renewable fuel categories shown in Table I-1. The proposed standards are shown in Table I.E-1. Details, including the projected gasoline and diesel volumes used, can be found in Section VI. In the 2020 standards final rule, we modified the formulas used to calculate the percentage standards to account for a projection of exempt gasoline and diesel volumes produced by small refineries.\10\ Subsequent to the promulgation of that rule, the Tenth Circuit Court of Appeals vacated three EPA SRE decisions as exceeding our statutory authority in Renewable Fuels Association v. EPA (hereinafter RFA).\11\ Most recently, the Supreme Court, in HollyFrontier v. Renewable Fuels Association (hereinafter HollyFrontier), vacated one of the bases for the RFA decision, holding that small refineries need not have had continuous exemptions since the original statutory exemption, but did not opine on the other two holdings in RFA because those issues were not appealed to the Court. We continue to consider the impact of these decisions on our SRE policy, and it is still unclear at this time whether we will be granting SREs for 2020, 2021, or 2022, and if so, to what degree. Thus, we are proposing a range of exempted volumes of gasoline and diesel as a result of SREs in the calculation of the applicable percentage standards, ranging from zero to 8.19 billion gallons.--------------------------------------------------------------------------- \10\ 85 FR 7016 (February 6, 2020). \11\ Renewable Fuels Ass'n v. EPA, 948 F.3d 1206 (10th Cir. 2020), rev'd in part sub nom., HollyFrontier Cheyenne Refining, LLC, v. Renewable Fuels Ass'n, 114 S. Ct. 2172 (2021).--------------------------------------------------------------------------- The resulting range in the proposed percentage standards is shown in Table I.F-1. Table I.F-1--Proposed Percentage Standards a-------------------------------------------------------------------------------------------------------------------------------------------------------- 2020 2021 2022 Category ----------------------------------------------------------------------------------------------- Low (%) High (%) Low (%) High (%) Low (%) High (%)--------------------------------------------------------------------------------------------------------------------------------------------------------Cellulosic Biofuel...................................... 0.32 0.34 0.36 0.38 0.44 0.46Biomass-Based Diesel.................................... 2.37 2.50 2.19 2.30 2.42 2.54Advanced Biofuel........................................ 2.91 3.07 3.03 3.18 3.27 3.42Renewable Fuel.......................................... 10.78 11.36 10.79 11.33 11.76 12.33Supplemental Standard................................... n/a n/a n/a n/a 0.14 0.15--------------------------------------------------------------------------------------------------------------------------------------------------------\a\ Low values do not include any projected exempted gasoline and diesel volumes from SREs. High values include 8.19 billion gallons of projected exempted gasoline and diesel from SREs.[[Page 72440]]G. Biointermediates Since the RFS2 program was finalized in 2010, we have been made increasingly aware of renewable fuel producers that would like to process fuel at more than one facility. Specifically, renewable fuel producers would like to first have a facility process renewable biomass into a proto-renewable fuel (or ``biointermediate'') and then have a second, separate facility process that biointermediate into renewable fuel. In some cases, it may be preferable for economic or practical reasons for renewable biomass to be subjected to substantial pre-processing at one facility before being sent to a different facility where it is converted into renewable fuel. For example, renewable biomass may be converted into a biointermediate (such as a biocrude) at one facility that requires some additional processing at a different facility before it can be used as transportation fuel. These production methodologies have the potential to lower the cost of using cellulosic and other feedstocks for the production of renewable fuels by reducing capital costs for new facilities and/or the storage and transportation costs associated with feedstock handling--especially for cellulosic biomass. Thus, we believe that such technologies provide an opportunity for the future growth in production of the cellulosic biofuels required under the RFS program. Based on this potential for future growth, in 2016 we included in the proposed the Renewables Enhancement and Growth Support (REGS) rule provisions to allow for the production, transfer, and use of biointermediates to generate qualifying renewable fuel under the RFS program.\12\--------------------------------------------------------------------------- \12\ See 81 FR 80828 (November 16, 2016).--------------------------------------------------------------------------- Due to the elapsed time since the proposed REGS rule and our continued consideration of how to most effectively allow biointermediates into the program, we are proposing anew provisions to allow for the use of biointermediates to produce qualifying renewable fuels. Consistent with what we previously proposed in the REGS rule, these provisions specify requirements that apply when renewable fuel is produced through sequential operations at more than one facility. These provisions center around the production, transfer, and use of biointermediates and the creation of new regulatory requirements related to registration, recordkeeping, and reporting for facilities producing or using a biointermediate for renewable fuel production. We are reproposing many of the proposed biointermediate provisions from the REGS rule without significant changes, making significant changes to some of the previously proposed provisions, and proposing some provisions for the first time here. We further discuss biointermediates in Section VII.H. Other Changes We have identified several areas where regulatory changes would assist EPA in implementing our fuel quality and RFS programs. These proposed regulatory changes include: Changing the BBD weighting factor from 1.50 to 1.55 Changes to registration for baseline volumes Changes to attest engagements for parties owning Renewable Identification Numbers (RINs) Treatment of confidential business information Clarifying the definition of ``***agricultural*** digesters'' Adding a definition of ``produced from renewable biomass'' Other minor changes and technical corrections Each of these regulatory changes is discussed in greater detail in Section VIII. In Section VIII, we also seek comment on potential changes to our treatment of landfill emissions in our lifecycle greenhouse gas (GHG) analysis for fuels produced from separated municipal solid waste.I. Environmental Justice Executive Order 12898 (59 FR 7629, February 16, 1994) establishes Federal executive policy on environmental justice (``EJ''). It directs Federal agencies, to the greatest extent practicable and permitted by law, to make achieving EJ part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations in the United States. EPA defines EJ as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.\13\ Executive Order 14008 (86 FR 7619, February 1, 2021) also calls on Federal agencies to make achieving EJ part of their missions ``by developing programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts.'' It also declares a policy ``to secure environmental justice and spur economic opportunity for disadvantaged communities that have been historically marginalized and overburdened by pollution and under-investment in housing, transportation, water and wastewater infrastructure and health care.'' EPA also released its ``Technical Guidance for Assessing Environmental Justice in Regulatory Analysis'' providing recommendations on conducting the highest quality analysis feasible, recognizing that ***data*** limitations, time and resource constraints, and analytic challenges will vary by media and regulatory context.\14\--------------------------------------------------------------------------- \13\ See, e.g , ``Environmental Justice.'' Epa.gov, Environmental Protection Agency, 4 Mar. 2021, [*https://www.epa.gov/environmentaljustice*](https://www.epa.gov/environmentaljustice). \14\ The definitions and criteria for ``disproportionate impacts,'' ``difference,'' and ``differential'' are contained in EPA's June 2016 guidance document ``Technical Guidance for Assessing Environmental Justice in Regulatory Analysis.'' Epa.gov, Environmental Protection Agency, [*https://www.epa.gov/sites/production/files/2016-06/documents/ejtg\_5\_6\_16\_v5.1.pdf.---------------------------------------------------------------------------*](https://www.epa.gov/sites/production/files/2016-06/documents/ejtg_5_6_16_v5.1.pdf.---------------------------------------------------------------------------) When assessing the potential for disproportionately high and adverse health or environmental impacts of regulatory actions on minority populations, low-income populations, tribes, and/or indigenous peoples, EPA strives to answer three broad questions: (1) Is there evidence of potential EJ concerns in the baseline (the state of the world absent the regulatory action)? Assessing the baseline will allow EPA to determine whether pre-existing disparities are associated with the pollutant(s) under consideration (e.g , if the effects of the pollutant(s) are more concentrated in some population groups). (2) Is there evidence of potential EJ concerns for the regulatory option(s) under consideration? Specifically, how are the pollutant(s) and their effects distributed for the regulatory options under consideration? And, (3) do the regulatory option(s) under consideration exacerbate or mitigate EJ concerns relative to the baseline? It is not always possible to assess these questions in ways that produce quantitative results, though it may still be possible to describe them qualitatively. EPA's 2016 Technical Guidance does not prescribe or recommend a specific approach or methodology for conducting an EJ analysis, though a key consideration is consistency with the assumptions underlying other parts of the regulatory analysis when evaluating[[Page 72441]]the baseline and regulatory options. Where applicable and practicable, the Agency endeavors to conduct such an analysis. Going forward, EPA is committed to conducting EJ analysis for rulemakings based on a framework similar to what is outlined in EPA's Technical Guidance, in addition to investigating ways to further weave EJ into the fabric of the rulemaking process. In 2009, under the Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act (``Endangerment Finding''), the Administrator considered how climate change threatens the health and welfare of the U.S population. As part of that consideration, he also considered risks to minority and low-income individuals and communities, finding that certain parts of the U.S population may be especially vulnerable based on their characteristics or circumstances. These groups include economically and socially disadvantaged communities; individuals at vulnerable lifestages, such as the elderly, the very young, and pregnant or nursing women; those already in poor health or with comorbidities; the disabled; those experiencing homelessness, mental illness, or substance abuse; and/or Indigenous or minority populations dependent on one or limited resources for subsistence due to factors including but not limited to geography, access, and mobility. Scientific assessment reports produced over the past decade by the U.S Global Change Research Program (USGCRP),15 16 the Intergovernmental Panel on Climate Change (IPCC),17 18 19 20 and the National Academies of Science, Engineering, and Medicine 21 22 add more evidence that the impacts of climate change raise potential EJ concerns. These reports conclude that poorer or predominantly non-White communities can be especially vulnerable to climate change impacts because they tend to have limited adaptive capacities and are more dependent on climate-sensitive resources such as local water and food supplies, or have less access to social and information resources. Some communities of color, specifically populations defined jointly by ethnic/racial characteristics and geographic location, may be uniquely vulnerable to climate change health impacts in the United States. In particular, the 2016 scientific assessment on the Impacts of Climate Change on Human Health found with high confidence that vulnerabilities are place- and time-specific, lifestages and ages are linked to immediate and future health impacts, and social determinants of health are linked to greater extent and severity of climate change-related health impacts.--------------------------------------------------------------------------- \15\ USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R , C.W Avery, D.R Easterling, K.E Kunkel, K.L.M Lewis, T.K Maycock, and B.C Stewart (eds.)]. U.S Global Change Research Program, Washington, DC, USA, 1515 pp. doi: 10.7930/NCA4.2018 \16\ USGCRP, 2016: The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. Crimmins, A., J. Balbus, J.L Gamble, C.B Beard, J.E Bell, D. Dodgen, R.J Eisen, N. Fann, M.D Hawkins, S.C Herring, L. 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For instance, replacing petroleum fuels with renewable fuels could have impacts on water, air, and hazardous waste exposure for communities living near either existing or new facilities that produce these fuels. Replacing petroleum fuels with renewable fuels could also impact feedstock supplies and land-use, which could impact a range of communities through their impacts on air, water, and soil quality, as well as water quantity. Impacts on water quality in particular could impact communities that rely on aquatic ecosystems for income or sustenance, including indigenous peoples. While replacing petroleum fuels with renewable fuels is projected to cause small increases in food and fuel prices, these price impacts also may disproportionately affect low-income populations who spend a larger portion of their income on food and fuel. The extent to which such changes may be unevenly distributed spatially in ways that coincide with patterns of pre-existing exposure and vulnerabilities for minority populations, low income populations, and/or indigenous peoples is uncertain and would require predicting where these changes in production and land use change would occur at a fine spatial scale. EPA is taking comment on ways in which such effects could be better evaluated for future rulemakings. A more detailed discussion of potential EJ concerns as a result of this action can be found in Chapter 8 of the Draft Regulatory Impacts Analysis (DRIA), available in the docket for this action.J. Endangered Species Act Section 7(a)(2) of the Endangered Species Act (ESA), 16 U.S.C 1536(a)(2), requires that Federal agencies such as EPA, along with the U.S Fish and Wildlife Service (USFWS) and/or the National Marine Fisheries Service (NMFS) (collectively ``the Services''), ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat for such species. Under relevant implementing regulations, consultation is required[[Page 72442]]only for actions that ``may affect'' listed species or designated critical habitat. 50 CFR 402.14 Consultation is not required where the action has no effect on such species or habitat. For several prior RFS annual standard-setting rules, EPA did not consult with the Services under section 7(a)(2). On September 6, 2019, the United States Court of Appeals for the D.C Circuit decided American Fuel & Petrochemical Manufacturers v. EPA, 937 F.3d 559 (2019), finding that EPA had failed to make an effects determination for ESA purposes with regard to the 2018 RFS rule and remanding the rule without vacatur to the Agency to make an appropriate effects determination. See id. at 598. On July 16, 2021, the same court decided Growth Energy v. EPA, 5 F.4th 1 (2021), finding that EPA's determination that the 2019 RFS rule would have no effect on listed species or the designated critical habitat of such species was arbitrary and capricious and remanding the rule to the Agency without vacatur to comply with the ruling. See id. at 32. In light of this case law pertaining to EPA's action in prior years and consistent with section 7(a)(2) of the ESA and relevant ESA implementing regulations at 50 CFR part 402, EPA intends to initiate consultation, as appropriate, with the Services regarding this proposed rule.\23\ At this time, EPA is evaluating whether any federally listed threatened or endangered species or their critical habitat are likely to be adversely affected by the finalization of this rulemaking.--------------------------------------------------------------------------- \23\ EPA also intends to respond to the court's remand of the 2018 and 2019 RFS rules in a separate proceeding. We are not revisiting our ESA obligations related to the 2018 or 2019 rules in this rulemaking; any comments received on those topics will be deemed beyond the scope of this rulemaking.---------------------------------------------------------------------------II. Legal Authorities To Reduce and Establish Volumes The CAA provides EPA with several authorities to reduce or establish the applicable renewable fuel volumes. This section discusses the statutory authorities, additional factors we are considering due to the retroactivity or lateness of parts of this rulemaking, additional factors related to our reconsideration of the previously finalized standards for 2020, how we are applying our authorities to propose these volumes, as well as the severability of the various portions of this proposed rule.A. Authorities To Modify Statutory Volumes Targets In CAA section 211(o)(2), Congress specified increasing annual volume targets for total renewable fuel, advanced biofuel, and cellulosic biofuel for each year through 2022. However, Congress also recognized that under certain circumstances it would be appropriate for EPA to set different volume requirements than the statutory volume targets and thus provided waiver provisions in CAA section 211(o)(7). In this proposal, we are utilizing the cellulosic waiver authority under CAA section 211(o)(7)(D), and the reset authority under CAA section 211(o)(7)(F) to reduce volumes for 2020, 2021, and 2022. As discussed below, while we have previously sought comment on the use of general waiver authority to reduce volumes for 2020, the reductions proposed in this action are based on the use of our other authorities. 1. Cellulosic Waiver Authority. Section 211(o)(7)(D)(i) of the CAA provides that if EPA determines that the projected volume of cellulosic biofuel production for a given year is less than the applicable volume specified in the statute, then EPA must reduce the applicable volume of cellulosic biofuel required to the projected volume available for that calendar year. In making this projection, EPA must take a ``neutral aim at accuracy.'' API v. EPA, 706 F.3d 474, 479 (D.C Cir. 2013). Pursuant to this provision, EPA has set the cellulosic biofuel requirement lower than the statutory volume for each year since 2010. CAA section 211(o)(7)(D)(i) also provides EPA with the authority to reduce the applicable volume of total renewable fuel and advanced biofuel in years when it reduces the applicable volume of cellulosic biofuel under that provision. The reduction must be less than or equal to the reduction in cellulosic biofuel. EPA has used this aspect of the cellulosic waiver authority to lower the advanced biofuel and total renewable fuel volumes every year since 2014. Further discussion of the cellulosic waiver authority, and EPA's interpretation of it, can be found in the preamble to the 2017 final rule.\24\--------------------------------------------------------------------------- \24\ See 81 FR 89752-89753 (December 12, 2016); see also API v. EPA, 706 F.3d 474 (D.C Cir. 2013) (requiring that EPA's cellulosic biofuel projections reflect a neutral aim at accuracy); Monroe Energy v. EPA, 750 F.3d 909, 915-16 (D.C Cir. 2014) (affirming EPA's broad discretion under the cellulosic waiver authority to reduce volumes of advanced biofuel and total renewable fuel); Americans for Clean Energy v. EPA (``ACE''), 864 F.3d 691, 730-735 (D.C Cir. 2017) (same); Alon Refining Krotz Spring, Inc. v. EPA, 936 F.3d 628, 662-663 (D.C Cir. 2019) (same); American Fuel & Petrochemical Manufacturers v. EPA, 937 F.3d 559, 577-78 (D.C Cir. 2019) (same).--------------------------------------------------------------------------- 2. Reset Authority. The CAA provides that EPA shall modify the statutorily prescribed RFS volumes once certain triggers are met. This section discusses the statutory requirements that trigger the use of this reset authority, describes the process and criteria for such use, and explains the impact of this modification on our other waiver authorities.a. Conditions for Resetting Volume Targets CAA section 211(o)(7)(F) sets forth EPA's authority to modify (or reset) the applicable volumes once certain triggers have been met. Specifically, EPA must reset the applicable volumes for a particular category of biofuel when, under CAA section 211(o)(7)(F)(i), we waive at least 20 percent of the applicable volume requirement for such category for two consecutive years, or, under CAA section 211(o)(7)(F)(ii), we waive at least 50 percent of such applicable volume requirement for a single year. With the promulgation of the 2019 annual standards, these conditions have been met for three categories of biofuel: Cellulosic biofuel, advanced biofuel, and total renewable fuel.\25\ We describe below, for each category of biofuel, the specific annual rules that satisfied these conditions.--------------------------------------------------------------------------- \25\ Because the statutory volumes for biomass-based diesel lapsed after 2012, the reset provision, which only applies to 2016 and subsequent years, does not apply to BBD.--------------------------------------------------------------------------- The conditions for resetting cellulosic biofuel volumes were met by the 2010 annual standard, which reduced the applicable cellulosic biofuel volume by at least 50 percent triggering application of the reset authority under CAA section 211(o)(7)(F). In that rule, we waived the cellulosic applicable volume for the first time using the cellulosic waiver authority.\26\ We set the cellulosic biofuel applicable volume at 6.5 million gallons for 2010.\27\ This waiver resulted in an applicable volume that was 93.5 percent lower than the applicable volume requirement provided in the statute, 100 million, thus triggering the reset requirement under CAA section 211(o)(7)(F)(ii). However, the statute also provides that ``no such modification in applicable volumes shall be made for any year before 2016.'' CAA section 211(o)(7)(F). Therefore, although the trigger to modify the cellulosic biofuel volume target under the reset provision was met in 2010, the[[Page 72443]]statute did not require a change to the applicable volumes until 2016.--------------------------------------------------------------------------- \26\ 75 FR 14670 (March 26, 2010). \27\ 75 FR 14675.--------------------------------------------------------------------------- The conditions for resetting advanced biofuel volumes were met by the 2014 and 2015 annual standards, which reduced the applicable advanced biofuel volume by at least 20 percent for two consecutive years. For the 2014 annual standard, we waived the advanced biofuel volume for the first time.\28\ We set the advanced biofuel volume at 2.67 billion gallons.\29\ This represented a reduction of 28.8 percent from the applicable volume requirement provided in the statute (3.75 billion). This reduction therefore triggered the first year of reductions of at least 20 percent under CAA section 211(o)(7)(F)(i). For the 2015 annual standard, we reduced the advanced biofuel applicable volume to 2.88 billion gallons.\30\ This represented a reduction of 47.6 percent from the applicable volume requirement provided in the statute (5.5 billion). This represented the second consecutive year for which the Administrator waived volumes by at least 20 percent, thus triggering the modification of the advanced biofuel volume under CAA section 211(o)(7)(F)(i).--------------------------------------------------------------------------- \28\ 80 FR 77420 (December 14, 2015). \29\ Id. \30\ Id.--------------------------------------------------------------------------- The conditions for resetting total renewable fuel volumes were met by the 2018 and 2019 annual standards, which reduced the applicable total renewable fuel volume by at least 20 percent for two consecutive years. For the 2018 annual standard, we reduced the total renewable fuel volume to 19.29 billion gallons.\31\ This represented a reduction of 25.8 percent from the applicable volume requirement provided in the statute (26 billion). This reduction therefore triggered the first year of reductions of at least 20 percent under CAA section 211(o)(7)(F)(i). For the 2019 annual standard, we reduced the total renewable fuel applicable volume to 19.92 billion gallons.\32\ This represented a reduction of 29 percent from the applicable volume requirement provided in the statute (28 billion). This represented the second consecutive year for which the Administrator waived volumes by at least 20 percent, thus triggering the modification of the total renewable fuel volume under CAA section 211(o)(7)(F)(i).\33\--------------------------------------------------------------------------- \31\ 82 FR 58486 (December 12, 2017). \32\ 83 FR 63704 (December 11, 2018). \33\ Although we are exercising the reset authority in this action for 2020-2022 volumes, we could have exercised the reset authority for the 2016-2019 cellulosic and advanced biofuel volumes as well. We do not, however, have authority to reset total renewable fuel volumes for those years. In any event, we are not proposing to revisit the 2016-2019 volumes in this rulemaking.---------------------------------------------------------------------------b. Factors That Must Be Analyzed In resetting the statutory volumes, EPA must comply with the processes, criteria, and standards set forth in CAA section 211(o)(2)(B)(ii). That provision provides that the Administrator shall, in coordination with the Secretary of Energy and the Secretary of ***Agriculture***, determine the applicable volumes of each biofuel category specified based on a review of implementation of the program during the calendar years specified in the table, and an analysis of the impact of: The production and use of renewable fuels on the environment; The impact of renewable fuels on the energy security of the U.S ; The expected annual rate of future commercial production of renewable fuels; The impact of renewable fuels on the infrastructure of the U.S ; The impact of the use of renewable fuels on the cost to consumers of transportation fuel and on the cost to transport goods; and The impact of the use of renewable fuels on other factors, including job creation, the price and supply of ***agricultural*** commodities, rural economic development, and food prices. While the statute requires that EPA base its determination on an analysis of these factors, it does not establish any numeric criteria, require a specific type of analysis (such as quantitative analysis), or provide guidance on how EPA should weigh the various factors. Additionally, we are not aware of anything in the legislative history of EISA that addresses these issues. Thus, as the Act ``does not state what weight should be accorded to the relevant factors,'' it ``give[s] EPA considerable discretion to weigh and balance the various factors required by statute.'' \34\--------------------------------------------------------------------------- \34\ Nat'l Wildlife Fed'n v. EPA, 286 F.3d 554, 570 (D.C Cir. 2002); accord Riverkeeper, Inc. v. United States EPA, 358 F.3d 174, 195 (2d Cir. 2004); BP Exploration & Oil, Inc. v. EPA, 66 F.3d 784, 802 (6th Cir. 1995); see also Cal. by Brown v. Watt, 668 F.2d 1290, 1317 (D.C Cir. 1981) (``A balancing of factors is not the same as treating all factors equally. The obligation instead is to look at all factors and then balance the results. The Act does not mandate any particular balance, but vests the Secretary with discretion to weigh the elements. . . .'').--------------------------------------------------------------------------- Additionally, we also have authority to consider other factors, including implied authority to consider factors that inform our analysis of the statutory factors, as well as explicit authority to consider ``the impact of the use of renewable fuels on other factors. . . .'' \35\ Accordingly, we have considered several other factors, including the intertwined nature of compliance with the 2020-2022 standards, the size of the carryover RIN bank,\36\ how the retroactive nature of the 2020 and 2021 standards as compared to the prospective nature of the 2022 annual and supplemental standards affects the feasibility of compliance (Section IV),\37\ the supply of qualifying renewable fuels to U.S consumers (Section III),\38\ soil quality (Chapter 3 of the DRIA),\39\ and environmental justice (Section I of this preamble and Chapter 8 of the DRIA).\40\--------------------------------------------------------------------------- \35\ CAA section 211(o)(2)(B)(ii)(VI). \36\ The first two factors inform our analysis of the statutory factor ``review of the implementation of the program.'' CAA section 211(o)(2)(B)(ii). \37\ The third factor (how the standards affect the feasibility of compliance) also informs our analysis of the statutory factor ``the expected annual rate of future commercial production of renewable fuels.'' CAA section 211(o)(2)(B)(ii)(III). \38\ The fourth factor (supply of renewable fuels) is based on our analysis of this same statutory factor as well as of downstream constraints on biofuel use, including the statutory factors relating to infrastructure and costs. CAA section 211(o)(2)(B)(ii)(IV)-(V). \39\ Soil quality is closely tied to water quality and is also relevant to the impact of renewable fuels on the environment more generally. \40\ Environmental justice involves consideration of the impact of renewable fuels on several factors, including environmental and cost factors. This and the other non-enumerated factors are also relevant under the statutory factor ``the impact of the use of renewable fuels on other factors. . . .'' CAA section 211(o)(2)(B)(ii)(VI).---------------------------------------------------------------------------c. Impact on other Statutory Authorities To Waive Volumes Our proposed use of the reset authority in this action does not preclude our legal authority to waive volumes under the other waiver authorities. Nothing in the CAA suggests that once the volumes are reset they cannot be modified further, or that the reset authority cannot be used in conjunction with other waiver authorities such as the cellulosic waiver authority.\41\--------------------------------------------------------------------------- \41\ See J.E.M Ag Supply, Inc. v. Pioneer Hi-Bred Intern., Inc., 534 U.S 124, 143-44 (2001) (holding that when two statutes are capable of coexistence and there is not clearly expressed legislative intent to the contrary, each should be regarded as effective).---------------------------------------------------------------------------3. General Waiver Authority Section 211(o)(7)(A) of the CAA provides that EPA, in consultation with the Secretary of ***Agriculture*** and the Secretary of Energy, may waive the applicable volumes specified in the Act in whole or in part based on a petition by one or more States, by any person subject to the requirements of the Act, or by the EPA Administrator by his own initiative. Such a waiver must be based on a determination by the Administrator, after public notice and opportunity for comment that: (1)[[Page 72444]]Implementation of the requirement would severely harm the economy or the environment of a State, a region, or the United States; or (2) there is an inadequate domestic supply. EPA received several requests for use of the general waiver authority for the 2020 standards from stakeholders concerned about the impacts on the fuels markets resulting from the COVID-19 pandemic. These included requests from the governors of multiple states based on their belief that the criteria for application of the general waiver authority were satisfied and that lowering the required volumes for 2020 was appropriate. We published a notice in the Federal Register seeking comment on these requests.\42\ We are not proposing modifications to the 2020 volumes utilizing the general waiver authority in this action. In lieu of doing so, we are proposing to revise the 2020 volumes under our reset authority as discussed in Section III.B Our proposal addresses many of the concerns raised in the general waiver petitions, including the shortfall in RIN generation in 2020, uncertainty regarding SREs following the Tenth Circuit's decision in RFA, and the hurdles those may present to obligated parties' compliance.--------------------------------------------------------------------------- \42\ 86 FR 5182 (January 19, 2021). Comments on these requests are available in the docket for that notice, EPA-HQ-OAR-2020-0322. We have recently received an additional request to waive volumes using the general waiver authority from the Governor of Montana, available in the docket for this action.---------------------------------------------------------------------------B. Authority To Establish BBD Volumes EPA has established the biomass-based diesel requirement under CAA section 211(o)(2)(B)(ii) since 2013 because the statute only provided BBD volumes through 2012. Thus, EPA is proposing an applicable volume for BBD for 2022 under this authority, which we term the ``set'' authority.\43\ As discussed in prior annual rulemakings, EPA is to determine the applicable volume of BBD, in coordination with the Secretary of Energy and the Secretary of ***Agriculture***, based on an analysis of the same statutory factors enumerated above for ``resetting'' volumes for the other fuel categories.\44\ The statute also requires that the BBD volume be set at or greater than the 1.0 billion gallon volume requirement for 2012 in the statute, but does not provide any other numerical criteria that EPA is to consider.--------------------------------------------------------------------------- \43\ The applicable volume for BBD for 2021 was established in the 2020 annual rulemaking. 85 FR 7016 (February 6, 2020). \44\ 85 FR 7016, 7047-7048 (February 6, 2020).---------------------------------------------------------------------------C. Considerations for Retroactive and Late Rulemaking In this rulemaking, we are proposing several late or retroactive standards. EPA has in the past also missed statutory deadlines for promulgating RFS annual standards. In those cases, the D.C Circuit found that EPA retains authority to promulgate annual standards for the years in question, so long as EPA exercises this authority reasonably.\45\ In doing so, EPA must balance the burden on obligated parties of a retroactive standard with the broader goal of the RFS program to increase renewable fuel use.\46\ Even if the rule does not operate retroactively, but is promulgated after the statutory deadline, EPA must consider and mitigate the burdens on obligated parties associated with a delayed rulemaking.\47\ In upholding EPA's retroactive standards for 2014 and 2015 in ACE, the court considered several specific factors, including the availability of RINs for compliance, the amount of lead time and adequate notice for obligated parties, and the availability of compliance flexibilities. Additionally, the court separately addressed rulemakings that were late (i.e , those issued after the statutory deadline) but were nonetheless not retroactive, emphasizing in that context the amount of lead time and adequate notice for obligated parties.\48\--------------------------------------------------------------------------- \45\ Americans for Clean Energy v. EPA, 864 F.3d 691, 720 (D.C Cir. 2017) (ACE); Monroe Energy, LLC v. EPA, 750 F.3d 909 (D.C Cir. 2014); Nat'l Petrochemical & Refiners Ass'n v. EPA, 630 F.3d 145, 154-58 (D.C Cir. 2010) (NPRA). \46\ NPRA, at 154-58 (D.C Cir. 2010). \47\ ACE, 864 F.3d 691, 718 (D.C Cir. 2017). \48\ Id. at 721.--------------------------------------------------------------------------- In this rulemaking, we are proposing to exercise our reset authority after the statutory deadline of December 11, 2019 (which is one year after the promulgation of the 2019 final rule, which triggered the reset obligation for total renewable fuel).\49\ We are also proposing to exercise our set authority for the 2022 BBD volume after the statutory deadline of October 31, 2020. We are also promulgating the 2020 and 2021 standards after their statutory deadlines of November 30, 2019 and 2020 respectively.\50\ These standards are retroactive and apply to gasoline and diesel produced or imported in 2020 and 2021. We discuss in detail the considerations for late or retroactive rulemaking for each of these requirements further in Section III.--------------------------------------------------------------------------- \49\ This was the deadline for resetting total renewable fuel volumes. The deadline for resetting advanced and cellulosic volumes passed earlier. \50\ These are also the deadlines for exercising the cellulosic waiver authority for those years, which we will also miss.--------------------------------------------------------------------------- In addition, in responding to the ACE remand of the 2016 annual rule, EPA is proposing a supplemental standard for 2022.\51\ We are proposing this supplemental standard after the statutory deadline for the 2016 standards (November 30, 2015). However, the proposed supplemental standard would prospectively apply to gasoline and diesel produced or imported in 2022. We further discuss our response to the ACE remand in Section V.--------------------------------------------------------------------------- \51\ We also intend to propose a supplemental standard for 2023 in a subsequent action.--------------------------------------------------------------------------- We acknowledge that the final rule will issued after November 30, 2021, thus rendering the 2022 and supplemental standards late and retroactive.\52\ Nonetheless, we are issuing this proposal in advance of 2022, and we anticipate that the final rule will apply mostly, if not entirely, prospectively to 2022. Thus, we believe the rule will be able to incent increased renewable fuel demand in that year consistent with the analysis in this proposal.--------------------------------------------------------------------------- \52\ As discussed in Section V, the supplemental standard in response to the ACE remand is already late.---------------------------------------------------------------------------D. Considerations in Revisiting an Established RFS Standard We are proposing to revise the previously finalized 2020 standards in this rulemaking. We generally have authority to reconsider and revise previously finalized RFS standards.\53\ In addition, the D.C Circuit has held that EPA has authority to promulgate RFS standards retroactively. CAA section 211(o)(7) generally authorizes EPA to adjust the volume requirements based on appropriate considerations as well. In this action we are proposing to revise the 2020 standards in response to several unanticipated and exceptional events that have occurred since the promulgation of the standards and that have had direct and significant impacts on the fuels market and the ability of obligated parties to comply. We discuss these events and our rationale for revising the 2020 standards further in Section III.B \54\--------------------------------------------------------------------------- \53\ Nonetheless, we believe that we generally should not revisit past RFS standards. Doing so carries inherent costs for regulatory certainty and may unduly disrupt market expectations created by previously promulgated standards. Moreover, in the 2020 final rule itself, we expressly stated that we did not intend to revisit that rulemaking and subsequently adjust the standards. See Response to Comments at 173, EPA-HQ-OAR-2019-0136. \54\ EPA also received two petitions from AFPM and API in early 2020 seeking reconsideration of the 2020 annual rule under CAA section 307(d)(7)(B) in light of the RFA decision and its impact on EPA's projections of SREs in calculating the percentage standards. These petitions are available in the docket. See AFPM, Petition for Administrative Reconsideration of Renewable Fuel Standard Program: Standards for 2020 and Biomass-Based Diesel Volume for 2021 and Other Changes, 85 FR 7016 (Feb. 6, 2020) (Mar. 24, 2020); API, Petition for Reconsideration of the RFS 2020 Rule, EPA-HQ-OAR-2019-0136 (April 6, 2020). We are not at this time determining whether these petitions met the standards for reconsideration under CAA section 307(d)(7)(B). Nonetheless, for the reasons described in this document, we believe it is appropriate to reconsider the 2020 RFS standards, and we are providing the procedural process (i.e , a CAA section 307(d) rulemaking to reconsider the 2020 RFS standards) requested in the petitions.---------------------------------------------------------------------------[[Page 72445]]E. Applicability of Legal Authorities To Establish the Volume Requirements EPA is proposing to reduce the applicable statutory volumes for 2020, 2021 and 2022 utilizing both the cellulosic waiver and reset authorities. As described in Chapter 4 of the DRIA, the projected volumes of cellulosic biofuel production for 2020, 2021, and 2022 are all significantly less than the volume targets in the statute. Therefore, the cellulosic waiver authority requires EPA to lower the cellulosic biofuel volume for each year to the projected volumes available in each year. We are proposing to do so in this action. Additionally, we propose to find that these volumes are also appropriate under our reset authority. For advanced biofuel and total renewable fuel, we are proposing, under the reset authority alone, volumes equal to the projected actual volumes of such fuels available in 2020 and 2021. We recognize that this exceeds our maximum discretion under the cellulosic waiver authority; however, as we explain further in Section III, we do not believe that the lowest volumes permissible under the cellulosic waiver authority are appropriate based upon our consideration of the reset factors.\55\ For 2022, we are proposing, under both the cellulosic waiver authority and the reset authority, advanced biofuel and total renewable fuel volumes equal to the implied statutory volumes. This represents the maximum permitted reduction under the cellulosic waiver authority.\56\ We also believe these volumes are appropriate under the reset authority.--------------------------------------------------------------------------- \55\ Under the cellulosic waiver authority, when EPA reduces the volume of cellulosic biofuel, EPA may reduce the advanced biofuel and total renewable fuel volumes by the same or a lesser amount. \56\ This is also consistent with our authority to apply equal reductions to the volumes of advanced biofuel and total renewable fuel under the cellulosic waiver. CAA(o)(7)(D)(i), see also 85 FR 7016, 7047-7048 (February 6, 2020).--------------------------------------------------------------------------- In Sections III and IV and Chapter 2 of the DRIA, we set forth our policy and technical rationale for the proposed 2020, 2021, and 2022 volumes for cellulosic biofuel, advanced biofuel, and total renewable fuel. Our analysis is framed in terms of the statutory factors that the reset authority requires us to consider, along with the considerations for retroactive and late rules identified by the D.C Circuit.\57\ Since this analysis subsumes our policy and technical rationale for exercising the cellulosic waiver authority as well, we are not providing a separate analysis for the application of the cellulosic waiver authority.--------------------------------------------------------------------------- \57\ Further detail on our analysis of the statutory factors is found in the DRIA.--------------------------------------------------------------------------- We believe that subsuming the analysis for the application of the cellulosic waiver authority into the analysis for the application of the reset authority is appropriate for three reasons. First, with respect to the cellulosic biofuel volume for each year, the cellulosic waiver authority requires EPA to lower that volume to the projected volume available. This quantity is also a relevant consideration under the reset authority, and, accordingly, we have considered it in that context. See, e.g , CAA section 211(o)(2)(B)(ii)(III) (``the expected annual rate of future commercial production of renewable fuels''). Second, with respect to advanced biofuel and total renewable fuel, the cellulosic waiver authority does not specify any factors for EPA to consider (besides limiting the maximum quantity of reductions to the reduction in the cellulosic biofuel volume), and thus provides EPA broad discretion to consider relevant factors, including the factors we are considering in this proposal under the reset authority.\58\ Third, given the significant overlap between the analyses used for the cellulosic waiver and reset authorities, we do not believe that two sets of analyses would provide significant additional value, but would be redundant for both EPA and the public.--------------------------------------------------------------------------- \58\ In past annual rules, we considered many of the same factors as we do in this proposal, albeit under the guise of different terminology, such as ``reasonably attainable'' and ``attainable'' volumes. See Section IV of the 2020 final rule at 85 FR 7016. For instance, in that rule, just as in this rule, we considered feedstock availability, advanced biofuel production and distribution capacity, environmental impacts, and costs. We acknowledge that the analytical framework has shifted somewhat given the focus on the statutory reset factors. For instance, in the 2020 final rule, unlike in this proposed rule, we did not explicitly consider the impacts of renewable fuels on job creation or rural economic development. Nonetheless, we believe those statutory factors (along with all the other factors we are considering under the reset authority) are ones that EPA may consider under the discretion we have under the cellulosic waiver authority. Congress's specification of those factors in the reset authority further suggests that they are permissible considerations for determining volumes generally, including in exercising the cellulosic waiver. This approach presents a shift in EPA's policy for the cellulosic waiver that we explicitly recognize and adopt as reasonable for the reasons described in this proposal. See FCC v. Fox Television Stations, Inc., 556 U.S 502, 515 (2009). Ultimately, we note that the 2020, 2021, and 2022 total renewable fuel, advanced biofuel, and cellulosic biofuel volumes are all independently justified by the reset authority. Thus, any defect in our exercise of the cellulosic waiver authority is harmless so long as we have properly exercised the reset authority.--------------------------------------------------------------------------- We are also proposing a BBD volume for 2022 of 2.76 billion gallons under CAA section 211(o)(2)(B)(ii). Our policy and technical rationale for this volume is also set forth in Section III and Chapter 10 of the DRIA.F. Severability The following portions of this rulemaking are mutually severable from each other: (1) The volumes and percentage standards for 2020, 2021, and 2022; (2) The 2022 supplemental volume and standard; (3) The proposed provisions for biointermediates (discussed in Section VII); and (4) The regulatory amendments discussed in Section VIII. Each of the regulatory amendments in Section VIII is also severable from all the other regulatory amendments. If any of the above portions is set aside by a reviewing court, we intend the remainder of this action to remain effective. For instance, if a reviewing court sets aside the 2022 supplemental volume and standard, we intend the remaining 2020-2022 volumes and percentage standards, biointermediates provisions, and other regulatory amendments, to remain effective.III. Proposed Volumes We are proposing 2020, 2021, and 2022 cellulosic biofuel, advanced biofuel, and total renewable fuel volumes under our reset authority.\59\ We are proposing the 2022 biomass-based diesel (BBD) volume under our set authority. As required by both the reset and set authorities, we have analyzed the statutory factors under CAA section 211(o)(2)(B)(ii). We have also coordinated with the Secretary of Energy and the Secretary of ***Agriculture***, including through the interagency review process, and their input is reflected in this proposal.--------------------------------------------------------------------------- \59\ As we explained in Section II.D, some of the volumes we are proposing in this action are also independently justified under the cellulosic waiver authority, but the policy and technical analysis for our exercise of the cellulosic waiver is subsumed under our analysis of the reset factors.--------------------------------------------------------------------------- In Section III.A, we summarize our analyses as they apply to each of three component categories of biofuel: Cellulosic biofuel, non-cellulosic[[Page 72446]]advanced biofuel, and conventional renewable fuel.\60\ In Sections III.B through F, we describe our proposed volumes for 2020, 2021, and 2022, along with our supporting assessment of the statutory factors. In Section III.G, we summarize the fuel costs and energy security benefits of the proposed volumes. In Section IV, we further discuss the relationship between the volume requirements for all three years as part of our review of the implementation of the program. Our preamble discussion provides a high-level, narrative summary of the statutory factors, focusing on the factors that we deem most appropriate. A more detailed discussion of all the statutory factors is set forth in the DRIA.--------------------------------------------------------------------------- \60\ Cellulosic biofuel corresponds directly to the statutory biofuel category. Cellulosic biofuel plus non-cellulosic advanced biofuel constitute the statutory advanced biofuel category. Finally, advanced biofuel plus conventional renewable fuel constitute the statutory total renewable fuel category. See CAA section 211(o)(2)(B)(i)(I)-(IV).---------------------------------------------------------------------------A. EPA's Assessment of the Statutory Factors for Each Component Category of Biofuel1. Cellulosic Biofuel In EISA, Congress established escalating targets for cellulosic biofuel, reaching 16 billion gallons in 2022. After 2015, 84 percent of the growth in statutory volume of total renewable fuel was intended to come from cellulosic biofuel.\61\ This indicates that Congress intended the RFS program to provide a significant incentive for cellulosic biofuels and that the focus for years after 2015 was to be on cellulosic. Consistent with this intent, our assessment of the statutory factors suggests that cellulosic biofuels have multiple benefits, including the potential for very low lifecycle GHG emissions that meet or exceed the 60 percent GHG reduction threshold for cellulosic biofuel. Many of these benefits stem from the fact that nearly all of the feedstocks projected to be used to produce cellulosic biofuel through 2022 are either waste materials (as in the case of compressed natural gas and liquified natural gas (CNG/LNG) derived from biogas) or residues (in the cases of cellulosic ethanol from corn kernel fiber and corn stover, as well as cellulosic diesel and heating oil from mill residue). The use of many of the feedstocks currently being used to produce cellulosic biofuel are not expected to cause significant land use changes that might lead to adverse environmental impacts.--------------------------------------------------------------------------- \61\ From 2015 through 2022 the statutory target for cellulosic biofuel increases by 13.0 billion gallons, from 3.0 billion gallons to 16.0 billion gallons. During this same time period the statutory target for total renewable fuel increases by 15.5 billion gallons, from 20.5 billion gallons to 36.0 billion gallons. Thus, cellulosic biofuel was expected to account for 84% (13.0 billion gallons/15.5 billion gallons) of the total renewable fuel increase.--------------------------------------------------------------------------- Despite these similarities, there are also significant differences between liquid cellulosic biofuels and CNG/LNG derived from biogas. None of the cellulosic biofuel feedstocks expected to be used to produce liquid cellulosic biofuels through 2022 are specifically produced to be used as feedstocks for cellulosic biofuel production. Many of these feedstocks (including ***agricultural*** residues, mill residue, and separated municipal solid waste (MSW)) have limited uses in other markets.\62\ Because of this, using these feedstocks to produce liquid cellulosic biofuel is not expected to have significant adverse impacts related to several of the statutory factors, including the ***conversion*** of wetlands, ecosystems and wildlife habitat, soil and water quality, the price and supply of ***agricultural*** commodities, and food prices. Notwithstanding these benefits, the cost of producing liquid cellulosic biofuel is high. These high costs are generally the result of low yields (e.g , gallons of fuel per ton of feedstocks) and the high capital costs of liquid cellulosic biofuel production facilities. In the near term (through 2022), the production of these fuels is likely to be dependent on relatively high cellulosic RIN prices (in addition to state level programs such as California's low carbon fuel standard (LCFS)) to be economically competitive with petroleum-based fuels.--------------------------------------------------------------------------- \62\ One potential exception is corn kernel fiber. Corn kernel fiber is a component of distillers grains, which is currently sold as animal feed. Depending on the type of animal to which the distillers grain is fed, corn kernel fiber removed from the distillers grain through ***conversion*** to cellulosic biofuel may need to be replaced with additional feed.--------------------------------------------------------------------------- CNG/LNG derived from biogas, like liquid cellulosic biofuel, is generally produced from waste materials or residues (e.g , through biogas ***collection*** from landfills, municipal wastewater treatment facility digesters, ***agricultural*** digesters, and separated MSW digesters) and thus is not expected to affect the ***conversion*** of wetlands, ecosystems and wildlife habitat, soil and water quality, the price and supply of ***agricultural*** commodities, and food prices. However, in contrast to the feedstocks generally used to produce liquid cellulosic biofuels, significant quantities of biogas from these sources are currently used to produce electricity, while smaller quantities are injected into natural gas pipelines. In some situations, such as at larger landfills, CNG/LNG derived from biogas may also be able to be produced at a price comparable to fossil natural gas. Despite this relatively low cost of production, the combination of the high cellulosic biofuel RIN price and the significant volume potential for CNG/LNG derived from biogas used as transportation fuel could have a relatively significant impact (about $0.01 per gallon) on the price of gasoline and diesel.\63\--------------------------------------------------------------------------- \63\ See Chapter 5.1.2.2 of the DRIA for a further discussion of the expected impact of RINs generated for CNG/LNG derived from biogas on the transportation fuel market.---------------------------------------------------------------------------2. Non-Cellulosic Advanced Biofuel The volume targets established by Congress also anticipated significant growth in advanced biofuel beyond what is needed to satisfy the cellulosic standard. The statutory target for advanced biofuel in 2022 (21 billion gallons) allowed for up to 5 billion gallons of non-cellulosic advanced biofuel to be used towards the advanced biofuel volume target. In practice the vast majority of non-cellulosic advanced biofuel in the RFS program has been biomass-based diesel, with relatively small volumes of sugarcane ethanol and other advanced biofuels. Some of the statutory factors assessed by EPA suggest that the targets for non-cellulosic advanced biofuel established by Congress, or even higher volumes, are still appropriate. Notably, all advanced biofuels have the potential to provide significant GHG reductions as they are required to achieve at least 50 percent GHG reductions relative to the petroleum fuels they displace. Some types of advanced fuels, such as biodiesel and renewable diesel produced from fats, oils, and greases, provide even greater reductions than the 50 percent threshold. This summary focuses on the impacts of advanced biodiesel and renewable diesel. Advanced biodiesel and renewable diesel together comprise 95 percent or more of the total supply of non-cellulosic advanced biofuel over the last several years, and is expected to supply all of increase in advanced biofuel through 2022. High domestic production capacity and availability of imports indicate that volumes of non-cellulosic advanced biofuel in 2021 and 2022 may meet or even exceed the implied statutory targets. Similarly, the feedstocks used to make advanced biodiesel and renewable diesel (such as soy oil, canola oil, and corn oil, as well as waste oils such as white grease, yellow grease, trap grease, poultry fat, and tallow) currently exist in sufficient quantities globally to supply these increasing volumes. These feedstocks[[Page 72447]]have many existing uses that may require replacement with other suitable substitutes, but there is also potential for ongoing growth in the production of many of these feedstocks. Higher volume requirements for non-cellulosic advanced biofuel may also have energy security benefits, increase domestic employment in the biofuels industry, and increase income for biofuel feedstock producers. However, some of the factors assessed would support lower volumes of advanced biofuel. For instance, as described in Chapter 9 of the DRIA, the cost of biodiesel and renewable diesel is significantly higher than petroleum-based diesel fuel and is expected to remain so over the next several years. Even if biodiesel and renewable diesel blends are priced similarly to petroleum diesel at the pump after accounting for the relevant Federal and state incentives (including the RIN value), society as a whole nevertheless bears their full costs. Moreover, the fact that sufficient feedstocks exist to produce increasing quantities of advanced biodiesel and renewable diesel does not mean that those feedstocks are readily available or could be diverted to biofuel production without adverse consequences. As described in Chapter 5 of the DRIA, we expect only limited quantities of fats, oils, and greases and distillers corn oil to be available for increased biodiesel and renewable diesel production in future years. We expect that the primary feedstock available to biodiesel and renewable diesel producers in significant quantities through 2022 will be soybean oil and other vegetable oils whose primary markets are for food. Increased demand for soybean oil could lead to diversion of feedstocks from food and other current uses in addition to further incentivizing increased soybean crushing and soybean production. Increased soybean production in the U.S and abroad in turn could result in greater ***conversion*** of wetlands, adverse impacts on ecosystems and wildlife habitat, adverse impacts negative impacts on water quality and supply, and increased prices for ***agricultural*** commodities and food prices. We request comment on the impacts of advanced biofuel production on the statutory factors, including impacts on wetlands, ecosystems, and wildlife habitat.3. Conventional Renewable Fuel As with non-cellulosic advanced biofuel, some of the statutory factors assessed for conventional renewable fuel favor the implied statutory volume (15 billion gallons) or higher volumes, while other factors favor lower volumes. While conventional renewable fuels are generally required by EISA to achieve 20 percent GHG reductions relative to the petroleum fuels they displace, some conventional biofuel facilities exceed this threshold. Notably, EPA has developed an expedited petition process for ethanol production facilities using more efficient process technologies.\64\ The statute, however, also contains grandfathering provisions exempting any facility that had begun construction on or before December 19, 2007, from this requirement, so not all producers of conventional renewable fuels meet or are required to meet the 20 percent GHG reduction threshold.\65\--------------------------------------------------------------------------- \64\ EPA has developed an ``Efficient Producer Petition Process,'' which encourages adoption of efficiency improvements in new ethanol facilities by expediting petition review and approval. Existing EPA estimates for corn starch ethanol produced in 2022 using a dry mill process and natural gas fired process heat range from a 42 percent to a 17 percent reduction over baseline gasoline, depending on the technologies used at the production facility. \65\ See CAA section 211(o)(2)(A)(i).--------------------------------------------------------------------------- The vast majority of conventional renewable fuel that has been supplied to the U.S is corn ethanol. Domestic production capacity for corn ethanol exceeds 16 billion gallons. Production of corn-ethanol in the U.S reached a peak of 16.1 billion gallons in 2018.\66\ Higher volumes of conventional renewable fuel could result in more domestic jobs in the biofuels industry. At the same time, there are also significant volumes of palm biodiesel and renewable diesel that are produced internationally that could qualify as conventional renewable fuel under the grandfathering provisions of the RFS program. In the past, small volumes of grandfathered biodiesel and renewable diesel have been supplied to the U.S \67\--------------------------------------------------------------------------- \66\ Energy Information Administration (EIA) Monthly Energy Review. \67\ Use of grandfathered biodiesel and renewable diesel reached a maximum of 157 million gallons in 2016. Since 2018 use of grandfathered biodiesel and renewable diesel has been very small (less than 1 million gallons each year). See Chapter 1.6 of the DRIA.--------------------------------------------------------------------------- However, some of the analyses we conducted support lower volumes of conventional renewable fuel. As with soy biodiesel, increased corn production in the U.S could result in greater ***conversion*** of wetlands, adverse impacts on ecosystems and wildlife habitat, adverse impacts negative impacts on water quality and supply, and increased prices for ***agricultural*** commodities and food prices. Furthermore, constraints on ethanol use may also support lower implied volume requirements for conventional biofuel. The market has not achieved 15 billion gallons of actual use of conventional renewable fuel in any year in which the RFS standards were based on it. This was due to various factors, including limitations on ethanol use above the E10 blendwall, strong export markets for domestically produced ethanol, the effect of exempted small refinery volumes in depressing the effective RFS standards, and use of advanced biodiesel and renewable diesel, buoyed by its tax subsidy and other incentive programs, to meet the implied conventional portion of the total renewable fuel requirement. While the use of ethanol as E10 has been, and continues to be, economical for refiners and blenders, the use of E10 alone has not been sufficient to achieve the 15 billion gallons of ethanol use due to declining gasoline demand. The RFS program has had limited success in helping to increase the use of higher ethanol blends, and growth in the nationwide average gasoline ethanol concentration has virtually stagnated as the market reached the E10 blendwall. While the use of higher ethanol blends has increased since 2011, that growth has been small compared to prior growth in the use of E10 and in the use of non-ethanol biofuels. We do not anticipate that growth in the use of higher ethanol blends through 2022 will increase rapidly enough to result in significantly greater volumes of ethanol consumption in the U.S , even with the incentives created by the RFS program standards and other governmental efforts such as Department of ***Agriculture***'s (USDA's) Blender Infrastructure Program and Higher Blends Infrastructure Incentive Program. Moreover, exporting ethanol to be blended with gasoline abroad has been more profitable in recent years than selling greater volumes of E15 or E85 domestically. We expect these trends in exports to continue given international demand for ethanol. In addition, total demand for gasoline was lower in 2020 and is expected to remain lower in 2021 and 2022 relative to the volume of gasoline consumed in 2017-2019 according to EIA's May 2021 Short Term Energy Outlook (STEO), which will limit the volume of ethanol used as E10.\68\ Most notably, the COVID-19 pandemic caused a significant fall in gasoline demand and sales of E10 starting in 2020. We would[[Page 72448]]expect, therefore, that even maintaining the implied 15 billion gallon statutory volume target for conventional renewable fuel going forward would require that volumes of biodiesel and renewable diesel, the least costly alternative source, increase to compensate for the reduction in ethanol use.--------------------------------------------------------------------------- \68\ The May 2021 STEO estimates gasoline consumption of 8.03 million barrels per day (123.5 billion gallons) in 2020, projects 8.70 million barrels per day (133.3 billion gallons) in 2021, and projects 8.92 million barrels per day (136.8 billion gallons) in 2022. The STEO reported gasoline consumption in 2017-2019 at 9.31-9.33 million barrels per day (142.7-143.0 billion gallons) annually.--------------------------------------------------------------------------- If biodiesel and/or renewable diesel were able to be supplied in sufficient quantities to enable a conventional renewable fuel requirement at 15 billion gallons to be met despite lower ethanol consumption, there could still be other potentially adverse impacts. We project that much of this biodiesel and renewable diesel would be imported. Further, these fuels could be sourced from grandfathered facilities that may not achieve the desired GHG reductions. If imported biodiesel and renewable diesel were to increase, we would expect either an increase in the use of petroleum fuels from countries that previously used these fuels, or, alternatively, an expansion of palm oil production to produce biodiesel and renewable diesel, likely resulting in additional foreign land being converted to cropland for the production of palm oil. There would likely be both adverse wildlife impacts and higher GHG emissions of such international land use changes that would be associated with a higher implied conventional volume mandate satisfied by grandfathered biodiesel and renewable diesel. At the same time, we do not believe that setting volumes such that the implied conventional renewable fuel volume is below the E10 blendwall would be appropriate either. Under such a scenario, imports of biodiesel and renewable diesel to meet the demand provided by the implied conventional renewable fuel volume would cease altogether which would have some benefits for domestic energy independence and may have some environmental benefits as well insofar as those imports are produced from palm oil. However, impacts on domestic ethanol production would be small as E10 would continue to be used regardless. There would most likely be some decrease in the small amounts of higher ethanol blends used, but the use of E10 would be essentially unchanged, and since ethanol blended as E10 dominates the total volume of ethanol consumed, the overall ethanol volume would be minimally affected. Thus, we expect that setting the implied volume for conventional renewable fuel below the E10 blendwall would have little impact on domestic biofuel production or use.B. Proposed Volumes for 2020 We are proposing to revise previously finalized 2020 total renewable fuel, advanced biofuel, and cellulosic biofuel volumes to equal the volume of such fuels actually used in the U.S in 2020.\69\ As we discuss in Section VI, we are also proposing to make corresponding adjustments to the percent standards applicable to obligated parties.\70\--------------------------------------------------------------------------- \69\ We also call such volumes the volumes that are actually consumed or actually supplied. In this context, we are using the term ``supply'' distinct from the statutory term ``inadequate domestic supply'' in CAA section 211(o)(7)(A)(ii). \70\ As discussed in Section VI, the adjustments to the percentage standards would also include changes to the non-renewable gasoline and diesel volumes to reflect actual 2020 consumption.--------------------------------------------------------------------------- Since 2020 has already passed, this rulemaking has no ability to affect actual production, imports, and use of renewable fuel in 2020. The impact of the rule on each of the statutory factors is similarly limited. In contrast, were we to revise the 2020 volumes to be greater than the volume of renewable fuel that was supplied or were we to simply leave the original volumes from the 2020 final rule in place, we would expect some combination of potentially disruptive outcomes: (1) A reduction in the quantity of carryover RINs; (2) obligated parties carrying deficits into 2021; and/or (3) obligated parties being out of compliance with their RFS obligations.\71\ While this approach could have the effect of prospectively increasing demand for renewable fuels in 2022, simply establishing higher volumes for 2022 is expected to have the same effect on renewable fuel producers with a much lower risk of market disruptions that could result from maintaining volume obligations for 2020. As we explain in Section IV.B, we are proposing to revise the 2020 volume obligations to forestall potential disruptions in the fuels market that would impair the ongoing implementation of the RFS program.--------------------------------------------------------------------------- \71\ See Section IV.A for a discussion of carryover RINs.--------------------------------------------------------------------------- We acknowledge that this proposal to reconsider and revise the already finalized 2020 standards will be finalized after the November 30, 2019, statutory deadline for the 2020 standards and can operate only retroactively.\72\ We generally do not think it is appropriate to reconsider and revise previously finalized RFS standards. Nonetheless, we are proposing to do so because critical and unanticipated events have occurred affecting fuels markets and RFS compliance. First, we anticipate a significant and unprecedented shortfall in renewable fuel use in 2020 relative to the volumes that we required in the 2020 final rule. This is largely due to the COVID-19 pandemic, which caused an unforeseen and drastic fall in transportation fuel demand generally and in biofuel demand more specifically.--------------------------------------------------------------------------- \72\ 85 FR 7016 (February 6, 2020). In addition, the 2020 BBD volume was established in the 2019 final rule. 83 FR 63704.--------------------------------------------------------------------------- In general, under the RFS program, a shortfall in gasoline and diesel fuel consumption relative to the projected volumes results in a corresponding decrease in the volume of renewable fuel required. This self-adjusting nature of the program is a function of the fact that the RFS standards are applied as a percentage to an obligated party's gasoline and diesel fuel production; the obligation to acquire RINs for compliance rises and falls along with gasoline and diesel fuel production volume. Further, historical deviations between the volumes of gasoline and diesel actually used relative to their projected volumes have been relatively small. As a result, we have historically not adjusted the RFS standards after they have been established to account for updated gasoline and diesel consumption levels. This is consistent with our general policy of not reconsidering and revising previously finalized RFS standards. However, the situation in 2020 was different. As explained further in Section IV.B, the shortfalls in 2020 were both significantly larger than in any previous year and disproportionately affected gasoline more than diesel fuel. This is important because on average finished gasoline contains more renewable content than finished diesel. The vast majority of gasoline contains at least 10% ethanol, mostly in the form of E10, whereas the average concentration of renewables in diesel falls far short of that. Thus, while the decrease in transportation fuel demand in 2020 proportionally decreased the required renewable fuel volume, the decrease in the demand for renewable fuel was greater given the greater drop in gasoline versus diesel demand. Further, even with the lesser impact on diesel fuel consumption, we still observed a shortfall in the use of biodiesel and renewable diesel relative to our projections in the 2020 final rule. That is to say, the projections in the 2020 final rule overestimated the use of biodiesel and renewable diesel, even if we adjust those projections by the shortfall in diesel demand. Second, when we promulgated the 2020 volume requirements, we did so while projecting for the first time that we would be granting a large number of SREs for 2020. The 2020 final rule[[Page 72449]]reallocated the projected exempted volumes onto the remaining obligated parties, thereby significantly increasing the obligations on those parties. As we explain in Section VI.B, there continues to be substantial uncertainty regarding whether we will grant or deny the many SRE petitions for 2020 in the wake of the Tenth Circuit's decision in RFA and the Supreme Court's reversal of one of the bases for the Tenth Circuit's decision in HollyFrontier.\73\ Among the uncertainties are the impacts of the additional holdings in RFA that were not addressed on appeal to the Supreme Court. The significant impact of our earlier projection on the standards and the consequent impact on our SRE policy by the litigation in RFA and HollyFrontier suggest that reconsideration is warranted.\74\--------------------------------------------------------------------------- \73\ Renewable Fuels Ass'n v. EPA, 948 F.3d 1206 (10th Cir. 2020), rev'd in part sub nom., HollyFrontier Cheyenne Refining, LLC, v. Renewable Fuels Ass'n, 114 S. Ct. 2172 (2021). \74\ As noted in Section II.D, we have received petitions seeking reconsideration of the 2020 annual rule under CAA section 307(d)(7)(B).--------------------------------------------------------------------------- The decrease in biofuel use, together with the potential impacts of SRE decisions, means that compliance with the original 2020 standards would likely result in a significant drawdown of the number of carryover RINs available for use in 2021, which could negatively impact the functionality of the RIN market that enables the successful implementation of the RFS program. A well-functioning RIN market is foundational for allowing obligated parties to comply with their RFS mandates, particularly for obligated parties that do not themselves produce or blend renewable fuels. As discussed in Section IV.A, the carryover RIN bank is already projected to drop from 3.48 billion RINs in 2019 to 1.85 billion RINs in 2020, following 2019 compliance. We project that the 2020 standards, if unmodified and SREs are not granted, would result in a significant drawdown of the total number of carryover RINs, to a volume (630 million RINs) that would represent less than 4 percent of the proposed 2021 and 2022 total renewable fuel standards.\75\ The number of carryover cellulosic biofuel RINs would also be projected to decrease significantly, as we project that the number of cellulosic carryover RINs would be reduced to just 2.2 million RINs, which is less than 0.5 percent of the proposed 2021 and 2022 cellulosic biofuel volumes. Such a drastic reduction in the carryover RIN bank has the potential to reduce the liquidity of RINs and could negatively impact parties that do not currently have sufficient RINs to meet their 2020 obligation. This could make it difficult for some parties to acquire enough RINs to comply with their 2020 RFS obligations, as well as the 2021 and 2022 standards being proposed, and could cause those parties to carry forward deficits or to become non-compliant. This could lead to significant negative impacts on the fuels market and the ongoing implementation of the RFS program, as discussed in Section IV.B --------------------------------------------------------------------------- \75\ See Section VI of ``Carryover RIN Bank Calculations for 2020-2022 Proposed Rule,'' available in the docket for this action.--------------------------------------------------------------------------- These considerations also support our decision to retroactively reduce the 2020 volumes to those actually used. In doing so, we are relieving burdens on obligated parties, and in some cases, the potentially onerous burden of non-compliance with the RFS program and the possibility of penalty payments. This approach also ensures sufficient RINs for compliance. It also ensures the continued functioning of the carryover RIN bank, a necessary compliance flexibility for obligated parties. It also protects the ongoing implementation of the RFS program and facilitates the higher volumes proposed for 2022, as we discuss further in Section IV.B With regard to lead time, less lead time is needed for obligated parties given that we are reducing the stringency of their obligations, as opposed to increasing the stringency of their obligations. Nonetheless, we are providing significant lead time. We extended the 2020 compliance deadline for obligated parties to January 31, 2022, providing these parties with additional time to acquire RINs,\76\ and have proposed to further extend that deadline in a separate action.\77\ Had we not adjusted the compliance deadline, obligated parties would have needed to demonstrate compliance by March 31, 2021.--------------------------------------------------------------------------- \76\ 86 FR 17073 (April 1, 2021). \77\ 86 FR 67419 (November 26, 2021).--------------------------------------------------------------------------- We recognize that retroactively adjusting the 2020 standards will disrupt market expectations created by the prior final rule, for instance on the part of biofuel producers who made investments or other parties who transacted biofuels or RINs, based on the higher standards originally finalized. As a general matter, these expectations may not rise to the level of reliance interests recognized by the courts.\78\ Even if they do, however, we believe that revising the standards is nonetheless warranted based on the events and factors described above, which likely confounded market expectations in any event.--------------------------------------------------------------------------- \78\ Monroe Energy, LLC v. EPA, 750 F.3d 909, 919-20 (D.C Cir. 2014).--------------------------------------------------------------------------- As explained in Section II.A.2, the statutory deadline for resetting the total renewable fuel volume was in December 2019, or one year after the promulgation of the 2019 final rule. The statutory deadlines for resetting the advanced biofuel and cellulosic biofuel volumes occurred even earlier. Despite being late to meet our statutory obligations, we are proposing to exercise the reset authority for several reasons. First, doing so satisfies our statutory obligation to reset the statutory volumes. Second, we have already notified the public that we intended to exercise the reset authority.\79\ This proposal is a key step in making good on that intent and meeting our statutory obligation. Third, the reset authority also provides EPA broad discretion to modify the renewable fuel volumes and to establish biofuel volume requirements at the volumes actually consumed. Such volumes for advanced biofuel and total renewable fuel could not be established under the cellulosic waiver authority, which was the legal basis for the original 2020 final rule.\80\ Nonetheless, we believe that these are the appropriate volumes for the reasons explained above.--------------------------------------------------------------------------- \79\ See 84 FR 36766 (July 29, 2019). \80\ The cellulosic waiver authority limits reductions in the statutory total renewable fuel and advanced biofuel volumes to no more than the reduction in the cellulosic biofuel volume. In the 2020 final rule, we exercised the cellulosic waiver to the maximum extent, resulting in an implied conventional renewable fuel volume of 15 billion gallons and an implied non-cellulosic advanced biofuel volume of 4.5 billion gallons. However, the volumes of advanced biofuel and total renewable fuel actually supplied in 2020 fell short of these numbers.--------------------------------------------------------------------------- The proposed revised 2020 volumes, along with the original volumes, are shown in Table III.B-1. The proposed revised 2020 percentage standards, along with the original percentage standards, are provided in Section VI.C [[Page 72450]] Table III.B-1--Proposed Revised Volume Requirements for 2020 [Billion RINs]------------------------------------------------------------------------ Standard Original Revised------------------------------------------------------------------------Cellulosic Biofuel...................... 0.59 0.51Biomass-Based Diesel.................... \a\ 2.43 \a\ 2.43Advanced Biofuel........................ 5.09 4.63Total Renewable Fuel.................... 20.09 17.13------------------------------------------------------------------------Source: EMTS (EPA Moderated Transaction System). See ``RIN supply as of 3-22-21''.\a\ The BBD volume for 2020 is in physical gallons (rather than RINs) and was established in the 2019 final rule (83 FR 63704, December 11, 2018). We are not proposing to revise the 2020 BBD volume in this action. We request comment on our proposed approach of reconsidering and revising the 2020 RFS volumes from those promulgated in the prior final rule. We also request comment on modifying 2020 volumes to the volumes of renewable fuel actually supplied in 2020. We further request comment on whether we should include the approximately 40 million cellulosic biofuel carryover RINs in the 2020 cellulosic biofuel volume requirement. We discuss this issue in detail in Section IV.A.3 C. Proposed Volumes for 2021 We are proposing 2021 total renewable fuel, advanced biofuel, and cellulosic biofuel volumes at our projections of the volume of such fuels used in the U.S this year. This is the same general approach as for 2020, with the difference that we do not yet have complete ***data*** for biofuel use in 2021, and therefore we are projecting biofuel use throughout the remainder of 2021. Given that we are using the same basic approach as for 2020, the rationale for our 2021 volumes is similar to the rationale for our 2020 volumes. Below we present some of the key similarities and also note differences where they exist. As with 2020, due to the expected timing of the finalization of this rule, the ability for the rule to affect renewable fuel production, imports, and use in the U.S in 2021 is limited. As such, the impact of the rule on each of the statutory factors is similarly limited. Also, as for 2020, we could also set volumes for 2021 that are greater or lesser than the volume of renewable fuel that is actually supplied in 2021, but we do not believe that doing so would be appropriate for similar reasons. EPA does, however, believe that the RFS program should drive increases in renewable fuel volumes over time. Given that we are setting volumes for 2020-2022 in this rule and the fact that retrospective volumes have limited ability to affect biofuel use, we believe that increases in volume requirements are more appropriate in 2022. That is when this rule applies prospectively and has the potential to affect actual biofuel use. We discuss this relationship between the three years further in Section IV.B As with 2020, the 2021 volumes both are late and would operate retroactively. Unlike for 2020, however, we are not modifying previously finalized standards for 2021. The lateness and retroactivity of the 2021 volumes are appropriate for similar reasons as for 2020. We believe that establishing the 2021 volumes at the volumes projected to be used properly balances the statutory goal of increasing renewable fuel use with mitigating burdens on obligated parties. It ensures that the obligated parties should have sufficient RINs to comply. In a separate action, we have proposed to extend the compliance and attest engagement dates for 2021, providing additional lead time, as well as compliance flexibilities for obligated parties including access to carryover RINs and carryforward deficits.\81\ In addition, we note that this approach, of setting volumes at those actually used, is consistent with our approach in the 2014 and 2015 standards, which the D.C Circuit upheld in ACE.--------------------------------------------------------------------------- \81\ 86 FR 67419 (November 26, 2021).--------------------------------------------------------------------------- As with the 2020 volumes, the 2021 volumes also depend upon a belated exercise of the reset authority. We believe using the reset authority is appropriate for similar reasons as 2020: We are statutorily obligated to reset 2021 volumes, we have previously informed the public that we intended to reset the volumes, and the reset authority gives us discretion to reduce the total renewable fuel volume beyond what we could establish under the cellulosic waiver. There is also an additional reason, which is that the statute indicates that when we reset the volumes, we must do so for all remaining years in the statutory volume tables, which extend through 2022. Thus, in resetting the 2020 volumes, we are obligated to reset the 2021 and 2022 volumes.\82\--------------------------------------------------------------------------- \82\ See CAA section 211(o)(7)(F) (``the Administrator shall promulgate a rule . . . that modifies the applicable volumes set forth in the table concerned for all years following the final year to which the waiver applies'').--------------------------------------------------------------------------- The volumes of cellulosic biofuel, advanced biofuel, and total renewable fuel we are proposing for 2021 are shown in Table III.C-1. The biomass-based diesel volume for 2021 was previously established in the 2020 final rule and is included in Table III.C-1 for context. These volumes are based on the projected use of renewable fuels in the U.S , as discussed in greater detail in Chapter 5 of the DRIA. Table III.C-1--Proposed RFS Volumes for 2021 [Billion RINs]------------------------------------------------------------------------ Proposed Category volume------------------------------------------------------------------------Cellulosic Biofuel...................................... 0.62Biomass-Based Diesel.................................... \a\ 2.43Advanced Biofuel........................................ 5.20Total Renewable Fuel.................................... 18.52------------------------------------------------------------------------\a\ The BBD volume for 2021 is in physical gallons (rather than RINs) and was established in the 2020 final rule (85 FR 7016, February 6, 2020). We are not proposing to revise the 2021 BBD volume in this action. In the final rule, we intend to consider additional ***data***, including more recent ***data*** on renewable fuel production and use, and public comments, and update our projections accordingly. We request comment on both our proposed approach of establishing the RFS volumes for 2021 at the volume of renewable fuel projected to be supplied in 2021, as well as our projections of these volumes. We also request comment on whether or not to include volumes of cellulosic ethanol produced from corn kernel fiber in our projection of cellulosic biofuel production in 2021, as discussed in Chapter 5 of the DRIA.D. Proposed Volumes for 2022 We are proposing 2022 total renewable fuel, advanced biofuel, and cellulosic biofuel volumes that represent growth compared to historical volumes and compared to the volumes proposed for 2020 and 2021. We are[[Page 72451]]proposing a 150 million gallon increase in the 2022 cellulosic biofuel volume over the proposed 2021 volume based on the expected continued growth in biogas use. We are also proposing the full implied statutory volumes for non-cellulosic advanced biofuel (i.e , 5 billion gallons, or 500 million gallons more than the proposed 2021 volume) and conventional renewable fuel (15 billion gallons).\83\ We anticipate significant growth in the use of non-cellulosic advanced biofuels, especially in advanced renewable diesel.\84\ While we expect that conventional ethanol use will fall short of the implied 15 billion gallon volume in 2022 by roughly 1.2 billion gallons, we project that greater volumes of biodiesel and renewable diesel could be produced and imported to offset this shortfall. We discuss the 2022 BBD volume separately in Section III.D --------------------------------------------------------------------------- \83\ The implied statutory volume for non-cellulosic advanced biofuel in 2022 (5 billion gallons) is the difference between the statutory volumes for advanced biofuel (21 billion gallons) and cellulosic biofuel (16 billion gallons) in 2022. Similarly, the implied statutory volume for conventional renewable fuel in 2022 (15 billion gallons) is the difference between the statutory volumes for total renewable fuel (36 billion gallons) and advanced biofuel (21 billion gallons) in 2022. \84\ See Chapter 2 of the DRIA.--------------------------------------------------------------------------- The proposed cellulosic biofuel volume for 2022 is equal to the projected available volume of cellulosic biofuel (see Chapter 5.1 of the DRIA). This volume represents the highest volume of cellulosic biofuel we can establish for 2022 given the cellulosic waiver provision, which requires EPA to reduce the statutory cellulosic volume to the projected volume available. While EPA does have the authority to establish a lower cellulosic volume under the reset authority, we do not believe this would be appropriate for 2022, as discussed below. EPA's approach to the proposed cellulosic biofuel volume for 2022 seeks to realize the potential for GHG benefits associated with increased cellulosic biofuel production despite the relatively high costs (or in the case of CNG/LNG derived from biogas, the relatively high impact on the price of transportation fuel). Thus, while some of the statutory factors (such as the cost to consumers of transportation fuel) may suggest that a volume of cellulosic biofuel lower than the volume projected to be produced in 2022 would be appropriate, we have determined that these factors are outweighed by other factors (such as climate change). The proposed advanced biofuel and total renewable fuel volumes strike a balance between numerous competing statutory factors. They reflect the potential for growth in the volume of renewable fuel produced and consumed in the U.S , and the energy security and potential climate change benefits that producing and consuming increasing volumes of qualifying renewable fuels provide. They also take into consideration the potential negative impacts of renewable fuels produced from crops such as corn or soybeans on environmental factors such as the ***conversion*** of wetlands, ecosystems, and wildlife habitat, water quality, and water supply. We acknowledge that the implied conventional renewable fuel volume is higher than the volume of these fuels projected to be consumed in the U.S in 2022. We believe this may incentivize the continued expansion of the infrastructure necessary to use higher level blends of ethanol, which remains the dominant form of conventional renewable fuel. In recent years, ethanol consumption beyond the E10 blendwall in the U.S has been limited by infrastructure constraints (as well as other factors) to a volume significantly lower than the volume of ethanol produced in the U.S and the total production capacity of the U.S ethanol industry. If these infrastructure constraints are addressed, domestic ethanol consumption and ultimately domestic ethanol production could increase, and this could result in job creation, rural economic development, higher corn prices for farmers, and a greater supply of ***agricultural*** commodities. Alternatively, additional volumes of conventional biodiesel and renewable diesel could be supplied in 2022, including renewable fuels that are grandfathered under 40 CFR 80.1403 and are thus not required to meet the minimum 20 percent GHG reduction required for all qualifying renewable fuel. These fuels would most likely be produced in foreign facilities, which may cause additional environmental impacts and would not provide the same benefits to domestic job creation and rural economic development, but they could still provide energy security benefits.\85\--------------------------------------------------------------------------- \85\ Registered capacity to produce conventional biodiesel and renewable diesel exists at grandfathered facilities. Because grandfathered renewable fuels are not required to meet the GHG reduction thresholds, the GHG impacts of these fuels are highly uncertain.--------------------------------------------------------------------------- At the same time, this higher volume requirement means that obligated parties will likely need to look to other sources of renewable fuel beyond corn ethanol to meet their compliance obligations for 2022. While we are proposing the non-cellulosic portion of the advanced biofuel standard at the full implied statutory volume of 5 billion gallons, our assessment of potential supply indicates that some additional volume will likely be used in 2022. This means that if, as expected, the market falls short of the implied volume of conventional renewable fuel in 2022, as has happened in several years in the past, excess volumes of advanced biofuel beyond what is needed to meet the advanced biofuel volume could be available to fulfill some portion of the shortfall. Finally, as discussed for in the context of the proposed volume requirements for 2020 and 2021, there may also be implications of the proposed 2022 volume requirements on the carryover RIN bank. While we are projecting that sufficient renewable diesel, both advanced and conventional, will be available to meet the proposed 2022 volume requirements, there is the potential that the market may fall short, in which case the existence of sufficient carryover RINs in the carryover RIN bank can still enable compliance. Specifically, obligated parties may use carryover RINs to help them comply with the proposed 2022 standards. See Section IV.A for a more detailed discussion of carryover RINs. We acknowledge that in lieu of maintaining the implied statutory volumes of non-cellulosic advanced biofuel and conventional renewable fuel and relying on higher volumes of advanced biofuel to fulfill an expected shortfall in conventional biofuel, we could instead raise the advanced biofuel requirement and lower the conventional biofuel volume. However, we have chosen not to propose this. We expect that the impact on GHG emissions of the decision not to propose a higher advanced biofuel volume with a corresponding lower implied conventional biofuel volume will be minimal, given that additional volumes of advanced biofuels will likely be used to satisfy the conventional portion of the total renewable fuel requirement. Moreover, we believe that providing incentives for increased ethanol distribution and blending infrastructure through the higher implied volumes of conventional renewable fuel may result in the potential for greater renewable fuel consumption in future years. We note that this approach of maintaining the statutory implied conventional and non-cellulosic advanced biofuel volumes is inherently consistent with the volumes Congress itself established in EISA. It is also consistent with EPA's policy in prior years, during which we have never established prospective volume requirements lower than the implied statutory volume targets, with a single[[Page 72452]]exception.\86\ While we have discretion to deviate from this policy, we continue to believe that maintaining the implied statutory volumes strikes the proper balance based upon our consideration of the reset factors.--------------------------------------------------------------------------- \86\ We prospectively established a volume for conventional renewable fuel for 2016 (14.5 billion gallons) that was lower than the statutory implied volume (15 billion gallons). In doing so, we exercised our ``inadequate domestic supply'' waiver authority based largely on the limited demand for ethanol in the United States. That decision that was subsequently set aside by the U.S Court of Appeals for the District of Columbia Circuit in ACE, as exceeding our waiver authority.--------------------------------------------------------------------------- We also acknowledge that we are already late in resetting the 2022 volumes. We nonetheless believe that this late exercise of our reset authority is appropriate for similar reasons as for 2020 and for 2021. Moreover, the proposed 2022 volumes are also independently justified under our cellulosic waiver authority. The volumes of cellulosic biofuel, biomass-based diesel, advanced biofuel, and total renewable fuel we are proposing for 2022 are shown in Table III.D-1. We request comment on these proposed volumes. (The proposed BBD volume for 2022 is also included in Table III.D-1 for context, although we discuss it in Section III.E) Table III.D-1--Proposed RFS Volumes for 2022 [Billion RINs]------------------------------------------------------------------------ Proposed Category volume------------------------------------------------------------------------Cellulosic Biofuel...................................... 0.77Biomass-Based Diesel.................................... \a\ 2.76Advanced Biofuel........................................ 5.77Total Renewable Fuel.................................... 20.77------------------------------------------------------------------------\a\ The BBD volume for 2022 is in physical gallons (rather than RINs). In particular, we request comment on our projection of cellulosic biofuel for 2022. As discussed in greater detail in Chapter 4 of the DRIA, our cellulosic biofuel projections for 2022 do not include any volume of cellulosic ethanol produced from corn kernel fiber from facilities that are not currently registered to generate cellulosic RINs due to outstanding issues. If these technical and regulatory issues are resolved, we project that as much as 210 million additional gallons of cellulosic biofuel could be produced from corn kernel fiber in 2022. Our projections also do not include any volumes that might result from our proposed biointermediate regulations, as we believe the impacts of that proposal will not occur until after 2022. We request comment on whether we should project additional cellulosic biofuel production from corn kernel fiber or biointermediates in 2022, and, if so, the volume we should project.E. Proposed Biomass-Based Diesel Volume for 2022 As described above, we are proposing an increase of 500 million gallons in the non-cellulosic advanced biofuel volume for 2022. Consistent with this, we are also proposing to increase the BBD volume requirement by the same energy-equivalent amount (330 million physical gallons) to 2.76 billion gallons. As in recent years, we believe that excess volumes of BBD (above 2.76 billion gallons) will be used in 2022 to satisfy the advanced standard. Historically, the BBD standard has not independently driven the use of BBD in the market. This is due to the nested nature of the standards and the competitiveness of BBD relative to other advanced biofuels. Instead, the advanced biofuel standard, and occasionally the total renewable fuel standard, have driven the use of BBD in the market. We believe this trend will continue in 2022, and that the 2022 advanced standard, and potentially the total renewable fuel standard, will drive the use of BBD in the market in 2022. At the same time, we think it is important to maintain space for other advanced biofuels to participate in the RFS program. Although the BBD industry has matured over the past decade, the production of other advanced biofuels continues to be relatively low and uncertain. Maintaining this space for other advanced biofuels can facilitate in the long-term increased commercialization and use of other advanced biofuels, which may have superior environmental benefits and lower costs relative to BBD. Conversely, we do not think increasing the size of this space is necessary for 2022 given that only small quantities of these other advanced biofuels have been used in recent years relative to the space we have already provided. The proposed BBD volume for 2022 is consistent with our policy in previous annual rules, where we also set the BBD volume consistent with the change, if any, in the advanced volume. In the 2019 final rule, we set the 2020 BBD volume at 2.43 billion gallons. This was an increase from the prior year's BBD volume by the same energy-equivalent amount (330 million physical gallons) as the increase in the 2019 non-cellulosic advanced biofuel volume (500 million ethanol-equivalent gallons). By contrast, in the 2020 final rule, when the 2020 non-cellulosic advanced biofuel volume did not change, we also maintained the 2021 BBD volume at 2.43 billion gallons. In both rules, we preserved a significant space for other advanced biofuels to compete, approximately equal to 850 million RINs (approximately equal to 566 million physical gallons). In reality, only 334 million ethanol-equivalent gallons of other advanced biofuel was consumed in 2020. We acknowledge that in proposing the 2022 BBD volume in this action, we are proposing a late BBD volume. CAA section 211(o)(2)(B)(ii) provides that EPA shall determine the applicable volume 14 months prior to the year for which the standard will apply. That deadline has already passed. However, we do anticipate establishing the 2022 BBD standard ahead of the 2022 compliance year. The D.C Circuit in ACE has affirmed EPA's ability to promulgate late BBD standards as long as those standards are reasonable.\87\ In evaluating the reasonableness of EPA's standards, the Court suggested that EPA must ``consider[ ] various ways to minimize the hardship caused to obligated parties.'' \88\ In this action, we are providing obligated parties with notice of the potential 2022 BBD volume requirement well in advance of the 2022 compliance deadline. Additionally, we are proposing a volume requirement that is consistent with our treatment of the BBD volume requirement in the past, i.e , increasing the BBD volume requirement in accordance with increases in the implied statutory non-cellulosic advanced volume. Further, as in this case of previous annual rules, we continue to believe that it will be the advanced biofuel standard for 2022 that will drive the use of BBD in the market, and thus, the BBD standard we propose to establish is unlikely to result in additional burdens on obligated parties. Finally, we solicit comment on whether we should instead maintain the BBD standard for 2022 at 2.43 billion gallons. This would increase the space allowed for other advanced biofuels, as we are proposing to increase the advanced biofuel volume for 2022 by 500 million gallons over the proposed 2021 volume.--------------------------------------------------------------------------- \87\ ACE at 721. \88\ Id. (quoting Monroe Energy, LLC v. EPA, 750 F.3d 909, 920 (D.C Cir. 2014)).---------------------------------------------------------------------------F. Summary of the Proposed Volumes The proposed volumes for 2020, 2021, and 2022 are summarized in Table III.F-1. We request comment on these volumes (excepting the 2020 and 2021 BBD volumes, which were set in the 2019 and 2020 final rules, respectively), as well as any ***data*** or analysis that[[Page 72453]]would support alternative volumes for these years. Table III.F-1--Proposed RFS Volumes for 2020, 2021, and 2022 [Billion RINs]---------------------------------------------------------------------------------------------------------------- Category 2020 2021 2022----------------------------------------------------------------------------------------------------------------Cellulosic Biofuel.............................................. 0.51 0.62 0.77Biomass-Based Diesel \a\........................................ \b\ 2.43 \c\ 2.43 2.76Advanced Biofuel................................................ 4.63 5.20 5.77Total Renewable Fuel............................................ 17.13 18.52 20.77----------------------------------------------------------------------------------------------------------------\a\ The BBD volumes are in physical gallons (rather than RINs).\b\ The BBD volume for 2020 was established in the 2019 final rule (83 FR 63704, December 11, 2018).\c\ The BBD volume for 2021 was established in the 2020 final rule (85 FR 7016, February 6, 2020).G. Impacts of the Proposed Volumes As explained in Chapter 2.2 of the DRIA, we have used a baseline of the volumes actually supplied in 2020 to assess the impacts of this proposed rule, and thus the proposed 2020 volumes have no costs or benefits. We therefore focus on the projected impacts of the 2021 and 2022 volumes.\89\ We recognize that there are other possible baselines that could be used as a point of comparison, and that the choice of baseline significantly influences our impact analyses. A potential alternative baseline that might be informative would be the volumes of renewable fuels that would be used each year from 2020-2022 in the absence of RFS obligations. While we have not used this alternative baseline in this rule, Chapter 2.2 of the DRIA contains a brief description of what such a baseline might look like. We request comment on the volumes of renewable fuel and feedstock use that would occur in these years in the absence of the RFS obligations.--------------------------------------------------------------------------- \89\ The values for both 2021 and 2022 are calculated relative to the actual volumes of renewable fuel used in 2020. The 2022 values therefore reflect the incremental volumes for both 2021 and 2022.--------------------------------------------------------------------------- For two of the statutory factors (fuel costs and energy security benefits) we were able to quantify and monetize the expected impacts of this proposed rule.\90\ Information and specifics on how fuel costs are calculated are presented in Chapter 9 of the DRIA, while energy security benefits are discussed in Chapter 4 of the DRIA. A summary of the fuel costs and energy security benefits are shown in Table III.G-1 and Table III.G-2. Other factors, such as job creation and the price and supply of ***agricultural*** commodities, are quantified but have not been monetized. Further information and the quantified impacts of this proposed rule on these factors can be found in the DRIA. We were not able to quantify many of the impacts of this rulemaking, including impacts on many of the statutory factors such as the environmental impacts and rural economic development.--------------------------------------------------------------------------- \90\ Due to the uncertainty related to the GHG emission impacts of this proposed rule (discussed in further detail in Chapter 3.2 of the RIA) we have not included a quantified projection of the GHG emission impacts of this proposal. However, to provide perspective regarding the scope of the potential benefits, Chapter 3.2.2 of the RIA illustrates the potential GHG benefits associated with the proposed volumes in this rule using the lifecycle GHG values calculated in the 2010 RFS final rule and other prior actions. Table III.G-1--Fuel Costs of the Proposed Volumes [2020 and nominal year dollars, millions] \a\---------------------------------------------------------------------------------------------------------------- Discounted Year Undiscounted ------------------------------- Rate: 7% Rate: 3%----------------------------------------------------------------------------------------------------------------2021............................................................ 278 278 2782022 Excluding Supplemental Volumes.............................. 2,158 2,017 2,095 Including Supplemental Volumes.............................. 2,302 2,151 2,235----------------------------------------------------------------------------------------------------------------\a\ These costs represent the costs of producing and using biofuels relative to the petroleum fuels they displace. They do not include other factors, such as the potential impacts on soil and water quality or potential GHG reduction benefits. Table III.G-2--Energy Security Benefits of the Proposed Volumes [2020 dollars, millions]---------------------------------------------------------------------------------------------------------------- Discounted Year Undiscounted ------------------------------- Rate: 7% Rate: 3%----------------------------------------------------------------------------------------------------------------2021............................................................ 64 64 642022 Excluding Supplemental Volumes.............................. 151 141 147 Including Supplemental Volumes.............................. 162 151 157---------------------------------------------------------------------------------------------------------------- Regardless of whether or not we were able to quantify or monetize the impact of this proposed rule on each of the statutory factors, consideration of these factors is still required by the statute. We believe that the proposed standards[[Page 72454]]in this rulemaking are appropriate under our reset authority when we balance all of the relevant factors described throughout this preamble and the DRIA. We request comment generally on how costs and benefits quantified in this proposed rule are calculated and accounted for, as well as methods to quantify and monetize additional statutory factors.IV. Interactions Between the RFS Annual Volumes In resetting the volumes, EPA must review the implementation of the program. In conducting this review, we have assessed the carryover RIN bank \91\ and carryforward deficits, which are two important compliance mechanisms. Specifically, the RFS regulations contain provisions that allow an obligated party to satisfy their RFS obligations for a given year by using up to 20 percent of RINs generated in the previous year.\92\ Similarly, the RFS regulations also allow an obligated party to carry forward a compliance deficit from one year to the next, provided the party meets their full RFS obligations in the following year.\93\ These provisions operate such that any excess RINs generated in one year, or any RIN deficits, can impact the market for RINs and renewable fuels in the next year. As such, compliance with the RFS standards for one year is inherently intertwined with compliance for the prior year. This section discusses the projected volume of carryover RINs (net of carryforward deficits) that will be available for use towards compliance with the 2020, 2021, and 2022 RFS obligations. We also evaluate whether we should intentionally set the 2020, 2021, and 2022 volumes at levels that would intentionally reduce the size of the carryover RIN bank, and we propose that this would not be appropriate.--------------------------------------------------------------------------- \91\ CAA section 211(o)(5) requires that EPA establish a credit program as part of its RFS regulations, and that the credits be valid for obligated parties to show compliance for 12 months as of the date of generation. EPA implemented this requirement through the use of RINs, which are generated for the production of qualifying renewable fuels. Obligated parties can comply by blending renewable fuels themselves, or by purchasing the RINs that represent the renewable fuels from other parties that perform the blending. There are different ``D'' codes representing the different RFS standards that the various renewable fuels can be used to comply with. (e.g , D3 represents cellulosic biofuel that can be used to comply with the cellulosic biofuel standard.) RINs can be used to demonstrate compliance for the year in which they are generated or the subsequent compliance year. Obligated parties can obtain more RINs than they need in a given compliance year, allowing them to ``carry over'' these excess RINs for use in the subsequent compliance year, although our regulations limit the use of these carryover RINs to 20 percent of the obligated party's RVO. For the bank of carryover RINs to be preserved from one year to the next, individual carryover RINs are used for compliance before they expire and are essentially replaced with newer vintage RINs that are then held for use in the next year. For example, vintage 2020 carryover RINs must be used for compliance in 2021, or they will expire. However, vintage 2021 RINs can then be ``banked'' for use in 2022. \92\ 40 CFR 80.1427(a)(5). \93\ 40 CFR 80.1427(b).--------------------------------------------------------------------------- In addition, in reviewing the implementation of the program, we recognize the difference between the ability of retroactive versus prospective volume requirements to affect renewable fuel use. As we explained in Section II, we anticipate that the 2020 and 2021 standards will be largely retrospective, while the 2022 standards will be prospective. In this section, we explain that we do not expect the retroactive 2020 and 2021 standards to significantly affect renewable fuel use in 2020 and 2021, respectively, but we do expect the prospective 2022 standards to significantly affect renewable fuel use in 2022. Given this dynamic, we generally believe that higher renewable fuel volumes should occur in 2022 as opposed to 2020 or 2021.\94\--------------------------------------------------------------------------- \94\ We further discuss our review of the implementation of the program throughout the preamble and DRIA, especially in Chapter 1 of the DRIA.---------------------------------------------------------------------------A. Treatment of Carryover RINs Consistent with our approach in recent annual rules, we have also considered the availability and role of carryover RINs in setting the volume requirements for 2020, 2021, and 2022. In general, we have authority to consider the size of the carryover RIN bank in deciding whether and to what extent to exercise any of our discretionary waiver authorities.\95\ EPA's approach to the consideration of carryover RINs in exercising our cellulosic waiver authority was affirmed in Monroe Energy and ACE.\96\--------------------------------------------------------------------------- \95\ These discretionary waiver authorities include the reset and set authorities, CAA section 211(o)(7)(F) and 211(o)(2)(B)(ii) (both of which allow EPA to establish RFS volumes based upon a ``review of the implementation of the program''), discretionary portion of the cellulosic waiver authority, CAA section 211(o)(7)(D)(i) (``the Administrator may also reduce the applicable volume of renewable fuel and advanced biofuels requirement''), the general waiver authority, CAA section 211(o)(7)(A) (``The Administrator . . . may waive the requirements''), and the BBD waiver authority with regard to the extent of the reduction in the BBD volume, CAA section 211(o)(7)(E)(ii) (``the Administrator . . . shall issue an order to reduce . . . the quantity of biomass-based diesel . . . by an appropriate quantity''). \96\ Monroe Energy v. EPA, 750 F.3d 909 (D.C Cir. 2014); ACE, 864 F.3d at 713.--------------------------------------------------------------------------- As noted in past RFS annual rules, carryover RINs are a foundational element of the design and implementation of the RFS program.\97\ A bank of carryover RINs is extremely important in providing a liquid and well-functioning RIN market upon which success of the entire program depends, and in providing obligated parties compliance flexibility in the face of substantial uncertainties in the transportation fuel marketplace.\98\ Carryover RINs enable parties ``long'' on RINs to trade them to those ``short'' on RINs instead of forcing all obligated parties to comply through physical blending. Carryover RINs also provide flexibility in the face of a variety of unforeseeable circumstances that could limit the availability of RINs and reduce spikes in compliance costs, including weather-related damage to renewable fuel feedstocks and other circumstances potentially affecting the production and distribution of renewable fuel.--------------------------------------------------------------------------- \97\ See, e.g , 72 FR 23904 (May 1, 2007). \98\ See 80 FR 77482-87 (December 14, 2015), 81 FR 89754-55 (December 12, 2016), 82 FR 58493-95 (December 12, 2017), 83 FR 63708-10 (December 11, 2018), 85 FR 7016 (February 6, 2020).--------------------------------------------------------------------------- Just as the economy as a whole is able to function efficiently when individuals and businesses prudently plan for unforeseen events by maintaining inventories and reserve money accounts, we believe that the RFS program is able to function when sufficient carryover RINs are held in reserve for potential use by the RIN holders themselves, or for possible sale to others that may not have established their own carryover RIN reserves. Were there to be too few RINs in reserve, then even minor disruptions causing shortfalls in renewable fuel production or distribution, or higher than expected transportation fuel demand (requiring greater volumes of renewable fuel to comply with the percentage standards that apply to all volumes of transportation fuel, including the unexpected volumes) could result in deficits and/or noncompliance by parties without RIN reserves. Because carryover RINs are individually and unequally held by market participants, a small RIN bank may negatively impact the RIN market, even where the market overall could satisfy the standards. Consequently, were market disruptions to occur with an insufficient carryover RIN bank, it could force the need for a new waiver of the standards, undermining the market certainty so critical to the RFS program. For all of these reasons, the ***collective*** carryover RIN bank provides a necessary programmatic buffer that both facilitates individual compliance, provides for smooth overall functioning of the program to the benefit of all market[[Page 72455]]participants, and is consistent with the statutory provision allowing for the generation and use of credits. We anticipate that the carryover RIN bank will serve this very purpose for compliance with the 2019 standards, when actual biofuel use in that year is expected to have fallen short of the RFS standards.\99\--------------------------------------------------------------------------- \99\ EPA extended the 2019 compliance deadline for small refineries to November 30, 2021. See 86 FR 17073 (April 1, 2021). We have proposed to further extend that deadline in a separate action (86 FR 67419, November 26, 2021).--------------------------------------------------------------------------- EPA can also rely on the availability of carryover RINs to support ambitious volumes that may not be able to be met with renewable fuel production and use in that year, and in the context of the 2013 RFS rulemaking we noted that an abundance of carryover RINs available in that year, together with possible increases in renewable fuel production and import, justified maintaining the advanced and total renewable fuel volume requirements for that year at the levels specified in the statute.\100\--------------------------------------------------------------------------- \100\ 79 FR 49793-95 (August 15, 2013).---------------------------------------------------------------------------1. Carryover RIN Bank Size We project a significant drawdown in the number of carryover RINs as a result of compliance with the 2019 standards. After compliance with the 2019 RFS standards, we project that there will be approximately 1.85 billion total carryover RINs available, a decrease of 1.62 billion RINs from the previous estimate of 3.48 billion total carryover RINs in the 2020 final rule.\101\ Since we are proposing to set both the 2020 and 2021 volume requirements at the actual volume of renewable fuel produced in those years, we project that 1.85 billion total carryover RINs would be available for compliance with the 2022 standards as well.--------------------------------------------------------------------------- \101\ The calculations performed to estimate the size of the carryover RIN bank can be found in the memorandum, ``Carryover RIN Bank Calculations for 2020-2022 Proposed Rule,'' available in the docket for this action.--------------------------------------------------------------------------- However, there remains considerable uncertainty surrounding the ultimate number of carryover RINs that will be available for compliance with the 2020, 2021, and 2022 standards for several reasons, including the possibility of SREs and the fact that compliance with the 2019 standards has not yet occurred for all parties. Furthermore, as discussed in Section V, our proposed response to the remand of the 2016 rulemaking may reduce the total number of carryover RINs by up to 250 million RINs in 2022 (and up to another 250 million RINs in 2023). Finally, we note that there have been enforcement actions in past years that have resulted in the retirement of carryover RINs to make up for the generation and use of invalid RINs and/or the failure to retire RINs for exported renewable fuel. Future enforcement actions could have similar results and require that obligated parties or renewable fuel exporters settle past enforcement-related obligations in addition to complying with the annual standards. In light of these uncertainties, the net result could be a total carryover RIN bank larger or smaller than 1.85 billion RINs.2. EPA's Decision Regarding the Treatment of Carryover RINs We evaluated the volume of carryover RINs projected to be available and considered whether we should intentionally draw down the carryover RIN bank in setting the 2020, 2021, and 2022 volume requirements. We do not believe that would be appropriate. As described above, the current bank of carryover RINs provides an important and necessary programmatic and cost spike buffer that will both facilitate individual compliance and provide for smooth overall functioning of the program. We believe that a balanced consideration of the possible role of carryover RINs in achieving the statutory volumes for cellulosic biofuel, advanced biofuel, and total renewable fuel, versus maintaining an adequate bank of carryover RINs for important programmatic functions, is appropriate when EPA exercises its discretion under its statutory authorities. Furthermore, as noted earlier, after compliance with the 2019 standards, we project that there will be a significant drawdown in the number of carryover RINs. The advanced biofuel and total renewable fuel standards we are proposing for 2022, moreover, are significantly higher than the volume of renewable fuel used in previous years, as well as the volume of renewable fuel expected to be used in 2020 and 2021. As we explain further in Sections III and V, it may be challenging for the market to satisfy the 2022 annual standards and the 2022 supplemental standard entirely with renewable fuel use in 2022. Given this, the projected shortfall in RIN generation in 2019, and the uneven holding of carryover RINs among obligated parties, we expect that further increasing the standards with the intent to draw down the carryover RIN bank would lead to significant deficit carryovers and potential non-compliance by some obligated parties that own relatively few or no carryover RINs. We do not believe this is an appropriate outcome. Therefore, consistent with the approach we have taken in previous annual rules, we are not proposing to set the 2020, 2021, and 2022 volume requirements at levels that would intentionally draw down in the bank of carryover RINs. As noted above, it is possible the size of the RIN bank may be different than our projection. Regardless, however, we do not believe an intentional drawdown of the carryover RIN bank would be appropriate for many of the reasons stated above. The carryover RIN bank would continue to be an important compliance flexibility for obligated parties. Moreover, the standards we are proposing for 2022, along with the 2022 supplemental standard, are forward leaning and if the projected growth in renewable fuel volumes do not materialize would lead to a drawdown of the carryover RIN bank.3. Consideration of Cellulosic Carryover RINs In comments on the 2020 proposed rule and supplemental proposal, several parties suggested that EPA prospectively establish the cellulosic biofuel volume at the volume projected to be supplied plus the volume of available carryover RINs from the prior year.\102\ That is, these parties argued that EPA should set the cellulosic biofuel volume at a level that would intentionally eliminate the entire cellulosic carryover RIN bank. Because EPA established volumes solely under the cellulosic waiver authority that year, those parties focused their arguments on a legal interpretation of that provision, asserting that it required or allowed EPA to include, in its projection of the available volume, cellulosic carryover RINs that are projected to be available for compliance.--------------------------------------------------------------------------- \102\ For example, see comments from the Coalition for Renewable Natural Gas (EPA-HQ-OAR-2019-0136-0723) and AJW and Iogen (EPA-HQ-OAR-2019-0136-0467).--------------------------------------------------------------------------- Section 211(o)(7)(D)(i) of the CAA requires EPA to set the applicable volume of cellulosic biofuel at the ``projected volume available during [the] calendar year.'' EPA has consistently interpreted the statutory phrase ``projected volume available'' to refer to the volume of qualifying cellulosic biofuel projected to be produced or imported and available for use as transportation fuel in the U.S in that year. This is equivalent to the projected number of cellulosic RINs generated in the year that are available for obligated parties to use for compliance. Since we first exercised the cellulosic waiver authority in the 2010 annual rule, we have never included carryover cellulosic RINs in this projection. Parties that requested that EPA include carryover RINs in our projection of the available volume of cellulosic biofuel generally argued that despite the[[Page 72456]]continued rapid growth in cellulosic biofuel volumes, excess carryover cellulosic RINs in 2018 and 2019 resulted in low cellulosic RIN prices, which in turn may have negatively affected investment in cellulosic biofuel production. They further claimed that by including carryover RINs in the projected volume available, EPA would ensure that there was a strong market for cellulosic biofuel and cellulosic biofuel RINs in years when cellulosic biofuel production exceeded the number of cellulosic biofuel RINs needed by obligated parties for compliance. Commenters stated that this increased market certainty would result in increased investment in cellulosic biofuel production and ultimately increased cellulosic biofuel production. One commenter suggested that in conjunction with adding projected carryover RINs to the projected production volume of cellulosic biofuel when establishing the cellulosic biofuel volume, EPA could also subtract any projected deficits to account for years when cellulosic biofuel production falls short of EPA's projected production volume.\103\--------------------------------------------------------------------------- \103\ See comment from AJW and Iogen (Docket Item No. EPA-HQ-OAR-2019-0136-0467).--------------------------------------------------------------------------- In our response to these comments in the 2020 final rule,\104\ we disagreed with parties who claimed that the statutory language of the cellulosic waiver authority requires EPA to include carryover RINs in establishing the required volume of cellulosic biofuel. The statutory term ``projected volume available'' does not directly address the topic of carryover RINs. Indeed, the cellulosic waiver provision, CAA section 211(o)(7)(D)(i), does not mention carryover RINs at all, or otherwise refer to the statutory basis for such RINs, CAA section 211(o)(5). Thus, we believe there are multiple reasonable interpretations of this ambiguous statutory provision, including both the interpretation put forward by the stakeholders as well as the interpretation adopted by EPA in previous years.--------------------------------------------------------------------------- \104\ See Section 3.3 of the Response to Comments document for the 2020 final rule (EPA-420-R-19-018, December 2019).--------------------------------------------------------------------------- We further stated that the interpretation EPA adopted in previous years struck an appropriate balance between the interests of the cellulosic producers, those obligated to purchase and use cellulosic biofuels and cellulosic biofuel RINs, and consumers; and best ensured the ongoing smooth implementation of the RFS program.\105\ Finally, since the 2020 proposed rule did not raise the possibility of including cellulosic carryover RINs in the projected volume available, we did not think it would be appropriate to make such a change without first giving all stakeholders an opportunity to comment.--------------------------------------------------------------------------- \105\ See Chevron USA, Inc. v. Natural Resources Defense Council, Inc., 467 U.S 837 (1984).--------------------------------------------------------------------------- We are now providing stakeholders notice and opportunity for comment in this proposal on whether to include cellulosic carryover RINs as part of the projected volume available. With respect to the volumes in this rule, were we to include cellulosic carryover RINs, it would increase the 2020 cellulosic biofuel volume by 40 million gallons over the currently proposed volume.\106\ It would not affect the 2021 and 2022 cellulosic biofuel volumes, since we are establishing the cellulosic biofuel volumes based on actual supply for 2020 and 2021, and therefore at this time we do not project that excess RINs will be generated for carryover into 2021 or 2022.\107\--------------------------------------------------------------------------- \106\ The calculations performed to estimate the number of cellulosic carryover RINs can be found in the memorandum, ``Carryover RIN Bank Calculations for 2020-2022 Proposed Rule,'' available in the docket for this action. \107\ We acknowledge of course that our projections of the available volume of cellulosic biofuel are inherently uncertain, and that there may be more or fewer cellulosic RINs generated in 2020 and 2021 than what we project. However, at the time of this rule, we have done our best to take neutral aim at accuracy of the projected volume available.--------------------------------------------------------------------------- While we acknowledge that some aspects of the cellulosic category (such as the cellulosic waiver authority and the cellulosic waiver credits) \108\ are unique, at this time we believe the benefits of carryover RINs, discussed in Section IV.A, also apply to cellulosic carryover RINs. Adding carryover RINs to the volume projected to be produced would effectively guarantee that the demand for these RINs was always equal to the overall market supply and would likely result in cellulosic RIN prices at or near the price of an advanced biofuel RIN plus the price of a cellulosic waiver credit in future years. While raising prices would increase revenue for cellulosic biofuel producers, it may also increase the price of cellulosic biofuel. These higher prices would be passed on to consumers, who ultimately bear these costs.--------------------------------------------------------------------------- \108\ Cellulosic waiver credits may be purchased from EPA by obligated parties in years when EPA uses the cellulosic waiver authority to reduce the statutory volumes of cellulosic biofuel. Regulations related to cellulosic waiver credits can be found in 40 CFR 80.1456 --------------------------------------------------------------------------- We also note that the legal arguments made by the previous commenters, while still relevant, are less so in the context of this rulemaking. The prior comments focused on an interpretation of the cellulosic waiver authority. In this rulemaking, however, we are concurrently exercising both our cellulosic waiver and reset authorities. Under the reset authority, we have broad discretion to establish volumes, including cellulosic biofuel volumes lower than the volume required under the cellulosic waiver. Thus, regardless of whether the prior commenters are correct about EPA's legal authority under the cellulosic waiver, we have legal authority under reset to establish volumes at actual supply, excluding any carryover RINs. At the same time, however, the cellulosic waiver authority establishes the ceiling for cellulosic biofuel volumes. If we agree with the commenters that the cellulosic waiver mandates or allows volumes at supply plus carryover RINs, then we may establish cellulosic biofuel volumes up to that level. Thus, although the legal framework has changed somewhat since the comments were submitted, their arguments remain relevant, and EPA is soliciting comment on this issue.B. Ability for the RFS Volumes To Impact Renewable Fuel Supply In developing the proposed volume requirements, we considered the timing of this action and its ability to impact renewable fuel production, imports, and use. Since only prospective requirements have a significant chance of affecting actual renewable fuel use, we are proposing to require higher volumes for 2022. Imposing higher volumes for 2020 or 2021, in contrast, would have no effect on demand for fuels in those years. By contrast, retroactively requiring volumes higher than what the market has actually supplied could create market disruption and thus interfere with program implementation without advancing program goals. Setting 2020 and 2021 volumes at those actually supplied reflects the fact that we are acting retroactively, while in requiring higher volumes for 2022 we are setting prospective obligations. With respect to 2020, that year has already passed, so our retroactive revision of the RFS volumes cannot affect the production or use of renewable fuels in 2020 or consequently the statutory reset factors (e.g , the impacts of the use of renewable fuels on cost, the environment, and so forth). Any actual market effects will be felt after the rule is promulgated and mediated through the carryover RIN bank. With respect to 2021, there will not be sufficient time for the market to respond to the volumes that we finalize for 2021. The market may also respond in a more limited fashion to this proposed rule.[[Page 72457]]Regardless, any impact on the production, import, and use of renewable fuel in 2021 is likely to be limited, and therefore the ability for this rule to affect the statutory factors is likewise limited. The situation for 2022, however, is different. The RFS standards for 2022 will be in place throughout 2022 and should be able to affect market decisions for renewable fuel production, import, and use in 2022, albeit still within the bounds of the lead time available. Similarly, the ability for this action to affect the statutory factors in 2022 will be significantly greater than in 2021 or 2020. Thus, we believe that increased renewable fuel requirements should be imposed in 2022, when this rule has a much greater chance of actually increasing renewable fuel use and production, as opposed to 2020 or 2021. Conversely, there are also disadvantages to requiring higher volumes for 2020 and 2021 retroactively, or similarly, to maintaining the 2020 standards in the original final rule. Notably, such higher volumes would cause some combination of a drawdown of the carryover RIN bank, carryforward deficits, or non-compliance by obligated parties. While we have previously found an intentional drawdown of the carryover RIN bank to be appropriate in one case, we do not think that this is appropriate in this situation for reasons we describe below. We also do not think that intentionally relying on or effectively compelling carryforward deficits or intentionally causing non-compliance is generally appropriate. Given the drastic shortfall in renewable fuel use relative to what we projected in the 2020 final rule as discussed in Section III.B, compliance with the original 2020 standards would likely result in a significant drawdown in the number of carryover RINs available for use in 2021 and 2022. As discussed in Section IV.A.1, we currently project that as a result of compliance with the 2019 RFS standards, the number of carryover RINs available for compliance with the 2020 standards will be approximately 1.85 billion RINs, a considerable drop from the 3.48 billion total carryover RINs we projected in the 2020 final rule. We expect that as a result of revising the 2020 standards to equal the actual volume of renewable fuels consumed, the number of carryover RINs available for compliance with the 2021 and 2022 standards will remain at 1.85 billion RINs. Were we not to modify the 2020 standards, we anticipate that the total number of carryover RINs available for compliance with the 2021 and 2022 standards would decrease dramatically to 630 million RINs, or less than 4 percent of the proposed 2021 and 2022 total renewable fuel standards.\109\ This would be the lowest quantity of carryover RINs available since EPA began projecting the size of the carryover RIN bank in 2013, and the relatively small carryover RIN bank could increase the risk of disruptions in the RIN trading market. A number of obligated parties would also likely have to carry deficits into 2022, fail to comply with the 2021 total renewable fuel standard if they had already carried a deficit forward from 2020, or similarly fail to comply with the 2022 total renewable fuel standard.\110\--------------------------------------------------------------------------- \109\ The calculations performed to project the number of carryover RINs that would be available if we did not revise the 2020 standards can be found in the memorandum, ``Carryover RIN Bank Calculations for 2020-2022 Proposed Rule,'' available in the docket for this action. \110\ The regulations at 40 CFR 80.1427(b) allows obligated parties to only carry forward a deficit if they did not carry forward a deficit from the previous calendar year; thus, an obligated party that carries forward a deficit from 2020 into 2021 may not carry forward a deficit from 2021 into 2022.--------------------------------------------------------------------------- If these compliance difficulties occur, we believe that the harms would not just be felt by directly affected obligated parties but also extend to the entire fuels market and the RFS program. Notably, if insufficient RINs are available to obligated parties to meet their compliance obligations, that could negatively impact the regulatory and market certainty critical to the investments needed to increase renewable fuel volumes in 2022 and into the future. This could in turn diminish the expected future rate of production of renewable fuels, impair the development of infrastructure to distribute and use increased volumes of such fuels, and reduce the expected energy security, job creation, and rural economic benefits associated with higher renewable fuel use and production. Reduced business certainty could also deter the commercialization of novel advanced biofuels, which have the potential for lower costs and superior environmental benefits. Retroactively reducing the 2020 volumes mitigates these concerns. Specifically, our proposal to reduce the 2020 volumes to those actually supplied preserves an estimated carryover RIN bank of 1.85 billion RINs for use in 2021 and establishing the 2021 volumes at those actually supplied preserves the same estimated carryover RIN bank for compliance with the relatively aggressive 2022 standards. We note lesser reductions to 2020 or 2021 would give rise to the same concerns. The magnitude of those concerns would depend on how high the resulting volumes are. We think that some of these concerns, moreover, would remain even were we to make offsetting reductions to the 2022 volumes (e.g , were we to increase the proposed 2021 volumes by 500 million gallons and decrease the proposed 2022 volumes by the same amount). In that case, even though the aggregate incentive for renewable fuels across all three years might remain the same, retroactively requiring compliance for past years would be more likely to lead more RIN bank drawdowns, carryforward deficits, and non-compliance, and less likely to lead to actual increases in renewable fuel use and production. In sum, in proposing the 2020, 2021, and 2022 volumes, we recognize the interconnected nature of the RFS annual volume requirements. We believe that the volume should reflect both a desire to provide the necessary incentives for significant growth in renewable fuel production and use and our obligation to consider and mitigate the burdens on obligated parties associated with a retroactive rulemaking. In general, this indicates that required growth in renewable fuel use should occur prospectively in 2022, as opposed to retroactively in 2020 and 2021. We request comment on how EPA should consider the carryover RIN bank in establishing RFS volume obligations.V. Response to ACE Remand In addition to proposing the applicable volume requirements and percentage standards for 2020, 2021, and 2022, in this rulemaking we are also proposing to address the remand of the 2014-2016 annual rule \111\ by the U.S Court of Appeals for the D.C Circuit in ACE.\112\ In the 2020 proposal, we proposed to address the D.C Circuit's remand by retaining the original 2016 total renewable fuel standard.\113\ We received many comments both in support of and against this approach.\114\ In the 2020 final rule, we deferred taking action in response to the remand.\115\ We now believe that we should address the remand through supplemental renewable fuel volume requirements totaling 500 million gallons spread over two years. We are proposing a supplemental renewable fuel obligation of 250 million gallons to be applied in 2022 coupled with the intention of proposing an additional 250[[Page 72458]]million gallon supplemental standard in a subsequent action for 2023. We propose to establish the supplemental total renewable fuel volume requirement and the corresponding percentage standard for 2022 in this rulemaking. This section describes the relevant aspects of the 2014-2016 annual rule, the court's decision, EPA's responsibilities following the court's remand, and our proposed approach.--------------------------------------------------------------------------- \111\ 80 FR 77420 (December 14, 2015). \112\ 864 F.3d 691 (2017). \113\ 84 FR 36762 (July 29, 2019). \114\ See Docket No. EPA-HQ-OAR-2019-0136. \115\ 85 FR 7016 (February 6, 2020).---------------------------------------------------------------------------A. Reevaluating the 2014-2016 Annual Rule1. The 2016 Renewable Fuel Standard On December 14, 2015, we promulgated a rulemaking establishing the volume requirements and percentage standards for 2014, 2015, and 2016.\116\ In establishing those standards for 2016, we utilized the cellulosic waiver authority under CAA section 211(o)(7)(D) to lower the cellulosic biofuel, advanced biofuel, and total renewable fuel volume requirements, and the general waiver authority under CAA section 211(o)(7)(A) to lower total renewable fuel by an additional increment.\117\--------------------------------------------------------------------------- \116\ 80 FR 77420. The rule also established BBD volumes for 2017. \117\ 80 FR 77439.--------------------------------------------------------------------------- As an initial step, under CAA section 211(o)(7)(D), we lowered the cellulosic biofuel volume requirement by 4.02 billion gallons, to the projected production of cellulosic biofuel for 2016, as required by the statute.\118\ Using that same authority, we then elected to reduce the advanced biofuel and total renewable fuel volumes. We did not reduce the advanced biofuel volume requirement by the full 4.02 billion gallons that was permitted under this authority, but rather by a lesser 3.64 billion gallons that resulted in an advanced biofuel volume requirement that was ``reasonably attainable.'' \119\ This allowed some advanced biofuel to ``backfill'' for the shortfall in cellulosic biofuel. We then reduced the total renewable fuel volume by an amount equivalent to the reduction in advanced biofuel in accordance with our longstanding interpretation that when making reductions to advanced biofuel and total renewable fuel under CAA section 211(o)(7)(D), the best reading of the statute is to reduce them both by the same amount.\120\--------------------------------------------------------------------------- \118\ See 80 FR 77499. \119\ 80 FR 77427. \120\ Id.--------------------------------------------------------------------------- As a second step, under CAA section 211(o)(7)(A), under a finding of inadequate domestic supply, we further lowered the total renewable fuel standard by 500 million gallons for 2016.\121\ In assessing ``inadequate domestic supply,'' we considered the availability of renewable fuel to consumers. Based on such demand-side considerations, we made the additional 500 million gallon reduction in the total renewable fuel requirement.--------------------------------------------------------------------------- \121\ 80 FR 77444.--------------------------------------------------------------------------- The 2016 total renewable fuel standard was challenged in court. In an opinion issued on July 28, 2017, the D.C Circuit vacated our use of the general waiver authority under a finding of inadequate domestic supply to reduce the 2016 total renewable fuel standard, the second step of setting the 2016 total renewable fuel standard.\122\ The court in ACE held that we had improperly focused on supply of renewable fuel to consumers, and that the statute instead requires a ``supply-side'' assessment of the volumes of renewable fuel that can be supplied to refiners, blenders, and importers.\123\ Other components of our interpretation of ``inadequate domestic supply'' were either upheld by the court in ACE (e.g , EPA need not consider carryover RINs as a ``supply source of renewable fuel for purposes of determining the supply of renewable fuel in a given year'') or were not challenged (e.g , our consideration of biofuel imports as part of the domestic supply). Our use of the cellulosic waiver authority to provide the initial reduction in total renewable fuel was also upheld by the court. In establishing volume requirements for subsequent years, EPA has applied the court's holding and not proposed to reduce volumes under a finding of inadequate domestic supply.\124\--------------------------------------------------------------------------- \122\ ACE, 864 F.3d 691. \123\ Id. at 696. \124\ We note that the precedential effect of the ACE decision has governed subsequent RFS annual rules. Compare, e.g , 82 FR 34229 & n.82 (July 21, 2017) (2018 annual rule proposal, issued prior to ACE) (soliciting comment on whether it would be appropriate to exercise the inadequate domestic supply waiver authority based on the maximum reasonably achievable volume'' of renewable fuel, which incorporates demand-side considerations), with 82 FR 46177 (Oct. 4, 2017) (2018 annual rule availability of supplemental information and request for comment, issued after ACE) (recognizing, under ACE, that EPA may not consider demand-side constraints in determining inadequate domestic supply).---------------------------------------------------------------------------2. Agency Responsibility The court in ACE upheld our volume requirements for advanced biofuel, BBD, and cellulosic biofuel; there is, therefore, no need for the agency to adjust those 2016 final volume requirements, or to take further action with regard to these standards in light of the court's decision. The court also upheld EPA's use of the cellulosic waiver authority to reduce the 2016 total renewable fuel volume requirement. The court only vacated our decision to further reduce that requirement under the ``inadequate domestic supply'' waiver authority, remanding this issue to the Agency for further consideration consistent with the court's opinion.\125\ Our obligation is thus to reevaluate the 2016 total renewable fuel volume requirement in accordance with the court's decision.--------------------------------------------------------------------------- \125\ Id. at 703.---------------------------------------------------------------------------B. Consideration of Approaches for Responding to the ACE Remand As discussed in the previous section, we waived 500 million gallons of total renewable fuel volume associated with the 2016 volume requirements. In 2017, after the compliance year had passed, and after obligated parties had complied with those requirements, we received the ACE court's decision rejecting our use of the general waiver authority under a finding of inadequate domestic supply to reduce volumes as being beyond our statutory authority, and remanded the rulemaking action back to EPA. In this action, we propose to address the court's remand through a supplemental standard of 250 million gallons of total renewable fuel in 2022, with the intent of proposing an additional supplemental volume of 250 million gallons of renewable fuel to be required in 2023 in a subsequent action. As the court invalidated only the 500 million gallon total renewable fuel reduction, we therefore would limit our response to the remand to only the 2016 total renewable fuel standard and the corresponding 500 million gallon reduction stemming from our use of the general waiver authority. As the total renewable fuel volume is the outermost standard in the nested renewable fuel standards, this approach would not affect the other standards.1. Proposed Response to the ACE Remand We are proposing to address the ACE decision by applying a supplemental standard of 250 million gallons in 2022 with the intention of proposing an additional 250-million-gallon supplemental standard in a subsequent action for 2023. Under this approach, the original 2016 standard for total renewable fuel would remain unchanged and the compliance demonstrations that obligated parties made for it would likewise remain in place. A supplemental standard would thus avoid the difficulties associated with reopening 2016 compliance, as discussed below. This proposed supplemental standard would have the[[Page 72459]]same practical effect as increasing the 2022 total renewable fuel volume requirement by 250 million gallons, as compliance would be demonstrated using the same RINs as used for the 2022 standard. The percentage standard for the supplemental standard would be calculated the same way as the 2022 percentage standards (i.e , using the same gasoline and diesel projections), such that the supplemental standard would be additive to the 2022 total renewable fuel percentage standard. The proposed approach would provide a meaningful remedy in response to the court's vacatur and remand in ACE and would effectuate the Congressionally determined renewable fuel volume for 2016, modified only by the proper exercise of EPA's waiver authorities, as upheld by the court in ACE. It is with emphasis on these considerations that we are proposing a different approach from the one proposed in the 2020 proposal.\126\--------------------------------------------------------------------------- \126\ See FCC v. Fox, 556 U.S 502 (2009), acknowledging an agency's ability to change policy direction.--------------------------------------------------------------------------- We propose to treat such a supplemental standard as a supplement to the 2022 standards, rather than as a supplement to standards for 2016, which has passed. In order to comply with any supplemental standard, obligated parties would need to retire available RINs; it is thus logical to require the retirement of available RINs in the marketplace at the time of compliance with this supplemental standard. As discussed below, there are insufficient 2015 and 2016 RINs currently available to meet a supplemental 2016 standard, and additional 2015 or 2016 RINs cannot be generated. By applying the supplemental standard to 2022 instead of 2016, RINs generated in 2021 and 2022 could be used to comply with the 2022 supplemental standard. In applying the supplemental standard to 2022, we would treat the supplemental standards like a 2022 standard in all respects. That is, producers and importers of gasoline and diesel that are subject to the 2022 standards would also be subject to the supplemental standard. The applicable deadlines for attest engagements and compliance demonstrations that apply to the 2022 standards would also apply to the supplemental standard. The gasoline and diesel volumes used by obligated parties to calculate their obligation would be their 2022 gasoline and diesel production or importation. Additionally, obligated parties could use 2021 RINs for up to 20 percent of their 2022 supplemental standard. As described more fully in Section III, the proposed volume requirements for 2022 are forward leaning, requiring a growth in renewable fuel volumes that we believe is achievable. We also believe that compliance with the 2022 supplemental standard in addition to the proposed standards for 2022 is feasible. If it cannot be fully met through the supply of additional renewable fuel volumes in 2022, it could be met through a drawdown of the carryover RIN bank.\127\ After compliance with the 2019 standards, the carryover RIN bank is expected to consist of approximately 1.85 billion total carryover RINs for compliance in 2022 as discussed in Section IV.A \128\ We acknowledge that the size of the carryover RIN bank may change by the time this action is finalized. However, given the projected size of the carryover RIN bank, we think it is very likely that more than 250 million total carryover RINs will be available in 2022 for compliance with the supplemental standard, enabling the market to meet the supplemental standard entirely with carryover RINs, if necessary.--------------------------------------------------------------------------- \127\ See Section IV.A for a discussion of carryover RINs. \128\ The calculations performed to estimate the number of carryover RINs currently available can be found in the memorandum, ``Carryover RIN Bank Calculations for 2020-2022 Proposed Rule,'' available in the docket for this action.--------------------------------------------------------------------------- We believe that the potential drawdown of the carryover RIN bank by 250 million RINs is appropriate. As we stated in the 2020 final rule, ``[t]he current bank of carryover RINs provides an important and necessary programmatic and cost spike buffer that will both facilitate individual compliance and provide for smooth overall functioning of the program.'' \129\ As discussed in Section IV.A, we continue to believe that a significant carryover RIN bank is fundamental to the functionality and success of the RFS program. Therefore, we are reluctant to take potentially counterproductive actions which would force any significant drawdown of its volume. However, we believe that the important programmatic benefits of the carryover RIN bank would be preserved even if the market were to satisfy the supplemental standard purely by drawing down the carryover RIN bank. It is important to note that we would only be reducing the carryover RIN bank by up to 250 million RINs per year due to the phased-in nature of our response.--------------------------------------------------------------------------- \129\ 85 FR 7020-22 (February 6, 2020).--------------------------------------------------------------------------- By phasing in the 500 million gallons of total renewable fuel associated with the ACE remand through the implementation of two supplemental standards over two compliance years we believe we can maintain the functionality of the carryover RIN bank and lessen both the disruption to the market and the burden on obligated parties. Imposing two 250 million gallon standards in two compliance years, as opposed to one 500 million gallon supplemental standard in a single compliance year, provides additional notice for both obligated parties and the renewable fuel industry about the additional volume requirements and lessens the additional requirements for each compliance year. This could increase the likelihood that the volumes are met with additional renewable fuel use and, in turn, lessen the likelihood that the carryover RIN bank be drawn down. In summary, we are proposing to implement a 250 million gallon supplemental volume requirement in 2022 and intend to propose an additional 250 million gallon supplemental volume requirement in 2023, totaling 500 million gallons, that represent the reduction in the 2016 total renewable fuel volume improperly waived under the general waiver authority. This approach would address our obligation to respond to the ACE remand while accounting for the unique timing of imposing a 2016 requirement in 2022. Importantly, because there are insufficient 2015 and 2016 RINs to satisfy a supplemental standard, this approach would allow obligated parties to comply with the 2022 supplemental standard using 2021 and 2022 RINs. We seek comment on this approach of applying a supplemental standard for 2022 associated with the ACE remand on top of the proposed standards for 2022.2. Reopening 2016 Compliance In the alternative, we considered an approach where EPA could have obligated parties comply with a modified 2016 total renewable fuel standard that requires an additional 500 million gallons of renewable fuel relative to the 2016 standard promulgated in 2015. However, we have determined that such an approach would be impractical if not infeasible to implement. Under our current regulations, only 2015 and 2016 RINs can be used to demonstrate compliance with the 2016 standard.\130\ There are far fewer 2015 and 2016 RINs available today (i.e , RINs that are valid but have not already been retired to comply with the 2015, 2016, or 2017 standards) than would be needed to comply with a supplemental standard commensurate[[Page 72460]]with our exercise of the general waiver authority for 2016 (i.e , 500 million gallons).\131\ Additionally, the few 2015 and 2016 RINs available are unevenly held among obligated parties; because of the small number of RINs, any parties that held excess 2015 and 2016 RINs could attempt to sell them at a high price, creating dysfunction within the RIN market. These high prices would create a burden on obligated parties without providing any incentive for additional renewable fuel use in 2016 since that year has already passed. Because this approach would result in some parties being in noncompliance, we do not consider this a viable option to respond to the court's remand.--------------------------------------------------------------------------- \130\ 40 CFR 80.1427(a). \131\ RINs have a 2-year lifespan. Based on EMTS ***data***, 29 million 2016 RINs are still being held in obligated party accounts. Although these RINs still show up in the database as ``available,'' it is likely that many of these RINs are not actually valid. This simply means that these RINs have not been retired by obligated parties as the compliance year has passed and they are expired.--------------------------------------------------------------------------- As we have stated in the past, we believe the burdens associated with altering the 2016 standard are high.\132\ To illustrate the burdens associated with such an approach, we considered the steps that would be required to implement a revised 2016 standard. First, we would need to rescind the 2016 standard and promulgate a new 2016 standard. Next, we would need to return all of the RINs used for compliance to the original owners. Once those RINs were unretired (a process that could take several months), trading of those RINs could resume for a designated amount of time before retirements would again be required to demonstrate compliance. Obligated parties could then attempt to comply with a new, higher standard that includes an adjustment to the required total renewable fuel volume to address the ACE decision. However, simply unretiring 2016 RINs would not result in sufficient RINs for compliance with the higher standard. Furthermore, because the suite of obligated parties is no longer the same as it was in 2016, with some companies no longer in business, the distribution of unretired RINs could be perceived as unfair as well as uneven, highlighting the complexity of attempting to go back in time.--------------------------------------------------------------------------- \132\ 84 FR 36762, 36788 (July 29, 2019).--------------------------------------------------------------------------- To remedy the insufficient 2016 RINs used for compliance with the 2016 standard, we also considered an approach where 2016 RINs used for compliance with the 2017 standards could be unretired and used for compliance with the increased 2016 standard, but this would essentially also reopen 2017 compliance, with cascading impacts on each subsequent year's compliance. Reopening compliance would impose a significant burden on both obligated parties and EPA as described above. Moreover, stakeholders have expressed strong desires for consistent compliance requirements on an annual basis. Having compliance demonstrations for the prior year complete before requiring compliance with the subsequent year is considered essential to allow obligated parties to properly account for the vintage of the various RINs in their holdings as they develop their compliance strategies and avoid having RINs expire. Therefore, we do not find that it would be appropriate or reasonable to reopen compliance with the 2016 total renewable fuel standard. Aside from the paucity of available 2015 and 2016 RINs, applying a supplemental standard to the 2016 compliance year would require us to consider whether the obligated gasoline and diesel volumes used in the calculation of the percentage standards would be derived from the projected volumes used in the rulemaking that established the 2016 standards, or instead the actual obligated gasoline and diesel volumes in 2016. Of these two choices, using the actual obligated gasoline and diesel volumes would more accurately result in the full volume of the adjustment being realized through the retirement of RINs.\133\ However, using the actual obligated gasoline and diesel volumes for the supplemental standard would make it inconsistent with the other 2016 standards, and call into question whether the other percentage standards should also be revised to account for actual obligated 2016 gasoline and diesel volumes and compliance revised for all obligated parties. We do not believe that it would be appropriate to revise the other 2016 percentage standards when only the total renewable fuel standard is at issue under the ACE remand. Applying the supplemental standard to 2022 and 2023 would avoid this issue.--------------------------------------------------------------------------- \133\ The projected 2016 non-renewable gasoline volume and diesel volume used in the rulemaking that set the 2016 standards was 179.33 billion gallons. According to EIA's May 2021 STEO, the actual non-renewable gasoline and diesel consumption volume in 2016 was 179.16 billion gallons.---------------------------------------------------------------------------C. Demonstrating Compliance With the 2022 Supplemental Standard We intend to prescribe formats and procedures as specified in 40 CFR 80.1451(j) for how obligated parties would demonstrate compliance with the 2022 supplemental standard that simplifies the process in this unique circumstance.\134\ Although the proposed 2022 supplemental standard would be a regulatory requirement separate from and in addition to the 2022 total renewable fuel standard, we intend that obligated parties would submit a single annual compliance report for both the 2022 annual standards and the supplemental standard. Under this intended approach, obligated parties would only report a single number for their total renewable fuel obligation in the 2022 annual compliance report.\135\ Obligated parties would also only need to submit a single annual attest engagement report for the 2022 compliance period that covers both the 2022 annual standards and 2022 supplemental standard.\136\ If we set a 2023 supplemental standard as intended, we would intend to use the same approach for annual compliance demonstrations for both the 2022 and 2023 compliance periods.--------------------------------------------------------------------------- \134\ We note that we are not proposing to change the reporting regulations at 40 CFR 80.1451(a) as we do not believe that regulatory changes are needed to accommodate annual compliance demonstration for the proposed 2022 supplemental standard. Any comments suggesting changes to such reporting regulations will be considered outside the scope of this rulemaking. \135\ Obligated parties demonstrate annual compliance by following the reporting instructions entitled, ``Instructions for RFS0304: RFS Annual Compliance Report'' (RFS0304 report). A copy of these reporting instructions is available in the docket of this action. Under our intended approach, obligated parties would combine the 2022 total renewable fuel standard with the 2022 supplemental standard in ``Field 18'' of the RFS0304 report. This combined value would then be multiplied by the obligated gasoline and diesel fuel volume reported as specified in reporting instructions for ``Field 20'' of the RFS0304 report. \136\ The deadline for the attest engagement reports for the 2022 compliance period is June 1, 2023, and we are not proposing to modify that deadline in this action.--------------------------------------------------------------------------- To assist obligated parties with this unique compliance situation, we intend to issue guidance with instructions on how to calculate and report the values to be submitted in the 2022 compliance reports.D. Authority and Consideration of the Benefits and Burdens In establishing the 2016 total renewable fuel standard, EPA waived the required volume of total renewable fuel by 500 million gallons using the inadequate domestic supply general waiver authority. The use of that waiver authority was vacated by the court in ACE and the rule was remanded to the EPA. In order to remedy our improper use of the inadequate domestic supply general waiver authority, we find that it is appropriate to treat our authority to[[Page 72461]]propose a supplemental volume requirement at this time as the same authority used to establish the 2016 total renewable fuel volume requirement--CAA section 211(o)(3)(B)(i), which requires EPA to establish percentage standard requirements by November 30 of the year prior to which the standards will apply and to ``ensure'' that the volume requirements ``are met.'' EPA exercised this authority for the 2016 standards once already. However, the effect of the ACE vacatur is that there remain 500 million gallons of total renewable fuel from the 2016 statutory volumes that were not included under the original exercise of EPA's authority under CAA section 211(o)(3)(B)(i). Therefore, EPA has retained authority for the remaining 500 million gallons. EPA also has authority under CAA section 211(o)(2)(A)(i). The D.C Circuit in NPRA noted Congress granted EPA authority to `` `ensure' that `at least' the set volumes were used each year.'' \137\--------------------------------------------------------------------------- \137\ NPRA, 630 F.3d at 157.--------------------------------------------------------------------------- We have sought to mitigate the burdens of a late or retroactive standard in part by proposing a supplemental standard that applies for the 2022 compliance year. Although we established a total renewable fuel standard in 2016, we did so while erroneously waiving 500 million gallons of total renewable fuel through the use of our general waiver authority. In this action, we are proposing to begin to remedy that error by requiring an additional 250 million gallon total renewable fuel volume requirement in the 2022 compliance year.\138\--------------------------------------------------------------------------- \138\ As noted earlier, we intend to propose an additional supplemental volume of 250 million gallon for 2023 in a subsequent action.--------------------------------------------------------------------------- As noted in Section II.C, in ACE and two prior cases, the court upheld EPA's authority to issue late renewable fuel standards, even those applied retroactively, so long as EPA's approach is reasonable.\139\ EPA must consider and mitigate the burdens on obligated parties associated with a delayed rulemaking.\140\ When imposing a late or retroactive standard, we must balance the burden on obligated parties of a retroactive standard with the broader goal of the RFS program to increase renewable fuel use.\141\ The approach we are proposing in this action would implement a late standard as described in these cases. Obligated parties made their RIN acquisition decisions in 2016 based on the standards as established in 2016 and they may have made different decisions had we not reduced the 2016 total renewable fuel standard by 500 million gallons using the general waiver authority. Were EPA to create a supplemental standard for 2016 designed to address the use of the general waiver authority in 2016, we would be imposing a wholly retroactive standard on obligated parties, but because the proposed supplemental standard will be complied with in the 2022 compliance year, it will instead be a late standard. Pursuant to the court's direction, we have carefully considered the benefits and burdens of our approach and considered and mitigated the burdens to obligated parties caused by the lateness.--------------------------------------------------------------------------- \139\ See ACE, 864 F.3d at 718; Monroe Energy, LLC v. EPA, 750 F.3d at 920; NPRA, 630 F.3d at 154-58. \140\ ACE, 864 F.3d at 718. \141\ NPRA, 630 F.3d at 154-58.--------------------------------------------------------------------------- We acknowledge that in the 2020 proposal, we stated that a supplemental standard would ``impose a significant burden on obligated parties'' that would ``be unduly burdensome and inappropriate'' and lack ``any corresponding benefit as any additional standard cannot result in additional renewable fuel use in 2016.'' \142\ We seek comment on whether the approach described in this document mitigates the associated burdens or even entirely avoids most of the burdens we described in the 2020 proposal (such as those associated with allowing only 2015 and 2016 RINs to be used for compliance). We seek comment on whether the current size of the carryover RIN bank is sufficient to mitigate the burden on obligated parties from a supplemental standard as well as whether the proposal to spread the 500 million gallon volume over two compliance years also mitigates the burdens on the carryover RIN bank. In short, we seek comment on whether this approach would reasonably balance the benefits and burdens and whether it would provide appropriate and meaningful relief in response to the ACE remand.--------------------------------------------------------------------------- \142\ 84 FR 36788 (July 29, 2019).--------------------------------------------------------------------------- We believe that the approach proposed in this action, if finalized, could provide benefits that outweigh potential burdens. Consistent with the 2016 renewable fuel volume established by Congress, our proposed and intended supplemental standards for 2022 and 2023, respectively, are in total equivalent to the volume of total renewable fuel that we inappropriately waived for the 2016 total renewable fuel standard. The use of these supplemental standards phased across two compliance years would provide a meaningful remedy to the D.C Circuit's vacatur of EPA's use of the general waiver authority and remand of the 2016 rule in ACE. We have carefully considered and designed this approach to mitigate any burdens on obligated parties. We have considered the availability of RINs to satisfy this additional requirement. We are soliciting comment on the feasibility of the proposed 250-million-gallon supplemental standard in 2022. As explained earlier, there are insufficient 2015 and 2016 RINs available to satisfy the proposed 250-million-gallon standard.\143\ Instead, we are proposing a supplemental volume requirement to the 2022 standards that will apply in the 2022 compliance year. Doing so would allow 2021 and 2022 RINs to be used for compliance with the 2022 supplemental standard, in keeping with existing RFS regulations. We believe there would be a sufficient number of 2021 and 2022 RINs to satisfy the 2022 supplemental standard. Although it is possible that the supplemental standard could be met through additional renewable fuel production, we generally believe that requiring volumes for the 2022 annual standards beyond those we are proposing in this action results in increasing difficulty in the standards being met through additional renewable fuel production. We believe that potential drawdown of the carryover RIN bank as a result of compliance with the proposed supplemental standard would be appropriate in light of the projected size of the carryover RIN bank in 2022 and the desire to provide a meaningful remedy to the court's remand and the Congressional intent evidenced by the statutory 2016 total renewable fuel standard.--------------------------------------------------------------------------- \143\ As also described above, it is likely that some amount of the existing carryover RIN bank represents RINs generated but not used for compliance in 2016, as the market over complied with the total renewable fuel standard that year.--------------------------------------------------------------------------- Second, we provide significant lead-time for obligated parties by proposing this standard as supplemental to the 2022 standard: More than one year prior to the 2022 compliance deadline. Third, we are proposing multiple mechanisms to mitigate the potential compliance burden. One step is to designate that the response to the ACE remand will be a supplement to the 2022 standards. This approach would not only allow the use of 2021 and 2022 RINs for compliance with the 2022 standard, as described earlier, but it would also avoid the need for obligated parties to revise their 2016 (and potentially 2017, 2018, 2019, etc.) compliance demonstrations, which would be a burdensome and time-consuming process. In addition, our proposal allows obligated parties to[[Page 72462]]satisfy both the 2022 standards and the supplement in a single set of compliance and attest engagement demonstrations. We are also proposing to extend the same compliance flexibility options already available for the 2022 standards to the 2022 supplemental standard, including allowing the use of carryover RINs and deficit carry forward subject to the conditions of 40 CFR 80.1427(b)(1). We also intend to spread out the 500-million-gallon obligation over two compliance years as described above. This will allow obligated parties and renewable fuel producers additional lead time to meet the standard because the RFS program will phase in the requirement, thus providing about a year of lead time for the second 250 million gallon requirement. Lastly, we have carefully considered alternatives, including retaining the 2016 total renewable fuel volume as described in the 2020 proposal. We seek comment on this alternative, as well as on any other alternative approaches for addressing the ACE remand. On balance, we find that requiring an additional 500 million gallons of total renewable fuel to be complied with through two supplemental standards spread over two years would be an appropriate response to the court's vacatur and remand of our use of the general waiver authority to waive the 2016 total renewable fuel standard by 500 million gallons. We seek comment on this approach.E. Calculating a Supplemental Percentage Standard for 2022 The formulas in 40 CFR 80.1405(c) for calculating the applicable percentage standards were designed explicitly to associate a percentage standard for a particular year with the volume requirement for that same year. The formulas are not designed to address the approach that we are proposing in this action, namely the use of a 2016 volume requirement to calculate a 2022 percentage standard. Nonetheless, we can apply the same general approach to calculating a supplemental percentage standard for 2022. If this proposed approach to the ACE remand in finalized, the numerator in the formula in 40 CFR 80.1405(c) would be the supplemental volume of 250 million gallons of total renewable fuel. The values in the denominator would remain the same as those used to calculate the proposed 2022 percentage standards in Section VI.C, which can be found in Table VI.C-1.\144\ As described in Section VI.C, the resulting supplemental renewable fuel standard percentage standard for a 250 million gallon volume requirement in 2022 would be 0.14-0.15 percent, depending on the projection of exempt volume of gasoline and diesel.--------------------------------------------------------------------------- \144\ We intend to update the values in the denominator, such as the projected gasoline and diesel volumes, based on updated information available at the time of the final rule.--------------------------------------------------------------------------- The proposed supplemental standard for 2022 would be a requirement for obligated parties separate from and in addition to the 2022 standard for total renewable fuel. The two percentage standards would be listed separately in the regulations at 40 CFR 80.1405(a), but in practice obligated parties would demonstrate compliance with both at the same time. Thus, the two percentage standards would effectively be additive (e.g , 11.76% + 0.14% = 11.90%, using the low end of the proposed percentage standards in Section VI.C).VI. Percentage Standards EPA implements the nationally applicable volume requirements by establishing percent standards that apply to obligated parties. The obligated parties are producers and importers of gasoline and diesel, as defined by 40 CFR 80.1406(a). The standards are expressed as volume percentages. Each obligated party multiplies the percentage standards by sum of all non-renewable gasoline and diesel they produce or import to determine their Renewable Volume Obligations (RVOs).\145\ The RVOs are the number of RINs that the obligated party is responsible for procuring to demonstrate compliance with the RFS rule for that year. Since there are four separate standards under the RFS program, there are likewise four separate RVOs applicable to each obligated party for each year.--------------------------------------------------------------------------- \145\ 40 CFR 80.1407 --------------------------------------------------------------------------- The volumes used to determine the proposed 2020, 2021, and 2022 percentage standards are described in Section III and are shown in Table VI-1. Table VI-1--Volumes for Use in Determining the Proposed Applicable Percentage Standards (billion RINs)---------------------------------------------------------------------------------------------------------------- Standard 2020 2021 2022----------------------------------------------------------------------------------------------------------------Cellulosic Biofuel.............................................. 0.51 0.62 0.77Biomass-Based Diesel \a\........................................ \b\ 2.43 \c\ 2.43 2.76Advanced Biofuel................................................ 4.63 5.20 5.77Total Renewable Fuel............................................ 17.13 18.52 20.77Supplemental Standard........................................... n/a n/a 0.25----------------------------------------------------------------------------------------------------------------\a\ The BBD volumes are in physical gallons (rather than RINs).\b\ The BBD volume requirement for 2020 was established in the 2019 standards rulemaking (83 FR 63704, December 11, 2018).\c\ The BBD volume requirement for 2021 was established in the 2020 standards rulemaking (85 FR 7016, February 6, 2020).A. Calculation of Percentage Standards The formulas used to calculate the percentage standards applicable to obligated parties are provided in 40 CFR 80.1405(c). The formulas apply to the estimates of the volumes of non-renewable gasoline and diesel fuel, for both highway and nonroad uses, which are projected to be used in the year in which the standards will apply. EIA provides projected gasoline and diesel volumes, but these include projections of ethanol and biomass-based diesel used in transportation fuel. Since the percentage standards apply only to the non-renewable gasoline and diesel, the volumes of renewable fuel are subtracted out of the EIA projections of gasoline and diesel. In addition, transportation fuels other than gasoline or diesel, such as natural gas, propane, and electricity from fossil fuels, are not currently subject to the standards, and volumes of such fuels are not used in calculating the annual percentage standards or obligated parties' RVOs. As specified in the 2010 RFS2 final rule,\146\ the percentage standards are based on energy-equivalent gallons of renewable fuel, with the cellulosic biofuel, advanced biofuel, and total renewable fuel standards based on ethanol equivalence and the BBD[[Page 72463]]standard based on biodiesel equivalence. However, all RIN generation is based on ethanol-equivalence. To effectuate this difference between BBD and the other three standards, the formula used to calculate the percent standard for BBD in 40 CFR 80.1405 includes a factor of 1.5 to convert physical volumes of BBD into ethanol-equivalent volumes. However, as discussed more fully in Section VII.A, based on updated ***data*** regarding BBD use, we are proposing to change this factor from 1.5 to 1.55 --------------------------------------------------------------------------- \146\ See 75 FR 14670 (March 26, 2010).---------------------------------------------------------------------------B. Small Refineries and Small Refiners In CAA section 211(o)(9), Congress exempted small refineries from RFS compliance temporarily through December 31, 2010. Congress also provided that small refineries could receive an extension of the exemption beyond 2010 based either on the results of a required Department of Energy (DOE) study or in response to individual small refinery petitions demonstrating ``disproportionate economic hardship.'' CAA section 211(o)(9)(B)(i). In the 2020 final rule, EPA revised certain definitions in the percentage standards formulae at 40 CFR 80.1405(c) to account for a projection of the total exempted volume of gasoline and diesel produced at small refineries, including for those exemptions granted after the final rule. In this proposed action, we are applying these revised definitions to calculate the projected exemptions for 2020, 2021, and 2022 and proposing a range of values. On the low end, we are proposing that the exempted volume is zero; on the high end, we are proposing to project the volume using the same methodology used in the 2020 final rule and updating values with more recent ***data***. The low end of the range of applicable percentage standards would be based on the fact that on January 24, 2020, the United States Court of Appeals for the Tenth Circuit ruled in RFA that EPA's grant of three individual SREs exceeded our statutory authority.\147\ The court vacated EPA's actions under multiple bases. First, under the Tenth Circuit's reading of the CAA, a small refinery is eligible for relief only if it has received a continuous exemption from the RFS program since the initial blanket exemption through 2010.\148\ The Supreme Court subsequently reversed the Tenth Circuit's decision in part on this basis.--------------------------------------------------------------------------- \147\ Renewable Fuels Ass'n v. EPA, 948 F.3d 1206 (10th Cir. 2020), rev'd in part sub nom., HollyFrontier Cheyenne Refining, LLC, v. Renewable Fuels Ass'n, 114 S. Ct. 2172 (2021). \148\ RFA at 1244-49.--------------------------------------------------------------------------- However, the Tenth Circuit also vacated EPA's actions for two other reasons: EPA may grant relief only when it finds that the small refinery would suffer disproportionate economic hardship due to compliance with the RFS program, not due to other factors, and EPA had failed to discuss how granting the exemptions was consistent with our findings on RIN cost pass-through.\149\ Were EPA to follow these aspects of the RFA decision nationwide, we would not anticipate granting any SREs for 2020, 2021, or 2022.--------------------------------------------------------------------------- \149\ RFA at 1253-54.--------------------------------------------------------------------------- As described in previous actions, our assessment indicates that small refineries fully recover the costs of RFS compliance through higher prices on sales of gasoline and diesel, and that as a result they do not suffer economic hardship due to the RFS.\150\ EPA has stated that refineries, including small refineries, are generally able to recover the costs of the RIN in the revenues received for their petroleum products, and that the cost of the RIN is passed through to consumers in the marketplace and does not represent a net cost to obligated parties.\151\ While some small refineries have contested RIN cost pass-through in their exemption petitions, we have not credited such arguments in the past. Even when we granted relief in past years, we did so for other reasons.--------------------------------------------------------------------------- \150\ ``A Preliminary Assessment of RIN Market Dynamics, RIN Prices, and Their Effects,'' Dallas Burkholder, Office of Transportation and Air Quality, US EPA. May 14, 2015. \151\ ``Denial of Petitions for Rulemaking to Change the RFS Point of Obligation,'' EPA-420-R-17-008, EPA-HQ-OAR-2016-0544-0525, (November 22, 2017).--------------------------------------------------------------------------- In addition, because the applicable standards are expressed as a percentage of production basis, the cost of RFS compliance (prior to being recovered in the marketplace through higher sales prices on gasoline and diesel) is proportional to the amount of gasoline and diesel the obligated party produces. In other words, the cost of RFS compliance, per gallon of gasoline and diesel production, is the same for all obligated parties. This same cost applies to all obligated parties and is not disproportionate. The high end of the proposed range of applicable percentage standards is based on the fact that small refineries subsequently sought review of RFA from the U.S Supreme Court in HollyFrontier and received a favorable ruling.\152\ At this time we do not yet know how the court's ruling will affect SRE decisions currently before EPA or in the future. The high end of the proposed range therefore reflects a continuation of the intent described in the 2020 final rule to project the volumes of gasoline and diesel associated with future SREs.\153\ Specifically, we are proposing to project the SRE volume for 2020, 2021, and 2022 using the same methodology used in the 2020 final rule, but updating the values using more recent ***data*** for 2016-2018 SRE petitions.\154\--------------------------------------------------------------------------- \152\ 114 S. Ct. 2172 (2021). \153\ 85 FR 7049 (February 6, 2020). \154\ We are not adjudicating any SREs in this action, and this action does not prejudge any SRE petition. Rather, this proposal simply reflects our best estimate at this time of the potential range of exempt volumes in 2020, 2021, and 2022.--------------------------------------------------------------------------- EPA is also soliciting comment on the revisions we made in the 2020 final rule to the definitions in the percentage standards formulae at 40 CFR 80.1405(c) to account for a projection of the exempted small refinery volume, including for exemptions granted after the final rule. In the 2020 final rule, we justified the revised formulae based in part on our then-prospective SRE policy of following DOE's recommendations. As noted above, EPA does not know at this time how RFA and Holly Frontier will affect our SRE policy going forward, so we are co-proposing a range of exempted small refinery volumes. Since the revisions to the formulae were based in part on our SRE policy, we are also soliciting comment on the revisions, specifically with regard to our decision to account for a projection of exemptions granted after the final rule.C. Modification of the 2020 Biomass-Based Diesel Percentage Standard As noted above, the percentage standards implement the nationally applicable volume requirements. Since EPA is proposing to revise the nationally applicable volume requirements for 2020 in this action under our reset authorities, we are proposing to also establish revised percentage standards corresponding to those volumes. With regard to the 2020 and 2021 BBD volumes, EPA is not proposing to revise such volumes, which were established in the 2019 and 2020 final rules, respectively.\155\ Nonetheless, EPA is proposing to revise the percent standards for the 2020 volume. We are also proposing to establish the volume requirement and associated percentage standard for 2022 for the nationally applicable volume requirement for BBD using our set authority as described in Section III.E --------------------------------------------------------------------------- \155\ 83 FR 63704 (December 11, 2018); 85 FR 7016 (February 6, 2020). In this action, we are not reopening nor seeking comment on the 2020 or 2021 BBD volume requirements.--------------------------------------------------------------------------- With regard to 2021 BBD, EPA did not previously promulgate percentage[[Page 72464]]standards, and thus we do so now for the first time.\156\ With regard to 2020 BBD, EPA previously promulgated percentage standards in the 2020 final rule.\157\ In this action, EPA is proposing to modify the 2020 BBD percentage standard, even though we are not modifying the 2020 BBD volume requirement that we previously established. Specifically, we are proposing to use the same volume requirement previously promulgated (2.43 billion gallons) but to update the other inputs for calculating the standard (such as the projections of gasoline and diesel consumption and exempted small refinery volumes in 2020), which we term ``inputs'' in the remainder of this section. We are also proposing to apply the new BBD multiplier of 1.55, which we discuss further in Section VIII.A --------------------------------------------------------------------------- \156\ This action is consistent with past annual rules, which have generally promulgated the BBD percentage standard for the BBD volume set in the prior year's annual rule. This is due to the unique statutory timing applicable to BBD, where EPA must set the volume 14 months in advance but promulgate percentage standards by November 30 of the immediately preceding year. See CAA section 211(o)(2)(B)(ii), (o)(3)(B)(i). \157\ 85 FR 7049 (February 6, 2020).--------------------------------------------------------------------------- We are proposing to update the inputs because it is logical for all of the 2020 percentage standards to be calculated using the same inputs. This is consistent with EPA's policy since the beginning of the RFS program, where we have generally calculated all the percentage standards for a given year based on the same inputs. Here, because we are updating the inputs for the other 2020 percentage standards, we also propose to modify the inputs for the 2020 BBD percentage standard. This approach is supported by the nested nature of the standards, where BBD is a subset of the advanced biofuel and total renewable fuel standards, and compliance with all three is accomplished in part by using the same RIN credits. We think it would not be appropriate to use updated inputs for the other standards, while simultaneously using what is now outdated ***data*** for the BBD standard alone. Additionally, the inputs we are proposing to use in this action are quite different from the inputs used in the 2020 final rule. As discussed in Section II.D and III.B , the projections for gasoline and diesel consumption in 2020 final rule, which were used to establish the BBD standard, are significantly different than the actual gasoline and diesel consumed in 2020. Relative to the 2020 final rule, we are also co-proposing different projections of SREs, as discussed in the prior section. Finally, we note that our proposed modification to the 2020 BBD percentage standard is not anticipated to have any significant real-world impacts. As set forth in the next section, the proposed modification results in an increase in the BBD percentage standard, which will increase the number of RINs required for compliance with this standard. However, even were we to retain the original, lower standard, we would nonetheless expect the same number of BBD RINs to be used for 2020 compliance given that BBD is nested within the advanced biofuel category and we are proposing to set the advanced biofuel percentage standard based on actual use of renewable fuels.D. Proposed Standards The formulas in 40 CFR 80.1405 for the calculation of the percentage standards require the specification of a total of 14 ***variables*** comprising the renewable fuel volume requirements, projected gasoline and diesel demand for all states and territories where the RFS program applies, renewable fuels projected by EIA to be included in the gasoline and diesel demand, and projected gasoline and diesel volumes from exempt small refineries. The values of all the ***variables*** used for this proposed rule are shown in Table VI.C-1 for the applicable 2020, 2021, and 2022 standards.\158\--------------------------------------------------------------------------- \158\ See the technical memoranda, ``Calculation of proposed % standards for 2020,'' ``Calculation of proposed % standards for 2021,'' and ``Calculation of proposed % standards for 2022,'' available in the docket for this action. Table VI.C-1--Volumes for Terms in Calculation of the Proposed Percentage Standards [Billion RINs]-------------------------------------------------------------------------------------------------------------------------------------------------------- 2022 Term Description 2020 2021 2022 supplemental--------------------------------------------------------------------------------------------------------------------------------------------------------RFVCB.......................................... Required volume of cellulosic biofuel.. 0.51 0.62 0.77 0RFVBBD......................................... Required volume of biomass-based diesel 2.43 2.43 2.76 0 \a\.RFVAB.......................................... Required volume of advanced biofuel.... 4.63 5.20 5.77 0RFVRF.......................................... Required volume of renewable fuel...... 17.13 18.52 20.77 0.25G.............................................. Projected volume of gasoline........... 123.25 133.06 136.49 136.49D.............................................. Projected volume of diesel............. 50.49 54.52 56.81 56.81RG............................................. Projected volume of renewables in 12.63 13.64 13.98 13.98 gasoline.RD............................................. Projected volume of renewables in 2.15 2.23 2.66 2.66 diesel.GS............................................. Projected volume of gasoline for opt-in 0 0 0 0 areas.RGS............................................ Projected volume of renewables in 0 0 0 0 gasoline for opt-in areas.DS............................................. Projected volume of diesel for opt-in 0 0 0 0 areas.RDS............................................ Projected volume of renewables in 0 0 0 0 diesel for opt-in areas.GE............................................. Projected volume of gasoline for exempt 0.00 0.00 0.00 0.00 small refineries (low). Projected volume of gasoline for exempt 4.80 4.80 4.80 4.80 small refineries (high).DE............................................. Projected volume of diesel for exempt 0.00 0.00 0.00 0.00 small refineries (low). Projected volume of diesel for exempt 3.39 3.39 3.39 3.39 small refineries (high).--------------------------------------------------------------------------------------------------------------------------------------------------------\a\ The BBD volume used in the formula represents physical gallons. The formula contains a proposed 1.55 multiplier to convert this physical volume to ethanol-equivalent volume.[[Page 72465]] Projected volumes of gasoline and diesel, and the renewable fuels contained within them, were derived from EIA's May 2021 STEO. For the final rule, the 2022 gasoline and diesel projections will be provided by EIA in a letter to EPA that is required under the statute, while the projections for 2020 and 2021 will be derived from the latest version of the STEO, which we anticipate being the October 2021 STEO.\159\--------------------------------------------------------------------------- \159\ To determine the 49-state values for gasoline and diesel, the amount of these fuels used in Alaska is subtracted from the totals provided by EIA because petroleum-based fuels used in Alaska do not incur RFS obligations. The Alaska fractions are determined from the June 26, 2020 EIA State Energy ***Data*** System (SEDS), Energy Consumption Estimates. In addition, fuel used in ocean-going vessels is also subtracted from the total because it is excluded from the definition of transportation fuel by the statute. This volume is provided directly by EIA.--------------------------------------------------------------------------- Using the volumes shown in Table VI.C-1, we have calculated the proposed percentage standards for 2020, 2021, and 2022 as shown in Table VI.C-2. Table VI.C-2--Proposed Percentage Standards-------------------------------------------------------------------------------------------------------------------------------------------------------- 2020 2021 2022 Standard --------------------------------------------------------------------------------------------------------------- Original Revised low Revised high Low High Low High--------------------------------------------------------------------------------------------------------------------------------------------------------Cellulosic Biofuel...................... 0.34% 0.32% 0.34% 0.36% 0.38% 0.44% 0.46%Biomass-Based Diesel.................... 2.10 2.37 2.50 2.19 2.30 2.42 2.54Advanced Biofuel........................ 2.93 2.91 3.07 3.03 3.18 3.27 3.42Renewable Fuel.......................... 11.56 10.78 11.36 10.79 11.33 11.76 12.33Supplemental Standard................... n/a n/a n/a n/a n/a 0.14 0.15-------------------------------------------------------------------------------------------------------------------------------------------------------- The proposed regulations at 40 CFR 80.1405 can only contain one set of percentage standards. Given this constraint, the proposed regulations contain only the percentage standards representing the low end of the range shown in the table above. However, we do not intend this approach to indicate a preference for the low end of the range of proposed percentage standards.VII. BiointermediatesA. Background The RFS regulations were designed with the general expectation that renewable biomass would be converted into renewable fuel at a single facility (e.g , a renewable fuel producer purchases corn directly from several farmers in a region, crushes the corn in a mill, and then ferments the corn into ethanol, all at the same facility). The regulations therefore impose requirements on renewable fuel producers to provide EPA with information necessary to verify that their fuel was made with qualifying renewable biomass, through production processes corresponding with approved pathways, and in volumes corresponding to feedstocks used. Such information submissions are necessary for oversight and enforcement, leading to increased integrity and confidence in the program. Since the RFS2 regulatory program was promulgated in 2010, however, EPA has received a number of inquiries from companies regarding the possible use of renewable biomass that has been substantially pre-processed at one facility to produce a proto-renewable fuel (referred to as a biointermediate) that is subsequently used at a different facility to produce renewable fuel for which RINs would be generated. For example, a number of companies have approached us with the proposed use of woody biomass or separated MSW to produce a biocrude (a pre-processed feedstock that could then be processed into renewable fuel at a crude oil refinery). In response to these requests, EPA has stated that the existing RFS regulations are insufficient to generally allow RINs to be generated in situations wherein multiple facilities are involved in the ***conversion*** of renewable biomass feedstocks into renewable fuel. On November 16, 2016, EPA issued the proposed Renewables Enhancement and Growth Support (REGS) rule that outlined proposed provisions to allow the use of biointermediates to produce qualifying renewable fuels under the RFS program.\160\ The proposed REGS rule outlined a comprehensive set of compliance provisions, enforcement provisions, and oversight mechanisms for biointermediates that would have allowed biointermediates into the RFS program while maintaining effective oversight of the production, transfer, and use of biointermediates to make renewable fuels. A public hearing was held in Chicago, IL, on December 16, 2016, and the public comment period ended on January 17, 2017.--------------------------------------------------------------------------- \160\ See 81 FR 80828 (November 16, 2016).--------------------------------------------------------------------------- Since the proposed REGS rule was issued, EPA has continued to review public comments and other information and to carefully consider how best to develop and implement a program that would allow for the production, transfer, and use of biointermediates to produce renewable fuel under RFS. We continue to believe that the use of biointermediates to produce renewable fuels would be a reasonable and positive development for the future growth in production particularly of cellulosic and advanced biofuels. However, we also continue to believe that the existing regulations are insufficient to allow the use of biointermediates because we are unable to verify the validity of RINs generated in situations where feedstocks are allowed to be processed at multiple facilities, and where partially processed feedstocks, which may appear very similar to renewable fuels themselves, are transferred between parties. The value of these RINs provides considerable incentive for fraudulent activity, and therefore it is important for the integrity of the program that mechanisms be in place to verify their validity.\161\--------------------------------------------------------------------------- \161\ We note that there has been a long history of RIN fraud in the RFS program. We detail several of the major RIN fraud civil enforcement cases on our website, available at [*https://www.epa.gov/enforcement/civil-enforcement-renewable-fuel-standard-program.---------------------------------------------------------------------------*](https://www.epa.gov/enforcement/civil-enforcement-renewable-fuel-standard-program.---------------------------------------------------------------------------) After careful consideration of public comments received in response to the proposed biointermediates provisions in the proposed REGS rule and further thought on how best to design and implement a potential biointermediates program, we are proposing biointermediates provisions anew. This proposal re-proposes many aspects of the biointermediate provisions in the proposed REGS rule but also updates several key aspects of that proposal reflecting what we have learned since the original proposal. We discuss what biointermediate provisions we are re-proposing without significant changes from the proposed REGS rule in Section VII.B and the updated revisions in Section VII.C We also specifically seek comment on a number of issues related[[Page 72466]]to including biointermediates in the RFS program in Section VII.D We are reproposing (i.e , proposing anew) the biointermediates provisions here for two main reasons. First, since the publication of the proposed REGS rule, we have reviewed comments received on that proposed rulemaking and have engaged in numerous discussions with parties interested in bringing biointermediates into the RFS program. After almost five years of further consideration, we have identified several areas that we would like to modify or enhance. These changes impact what biointermediates would be allowed under the program and what parties that produce, transfer, and use biointermediates would need to do to demonstrate compliance. Second, we believe it would be useful to provide an additional opportunity for stakeholders interested in biointermediates to comment on the proposed biointermediates provisions more generally. Due to the amount of time that has passed since we proposed the REGS rule, the nature and number of the parties interested in bringing biointermediates into the program has changed. We believe that by providing an additional opportunity for public comment on all aspects of the proposed biointermediates provisions, we would receive additional comments with reasonable suggestions to modify and enhance the proposed biointermediates provision in addition to those we received during the proposed REGS rule comment period. Furthermore, we believe there are specific provisions that we proposed in the REGS rule that would benefit from additional public comment (these are discussed in Section VII.D). For these reasons, we are proposing all the biointermediates provisions anew and broadly seek comment on these reproposed biointermediate provisions. Commenters that submitted comments on the proposed biointermediates provisions in the REGS rule must resubmit any relevant comments in order for those comments to be considered. As this is a new proposal, we do not intend to respond to comments that were submitted only on the previously proposed biointermediates provisions in the REGS rule. Such comments are outside the scope of this action. We also seek comment from potential producers of biointermediates on the current status of operations, potential production volumes, timelines for production, and any other information that may help inform EPA as to the expected use of biointermediates to produce renewable fuel both during 2022 and out into the future.B. Re-Proposal of Biointermediates Provisions Previously Proposed in REGS In this action, we are reproposing certain biointermediate provisions that we previously proposed in the REGS rule. Many of the program design elements for proposed biointermediate provisions remain unchanged from the REGS proposal and are being reproposed here with no modifications other than ministerial changes. The provisions we are reproposing without substantive changes are the following: The calculation of lifecycle GHG emissions where biointermediates are used to make renewable fuels and the treatment of pathways for RIN generation where biointermediates are converted into renewable fuels; Limiting the production of biointermediates to a single facility; The potential liability of biointermediate and renewable fuel producers for violations of the proposed biointermediate provisions; Registration, reporting, and recordkeeping requirements for biointermediate producers as well as additional registration, reporting, and recordkeeping requirements for renewable fuel producers that use biointermediates; Annual attest engagements for biointermediate producers; RFS quality assurance program (QAP) provisions for biointermediate producers and renewable fuel producers that use biointermediates; and The treatment of biointermediates produced at foreign facilities. This preamble incorporates the discussions of each of these elements that are contained in the referenced memo to the docket.\162\ We note that because the RFS regulations have undergone several revisions since these elements were previously proposed, we have updated the proposed regulatory language to accommodate these revisions to help ensure consistency between the proposed biointermediate provisions and the rest of the RFS regulations. Additionally, while each of these individual provisions is substantively unchanged from the REGS proposal, how they fit into and function within the larger biointermediates program may be different under our proposed revised program. We discuss broader, substantive changes to the proposed biointermediate provisions in Section VII.C --------------------------------------------------------------------------- \162\ Each of these elements are described in greater detail in the memorandum to the docket, ``Proposed Biointermediate Provisions in the proposed Renewables Enhancement Growth Support Rule,'' available in the docket for this action.--------------------------------------------------------------------------- As explained above, we are requesting comment on these re-proposed provisions. Comments on these provisions previously submitted to the REGS rulemaking docket will not be considered unless they are resubmitted to the docket for this action (i.e , EPA-HQ-OAR-2021-0324).C. Changes to the Biointermediates Provisions Previously Proposed in the REGS Rule In this action, we are also proposing some additions and updates to the biointermediate provisions previously proposed in the REGS rule. Specifically, we are proposing changes to the definition of biointermediate, limits on biointermediate transfers, and mandatory participation in the RFS QAP. We are also proposing changes to the compliance and enforcement provisions, including: New product transfer document requirements for RINs generated from renewable fuels produced from biointermediates; changes to the registration, reporting, recordkeeping, and attest engagement requirements; and provisions for the treatment of invalid RINs generated from biointermediates. These changes are discussed in more detail below.1. Implementation Dates We are proposing that the biointermediates provisions will be implemented starting 60 days after the publication of the final rule in the Federal Register. In recognition of the time that has passed since EPA first identified the need to revise the regulations to allow the use of biointermediates, we now intend to put a biointermediates program in place as soon as possible. We believe this proposed implementation date is achievable based on the scope of biointermediates provisions as proposed here. However, we note that depending on the complexity of the final biointermediate provisions, we may need to finalize a later implementation date to provide us enough time to put in place the compliance and oversight mechanisms necessary to effectively oversee the program. We are seeking specific comments on when biointermediate producers expect to be able to begin production so we can consider the potential impacts of a later implementation date.2. Definition of Biointermediate We are proposing a definition of biointermediate that differs from what we proposed in the REGS rule. Previously, we proposed to define a[[Page 72467]]biointermediate as any renewable fuel feedstock material that meets all of the following criteria: It was derived from renewable biomass. It did not meet the definition of renewable fuel and RINs were not generated for it. It was produced at a facility that is registered with EPA, but which is different than the facility at which it is used to produce renewable fuel. It was made from the feedstock and would be used to produce the renewable fuel in accordance with the process(es) listed in the approved pathway. It was processed in such a way that it is substantially altered from the feedstock listed in the approved pathway. We pointed out in the proposed REGS rule that our intent was that feedstocks currently listed in an approved pathway or that underwent form changes would not be considered biointermediates \163\ and excluded form changes from the definition included in the proposed REGS rule. Such form changes included, but were not limited to the following:--------------------------------------------------------------------------- \163\ See 81 FR 80834 (November 16, 2016).--------------------------------------------------------------------------- Chopping biomass into small pieces, pressing it, or grinding it into powder. Filtering out suspended solids from recycled cooking and trap grease. Degumming vegetable oils. Drying wet biomass. Adding water to biomass to produce a slurry. We received several public comments suggesting that the proposed definition was too broad and would include existing feedstocks that are currently used in approved pathways. These commenters argued that the additional registration, reporting, and recordkeeping requirements would be unnecessarily burdensome on the production of renewable fuels that already can generate RINs under the current RFS program. Commenters pointed to EPA's stated intent in the proposed REGS rule to avoid inclusion of almost all feedstocks covered by existing pathways either in Table 1 to 40 CFR 80.1426 or an EPA-approved pathway under 40 CFR 80.1416 Additionally, since the proposed REGS rule, we have developed a better understanding of the potential implementation oversight challenges surrounding the inclusion of certain types of biointermediates. We now believe that the general, one-size-fits-all regulatory framework proposed in the REGS rule would not work in many of the biointermediates situations anticipated now and in the future and that it would be difficult for us to implement appropriately. In some cases it would treat situations as biointermediates when it was not necessary to do so, in other cases it would not treat situations as biointermediates that should be in order to provide proper oversight, and in still other cases it might treat situations as biointermediates but not in the way that our regulations were intended to address. Our additional consideration of biointermediates since REGS has emphasized that some potential biointermediates require unique provisions for ensuring that qualifying renewable biomass was used to make the biointermediate, ensuring that the biointermediate and the resultant renewable fuel processed at separate facilities continues to fall under an approved pathway, and ensuring that the renewable fuel gets used as transportation fuel, heating oil, or jet fuel. In other cases, we have concerns with the potential generation of invalid or fraudulent RINs especially when a biointermediate either is itself or is similar to a renewable fuel. Historically, when we have brought renewable fuels into the program that required unique considerations or had concerns over the generation of valid RINs, we have either promulgated specific regulatory requirements to address any concerns (e.g , renewable fuel oil) or imposed certain terms and conditions on approved pathways as described at 40 CFR 80.1460(a)(7). Based on the concerns highlighted in comments and what we have learned about individual biointermediates over the last several years, we no longer believe a broad approach to defining biointermediates would allow us to have sufficient oversight of the program (i.e , to ensure that renewable fuels that generate RINs meet the applicable statutory and regulatory requirements). Each biointermediate has particular compliance and enforcement considerations, including how to track the biointermediate back to renewable biomass, how a biointermediate may be processed with other feedstocks to produce renewable fuel, how a biointermediate fits within existing pathways, and how to demonstrate the cellulosic content of the biointermediate. As such, we now believe it is necessary to design a program that allows us to consider and, if necessary, address these challenges on a biointermediate-by-biointermediate basis. We are thus proposing to specifically define the scope of which biointermediates would be covered by a biointermediates program. In other words, under this proposal we are defining the specific situations in which it would be permitted to process feedstocks into renewable fuels at multiple facilities. Under this proposal, if we do not list a ``biointermediate'' explicitly in the definition of biointermediate, the ``biointermediate'' would not be lawful for use in making renewable fuels under the RFS program. In order for a new biointermediate to be brought into the program, under this proposal, we would amend the regulations again in the future to add the new biointermediate to the list and make any other necessary regulatory changes needed to provide proper oversight for its potentially unique circumstances. In this action, we are proposing to initially include the following biointermediates: Biocrude, free fatty acid (FFA) feedstock, and undenatured ethanol (including ethanol solutions containing less than 95% ethanol). We are also seeking comment on a longer list of additional potential biointermediates that we may choose to include in the final rulemaking depending upon the comments we receive on this proposal. We believe that the three proposed types of biointermediates we are proposing could effectively be accommodated by the updated provisions described in this action. We believe these biointermediates are likely to be available in measurable quantities in the near future and that our proposed biointermediate regulations can ensure proper compliance oversight and enforcement. We have had discussions with a variety of parties interested in producing and using biointermediates since the proposed REGS rule. Some parties making fuels from biocrude, FFA feedstocks, and undenatured ethanol could begin producing volumes as early as 2022. Since these parties are relatively close or already capable of producing renewable fuels from biocrude, FFA feedstock, and undenatured ethanol, and it is relatively clear to us how they will do so and what the compliance oversight issues might be with these biointermediates, we believe that it would be appropriate to allow the use of these biointermediates to produce renewable fuel after we finalize a biointermediates program. To clearly establish what would be allowed under this proposed biointermediates program, we are also proposing definitions for the specific biointermediates that would initially be included in the program. We are proposing to define undenatured ethanol as ethanol that has not been denatured per Department of Treasury[[Page 72468]]requirements.\164\ We are also proposing specific definitions for biocrude and FFA feedstock. In the future as we revise the regulations to allow new biointermediate into the program, we would then also define those biointermediates. We also note that if we finalize additional biointermediates as part of the biointermediate definition in the final rule, we will also include specific definitions for those additional biointermediates.--------------------------------------------------------------------------- \164\ See 27 CFR parts 19 through 21. Ethanol does not become a ``renewable fuel'' under the RFS regulations until it is denatured. The preamble to the RFS2 regulations explains that ``ethanol that is valid under RFS2 must be denatured.'' See 75 FR 14670, 14713 (March 26, 2010).--------------------------------------------------------------------------- The inclusion of FFA feedstock in the proposed definition of biointermediates implies that the existing pathways in Table 1 to 40 CFR 80.1426 satisfy the applicable GHG reduction thresholds in cases where FFA is produced from a feedstock and used to produce a renewable fuel in accordance with a process(es) listed in an approved pathway. We believe this conclusion is supported for the feedstocks listed in Table 1 that FFA biointermediates may be produced from, including biogenic waste fats, oils, and greases (FOG), distillers corn oil and sorghum oil, food wastes, oil crops, and algal oil. As discussed in the 2020 proposed rule, our original approval of pathways that use these feedstocks was based on lifecycle GHG assessments; our basis for potentially allowing FFAs produced from those feedstocks as biointermediates is that we believe the potential additional processing and transport associated with the additional FFA production step would add a limited amount of GHG emissions to the fuel's lifecycle.\165\ However, where EPA has not conducted a lifecycle GHG assessment and determined that the original renewable biomass feedstock meets the GHG emission reduction requirements of the CAA, we cannot say that FFAs produced from that feedstock fit within existing pathways. Therefore, as explained further below, the proposed definition of FFA feedstock includes the following restriction: ``FFA feedstock must not include any free fatty acids from the refining of crude palm oil.''--------------------------------------------------------------------------- \165\ 84 FR 36801-36803 (July 29, 2019).--------------------------------------------------------------------------- The existing pathways using waste FOG feedstocks were approved based on our lifecycle GHG analysis of yellow grease (also known as used cooking oil or ``UCO'') for the RFS2 rule, which found, for example, that biodiesel produced from UCO results in a greater than 80% GHG reduction compared to baseline conventional diesel. In addition to UCO, the waste FOG feedstock category includes inedible animal tallow, the FOG components of food wastes and other similar materials that ``would otherwise normally be discarded or used for another secondary purpose because they are no longer suitable for their original intended use.'' \166\ EPA has not determined whether FFA from the refining of crude palm oil (hereafter referred to as palm fatty-acid distillate or ``PFAD'') is consistent with and covered by our existing analyses and pathways. In particular, we have not investigated potential existing markets for PFAD and the potential market effects associated with using it as a biofuel feedstock. Although PFAD is a secondary product from crude palm oil refining, we believe that additional analysis is needed to determine whether fuel produced from PFAD would qualify for the applicable GHG reduction thresholds. Our lifecycle analysis of palm oil biodiesel, which has not been finalized through rulemaking, estimated that palm oil-based biodiesel and renewable diesel do not satisfy the 20% GHG reduction for renewable fuel.\167\ Those estimates underscore the need to further evaluate the GHG emissions associated with using PFAD as a biofuel feedstock. For these reasons, we are specifying at this time that FFA feedstock does not include FFA from the refining of crude palm oil.--------------------------------------------------------------------------- \166\ 75 FR 14794 (March 26, 2010). \167\ 77 FR 4300 (January 27, 2012).--------------------------------------------------------------------------- Our proposed approach to defining biointermediates is not intended to affect pre-processing steps for feedstocks in Table 1 that are limited to form changes. We recognize that it has been common practice for some feedstocks listed in Table 1 to 40 CFR 80.1426 or in an approved pathway pursuant to 40 CFR 80.1416 to be physically pre-processed at separate facilities before they are delivered to a renewable fuel production facility and used to produce renewable fuel. We do not intend to disrupt this practice. However, in order to assure that EPA can verify that renewable fuel was made with qualifying renewable biomass, through production processes corresponding with approved pathways, we need to impose limits on the type of pre-processing of qualifying feedstocks that will be allowed without complying with the biointermediate requirements. We intend to balance these interests by allowing the pre-processing of feedstocks listed in approved pathways at facilities other than the renewable fuel production facility, but only if the pre-processing results only in a form change such as chopping, crushing, grinding, pelletizing, filtering, compacting/compression, centrifuging, degumming, dewatering/drying, melting, or the addition of water to produce a slurry. To implement this approach, we are proposing to prohibit any person from producing a renewable fuel at more than one facility unless the person uses a biointermediate as defined in 40 CFR 80.1401 or uses feedstocks identified in Table 1 to 40 CFR 80.1426 or in an approved pathway pursuant to 40 CFR 80.1416, which were pre-processed at a different facility, and the pre-processing results only in a form change such as chopping, crushing, grinding, pelletizing, filtering, compacting, compression, centrifuging, degumming, dewatering/drying, melting, or the addition of water to produce a slurry. We seek comment on whether we should expand or narrow the types of pre-processing that should be allowed for feedstocks that are not biointermediates at facilities other than the renewable fuel production facilities. Our intent with this proposed addition is to make clear the specific situations where feedstocks will be allowed to be processed at multiple facilities without being subject to the proposed biointermediates provisions. We believe this change would address comments received in the proposed REGS rule that we were overly inclusive of feedstocks already in use in current pathways. We recognize that the proposed definition of biointermediates does not reflect the full range of potential biointermediates identified to the Agency over the years. As such, we seek comment on whether we should include other potential biointermediates in the proposed definition for the final rulemaking. We will consider adding these additional biointermediates in the definition in the final rulemaking if the potential biointermediate could appropriately be produced, transferred, and used to make renewable fuel within the proposed provisions for biointermediates in this action. Specifically, we intend to base our consideration of including a potential biointermediate on whether there are adequate controls to limit opportunities to generate fraudulent RINs, whether feedstocks used to produce the biointermediate qualify as renewable biomass, and whether there are any unique considerations for the potential biointermediate that would require further regulatory requirements to ensure that generated RINs are valid. Commenters suggesting that we include a potential biointermediate in the final rulemaking should specifically address[[Page 72469]]these issues in their comments. Furthermore, commenters should provide information describing the type of potential biointermediate, the potential volume of renewable fuel(s) that could be produced from it, and the timeline for its development and ultimate production. Based on consideration of information submitted from commenters on potential biointermediates, we would only intend to finalize those potential biointermediates for which we believe that proposed compliance and oversight provisions can be effectively overseen, have a low likelihood of being susceptible to generation of fraudulent RINs, can be verified as being renewable biomass, and would not require further regulatory provisions. To aid commenters as to some of the potential biointermediates we will consider including in the final rulemaking, we are providing a memorandum to the docket that lists potential biointermediates that have come to our attention over the past 5 years.\168\ The list of potential biointermediates described in the memorandum to the docket is not intended to be exhaustive, and we will consider potential biointermediates not included in the memorandum in the final rule.--------------------------------------------------------------------------- \168\ See memorandum to the docket entitled, ``Potential Biointermediates,'' available in the docket for this action.---------------------------------------------------------------------------3. Limits on Biointermediate Transfers We are proposing that renewable fuel production facilities would be able to receive biointermediates from multiple biointermediate production facilities. However, unlike under the proposed REGS rule provisions, under this new proposal biointermediate production facilities would not be able to send biointermediates to multiple renewable fuel production facilities.\169\ We believe this limitation will significantly simplify and improve oversight of RIN generation for renewable fuels produced from biointermediates without unreasonably limiting the production and use of biointermediates. Since the proposed REGS rule, we have become increasingly concerned that, were we to allow biointermediate production facilities to transfer product to multiple renewable fuel production facilities and renewable fuel production facilities to also receive product from multiple biointermediate producers, some parties could take advantage of the increased complexity in tracking relationships and batches to use non-qualifying feedstocks to make renewable fuel or generate fraudulent RINs through double-counting. We believe that without this restriction on biointermediates transfers the use of non-qualifying feedstocks would be more likely to occur and more difficult to detect. In order to effectively audit whether the correct type(s) and volumes of biointermediates were used, all facilities that produced and used biointermediates would need to be audited, which could be a large number of facilities if there were no limits on biointermediate transfers. Such oversight would be unrealistic for EPA or independent third parties to oversee, which would increase opportunities for the generation of invalid or fraudulent RINs and undermine the intent of the program. Since we expect most biointermediate situations will involve relatively small biointermediate production facilities and relatively large renewable fuel production facilities, we have structured the program to provide flexibility where it is most needed and most beneficial for enabling increased renewable fuel production. Namely this new proposal continues to allow multiple biointermediate producers to provide their product to a single renewable fuel production facility to be converted into renewable fuel. We seek comment on our proposal to limit biointermediate transfers such that renewable fuel production facilities can receive biointermediates from multiple biointermediate producers but each biointermediate producer can transfer its product to only one renewable fuel producer.--------------------------------------------------------------------------- \169\ Informally, this type of relationship is called a ``many-to-one'' relationship in that under this approach many biointermediate production facilities could only transfer biointermediates to a single renewable fuel production facility. In contrast, the proposed REGS rule would have allowed biointermediate production facilities to transfer a biointermediate to more than one renewable fuel production facility and for renewable fuel production facilities to receive biointermediates from multiple biointermediate production facilities. Informally, this type of relationship is called a ``many-to-many'' relationship in that biointermediate production facilities could transfer biointermediates to many renewable fuel production facilities, and renewable fuel production facilities could receive biointermediates from many biointermediate production facilities.--------------------------------------------------------------------------- Under this proposal, the biointermediate and renewable fuel producer would need to designate through registration the receiving renewable fuel production facility to which biointermediate would be transferred. As explained in Section VII.B and docket memo, we are proposing anew the REGS provisions that require tracking of the volumes of biointermediate, and associated properties of the biointermediate, through periodic reporting requirements.\170\ Recognizing that biointermediate producers may need to periodically change the receiving renewable fuel production facility, we are proposing that biointermediate producers would be allowed to change their designated renewable fuel production facility no more than one time per calendar year unless, in its sole discretion, EPA determined that it was appropriate to allow the biointermediate producer to change its designated renewable fuel production facility more than once in a year. An example of a situation where EPA would consider it appropriate is the closure of the receiving renewable fuel production facility.--------------------------------------------------------------------------- \170\ These provisions are described in greater detail in the memorandum to the docket, ``Proposed Biointermediate Provisions in the proposed Renewables Enhancement Growth Support Rule,'' available in the docket for this action.--------------------------------------------------------------------------- We do not believe this restriction would impose much practical burden on transfers of biointermediate producers. We note that under the proposed biointermediates program, the newly designated receiving renewable fuel production facility would need to be registered to use the biointermediate, which would in turn require an engineering review by a professional engineer. This process can take several months to arrange for a PE to conduct the engineering review, submit the registration update to EPA, and have it ultimately accepted by EPA. Also, as discussed in Section VII.C.4, under this proposal both the biointermediate and renewable fuel producers would need their respective facilities audited under the QAP program, which would also increase the amount of time needed to change the designated receiving renewable fuel production facility. Consequently, because of the time to conduct new engineering reviews and have new quality assurance plans approved by EPA, we believe that biointermediate producers would be practically limited to only being able to change their receiving renewable fuel production facility once per calendar year. Despite these practical limitations, we seek comment on whether and in which narrow circumstances we should allow biointermediate producers to change their designated receiving renewable fuel production facility more than once a calendar year. We believe that the proposed biointermediate transfer provisions will enable both the production and use of biointermediates and enhance our ability to provide compliance and enforcement oversight. In most cases, we believe that a single renewable fuel production facility would receive all[[Page 72470]]biointermediate produced from a biointermediate production facility. This approach is primarily based on discussions with parties interested in the production and use of biointermediates, and on our understanding of how we believe that biointermediate transfers would be contracted by biointermediate and renewable fuel productions and how renewable fuel production facilities would be designed to accommodate the use of biointermediates. We seek comment on the proposed provisions for biointermediate transfers. We specifically seek comment on specific examples of where the proposed provisions may encourage or restrict the use of biointermediates to generate renewable fuel volumes and the likely volumes that may be affected, as well as on any examples of how the proposed provisions may or may not provide for sufficient oversight or RIN fraud prevention. We also ask that commenters describe any additional or alternative provisions that might allow the use of biointermediates from multiple facilities to be used to produce fuel at multiple renewable fuel producers while still allowing effective oversight.4. Mandatory QAP We are proposing anew the revisions to the RFS QAP to cover biointermediate production and use.\171\ The RFS QAP provides for auditing of renewable fuel production facilities by independent third-party auditors who review feedstock elements, process elements, and RIN generation elements to determine if renewable fuel production is consistent with EPA requirements. These independent third-party auditors verify the RINs generated from these renewable fuel production facilities. Under this proposal, independent third-party auditors would review feedstock and process elements for biointermediate production facilities like those currently reviewed for renewable fuel production facilities. In turn, these independent third-party auditors would verify that the biointermediate was properly produced.

**Load-Date:** December 23, 2021

**End of Document**



[***Federal Register: Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards Pages 74434 - 74526 [FR DOC #2021-27854]***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:64DX-S8G1-F0YC-N2HH-00000-00&context=1516831)

Impact News Service

December 30, 2021 Thursday

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**Length:** 109697 words

**Body**

Washington: Office of the Federal Register has issued the following notice:Environmental Protection Agency-----------------------------------------------------------------------40 CFR Parts 86 and 600Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards; Final RuleFederal Register / Vol. 86 , No. 248 / Thursday, December 30, 2021 / Rules and Regulations[[Page 74434]]-----------------------------------------------------------------------ENVIRONMENTAL PROTECTION AGENCY40 CFR Parts 86 and 600[EPA-HQ-OAR-2021-0208; FRL 8469-01-OAR]RIN 2060-AV13Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions StandardsAGENCY: Environmental Protection Agency (EPA).ACTION: Final rule.-----------------------------------------------------------------------SUMMARY: The Environmental Protection Agency (EPA) is revising the greenhouse gas (GHG) emissions standards under the Clean Air Act section 202(a) for light-duty vehicles for 2023 and later model years to make the standards more stringent. On January 20, 2021, President Biden issued Executive Order 13990 ``Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis'' directing EPA to consider whether to propose suspending, revising, or rescinding the standards previously revised under the ``The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks,'' promulgated in April 2020. EPA is revising the GHG standards to be more stringent than the SAFE rule standards in each model year from 2023 through 2026. EPA is also including temporary targeted flexibilities to address the lead time of the final standards and to incentivize the production of vehicles with zero and near-zero emissions technology. In addition, EPA is making technical amendments to clarify and streamline our regulations.DATES: This final rule is effective on February 28, 2022. The incorporation by reference of certain publications listed in this regulation is approved by the Director of the Federal Register as of February 28, 2022.ADDRESSES: EPA has established a docket for this action under Docket ID No. EPA-HQ-OAR-2021-0208. All documents in the docket are listed on the [*http://www.regulations.gov*](http://www.regulations.gov) website. Although listed in the index, some information is not publicly available, e.g , CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the internet and will be publicly available only in hard copy form. Publicly available docket materials are available electronically through [*http://www.regulations.gov.FOR*](http://www.regulations.gov.FOR) FURTHER INFORMATION CONTACT: Elizabeth Miller, Office of Transportation and Air Quality, Assessment and Standards Division (ASD), Environmental Protection Agency, 2000 Traverwood Drive, Ann Arbor, MI 48105; telephone number: (734) 214-4703; email address: [*miller.elizabeth@epa.gov.SUPPLEMENTARY*](mailto:miller.elizabeth@epa.gov.SUPPLEMENTARY) INFORMATION:Does this action apply to me? This action affects companies that manufacture or sell passenger automobiles (passenger cars) and non-passenger automobiles (light trucks) as defined in 49 CFR part 523. Regulated categories and entities include:---------------------------------------------------------------------------------------------------------------- Examples of potentially Category NAICS codes \A\ regulated entities----------------------------------------------------------------------------------------------------------------Industry.............................. 336111, 336112 Motor Vehicle Manufacturers.Industry.............................. 811111, 811112, 811198, 423110 Commercial Importers of Vehicles and Vehicle Components.Industry.............................. 335312, 811198 Alternative Fuel Vehicle Converters.----------------------------------------------------------------------------------------------------------------\A\ North American Industry Classification System (NAICS). This list is not intended to be exhaustive, but rather provides a guide regarding entities likely to be regulated by this action. 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Final Light-Duty GHG Standards for Model Years 2023-2026 In this final action, the Environmental Protection Agency (EPA) is establishing revised, more stringent national greenhouse gas (GHG) emissions standards for passenger cars and light trucks under section 202(a) of the Clean Air Act (CAA), 42 U.S.C 7521(a). Section 202(a) requires EPA to establish standards for emissions of air pollutants from new motor vehicles which, in the Administrator's judgment, cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare. This action finalizes the standards that EPA proposed in August 2021.\1\--------------------------------------------------------------------------- \1\ 86 FR 43726.--------------------------------------------------------------------------- In response to Executive Order 13990 ``Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis,'' \2\ EPA conducted an extensive review of the existing regulations, which resulted in EPA proposing revised, more stringent standards. In the proposed rule, EPA sought public comment on a range of alternative standards, including alternatives that were less stringent (Alternative 1) and more stringent (Alternative 2) than the proposed standards as well as standards that were even more stringent (in the range of 5-10 grams CO2per mile (g/mile)) for model year (MY) 2026. As discussed in Section I.A.2 of this preamble, based on public comments and EPA's final analyses, EPA is finalizing standards consistent with the standards we proposed for MYs 2023 and 2024, and more stringent than those we proposed for MYs 2025 and 2026. EPA's final standards for MYs 2025 and 2026 are the most stringent standards considered in the proposed rule and establish the most stringent GHG standards ever set for the light-duty vehicle sector. EPA is revising the light-duty vehicle GHG standards for MYs 2023 through 2026, which had been previously revised by the SAFE rule, in part by building on earlier EPA actions and supporting analyses that established or maintained stringent standards. For example, in 2012, EPA issued a final rule establishing light-duty vehicle GHG standards for MYs 2017-2025,\3\ which were supported by analyses of compliance costs, lead time and other relevant factors.\4\ That rule and its analyses also accounted for the development and availability of advanced GHG emission-reducing vehicle technologies, which demonstrated that the standards were appropriate under section 202(a) of the CAA.--------------------------------------------------------------------------- \2\ 86 FR 7037, January 25, 2021. ``[T]he head of the relevant agency, as appropriate and consistent with applicable law, shall consider publishing for notice and comment a proposed rule suspending, revising, or rescinding the agency action[s set forth below] within the time frame specified.'' ``Establishing Ambitious, Job-Creating Fuel Economy Standards: . . . `The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks,' 85 FR 24174 (April 30, 2020), by July 2021. In considering whether to propose suspending, revising, or rescinding the latter rule, the agency should consider the views of representatives from labor unions, States, and industry.'' \3\ EPA's model year emission standards also apply in subsequent model years, unless revised, e.g , MY 2025 standards issued in the 2012 rule also applied to MY 2026 and beyond. \4\ 77 FR 62624, October 15, 2012.--------------------------------------------------------------------------- This final rule is also supported by updated analyses that consider the most recent technical and scientific ***data*** and continuing developments in the automotive industry, as well as public comments on the proposed rule. As noted in the proposed rule, auto manufacturers continue to implement a broad array of advanced gasoline vehicle GHG emission-reducing technologies at a rapid pace throughout their vehicle fleets. Even more notably, vehicle electrification technologies are advancing at a historic pace as battery costs continue to decline and automakers continue to announce plans for an increasing diversity and production volume of zero- and near-zero emission vehicle models. These trends continue to support EPA's decision to revise the existing GHG standards, particularly in light of factors indicating that more stringent near-term standards are feasible at reasonable cost and would achieve significantly greater GHG emissions reductions and public health and welfare benefits than the existing program. In developing this final rule, EPA considered comments received during the public comment period, including during the public hearing. EPA held a two-day virtual public hearing on August 25 and 26, 2021 and heard from approximately 175 speakers. During the public comment period that ended on September 27, 2021, EPA received more than 188,000 written comments. This preamble, together with the accompanying Response to Comments (RTC) document, responds to all significant comments we received on the proposed rule. Comments from automakers that historically have produced primarily internal combustion engine (ICE) vehicles, such as comments by the Alliance for Automotive Innovation (hereafter referred to as ``the Alliance'') as well as comments by several individual automakers, generally supported the proposed standards and did not support the more stringent alternatives on which we requested comment. A common theme from these commenters is that EPA should not overly rely on high penetrations of electric vehicles (EVs) during the period through MY 2026 as a means of compliance for the industry, because of uncertainty about the degree of availability of EV charging infrastructure and market uptake of EVs in this time frame. The United Auto Workers (UAW) commented similarly, generally supporting the proposed standards and flexibilities but not[[Page 74436]]supporting more stringent standards or reduced flexibilities. In contrast, automakers producing (or planning to produce) only EVs (Tesla, Rivian, and Lucid) supported standards more stringent than the proposed standards, and they generally did not support the proposed flexibilities. Comments from organizations representing environmental, public health, and consumer groups as well as comments from many states and local governments generally state that in this rulemaking EPA should address public health, climate change, and social equity in a robust manner. These commenters expressed nearly universal support for the more stringent Alternative 2; many also support an additional 10 g/mile more stringent standards in MY 2026, on which we requested comment. In addition, during the public hearing, many of these commenters, as well as speakers who identified themselves as representing frontline communities, urged the strongest possible emissions standards to address environmental impacts on overburdened communities. There was also broad opposition among these commenters to the proposed flexibilities and incentives, based on concerns that the flexibilities were unnecessary and would compromise the stringency of the program. In addition, tens of thousands of individual public commenters echoed these themes, urging EPA to establish the strongest possible GHG emissions standards. As discussed in Section I.B of this preamble, the final rule revises GHG emissions standards for MYs 2023-2026, incorporating several changes from the proposed standards and flexibilities, based on our consideration of the public comments and updated information and analysis. As discussed in Section I.A.2 of this preamble, it is EPA's assessment that the final standards are reasonable and appropriate, after considering lead time, cost, and other relevant factors under the CAA. As noted in the proposed rule, EPA set previous light-duty vehicle GHG emission standards in joint rulemakings where NHTSA also established CAFE standards. EPA concluded that it was not necessary for this rulemaking to be jointly issued with the National Highway Traffic Safety Administration (NHTSA). EPA has, however, coordinated with NHTSA, both on a bilateral level as well as through the interagency review process for EPA's proposed rule and this final rule facilitated by the Office of Management and Budget (OMB) under E.O 12866.2. Why does EPA believe the final standards are appropriate under the CAA? EPA is revising GHG emissions standards for passenger cars and light trucks under the authority provided by section 202(a) of the CAA. Section 202(a) requires EPA to establish standards for emissions of pollutants from new motor vehicles which, in the Administrator's judgment, cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare. Standards under section 202(a) take effect ``after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period.'' Thus, in establishing or revising section 202(a) standards designed to reduce air pollution that endangers public health and welfare, EPA also must consider technological feasibility, compliance cost, and lead time. EPA also may consider other factors and in previous light-duty vehicle GHG standards rulemakings has considered the impacts of potential GHG standards on the auto industry, cost impacts for consumers, oil conservation, energy security and other energy impacts, as well as other relevant considerations such as safety. When considering these factors for the SAFE rule, EPA identified several factors, primarily costs to manufacturers and upfront costs to vehicle purchasers, as disfavoring maintaining or increasing the stringency of the then-existing standards, and other factors, such as reduced emissions that endanger public health and welfare and reduced operating costs for consumers, as favoring increased stringency (or a lesser degree of reduced stringency from the then-existing standards). In balancing these factors in the SAFE rule, EPA placed greater weight on the former factors (reducing the costs for the manufacturers and reducing upfront costs for vehicle buyers), and thereby decided to make EPA's GHG standards significantly less stringent. However, the purpose of adopting standards under CAA section 202 is to address air pollution that may reasonably be anticipated to endanger public health and welfare. Indeed, reducing air pollution has traditionally been the focus of such standards. EPA has reconsidered how costs, lead time and other factors were weighed in the SAFE rule against the potential for achieving emissions reductions and is reaching a different conclusion as to the appropriate stringency of the standards. In light of the statutory purpose of CAA section 202, the Administrator is placing greater weight on the emission reductions and resulting public health and welfare benefits and, taking into consideration EPA's updated technical analysis, accordingly is establishing significantly more stringent standards for MYs 2023-2026 compared to the standards established by the SAFE rule. We are revising decisions made in the SAFE final rule in accordance with our updated technical analyses for the proposed and final rule. EPA's approach is consistent with Supreme Court decisions affirming that agencies are free to reconsider and revise their prior decisions where they provide a reasonable explanation for their revised decisions.\5\ In this rule, the agency is changing its 2020 position and restoring its previous approach by finding, in light of its updated technical analyses and of the statutory purposes of the CAA and in particular of section 202(a), that it is more appropriate to place greater weight on the magnitude and benefits of reducing emissions that endanger public health and welfare, while continuing to consider compliance costs, lead time and other relevant factors. In addition to the greater emphasis on emissions reductions, the agency's decision to adopt more stringent standards for MYs 2023-2026 is significantly informed by consideration of new information that was not available during the SAFE rule development. Specifically, the agency's decision has been informed by the further technological advancements and successful implementations of electric vehicles since the SAFE rule, by the recent manufacturer announcements signaling an accelerated transition to electrified vehicles, and by additional evidence of sustained and active credit trading as manufacturers take advantage of this additional flexibility for adopting emissions-reducing technologies across the new vehicle fleet.--------------------------------------------------------------------------- \5\ See, e.g , Encino Motorcars, LLC v. Navarro, 136 S. Ct. 2117, 2125 (2016); FCC v. Fox Television Stations, Inc., 556 U.S 502, 515 (2009).--------------------------------------------------------------------------- When considering these factors for the SAFE rule, EPA identified several factors, primarily costs to manufacturers and upfront costs to vehicle purchasers, as disfavoring maintaining or increasing the stringency of the then-existing standards, and other factors, such as reduced emissions that endanger public health and welfare and reduced operating costs for consumers, as favoring increased stringency (or a lesser degree of reduced stringency from the then-existing standards). In balancing these factors in the SAFE rule,[[Page 74437]]EPA placed disproportionate weight on the former factors (reducing the costs for the manufacturers and reducing upfront costs for vehicle buyers), and thereby significantly diminished the relative weight given to the latter factors (increased operating costs and increased harmful emissions). The SAFE rule relied on this re-weighting to justify making EPA's GHG standards significantly less stringent in a way that (under the SAFE rule's own analysis) would have resulted in increases in CO2 emissions of 867 MMT (over the vehicles' lifetimes), increases in criteria pollutants, and resulting increases in adverse health effects (as well as net costs to public welfare).\6\--------------------------------------------------------------------------- \6\ See 85 FR 25111, April 30, 2020.--------------------------------------------------------------------------- The purpose of adopting standards under CAA section 202, however, is to address air pollution that may reasonably be anticipated to endanger public health and welfare. Indeed, reducing air pollution has traditionally been the focus of such standards. EPA has therefore updated its technical analysis of potential emissions control technologies, costs and lead time and reconsidered how those and other factors were weighed in the SAFE rule against the potential for achieving emissions reductions. In light of the statutory purpose of CAA section 202, the Administrator is restoring the appropriate, central consideration given to the emission reductions from motor vehicles and resulting public health and welfare benefits, while still giving appropriate consideration to compliance costs and other factors (including savings in vehicle operating costs). Accordingly, EPA is establishing significantly more stringent standards for MYs 2023-2026 compared to the standards established by the SAFE rule. As discussed in Section III.A of this preamble, the standards take into consideration both the updated analyses for the proposed and final rule and past EPA analyses conducted for previous GHG standards. We are revising decisions made in the SAFE final rule in accordance with Supreme Court decisions affirming that agencies are free to reconsider and revise their prior decisions where they provide a reasonable explanation for their revised decisions. In this rulemaking, the agency is changing its 2020 position and restoring its previous approach by finding, in light of the statutory purposes of the CAA and in particular of section 202(a), that it is more appropriate to place considerable weight on the magnitude and benefits of reducing emissions that endanger public health and welfare, while continuing to consider compliance costs, lead time and other relevant factors. EPA has carefully considered the technological feasibility and cost of the full range of alternatives on which we sought public comment in the proposed rule and the available lead time for manufacturers to comply with them, including the role of flexibilities designed to facilitate compliance. In our technical assessment, discussed in further detail in section VI.A of this preamble, we conclude that there has been ongoing advancement in emissions reducing technologies since the beginning of the EPA's program in 2012, and that there is potential for greater penetration of these technologies across all new vehicles. In addition to improvements in ICE vehicles, recent advancements in electric vehicle technologies have greatly increased the available options for manufacturers to meet more stringent standards. Based on our updated technical analyses and consideration of the public comments, EPA has determined that standards that are more stringent in the later model years (i.e , after MY 2024) than the proposed standards are more appropriate under Section 202(a). In recognition of lead time considerations, for MYs 2023 and 2024, EPA is finalizing the proposed standards for those model years. For MYs 2025 and 2026, EPA has determined that it is appropriate to finalize standards more stringent than those proposed, and, as described in more detail in section I.B of this preamble, we are finalizing standards that are the most stringent of the alternatives considered in the proposed rule for those model years. This approach best meets EPA's responsibility under the CAA to protect human health and the environment, as well as its statutory obligation to consider lead time, feasibility, and cost. The final standards will result in significantly greater reductions of GHG emissions over time compared to the proposed standards. EPA projects that the final standards will result in a reduction of 3.1 billion tons of GHG emissions by 2050--50 percent greater emission reductions than our proposed standards. In addition, the final standards will reduce emissions of some criteria pollutants and air toxics, resulting in important public health benefits, as described in Section V of this preamble. The final standards will result in reduced vehicle operating costs for consumers. The fuel consumption reduced by the final standards will save consumers $210 to $420 billion in retail fuel costs through 2050. Although the up-front technology cost for a MY 2026 vehicle meeting the final standards is estimated to be $1,000 on average, drivers will recover that up-front cost over time through savings in fuel costs. For an individual consumer on average, EPA estimates that, over the lifetime of a MY 2026 vehicle, the reduction in fuel costs will exceed the increase in vehicle costs by $1,080 (see Section VII.J of this preamble). Further, the overall benefits of the program will far outweigh the costs, as EPA estimates net benefits of $120 billion to $190 billion through 2050.\7\ Section I.B of this preamble describes the final standards in more detail.--------------------------------------------------------------------------- \7\ See Section VII.I of this preamble for more detail.--------------------------------------------------------------------------- In developing this final rulemaking, EPA updated the analyses based, in part, on our assessment of the public comments. We agree with commenters who stated that it is appropriate to update certain key inputs--for example, the vehicle baseline fleet and certain technology costs--to reflect newer ***data***. For example, a key update was to the estimates of battery costs for electrified vehicles, which have decreased significantly in recent years. EPA's approach to updating these costs and other inputs to the analyses is described in Section III.A of this preamble. The more stringent standards for MY 2025 and 2026 also provide a more appropriate transition to new standards for MY 2027 and beyond. As stated in the proposal, EPA is planning to initiate a rulemaking to establish multi-pollutant emission standards for MY 2027 and later (see the preamble to the proposed rule at section I.A.3). Consistent with the direction of Executive Order 14037, ``Strengthening American Leadership in Clean Cars and Trucks,'' \8\ this subsequent rulemaking will extend to at least MY 2030 and will apply to light-duty vehicles as well as medium-duty vehicles (e.g , commercial pickups and vans, also referred to as heavy-duty class 2b and 3 vehicles) and is likely to significantly build upon the standards established in this final rule. EPA looks forward to engaging with all stakeholders, including states and our federal partners, to inform the development of these future standards.--------------------------------------------------------------------------- \8\ 86 FR 43583, August 10, 2021.---------------------------------------------------------------------------B. Summary of Final Light-Duty Vehicle GHG Program EPA is finalizing revised GHG standards that begin in MY 2023 and increase in stringency year over year through MY 2026. After consideration of public comments, EPA is adopting the[[Page 74438]]following approach for setting the final standards: For MYs 2023 and 2024, EPA is finalizing the proposed standards. For MY 2025, EPA is finalizing the Alternative 2 standards (the most stringent standards considered in the proposed rule for this MY). For MY 2026, EPA is finalizing the most stringent alternative upon which we sought comment--the Alternative 2 standards with an additional 10 g/mile increased stringency. EPA is finalizing optional flexibility provisions for manufacturers that are more targeted than proposed, primarily to focus most of the flexibilities on MYs 2023-2024 in consideration of lead time for manufacturers and to help them manage the transition to more stringent standards by providing some additional flexibility. We summarize the final flexibility program elements, including an analysis of key public comments, in Sections II.A.4 and II.B of this preamble. This final rule accelerates the rate of stringency increases of the MY 2023-2026 SAFE standards from a roughly 1.5 percent year-over-year rate of stringency increase to a nearly 10 percent stringency increase from MY 2022 to MY 2023, followed by a 5 percent stringency increase in MY 2024, as proposed. In MY 2025, the stringency of the final standards increases by 6.6 percent, culminating with a 10 percent stringency increase in MY 2026, as provided in the Alternative 2 standards with an additional 10 g/mile increased stringency in MY 2026, on which we sought comment. EPA believes the 10 percent increase in stringency in MY 2023 is appropriate given the technological investments industry was on track to make under the 2012 standards and has continued to make beyond what would be required to meet the SAFE rule standards, as well as the compliance flexibilities available within the program. This is illustrated in part by several manufacturers, representing nearly 30 percent of the nationwide auto market, having chosen to participate in the California Framework Agreements. Our decision to finalize the more stringent Alternative 2 standards for MY 2025, and the Alternative 2 standards with a further increase of stringency of 10 g/mile in MY 2026 takes into account the additional lead time available for MYs 2025-2026 compared to MYs 2023-2024. Given this additional lead time, EPA has determined that it is appropriate, particularly in light of the accelerating transition to electrified vehicles that has already begun, to require additional emissions reductions in this time frame. The resulting trajectory of increasing stringency from MYs 2023 to 2026 also takes into account the credit-based emissions averaging, banking and trading flexibilities of the current program, including flexibility provisions that have been retained, and the targeted additional flexibilities that are being extended in this final rule, especially in the early years of the program. EPA has also taken into account manufacturers' ability to generate credits against the existing standards that were relaxed in the SAFE rule for MYs 2021 and 2022, which we are not revising. The final standards for MYs 2023-2026 will achieve significant GHG and other emission reductions and related public health and welfare benefits, while providing consumers with lower operating costs resulting from significant fuel savings. Our analyses described in this final rule support the conclusion that the final standards are appropriate under section 202(a) of the CAA, considering costs, technological feasibility, available lead time, and other factors. In our design and analyses of the final program, and our overall updated assessment of feasibility, EPA took into account the decade-long light-duty vehicle GHG emission reduction program in which the auto industry has introduced a wide lineup of ever more fuel-efficient, GHG-reducing technologies that are already present in much of the fleet and will enable the industry to achieve the standards established in this rule. As explained in the preamble to the proposed rule, in light of the design cycle timing for manufacturers of light-duty vehicles, EPA reasonably expects that the vehicles that automakers will be selling during the first years of the MY 2023-2026 program were already designed before the less stringent SAFE standards were adopted. Most automakers have launched ambitious plans to develop and produce increasing numbers of zero- and near-zero-emission vehicles. EPA recognizes that during the near-term timeframe of the standards, the new vehicle fleet likely will continue to consist predominantly of gasoline-fueled vehicles, although the volumes of electrified vehicles will continue to increase, particularly in MYs 2025 and 2026. In this preamble and the Regulatory Impact Analysis (RIA), we provide analyses supporting our assessment that the final standards for MYs 2023 through 2026 are achievable primarily through the application of advanced gasoline vehicle technologies but with a growing percentage of electrified vehicles. We project that during the four-year ramp up of the stringency of the GHG standards, the standards can be met with gradually increasing sales of plug-in electric vehicles in the U.S , from about 7 percent market share in MY 2023 (including both fully electric vehicles (EVs) and plug-in hybrid vehicles (PHEVs)) up to about 17 percent in MY 2026. In MY 2020, EVs and PHEVs represented about 2.2 percent of U.S new vehicle production.\9\ From January through September 2021, EVs and PHEVs represented 3.6 percent of total U.S light-duty vehicle sales,\10\ and are projected to be 4.1 percent of production by the end of MY 2021.\11\ This rule is expected to result in an increase in penetration of EV and PHEV vehicles from today's levels, and we believe the projected penetrations are reasonable when considering the results of our analysis as well as these trends in the growth of EV market share, as well as the proliferation of recent automaker announcements on plans to transition toward an electrified fleet (which we discuss in Section III.C of this preamble). Projections of future EV market share also increasingly show rates of EV penetration commensurate with what we project under the final standards.\12\ \13\ \14\ Numerous automaker announcements of a rapidly increasing focus on EV and PHEV production (see Section III.C of this preamble), which were reiterated in their public comments, show that automakers are already preparing for rapid growth in EV penetration. EPA finds that, given[[Page 74439]]the rate and breadth of these announcements across the industry, the levels of EV penetration we project to occur are appropriate. As described elsewhere in this preamble, based on our analysis of the final standards, we believe that the targeted incentives and flexibilities that we are finalizing for the early years of the program will further address lead time considerations as well as support the acceleration of automakers' introduction and sales of advanced technologies, including zero and near-zero-emission technologies.--------------------------------------------------------------------------- \9\ ``The 2021 EPA Automotive Trends Report, Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975,'' EPA-420R-21023, November 2021. \10\ Argonne National Laboratory, ``Light Duty Electric Drive Vehicles Monthly Sales Updates,'' September 2021, accessed on October 20, 2021 at: [*https://www.anl.gov/es/light-duty-electric-drive-vehicles-monthly-sales-updates*](https://www.anl.gov/es/light-duty-electric-drive-vehicles-monthly-sales-updates). \11\ ``The 2021 EPA Automotive Trends Report, Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975,'' EPA-420R-21023, November 2021. \12\ Bloomberg New Energy Finance (BNEF), BNEF EV Outlook 2021, Figure 5. Accessed on November 1, 2021 at [*https://about.bnef.com/electric-vehicle-outlook*](https://about.bnef.com/electric-vehicle-outlook)/ (Figure 5 indicates U.S BEV+PHEV penetrations of approximately 7% in 2023, 9% in 2024,11% in 2025 and 15% in 2026). \13\ IHS Markit, ``US EPA Proposed Greenhouse Gas Emissions Standards for Model Years 2023-2026; What to Expect,'' August 9, 2021. Accessed on October 28, 2021 at [*https://ihsmarkit.com/research-analysis/us-epa-proposed-greenhouse-gas-emissions-standards-MY2023-26.html*](https://ihsmarkit.com/research-analysis/us-epa-proposed-greenhouse-gas-emissions-standards-MY2023-26.html) (Table indicates 12.2% in 2023, 16% in 2024, 20.1% in 2025 and 24.3% in 2026). \14\ Rhodium Group, ``Pathways to Build Back Better: Investing in Transportation Decarbonization,'' May 13, 2021. Accessed on November 1, 2021 at [*https://rhg.com/research/build-back-better-transportation/*](https://rhg.com/research/build-back-better-transportation/) (Figure 3 indicates EV penetration of 11% to 19% in 2026 under a current policy scenario).--------------------------------------------------------------------------- We describe additional details of the final standards below and in later sections of the preamble as well as in the RIA.1. Final Revised GHG Emissions Standards As with EPA's previous light-duty GHG programs, as proposed, EPA is finalizing footprint-based standards curves for both passenger cars and light trucks (throughout this action, ``trucks'' or ``light trucks'' refers to light-duty trucks). Each manufacturer has a unique standard for the passenger cars category and another for the truck category \15\ for each MY based on the sales-weighted footprint-based CO2targets \16\ of the vehicles produced in that MY.--------------------------------------------------------------------------- \15\ Passenger cars include cars and smaller cross-overs and SUVs, while the truck category includes larger cross-overs and SUVs, minivans, and pickup trucks. \16\ Because compliance is based on the full range of vehicles in a manufacturer's car and truck fleets, with lower-emitting vehicles compensating for higher-emitting vehicles, the emission levels of specific vehicles within the fleet are referred to as targets, rather than standards.--------------------------------------------------------------------------- EPA is finalizing the proposed standards for MYs 2023 and 2024, the Alternative 2 standards for MY 2025, and the Alternative 2 standards minus 10 g/mile for MY 2026. In the proposed rule, EPA requested comment on standards for MY 2026 that would result in fleet average target levels that are in the range of 5-10 g/mile lower (i.e , more stringent) than the levels proposed in each of the three alternatives, and is finalizing a level 10 g/mile lower than the proposed rule's Alternative 2 for MY 2026. Figure 1 shows EPA's final standards, expressed as average projected fleetwide GHG emissions targets (cars and trucks combined), through MY 2026. For comparison, the figure also shows the corresponding targets for the proposed standards (Proposal), the Alternative 2 standards reduced by 10 g/mile in MY 2026 (Alternative 2 minus 10), as described further in Section II.C of this preamble, the SAFE standards, and the 2012 FRM standards.\17\ The projected fleet targets for the final standards increase in stringency in MY 2023 by almost 10 percent (compared to the SAFE rule standards in MY 2022), followed by stringency increases of 5 percent in MY 2024, 6.6 percent in MY 2025 and 10 percent in MY 2026. As with all EPA vehicle emissions standards, the MY 2026 standards will remain in place for all subsequent MYs, unless and until the standards for future MYs are revised in a subsequent rulemaking. As noted previously, EPA is planning a future rulemaking to establish new emissions standards for MY 2027 and beyond.--------------------------------------------------------------------------- \17\ The Proposal and Alternative 2 minus 10 standards are the less and more stringent alternatives EPA analyzed in addition to the final rule. See Sections II.C and III.D of this preamble for more information these alternatives.--------------------------------------------------------------------------- Table 1 presents the projected overall industry fleetwide CO2-equivalent emission compliance target levels, based on EPA's final standards presented in Figure 1. The industry fleet-wide estimates in Table 1 are projections based on EPA's modeling, taking into consideration projected fleet mix and footprints for each manufacturer's fleet in each model year. Table 2 presents projected industry fleet average year-over-year percent reductions (and cumulative reductions from 2022 through 2026) comparing the standards under the SAFE rule and the revised final standards. See Section II.A of this preamble for a full discussion of the final standards and presentations of the footprint standards curves.BILLING CODE 6560-50-P[[Page 74440]][GRAPHIC] [TIFF OMITTED] TR30DE21.000BILLING CODE 6560-50-C Table 1--Projected Industry Fleet-Wide CO2 Compliance Targets for MYs 2023-2026 [g/mile] \*---------------------------------------------------------------------------------------------------------------- Light trucks Model year Cars CO2 (g/ CO2 (g/mile) Fleet CO2 (g/ mile) mile)----------------------------------------------------------------------------------------------------------------2022 (SAFE reference)........................................... 181 261 2242023............................................................ 166 234 2022024............................................................ 158 222 1922025............................................................ 149 207 1792026 and later.................................................. 132 187 161 ----------------------------------------------- Total change 2022-2026...................................... -49 -74 -63----------------------------------------------------------------------------------------------------------------\* The combined car/truck CO2 targets are a function of projected car/light truck shares, which have been updated for this final rule (MY 2020 is 44 percent car and 56 percent light trucks while the projected mix changes to 47 percent cars and 53 percent light trucks by MY 2026). Table 2--Projected Industry Fleet Average Target Year-Over-Year Percent Reductions-------------------------------------------------------------------------------------------------------------------------------------------------------- SAFE rule standards \* Proposed standards \*\* Final standards \*\* ----------------------------------------------------------------------------------------------------------- Trucks Combined Trucks Combined Trucks Combined Cars (%) (%) (%) Cars (%) (%) (%) Cars (%) (%) (%)--------------------------------------------------------------------------------------------------------------------------------------------------------2023........................................ 1.7 1.7 2.1 8.4 10.4 9.8 8.4 10.4 9.82024........................................ 0.6 1.5 1.4 4.7 5.0 5.1 4.8 4.9 5.12025........................................ 2.3 1.7 2.2 4.8 5.0 5.0 5.7 7.0 6.62026........................................ 1.8 1.6 1.9 4.8 5.0 5.0 11.4 9.5 10.3--------------------------------------------------------------------------------------------------------------------------------------------------------[[Page 74441]] Cumulative.............................. 6.3 6.3 7.4 20.9 23.1 22.8 27.1 28.3 28.3--------------------------------------------------------------------------------------------------------------------------------------------------------\* Note the percentages shown for the SAFE rule targets have changed slightly from the proposed rule, due to the updates in our base year fleet from MY 2017 to MY 2020 manufacturer fleet ***data***.\*\* These are modeled results based on projected fleet characteristics and represent percent reductions in projected targets, not the standards (which are the footprint car/truck curves), associated with that projected fleet (see Section III of this preamble for more detail on our modeling results).2. Final Compliance Flexibilities and Advanced Technology Incentives EPA received many comments on the proposed flexibility provisions. After considering the comments along with our updated analyses, we are finalizing flexibility provisions that are narrower than proposed in several aspects, primarily to focus the additional flexibilities in MYs 2023-2024 to help manufacturers manage the transition to more stringent standards by providing some additional flexibility in the near-term. We summarize the final flexibility program elements, including a summary and analysis of key comments, in Section II.B of this preamble. EPA proposed a set of extended or additional temporary compliance flexibilities and incentives that we believed would be appropriate given the stringency and lead time of the proposed standards. We proposed four types of flexibilities/incentives, in addition to those already available under EPA's previously established regulations: (1) A limited extension of carry-forward credits generated in MYs 2016 through 2020 beyond the normal five years otherwise specified in the regulations; (2) an extension of the advanced technology vehicle multiplier credits for MYs 2022 through 2025 with a cumulative credit cap; (3) full-size pickup truck incentives for strong hybrids or similar performance-based credit for MYs 2022 through 2025 (provisions which were removed in the SAFE rule); and (4) an increase of the off-cycle credits menu cap from 10 g/mile to 15 g/mile. EPA also proposed to remove the multiplier incentives for natural gas fueled vehicles for MYs 2023-2026. The GHG program includes existing provisions initially established in the 2010 rule, which set the MYs 2012-2016 GHG standards, for how credits may be used within the program. These averaging, banking, and trading (ABT) provisions include credit carry-forward, credit carry-back (also called deficit carry-forward), credit transfers (within a manufacturer), and credit trading (across manufacturers). These ABT provisions define how credits may be used and are integral to the program, essentially enabling manufacturers to plan compliance over a multi-year time period. The current program allows credits to be carried forward for 5 years (i.e , a 5-year credit life). EPA proposed a two-year extension of MYs 2016 credit life and a one-year extension of MYs 2017-2020 credit life. EPA is finalizing a more limited approach to credit life extension, adopting only a one-year extension for MY 2017-2018 credits, as shown in Table 3 below. EPA was persuaded by public comments from non-governmental organizations (NGOs), some states including California, and EV manufacturers that the proposed credit life extension overall was unnecessary and could diminish the stringency of the final standards. While several auto industry commenters suggested even additional credit life extensions, EPA's assessment is that the standards are feasible with the more narrowed credit extensions of one-year for the MYs 2017 and 2018 credits, which make more credits available in the early years of the program, MYs 2023 and 2024, to help manufacturers manage the transition to more stringent standards by providing some additional flexibility. For all other credits generated in MY 2016 and later, credit carry-forward remains unchanged at five years. Table 3--Final Extension of Credit Carry-Forward for MY 2016-2020 Credits-------------------------------------------------------------------------------------------------------------------------------------------------------- MYs credits are valid under extension MY credits are banked ------------------------------------------------------------------------------------------------------------- 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026--------------------------------------------------------------------------------------------------------------------------------------------------------2016...................................... ........ x x x x x ........ ........ ........ ........ ........2017...................................... ........ x ........ x x x x + ........ ........ ........2018...................................... ........ ........ x x ........ x x x + ........ ........2019...................................... ........ ........ ........ x x ........ x x x ........ ........2020...................................... ........ ........ ........ ........ x ........ x x x x ........2021...................................... ........ ........ ........ ........ ........ ........ x x x x x--------------------------------------------------------------------------------------------------------------------------------------------------------x = Previous program. + = Additional years included in Final Rule. The previous GHG program also includes temporary incentives through MY 2021 that encourage the use of advanced technologies such as electric, hybrid, and fuel cell vehicles, as well as incentives for full-size pickups using strong hybridization or technologies providing similar emissions reductions to hybrid technology. The full-size pickup incentives originally (in the 2012 rule) were available through MY 2025, but the SAFE rule removed these incentives for MYs 2022 through 2025. When EPA established these incentives in the 2012 rule, EPA recognized that they would reduce the effective stringency of the standards, but believed that it was worthwhile to have a limited near-term loss of emissions reduction benefits to increase the potential for far greater emissions reduction and technology diffusion benefits in the longer term.\18\ EPA believed that the temporary regulatory incentives would[[Page 74442]]help bring low emission technologies to market more quickly than an effective market would in the absence of incentives.\19\ \20\ With these same goals in mind for this program, EPA proposed multiplier incentives from MYs 2022 through MY 2025 with a cap on multiplier credits and to reinstate the full-size pickup incentives also for MYs 2022 through 2025. The proposed incentives were intended as a temporary measure supporting the transition to zero-emission vehicles and to provide additional flexibility in meeting the MY 2023-2026 proposed standards.--------------------------------------------------------------------------- \18\ See Tables III-2 and III-3, 77 FR 62772, October 15, 2012. \19\ 77 FR 62812, October 15, 2012. \20\ Manufacturers use of the incentives is provided in ``The 2021 EPA Automotive Trends Report, Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975,'' EPA-420R-21023, November 2021.--------------------------------------------------------------------------- However, EPA is finalizing a narrower timeframe for the temporary multiplier and full-size pickup incentives, focusing the incentives only in MYs 2023-2024, to help manufacturers manage the transition to more stringent standards by providing some additional flexibility. After considering comments and further analyzing the potential impact of multipliers on costs and emissions reductions, EPA is adopting temporary multipliers for MYs 2023-2024 at a level lower than proposed while finalizing the proposed credit cap of 10 g/mile cumulatively, as further discussed in Section II.B.1 of this preamble. EPA is not finalizing multiplier incentives for MY 2022 or MY 2025 and is instead sunsetting them at the end of MY 2024. Under this approach, manufacturers utilizing this optional incentive program would need to produce more advanced technology vehicles (EVs, PHEVs or fuel cells) in order to fully utilize multiplier credits before reaching the cap, thus incentivizing greater volumes of these zero and near-zero emission vehicles. Similarly, EPA is finalizing temporary full-size pickup incentives only for MYs 2023-2024 and sunsetting them at the end of MY 2024. These provisions are further discussed in Section II.B.2 of this preamble. EPA is finalizing our proposed removal of the extended multiplier incentives for natural gas vehicles (NGVs) after MY 2022, which was added by the SAFE rule, because NGVs are not a near-zero emissions technology and EPA believes multipliers are no longer necessary or appropriate for these vehicles. NGV multiplier incentives are discussed in Section II.B.1.iii of this preamble. For the off-cycle credits program, EPA is finalizing our proposed incentive to increase the menu cap from 10 to 15 g/mile, but for a more limited time frame. EPA is finalizing this cap increase beginning in MY 2023 through MY 2026, instead of beginning the cap increase in MY 2020 as in the proposed rule. Off-cycle credits are intended to reflect real-world emissions reductions for technologies not captured on the CO2 compliance test cycles. EPA agrees with public comments from many NGOs and states that increasing the off-cycle credit menu cap starting in MY 2020 would unnecessarily provide additional credit opportunities during the years of the weakened SAFE standards in MYs 2021 and 2022. EPA also is finalizing revised definitions for three off-cycle technologies to begin in MY 2023, to ensure real-world emission reductions consistent with the menu credit values. See Section II.B.3 of this preamble for further information.C. Analytical Support for the Final Revised Standards EPA updated several key inputs to our analysis for this final rule based on public comments and newer available ***data***, as detailed in Section III.A of this preamble, including updates to the baseline vehicle fleet and battery costs, issues on which we received a substantial number of public comments. We have updated the baseline vehicle fleet to reflect the MY 2020 fleet rather than the MY 2017 fleet used in the analysis for the proposed rule.\21\ As a result, there is slightly more GHG-reducing technology contained in the baseline fleet and the fleet mix has changed to reflect more light trucks in the fleet (56 percent trucks/44 percent cars, compared to the 50/50 car/truck split in the analysis for the proposed rule).--------------------------------------------------------------------------- \21\ EPA's updated MY 2020 baseline fleet is generally consistent with that used by NHTSA in their recent CAFE NPRM (86 FR 49602, September 3, 2021).--------------------------------------------------------------------------- In the proposed rule, we noted that the electrified vehicle battery costs used in the SAFE FRM, which were carried over to the proposed rule analysis, could be lower based on EPA's latest assessment and that updating those costs for the proposed rule would not have had a notable impact on overall cost estimates. This conclusion was based in part on our expectation that electrification would continue to play a relatively modest role in our projections of compliance paths for the proposed standards, as it had in all previous analyses of standards with a similar level of stringency. We also noted in the proposal that we could update battery costs for the final rule and requested comment on whether our choice of modeling inputs such as these should be modified for the final rule analysis. In response to the public comments regarding EPA's battery cost estimates used in the proposed rule, EPA has updated the battery costs for the final rule analysis based on the most recent available ***data***, resulting in lower projected battery costs compared to our proposed rule. EPA agrees with commenters that battery costs used in the proposed rule were higher than recent evidence supports. Consideration of the current costs of batteries for electrified vehicles, as widely reported in the trade and academic literature and further supported by our battery cost modeling tools, led EPA to adjust the battery costs to more accurately account for these trends. Based on an updated assessment, described further in Section III.A of this preamble and Chapter 2 of the RIA, we determined that battery costs should be reduced by about 25 percent. More information on the public comments we received and the revised inputs leading to this change is available in Section III.A of this preamble and Chapter 2 of the RIA. Other key changes to our analysis since the proposed rule include:--Updated projections from EIA (AEO 2021), including Gross Domestic Product, number of households, vehicle miles traveled (VMT) growth rates and historic fleet ***data***--Updated energy security cost per gallon factors--Updated tailpipe and upstream emission factors--High compression ratio level 2 (HCR2) technology was removed as a separate compliance option within the model although HCR0 and HCR1 remain as options 22 23--------------------------------------------------------------------------- \22\ For further details on HCR definitions, see Chapter 2.3.2 of the RIA. For HCR implementation in CCEMS, see Chapter 4.1.1.3 of the RIA. \23\ See Section III.A of this preamble.-----------------------------------------------------------------------------Increased utilization of BEVs with a 300 mile range and lower utilization of BEVs with a 200 mile range--Updated credit banks reflecting more recent information from EPA's manufacturer certification and compliance ***data***--Updated valuation of off-cycle credits (lower costs) and updated assumptions for off-cycle credit usage across manufacturers--Updated vehicle sales elasticity (changed from -1 percent to -0.4 percent) based on a recent EPA study \24\--------------------------------------------------------------------------- \24\ See Section VII.B of this preamble. More information on these and other analysis updates is in Section III.A of this preamble.[[Page 74443]] As with our earlier analyses, including SAFE and the August 2021 EPA proposed rule, for this final rule EPA used a model to simulate the decision process of auto manufacturers in choosing among the emission reduction technologies available to incorporate in vehicles across their fleets. The model takes into account both the projected costs of technologies and the relative ability of each of these technologies to reduce GHG emissions. This process identifies potential pathways for manufacturers to comply with a given set of GHG standards. EPA then estimates projected average and total costs for manufacturers to produce these vehicles to meet the standards under evaluation during the model years covered by the analysis. In addition to projecting the technological capabilities of the industry and estimating compliance costs for each of the four affected model years (MYs 2023-2026), EPA has considered the role of the averaging, banking, and trading system that has been available and extensively used by the industry since the beginning of the light-duty vehicle GHG program in model year 2012. Our analysis of the current and anticipated near-future usage of the GHG credit mechanisms reinforces the trends we identified in our other analyses showing widespread technological advancement in the industry at reasonable per-vehicle costs. Together, these analyses support EPA's conclusion under section 202(a) of the CAA that technologically feasible pathways are available at reasonable costs for automakers to comply with EPA's standards during each of the four model years. We discuss these analyses and their results further in Section III of this preamble. We also estimate the GHG and non-GHG emission impacts (tailpipe and upstream) of the standards. EPA then builds on the estimated changes in emissions and fuel consumption to calculate projected net economic impacts from these changes. Key economic inputs include: Measures of health impacts from changes in criteria pollutant emissions; a value for the vehicle miles traveled ``rebound effect;'' estimates of energy security impacts of changes in fuel consumption; the social costs of GHGs; and costs associated with crashes, noise, and congestion from additional rebound driving. Our overall analytical approach generates key results for the following metrics: Incremental costs per vehicle (industry-wide averages and by manufacturer); total vehicle technology costs for the auto industry; GHG emissions reductions and criteria pollutant emissions reductions; penetration of key GHG-reducing technologies across the fleet; consumer fuel savings; oil reductions; and net societal costs and benefits. We discuss these analyses in Sections III, IV, V, and VII of this preamble as well as in the RIA.D. Summary of Costs, Benefits and GHG Emission Reductions of the Final Program EPA estimates that the total benefits of this final rule far exceed the total costs--the net present value of benefits is between $120 billion to $190 billion (annualized net benefits between $6.2 billion to $9.5 billion). Table 4 below summarizes EPA's estimates of total discounted costs, fuel savings, and benefits. The results presented here project the monetized environmental and economic impacts associated with the final program during each calendar year through 2050. The benefits include climate-related economic benefits from reducing emissions of GHGs that contribute to climate change, reductions in energy security externalities caused by U.S petroleum consumption and imports, the value of certain particulate matter-related health benefits, the value of additional driving attributed to the rebound effect, and the value of reduced refueling time needed to fill a more fuel-efficient vehicle. Between $8 and $19 billion of the total benefits through 2050 are attributable to reduced emissions of non-GHG pollutants, primarily those that contribute to ambient concentrations of smaller particulate matter (PM2.5). PM2.5is associated with premature death and serious health effects such as hospital admissions due to respiratory and cardiovascular illnesses, nonfatal heart attacks, aggravated asthma, and decreased lung function. The program will also have other significant social benefits including $130 billion in climate benefits (with the average SC-GHGs at a 3 percent discount rate) and fuel savings of $150 billion to $320 billion exclusive of fuel taxes. For American drivers, who purchase fuel inclusive of fuel taxes, the fuel savings will total $210 billion to $420 billion through 2050 (see Table 44). With these fuel savings, consumers will benefit from reduced operating costs over the vehicle lifetime. Over the lifetime of a MY 2026 vehicle, EPA estimates that the reduction in fuel costs will exceed the increase in vehicle costs by $1,080 for consumers on average. The analysis also includes estimates of economic impacts stemming from additional vehicle use from increased rebound driving, such as the economic damages caused by crashes, congestion, and noise. See Chapter 3 of the RIA for more information regarding these estimates. Table 4--Monetized Discounted Costs, Benefits, and Net Benefits of the Final Program for Calendar Years Through 2050 [billions of 2018 dollars] \a\ \b\ \c\ \d\ \e\---------------------------------------------------------------------------------------------------------------- Present value Annualized value --------------------------------------------------------------- 3% discount 7% discount 3% discount 7% discount rate rate rate rate----------------------------------------------------------------------------------------------------------------Costs........................................... $300 $180 $15 $14Fuel Savings.................................... 320 150 16 12Benefits........................................ 170 150 8.6 8.1Net Benefits.................................... 190 120 9.5 6.2----------------------------------------------------------------------------------------------------------------Notes:\a\ Values rounded to two significant figures; totals may not sum due to rounding. Present and annualized values are based on the stream of annual calendar year costs and benefits included in the analysis (2021-2050) and discounted back to year 2021.[[Page 74444]] \b\ Climate benefits are based on reductions in CO2, CH4 and N2O emissions and are calculated using four different estimates of the social cost of each GHG (SC-GHG model average at 2.5%, 3%, and 5% discount rates; 95th percentile at 3% discount rate), which each increase over time. In this table, we show the benefits associated with the average SC-GHGs at a 3% discount rate but the Agency does not have a single central SC-GHG point estimate. We emphasize the importance and value of considering the benefits calculated using all four SC- GHG estimates and present them later in this preamble. As discussed in Chapter 3.3 of the RIA, a consideration of climate benefits calculated using discount rates below 3 percent, including 2 percent and lower, is also warranted when discounting intergenerational impacts. For further discussion of how EPA accounted for these estimates, please refer to section VI of this preamble and the separate Response to Comments.\c\ The same discount rate used to discount the value of damages from future GHG emissions (SC-GHGs at 5, 3, and 2.5 percent) is used to calculate the present and annualized values of climate benefits for internal consistency, while all other costs and benefits are discounted at either 3% or 7%.\d\ Net benefits reflect the fuel savings plus benefits minus costs.\e\ Non-GHG impacts associated with the standards presented here do not include the full complement of health and environmental effects that, if quantified and monetized, would increase the total monetized benefits. Instead, the non-GHG benefits are based on benefit-per-ton values that reflect only human health impacts associated with reductions in PM2.5 exposure. EPA estimates the average per-vehicle cost to meet the standards to be $1,000 in MY 2026, as shown in Table 5 below. Note that compared to the proposal, the total costs through 2050, shown in Table 4, are somewhat higher, while the per-vehicle costs shown in Table 5 are slightly lower. We discuss this in more detail in Section III.B.2 of this preamble and RIA Chapter 4.1.3 Table 5--Car, Light Truck and Fleet Average Cost per Vehicle Relative to the No Action Scenario [2018 dollars]---------------------------------------------------------------------------------------------------------------- 2023 2024 2025 2026----------------------------------------------------------------------------------------------------------------Car............................................. $150 $288 $586 $596Light Truck..................................... 485 732 909 1,356Fleet Average................................... 330 524 759 1,000---------------------------------------------------------------------------------------------------------------- The final standards will achieve significant reductions in GHG emissions. As seen in Table 6 below, through 2050 the program will achieve more than 3.1 billion tons of GHG emission reductions, which is 50 percent greater emissions reductions than EPA's proposed standards. Table 6--GHG Reductions Through 2050---------------------------------------------------------------------------------------------------------------- Emission impacts relative to no action Percent change from no action---------------------------------------------------------------------------------------------------------------- CH4 (metric N2O (metric CO2 (million metric tons) tons) tons) CO2 CH4 N2O-----------------------------------------------------------------------------------------------------------------3,125.......................... -3,272,234 -96,735 -9% -8% -8%----------------------------------------------------------------------------------------------------------------E. How has EPA considered environmental justice in this final rule? Executive Order 12898 (59 FR 7629, February 16, 1994) establishes federal executive policy on environmental justice. It directs federal agencies, to the greatest extent practicable and permitted by law, to make achieving environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations in the United States (U.S ). EPA defines environmental justice as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.\25\--------------------------------------------------------------------------- \25\ Fair treatment means that ``no group of people should bear a disproportionate burden of environmental harms and risks, including those resulting from the negative environmental consequences of industrial, governmental and commercial operations or programs and policies.''. Meaningful involvement occurs when ``(1) potentially affected populations have an appropriate opportunity to participate in decisions about a proposed activity [e.g , rulemaking] that will affect their environment and/or health; (2) the public's contribution can influence [the EPA's rulemaking] decision; (3) the concerns of all participants involved will be considered in the decision-making process; and (4) [the EPA will] seek out and facilitate the involvement of those potentially affected'' A potential EJ concern is defined as ``the actual or potential lack of fair treatment or meaningful involvement of minority populations, low-income populations, tribes, and indigenous peoples in the development, implementation and enforcement of environmental laws, regulations and policies.'' See ``Guidance on Considering Environmental Justice During the Development of an Action.'' Environmental Protection Agency, [*https://www.epa.gov/environmentaljustice/guidance-considering-environmental-justice-during-development-action*](https://www.epa.gov/environmentaljustice/guidance-considering-environmental-justice-during-development-action). See also [*https://www.epa.gov/environmentaljustice.---------------------------------------------------------------------------*](https://www.epa.gov/environmentaljustice.---------------------------------------------------------------------------) Executive Order 14008 (86 FR 7619, February 1, 2021) also calls on federal agencies to make achieving environmental justice part of their respective missions ``by developing programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts.'' It declares a policy ``to secure environmental justice and spur economic opportunity for disadvantaged communities that have been historically marginalized and overburdened by pollution and under-investment in housing, transportation, water and wastewater infrastructure and health care.'' Under E.O 13563, federal agencies may consider equity, human dignity, fairness, and distributional considerations in their regulatory analyses, where appropriate and permitted by law. EPA's 2016 ``Technical Guidance for Assessing Environmental Justice in Regulatory Analysis'' provides recommendations on conducting the highest quality analysis feasible, recognizing that ***data*** limitations, time[[Page 74445]]and resource constraints, and analytic challenges will vary by media and regulatory context.\26\--------------------------------------------------------------------------- \26\ ``Technical Guidance for Assessing Environmental Justice in Regulatory Analysis.'' Epa.gov, Environmental Protection Agency, [*https://www.epa.gov/sites/production/files/2016-06/documents/ejtg\_5\_6\_16\_v5.1.pdf*](https://www.epa.gov/sites/production/files/2016-06/documents/ejtg_5_6_16_v5.1.pdf). (June 2016).--------------------------------------------------------------------------- EPA's mobile source regulatory program has historically reduced significant amounts of both GHG and non-GHG pollutants to the benefit of all U.S residents, including populations that live near roads and in communities with environmental justice (EJ) concerns. EJ concerns may arise in the context of this rulemaking in two key areas. First, people of color and low-income populations may be especially vulnerable to the impacts of climate change. As discussed in Section IV.C of this preamble, this rulemaking will mitigate the impacts of climate change by achieving significant GHG emission reductions, which will benefit populations that may be especially vulnerable to various forms of damages associated with climate change. Second, in addition to significant climate-change benefits, the standards will also impact non-GHG emissions. As discussed in Section VII.L.2 of this preamble, numerous studies have found that environmental hazards such as air pollution are more prevalent in areas where people of color and low-income populations represent a higher fraction of the population compared with the general population. There is substantial evidence, for example, that people who live or attend school near major roadways are more likely to be of a non-White race, Hispanic ethnicity, and/or low socioeconomic status (see Section VII.L.2 of this preamble). We project that this rule will, over time, result in reductions of non-GHG tailpipe emissions and emissions from upstream refinery sources. We also project that the rule will result in small increases of non-GHG emissions from upstream Electric Generating Unit (EGU) sources. Overall, there are substantial PM2.5-related health benefits associated with the non-GHG emissions reductions that this rule will achieve. The benefits from these emissions reductions, as well as the adverse impacts associated with the emissions increases, could potentially impact communities with EJ concerns, though not necessarily immediately and not equally in all locations. The air quality information needed to perform a quantified analysis of the distribution of such impacts was not available for this rulemaking. We therefore recommend caution when interpreting these broad, qualitative observations. As noted previously, EPA intends to develop a subsequent rule to control emissions of GHGs as well as criteria and air toxic pollutants from light- and medium-duty vehicles for MYs 2027 and beyond. We are considering how to project air quality impacts from the changes in non-GHG emissions for that future rulemaking (see Section V.C of this preamble).F. Affordability and Equity In addition to considering environmental justice impacts, we have examined the effects of the standards on affordability of vehicles and transportation services for low-income households in Section VII.L of this preamble and Chapter 8.4 of the RIA. As with the effects of the standards on vehicle sales discussed in Section VII.B of this preamble, the effects of the standards on affordability and equity depend in part on two countervailing effects: The increase in the up-front costs of new vehicles subject to more stringent standards, and the decrease in operating costs from reduced fuel consumption over time. The increase in up-front new vehicle costs has the potential to increase the prices of used vehicles, to make credit more difficult to obtain, and to make the least expensive new vehicles less desirable compared to used vehicles. The reduction in operating costs over time has the potential to mitigate or reverse all these effects. Lower operating costs on their own increase mobility (see RIA Chapter 3.1 for a discussion of rebound driving). While social equity involves issues beyond income and affordability, including race, ethnicity, gender, gender identification, and residential location, the potential effects of the standards on lower-income households are of great importance for social equity and reflect these contrasting forces. The overall effects on vehicle ownership, including for lower-income households, depend heavily on the role of fuel consumption in vehicle sales decisions, as discussed in Section VII.M of this preamble. At the same time, lower-income households own fewer vehicles per household and are more likely to buy used vehicles than new. In addition, for lower-income households, fuel expenditures are a larger portion of household income, so the fuel savings that will result from this rule may be more impactful to these consumers. Thus, the benefits of this rule may be stronger for lower-income households even (or especially) if they buy used vehicles: As vehicles meeting the standards enter the used vehicle market, they will retain the fuel economy/GHG-reduction benefits, and associated fuel savings, while facing a smaller portion of the upfront vehicle costs; see Section VII.J of this preamble. The reduction in operating costs may also increase access to transportation services, such as ride-hailing and ride-sharing, where the lower per-mile costs may play a larger role than up-front costs in pricing. As a result, lower-income consumers may be affected more from the reduction in operating costs than the increase in up-front costs. The analysis for this final rule projects that EVs and PHEVs will gradually increase to about 17 percent market share by MY 2026, although the majority of vehicles produced in the time frame of the final standards will continue to be gasoline-fueled vehicles (see Section III.B.3 of this preamble). EPA has heard from some environmental justice groups and Tribes that limited access to electric vehicles and charging infrastructure for electric vehicles can be a barrier for purchasing EVs. A recent report from the National Renewable Energy Laboratory estimates that public and workplace charging is keeping up with projected needs, based on Level 2 and fast charging ports per plug-in EV.\27\ Comments received on the proposed rule point out both the higher up-front costs of EVs as challenges for adoption and their lower operating and maintenance costs as incentives for adoption. As noted previously, the higher penetration of EVs in the current analysis as compared to that of the proposed rule is in part an outgrowth of updated estimates of battery costs, which reduce the projected costs of EVs as a compliance path and is consistent with expectations that cost parity with conventional vehicles is in the process of being attained in an increasing number of market segments. A number of auto manufacturers commented on the importance of consumer education, purchase incentives, and charging infrastructure development for promoting adoption of electric vehicles. Some NGOs commented that EV purchase incentives should focus on lower-income households, because they are more responsive to price incentives than higher-income households. EPA will continue to monitor and study affordability issues related to electric[[Page 74446]]vehicles as their prevalence in the vehicle fleet increases.--------------------------------------------------------------------------- \27\ Brown, A., A. Schayowitz, and E. Klotz (2021). ``Electric Vehicle Infrastructure Trends from the Alternative Fueling Station Locator: First Quarter 2021.'' National Renewable Energy Laboratory Technical Report NREL/TP-5400-80684, [*https://afdc.energy.gov/files/u/publication/electric\_vehicle\_charging\_infrastructure\_trends\_first\_quarter\_2021.pdf*](https://afdc.energy.gov/files/u/publication/electric_vehicle_charging_infrastructure_trends_first_quarter_2021.pdf), accessed 11/3/2021.---------------------------------------------------------------------------II. EPA Standards for MY 2023-2026 Light-Duty Vehicle GHGsA. Model Year 2023-2026 GHG Standards for Light-Duty Vehicles, Light-Duty Trucks, and Medium-Duty Passenger Vehicles As noted, the transportation sector is the largest U.S source of GHG emissions, making up 29 percent of all emissions.\28\ Within the transportation sector, light-duty vehicles are the largest contributor, 58 percent, to transportation GHG emissions in the U.S \29\ EPA has concluded that more stringent standards are appropriate in light of our assessment of the need to reduce GHG emissions, technological feasibility, costs, lead time, and other factors. The MY 2023 through MY 2026 program that EPA is finalizing in this action is based on our assessment of the near-term potential of technologies already available and present in much of the fleet. This program also will serve as an important transition to a longer-term program beyond MY 2026. The following section provides details on EPA's revised standards and related provisions.--------------------------------------------------------------------------- \28\ Inventory of U.S Greenhouse Gas Emissions and Sinks: 1990-2019 (EPA-430-R-21-005, published April 2021). \29\ Ibid.--------------------------------------------------------------------------- EPA is finalizing revised, more stringent standards to control the emissions of GHGs from MY 2023 and later light-duty vehicles.\30\ Carbon dioxide (CO2) is the primary GHG resulting from the combustion of vehicular fuels.\31\ The standards regulate CO2on a grams per mile (g/mile) basis, which EPA defines by separate footprint curves that apply to vehicles in a manufacturer's car and truck fleets.\32\ The final standards apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles (MDPVs).\33\ As an overall group, they are referred to in this preamble as light-duty vehicles or simply as vehicles. In this preamble, passenger cars may be referred to as ``cars,'' and light-duty trucks and MDPVs as ``light trucks'' or ``trucks.'' Based on compliance with the final revised standards, the industry-wide average emissions target for new light-duty vehicles is projected to be 161 g/mile of CO2in MY 2026.\34\ Except for a limited extension of credit carry-forward provisions for certain model years discussed in Section II.A.4 of this preamble, EPA is not changing existing averaging, banking, and trading program elements.--------------------------------------------------------------------------- \30\ See Sections III and VI of this preamble for discussion of our technical assessment and basis of the final standards. \31\ EPA's existing vehicle GHG program also includes emissions standards for methane (CH4) and nitrous oxide (N2O), and credits for hydrofluorocarbons (HFCs) reductions from air conditioning refrigerants. \32\ Footprint curves are graphical representations of the algebraic formulae defining the emission standards in the regulatory text. \33\ As with previous GHG emissions standards, EPA will continue to use the same vehicle category definitions as in the CAFE program. MDPVs are grouped with light trucks for fleet average compliance determinations. \34\ The reference to CO2here refers to CO2equivalent reductions, as this level includes some reductions in emissions of greenhouse gases other than CO2, from refrigerant leakage, as one part of the A/C related reductions.--------------------------------------------------------------------------- EPA has determined that the revised final standards reflect an appropriate balance of factors considered under section 202(a) of the CAA, as discussed in Section VI of this preamble. In selecting the final standards, EPA carefully considered the concerns raised in public comments submitted by a wide range of stakeholders. EPA appreciates that the auto industry and the UAW generally support the proposed standards, and we also recognize the shorter lead time for the standards beginning in MY 2023. At the same time, we recognize the multitude of stakeholders who voiced the critical need for greater GHG emissions reductions from the light-duty vehicle sector through MY 2026 given the significant need to address air pollution and climate change, as well as the many stakeholders who provided comments and analyses indicating that more stringent standards are achievable in this time frame. EPA has considered all public comments and our updated technical analysis in determining appropriate standards under the CAA. EPA is finalizing standards that maintain the stringency level of the proposed standards in the first two years (MYs 2023 and 2024) in consideration of the shorter lead time, and that are more stringent than the proposed standards in the latter two years (MYs 2025 and 2026). EPA notes that the revised final standards in each model year are significantly more stringent than the SAFE standards. After considering the public comments received, EPA is finalizing a more limited set of optional manufacturer flexibilities than proposed. Generally, we are narrowing the availability of these flexibilities to MY 2023 and 2024 in consideration of lead time, with the exception of the off-cycle menu credit cap which is available for MY 2023 through 2026 given that these credits achieve real-world emission reductions. The set of four flexibilities includes: (1) A one-year extension of credit life for MYs 2017 and 2018 credits such that they are available for use in MY 2023 and 2024, respectively; (2) an increase in the off-cycle credit menu cap from 10 g/mile to 15 g/mile from MYs 2023 through 2026. EPA also is finalizing revised definitions for three technologies to ensure real-world emission reductions commensurate with the menu credit values; (3) multiplier incentives for EVs, PHEVs, and FCVs, for 2023 and 2024, with a cumulative credit cap of 10 g/mile, and with multiplier levels lower than those proposed to incentivize more production of advanced technologies. EPA is eliminating multiplier incentives for natural gas vehicles adopted in the SAFE rule after MY 2022; (4) full size pick-up truck incentives for MYs 2023 and 2024 for vehicles that meet efficiency performance criteria or include strong hybrid technology at a minimum level of production volumes. The details of EPA's final provisions for these flexibilities are discussed in Section II.A.4 (credit life extension) and Section II.B (off-cycle, advanced technology multipliers, and full-size pickup credits) of this preamble. The current light-duty vehicle program includes several program elements that will remain in place, without change. EPA is not changing the fundamental structure of the GHG standards, which are based on the footprint attribute with separate footprint curves for cars and trucks. EPA is also not changing the existing CH4and N2O emissions standards or the program structure in terms of vehicle certification, compliance, and enforcement. EPA is continuing to use tailpipe-only values to determine vehicle GHG emissions, without accounting for upstream emissions (i.e , EVs and PHEVs will continue to apply 0 g/mile through MY 2026). EPA is also not changing existing program opportunities to earn compliance credits toward the fleet-wide average CO2standards for improvements to air conditioning systems. The current A/C credits program provides credits for improvements to address both hydrofluorocarbon (HFC) refrigerant direct losses (i.e , system ``leakage'') and indirect CO2emissions related to the increased load on the engine (also referred to as ``A/C efficiency'' related emissions). We did not propose to change any of these aspects of the existing program, they continue to function as intended and we do not presently believe changes are needed in the context of standards for MY 2023-2026.[[Page 74447]]1. What fleet-wide emissions levels correspond to the CO2standards? EPA is finalizing revised standards for MYs 2023-2026 that are projected to result in an industry-wide average target for the light-duty fleet of 161 g/mile of CO2in MY 2026. The final standards are consistent with the proposed standards in MYs 2023 and 2024 and are more stringent than the proposed standards in MYs 2025 and 2026. In MY 2023, the final standards represent a nearly 10 percent increase in stringency from the SAFE rule standards. The final standards continue to increase in stringency by 5 percent in MY 2024, 6.6 percent in MY 2025, and more than 10 percent in 2026. For MYs 2025 and 2026, the final standards are more stringent than the 2012 rule level of stringency, making the MY 2025 and 2026 standards the most stringent vehicle GHG standards that EPA has finalized to date. Based on auto manufacturers' continued technological advancements and progress towards electrification, EPA believes that it is feasible and appropriate to make additional progress in reducing GHG emissions from light-duty vehicles by surpassing the level of stringency of the original MY 2025 and later standards established nine years ago in the 2012 rule, as further described in Sections III and VI of this preamble. EPA is finalizing standards that will take a reasonable approach towards achieving the need for ambitious GHG emission reductions to address climate change. These final standards will play an important role in the transition from the current fleet to even greater GHG emissions reductions in the light-duty fleet, which EPA will pursue in a subsequent rulemaking for MYs 2027 and later. The industry fleet average and car/light truck year-over-year percent reductions for the final standards compared to the proposed standards and the SAFE rule standards are provided in Table 7 below. For passenger cars, the footprint curves are projected to result in reducing industry fleet average CO2emissions targets by 8.4 percent in MY 2023 followed by year over year reductions of 4.8 to 11.4 percent in MY 2024 through MY 2026. For light-duty trucks, the footprint standards curves are projected to result in reducing industry fleet average CO2emissions targets by 10.4 percent in MY 2023 followed by year over year reductions of 4.9 to 9.5 percent in MY 2024 through MY 2026. Cumulative reductions in the projected fleet average CO2targets over the four model year period are projected to total 27.1 for cars and 28.3 for light-duty trucks. Table 7--Projected Industry Fleet Average CO2 Target Year-Over-Year Percent Reductions-------------------------------------------------------------------------------------------------------------------------------------------------------- SAFE rule standards \* Proposed standards \*\* Final standards \*\* ----------------------------------------------------------------------------------------------------------- Trucks Combined Trucks Combined Trucks Combined Cars (%) (%) (%) Cars (%) (%) (%) Cars (%) (%) (%)--------------------------------------------------------------------------------------------------------------------------------------------------------2023........................................ 1.7 1.7 2.1 8.4 10.4 9.8 8.4 10.4 9.82024........................................ 0.6 1.5 1.4 4.7 5.0 5.1 4.8 4.9 5.12025........................................ 2.3 1.7 2.2 4.8 5.0 5.0 5.7 7.0 6.62026........................................ 1.8 1.6 1.9 4.8 5.0 5.0 11.4 9.5 10.3 ----------------------------------------------------------------------------------------------------------- Cumulative.............................. 6.3 6.3 7.4 20.9 23.1 22.8 27.1 28.3 28.3--------------------------------------------------------------------------------------------------------------------------------------------------------\* Note the percentages shown for the SAFE rule targets have changed slightly from the proposed rule, due to the updates in our base year fleet from MY 2017 to MY 2020 manufacturer fleet ***data***.\*\* These are modeled results based on projected fleet characteristics and represent percent reductions in projected targets, not the standards (which are the footprint car/truck curves), associated with that projected fleet (see Section III of this preamble for more detail on our modeling results). For light-trucks, EPA is finalizing, as proposed, a change to the upper right cutpoints of the CO2-footprint curves (i.e , the footprint sizes in sq. ft. at which the CO2standards level off as flat CO2target values for larger vehicle footprints. See Figure 4). The SAFE rule altered these cutpoints and EPA is now restoring them to the original upper right cutpoints initially established in the 2012 rule, for MYs 2023-2026, essentially requiring increasingly more stringent CO2targets at the higher footprint range up to the revised cutpoint levels. The shapes of the curves and the cutpoints are discussed in Section II.A.2 of this preamble. The 161 g/mile estimated industry-wide target for MY 2026 noted above is based on EPA's projected fleet mix projections for MY 2026 (approximately 47 percent cars and 53 percent trucks, with only slight variations from MYs 2023-2026). As discussed below, the final fleet average standards for each manufacturer ultimately will depend on each manufacturer's actual rather than projected production in each MY from MY 2023 to MY 2026 under the sales-weighted footprint-based standard curves for the car and truck regulatory classes. In the 2012 rule, EPA estimated that the fleet average target would be 163 g/mile in MY 2025 based on the projected fleet mix for MY 2025 (67 percent car and 33 percent trucks) based on information available at the time of the 2012 rulemaking. Primarily due to the historical and ongoing shift in fleet mix that has included more crossover and small and mid-size SUVs and fewer passenger cars, EPA's projection in the Midterm Evaluation (MTE) January 2017 Final Determination for the original MY 2025 fleet average target level increased to 173 g/mile.\35\ EPA has again updated its fleet mix projections for this final rule and projects that the original 2012 rule MY 2025 footprint standards curves would result in an industry-wide fleet average target level of 180 g/mile. The projected fleet average targets under the 2012 rule, using the updated fleet mix projections and the projected fleet average targets for the final rule are provided in Table 8 below. Figure 2 below, based on the values in Table 8, shows the final standards target levels along with estimated targets for the proposed standards, SAFE rule, and the 2012 rule for comparison.\36\--------------------------------------------------------------------------- \35\ ``Final Determination on the Appropriateness of the Model Year 2022-2025 Light-Duty Vehicle Greenhouse Gas Emissions Standards under the Midterm Evaluation,'' EPA-420-R-17-001, January 2017.[[Page 74448]] Table 8--Fleet Average Target Projections for the Final Standards Compared to Updated Fleet Average Target Projections \* for the Proposed Standards, SAFE Rule 2012 Rule [CO2 g/mile]---------------------------------------------------------------------------------------------------------------- Final Proposed SAFE rule standards standards standards 2012 rule MY projected projected projected projected targets targets targets targets----------------------------------------------------------------------------------------------------------------2021............................................ \*\* 229 \*\* 229 229 2192022............................................ \*\* 224 \*\* 224 224 2082023............................................ 202 202 220 1992024............................................ 192 192 216 1892025............................................ 179 182 212 1802026............................................ 161 173 208 179 --------------------------------------------------------------- Total change 2022-2026...................... -63 -51 -16 -29----------------------------------------------------------------------------------------------------------------\* All projections have been updated to reflect the updated base year fleet, which results in slight changes compared to the values shown in the proposed rule.\*\* SAFE Rule targets shown for reference.BILLING CODE 6560-50-P[GRAPHIC] [TIFF OMITTED] TR30DE21.001BILLING CODE 6560-50-C EPA's standards are based in part on EPA's projection of average industry wide CO2-equivalent emission reductions from A/C improvements; specifically the footprint standards curves are made numerically more stringent by an amount equivalent to this projection of industry-wide A/C[[Page 74449]]refrigerant leakage credits.\37\ Including this projection of A/C credits for purposes of setting GHG standards levels is consistent with the 2012 rule and the SAFE rule.--------------------------------------------------------------------------- \37\ The total A/C adjustment is 18.8 g/mile for cars and 24.4 g/mile for trucks.--------------------------------------------------------------------------- Table 9 below shows overall fleet average target levels for both cars and light trucks that are projected over the implementation period of the final standards. A more detailed manufacturer by manufacturer break down of the projected target and achieved levels is provided in Section III.B.1 of this preamble. The actual fleet-wide average g/mile level that would be achieved in any year for cars and trucks will depend on the actual production of vehicles for that year, as well as the use of the various credit and averaging, banking, and trading provisions. For example, in any year, manufacturers would be able to generate credits from cars and use the credits for compliance with the truck standard, or vice versa. In Section V of this preamble, EPA discusses the year-by-year estimate of emissions reductions that are projected to be achieved by the standards. In general, the level and implementation schedule of the final standards provides for an incremental phase-in to the MY 2026 stringency level and reflects consideration of the appropriate lead time for manufacturers to take actions necessary to meet the final standards.\38\ The technical feasibility of the standards is discussed in Section III of this preamble and in the RIA. Note that MY 2026 is the final MY in which the standards become more stringent. The MY 2026 CO2standards will remain in place for later MYs, unless and until they are revised by EPA in a future rulemaking. As mentioned in Section I.A.2 of this preamble, EPA is planning a subsequent rulemaking to set more stringent standards for the light-duty vehicle sector in MYs 2027 and beyond.--------------------------------------------------------------------------- \38\ As discussed in Section III of this preamble, EPA has used the Corporate Average Fuel Economy (CAFE) Compliance and Effects Modeling System (CCEMS) to support the technical assessment. Among the ways EPA has considered lead time is by using the constraints built into the CCEMS model which are designed to represent lead-time constraints, including the use of redesign and refresh cycles. See CCEMS Model Documentation on web page [*https://www.nhtsa.gov/corporate-average-fuel-economy/compliance-and-effects-modeling-system*](https://www.nhtsa.gov/corporate-average-fuel-economy/compliance-and-effects-modeling-system) and contained in the docket for this rule.--------------------------------------------------------------------------- EPA has estimated the overall fleet-wide CO2emission target levels that correspond with the attribute-based footprint standards, based on projections of the composition of each manufacturer's fleet in each year of the program. As noted above, EPA estimates that, on a combined fleet-wide national basis, the 2026 MY standards will result in a target level of 161 g/mile CO2.The derivation of the 161 g/mile estimate is described in Section III.A of this preamble. EPA aggregated the estimates for individual manufacturers based on projected production volumes into the fleet-wide averages for cars, trucks, and the entire fleet, shown in Table 9.\39\ As discussed above, the combined fleet estimates are based on projected fleet mix of cars and trucks that varies over the MY 2023-2026 timeframe. This fleet mix distribution can also be found in Section III.A of this preamble.--------------------------------------------------------------------------- \39\ Due to rounding during calculations, the estimated fleet-wide CO2target levels may vary by plus or minus 1 gram. Table 9--Estimated Fleet-Wide CO2 Target Levels Corresponding to the Final Standards---------------------------------------------------------------------------------------------------------------- Cars CO2 (g/ Trucks CO2 (g/ Fleet CO2 (g/ Model year mile) mile) mile)----------------------------------------------------------------------------------------------------------------2023............................................................ 166 234 2022024............................................................ 158 222 1922025............................................................ 149 207 1792026 and later.................................................. 132 187 161---------------------------------------------------------------------------------------------------------------- As shown in Table 9, fleet-wide CO2emission target levels for cars under the final standards are projected to decrease from 166 to 132 g/mile between MY 2023 and MY 2026. Similarly, fleet-wide CO2target levels for trucks are projected to decrease from 233 to 187 g/mile during the same period. These target levels reflect both the final standards and the flexibilities and credits available in the program.\40\ The estimated fleetwide achieved values can be found in Section III.B.1 of this preamble.--------------------------------------------------------------------------- \40\ The target levels do not reflect credit trading across manufacturers under the ABT program.--------------------------------------------------------------------------- As noted above, EPA is finalizing CO2standards that are increasingly more stringent each year from MY 2023 though MY 2026. Applying the CO2footprint standard curves applicable in each MY to the vehicles (and their footprint distributions) projected to be sold in each MY produces projections of progressively lower fleet-wide CO2emission target levels. EPA believes manufacturers can achieve the final standards and their important CO2emissions reductions through the application of available control technology at reasonable cost, as well as the use of optional program flexibilities available in certain model years. The existing program includes several provisions that we are not changing and so would continue during the implementation timeframe of this final rule. Consistent with CAA section 202(a)(1) that standards be applicable to vehicles ``for their useful life,'' the MY 2023-2026 vehicle standards will apply for the useful life of the vehicle.\41\ Also, in this action EPA is not changing the test procedures over which emissions are measured and weighted to determine compliance with the GHG standards. These procedures are the Federal Test Procedure (FTP or ``city'' test) and the Highway Fuel Economy Test (HFET or ``highway'' test). While EPA may consider requiring the use of test procedures other than the 2-cycle test procedures in a future rulemaking, EPA did not propose and is not adopting any test procedure changes in this final rule.--------------------------------------------------------------------------- \41\ The GHG emission standards apply for a useful life of 10 years or 120,000 miles for light duty vehicles (LDVs) and light-light-duty trucks (LLDTs) and 11 years or 120,000 miles for heavy-light-duty trucks (HLDTs) and medium-duty passenger vehicles (MDPVs). See 40 CFR 86.1805-17.--------------------------------------------------------------------------- EPA has analyzed the feasibility of achieving the car and truck CO2footprint based standards through the application of available technologies, based on projections of technology penetration rates that are in turn based on our estimates of the effectiveness and cost of the technology. The results of the analysis are discussed in detail in Section III of this preamble and in the RIA. EPA also presents the overall estimated costs and benefits of the final car and truck CO2standards in Section VII.I of this preamble.[[Page 74450]]2. What are the final CO2attribute-based standards? As with the existing GHG standards, EPA is finalizing separate car and truck standards--that is, vehicles defined as cars have one set of footprint-based curves, and vehicles defined as trucks would have a different set.\42\ In general, for a given footprint, the CO2g/mile target \43\ for trucks is higher than the target for a car with the same footprint. The curves are defined mathematically in EPA's regulations by a family of piecewise linear functions (with respect to vehicle footprint) that gradually and continually ramp down from the MY 2022 curves established in the SAFE rule. EPA's minimum and maximum footprint targets and the corresponding cutpoints are provided below in Table 10 for MYs 2023-2026 along with the slope and intercept defining the linear function for footprints falling between the minimum and maximum footprint values. For footprints falling between the minimum and maximum, the targets are calculated as follows: Slope x Footprint + Intercept = Target. Figure 3 and Figure 4 provide the existing MY 2021-2022 and final MY 2023-2026 footprint curves graphically for both car and light trucks, respectively.--------------------------------------------------------------------------- \42\ See 49 CFR part 523. Generally, passenger cars include cars and smaller cross-overs and SUVs, while the truck category includes larger cross-overs and SUVs, minivans, and pickup trucks. \43\ Because compliance is based on a sales-weighting of the full range of vehicles in a manufacturer's car and truck fleets, the footprint based CO2emission levels of specific vehicles within the fleet are referred to as targets, rather than standards. Table 10--Final Footprint-Based CO2 Standard Curve Coefficients-------------------------------------------------------------------------------------------------------------------------------------------------------- Car Truck ------------------------------------------------------------------------------------------------------- 2023 2024 2025 2026 2023 2024 2025 2026--------------------------------------------------------------------------------------------------------------------------------------------------------MIN CO2 (g/mile)................................ 145.6 138.6 130.5 114.3 181.1 172.1 159.3 141.8MAX CO2 (g/mile)................................ 199.1 189.5 179.4 160.9 312.1 296.5 277.4 254.4Slope (g/mile/ft\2\)............................ 3.56 3.39 3.26 3.11 3.97 3.77 3.58 3.41Intercept (g/mile).............................. -0.4 -0.4 -3.2 -13.1 18.4 17.4 12.5 1.9MIN footprint (ft\2\)........................... 41 41 41 41 41 41 41 41MAX footprint (ft\2\)........................... 56 56 56 56 74 74 74 74--------------------------------------------------------------------------------------------------------------------------------------------------------BILLING CODE 6560-50-P[GRAPHIC] [TIFF OMITTED] TR30DE21.002[[Page 74451]][GRAPHIC] [TIFF OMITTED] TR30DE21.003BILLING CODE 6560-50-C The shapes of the MY 2023-2026 car curves are similar to the MY 2022 car curve. By contrast, the MY 2023-2026 truck curves return to the cutpoint of 74.0 sq ft that was originally established in the 2012 rule but was changed in the SAFE rule.\44\ The gap between the 2022 curves and the 2023 curves is indicative of the design of the final standards as described earlier, where the gap between the MY 2022 and MY 2023 curves is roughly double the gap between the curves for MYs 2024-2026.--------------------------------------------------------------------------- \44\ 77 FR 62781.---------------------------------------------------------------------------3. EPA's Statutory Authority Under the CAAi. Standards-Setting Authority Under CAA Section 202(a) Title II of the CAA provides for comprehensive regulation of mobile sources, authorizing EPA to regulate emissions of air pollutants from all mobile source categories. Pursuant to these sweeping grants of authority, when setting GHG standards for light-duty vehicles, EPA considers such issues as technology effectiveness, technology cost (per vehicle, per manufacturer, and per consumer), the lead time necessary to implement the technology, and--based on these considerations--the feasibility and practicability of potential standards; as well as the impacts of potential standards on emissions reductions of both GHGs and non-GHGs; the impacts of standards on oil conservation and energy security; the impacts of standards on fuel savings by consumers; the impacts of standards on the auto industry; other energy impacts; and other relevant factors such as impacts on safety. Title II emission standards have stimulated the development of a broad set of advanced automotive technologies, such as on-board computers and fuel injection systems, which have been the building blocks of automotive designs and have yielded not only lower pollutant emissions, but improved vehicle performance, reliability, and durability. In response to EPA's adoption of Title II emission standards for GHGs from light-duty vehicles in 2010 and later, manufacturers have continued to significantly ramp up their development and application of a wide range of new and improved technologies, including more fuel-efficient engine designs, transmissions, aerodynamics, and tires, air conditioning systems that contribute to lower GHG emissions, and various levels of electrified vehicle technologies. This rule implements a specific provision in Title II, section 202(a) of the CAA. Section 202(a)(1), 42 U.S.C 7521(a)(1), states that ``the Administrator shall by regulation prescribe (and from time to time revise) . . . standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles . . . which in his judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.'' Once EPA makes the appropriate endangerment and cause or contribute findings,\45\ CAA section 202(a) authorizes EPA to issue standards applicable to emissions of those pollutants. Indeed, EPA's obligation to do so is mandatory. See Coalition for Responsible Regulation v. EPA, 684 F.3d 102, 126-27 (D.C Cir. 2012); Massachusetts v. EPA, 549 U.S 497, 533 (2007). Moreover, EPA's mandatory legal duty to promulgate these emission standards derives from ``a statutory obligation wholly independent of DOT's mandate to promote energy efficiency.'' Massachusetts, 549 U.S at 532. Consequently, EPA has no discretion to decline to issue GHG standards under[[Page 74452]]section 202(a), or to defer issuing such standards due to NHTSA's regulatory authority to establish fuel economy standards. Rather, ``[j]ust as EPA lacks authority to refuse to regulate on the grounds of NHTSA's regulatory authority, EPA cannot defer regulation on that basis.'' Coalition for Responsible Regulation, 684 F.3d at 127.--------------------------------------------------------------------------- \45\ EPA did so in 2009 for the group of six well-mixed greenhouse gases--carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride--which taken in combination endanger both the public health and the public welfare of current and future generations. EPA further found that the combined emissions of these greenhouse gases from new motor vehicles and new motor vehicle engines contribute to greenhouse gas air pollution that endangers public health and welfare. 74 FR 66496 (Dec. 15, 2009).--------------------------------------------------------------------------- Any standards under CAA section 202(a)(1) ``shall be applicable to such vehicles . . . for their useful life.'' Emission standards set by EPA under CAA section 202(a)(1) are technology-based, as the levels chosen must be premised on a finding of technological feasibility. Thus, standards promulgated under CAA section 202(a) are to take effect only ``after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period.'' CAA section 202(a)(2); see also NRDC v. EPA, 655 F. 2d 318, 322 (D.C Cir. 1981). EPA must consider costs to those entities which are directly subject to the standards. Motor & Equipment Mfrs. Ass'n Inc. v. EPA, 627 F. 2d 1095, 1118 (D.C Cir. 1979). Thus, ``the [s]ection 202(a)(2) reference to compliance costs encompasses only the cost to the motor-vehicle industry to come into compliance with the new emission standards, and does not mandate consideration of costs to other entities not directly subject to the proposed standards.'' See Coalition for Responsible Regulation, 684 F.3d at 128. EPA is afforded considerable discretion under CAA section 202(a) when assessing issues of technical feasibility and availability of lead time to implement new technology. Such determinations are ``subject to the restraints of reasonableness,'' which ``does not open the door to `crystal ball' inquiry.'' NRDC, 655 F. 2d at 328, quoting International Harvester Co. v. Ruckelshaus, 478 F. 2d 615, 629 (D.C Cir. 1973). However, ``EPA is not obliged to provide detailed solutions to every engineering problem posed in the perfection of [a particular device]. In the absence of theoretical objections to the technology, the agency need only identify the major steps necessary for development of the device, and give plausible reasons for its belief that the industry will be able to solve those problems in the time remaining. The EPA is not required to rebut all speculation that unspecified factors may hinder `real world' emission control.'' NRDC, 655 F. 2d at 333-34. In developing such technology-based standards, EPA has the discretion to consider different standards for appropriate groupings of vehicles (``class or classes of new motor vehicles''), or a single standard for a larger grouping of motor vehicles. NRDC, 655 F.2d at 338. Finally, with respect to regulation of vehicular GHG emissions, EPA is not ``required to treat NHTSA's . . . regulations as establishing the baseline for the [section 202(a) standards].'' Coalition for Responsible Regulation, 684 F.3d at 127 (noting that the section 202(a) standards provide ``benefits above and beyond those resulting from NHTSA's fuel-economy standards.'') Although standards under CAA section 202(a)(1) are technology-based, they are not based exclusively on technological capability. EPA has the discretion to consider and weigh various factors along with technological feasibility, such as the cost of compliance (section 202(a)(2)), lead time necessary for compliance (section 202(a)(2)), safety (see NRDC, 655 F. 2d at 336 n. 31),\46\ other impacts on consumers, and energy impacts associated with use of the technology. See George E. Warren Corp. v. EPA, 159 F.3d 616, 623-624 (D.C Cir. 1998) (ordinarily permissible for EPA to consider factors not specifically enumerated in the Act).--------------------------------------------------------------------------- \46\ Since its earliest Title II regulations, EPA has considered the safety of pollution control technologies. See 45 FR 14496, 14503 (1980) (``EPA would not require a particulate control technology that was known to involve serious safety problems. If during the development of the trap-oxidizer safety problems are discovered, EPA would reconsider the control requirements implemented by this rulemaking'').--------------------------------------------------------------------------- In addition, EPA has clear authority to set standards under CAA section 202(a) that are technology-forcing when EPA considers that to be appropriate, but EPA is not required to do so (as distinguished from standards under provisions such as section 202(a)(3) and section 213(a)(3)). Section 202(a) of the CAA does not specify the degree of weight to apply to each factor, and EPA accordingly has discretion in choosing an appropriate balance among factors. See Sierra Club v. EPA, 325 F.3d 374, 378 (D.C Cir. 2003) (even where a provision is technology-forcing, the provision ``does not resolve how the Administrator should weigh all [the statutory] factors in the process of finding the `greatest emission reduction achievable' ''); NPRA v. EPA, 287 F.3d 1130, 1135 (D.C Cir. 2002) (EPA decisions, under CAA provision authorizing technology-forcing standards, based on complex scientific or technical analysis are accorded particularly great deference); see also Husqvarna AB v. EPA, 254 F. 3d 195, 200 (D.C Cir. 2001) (great discretion to balance statutory factors in considering level of technology-based standard, and statutory requirement ``to [give appropriate] consideration to the cost of applying . . . technology'' does not mandate a specific method of cost analysis); Hercules Inc. v. EPA, 598 F. 2d 91, 106 (D.C Cir. 1978) (``In reviewing a numerical standard we must ask whether the agency's numbers are within a zone of reasonableness, not whether its numbers are precisely right''); Permian Basin Area Rate Cases, 390 U.S 747, 797 (1968) (same); Federal Power Commission v. Conway Corp., 426 U.S 271, 278 (1976) (same); Exxon Mobil Gas Marketing Co. v. FERC, 297 F. 3d 1071, 1084 (D.C Cir. 2002) (same).ii. Testing Authority Under section 203 of the CAA, sales of vehicles are prohibited unless the vehicle is covered by a certificate of conformity. EPA issues certificates of conformity pursuant to section 206 of the CAA, based on (necessarily) pre-sale testing conducted either by EPA or by the manufacturer. The Federal Test Procedure (FTP or ``city'' test) and the Highway Fuel Economy Test (HFET or ``highway'' test) are used for this purpose. Compliance with standards is required not only at certification but throughout a vehicle's useful life, so that testing requirements may continue post-certification. Useful life standards may apply an adjustment factor to account for vehicle emission control deterioration or variability in use (section 206(a)). EPA establishes the test procedures under which compliance with the CAA GHG standards is measured. EPA's testing authority under the CAA is broad and flexible. EPA has also developed tests with additional cycles (the so-called 5-cycle tests) which are used for purposes of fuel economy labeling and are used in EPA's program for extending off-cycle credits under the light-duty vehicle GHG program.iii. Compliance and Enforcement Authority EPA oversees testing, ***collects*** and processes test ***data***, and performs calculations to determine compliance with CAA standards. CAA standards apply not only at certification but also throughout the vehicle's useful life. The CAA provides for penalties should manufacturers fail to comply with their fleet average standards, and there is no option for manufacturers to pay fines in lieu of compliance with the standards. Under the CAA, penalties for violation of a fleet average standard are typically determined on a vehicle-specific basis[[Page 74453]]by determining the number of a manufacturer's highest emitting vehicles that cause the fleet average standard violation. Penalties for reporting requirements under Title II of the CAA apply per day of violation, and other violations apply on a per vehicle, or a per part or component basis. See CAA sections 203(a) and 205(a) and 40 CFR 19.4 Section 207 of the CAA grants EPA broad authority to require manufacturers to remedy vehicles if EPA determines there are a substantial number of noncomplying vehicles. In addition, section 205 of the CAA authorizes EPA to assess penalties of up to $48,762 per vehicle for violations of various prohibited acts specified in the CAA. In determining the appropriate penalty, EPA must consider a variety of factors such as the gravity of the violation, the economic impact of the violation, the violator's history of compliance, and ``such other matters as justice may require.''4. Averaging, Banking, and Trading Provisions for CO2Standards EPA is finalizing provisions to extend credit life that are more targeted than those proposed. EPA proposed to extend credit carry-forward for MY 2016-2020 credits, including a two-year extension of MY 2016 credits and a one-year extension of MY 2017-2020 credits. After considering the comments received on this topic and further analyzing manufacturers' need for extended credit life, EPA is adopting a narrower approach in the final rule of adopting the one-year credit life extension only for MY 2017 and 2018 credits so they may be used in MYs 2023 and 2024, respectively. This section provides background on the ABT program as well as a summary of the proposed rule, public comments, and final rule provisions.i. Background on Averaging, Banking, and Trading Program Under Previous Programs Averaging, banking, and trading (ABT) is an important compliance flexibility that has been built into various highway engine and vehicle programs (and nonroad engine and equipment programs) to support emissions standards that, through the introduction and application of new technologies, result in reductions in air pollution. The light-duty ABT program for GHG standards includes existing provisions initially established in the 2010 rule for how credits may be generated and used within the program.\47\ These provisions include credit carry-forward, credit carry-back (also called deficit carry-forward), credit transfers (within a manufacturer), and credit trading (across manufacturers).--------------------------------------------------------------------------- \47\ 40 CFR 86.1865-12.--------------------------------------------------------------------------- Credit carry-forward refers to banking (saving) credits for future use, after satisfying any needs to offset prior MY debits within a vehicle category (car fleet or truck fleet). Credit carry-back refers to using credits to offset any deficit in meeting the fleet average standards that had accrued in a prior MY. A manufacturer may have a deficit at the end of a MY (after averaging across its fleet using credit transfers between cars and trucks)--that is, a manufacturer's fleet average level may fail to meet the manufacturer's required fleet average standard for the MY, for a limited number of model years, as provided in the regulations. The CAA does not specify or limit the duration of such credit provisions, and in the MY 2012-2016 and 2017-2025 light-duty GHG programs, EPA chose to adopt 5-year credit carry-forward (generally, with an exception noted below) and 3-year credit carry-back provisions as a reasonable approach that maintained consistency between EPA's GHG and NHTSA CAFE regulatory provisions.\48\ While some stakeholders had suggested that light-duty GHG credits should have an unlimited credit life, EPA did not adopt that suggestion for the light-duty GHG program because it would pose enforcement challenges and could lead to some manufacturers accumulating large banks of credits that could interfere with the program's goal to develop and transition to progressively more advanced emissions control technologies in the future.--------------------------------------------------------------------------- \48\ The EPCA/EISA statutory framework for the CAFE program limits credit carry-forward to 5 years and credit carry-back to 3 years.--------------------------------------------------------------------------- Although the existing credit carry-forward and carry-back provisions generally remained in place for MY 2017 and later standards, EPA finalized provisions in the 2012 rule allowing all unused (banked) credits generated in MYs 2010-2015 (but not MY 2009 early credits) to be carried forward through MY 2021. See 40 CFR 86.1865-12(k)(6)(ii); 77 FR 62788 (October 15, 2012). This credit life extension provided additional carry-forward years for credits generated in MYs 2010-2015, thereby providing greater flexibility for manufacturers in using these credits. This provision was intended to facilitate the transition to increasingly stringent standards through MY 2021 by helping manufacturers resolve lead time issues they might face in the early MYs of the program. This extension of credit carry-forward also provided an additional incentive for manufacturers to generate credits earlier, for example in MYs 2014 and 2015, thereby encouraging the earlier use of additional CO2reducing technologies. In addition, the existing 5-year carry-forward provisions applied to MY 2016 and later credits, making MY 2016 credits also eligible to be carried forward through MY 2021. Transferring credits in the GHG program refers to exchanging credits between the two averaging sets-- passenger cars and light trucks--within a manufacturer. For example, credits accrued by overcompliance with a manufacturer's car fleet average standard can be used to offset debits accrued due to that manufacturer not meeting the truck fleet average standard in a given model year. In other words, a manufacturer's car and truck fleets together are, in essence, a single averaging set in the GHG program. Finally, accumulated credits may be traded to another manufacturer. Credit trading has occurred on a regular basis in EPA's vehicle program.\49\ Manufacturers acquiring credits may offset credit shortfalls and bank credits for use toward future compliance within the carry-forward constraints of the program.--------------------------------------------------------------------------- \49\ EPA provides general information on credit trades annually as part of its annual Automotive Trends and GHG Compliance Report. The latest report is available at: [*https://www.epa.gov/automotive-trends*](https://www.epa.gov/automotive-trends) and the docket for this rulemaking.--------------------------------------------------------------------------- The ABT provisions are an integral part of the vehicle GHG program and the agency expects that manufacturers will continue to utilize these provisions into the future. EPA's annual Automotive Trends Report provides details on the use of these provisions in the GHG program.\50\ ABT allows EPA to consider standards more stringent than we would otherwise consider by giving manufacturers an important tool to resolve lead time and feasibility issues. EPA believes the targeted one-year extension of credit carry-forward for MY 2017 and 2018 credits that we are finalizing, discussed below, is appropriate considering the stringency and implementation timeframe of the revised standards.--------------------------------------------------------------------------- \50\ ``The 2021 EPA Automotive Trends Report, Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975,'' EPA-420-R-21-023, November 2021.---------------------------------------------------------------------------ii. Extended Credit Carry-Forward As in the transition to more stringent standards under the 2012 rule, EPA recognizes that auto manufacturers will again be facing a transition to more stringent standards for MYs 2023-2026.[[Page 74454]]We also recognize that the stringency increase from MY 2022 to MY 2023 is a relatively steep step in our program with shorter lead time for MYs 2023 and 2024. Therefore, we believe it is again appropriate in the context of the revised standards to provide a targeted, limited amount of additional flexibility to carry-forward credits into MYs 2023-2024, as manufacturers manage the transition to these more stringent standards. EPA proposed to temporarily increase the number of years that MY 2016-2020 credits could be carried-forward to provide additional flexibility for manufacturers in the transition to more stringent standards. EPA proposed to increase credit carry-forward for MY 2016 credits by two years such that they would not expire until after MY 2023. For MY 2017-2020 credits, EPA proposed to extend the credit life by one year, so that those banked credits can be used through MYs 2023-2026, depending on the MY in which the credits are banked. For MY 2021 and later credits, EPA did not propose any modification to existing credit carry-forward provisions, which allow credit carry-forward for 5 model years. EPA noted that the proposed extended credit carry-forward would help some manufacturers to have lower overall costs and address any potential lead time issues they may face during these MYs, especially in the first year of the proposed standards (MY 2023). EPA proposed to extend credit life only for credits generated against applicable standards established in the 2012 rule for MYs 2016-2020. EPA viewed these credits as a reflection of manufacturers' having achieved reductions beyond and earlier than those required by the 2012 rule standards. As noted in the proposed rule and discussed above, there is precedent for extending credit carry-forward temporarily beyond five years to help manufacturers transition to more stringent standards. In the 2012 rule, EPA extended carry-forward for MY 2010-2015 credits to MY 2021 for similar reasons, to provide more flexibility for a limited time during a transition to more stringent standards.\51\ ABT is an important compliance flexibility and has been built into various highway engine and vehicle programs to support emissions standards programs that through the introduction of new technologies result in reductions in air pollution. While the existing five-year credit life provisions in the light-duty GHG program are generally sufficient to provide for manufacturer flexibility while balancing the practical challenges of properly tracking credits over an extended period of time for compliance and enforcement purposes, there are occasions--such as when the industry is transitioning to significantly more stringent standards--where more flexibility may be appropriate.--------------------------------------------------------------------------- \51\ 77 FR 62788.--------------------------------------------------------------------------- EPA received a mix of comments regarding EPA's proposed provision for limited extended credit carry-forward. The Alliance and several individual manufacturers commented in support of the proposed credit life extensions. The Alliance commented that ``limited expansion of credit carry-forward provisions may provide some additional flexibility for a limited number of manufacturers, and in theory could provide some additional credit market liquidity during the rapidly tightening standards in MYs 2023-2026.'' It also commented that carry-forward credits do not reduce the environmental benefits of the standards as these credits represent tons of emissions avoided in advance of requirements. Honda provided similar comments and commented further that the automobile industry is facing severe global supply chain issues that continue to disrupt vehicle production volumes, launch dates and compliance strategies. Honda stated that slight modifications to the proposed credit carry forward provisions (e.g , Honda suggested a two-year extension for MY 2016-2020 credits) could provide much needed compliance flexibility during an exceedingly challenging compliance planning time. Honda also commented that companies that signed up to the California Framework agreement can reasonably be expected to meet MY 2023 stringencies, but MY 2026 is likely to prove difficult for most, if not all, manufacturers. In addition, Honda commented in support of extending the credit carry forward provisions beyond those specified in the proposed rule. Nissan commented that EPA should extend the life of all model year 2015 and later GHG credits through at least model year 2026 to provide manufacturers with necessary compliance flexibility. Nissan believed that their recommended approach would enable manufacturers to invest appropriate resources at the appropriate time without eroding overall industry GHG benefits. EV manufacturers did not support the proposed extended credit carry-forward, commenting that it is unnecessary and could lead to loss of emissions reductions. Tesla commented that it estimates the extension of the MY 2016 and 2017 credit bank will result in a reduction in stringency of 4.3 g/mile in MY 2023. Tesla commented that the one-year extension of the credit lifetime for model years beyond MY 2017 will further reduce stringency by another ~5 g/mile. Additionally, Tesla commented that ``the credit lifetime extension will also lessen the immediate value of earned credits in the trading market as underperforming manufacturers now may have greater opportunity on when to deploy credits. Operating under a consistent set of credit lifetime regulations, manufacturers over complying have been able to enter a robust credit marketing, basing credit value and need, in part, on a five-year lifetime. Under the proposal, the immediacy of the market will diminish, meaning less revenue and opportunity for an overperforming manufacturer that seeks to utilize credit revenue sales to invest in increased manufacturing of advanced technology vehicles. Like the other proposed flexibilities, this proposed change in credit lifetime reduces the standard's stringency, diminishes the level of investment going back into advanced manufacturing, and only serves to reward those manufacturers that delay deploying advanced technologies.'' The California Air Resources Board (CARB) also did not support the credit life extensions in the proposed rule, commenting ``when manufacturers planned their products to generate the credits, they were aware of the constraints on their use and available terms. Because these credits were earned before the Final SAFE Rules went into effect, they reflect manufacturer planning to meet the more stringent standards then in effect with improved technology after those credits had expired. Furthermore, extending the credit life is not necessary to facilitate compliance. In the time available, manufacturers can incentivize sales of vehicles with more of the necessary technologies if they are needed to meet the proposed standards, including additional zero-emission technologies.'' The California Attorney General commented that extending credit life for standards weaker than Alternative 2 could further delay the emissions reductions that are urgently needed. Several environmental and health NGOs opposed the proposed extension as unnecessary and were concerned that it could lead to a loss of emissions reductions. A coalition of NGOs recommended that EPA not extend the lifetime of MY 2016-2020 credits as proposed, particularly not beyond MY 2024. They commented that extending credit life does not spur the development or application of more advanced technologies or vehicle[[Page 74455]]electrification and represents a windfall since manufacturers have not taken the extension into account in the product plans. Union of Concerned Scientists (UCS) commented that the proposed extension is not necessary, presenting modeling of the proposed standards and Alternative 2 in the proposed rule and found that the proposed standards could be met without the extended credit life with the same technology penetration rates as estimated by EPA for the proposed rule. American Council for an Energy- Efficient Economy (ACEEE) also commented that the extension was unnecessary because manufacturers could use their MY 2018 and 2019 credits in MYs 2023 and 2024 and those credits would likely still be available because it is unlikely manufacturers would need to use them prior to those years due to the previous credit banks and the less stringent standards adopted in the SAFE rule for MYs 2021-2022. After analyzing the public comments and further analyzing the need for and impacts of extending credit carry-forward, EPA is finalizing a one-year credit life extension only for MYs 2017-2018 credits, as shown in Table 11. This approach focuses the credit carry-forward extension on MYs 2023-2024 where lead-time is limited and manufacturers' ability to make adjustments to meet the more stringent standards is most constrained. EPA is not including the proposed one-year extension for MYs 2019 and 2020 credits out to MYs 2025 and 2026, respectively, because EPA believes there is sufficient lead time for manufacturers to make adjustments in their product and technology mix to meet the standards without the extension (see EPA's technical assessment of the standards in section III, of this preamble). MYs 2019 and 2020 credits will continue to be allowed to be carried forward through MYs 2024 and 2025, respectively, under the existing five year credit life provisions. EPA is not finalizing the two-year extension of the MY 2016 credits because we agree with the public comments that this additional year of credit life extension is unnecessary and could have the effect of weakening the MY 2022 SAFE standards. If EPA were to extend MY 2016 credits, given the significant volume of currently banked credits that expire in MY2021 (as do the MY2016 credits), EPA expects that most of the MY 2016 credits would remain banked for use in MY 2023. However, if the MY2016 credits were extended, it is also possible due to the high number of credits held by some manufacturers, that some credits could be used or traded toward compliance with the weakened SAFE standards in MY 2022, for which EPA believes clearly no additional flexibility is warranted. This was not EPA's intent in proposing the extension. After considering the feasibility of the standards without the extension for MY 2016 credits, EPA determined that the MY 2023 standards could be met without the extension. Also, without an extension, MY 2016 credits will expire in MY 2021, a MY where several manufacturers will already have relatively large banks of MY 2010-2015 credits that also expire in MY 2021 (as noted, the 2012 rule provided a ``one-time'' extended credit life for these credits, and thus several manufacturers in the industry have built up extensive banks of credits all due to expire after MY 2021). The result of declining to extend MY 2016 credits, is that there will be an unusually high amount of credits that must be used or expire in MY 2021. In turn, the availability of these expiring credits will likely leave MY 2017-2021 credit balances unused by many manufacturers in MY 2021 and therefore available for use in MYs 2022 and beyond, depending on each manufacturer's MY 2021 and later compliance plans.\52\ By extending MY 2017 credits but not MY 2016 credits, manufacturers' need for near-term flexibility are balanced with concerns that excess credit banks could delay the introduction or further penetration of technology. EPA believes that the extension of MY 2017 and 2018 credits by one year provides a reasonable and sufficient level of additional flexibility in meeting the final MYs 2023 and 2024 standards, focusing the additional flexibility on MYs with relatively shorter lead time. Several manufacturers have MY 2017-2018 vintage credits banked for future use, which could be used either internally within the manufacturer or traded to another manufacturer, so this provision provides additional flexibility for MYs 2023-2024 compliance.\53\--------------------------------------------------------------------------- \52\ ``The 2021 EPA Automotive Trends Report, Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975,'' EPA-420-R-21-023, November 2021. \53\ ``The 2021 EPA Automotive Trends Report, Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975,'' EPA-420-R-21-023, November 2021. See Table 5.19 Credits noted as expiring in MYs 2022-2023 represent MY 2017-2018 vintage credits, respectively. These credits will now expire one year later, respectively, in MYs 2023-2024. Table 11--Final Extension of Credit Carry-Forward for MY 2016-2020 Credits------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------ MYs credits are valid under extension MY credits are banked ----------------------------------------------------------------------------------------------------------------------------------- 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------2016........................................................ .......... x x x x x .......... .......... .......... .......... ..........2017........................................................ .......... .......... x x x x x + .......... .......... ..........2018........................................................ .......... .......... .......... x x x x x + .......... ..........2019........................................................ .......... .......... .......... .......... x x x x x .......... ..........2020........................................................ .......... .......... .......... .......... .......... x x x x x ..........2021........................................................ .......... .......... .......... .......... .......... .......... x x x x x------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------x = Existing program. + = Additional years included in Final Rule. In response to the comments received, EPA believes the approach it is finalizing provides manufacturers with the flexibility asked for given the stated concerns about lead time, while also responding to other concerns raised that the proposed extension is unnecessary and could lead to a delay in application of emissions reducing technology. By adopting a one-year extension only for MYs 2017-2018 credits, EPA more narrowly focuses the extension on MYs 2023-2024 to help manufacturers manage the transition to more stringent standards by providing some additional flexibility. There is greater need for flexibility in these early years because manufacturers will be somewhat limited in making product plan changes in response to the final standards. By not adopting the proposed extension for MY[[Page 74456]]2019 and MY 2020 credits, EPA's approach also responds to other commenters' concerns that the proposed extension may slow the adoption of emissions reducing technology. Concerning compliance with MYs 2025-2026 standards, EPA agrees with comments that manufacturers will be able to meet the standards through the application of technology and changes to product mix that includes increasing sales of lower emitting, credit generating vehicles, as shown in our technical analysis for the final rule. In response to Tesla's comments that the extension may lessen the value of credits in the trading market, EPA believes this could be true if EPA were not adopting more stringent standards at the same time. However, any loss of credit value is likely more than offset by the stringent final standards which could make available credits even more sought after by some manufacturers, and thus potentially increasing credit value. EPA also notes that the GHG program regulations clearly state, ``There are no property rights associated with CO2credits generated under this subpart. Credits are a limited authorization to emit the designated amount of emissions. Nothing in this part or any other provision of law should be construed to limit EPA's authority to terminate or limit this authorization through a rulemaking.'' \54\ EPA retains the ability to revise credits provisions as it believes prudent through rulemaking.--------------------------------------------------------------------------- \54\ 30 CFR 86.1865-12(k)(2). EPA adopted this regulatory provision when it established the first GHG standards in the 2010 rule.---------------------------------------------------------------------------5. Certification, Compliance, and Enforcement EPA established comprehensive vehicle certification, compliance, and enforcement provisions for the GHG standards as part of the rulemaking establishing the initial GHG standards for MY 2012-2016 vehicles.\55\ Manufacturers have been using these provisions since MY 2012 and EPA neither proposed nor is adopting any changes in the areas of certification, compliance, or enforcement.--------------------------------------------------------------------------- \55\ See 75 FR 25468-25488 and 77 FR 62884-62887 for a description of these provisions. See also ``The 2020 EPA Automotive Trends Report, Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975,'' EPA-420-R-21-003 January 2021 for additional information regarding EPA compliance determinations.---------------------------------------------------------------------------6. On-Board Diagnostics Program Updates EPA regulations state that onboard diagnostics (OBD) systems must generally detect malfunctions in the emission control system, store trouble codes corresponding to detected malfunctions, and alert operators appropriately. EPA adopted (as a requirement for an EPA certificate) the 2013 CARB OBD regulation, with certain additional provisions, clarifications and exceptions, in the Tier 3 Motor Vehicle Emission and Fuel Standards final rulemaking (40 CFR 86.1806-17; 79 FR 23414, April 28, 2014). Since that time, CARB has made several updates to their OBD regulations and continues to consider changes periodically.\56\ Manufacturers may find it difficult to meet both the 2013 OBD regulation adopted in EPA regulations and the currently applicable CARB OBD regulation on the same vehicles. This may result in different calibrations being required for vehicles sold in states subject to Federal OBD (2013 CARB OBD) and vehicles sold in states subject to current CARB OBD.--------------------------------------------------------------------------- \56\ See [*https://ww2.arb.ca.gov/our-work/programs/obd-board-diagnostic-program/obd-workshops.---------------------------------------------------------------------------*](https://ww2.arb.ca.gov/our-work/programs/obd-board-diagnostic-program/obd-workshops.---------------------------------------------------------------------------) To provide clarity and regulatory certainty to manufacturers, EPA is finalizing as proposed a limited regulatory change to streamline OBD requirements. Under this change, EPA can find that a manufacturer met OBD requirements for purposes of EPA's certification process if the manufacturer can show that the vehicles meet newer CARB OBD regulations than the 2013 CARB regulation which currently establishes the core OBD requirements for EPA certification and that the OBD system meets the intent of EPA's regulation, including provisions that are in addition to or different from the applicable CARB regulation. The intent of this provision is to allow manufacturers to produce vehicles with one OBD system (software, calibration, and hardware) for all 50 states. We received only supportive comments on this change, from the auto industry, as summarized in the Response to Comments (RTC) document for this rulemaking.7. Stakeholder Engagement In developing this rule, EPA conducted outreach with a wide range of stakeholders, including auto manufacturers, automotive suppliers, labor groups, state/local governments, environmental and public interest groups, public health professionals, consumer groups, and other organizations. We also coordinated with the California Air Resources Board. Consistent with Executive Order 13990, in developing this rule EPA has considered the views from labor unions, states, and industry, as well as other stakeholders. EPA has considered all public comments received during the two-day public hearing on August 25 and 26, 2021, and written comments submitted to the docket during the public comment period, which closed September 27, 2021. Responses to comments can be found in this preamble and the Response to Comments document. We look forward to continuing to engage with interested stakeholders as we embark on a future rulemaking to set standards beyond 2026, so diverse views can continue to be considered in our development of a longer-term program.8. How do EPA's final standards relate to NHTSA's CAFE proposal and to California's GHG program?i. EPA and NHTSA Rulemaking Coordination In E.O 13990, President Biden directed NHTSA and EPA to consider whether to propose suspending, revising, or rescinding the SAFE rule standards for MYs 2021-2026.\57\ Both agencies determined that it was appropriate to propose revisions to their respective standards; EPA proposed and is finalizing revisions to its GHG standards and, in a separate rulemaking action, NHTSA proposed to revise its CAFE standards.\58\ Since 2010, EPA and NHTSA have adopted fuel economy and GHG standards in joint rulemakings. In the 2010 joint rule, EPA and NHTSA explained the purpose of the joint rulemaking effort was to develop a coordinated and harmonized approach to implementing the two agencies' statutes. The joint rule approach was one appropriate mechanism for the agencies to coordinate closely, given the common technical issues both agencies needed to consider and the importance of avoiding inconsistency between the programs. A few environmental NGOs commented that the CAA does not require EPA to engage in joint rulemaking for its LD GHG program.--------------------------------------------------------------------------- \57\ 86 FR 7037, January 25, 2021. \58\ 86 FR 49602, September 3, 2021.--------------------------------------------------------------------------- In light of additional experience as the GHG and CAFE standards have co-existed since the 2010 rule and the agencies have engaged in several joint rulemakings, EPA has concluded that while it remains committed to ensuring that GHG emissions standards for light duty vehicles are coordinated with fuel economy standards for those vehicles, it is unnecessary for EPA to do so specifically through a joint rulemaking. In reaching this conclusion, EPA notes that the agencies have different statutory mandates and their respective programs have always reflected those[[Page 74457]]differences. As the Supreme Court has noted ``EPA has been charged with protecting the public's 'health' and 'welfare,' a statutory obligation wholly independent of DOT's mandate to promote energy efficiency.'' \59\ The agencies have recognized these different mandates, and the fact that they have produced different analytical approaches and standards. For example, since EPA's responsibility is to address air pollution, it sets standards not only for carbon dioxide (measured as grams per mile), but also for methane and nitrous oxide. Even more significantly, EPA regulates leakage of fluorocarbons from air conditioning units by providing a credit against the tailpipe CO2standard for leakage reduction and adjusting those standards numerically downwards to reflect the anticipated availability of those credits. NHTSA, given its responsibility for fuel economy (measured as miles per gallon), does not have these elements in the CAFE program but has limits on transfers between car and truck fleets. There have always been other differences between the programs as well, which generally can be traced back to differences in statutory mandates. As the agencies reconsider the SAFE 2 standards, the difference in statutory lead time requirements has similarly led to a difference in the model years for which standards are being revised.--------------------------------------------------------------------------- \59\ Massachusetts v. EPA, 549 U.S at 532.--------------------------------------------------------------------------- We note that EPA coordinates with NHTSA regardless of whether it is in the formal context of a joint rulemaking, and indeed we have done so during the development of this rulemaking. Although there is no statutory requirement for EPA to consult with NHTSA, EPA has consulted significantly with NHTSA in the development of this rule. For example, staff of the two agencies met to discuss various technical issues including modeling inputs and assumptions, shared technical information, and shared views related to the modeling used for each rule. Under other areas of the CAA, consultation is the usual approach Congress has specified when it recognizes that in addition to EPA, another agency shares expertise and equities in an area. The CAA does not require joint rulemaking, even for its many provisions that require EPA consultation with other agencies on topics such as the impacts of ozone-depleting substances on the atmosphere (CAA section 603(f) requires consultation with Administrators of NASA and NOAA), renewable fuels (CAA section 211(o)(2)(B)(ii) requires coordination with the Secretaries of Energy and ***Agriculture***, and section 211(o)(7) requires consultation with those Secretaries), the importance of visibility on public lands (CAA section 169A(d) requires consultation with Federal Land Manager), regulation of aerospace coatings (CAA section 183(b)(3) requires consultation with Secretaries of Defense and Transportation and NASA Administrator), and federal procurement (CAA section 613 requires consultation with GSA Administrator and Secretary of Defense). For example, for aircraft emissions standards, where CAA section 231(a)(2)(B)(i) requires EPA to set the standards in consultation with the Federal Aviation Administration (FAA), and FAA implements the standards, the two agencies may undertake, and have undertaken, separate rulemakings. Likewise, when EPA revises test procedures for NHTSA's fuel economy standards under EPA's authority in 42 U.S.C 32904(c), those rules are not done as joint rulemaking (unless they were included as part of a larger joint rulemaking on GHG and fuel economy standards). Thus, EPA concludes that joint rulemaking is unnecessary, particularly to the extent it was originally intended to ensure that the agencies work together and coordinate their rules, which the agencies are indeed doing through separate rulemaking processes. We note that many commenters, including automakers, suppliers, dealers and the UAW noted benefits of coordination between EPA and NHTSA in establishing their respective programs, and urged EPA to maintain a close alignment with NHTSA, to ensure that automakers can continue to design and build vehicles to meet both sets of standards. As explained above, and at proposal, EPA has coordinated and will continue to coordinate with NHTSA in the development of EPA's and NHTSA's standards even in the absence of joint rulemaking. While the statutory differences between the programs remain, and thus some differences in compliance strategies might result, EPA agrees with commenters that it is an important goal for coordination that automakers be able to produce a fleet of vehicles which achieves compliance with both sets of standards simultaneously, and we believe these standards are consistent with that longstanding practice and goal. For example, EPA believes that the revised MY 2023 GHG standards will not interfere with automakers' ability to comply with MY 2023 CAFE standards even though NHTSA has not proposed revising CAFE standards for that year.ii. California GHG Program California has long been a partner in reducing light-duty vehicle emissions, often leading the nation by setting more stringent standards before similar standards are adopted by EPA. This historically has been the case with GHG emissions standards in past federal rulemakings, where California provided technical support to EPA's nationwide programs. Prior to EPA's 2010 rule establishing the first nationwide GHG standards for MYs 2012-2016 vehicles, California had adopted GHG standards for MYs 2009-2016.\60\ California subsequently adopted its MYs 2017-2025 GHG standards as part of its Advanced Clean Car (ACC) program. After EPA adopted its standards in the 2012 rule for MYs 2017-2025, California adopted a deemed-to-comply regulation whereby manufacturers could demonstrate compliance with California's standards by complying with EPA's standards.\61\ California also assisted and worked with EPA in the development of the 2016 Draft Technical Assessment Report for the Mid-term Evaluation,\62\ issued jointly by EPA, CARB and NHTSA, that served as an important technical basis for EPA's original January 2017 Final Determination that the standards adopted in the 2012 rule for MYs 2022-2025 remained appropriate. California also conducted its own Midterm Review that arrived at a similar conclusion.\63\--------------------------------------------------------------------------- \60\ EPA issued a waiver for CARB's 2009-2016 model year vehicles in 2009 (74 FR 32744). EPA subsequently issued a within-the-scope waiver determination for CARB's subsequent deemed-to-comply regulation (CARB adopted this regulation after EPA finalized its 2012-2016 model year GHG standards in 2010 on June 14, 2011 (76 FR 34693). \61\ The California Air Resources Board (CARB) received a waiver of Clean Air Act preemption on January 9, 2013 (78 FR 2211) for its Advanced Clean Car (ACC) program. CARB's ACC program includes the MYs 2017-2025 greenhouse gas (GHG) standards as well as regulations for zero-emission vehicle (ZEV) sales requirements and California's low emission vehicle (LEV) III requirements. \62\ Draft Technical Assessment Report: Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022-2025, EPA-420-D-16-900, July 2016. \63\ [*https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/advanced-clean-cars-midterm-review.---------------------------------------------------------------------------*](https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/advanced-clean-cars-midterm-review.---------------------------------------------------------------------------) In August 2018, EPA and NHTSA jointly issued the SAFE rule proposal, which included an EPA proposal to withdraw CARB's Advanced Clean Car (ACC) waiver as it related to California GHG emission standards and ZEV sales requirements (that would preclude California from enforcing its own program) as well as a proposal to[[Page 74458]]sharply reduce the stringency of the national standards.\64\ In September 2019, EPA and NHTSA then jointly issued a final SAFE ``Part One'' rule, which included a final EPA action withdrawing CARB's ACC waiver as it related to California GHG emission standards and ZEV sales requirements.\65\ In response to the SAFE rule proposal, California and five auto manufacturers entered into identical agreements commonly referred to as the California Framework Agreements. The Framework Agreements included national GHG emission reduction targets for MYs 2021-2026 that, in terms of stringency, are about halfway between the original 2012 rule standards and those adopted in the final SAFE rule. The Framework Agreements also included additional flexibilities such as additional incentive multipliers for advanced technologies, off-cycle credits, and full-size pickup strong hybrid incentives.--------------------------------------------------------------------------- \64\ EPA's waiver for CARB's Advanced Clean Car regulations is at 78 FR 2211 (January 9, 2013). The SAFE NPRM is at 83 FR 42986 (August 24, 2018). \65\ 84 FR 51310 (Sept. 27, 2019).--------------------------------------------------------------------------- EPA has considered California standards in past vehicle standards rules as we considered the factors of feasibility, costs of compliance and lead time. The California Framework Agreement provisions, and the fact that five automakers representing nearly 30 percent of national U.S vehicle sales voluntarily committed to them, at a minimum provide a clear indication of manufacturers' capabilities to produce cleaner vehicles than required by the SAFE rule standards in the implementation timeframe of EPA's revised standards.\66\ EPA further discusses how we considered the California Framework Agreements in the context of feasibility and lead time for our standards in Section III.C of this preamble. Some commenters supported continued coordination between EPA and California on our respective light-duty GHG programs. EPA expects to continue our long-standing practice of working closely with CARB and all other interested stakeholders in development of future emissions standards.--------------------------------------------------------------------------- \66\ The five California Framework Agreements may be found in the docket for this rulemaking and at: [*https://ww2.arb.ca.gov/news/framework-agreements-clean-cars.---------------------------------------------------------------------------*](https://ww2.arb.ca.gov/news/framework-agreements-clean-cars.---------------------------------------------------------------------------) In a separate but related action, on April 28, 2021, EPA issued a Notice of Reconsideration for the previous withdrawal of the California's ACC waiver as it relates to the ZEV sales mandate and GHG emission standards (SAFE 1), requesting comments on whether the withdrawal should be rescinded, which would reinstate the waiver.\67\ EPA conducted a virtual public hearing on June 2, 2021 and the comment period closed on July 6, 2021. EPA will announce the results of its reconsideration once it is complete.--------------------------------------------------------------------------- \67\ 80 FR 22421 (April 28, 2021).---------------------------------------------------------------------------B. Manufacturer Compliance Flexibilities EPA is finalizing a targeted set of additional temporary compliance flexibilities intended to provide additional flexibility for manufacturers in meeting the 2023 and 2024 standards. EPA proposed temporary changes to certain flexibility provisions to provide limited additional flexibility for manufacturers in transition to more stringent standards. After considering comments and further analysis, EPA is adopting a narrower set of flexibilities than proposed, focusing them particularly on MYs 2023-2024 to help manufacturers manage the transition to more stringent standards by providing some additional flexibility in the near-term. One of the four flexibilities, extended credit carry-forward, is discussed above in section II.A.4 of this preamble. This section provides a detailed discussion of the remaining three flexibilities, listed below, including a summary of the final flexibility provisions compared to those proposed and public comment highlights. (1) Credit carry-forward extension: As discussed previously in Section II.A.4 of this preamble, EPA is finalizing provisions for credit carry-forward extension that are more targeted than those proposed. EPA proposed to extend credit carry-forward for MY 2016-2020 credits to allow more flexibility for manufacturers in using banked credits in MYs 2023-2026. Specifically, EPA proposed a two-year extension of MY 2016 credits and a one-year extension of MY 2017-2020 credits. After considering comments and further analyzing the need for extended credit life, EPA is adopting a narrower approach for the final rule of only adopting the one-year credit life extension for MY 2017-2018 credits so they may be used in MYs 2023-2024. (2) Advanced technology multiplier incentives: EPA proposed increased and extended advanced technology multiplier incentives for MYs 2021-2025 but is finalizing the multipliers at their MY 2021 levels as established in the 2012 rule (e.g , 1.5 for EVs rather than the proposed 2.0) and including them only for MYs 2023-2024. Also, EPA proposed to remove the multiplier incentives for natural gas vehicles for MYs 2023-2026 established by the SAFE rule and is finalizing this program change as proposed. (3) Full-size pickup truck incentives: EPA proposed to extend the full-size pickup incentives for MYs 2022-2025, reinstating the provisions of the 2012 rule after EPA had eliminated them for these years as part of the SAFE rule. As with multipliers, EPA is finalizing the full-size pickup credits only for MYs 2023-2024. (4) Off-cycle credits: EPA proposed additional opportunities for menu-based off-cycle credits starting in MY 2020, along with updated technology definitions for some of the menu technologies. EPA is finalizing those additional credit opportunities only for MYs 2023-2026 and is not including them as an option for MYs 2020-2022. EPA is adopting new definitions for certain menu technologies as proposed with minor edits after considering comments. The use of the optional credit and incentive provisions has varied, and EPA continues to expect it to vary, from manufacturer to manufacturer. However, most manufacturers are currently using at least some of the flexibilities.\68\ Although a manufacturer's use of the credit and incentive provisions is optional.--------------------------------------------------------------------------- \68\ See ``The 2020 EPA Automotive Trends Report, Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975,'' EPA-420-R-21-003 January 2021 for additional information regarding manufacturer use of program flexibilities.---------------------------------------------------------------------------1. Multiplier Incentives for Advanced Technology Vehiclesi. Background on Multipliers Under Previous Programs In the 2012 rule, EPA included incentives for advanced technologies to promote the commercialization of technologies that have the potential to transform the light-duty vehicle sector by achieving zero or near-zero GHG emissions in the longer term, but which faced major near-term market barriers. EPA recognized that providing temporary regulatory incentives for certain advanced technologies would decrease the overall GHG emissions reductions associated with the program in the near term, by reducing the effective stringency of the standards in years in which the incentives were available, to the extent the incentives were used. However, in setting the 2017-2025 standards, EPA believed it was worthwhile to forego modest additional emissions reductions in the near term in order to lay the foundation for much larger GHG emissions reductions in the longer term. EPA also[[Page 74459]]believed that the temporary regulatory incentives may help bring some technologies to market more quickly than in the absence of incentives.\69\--------------------------------------------------------------------------- \69\ See 77 FR 62811 et seq.--------------------------------------------------------------------------- EPA established multiplier incentives for MYs 2017-2021 electric vehicles (EVs), plug-in hybrid electric vehicles (PHEVs), fuel cell vehicles (FCVs), and natural gas vehicles (NGVs).\70\ The multiplier allows a vehicle to ``count'' as more than one vehicle in the manufacturer's compliance calculation. Table 12 provides the multipliers for the various vehicle technologies included in the 2012 final rule for MY 2017-2021 vehicles.\71\ Since the GHG performance for these vehicle types is significantly better than that of conventional vehicles, the multiplier provides a significant benefit to the manufacturer. EPA chose the magnitude of the multiplier levels to be large enough to provide a meaningful incentive, but not be so large as to provide a windfall for vehicles that still would have been produced even at lower multiplier levels. The multipliers for EVs and FCVs were larger because these technologies faced greater market barriers at the time.--------------------------------------------------------------------------- \70\ 77 FR 62810, October 15, 2012. \71\ 77 FR 62813-62816, October 15, 2012.Table 12--Incentive Multipliers for EV, FCV, PHEVs, and NGVs Established in 2012 Rule------------------------------------------------------------------------ Model years EVs and FCVs PHEVs and NGVs------------------------------------------------------------------------2017-2019............................... 2.0 1.62020.................................... 1.75 1.452021.................................... 1.5 1.3------------------------------------------------------------------------ In the SAFE rule, EPA adopted a multiplier of 2.0 for MYs 2022-2026 natural gas vehicles (NGVs), noting that no NGVs were being sold by auto manufacturers at that time. EPA did not extend multipliers for other vehicle types in the SAFE rule, as the SAFE standards did not contemplate the extensive use of these technologies in the future so there was no need to continue the incentives.ii. Proposed and Final Multiplier Extension and Cap EPA is adopting a narrower set of temporary advanced technology multipliers in the final rule, limiting the multipliers to MYs 2023-2024 and at multiplier values consistent with the MY 2021 multiplier levels shown in Table 12, which are lower than the levels in the proposed rule. EPA is also finalizing the proposed 10 g/mile multiplier credit cap as proposed. This section first discusses the final multiplier levels and model year availability followed by a discussion of the multiplier cap.a. Multiplier Levels and Model Year Applicability EPA proposed to extend multipliers for EVs, PHEVs, and FCVs for MYs 2022-2025, but with a cap to limit the magnitude of resulting emissions reduction losses and to provide a means to more definitively project the impact of the multipliers on the overall stringency of the program. EPA noted in the proposed rule that with the revised more stringent standards being proposed, the Agency believed limited additional multiplier incentives would be appropriate for the purposes of encouraging manufacturers to accelerate the introduction of zero and near-zero emissions vehicles and maintaining momentum for that market transition. EPA requested comment on all aspects of the proposed extension of multipliers, including the proposed multiplier levels, model years when multipliers are available, and the size and structure of the multiplier credit cap. Given that the multipliers previously established in the 2012 rule and modified in the SAFE rule only run through MY 2021, EPA proposed to start the new multipliers in MY 2022 to provide continuity for the incentives over MYs 2021-2025. As proposed the multipliers would function in the same way as they have in the past, allowing manufacturers to count eligible vehicles as more than one vehicle in their fleet average calculations. The levels of the proposed multipliers, shown in Table 13 below, are the same as those contained in the California Framework Agreements for MY 2022-2025. EPA proposed to sunset the multipliers after MY 2025, rather than extending them to MY 2026, because EPA intended them to be a temporary part of the program to incentivize technology in the near-term, consistent with previous multipliers. EPA noted in the proposed rule that sunsetting the multipliers at the end of MY 2025 would help signal that EPA does not intend to include multipliers in its future proposal for standards for MY 2027 and later MYs, where these technologies are likely to be integral to the feasibility of the standards. The goal of a long-term program would be to quickly transition the light-duty fleet to zero-emission technology, in which case ``incentives'' would no longer be appropriate, noting further that as zero-emissions technologies become more mainstream, EPA believes it is appropriate to transition away from multiplier incentives. Table 13--Proposed Multiplier Incentives for MYs 2022-2025------------------------------------------------------------------------ Model years EVs and FCVs PHEVs------------------------------------------------------------------------2022-2024....................... 2.0 .............. 1.62025............................ 1.75 ............. 1.452026+........................... 1.0 (no multiplier 1.0 (no multiplier credits). credits).------------------------------------------------------------------------ EPA also noted in the proposed rule that it believes sunsetting multipliers would simplify programmatically a transition to a more stringent program for MY 2027. The proposed MY 2025 sunset date combined with the cap, discussed below, was intended to begin the process of transitioning away from auto manufacturers' ability to make use of the incentive multipliers. While EPA proposed to end multipliers after MY 2025 for these reasons, EPA requested comments on whether it would be more appropriate to allow multiplier credits to be generated in MY 2026 without an increase in the cap, potentially providing an additional incentive for manufacturers who had not yet produced advanced technology vehicles by MY 2026. EPA noted, however, that extending the multipliers through MY 2026 could also potentially complicate transitioning to MY 2027 standards for some manufacturers. EPA received a range of comments on its proposed multipliers for MYs 2021-2025, including both support for and opposition to including multipliers in the program. The Alliance and several member auto companies commented in support of including multipliers in the program. The Alliance commented that multipliers have proven effective in incentivizing increased production and sales of EVs and that it is aligned with EPA in recognizing that multipliers have provided, and can continue to provide, a meaningful incentive for manufacturers to help drive additional EVs into the marketplace and to help overcome ongoing market headwinds. The Alliance commented that ``for the duration of this rule, it can be broadly summarized that while improving, there is projected to remain a lingering price disparity between EVs and conventional models. This disparity continues to support the basis of the EV multiplier to deliver ``substantial induced innovation. Separate from the issue of cost, there are several points of friction that EVs have and may continue to struggle to overcome including availability of public charging infrastructure.'' The[[Page 74460]]Alliance commented it believes the inclusion of EV multipliers for MY 2026 and a higher cap would better recognize the current state of EV technology and markets and incentivize additional EV production. The Alliance also commented that extending the multipliers out to MY 2026 would also recognize that some manufacturers are still developing EVs and would be influenced by later incentives. The Alliance suggested that EPA include an EV multiplier in MY 2026, and reconsider the need for such incentives beyond MY 2026 based on technology and market development in a subsequent rulemaking. Honda commented that policy levers such as advanced technology multipliers can play an important role in driving continued investment in the face of market uncertainty, multipliers have the potential to bring the cost-effectiveness of long-term technologies more in line with those of shorter-term technologies, and can help facilitate a virtuous cycle in which reduced technology costs, passed along to consumers, can further assist market uptake. Jaguar Land Rover commented in support of lowering the multiplier levels to those in place for MY 2021. Toyota commented that the multiplier should be increased for PHEVs, to a level closer to that provided to EVs, as they claim that PHEVs are often driven as EVs. Lucid, an EV-only manufacturer, supported the multipliers. CARB commented that EPA's proposed multiplier levels are too high because the proposed cap would be reached at around two percent of sales, a level already met by some auto manufacturers. CARB commented that, as such, the proposed cap would not provide much incentive for increased EV sales. CARB commented that EPA should finalize multipliers only for MYs 2023-2025 at a multiplier levels lower than the proposed levels as they believed that this approach would require manufacturers to sell more EVs in order to maximize multiplier incentive credits and reach the cap, thus providing a greater incentive for manufacturers to increase EV sales in this time frame. Similar comments were received from other state government stakeholders including New York, Minnesota, New Mexico, as well as NACAA. South Coast Air Quality Management District (SCAQMD) supported multipliers and suggested extending them out to MY 2026 but at a lower level as part of a phase-out. Other commenters supporting multipliers include Motor and Equipment Manufacturers Association (MEMA), Manufacturers of Emission Controls Association (MECA), ITB Group, and several individual suppliers. MEMA and MECA commented that their support was conditioned on the incentives sunsetting in 2025 and the program including a stringent cap, discussed below. MEMA commented ``while MEMA can support these advanced technology multiplier incentives, these multiplier incentives should not be extended indefinitely, credits should not be set higher than the proposed levels, and the proposed cap should not be increased.'' The Electric Drive Transportation Association also supported multipliers, commenting that EVs are still an emerging market and industry and that multipliers promote investment in innovation and noting that there is still significant uncertainty in multi-year EV market predictions. The Edison Electric Institute also supported the proposed multipliers as reasonable and well supported. Rivian and Tesla, both EV-only manufacturers, did not support including multipliers. Rivian commented that ``artificially enhancing the compliance value of EVs, the multiplier can enable manufacturers to sell additional conventional vehicles if those units deliver a greater financial return. It is also debatable whether the multiplier is even necessary at this stage to help commercialize EV technology. With a rapidly proliferating lineup of EVs in all body styles and vehicle segments, the auto industry has amply demonstrated its ability to bring compelling and competitive advanced technology vehicles to market.'' Tesla commented that the renewal of multipliers and increased value are unnecessary and, rather than serve as an incentive, will further delay manufacturers from deploying large amounts of electric vehicles in the U.S Tesla also commented that the proposed enhanced multiplier unnecessarily rewards late-acting manufacturers with excessive credits and richer credits after over a decade of notice from the EPA that such incentives were temporary and destined to decline in reward. Environmental and health NGOs also did not support the proposed multipliers, commenting that the incentives were not needed and would result in a loss of emissions reductions. A coalition of NGOs commented that the proposed multipliers would reduce the stringency of proposed rule through MY 2021-MY 2026 by about 6 percent--an amount exceeding one full year of emissions reductions and that the multipliers are no longer serving their original purpose of incentivizing the production of more EVs. NGOs commented that the multiplier credits represent a windfall for manufacturers already planning to sell EVs. They commented further that EPA, at a minimum, should end the lifetimes of any multiplier credit in the final year for which they are granted such that the multiplier credits are not banked to be used in MY 2027 and later. UCS urged EPA to eliminate multipliers as the current program already provides substantial incentives by excluding upstream emissions; UCS submitted a modeling analysis which they believe indicates that multipliers are ineffective in encouraging greater EV sales. The Southern Environmental Law Center commented that, at a minimum, EPA should revise the proposed rule so the MYs 2022 through 2024 multiplier incentives values start at 1.5 for EVs and FCVs, and 1.3 for PHEVs--the values provided for the last year of advanced technology credits (MY 2021) in the 2012 Rule--and then decrease to a value of 1.0 (no multiplier credits) by MY 2026. Securing America's Future Energy (SAFE) commented in support of the proposed multipliers. SAFE further commented: [I]f EPA remains concerned that the multiplier will result in fewer EV sales because the availability of the multiplier relaxes the stringency of the standard, EPA could modify the operation of the multiplier to mitigate those concerns while still incentivizing the sale of electric vehicles. First, EPA could take into account the possibility that the multiplier might relax the stringency of the standards, and then further tighten the standards to maintain its initial level of stringency. In the alternative, EPA could modify the multiplier so that it would only apply to the incremental percentage of EVs that an automaker sold over the percentage in the previous year. By limiting the availability of the multiplier to the incremental sales of EVs year over year, EPA could reduce the extent to which it decreases the overall stringency of the standard. Yet, by maintaining the multiplier for electric vehicles that represent growth of the EV segment of an automakers' sales, the multiplier would provide an ongoing and robust incentive for automakers to continually increase their EV sales. The Institute for Policy Integrity commented that EPA should consider whether scaling back some of the multiplier credits, or limiting their application to MY 2023, would increase net social benefits while still preserving more than enough compliance flexibility to satisfy the requirement for lead time. The Alliance for Vehicle Efficiency (AVE) commented in support of EPA's goal of offering advanced multiplier credits up until 2026 and recommended EPA offer additional performance-based[[Page 74461]]credits to automotive manufacturers (OEMs) for any vehicle that exceeds the standards ahead of EPA's compliance timeline, including ICE vehicles. AVE commented that ``by steering OEMs towards specific technologies that may only affect about 8 percent of the fleet by 2026 with extensive credits, EPA risks losing immediate and more extensive environmental improvements in exchange for estimated environmental gains years from now. EPA instead has an opportunity to accelerate the adoption of advanced vehicle technologies and reduce emissions from the vast majority of vehicles that will be sold between MYs 2023 to 2026 with performance-based credits.'' After careful weighing the diverse and thoughtful comments received regarding multipliers, EPA is finalizing temporary multipliers at lower levels than those proposed and for fewer model years. Table 14 provides the final multipliers. Table 14--Final Multiplier Incentives for MYs 2023-2024------------------------------------------------------------------------ Model years EVs and FCVs PHEVs------------------------------------------------------------------------2022............................ None.............. None.2023-2024....................... 1.5 .............. 1.3 2025+........................... None.............. None.------------------------------------------------------------------------ EPA believes the approach being finalized strikes an appropriate balance between providing additional near-term flexibility (with the goal that multipliers can act as an incentive for manufacturers to ramp up EV sales more quickly in this time period) and the overall emissions reduction goals of the program. To the extent that manufacturers utilize the optional multiplier flexibility to the maximum extent, it provides additional flexibility of up to 10 g/mile (compared to a projected total decrease in the fleet average targets over MYs 2023-2024 of 32 g/mile, as shown in Table 8 of section II.A.1 of this preamble.) for a manufacturer's overall fleet, consistent with the cap level of the proposal. EPA's final approach is also directionally responsive to many of the concerns raised about multipliers and incorporates several of the suggestions made by commenters to narrow the model years and reduce the magnitude of the multipliers. By reducing the multiplier numeric levels by 50 percent compared to the proposed rule (i.e , reducing the EV multiplier from 2.0 to 1.5), manufacturers will need to sell twice as many advanced technology vehicles if they wish to fully utilize the multiplier incentive and reach the cap. In addition, by retaining the proposed cumulative cap of 10 g/mile, but focusing the multiplier incentives on MYs 2023-2024, the result is an effective or average per year cap of 5.0 g/mile as opposed to the 2.5 g/mile nominal per year cap proposed, under which the 10 g/mile cumulative would spread over four rather than 2 years. EPA believes this approach is responsive to comments that the proposed multipliers would not represent an incentive but simply windfall credits manufacturers would generate by selling the same number of EVs as had been planned previously. In response to comments that the proposed multipliers could have the effect of delaying or reducing EV sales, EPA modeled the final program with and without the final multipliers and found that the final multipliers are not expected to reduce EV sales (see RIA Chapter 4.1.4). In response to comments provided by SAFE, EPA believes the concept SAFE presented regarding incentivizing only incremental sales beyond those sold by manufacturers in the previous model year to focus the incentive more directly on increased sale has some merit, but EPA is not adopting such an approach. EPA proposed that the multipliers would be applied in the same way as those provided previously in the 2012 rule for MYs 2017-2021, with the exception of the credit cap. EPA would want to seek input from all stakeholders on the merits and implementation details of this type of approach prior to adopting such a fundamental change to the program. Also, the approach offered by SAFE would add complexity to the program which EPA does not believe to be necessary for the few model years, MYs 2023-2024, for which EPA is adopting new multipliers. Some auto manufacturers commented in support of extending multipliers through MYs 2026 and even beyond, while other commenters were concerned that providing multipliers in later model years would reward manufacturers that introduce advanced technology vehicles such as EVs later than other manufacturers. EPA does not intend for multipliers to be an ongoing incentive but only a narrow flexibility to help address lead time concerns in early model years. EPA proposed to end the multipliers in MY 2025 and is finalizing ending them a year earlier in MY 2024, which is consistent with EPA's intention that the incentives be short lived and narrowly targeted. As discussed further in Section III of this preamble, EPA believes that there is enough lead time for manufacturers to prepare to meet the final standards starting in MY 2025 without such incentives. Regarding comments that EPA should not allow the multiplier credits to be used in MYs 2027 and later because the credits could unduly delay the application of technology and delay emissions reductions, EPA understands this concern. When considering the feasibility of standards for MYs 2027 and later, EPA intends to take credit banks and credit availability into consideration. EPA received many comments on multiplier incentives and responds fully to comments in the RTC for the rule.b. Multiplier Incentive Credit Cap To limit the potential effect of the multipliers on reducing the effective stringency of the standards, EPA proposed to cap the credits generated by a manufacturer's use of the multipliers to the Megagram (Mg) equivalent of 2.5 g/mile for their car and light truck fleets per MY for MYs 2022-2025 or 10.0 g/mile on a cumulative basis.\72\ Above the cap, the multiplier would effectively have a value of 1.0--in other words, after a manufacturer reaches the cap, the multiplier would no longer be available and would have no further effect on credit calculations. A manufacturer would sum the Mg values calculated for each of its car and light truck fleets at the end of a MY into a single cap value that would serve as the overall multiplier cap for the combined car and light truck fleets for that MY. This approach would limit the effect on stringency of the standards for manufacturers that use the multipliers to no greater than 2.5 g/mile less stringent each year on average over MYs 2022-2025. EPA proposed that manufacturers would be able to choose how to apply the cap within the four-year span of MYs 2022-2025 to best fit their product plans. Under the proposed approach, manufacturers could opt to use values other than 2.5 g/mile in the cap calculation as long as the sum of those values over MYs 2022-2025 did not exceed 10.0 g/mile (e.g , 0.0, 2.5, 2.5, 5.0 g/mile in MYs 2022-2025).--------------------------------------------------------------------------- \72\ Proposed Multiplier Credit Cap [Mg] = (2.5 g/mile CO2x VMT x Actual Annual Production)/1,000,000 calculated annually for each fleet and summed. The proposed approach would allow manufacturers to use values higher than 2.5 g/mile in the calculation as long as the sum of the cumulative values over MYs 2022-2025 did not exceed 10.0 g/mile. The vehicle miles traveled (VMT) used in credit calculations in the GHG program, as specified in the regulations, are 195,264 miles for cars and 225,865 for trucks. See 40 CFR 86.1866-12. See also 40 CFR 86.1866-12(c) for the calculation of multiplier credits to be compared to the cap.--------------------------------------------------------------------------- EPA received a range of comments regarding the proposed cap. The[[Page 74462]]Alliance and some individual auto manufacturers commented that EPA should provide a cap more in line with that included in the California Framework, equivalent to 23 g/mile (about 5.8 g/mile/year) through MY 2025 and 32 g/mile (about 6.4 g/mile/year) through MY 2026, in order to further incentivize EVs. The Alliance commented that the proposed 10 g/mile cap provides little incentive to increase EV production unless it is taken in a single, or limited, years. The Alliance also commented that the increased cap would better recognize the current state of EV technology and markets. Auto Innovators believes additional EV production can be incentivized by a higher credit cap while still balancing with the policy goal of maximizing near-term GHG benefits. Several individual manufacturers including Honda, Hyundai, JLR, Mercedes, Nissan, Stellantis, and Toyota also commented in support of a cap in line with or closer to the California Framework levels. Ford commented that a larger multiplier should be provided for trucks compared to cars to alleviate proportionally lower benefits provided to OEMs with a higher truck mix. Lucid commented that EV-only manufacturers should not be subject to a cap because they are not off-setting higher emitting ICE vehicles in their own fleets. Lucid commented that the cap was intended to target manufacturers that produce vehicles with internal combustion engines to prevent them from counterbalancing high-emitting vehicles with ZEV sales. CARB and New York State Department of Environmental Quality (DEQ) supported the proposed cap, but with lower multipliers such that more EVs are needed to reach the cap, thus providing an incentive for greater EV sales. UCS commented it supports EPA's cap and smaller window of time for those multipliers if multipliers are to remain in the final rule. It commented further that ``should EPA continue to move forward with a new phase of EV multipliers, we are strongly supportive of the agency's proposed approach with the cap. The current cap is appropriately low--with a typical fleet compliance of 200-250 g/mile in this timeframe, even using all of the cap in a single year would affect no more than a few percent of a manufacturer's fleet in that year. Because the total impact is relatively low, allowing manufacturers to distribute the total cap utilization according to their own optimal usage does not pose a drastic risk--however, generally such flexibility is maximized by manufacturers at a cost to the goals of the program, and any increase in the total g/mile value of the cap or additional years in which the multipliers are made available significantly enhances such risk.'' MEMA supported including a cap, as noted above, commenting that ``without a cap and sunset, the advanced technology multiplier credits could drive technologies down too narrow of a regulatory path, too quickly. MEMA commented further that the cap should not be increased beyond the level proposed. MECA submitted similar comments. The Southern Environmental Law Center commented that EPA should cap the amount of credits generated by PHEVs that may be used to satisfy the overall multiplier incentive credit cap--similar to the cap established by California in the ZEV program for transitional zero emissions vehicles. On the topic of allowing multiplier credits to be generated in MY 2026 and the credit cap, SCAQMD commented that it generally supported sunsetting the multipliers in MY 2025 but if the rule design could recognize narrower eligibility for generating credits in 2026, e.g , extending the incentive only to those manufacturers that have used less than some fraction of the cap, it could promote this beneficial result without further ossifying multipliers. SCAQMD commented ``[m]oreover, if MY 2026 had its own year-specific, lesser cap, such that a manufacturer would not rely too heavily on any new-gained multiplier incentive, that may partly address EPA's stated concern that any MY 2026 credits could `potentially complicate transitioning to MY 2027 standards for some manufacturers.' '' After considering comments, EPA is finalizing the proposed credit cap of 10.0 g/mile on a cumulative basis. The nominal credit cap on a per year basis is five g/mile because the cap is spread over two MYs, 2023-2024, rather than the four MYs of 2022-2025 proposed. Commenters were generally supportive of including a multiplier cap and while comments differed on the appropriate magnitude of the cap, EPA believes its approach for the final cap addresses many of the concerns expressed by commenters. Even though EPA reduced the number of years over which multiplier incentives would be available from four to two years, EPA is retaining the proposed cumulative cap of 10 g/mile. This is equivalent to a nominal per year cap of 5.0 g/mile compared to the 2.5 g/mile per year nominal cap proposed. This preserves the magnitude of the additional flexibility proposed overall but focuses it more narrowly on MYs 2023-2024. Based on current use of multipliers and manufacturers' announced plans for the introduction of more advanced technology vehicles in this time frame, EPA believes this provision will provide additional flexibility in meeting the near-term standards and help them manage the transition to more stringent standards.\73\--------------------------------------------------------------------------- \73\ ``The 2021 EPA Automotive Trends Report, Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975,'' EPA-420-R-21-023, November 2021. Manufacturers generated overall fleet average multiplier credits equivalent to just under 3 g/mile (See Figure 5.5).--------------------------------------------------------------------------- EPA considered whether reducing the magnitude of the cap by half would be appropriate, retaining the proposed nominal cap of 2.5 g/mile per year. EPA decided that rather than reduce the magnitude of the cap, it would be more appropriate to retain the 10 g/mile cap so that the available total incentive credits, and the flexibility they represent in the earliest years of the program, is retained. The approach EPA is finalizing is also consistent with the Alliance comments that, as proposed, the multipliers would provide little incentive and did not recognize the current state of technology or the market. We believe, as noted above, that concentrating the multipliers over two years with the same cumulative cap, rather than the proposed four years, provides additional incentive for increasing sales of advanced technology vehicles. EPA recognizes, also, that while the effect on emissions reductions would remain the same as under the proposed rule if manufacturers are able to maximize the use of the multipliers in MYs 2023-24, given that the cap remains at 10 g/mi, we expect it to be less likely for manufacturers to reach that level given the more limited timeline and reduced multiplier levels compared to the proposal. EPA believes the final approach better provides the intended incentive to manufacturers to more quickly ramp up sales of these vehicles, which are key in transitioning the light-duty fleet toward zero-emissions vehicles. In response to comments that EPA should adopt a more generous multiplier cap, in line with that included in the California Framework, EPA did not take this approach because EPA believed the California Framework cumulative cap to be too generous for the EPA program. Conversely, other commenters believe that no multiplier should be allowed because, even under the proposed cap, multipliers may act to lessen the real world emission reductions from the standards. EPA notes that the California Framework Agreements take effect in MY 2021 compared to EPA's final standards that[[Page 74463]]begin in MY 2023 and thus there is a significant difference in the program time frames. Although EPA is adopting a nominal per year cap that is more similar to that of the California Framework, EPA is not increasing the cumulative cap from the proposed 10 g/mile cap. The multipliers in EPA's final program are only available for MYs 2023-2024 compared to the longer duration of multipliers in the California Framework, which provides additional multipliers in MYs 2020-2026. EPA is providing more limited flexibilities in its final program in order to preserve the most emissions reductions feasible while still providing near-term flexibility in consideration of lead time.iii. Natural Gas Vehicle Multipliers As noted above, the SAFE rule did not extend multipliers for advanced technology vehicles but did extend and increase multiplier incentives for dual-fuel and dedicated natural gas vehicles (NGVs). The current regulations include a multiplier of 2.0, uncapped, for MYs 2022-2026 NGVs. In the SAFE rule, EPA said it was extending the multipliers for NGVs because ``NGVs could be an important part of the overall light-duty vehicle fleet mix, and such offerings would enhance the diversity of potentially cleaner alternative fueled vehicles available to consumers.'' \74\ After further considering the issue, as proposed, EPA is removing the extended multiplier incentives added by the SAFE rule from the GHG program after MY 2022. EPA is ending multipliers for NGVs in this manner because NGVs are not a near-zero emissions technology and EPA no longer believes it is appropriate to incentivize these vehicles to encourage manufacturers to introduce them in the light-duty vehicle market. EPA does not view NGVs as a pathway for significant vehicle GHG emissions reductions in the future. Any NGV multiplier credits generated in MY 2022 would be included under the proposed multiplier cap. There are no NGVs currently offered by manufacturers in the light-duty market and EPA is unaware of any plans to introduce NGVs, so EPA does not expect the removal of multipliers for NGVs to have an impact on manufacturers' ability to meet standards.\75\--------------------------------------------------------------------------- \74\ 85 FR 25211. \75\ The last vehicle to be offered, a CNG Honda Civic, was discontinued after MY 2015. It had approximately 20 percent lower CO2than the gasoline Civic. For more recent advanced internal combustion engines, the difference may be less than 20 percent due to lower emissions of the gasoline-fueled vehicles.--------------------------------------------------------------------------- EPA requested comment on its proposed treatment of multipliers for NGVs including whether they should be eliminated altogether for MYs 2023-2026 as proposed or retained partially or at a lower level for MYs 2023-2025. Comments on this topic are summarized and discussed in the RTC document for the rule.2. Full-Size Pickup Truck Incentives EPA is finalizing temporary full-size pickup incentives for a more limited time frame than proposed, just for MYs 2023-2024 rather than the proposed MYs 2022-2025. This section provides an overview of the incentives, comments received, and the provisions EPA is finalizing in the final rule.i. Background on Full Size Pickup Incentives in Past Programs In the 2012 rule, EPA included a per-vehicle credit provision for manufacturers that hybridize a significant number of their full-size pickup trucks or use other technologies that comparably reduce CO2emissions. EPA's goal was to incentivize the penetration into the marketplace of low-emissions technologies for these pickups. The incentives were intended to provide an opportunity in the program's early years to begin penetration of advanced technologies into this category of vehicles, which face unique challenges in the costs of applying advanced technologies due to the need to maintain vehicle utility and meet consumer expectations. In turn, the introduction of low-emissions technologies in this market segment creates more opportunities for achieving the more stringent later year standards. Under the existing program, full-size pickup trucks using mild hybrid technology are eligible for a per-truck 10 g/mile CO2credit during MYs 2017-2021.\76\ Full-size pickup trucks using strong hybrid technology are eligible for a per-truck 20 g/mile CO2credit during MYs 2017-2021, if certain minimum production thresholds are met.\77\ EPA established definitions in the 2012 rule for full-size pickup and mild and strong hybrid for the program.\78\--------------------------------------------------------------------------- \76\ As with multiplier credits, full-size pickup credits are in Megagrams (Mg). Full-size pickup credits are derived by multiplying the number of full-size pickups produced with the eligible technology by the incentive credit (either 10 or 20 g/mile) and a vehicle miles traveled (VMT) value for trucks of 225,865, as specified in the regulations. The resulting value is divided by 1,000,000 to convert it from grams to Mg. EPA is not adopting a cap for these credits and they are only available for full-size pickups, rather than the entire fleet, so the calculation is simpler than that for multiplier credits. \77\ 77 FR 62825, October 15, 2012. \78\ 77 FR 62825, October 15, 2012. Mild and strong hybrid definitions as based on energy flow to the high-voltage battery during testing. Both types of vehicles must have start/stop and regenerative braking capability. Mild hybrid is a vehicle where the recovered energy over the Federal Test Procedure is at least 15 percent but less than 65 percent of the total braking energy. Strong hybrid means a hybrid vehicle where the recovered energy over the Federal Test Procedure is at least 65 percent of the total braking energy.--------------------------------------------------------------------------- Alternatively, manufacturers may generate performance-based credits for full-size pickups. This performance-based credit is 10 g/mile CO2or 20 g/mile CO2for full-size pickups achieving 15 percent or 20 percent, respectively, better CO2performance than their footprint-based targets in a given MY through MY 2021.\79\ This second option incentivizes other, non-hybrid, advanced technologies that can reduce pickup truck GHG emissions and fuel consumption at rates comparable to strong and mild hybrid technology. These performance-based credits have no specific technology or design requirements; automakers can use any technology or set of technologies as long as the vehicle's CO2performance is at least 15 or 20 percent below the vehicle's footprint-based target. However, a vehicle cannot receive both hybrid and performance-based credits since that would be double-counting.--------------------------------------------------------------------------- \79\ 77 FR 62826, October 15, 2012. For additional discussion of the performance requirements, see Section 5.3.4 of the ``Joint Technical Support Document: Final Rulemaking for 2017-2025 Light-duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards'' for the Final Rule,'' EPA-420-R-12-901, August 2012.--------------------------------------------------------------------------- Access to any of these large pickup credits requires that the technology be used on a minimum percentage of a manufacturer's full-size pickups. These minimum percentages, established in the 2012 final rule, are set to encourage significant penetration of these technologies, leading to long-term market acceptance. Meeting the penetration threshold in one MY does not ensure credits in subsequent years; if the production level in a MY drops below the required threshold, the credit is not earned for that MY. The required penetration levels are shown in Table 15 below.\80\--------------------------------------------------------------------------- \80\ 40 CFR 86.1870-12.[[Page 74464]] Table 15--Penetration Rate Requirements by Model Year for Full-Size Pickup Credits [% of production]---------------------------------------------------------------------------------------------------------------- 2017 2018 2019 2020 2021----------------------------------------------------------------------------------------------------------------Strong hybrid................... 10 10 10 10 10Mild Hybrid..................... 20 30 55 70 8020% better performance.......... 10 10 10 10 1015% better performance.......... 15 20 28 35 40---------------------------------------------------------------------------------------------------------------- Under the 2012 rule, the strong hybrid/20 percent better performance incentives initially extended out through MY 2025, the same as the 10 percent production threshold. However, the SAFE rule removed these incentives after MY 2021, given the reduced stringency of the SAFE standards. The mild hybrid/15 percent better performance incentive was not affected by the SAFE rule, as those provisions end after MY 2021.\81\--------------------------------------------------------------------------- \81\ See 85 FR 25229.---------------------------------------------------------------------------ii. Proposed and Final Full Size Pickup Truck Incentives EPA proposed to reinstate the full-size pickup credits as they existed before the SAFE rule, for MYs 2022 through 2025. As discussed in the proposal, while no manufacturer has yet claimed these credits, the rationale for establishing them in the 2012 rule remains valid. In the context of the proposed rule that included more stringent standards for MY 2023-2026, EPA believed these full-size pickup truck credits were appropriate to further incentivize advanced technologies penetrating this particularly challenging segment of the market. As with the original program, EPA proposed to limit this incentive to full-size pickups rather than broadening it to other vehicle types. Introducing advanced technologies with very low CO2emissions in the full-size pickup market segment remains a challenge due to the need to preserve the towing and hauling capabilities of the vehicles. The full-size pickup credits incentivize advanced technologies into the full-size pickup truck segment to help address cost, utility, and consumer acceptance challenges. EPA requested comments on whether or not to reinstate the previously existing full-size pickup strong hybrid/20 percent better performance incentives and on the proposed approach for doing so. EPA also requested comment on the potential impacts of the full-size pickup incentive credit, and whether, and how, EPA should take the projected effects into account in the final rulemaking. EPA received a range of comments both supporting and opposing the proposed full-size pickup incentives. The Alliance supported the proposed full-size pickup hybrid and over-performance incentive credits and suggested that they should be extended through MY 2026. The Alliance commented that although many full-size pickup trucks are quite efficient for their size, weight, and utility, they remain among the highest emitting non-niche vehicles in the fleet. Incentivizing strong hybridization or other technology solutions that yield GHG emission rates 20 percent or better than their regulatory targets, the Alliance believes, can help encourage manufacturer production and marketing to foster greater long-term consumer market adoption in the transition to EVs. Ford commented that it believes that the full-size pickup incentives are essential in enabling continued adoption of advanced technology in the full-size pickup segment and supports EPA's proposed reinstatement. Ford commented further that one concern with this credit mechanism is the requirement that 10 percent volume penetration of the relevant technologies must be reached within a given model before any credit is granted. Ford commented ``this `all-or-nothing' approach poses risks and uncertainty to OEM compliance planning since it is difficult to predict future volumes with precision, particularly for new or advanced technologies such as hybridization. Ford believes that the threshold is also unnecessary since an OEM is already motivated to maximize volumes to the greatest extent possible--within market and material constraints--in order to recoup the sizeable investments needed to implement such technologies. For these reasons, Ford believes it is appropriate to lower or remove the volume threshold requirement. In the alternative, Ford asks that EPA clarify that an OEM may include multiple technologies toward the 10 percent threshold, for example, by combining BEV and HEV volumes to satisfy a given model's 10 percent threshold requirement for the performance-based credit pathway.'' The Alliance also supported this approach. CARB supported restoring the full-size pickup credits in conjunction with revised standards but disagreed that the credits should be restored for MY 2022, commenting that vehicles produced for MY 2022 will remain subject to the substantially less stringent SAFE standards and no action should be taken to effectively further weaken the 2021 or 2022 standards. Environmental and health NGOs opposed the pickup incentives. Center for Biological Diversity, Earthjustice, and Sierra Club (hereinafter ``CBD et al.'') jointly commented that the incentives were unnecessary, noting automakers are making new electric trucks, and consumers are buying them. CBD et al. elaborated ``For example, as of early June 2021, Ford had reached 100,000 reservations for its 2022 Ford F-150 electrified full-size truck. Rivian's electric R1T will be released this year, and General Motors is planning an electric version of its popular Chevrolet Silverado for 2023.'' CBD et al. commented that, as these developments are happening on their own, there is no evidence that EPA's incentives would further spur production. ACEEE commented, ``this is another instance of awarding credits in excess of actual emission reductions, which reduces the stringency of the standards. This specific incentive is also problematic because it could encourage production of full-sized pickup trucks at the expense of smaller vehicles. It also provides a loophole to the 2.5 g/mile EV multiplier credit limit, by creating an alternative pathway for EV pickup trucks to earn unwarranted credits after the fleetwide EV multiplier limit has been reached. ACEEE estimates that this provision alone could reduce stringency by up to 2 g/mile by MY 2025 and reduce emissions savings by up to 1 percent for the entire period of the proposed rule.'' UCS provided similar comments, stating that ``even in the absence of the full-size pick-up strong hybrid/performance credit, manufacturers have moved forward with plans for full-size pick-ups that meet the criteria. The simple reason is that these vehicles are sold by only a[[Page 74465]]small number of manufacturers, and as such represent a critical piece of the portfolio of those manufacturers--a company like Ford cannot afford for its best-selling vehicle to be a deficit-generator under the standards. Since these vehicles are already planned, the agency's reinstatement of the credit cannot be considered an incentive--instead, it is a windfall credit.'' SAFE also opposed the pickup incentives, commenting that hybridization of pick-up trucks is no longer an innovative technology, as it has been replaced by full electric pickup trucks, with towing and hauling capacity similar to conventional pickups, that are entering the market shortly. SAFE further commented that EPA acknowledged that the proposed pickup incentives would allow additional GHG emissions and did not to adequately support its proposed rule. SAFE commented that ``given the current state of pickup truck technology, EPA should focus on incentivizing transformative electric pickup trucks and decline to extend incentives to hybrids.'' Tesla commented that EPA should not renew the full-size pick-ups incentives, commenting that EPA's analysis underestimates the deployment of newly manufactured full EV pick-up trucks. Tesla notes, for example, EPA projects no delivery of the Tesla Cybertruck as is scheduled in MY 2022, ignores any deployment of pickups by Rivian, and appears to underestimate Toyota's deployment despite pronouncement of seven models by MY 2025. Tesla commented that their modeling anticipates that starting in MY 2023 this annual credit would further erode the proposed standard's stringency starting at 0.3 g/mile and grow in usage in MYs 2024 and 2025. Tesla also asserted this incentive is not needed to incentivize deployment of actual EV pickups and should be removed to increase the revised standards' stringency. Consumer Reports recommended that EPA simplify the credit by eliminating the strong hybrid credit, and only provide the credit to vehicles that meet the 20 percent improvement above the standard threshold, regardless of technology used. Consumer Reports commented that this would avoid potentially giving credits to strong hybrids designed to deliver increased performance, but minimal efficiency improvements. UCS provided similar comments regarding strong hybrid pickups, commenting that strong hybrid pickups are not being designed for efficiency, and given that, it makes sense to eliminate the strong hybrid credit entirely. UCS further commented that if EPA wishes to implement a full-size pick-up credit, it should only be for the 20 percent performance credit to ensure that at least the credit windfall will be limited to efficient vehicles, not just a high-performance trim level. After considering the wide range of comments, EPA is finalizing a more limited time period for full-size pickup incentives--only for MYs 2023-2024. EPA is not finalizing the proposed incentives for MYs 2022 or 2025. These incentives will sunset at the end of MY 2024. EPA believes this approach balances the need for flexibility in these near-term model years given lead time considerations, with the overall emissions reduction goals of the program. EPA believes that this more targeted approach to full-size pickup truck credits is appropriate to further incentivize advanced technologies in this segment, which continues to be particularly challenging given the need to preserve the towing and hauling capabilities while addressing cost and consumer acceptance challenges. EPA is also retaining the production thresholds to ensure that manufacturers taking advantage of the flexibility must sell a significant number of qualifying vehicles to do so. While this flexibility is more narrowly focused, since not all manufacturers produce full-size pickups, it represents another avenue for credits that may help manufacturers meet the near-term standards, in addition to the other flexibilities included in the program. Regarding comments from Consumer Reports and UCS that EPA should not include an incentive for strong hybrid technology, EPA understands the concerns raised by the commenters and believes the comments have some merit. However, EPA has decided to constrain the overall program instead in terms of timeframe by only finalizing the incentive for two model years, which directionally responds to the commenters more general concerns about the potential impact of the proposal. The approach EPA is finalizing is more in line with EPA's proposal and request for comments regarding the scope full-size pickup incentives, since EPA did not seek comments or otherwise consider not including the strong hybrid portion of the full-size pickup incentive. EPA also is finalizing the proposed provision to prevent double counting of the full-size pickup credits and the advanced technology multipliers. In the 2012 rule, EPA included a provision that prevents a manufacturer from using both the full-size pickup performance-based credit pathway and the multiplier credits for the same vehicles. This would prevent, for example, an EV full-size pickup from generating both credits. EPA proposed the same restriction for vehicles qualifying for the full-size pickup hybrid credit pathway. With the extended multiplier credits and the full-size pickup credit, EPA believes allowing both credits would be double-counting and inappropriate. EPA did not receive adverse comments on this provision. Therefore, EPA is modifying the regulations as proposed such that manufacturers may choose between the two credits in instances where full-size pickups qualify for both but may not use both credits for the same vehicles. A manufacturer may choose to use the full-size pickup strong hybrid credit, for example, if the manufacturer either has reached the multiplier credit cap or intends to do so with other qualifying vehicles.3. Off-Cycle Technology Credits EPA is finalizing a temporary increase in the off-cycle menu credit cap from 10 to 15 g/mile, but over a more limited time frame than proposed, from MY 2023 through 2026. Coinciding with the increased menu cap, EPA is also adopting revised definitions for certain off-cycle menu technologies as proposed, with minor edits in response to comments, starting in MY 2023. EPA proposed to allow manufacturers the option to take advantage of the higher cap, using the updated definitions, in MYs 2020-2022. After considering comments, EPA is not finalizing the provisions applicable to MYs 2020-2022, due to concerns that they would provide unnecessary additional flexibility for the MY 2020-2022 standards established in the SAFE rule. The off-cycle credits program and the revisions EPA is finalizing are discussed in the section below.i. Background on Off-Cycle Credits in Prior Programs Starting with MY 2008, EPA started employing a ``five-cycle'' test methodology to measure fuel economy for purposes of new car window stickers (labels) to give consumers better information on the fuel economy they could more reasonably expect under real-world driving conditions.\82\ However, for GHG compliance, EPA continues to use the established ``two-cycle'' (city and highway test cycles, also known as the FTP and HFET) test[[Page 74466]]methodology.\83\ As learned through development of the ``five-cycle'' methodology and prior rulemakings, there are technologies that provide real-world GHG emissions improvements, but whose improvements are not fully reflected on the ``two-cycle'' test. EPA established the off-cycle credit program to provide an appropriate level of CO2credit for technologies that achieve CO2reductions, but may not otherwise be chosen as a GHG control strategy, as their GHG benefits are not measured on the specified 2-cycle test. For example: High efficiency lighting is not measured on EPA's 2-cycle tests because lighting is not turned on as part of the test procedure but reduces CO2emissions by decreasing the electrical load on the alternator and engine. The key difference between the credits discussed below and the incentives discussed in the previous two sections is that off-cycle credits--as well as A/C credits, discussed in the next section--represent real-world emissions reductions if appropriately sized and therefore their use should not result in deterioration of program benefits, and should not be viewed as cutting into the effective stringency of the program.--------------------------------------------------------------------------- \82\ [*https://www.epa.gov/vehicle-and-fuel-emissions-testing/dynamometer-drive-schedules*](https://www.epa.gov/vehicle-and-fuel-emissions-testing/dynamometer-drive-schedules). See also 75 FR 25439 for a discussion of 5-cycle testing. \83\ The city and highway test cycles, commonly referred to together as the ``2-cycle tests'' are laboratory compliance tests are effectively required by law for CAFE, and also used for determining compliance with the GHG standards. 49 U.S.C 32904(c).--------------------------------------------------------------------------- Under EPA's existing regulations, there are three pathways by which a manufacturer may accrue off-cycle technology credits.\84\ The first pathway is a predetermined list or ``menu'' of credit values for specific off-cycle technologies that was effective starting in MY 2014.\85\ This pathway allows manufacturers to use credit values established by EPA for a wide range of off-cycle technologies, with minimal or no ***data*** submittal or testing requirements. The menu includes a fleetwide cap on credits of 10 g/mile to address the uncertainty of a one-size-fits-all credit level for all vehicles and the limitations of the ***data*** and analysis used as the basis of the menu credits. A second pathway allows manufacturers to use 5-cycle testing to demonstrate and justify off-cycle CO2credits.\86\ The additional emissions tests allow emission benefits to be demonstrated over some elements of real-world driving not captured by the GHG compliance tests, including high speeds, rapid accelerations, and cold temperatures. Under this pathway, manufacturers submit test ***data*** to EPA, and EPA determines whether there is sufficient technical basis to approve the off-cycle credits. The third pathway allows manufacturers to seek EPA approval, through a notice and comment process, to use an alternative methodology other than the menu or 5-cycle methodology for determining the off-cycle technology CO2credits.\87\ This option is only available if the benefit of the technology cannot be adequately demonstrated using the 5-cycle methodology.--------------------------------------------------------------------------- \84\ See ``The 2020 EPA Automotive Trends Report, Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975,'' EPA-420-R-21-003 January 2021 for information regarding the use of each pathway by manufacturers. \85\ See 40 CFR 86.1869-12(b). \86\ See 40 CFR 86.1869-12(c). \87\ See 40 CFR 86.1869-12(d).--------------------------------------------------------------------------- Prior to this rulemaking, EPA received comments from manufacturers on multiple occasions requesting that EPA increase the menu credit cap. Previously, EPA has opted not to increase the cap for several reasons.\88\ First, the cap is necessary given the uncertainty in the menu values for any given vehicle. Menu credits are values EPA established to be used across the fleet rather than vehicle-specific values. When EPA established the menu credits in the 2012 rule, EPA included a cap because of the uncertainty inherent in using limited ***data*** and modeling as the basis of a single credit value for either cars or trucks. While off-cycle technologies should directionally provide an off-cycle emissions reduction, quantifying the reductions and setting appropriate credit values based on limited ***data*** was difficult. Manufacturers wanting to generate credits beyond the cap may do so by bringing in their own test ***data*** as the basis for the credits. Credits established under the second and third pathways do not count against the menu cap. Also, until recently most manufacturers still had significant headroom under the cap allowing them to continue to introduce additional menu technologies.\89\ Finally, during the implementation of the program, EPA has expended significantly more effort than anticipated on scrutinizing menu credits to determine if a manufacturer's technology approach was eligible under the technology definitions contained in the regulations. This further added to concerns about whether the technology could reasonably be expected to provide the real-world benefits that credits are meant to represent. For these reasons, EPA has been reluctant to consider increasing the cap.--------------------------------------------------------------------------- \88\ 85 FR 25237. \89\ See ``The 2020 EPA Automotive Trends Report, Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975,'' EPA-420-R-21-003 January 2021 for information on the use of menu credits.--------------------------------------------------------------------------- EPA may make changes to the test procedures for the GHG program in the future that could change the need for an off-cycle credits program, but there were no such test procedure changes proposed in this rule. EPA recognizes that off-cycle credits, therefore, will likely remain an important source of emissions reductions under the program, at least through MY 2026. Off-cycle technologies are often more cost effective than other available technologies that reduce vehicle GHG emissions over the 2-cycle tests and manufacturer use of the program continues to grow. Off-cycle credits reduce program costs and provide additional flexibility in terms of technology choices to manufacturers which has resulted in many manufacturers using the program. Multiple manufacturers were at or approaching the 10 g/mile credit cap in MY 2019.\90\ Also, in the SAFE rule, EPA added menu credits for high efficiency alternators but did not increase the credit cap for the reasons noted above.\91\ While adding the technology to the menu has the potential to reduce the burden associated with the credits for both manufacturers and EPA, it further exacerbates the credit cap issue for some manufacturers.--------------------------------------------------------------------------- \90\ In MY 2019, Ford, FCA, and Jaguar Land Rover reached the 10 g/mile cap and three other manufacturers were within 3 g/mile of the cap. See ``The 2020 EPA Automotive Trends Report, Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975,'' EPA-420-R-21-003 January 2021. \91\ 85 FR 25236.---------------------------------------------------------------------------ii. Proposed and Final Off-Cycle Credit Menu Cap Increase EPA is finalizing its proposed provision to increase the off-cycle menu cap, but over a more limited time period (MY 2023 through 2026) than proposed. EPA proposed increasing the cap on menu-based credits from the current 10 g/mile to 15 g/mile beginning as early as MY 2020. As a companion to increasing the credit cap, EPA also proposed modifications to some of the off-cycle technology definitions to improve program implementation and to better accomplish the goal of the off-cycle credits program: To ensure emissions reductions occur in the real-world from the use of the off-cycle technologies. EPA proposed that manufacturers could optionally access the 15 g/mile menu cap in MYs 2020-2022 if the manufacturers met all of the revised definitions. EPA is finalizing the increased credit cap of 15 g/mile along with the proposed definition changes[[Page 74467]]starting in MY 2023. For reasons discussed below, EPA is not finalizing the proposed MY 2020-2022 opt-in provisions. EPA believes this is a reasonable approach to provide more opportunity for menu-based credits in the off-cycle program, while still keeping a limit in place. For MY 2020, manufacturers claimed an average of 7.8 g/mile of menu credits with three manufacturers claiming the maximum 10 g/mile of credits.\92\ Increasing the cap provides an additional optional flexibility and also an opportunity for manufacturers to earn more menu credits by applying additional menu technologies, recognizing that some manufacturers may need to make changes to some of their current designs if they choose to continue to earn menu credits under the revised definitions.--------------------------------------------------------------------------- \92\ ``The 2021 EPA Automotive Trends Report, Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975,'' EPA-420-R-21-023, November 2021.--------------------------------------------------------------------------- In the proposal, EPA requested comment on whether the menu credit cap should be increased to 15 g/mile, EPA's proposed approach for implementing the increased credit cap, including the start date of MY 2020, as well as the proposed application of revised technology definitions. EPA specifically requested comment on whether an increased credit cap, if finalized, should begin in MY 2020 as proposed or a later MY such as MY 2021, 2022, or 2023. EPA encouraged commenters supporting off-cycle provisions that differ from EPA's proposed rule to address how such differences could be implemented to improve real-world emissions benefits and how such provisions could be effectively implemented. EPA received both supportive and adverse comments regarding the proposed off-cycle menu cap increase. The Alliance supported raising the credit cap for the off-cycle technology menu, effective in MY 2020, commenting that the 10 g/mile cap was originally promulgated in the 2012 Rule and has become constraining to technology additions, particularly with the addition of new menu technologies added in the SAFE rule. The Alliance did not support tying the increased menu cap to the revised definitions, commenting that the issues should be considered separately. The Alliance commented that ``the cap should be raised regardless of the decision whether to modify technology definitions or not and, if modified technology definitions are adopted, regardless of when a manufacturer applies the modified definitions.'' The Alliance recommended that EPA not adopt the revised definitions in this rulemaking but wait until the subsequent rule for MYs 2027 and later. The Alliance commented that ``model year 2023 vehicles can be built as soon as January 2022, leaving manufacturers only three to at most nine months to design, validate, and certify vehicles with systems that meet the new definitions. This lead-time is simply insufficient to make the necessary level of changes. In MY 2019, the fleetwide average use of active engine warmup, active transmission warmup, and passive cabin ventilation technologies resulted in a credit of approximately 3.6 g/mile. Modifying definitions without sufficient lead-time would likely result in an immediate loss of most, if not all of this credit, further escalating the challenge of managing the large increase in standard stringency proposed for MY 2023. The new definitions will require innovative solutions and significant changes to vehicle design to meet them.'' The Alliance commented further, ``if EPA adopts new definitions for passive cabin ventilation, active engine warm-up, and/or active transmission warm-up technologies, EPA should also continue to recognize existing designs. EPA justifies its proposed provision to modify technology definitions on the basis that current system designs are not meeting EPA's original expectations. However, current system designs are providing off-cycle emissions benefits. Given the benefits of such systems, EPA should continue to provide credit for systems that meet existing definitions through the menu, in addition to newly defined systems.'' Several individual manufacturers also raised lead time concerns regarding the implementation of revised definitions. Stellantis commented that if EPA wants to implement new technology definitions, EPA should do so starting in MY 2027, allowing manufacturers to plan and implement fleetwide changes. Stellantis argued that previous systems were approved by EPA and that the benefits they provide are threatened by the revised definitions. Toyota requested that the revised definitions be effective starting with the 2025 model year at the earliest to provide adequate lead time for appropriate countermeasures and compliance plan adjustments. Hyundai requested that the revised definitions not be implemented until 2027 MY for similar reasons, adding that ``use of the higher 15 g/mile cap should be permitted without prejudice in order to encourage the inclusion of more fuel saving technologies.'' Ford commented that the ``Notice and Comment process is the appropriate mechanism for making major policy or technology definition clarifications to the off-cycle program. However, such clarifications should not be retroactively applied, or be required in order to qualify for the 15 g/mile cap for previous model years. It should also be noted that Ford has relied on these credits to comply with current and past regulatory structures, such as `One National Program' and the California Framework Agreement.'' JLR commented that it understands EPA's proposed provision to change the technology definitions but requested that the menu be expanded to include technologies that do not meet the new definition, but do meet the old definition, with appropriate credit values assigned. JLR also commented that there should be an option for manufacturers to remain at the 10 g/mile cap with the original technology definitions up to and including MY 2025. JLR commented that this is required as, for technologies that involve significant changes to the vehicle to meet the new definition such as active transmission warm up, there must be a longer lead time for manufacturers to adapt to this change in the regulation. MEMA commented that it strongly supports EPA expanding the off-cycle technology credit program by increasing the credit cap on credits received through the off-cycle menu from 10 g/mile to 15 g/mile. Similarly, MECA commented that it supports EPA's continuation and improvement of the off-cycle credit program with the higher credit cap. BorgWarner commented that the credit cap ``should be removed to allow and promote the true potential of these technologies to achieve the new standards. We do not see the value of a cap that excludes technologies that are shown to provide additional real-world fuel economy benefits. Credit programs should be continued and expanded to provide important flexibilities and broader pathways for greater innovation and lower compliance costs.'' Environmental Defense Fund (EDF) commented that the proposed off-cycle program changes would help manufacturers meet the MY 2023-2024 standards and, in modeling performed to support their comments that the standards are feasible, included a portion of the proposed increased off-cycle credits. EDF commented that ``it is also eminently reasonable to assume automakers could (and would) apply relatively inexpensive, widely deployed off-cycle technologies that can be added[[Page 74468]]at the tail end of the product-development process.'' ACEEE supported EPA's proposed provision to revise the definitions, commenting that EPA should continue to scrutinize menu credits to ensure that definitions only allow for technologies that have been researched and tested and not others that may be superficially similar. ACEEE, however, opposed beginning the 15 g/mile credit cap increase in MY 2020, commenting that those vehicles have already been designed and no new menu technologies will be added to the vehicles. Therefore, the change would not lead to any additional emissions reductions but instead, would effectively reduce the stringency of the proposed rule by giving automakers credits for decisions that they have already made and implemented. ACEEE estimated that if automakers were to take advantage of the entire 5 g/mile retroactive cap increase, emission savings from the proposed standards would be reduced by 19 percent. ACEEE also commented that the credit cap increase is concerning as applied to future model years, as it believes the off-cycle credit system already over awards credits and further weakens the rule stringency. ACEEE commented that research has shown that some technologies are awarded up to 100 percent more credits than appropriate, equaling up to 3 g/mile of credits per technology (Gonder et al. 2016; Kreutzer et al., 2017). Another concern raised by ACEEE is that technologies that qualify for menu credits have not been evaluated for redundancies or overlaps in benefits (Lutsey and Isenstadt 2018). ACEEE commented that a vehicle that has more than one of the technologies addressing the same inefficiencies may not achieve the sum of the benefits of the individual technologies due to synergistic effects. UCS also did not support raising the menu credit cap, commenting that there is a lack of evidence demonstrating real-world reductions associated with some off-cycle technologies and in some cases, there is evidence that some credit levels are too high, supporting a reduction rather than expansion of the program. UCS also commented in support of implementing the revised definitions and suggest the definitions be implemented immediately to avoid further unwarranted credits for these inferior technologies. UCS also agrees with EPA that any manufacturers seeking credit for technologies that do not meet the revised definitions must do so through the off-cycle credit public comment process pathway. CBD et al. commented that EPA should end, reduce, or significantly reform the off-cycle credits program. CBD et al. commented that uncertainties arise due to ``the lack of ***data*** submission; the lack of testing; and the practice of `one-size-fits-all installation' by which automakers who install the same technology not just on the specific vehicle type and model they tested, but also on many or all of the other cars and trucks in their fleets, without submitting any test ***data*** on the level of emissions reductions, if any, they generate on these different and diverse vehicles. CBD et al. commented that if EPA proceeds with its current proposed rule, off-cycle credits should, at a minimum, be limited and reformed so real-world results are assured and verified, as stated in the Joint Comments. If the agency adopts Alternative 2 plus, off-cycle credits should still not be expanded, and their cap maintained.'' Tesla also commented that EPA should end the off-cycle credits program. Tesla argued that ``extending and expanding these credit rewards old technology and, to the extent new technologies are deployed to generate off-cycle credits, focuses critical R&D budgets on tweaking legacy ICE platforms rather than directing these budgets to electrification and greater emissions reductions. As such, EPA's proposed rule, rather than confronting this built-in bias toward ICE legacy technology, enhances the pre-existing bias by increasing the off-cycle cap to 15 g/mile. Again, such perverse incentives should not be extended, much less increased.'' After carefully considering the comments, EPA is finalizing the 15 g/mile cap and revised definitions, beginning in MYs 2023 through 2026. Given the level of concern expressed regarding optionally allowing the cap to increase retroactively starting in MY 2020 and comments from manufacturers that it would not be particularly useful to the extent they may need to make technology changes in order to meet the new definitions, EPA is not finalizing the optional provisions for MYs 2020-2022. EPA views the definition updates as important refinements to the ongoing off-cycle program to improve its implementation and help ensure that the program produces real-world benefits as intended and continues believes that it is reasonable and appropriate to make these updates in parallel with the cap increase for MYS 2023-2026. EPA acknowledges that off-cycle credits are meant to represent real-world reductions and theoretically there would not be a loss of emissions reductions associated with allowing manufacturers to use the revised definitions and increased cap in MY 2021-2022 as proposed. However, many commenters were concerned with EPA making any changes in MYs 2021-2022 that could make it easier for manufacturers to meet the revised less stringent standards established in the SAFE rule for those years. EPA understands this concern, and also is concerned that additional off-cycle credits in those years may represent a windfall for manufacturers since there is no lead time for manufacturer to change their product line in MYs 2021-2022 and therefore manufacturers would likely only generate additional credits to the extent they had already deployed qualifying technologies. For these reasons, also, EPA is finalizing the start of both the revised definitions and increased cap prospectively only, rather than retroactively in MYs 2021-2022. The new definitions will go into effect in MY 2023 and EPA believes it's appropriate that the cap be increased only once the revised definitions go into effect to ensure the real-world reductions for these technologies. EPA disagrees with comments that EPA should continue to allow the use of the unrevised definitions and menu credits for several model years into the future. When EPA established the menu, EPA intended it to be a streamlined process not requiring manufacturers to produce ***data*** on which to base credits. There are not ***data*** requirements associated with menu credits. Also, EPA notes that claiming menu credits from the off-cycle menu does not require EPA pre-approval. EPA made clear its intended approach in the 2012 rule preamble establishing the menu where EPA stated that ``both technologies and credit values based on the list are established by rule. That is, there is no approval process associated with obtaining the credit.'' \93\ As discussed in the proposed rule, the original regulatory definitions for a few technologies have allowed manufacturers to use technological approaches that were not consistent with those envisioned in the 2012 rule that established them. These approaches are unlikely to produce emissions reductions matching the menu credits. For example, when establishing the passive cabin ventilation credit, EPA envisioned air flow consistent with windows and/or sunroof being open for a period of time to allow hot air to escape the cabin through convective air flow. Under the original definitions, manufacturers are generating a sizeable[[Page 74469]]credit for simply opening the interior vents when the vehicle is keyed off. EPA recognized that this approach would not produce benefits consistent with the credits but was not able to disallow the credit.--------------------------------------------------------------------------- \93\ 77 FR 62833.--------------------------------------------------------------------------- Although EPA may have detailed discussions with manufacturers regarding their claims, in the end, under 40 CFR 86.1869-12(b) EPA's only recourse in situations where the technology may not provide the emissions reductions envisioned is to scrutinize the technologies to determine if the approach does in fact meet the definition. EPA may also request ***data***, engineering analyses, or other information to support a manufacturer's claim that a technology meets the regulatory definition. In cases where EPA finds that it does not meet the definition, it may disallow the claimed credit. However, if EPA finds that the approach does meet the definition, EPA may not disallow the credit even if the technology is not likely to provide a benefit in line with the menu credit level. In those situations, EPA must revise the definitions section of the regulations in order to strengthen the program, a step EPA is now taking in this final rule. To help preserve the integrity of the off-cycle program, EPA believes that updating the program by revising the definitions as needed to correct known deficiencies discovered during implementation is essential to maintaining program integrity and emissions benefits. Also, EPA's requests for information regarding the technologies and follow-up with manufacturers has been flagged by manufacturers as causing delays in the manufacturer ability to claim credits and that further streamlining is needed, so revising the definitions will help with program implementation. EPA notes that the off-cycle program is optional, and there is no requirement for any manufacturer to produce any menu technology. If a manufacturer does use the off-cycle menu for any given technology, it is important for EPA and the public to have confidence that technology used by manufacturers achieves the emission reductions reflected by the credit value. Thus, we are not persuaded that the issue of lead time is relevant in the context of optional off-cycle credit technologies or outweighs the need to maintain off-cycle program integrity by revising it when necessary to ensure that the program delivers intended emissions reductions. These are optional, additional, potential avenues to manufacturers to achieve the standards, but only to the extent that the technologies indeed provide the expected real-world emission benefits. EPA has had discussions with manufacturers regarding each of the technologies where EPA is now revising the definitions, during which EPA raised questions and concerns regarding certain technological approaches being taken by manufacturers, so these issues have been generally known amongst manufacturers claiming credits. Also, the manufacturers that use technological approaches consistent with the known intent of the regulations, will continue to generate credits without interruption due to the definition changes. Regarding manufacturer comments that EPA allow some lesser credit for technologies that meet the unrevised definitions but not the updated definitions (definitions are discussed below), EPA does not have sufficient ***data*** on which to base an appropriate credit value. Manufacturers may use the other program pathways to demonstrate a credit value for such approaches by presenting ***data*** to support an appropriate credit level. EPA is only finalizing the 15 g/mile menu credit cap through MY 2026. EPA received several critical comments regarding the off-cycle program, its value moving forward, and its implementation which has been challenging both for manufacturers and the agency. EPA intends to thoroughly review all aspects of the off-cycle program for the future rulemaking covering MYs 2027 and later. EPA received numerous additional comments regarding the structure and implementation of the off-cycle credits program that were not specific to the proposed off-cycle program revisions. See the RTC for a full summary and response to off-cycle credits program comments.iii. EPA Proposed and Final Modifications to Menu Technology Definitions Some stakeholders have previously raised concerns about whether the off-cycle credit program produces the real-world emissions reductions as intended, or results in a loss of emissions benefits.\94\ EPA believes these are important considerations, as noted above, and believes it is important to address to the extent possible the issues that the agency has experienced in implementing the menu credits, alongside raising the menu cap. EPA believes that raising the menu cap is appropriate so long as the agency can improve the program and reasonably expect the use of menu technologies to provide real-world emissions reductions, consistent with the intent of the program. Providing additional opportunities for menu credits may allow for more emissions reductions sooner and at a lower cost than would otherwise be possible under a program without off-cycle credits. With that in mind, EPA is finalizing modifications to the menu definitions discussed below to coincide with increasing the menu cap in MY 2023.--------------------------------------------------------------------------- \94\ 85 FR 25237.--------------------------------------------------------------------------- The existing menu technologies and associated credits are provided below in Table 16 and Table 17 for reference.\95\--------------------------------------------------------------------------- \95\ See 40 CFR 86.1869-12(b). See also ``Joint Technical Support Document: Final Rulemaking for 2017-2025 Light-duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for the Final Rule,'' EPA-420-R-12-901, August 2012, for further information on the definitions and derivation of the credit values.Table 16--Existing Off-Cycle Technologies and Credits for Cars and Light Trucks------------------------------------------------------------------------ Credit for Technology Credit for light trucks cars (g/mile) (g/mile)------------------------------------------------------------------------High Efficiency Alternator (at 73%; 1.0 1.0 scalable)..............................High Efficiency Exterior Lighting (at 1.0 1.0 100W)..................................Waste Heat Recovery (at 100W; scalable). 0.7 0.7Solar Roof Panels (for 75W, battery 3.3 3.3 charging only).........................Solar Roof Panels (for 75W, active cabin 2.5 2.5 ventilation plus battery charging).....Active Aerodynamic Improvements 0.6 1.0 (scalable).............................Engine Idle Start-Stop with heater 2.5 4.4 circulation system.....................Engine Idle Start-Stop without heater 1.5 2.9 circulation system.....................Active Transmission Warm-Up............. 1.5 3.2[[Page 74470]] Active Engine Warm-Up................... 1.5 3.2Solar/Thermal Control................... Up to 3.0 Up to 4.3------------------------------------------------------------------------ Table 17--Off-Cycle Technologies and Credits for Solar/Thermal Control Technologies for Cars and Light Trucks------------------------------------------------------------------------ Car credit (g/ Truck credit Thermal control technology mile) (g/mile)------------------------------------------------------------------------Glass or Glazing........................ Up to 2.9 Up to 3.9Active Seat Ventilation................. 1.0 1.3Solar Reflective Paint.................. 0.4 0.5Passive Cabin Ventilation............... 1.7 2.3Active Cabin Ventilation................ 2.1 2.8------------------------------------------------------------------------a. Passive Cabin Ventilation Some manufacturers have claimed the passive cabin ventilation credits based on the addition of software logic to their HVAC system that sets the interior climate control outside air/recirculation vent to the open position when the power to vehicle is turned off at higher ambient temperatures. The manufacturers have claimed that the opening of the vent allows for the flow of ambient temperature air into the cabin. While opening the vent may ensure that the interior of the vehicle is open for flow into the cabin, no other action is taken to improve the flow of heated air out of the vehicle. This technology relies on the pressure in the cabin to reach a sufficient level for the heated air in the interior to flow out through body leaks or the body exhausters to open and vent heated air out of the cabin. The credits for passive cabin ventilation were determined based on an NREL study that strategically opened a sunroof to allow for the unrestricted flow of heated air to exit the interior of the vehicle while combined with additional floor openings to provide a minimally restricted entry for cooler ambient air to enter the cabin. The modifications that NREL performed on the vehicle reduced the flow restrictions for both heated cabin air to exit the vehicle and cooler ambient air to enter the vehicle, creating a convective airflow path through the vehicle cabin. Analytical studies performed by manufacturers to evaluate the performance of the open dash vent demonstrate that while the dash vent may allow for additional airflow of ambient temperature air entering the cabin, it does not reduce the existing restrictions on heated cabin air exiting the vehicle, particularly in the target areas of the occupant's upper torso. That hotter air generally must escape through restrictive (by design to prevent water and exhaust fumes from entering the cabin) body leaks and occasional venting of the heated cabin air through the body exhausters. While this may provide some minimal reduction in cabin temperatures, this open dash vent technology is not as effective as the combination of vents used by the NREL researchers to allow additional ambient temperature air to enter the cabin and also to reduce the restriction of heated air exiting the cabin. As noted in the Joint Technical Support Document: Final Rulemaking for 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, pg. 584, ``For passive ventilation technologies, such as opening of windows and/or sunroofs and use of floor vents to supply fresh air to the cabin (which enhances convective airflow), (1.7 g/mile for light-duty vehicles and 2.3 g/mile for light-duty trucks) a cabin air temperature reduction of 5.7 [deg]C can be realized.'' The passive cabin ventilation credit values were based on achieving the 5.7 [deg]C cabin temperature reduction. The Agency is finalizing revisions to the passive cabin ventilation definition with clarifying edits to make it consistent with the technology used to generate the credit value. The Agency continues to allow for innovation as the definition includes demonstrating equivalence to the methods described in the Joint TSD. As proposed, EPA is revising the definition of passive cabin ventilation to include only methods that create and maintain convective airflow through the body's cabin by opening windows or a sunroof, or equivalent means of creating and maintaining convective airflow, when the vehicle is parked outside in direct sunlight. Current systems claiming the passive ventilation credit by opening the dash vent would not meet the updated definition. Manufacturers seeking to claim credits for the open dash vent system will be eligible to petition the Agency for credits for this technology using the alternative EPA approved method outlined in 40 CFR86.1869-12(d). EPA's response to comments and discussion of the clarifying edits are provided in section 8 of the RTC.b. Active Engine and Transmission Warm-Up In the NPRM for the 2012 rule (76 FR 74854) EPA proposed capturing waste heat from the exhaust and using that heat to actively warm-up targeted parts of the engine and the transmission fluid. The exhaust waste heat from an internal combustion engine is heat that is not being used as it is exhausted to the atmosphere. In the 2012 Final Rule (77 FR 62624), the Agency revised the definitions for active engine and transmission warm-up by replacing exhaust waste heat with the waste heat from the vehicle. As noted in the Joint TSD, pages 5-98 and 5-99, the Alliance of Automobile Manufacturers and Volkswagen recommended the definition be broadened to account for other methods of warm-up besides exhaust heat such as a secondary coolant loop. EPA concluded that other methods, in addition to waste heat from the exhaust, that could provide similar performance--such as coolant loops or direct heating elements--may prove to be a more effective alternative to direct exhaust heat. Therefore, the Agency expanded the definition in the 2012 Final Rule.[[Page 74471]] In the 2012 Final Rule the Agency also required two unique heat exchanger loops--one for the engine and one for the transmission--for a manufacturer to claim both the Active Engine Warm-up and Active Transmission Warm-up credits. EPA stated in the Joint TSD that manufacturers utilizing a single heat exchanging loop would need to demonstrate that the performance of the single loop would be equivalent to two dedicated loops in order for the manufacturer to claim both credits, and that this test program would need to be performed using the alternative method off-cycle GHG credit application described in 40 CFR 86.1869-12(d). All Agency analysis regarding active engine and transmission warm-up through the 2012 Final Rule (77 FR 62624) was performed assuming the waste heat utilized for these technologies would be obtained directly from the exhaust prior to being released into the atmosphere and not from any engine-coolant-related loops. At this time, many of the systems in use are engine-coolant-loop-based and are taking heat from the coolant to warm-up the engine oil and transmission fluid. EPA provided additional clarification on the use of waste heat from the engine coolant in preamble to SAFE rule (85 FR 24174). EPA focused on systems using heat from the exhaust as a primary source of waste heat because that heat would be available quickly and also would be exhausted by the vehicle and otherwise unused (85 FR 25240). Heat from the engine coolant already may be used by design to warm up the internal engine oil and components. That heat is traditionally not considered ``waste heat'' until the engine reaches normal operating temperature and subsequently requires it to be cooled in the radiator or other heat exchanger. EPA allowed for the possible use of other sources of heat such as engine coolant circuits, as the basis for the credits as long as those methods would ``provide similar performance'' as extracting the heat directly from the exhaust system and would not compromise how the engine systems would heat up normally absent the added heat source. However, the SAFE rule also allowed EPA to require manufacturers to demonstrate that the system is based on ``waste heat'' or heat that is not being preferentially used by the engine or other systems to warm up other areas like engine oil or the interior cabin. Systems using waste heat from the coolant do not qualify for credits if their operation depends on, and is delayed by, engine oil temperature or interior cabin temperature. As the engine and transmission components are warming up, the engine coolant and transmission oil typically do not have any ``waste'' heat available for warming up anything else on the vehicle since they are both absorbing any heat from combustion cylinder walls or from friction between moving parts in order to achieve normal operating temperatures. During engine and transmission warm-up, the only waste heat source in a vehicle with an internal combustion engine is the engine exhaust, as the transmission and coolant have not reached warmed-up operating temperature and therefore do not have any heat to share (85 FR 25240). As proposed, EPA is finalizing revisions to the menu definitions of active engine and transmission warm-up to no longer allow systems that capture heat from the coolant circulating in the engine block to qualify for the Active Engine and Active Transmission warm-up menu credits. EPA would allow credit for coolant systems that capture heat from a liquid-cooled exhaust manifold if the system is segregated from the coolant loop in the engine block until the engine has reached fully warmed-up operation. The Agency would also allow system design that captures and routes waste heat from the exhaust to the engine or transmission, as this was the basis for these two credits as originally proposed in the proposal for the 2012 rule. The approach EPA is finalizing will help ensure that the level of menu credit is consistent with the technology design envisioned by EPA when it established the credit in the 2012 rule. Manufacturers seeking to utilize their existing systems that capture coolant heat before the engine is fully warmed-up and transfer this heat to the engine oil and transmission fluid would remain eligible to seek credits through the alternative method application process outlined in 40 CFR 86.1869-12(d). EPA expects that these technologies may provide some benefit, though not the level of credits included in the menu. But, as noted above, since these system designs remove heat that is needed to warm-up the engine the Agency expects that these technologies will be less effective than those that capture and utilize exhaust waste heat. Ford suggested clarifying edits to the proposed revised definitions for active engine and transmission definitions. In response, EPA has accepted some of their edits where the meaning of the definition is clarified but not altered, and has made some additional clarifying edits as well after reviewing Ford's comments. A full discussion of these comments and the definition revisions finalized by EPA is provided in section 8 of the RTC.iv. Clarification Regarding Use of Menu Credits While EPA received extensive comments on implementing the revised definitions, EPA did not receive many comments on the proposed revised definitions themselves. Comments on the revised definitions are summarized and discussed in the RTC. Finally, as proposed, EPA is finalizing clarifications that manufacturers claiming credits for a menu technology must use the menu pathway rather than claim credits through the public process or 5-cycle testing pathways. EPA views this as addressing a potential loophole around the menu cap. As is currently the case, a new technology that represents an advancement compared to the technology represented by the menu credit--that is, by providing significantly more emissions reductions than the menu credit technology--would be eligible for the other two pathways. Comments received on this provision are summarized and discussed in the RTC.4. Air Conditioning System Credits There are two mechanisms by which A/C systems contribute to the emissions of GHGs: through leakage of hydrofluorocarbon refrigerants into the atmosphere (sometimes called ``direct emissions'') and through the consumption of fuel to provide mechanical power to the A/C system (sometimes called ``indirect emissions'').\96\ The high global warming potential of the previously most common automotive refrigerant, HFC-134a, means that leakage of a small amount of refrigerant will have a far greater impact on global warming than emissions of a similar amount of CO2. The impacts of refrigerant leakage can be reduced significantly by systems that incorporate leak-tight components, or, ultimately, by using a refrigerant with a lower global warming potential. The A/C system also contributes to increased tailpipe CO2emissions through the additional work required to operate the compressor, fans, and blowers. This additional power demand is ultimately met by using additional fuel, which is converted into CO2by the engine during combustion and exhausted through the tailpipe. These emissions can be reduced by increasing the overall efficiency of an A/C system, thus reducing the additional load on the engine from A/C operation, which in turn means a reduction in fuel[[Page 74472]]consumption and a commensurate reduction in GHG emissions.--------------------------------------------------------------------------- \96\ 40 CFR 1867-12 and 40 CFR 86.1868-12.--------------------------------------------------------------------------- Manufacturers have been able to generate credits for improved A/C systems to help them comply with the CO2fleet average standards since the 2012 and later MYs. Because A/C credits represent a low-cost and effective technology pathway, EPA expected manufacturers to generate both A/C refrigerant and efficiency credits, and EPA accounted for those credits in developing the final CO2standards for the 2012 and SAFE rules, by adjusting the standards to make them more stringent. EPA believes it is important to encourage manufacturers to continue to implement low GWP refrigerants or low leak systems. Thus, EPA did not propose and is not finalizing any changes for its A/C credit provisions and is taking the same approach in adjusting the level of the standards to reflect the use of the A/C credits. Comments received regarding A/C credits are summarized in the RTC.5. Natural Gas Vehicles Technical Correction EPA is finalizing as proposed a narrow technical amendment to its regulations to correct a clerical error related to natural gas vehicles. In the SAFE rule, EPA established incentive multipliers for MYs 2022-2026 natural gas vehicles.\97\ EPA also received comments during the SAFE rulemaking recommending that EPA adopt an additional incentive for natural gas vehicles in the form of a 0.15 multiplicative factor that would be applied to the CO2emissions measured from the vehicle when tested on natural gas. Commenters recommended the 0.15 factor as an appropriate way to account for the potential use of renewable natural gas (RNG) in the vehicles.\98\--------------------------------------------------------------------------- \97\ 85 FR 25211, April 30, 2020. \98\ 85 FR 25210-25211.--------------------------------------------------------------------------- EPA decided not to adopt the additional 0.15 factor incentive, as discussed in the preamble to the SAFE Rule.\99\ EPA provided a detailed rationale for its decision not to implement a 0.15 factor recommended by commenters in the SAFE Rule.\100\ EPA is not revisiting or reopening its decision regarding the 0.15 factor. However, the regulatory text adopted in the SAFE rule contains an inadvertent clerical error that conflicts with EPA's decision and rationale in the final SAFE rule preamble and provides an option for manufacturers to use this additional incentive in MYs 2022-2026 by multiplying the measured CO2emissions measured during natural gas operation by the 0.15 factor.\101\ EPA proposed and is finalizing narrow technical amendments to its regulations to correct this clerical error by removing the option to use the 0.15 factor in MY 2022 (as discussed in Section II.B.1.iii of this preamble EPA is eliminating multipliers for NGVs after MY 2022). This will ensure the regulations are consistent with the decision and rationale in the SAFE final rule. EPA likely would not have granted credits under the erroneous regulatory text if such credits were sought by a manufacturer because the intent of the agency was clear in the preamble text. In addition, natural gas vehicles are not currently offered by any auto manufacturer and EPA is not aware of any plans to do so. Therefore, there are no significant impacts associated with the correction of this clerical error. The comments on this provision as well as EPA's analysis and response are provided in the RTC for the final rule.--------------------------------------------------------------------------- \99\ 85 FR 25211. \100\ Ibid. \101\ See 40 CFR 600.510-12(j)(2)(v) and (j)(2)(vii)(A).---------------------------------------------------------------------------C. What alternatives did EPA analyze? In addition to analyzing the standards we are finalizing, EPA analyzed two alternatives, one less stringent and one more stringent than the final standards. For the less stringent alternative, EPA assessed the proposed standards, i.e , the coefficients of the standards proposed in the NPRM, including the advanced technology multipliers consistent with those proposed. This alternative, referred to as the ``Proposal'' in Table 18 below, is less stringent than the final standards in MYs 2025 and 2026. For the more stringent alternative, EPA assessed Alternative 2 from our proposed rule with an additional 10 g/mile increased stringency in MY 2026 per our request for public comments on this option. This alternative is more stringent than the final standards, in particular for MYs 2023 and 2024. For this alternative, EPA used the coefficients from Alternative 2 in the proposed rule for MYs 2023 through 2025, with the standards increasing in stringency in MY 2026 by an additional 10 g/mile compared to the Alternative 2. The Alternative 2 minus 10 standards are the same as the final standards in MYs 2025 and 2026 and differ from the final standards in MYs 2023 and 2024. We provide the fleet average target levels for the two alternatives compared to the final standards in Table 18 below. Table 18--Projected Fleet Average Target Levels for Final Standards and Alternatives [CO2 g/mile] \*---------------------------------------------------------------------------------------------------------------- Final Alternative 2 standards Proposal minus 10 Model year projected projected projected targets targets targets----------------------------------------------------------------------------------------------------------------2021 \*\*......................................................... 229 229 2292022 \*\*......................................................... 224 224 2242023............................................................ 202 202 1982024............................................................ 192 192 1892025............................................................ 179 182 1802026............................................................ 161 173 161----------------------------------------------------------------------------------------------------------------\* Targets shown are modeled results and, therefore, reflect fleet projections impacted by the underlying standards. For that reason, slight differences in targets may occur despite equality of standards in a given year.\*\* SAFE rule targets shown for reference.BILLING CODE 6560-50-P[[Page 74473]][GRAPHIC] [TIFF OMITTED] TR30DE21.004BILLING CODE 6560-50-C As shown in Figure 5, the range of alternatives that EPA analyzed is fairly narrow, with the final standard target levels differing from the alternatives in MYs 2023-2025 by 3 to 4 g/mile, and in MY 2026 by 12 g/mile. EPA believes the analysis of these alternatives is reasonable and appropriate considering the shorter lead time for the revised standards, our assessment of feasibility, the existing automaker commitments to meet the California Framework (representing nearly 30 percent of the nationwide auto market), the standards adopted in the 2012 rule, public comments on the proposed rule, and the need to reduce GHG emissions. See Chapters 4, 6, and 10 of the RIA for the analysis of costs and benefits of the alternatives.III. Technical Assessment of the Final CO2 Standards In Section II of this preamble, we describe EPA's final standards and related program elements and present industry-wide estimates of projected GHG emissions targets. Section III of this preamble provides an overview of EPA's technical assessment of the final standards including the analytical approach, projected target levels by manufacturer, projected per vehicle cost for each manufacturer, projections of EV and PHEV technology penetration rates, and a discussion of why the final standards are technologically feasible, drawing from these analyses. Finally, this section discusses the alternative standards EPA analyzed in selecting the final standards. The RIA presents further details of the analysis including a full assessment of feasibility, technology penetration rates and cost projections. In Section VI of this preamble, EPA discusses the basis for our final standards under CAA section 202(a) and in Section VII of this preamble presents aggregate cost and benefit projections as well as other program impacts.A. What approach did EPA use in analyzing the standards? The final standards are based on the extensive light-duty GHG technical analytical record developed over the past dozen years, as represented by EPA's supporting analyses for the 2010 and 2012 final rules, the Mid-Term Evaluation (including the Draft TAR, Proposed Determination and Final Determinations), as well as the updated analysis for this final rule, informed by public comments and the best available ***data***. The updated analysis for the proposal and this final rule is not intended to be the sole technical basis of the final standards. EPA's extensive record is consistent and supports EPA's conclusion that year-over-year stringency increases in the time frame of this final rule are feasible at reasonable costs and can result in significant GHG emission reductions and public health and welfare benefits. The updated analysis shows that, consistent with past analyses, when modeling standards of similar stringency to those set forth[[Page 74474]]in the 2012 rule, the results are similar to the results presented previously. Chapter 1 of the RIA further discusses and synthesizes EPA's record supporting stringent GHG standards through the MY 2025-2026 time frame. To confirm that these past analyses continue to provide valid results for consideration by the Administrator in selecting the most appropriate level of stringency and other aspects of the final standards, we have conducted an updated analysis since the proposed rule issued in August 2021. Prior to the analysis used for the SAFE FRM, EPA has used its OMEGA (Optimization Model for reducing Emissions of Greenhouse gases from Automobiles) model as the basis for setting light-duty GHG emissions standards. EPA's OMEGA model was not used in the technical analysis of the GHG standards established in the SAFE FRM; instead, NHTSA's Corporate Average Fuel Economy (CAFE) Compliance and Effects Modeling System (CCEMS) model was used. For this final rule, consistent with the proposed rule, EPA has chosen to use the peer reviewed CCEMS model, and to use the same version of that model that was used in support of the SAFE FRM (though, as discussed below, EPA has updated several inputs to the model since the proposed rule based on public comments and newer available ***data***). As explained in the proposed rule, given that the SAFE FRM was published a little over a year ago, direct comparisons between the analysis presented in this rulemaking and the analysis presented in support of the SAFE FRM are more direct if the same modeling tool is used. For example, CCEMS has categorizations of technologies and model output formats that are distinct to the model, so continuing use of CCEMS for this rule has facilitated comparisons to the SAFE FRM. Also, by using the same modeling tool as used in the SAFE rule, we can more clearly illustrate the influence of some of the key updates to the inputs used in the SAFE FRM. EPA considers the SAFE FRM version of the CCEMS model to be an effective modeling tool for purposes of assessing standards through the MY 2026 timeframe, along with changes to some of the key inputs as discussed below (see Table 20). For use in future vehicle standards analyses, EPA is developing an updated version of its OMEGA model. This updated model, OMEGA2, is being developed to better account for the significant evolution over the past decade in vehicle markets, technologies, and mobility services. In particular, the recent advancements in battery electric vehicles (BEVs), and their introduction into the full range of market segments provides strong evidence that vehicle electrification can play a central role in achieving greater levels of emissions reductions in the future. In developing OMEGA2, EPA is exploring the interaction between consumer and producer decisions when modeling compliance pathways and the associated technology penetration into the vehicle fleet. OMEGA2 also is being designed to have expanded capability to model a wider range of GHG program options than are possible using existing tools, which will be especially important for the assessment of policies that are designed to address future GHG reduction goals. While the OMEGA2 model is not available for use in this rule, peer review of the draft model is underway. Our updated analysis is based on the same version of the CCEMS model that was used for the proposed rule and for the SAFE FRM. The CCEMS model was extensively documented by NHTSA for the SAFE FRM and the documentation also applies to the updated analysis for this final rule.\102\ While the CCEMS model itself remains unchanged from the version used in the final SAFE rule, EPA made the following changes (shown in Table 19) to the inputs for the analysis supporting the proposed rule. Further updates to the inputs based on our assessment of the public comments and newer ***data*** are summarized in Table 20.--------------------------------------------------------------------------- \102\ See CCEMS Model Documentation on web page [*https://www.nhtsa.gov/corporate-average-fuel-economy/compliance-and-effects-modeling-system*](https://www.nhtsa.gov/corporate-average-fuel-economy/compliance-and-effects-modeling-system). Table 19--Changes Made to CCEMS Model Inputs for the Proposed Rule, Relative to the SAFE FRM Analysis------------------------------------------------------------------------ Input file Changes------------------------------------------------------------------------Parameters file................... Global social cost of carbon $/ton values in place of domestic values (see RIA Chapter 3.3). Inclusion of global social cost of methane (CH4) and nitrous oxide (N2O) $/ton values (see Section IV of this preamble). Updated PM2.5 cost factors (benefit per ton values, see Section VII.E of this preamble). Rebound effect of -0.10 rather than -0.20 (see RIA Chapter 3.1). AEO2021 fuel prices (expressed in 2018 dollars) rather than AEO2019. Updated energy security cost per gallon factors (see Section VII.F of this preamble). Congestion cost factors of 6.34/6.34/5.66 (car/van-SUV/ truck) cents/mile rather than 15.4/ 15/4/13.75 (see RIA Chapter 5). Discounting values to calendar year 2021 rather than calendar year 2019. The following fuel import and refining inputs have been changed based on AEO2021 (see RIA Chapter 3.2): Share of fuel savings leading to lower fuel imports: Gasoline 7%; E85 19%; Diesel 7% rather than 50%; 7.5%; 50% Share of fuel savings leading to reduced domestic fuel refining: Gasoline 93%; E85 25.1%; Diesel 93% rather than 50%; 7.5%; 50% Share of reduced domestic refining from domestic crude: Gasoline 9%; E85 2.4%; Diesel 9% rather than 10%; 1.5%; 10% Share of reduced domestic refining from imported crude: Gasoline 91%; E85 24.6%; Diesel 91% rather than 90%; 13.5%; 90%Technology file................... High compression ratio level 2 (HCR2) technology allowance set to TRUE for all engines beginning in 2018 (see RIA Chapter 2).Market file....................... On the Engines sheet, we allow high compression ratio level 1 (HCR1) and HCR2 technology on all 6- cyclinder and smaller engines rather than allowing it on no engines (see RIA Chapter 2). Change the off-cycle credit values on the Credits and Adjustments sheet to 15 g/mile for 2020 through 2026 (for the CA Framework) or to 15 g/mile for 2023 through 2026 (for the proposed option) depending on the model run.------------------------------------------------------------------------[[Page 74475]] EPA invited public comment on the input changes noted in Table 19, as well as any other input choices that EPA should consider making for the final rule. EPA encouraged stakeholders to provide technical support for any suggestions on changes to modeling inputs. We received comments on our analysis. Specifically, the Alliance suggested that we use the updated version of CCEMS used in the recent NHTSA NPRM. The Alliance also suggested that we update our analysis fleet, model HCR2 technology with a more appropriate level of effectiveness relative to the HCR0 and HCR1 technologies, and limit the penetration of BEV200 technology. The Alliance took exception to the share of BEV200 versus BEV300 technology arguing that BEV300 is more in line with where industry is headed due to consumer desire for greater range. Regarding the first of these comments, that we use an updated version of CCEMS, we have chosen not to do so since it is possible that between the recent CAFE proposal and upcoming CAFE final rule NHTSA may make changes to that version of the model either of their own accord or in response to public comment. Therefore, we believe it is premature to use the NHTSA CAFE NPRM version of the CCEMS model for EPA's final rulemaking. Regarding each of the other Alliance comments on the use of the CCEMS model: As discussed further below, we removed HCR2 technology as a compliance option; we strictly limited BEV200 technology such that it represents a very small portion of the projected BEV technology penetration; and we have updated our analysis fleet to reflect the MY 2020 fleet. As a result, the analysis supporting this final rule includes several changes to the inputs as shown in Table 20. Table 20--Changes Made to CCEMS Model Inputs for the Final Rule, Relative to the Proposed Analysis------------------------------------------------------------------------ Input file Changes \*------------------------------------------------------------------------Parameters file................... Updated Gross Domestic Product, Number of Households, VMT growth rates and Historic Fleet ***data*** consistent with updated projections from EIA (AEO 2021). Updated energy security cost per gallon factors (see Section VII.F of this preamble). Distinct benefit per ton values for refinery and electricity generating unit benefits instead of treating all upstream emissions as refinery emission (see Section V of this preamble). Updated tailpipe and upstream emission factors from MOVES3 and GREET2020 and consistent with NHTSA's 20201 CAFE NPRM (86 FR 49602, September 3, 2021).Technology file................... High compression ratio level 2 (HCR2, sometimes referred to as Atkinson cycle) technology allowance set to FALSE thereby making this technology unavailable. BEV200 phase-in start year set to the same year as the new market file fleet (see below) which, given the low year-over-year phase-in cap allows for low penetration of BEV200 technology in favor of BEV300 technology. Battery cost was reduced by about 25 percent (see preamble Section III.A of this preamble and RIA 2.3.4); battery cost learning is also held constant (i.e , no further learning) beyond the 2029 model year.Market file....................... The market file has been completely updated to reflect the MY 2020 fleet rather than the MY 2017 fleet used in EPA's proposed rule (and the SAFE FRM) using the market file developed by NHTSA in support of their recent CAFE NPRM.\103\ Because the market files are slightly different between the version of CCEMS we are using and the version used by NHTSA, the files are not identical. However, the ***data*** are the same with the following exceptions: --We conducted all model runs using EPA Multiplier Mode 2 rather than Mode 1 as used in our proposed rule (and the SAFE FRM). --We have used projected off-cycle credits as developed by NHTSA in support of their recent CAFE NRPM rather than modeling all manufacturers as making use of the maximum allowable off-cycle credits (see RIA Chapter 4.1.1.1). --We have updated the credit banks to incorporate more up-to-date information from manufacturer certification and compliance ***data***.Scenarios file.................... The off-cycle credit cap has been set to 10 g/mile even in scenarios and years for which 15 g/mile are available. In addition, the off- cycle credit cost is set to $0 and then post-processed back into the costs calculated within CCEMS itself. See RIA Chapter 4.1.1.1 for more detail.Runtime settings.................. At runtime (in the CCEMS graphical user interface), the ``Price Elasticity Multiplier'' is now set to -0.40 rather than the value of - 1.0 used in the proposed rule analysis.\*................................. We are using a MY 2020 baseline fleet rather than a MY 2017 baseline fleet. However, since some date-based ***data*** used by the model is hardcoded in the model code, and because we did not want to change the model code for analytical consistency with the proposed rule, we adjusted any date-related input ***data*** accordingly. Therefore, the input files we are using have headings and date-related identifiers reflecting a MY 2017- based analysis but the ***data*** in the files have been adjusted by 3 years to reflect that anything noted as 2017 is actually 2020. For example, in the Scenarios input file which specifies the standards in a year- by-year format, the standards for MY 2023 through MY 2026 are actually entered in the columns noted as 2020 through 2023 due to this need to ``shift years''. Importantly, in post-processing of model results, the ``year-shift'' is corrected back to reflect the actual years.------------------------------------------------------------------------ As noted in Table 20, we have updated the baseline fleet to reflect the MY 2020 fleet rather than the MY 2017 fleet used in the proposed rule. As a result, there is slightly more technology contained in the MY 2020 baseline fleet and the fleet mix has changed to reflect a more truck-heavy fleet (56 percent truck vs. 44 percent cars, while the proposed rule fleet had a 50/50 split). There are also roughly 3.5 million fewer sales in the MY 2020 base fleet than were in the MY 2017 based fleet. As in the proposed rule, the future fleet is based on the CCEMS model's sales, scrappage, and fleet mix responses to the standards being analyzed, whether from the No Action scenario or one of the Action scenarios. The MY 2020 baseline fleet was developed by NHTSA for their recent CAFE NPRM.\104\ As in our proposed rule, we split the market file into separate California Framework[[Page 74476]]OEM (FW-OEM) and non-Framework OEM (NonFW-OEM) fleets for model runs. Note that the scrappage model received many negative comments in response to the SAFE NPRM, but changes made for the FRM version of the CCEMS model were responsive to the identified issues involving sales and VMT results of the SAFE NPRM version of the CCEMS model.\105\ That said, the Institute for Policy Integrity at New York University (NYU IPI) expressed concerns on the EPA proposal about the sales and scrappage modeling and commented that, while EPA has already begun to revise the modeling, we should continue to make adjustments in the future. Michalek and Whitefoot in their comments on the EPA proposal provide some preliminary research suggesting that non-rebound total fleet VMT might increase due to policy-induced scrappage delay. They do not rule out an effect of zero and note that their results are preliminary and not yet peer-reviewed. EPA is maintaining the assumption of constant non-rebound total fleet VMT for this FRM and will continue to review these and other modeling approaches for future analyses.--------------------------------------------------------------------------- \103\ 86 FR 49602, September 3, 2021. \104\ 86 FR 49602. \105\ See 85 FR 24647.--------------------------------------------------------------------------- As mentioned, for some model runs we have split the fleet in two, one fleet consisting of California Framework OEMs and the other consisting of the non-Framework OEMs. This was done because the Framework OEMs would be meeting more stringent emission reduction targets (as set in the scenarios file) and would have access to more advanced technology incentive multipliers as contained in the California Framework Agreements, while the non-Framework OEMs would be meeting less stringent standards and would not have access to any advanced technology multipliers. For such model runs, a post-processing step was necessary to properly sales-weight the two sets of model outputs into a single fleet of results. This post-processing tool is in the docket for this rule.\106\--------------------------------------------------------------------------- \106\ See EPA\_CCEMS\_PostProcessingTool, Release 0.3.1 July 21, 2021.--------------------------------------------------------------------------- In the proposed rule, we modeled all manufacturers as making use of the maximum number of off-cycle credits available under any given set of standards being analyzed. For example, under the California Framework and our proposed standards, manufacturers were projected to make use of 15 grams CO2per mile of off-cycle credit and to incur a cost for each of those credits at a rate of over $70 per credit (this would be the cost of the technology added to achieve the credits). Since their off-cycle credit allowance was identical in both action and no action scenarios, this resulted in no marginal cost for off-cycle credits for the Framework OEMs. However, for the non-Framework OEMs, modeled as making use of 10 grams per mile of credit under the SAFE FRM standards and 15 grams of credit under the proposed standards, the result was roughly $350 in marginal per vehicle costs (roughly $70 times 5 grams/mile of credits) even though more cost-effective technology, compared to off-cycle credits, may be available to facilitate a manufacturer's efforts toward complying with the standards. Commenters expressed concerns with our proposed rule over this approach as resulting in unreasonably high costs for use of the optional off-cycle credits. In response to the comments, in this final rule we have made two important changes to our modeling. First, we have projected use of off-cycle credits consistent with projections developed by NHTSA for their recent CAFE NPRM except that we have not exceeded 10 g/mile in any case. In this way, we avoid having a case where more off-cycle credits are used in an action scenario relative to a no action scenario. Second, we have set the cost of the off-cycle credits to $0 in the scenarios input file and are post-processing their costs back into the costs per vehicle results. CCEMS does not provide for technology application choices to be made between off-cycle credits and other technologies; instead the off-cycle credits are applied within the model regardless of their cost-effectiveness. Therefore, setting the off-cycle credit cost to $0 in the scenarios input file has no effect on technology application decisions within the model. Further, it allows off-cycle credit costs to be applied in a post-process rather than re-running the model. Last, we have updated the cost of each off-cycle credit to be less than the costs used in our proposed rule. As a result, each off-cycle credit is now roughly $30 less costly on a gram per mile basis than in our NRPM. We outline our methodology for this revised cost in RIA Chapter 4.1.1.1 Importantly, our primary model runs consist of a ``No Action'' scenario and an ``Action'' scenario. The results, or impact of our final standards (or alternatives being analyzed), are measured relative to the no action scenario. Our No Action scenario consists of the Framework OEMs (roughly 28 percent of fleet sales) meeting the Framework emission reduction targets and the Non-Framework OEMs (roughly 72 percent of fleet sales) meeting the SAFE FRM standards. Our action scenario consists of the whole fleet meeting our final standards (or alternatives) for MYs 2023 and later. Throughout this preamble, our ``No Action scenario'' refers to this Framework-OEM/NonFramework-OEM compliance split. In our analysis for the proposed rule, as indicated in Table 19, we used a VMT rebound effect of 10 percent. The 10 percent value had been used in EPA supporting analyses for the 2010 and 2012 final rules as well as for the 2017 MTE Final Determination. The SAFE rule used a VMT rebound effect of 20 percent. Our assessment for the proposed rule indicated that a rebound effect of 10 percent was appropriate and supported by the body of research on the rebound effect for light-duty vehicle driving. We requested comment on the use of the 10 percent VMT rebound value, or an alternative value such as 5 or 15 percent, for our analysis of the MY 2023 through 2026 standards. Several commenters (Center for Biological Diversity et al., CARB/Gillingham, New York University-Institute for Policy Integrity) are supportive of the approach that EPA has utilized to determine the value of the VMT rebound effect for this rule. Several commenters (Center for Biological Diversity et al., CARB/Gillingham, Consumer Federation of America, Consumer Reports, New York University-Institute for Policy Integrity) widely support the use of a 10 percent rebound effect, with a few commenters suggesting that a lower rebound estimate than 10 percent should be used. One commenter (Center for Biological Diversity et al.) suggests that while EPA's proposed rule reported a range of VMT rebound estimates from the Hymel and Small (2015) study of 4 to 18 percent, that only the lower value of the range, 4 percent, should be used in developing an overall estimate of the VMT rebound effect for use in this rule. We agree with this comment and discuss this issue in more detail in both the RIA and the RTC. One commenter (Consumer Reports) requests that EPA consider doing more research prior to future rulemakings on the potential applicability of rebound effects based on studies for conventional vehicles being applied to battery electric vehicles (BEVs). We address this comment in the RTC. After considering the comments received, EPA is continuing to use a 10 percent rebound effect for the analysis of the final rule. Our discussion of the basis for the 10 percent rebound value is in the RIA Chapter 3.1, and our assessment of the public comments is contained in the RTC.[[Page 74477]] For the proposed rule, EPA chose to change a select number of the SAFE FRM model inputs, as listed in Table 19, largely because we concluded that other potential updates, regardless of their potential merit, such as the continued use of the MY 2017 base year fleet, would not have a significant impact on the assessment of the proposed standards. In addition, while the technology effectiveness estimates used in the CCEMS model to support the SAFE FRM could have been updated with more recent engine maps, the incremental effectiveness values are of primary importance within the CCEMS model and, while the maps were somewhat dated, the incremental effectiveness values derived from them were in rough agreement with incremental values derived from more up-to-date engine maps (see RIA Chapter 2). As noted in Table 20, for this final rule we have chosen to conduct model runs with high compression ratio level 2 (HCR2) set to FALSE (i.e , it is not an available technology for the model to choose to apply in simulating compliance with the standards). We have done this due to our concerns over the effectiveness of the technology relative to the HCR0 and HCR1 technologies modeled in the SAFE FRM which were subsequently used in the analysis for our proposed rule. The HCR2 technology in CCEMS would require a level of cylinder deactivation technology (dynamic cylinder deactivation) that has not yet been added to Atkinson Cycle Engines either with or without cooled EGR. HCR1 technologies reflect the effectiveness of Atkinson Cycle engines with either cooled EGR or cylinder deactivation (however, not both technologies in combination) and thus also represent a number of high-volume ICE applications from Mazda, Toyota and Hyundai. The additional step to HCR2 reflected a level of ICE effectiveness that is not yet within the light-duty vehicle fleet, and that we do not anticipate seeing until the later years of this final rule (e.g , MYs 2025-2026).\107\--------------------------------------------------------------------------- \107\ For further information on HCR definitions, see RIA Chapter 2.3.2 For more information on HCR implementation in CCEMS, see RIA Chapter 4.1.1.4 --------------------------------------------------------------------------- In the proposed rule, we noted that the electrified vehicle battery costs used in the SAFE FRM, which were carried over to the proposed rule analysis, could have been lower based on EPA's latest assessment and that we had ultimately believed at the time of the proposed rule that updating those costs for the proposed rule would not have a notable impact on overall cost estimates. This conclusion was based in part on our expectation that electrification would continue to play a relatively modest role in our projections of compliance paths for the proposed standards, as it had in all previous analyses of standards having a similar level of stringency. We also noted that we could update battery costs for the final rule and requested comment on whether our choice of modeling inputs such as these should be modified for the final rule analysis. Commenters on the proposed rule made several observations and recommendations about battery costs, with most saying that the costs in the proposed rule analysis were too high. Tesla commented on [EPA's] ``refusal to revisit admittedly over-estimated battery costs in the agency's analysis,'' further stating that EPA ``failed to complete a review of battery cost for EVs, asserting it was unnecessary given the agency does not rely on significant EV penetration for MY 2023-26.'' Tesla stated that it ``agree[s] battery costs in the SAFE rule were too high,'' further citing various projections for future battery costs: ``UBS reports that leading manufacturers are estimated to reach battery pack costs as low as $67/kWh between 2022 and 2024. Recently, others have also projected costs significantly lower than EPA's past projections. BNEF's recent estimate is that pack prices go below $100/kWh on a volume-weighted average basis by 2024, hit $58/kWh in 2030, and could achieve a volume-weighted average price of $45/kWh in 2035. The National Academies of Sciences found high-volume battery pack production would be at costs of $65-80/kWh by 2030 and DNV-GL has predicted costs declining to $80/kWh in 2025. In short, had the agency rightfully determined that EVs offer the best compliance technology near term and revisited battery pack costs, it would have found dramatically decreasing battery costs that further support that EV deployment will accelerate rapidly near term and represent the best possible emissions reduction technology.'' ACEEE commented: ``Battery cost assumptions in the NRPM are too high and do not consider the manufacturing and technological advancements of the past few years. EPA uses the same cost figures used in the SAFE rule, which are based on 2017 ***data***, effectively inflating the costs of vehicle electrification (EPA 2021b, p. 145).'' Consumer Reports commented that it: ``recommends that EPA update their battery costs to be more in line with the current state of the electric vehicle market. This has the potential to have a significant impact on the cost-benefit analysis of the rule, especially with regards to the ability for EPA to push further, and set a stronger standard than the preferred alternative that is more in line with the administration's climate commitments.'' ICCT commented that: ``EPA used an updated ANL BatPaC model (BatPaC Version 3.1, 9 October 2017) as the basis for BEV, PHEV, HEV and mild HEV battery costs in its 2018 MTE, but these updated costs were not used in the proposed rule.'' ``Unlike for the other technologies in the agencies' analysis, the vast majority of costs related to the RPE markup are already included in the base costs that the agencies used from ANL lookup tables. In other words, those lookup tables do not provide ``direct manufacturing costs,'' they provide total costs, including indirect costs. Thus, EPA erroneously inflated battery costs by applying the retail price equivalent (RPE) markup to base costs that already include indirect costs.'' On this point, ICCT referred to the Joint NGO 2020 Reconsideration Petition, pages 88-90, which was filed in response to the final SAFE rule. NCAT commented: ``As explained in the Proposed Rule, EPA chose to continue to use certain model inputs from the modeling conducted several years ago for the 2020 Rule, including the continued use of MY 2017 as the base year fleet and use of the electric vehicle battery cost ***data*** from the 2020 Rule modeling effort. However, electric vehicle penetration has grown significantly since that time, see Section IV.A of this preamble, and battery costs have continued to decline dramatically [. . .] EPA even acknowledged that the agency may consider updating the battery costs for the final rule, noting that EPA's latest assessment suggests they could have been lower. There was a 13 percent drop in electric vehicle battery cost in just 2020 alone. EPA's approach was very conservative in light of these older model inputs relating to electric vehicles.'' World Resources Institute commented: ``Despite the very dynamic nature of the ZEV market, EPA chose not to update the battery cost assumptions used in its compliance modeling even though EPA considers the assumed battery costs to be too high.'' ``This is a fundamental error. While EPA is correct in observing that ``significant levels of vehicle electrification will not be necessary in order to comply with the proposed standard,'' this in no way obviates the need for EPA to properly evaluate likely ZEV penetration in order to determine[[Page 74478]]whether a more stringent standard is appropriate.'' ``EPA should update its projections of ZEV market shares to reflect current trends in battery prices, automaker investment plans and EV market development. EPA should also consider higher penetration scenarios that would occur if Congress enacts additional incentives and infrastructure investments and should update the final rule to reflect any enacted legislation.'' ``EPA's flawed battery price assumptions and resulting underestimate of ZEV market penetration rates have a dramatic impact on the emissions rates that would be required of ICEVs under the proposal as well as the alternatives considered.'' ``In order to have a rational basis for setting emissions standards that allow averaging across ICEVs and ZEVs EPA needs to update its battery cost assumptions and likely additional assumptions related to ZEV adoption rates.'' ``EPA should update its projections of ZEV market shares to reflect current trends in battery prices, automaker investment plans and EV market development.'' The Alliance noted the inherent uncertainty in predicting future battery costs, stating: ``Given high levels of investment in research and development, and production processes, and the considerable uncertainty of what approaches will succeed or fail, it is possible that NHTSA's estimates of battery pack direct manufacturing costs (after learning factor) will be meaningfully low, or high in the MY 2027 timeframe and beyond.'' ``EPA appears to use previous generation assumptions and battery costs from the SAFE Final Rule record, despite updated battery pack assumptions, and direct manufacturing cost assumptions being available for use in the DOT analysis.'' This is a reference to the NHTSA CAFE NPRM, which uses an updated version of the SAFE rule analysis, in which NHTSA uses costs from a more recent release of BatPaC and implements some changes in their input assumptions, which the Alliance states ``better account for high voltage isolation costs, and battery cell specifications.'' The Alliance also encouraged EPA to ``consider costs and specifications that are reasonable for the industry as a whole to inform policy analysis, and not to assume that intellectual property and proprietary production processes that have been the result of billions of dollars of research and development paid by one manufacturer will be readily available to all manufacturers.'' The Alliance went on to state: ``Total industry volumes of battery electric vehicles are not an appropriate volume assumption for BatPaC. Auto Innovators recommends that EPA update their approach to that used in the DOT analysis to estimate battery costs for strong hybrids, plug-in hybrids, and battery electric vehicles, considering vehicle type and synergies with other fuel saving technologies.'' Additional comments from the Alliance that were submitted to NHTSA as comment on the 2021 NHTSA NPRM were also placed in the EPA docket and can be found in Response to Comments Section 12.1 Among other topics, the Alliance commented on the potential for mineral costs to act as a constraint on the downward trajectory of battery costs in the future, citing in part a 2019 MIT report on the subject that suggested that battery costs for chemistries of the type relied on today may not have the potential to reach as low a cost as suggested by forecasts cited by other commenters. In response, EPA agrees that mineral and other material costs are a large component of the cost of the currently prevailing family of lithium-ion chemistries, that these costs might decline more slowly or increase if supply fails to meet demand in a timely manner, and that this is a relevant consideration when forecasting the potential for future reductions in battery costs. EPA also notes that manufacturers are working to reduce the content of some critical minerals in the battery chemistries used today, and that chemistries that have less critical mineral content may have less potential exposure to this effect. We have incorporated the uncertainties surrounding the future effect of mineral costs on battery cost reductions by limiting projected reductions in future battery costs to a level that we can reasonably technically validate at this time, as described below. EPA responds further to these comments in Section 12.1 of the Response to Comments document. Prompted by the totality of comments received on battery costs, EPA chose to update the battery costs for the FRM analysis. EPA believes that some of the more optimistic scenarios for reductions in battery costs that were cited in the public comments are difficult to validate at this time, given the importance of material costs to the cost of batteries, and the uncertainties surrounding mineral and other material costs as demand for batteries increases in the coming years. With regard to the ICCT comments that BatPaC output costs already include indirect costs that are represented by the RPE markup and hence RPE was double counted, EPA disagrees, and we note that the indirect costs represented in BatPaC output are those that apply to the battery supplier, and do not represent the indirect costs experienced by the OEM who purchases the battery and integrates it into the vehicle. EPA has always considered RPE markup to be applicable to purchased items, with the exception that BatPaC by default includes a warranty cost, which we have traditionally subtracted from BatPaC output because it is already covered in the RPE. However, EPA agrees with the commenters that battery costs used in the SAFE rulemaking, and hence the proposed rule, were higher than would be supported by information available today. Cited reports that are based on empirical ***data*** of what manufacturers are currently paying, and near-term forecasts that can reasonably be corroborated with our battery modeling tools, suggest lower battery costs than were assumed in the proposal. Consideration of the current and expected near-term costs of batteries for electrified vehicles, as widely reported in the trade and academic literature and further supported by our battery cost modeling tools, led to an adjustment of battery costs to more accurately account for these trends. Based on an assessment of the effect of using updated inputs to the BatPaC model in place of those used in the SAFE rulemaking, we determined that battery costs should be reduced by about 25 percent. We also considered the effect of this reduction on the projected battery costs for future years beyond MY2026, which due to this adjustment were now declining to levels below $80 per kWh (for an example 60 kWh battery) in the mid-2030s, and which our current battery cost modeling tools cannot technically validate at this time. Due to the widely acknowledged uncertainty of quantitatively projecting declines in battery costs far into the future, and to reflect current uncertainty about future mineral costs as battery demand increases (which is consistent with the points raised by the Alliance), we chose to place a limit on continued battery cost reductions past MY 2029 so as to prevent future costs from declining below $90 per kWh for a 60 kWh battery, a level that we can currently technically validate. More discussion of the rationale for these changes can be found in Chapters 2.3.4 and 4.1.1.2 of the RIA. We expect that pending updates to the ANL BatPaC model, as well as ***collection*** of emerging ***data*** on forecasts for future mineral prices and production capacity, will make it possible to more confidently characterize the declines in battery costs that we continue to believe[[Page 74479]]will occur in the 2030s and beyond, and we will incorporate this information in the subsequent rulemaking for MYs 2027 and beyond. In response to the Alliance comments on appropriate production volumes for developing battery costs, EPA understands how BatPaC considers production volume in developing pack costs and agrees that use of total industry volume to estimate the cost of a specific pack design would be inappropriate and would likely underestimate the true manufacturing cost. However, EPA also recognizes that using a production volume specific to the actual production of a specific pack design would tend to overestimate overhead costs by constructing a plant that is much smaller than the plants currently in operation and being planned today. For example, a 5 Gigawatt-hour (gWh) plant such as the LG Chem plant in Holland, Michigan is large enough to manufacture more than 80,000 60 kWh packs, while other leading plants in operation and under construction are designed for much higher volumes. For example, a 30 to 35 gWh plant such as the Tesla factory in Reno, Nevada, even when manufacturing an assortment of pack and cell designs would be able to amortize its construction, overhead and maintenance costs across 500,000 or more packs per year. Also, manufacturers are increasingly adopting design approaches that reuse cells and parts across multiple pack designs, meaning that the economies of scale that are relevant for those cells and parts are likely to be greater than the volume of a single pack design alone would represent. For these and similar reasons, EPA continues to believe that using a production volume specific to a given pack would create overly conservative estimates of battery manufacturing cost. With regard to the Alliance comments on the applicability of technology assumptions to all manufacturers, EPA recognizes that different manufacturers may experience different costs resulting from differences in their past research and investments and differences in their approach to sourcing components. Manufacturers have largely approached the sourcing of batteries through joint ventures or contractual relationships with established cell manufacturers rather than true vertical integration. For example, while Tesla has developed intellectual property relating to pack and cell design and production, their production occurs via a joint venture with Panasonic, and also includes sourcing from other suppliers that are not part of this venture. Other manufacturers are increasingly adopting a similar approach in which new manufacturing plants are to be constructed as part of a joint venture, by which the OEM may secure a supply of batteries for its products.108 109 110 111 112 As with other technologies, the existence of intellectual property belonging to one manufacturer seldom prevents other manufacturers from developing and benefiting from similarly effective technologies. The battery costs that EPA develops are not taken from the example of any specific manufacturer but are developed based on our assessment of the industry as a whole.--------------------------------------------------------------------------- \108\ Voelcker, J., ``Good News: Ford and GM Are Competing on EV Investments,'' Car and Driver, October 18, 2021. Accessed on December 9, 2021 at [*https://www.caranddriver.com/features/a37930458/ford-gm-ev-investments/*](https://www.caranddriver.com/features/a37930458/ford-gm-ev-investments/). \109\ Stellantis, ``Stellantis and LG Energy Solution to Form Joint Venture for Lithium-Ion Battery Production in North America,'' Press Release, October 18, 2021. \110\ Toyota Motor Corporation, ``Toyota Charges into Electrified Future in the U.S with 10-year, $3.4 billion Investment,'' Press Release, October 18, 2021. \111\ Ford Motor Company, ``Ford to Lead America's Shift To Electric Vehicles With New Mega Campus in Tennessee and Twin Battery Plants in Kentucky; $11.4B Investment to Create 11,000 Jobs and Power New Lineup of Advanced EVs,'' Press Release, September 27, 2021. \112\ General Motors Corporation, ``GM and LG Energy Solution Investing $2.3 Billion in 2nd Ultium Cells Manufacturing Plant in U.S ,'' Press Release, April 16, 2021.--------------------------------------------------------------------------- In regard to updating the BEV driving ranges that were considered in the analysis, the Alliance stated that the ``analysis could be improved by using the BatPaC results for BEV400's and BEV500's, instead of scaling up BEV300 costs.'' ``Auto Innovators encourages EPA to include BEV400 and BEV500 in their analysis tool, and to adopt DOT phase-in caps from the CAFE NPRM in place of the phase-in caps used in the EPA proposal, as the EPA proposal likely overestimates the number of consumers who would accept BEV200's, especially given today's charging infrastructure.'' In the updated analysis, we set the BEV200 phase-in start year to the same year as the new market file fleet, which, given the low year-over-year phase-in cap, allows for low penetration of BEV200 technology in favor of BEV300 technology. Thus, the great majority of BEV penetration projected by the model represents BEV300 vehicles. We did not choose to extend the analysis to BEV400 and BEV500 vehicles. While BEV400 and BEV500 vehicles are entering the market and are anticipated to be some part of the future market, the known examples are concentrated in the luxury, high-end market, limiting their likely penetration into the fleet during the time frame of the rule.B. Projected Compliance Costs and Technology Penetrations1. GHG Targets and Compliance Levels The final curve coefficients were presented in Table 10. Here we present the projected fleet targets for each manufacturer. These targets are projected based on each manufacturer's car/truck fleets and their sales weighted footprints. As such, each manufacturer has a set of targets unique to them. The projected targets are shown by manufacturer for MYs 2023 through 2026 in Table 21 for cars, Table 22 for light trucks, and Table 23 for the combined fleets.\113\--------------------------------------------------------------------------- \113\ Note that these targets are projected based on both projected future sales in applicable MYs and our final standards for each MY (i.e , the footprint curve coefficients); the projected targets shown here will change depending on each manufacturer's actual sales in any given MY. Table 21--Car Targets [CO2 g/mile]---------------------------------------------------------------------------------------------------------------- 2023 2024 2025 2026----------------------------------------------------------------------------------------------------------------BMW............................................. 169 161 152 135Daimler......................................... 174 166 156 139FCA............................................. 176 168 158 140Ford............................................ 170 162 153 136General Motors.................................. 163 155 147 130Honda........................................... 164 156 147 130Hyundai Kia-H................................... 165 157 148 131Hyundai Kia-K................................... 163 155 146 129[[Page 74480]] JLR............................................. 171 163 154 136Mazda........................................... 163 155 147 130Mitsubishi...................................... 153 145 137 120Nissan.......................................... 166 158 149 132Subaru.......................................... 159 152 143 126Tesla........................................... 179 171 161 144Toyota.......................................... 164 156 147 130Volvo........................................... 176 168 158 141VWA............................................. 164 156 148 131 --------------------------------------------------------------- Total....................................... 166 158 149 132---------------------------------------------------------------------------------------------------------------- Table 22--Light Truck Targets [CO2 g/mile]---------------------------------------------------------------------------------------------------------------- 2023 2024 2025 2026----------------------------------------------------------------------------------------------------------------BMW............................................. 227 216 201 182Daimler......................................... 227 216 201 182FCA............................................. 241 229 213 193Ford............................................ 249 237 220 200General Motors.................................. 252 240 223 203Honda........................................... 216 205 191 172Hyundai Kia-H................................... 231 219 204 184Hyundai Kia-K................................... 218 207 193 174JLR............................................. 223 212 197 177Mazda........................................... 206 196 182 163Mitsubishi...................................... 194 184 171 153Nissan.......................................... 221 210 195 176Subaru.......................................... 202 192 178 160Tesla........................................... 236 224 209 189Toyota.......................................... 227 215 201 181Volvo........................................... 222 211 196 176VWA............................................. 214 203 189 170 --------------------------------------------------------------- Total....................................... 234 222 207 187---------------------------------------------------------------------------------------------------------------- Table 23--Combined Fleet Targets [CO2 g/mile]---------------------------------------------------------------------------------------------------------------- 2023 2024 2025 2026----------------------------------------------------------------------------------------------------------------BMW............................................. 190 181 170 152Daimler......................................... 200 190 177 159FCA............................................. 231 219 204 185Ford............................................ 228 217 202 183General Motors.................................. 221 210 196 177Honda........................................... 186 176 165 147Hyundai Kia-H................................... 171 163 153 136Hyundai Kia-K................................... 182 172 161 144JLR............................................. 220 209 195 175Mazda........................................... 184 175 164 146Mitsubishi...................................... 174 165 155 137Nissan.......................................... 181 172 162 144Subaru.......................................... 191 182 169 151Tesla........................................... 180 172 162 145Toyota.......................................... 191 181 169 151Volvo........................................... 210 200 186 167VWA............................................. 193 183 171 153 --------------------------------------------------------------- Total....................................... 202 192 179 161---------------------------------------------------------------------------------------------------------------- The modeled achieved CO2-equivalent (CO2e) levels for the final standards are shown in Table 24 for cars, Table 25 for light trucks, and Table 26 for the combined fleets. These values were produced by the modeling analysis and represent the projected certification emissions values for possible compliance approaches with the final[[Page 74481]]standards for each manufacturer. These achieved values, shown as averages over the respective car, truck and combined fleets, include the 2-cycle tailpipe emissions based on the modeled application of emissions-reduction technologies minus the modeled application of off-cycle credit technologies and the full A/C efficiency credits. The values also reflect any application of the final advanced technology multipliers, up to the cap. Hybrid pickup truck incentive credits were not modeled (the CCEMS version used does not have this capability) and are therefore not included in the achieved values. Comparing the target and achieved values, it can be seen that some manufacturers are projected to have achieved values that are over target (higher emissions) on trucks, and under target (lower emissions) on cars, and vice versa for other manufacturers. This is a feature of the unlimited credit transfer (across a manufacturer's car and truck fleets) provision, which results in a compliance determination that is based on the combined car and truck fleet credits rather than a separate determination of each fleet's compliance. The application of technologies is influenced by the relative cost-effectiveness of technologies among each manufacturer's vehicles, which explains why different manufacturers exhibit different compliance approaches in the modeling results. For the combined fleet, the achieved values are typically close to, or slightly under the target values, which would represent the banking of credits that can be carried over into other model years. Note that an achieved value for a manufacturer's combined fleet that is above the target in a given model year does not indicate a likely failure to comply with the standards, since the model includes the GHG program credit banking provisions that allow credits from one year to be carried into another year. Table 24--Car Achieved Levels [CO2 g/mile]---------------------------------------------------------------------------------------------------------------- 2023 2024 2025 2026----------------------------------------------------------------------------------------------------------------BMW............................................. 192 173 138 121Daimler......................................... 171 150 158 155FCA............................................. 160 152 163 149Ford............................................ 158 157 158 146General Motors.................................. 163 158 158 153Honda........................................... 163 153 147 138Hyundai Kia-H................................... 160 149 134 132Hyundai Kia-K................................... 166 155 143 142JLR............................................. 224 188 189 189Mazda........................................... 166 146 146 145Mitsubishi...................................... 186 185 127 126Nissan.......................................... 170 157 132 132Subaru.......................................... 201 189 188 168Tesla........................................... -10 -10 -10 -10Toyota.......................................... 161 138 134 132Volvo........................................... 207 204 198 181VWA............................................. 165 153 156 127 --------------------------------------------------------------- Total....................................... 160 148 140 134---------------------------------------------------------------------------------------------------------------- Table 25--Light Truck Achieved Levels [CO2 g/mile]---------------------------------------------------------------------------------------------------------------- 2023 2024 2025 2026----------------------------------------------------------------------------------------------------------------BMW............................................. 197 197 203 203Daimler......................................... 229 229 193 84FCA............................................. 215 212 210 189Ford............................................ 250 222 222 192General Motors.................................. 265 238 217 193Honda........................................... 214 167 163 163Hyundai Kia-H................................... 268 267 266 127Hyundai Kia-K................................... 209 188 195 194JLR............................................. 214 203 179 146Mazda........................................... 203 202 177 118Mitsubishi...................................... 227 226 130 130Nissan.......................................... 205 200 195 181Subaru.......................................... 186 175 167 167Tesla........................................... -9 -9 -9 -9Toyota.......................................... 236 208 216 176Volvo........................................... 158 156 162 161VWA............................................. 213 203 171 147 --------------------------------------------------------------- Total....................................... 230 211 203 178----------------------------------------------------------------------------------------------------------------[[Page 74482]] Table 26--Combined Fleet Achieved Levels [CO2 g/mile]---------------------------------------------------------------------------------------------------------------- 2023 2024 2025 2026----------------------------------------------------------------------------------------------------------------BMW............................................. 194 182 162 151Daimler......................................... 199 188 175 122FCA............................................. 206 202 203 183Ford............................................ 225 205 205 180General Motors.................................. 230 210 196 179Honda........................................... 184 159 153 148Hyundai Kia-H................................... 171 160 147 131Hyundai Kia-K................................... 180 166 160 159JLR............................................. 215 203 179 149Mazda........................................... 184 173 161 132Mitsubishi...................................... 207 206 128 128Nissan.......................................... 180 169 150 145Subaru.......................................... 190 178 173 168Tesla........................................... -10 -10 -10 -10Toyota.......................................... 192 167 168 150Volvo........................................... 170 169 172 166VWA............................................. 193 182 164 139 --------------------------------------------------------------- Total....................................... 197 181 173 157----------------------------------------------------------------------------------------------------------------2. Projected Compliance Costs per Vehicle EPA has performed an updated assessment of the estimated per vehicle costs for manufacturers to meet the final MYs 2023-2026 standards. The total car, truck and combined fleet costs per vehicle for MY 2023-2026 are shown in Table 27. Table 27--Car, Light Truck and Fleet Average Cost per Vehicle Relative to the No Action Scenario [2018 Dollars]---------------------------------------------------------------------------------------------------------------- 2023 2024 2025 2026----------------------------------------------------------------------------------------------------------------Car............................................. $150 $288 $586 $596Light Truck..................................... 485 732 909 1,356Fleet Average................................... 330 524 759 1,000---------------------------------------------------------------------------------------------------------------- The car costs per vehicle by manufacturer from this analysis are shown in Table 28, followed by light truck costs by manufacturer in Table 29 and combined fleet costs by manufacturer in Table 30. As shown in these tables, the combined cost for car and truck fleets, averaged over all manufacturers, increases from MY 2023 to MY 2026 as the final standards become more stringent. The costs for trucks tend to be somewhat higher than for cars--many technology costs scale with engine and vehicle size--but it is important to note that the absolute emissions, and therefore emissions reductions, also tend to be higher for trucks. Projected costs for individual manufacturers vary based on the composition of vehicles produced. The estimated costs for California Framework Agreement manufacturers in MY 2026 range from approximately $600-$750 dollars per vehicle--because the final standards are more stringent than the Framework emission reduction targets--and fall within the wider cost range of non-Framework manufacturers. The estimated costs for Framework manufacturers are somewhat lower than the overall industry average costs of approximately $1000 per vehicle in MY 2026. Table 28--Car Costs Per Vehicle Relative to the No Action Scenario [2018 Dollars]---------------------------------------------------------------------------------------------------------------- 2023 2024 2025 2026----------------------------------------------------------------------------------------------------------------BMW \*........................................... $8 $112 $840 $762Daimler......................................... 232 542 480 479FCA............................................. 253 212 158 329Ford \*.......................................... 19 18 227 202General Motors.................................. 577 546 651 669Honda \*......................................... 67 310 362 329Hyundai Kia-H................................... 92 132 756 790Hyundai Kia-K................................... 170 273 644 619JLR............................................. 26 619 581 547Mazda........................................... 5 394 471 425Mitsubishi...................................... 0 0 914 898Nissan.......................................... 228 327 1,289 1,194Subaru.......................................... 18 18 17 209[[Page 74483]] Tesla........................................... 0 0 0 0Toyota.......................................... 21 429 576 578Volvo \*......................................... 0 -1 119 113VWA \*........................................... 0 60 125 549 --------------------------------------------------------------- Total....................................... 150 288 586 596----------------------------------------------------------------------------------------------------------------\* Framework Manufacturer. Table 29--Light Truck Cost Per Vehicle Relative to the No Action Scenario [2018 Dollars]---------------------------------------------------------------------------------------------------------------- 2023 2024 2025 2026----------------------------------------------------------------------------------------------------------------BMW \*........................................... $2 $2 $2 $9Daimler......................................... 35 34 725 3,556FCA............................................. 1,732 1,574 1,465 1,894Ford \*.......................................... 39 477 428 754General Motors.................................. 385 702 1,377 1,746Honda \*......................................... 118 915 950 878Hyundai Kia-H................................... 45 44 43 4,048Hyundai Kia-K................................... 1,194 1,327 1,230 1,144JLR............................................. 133 314 1,321 1,770Mazda........................................... 11 11 776 2,500Mitsubishi...................................... 0 0 2,159 2,028Nissan.......................................... 699 783 748 1,082Subaru.......................................... 2 27 57 57Tesla........................................... 0 0 0 0Toyota.......................................... 265 832 763 1,537Volvo \*......................................... 958 853 771 702VWA \*........................................... 0 125 461 856 --------------------------------------------------------------- Total....................................... 485 732 909 1,356----------------------------------------------------------------------------------------------------------------\* Framework Manufacturer. Table 30--Fleet Average Cost Per Vehicle Relative to the No Action Scenario [2018 Dollars]---------------------------------------------------------------------------------------------------------------- 2023 2024 2025 2026----------------------------------------------------------------------------------------------------------------BMW \*........................................... $6 $72 $538 $489Daimler......................................... 136 298 591 1,925FCA............................................. 1,502 1,355 1,254 1,639Ford \*.......................................... 34 353 373 604General Motors.................................. 452 648 1,123 1,369Honda \*......................................... 88 563 606 557Hyundai Kia-H................................... 87 123 688 1,093Hyundai Kia-K................................... 518 624 840 797JLR............................................. 128 332 1,283 1,708Mazda........................................... 7 207 612 1,411Mitsubishi...................................... 0 0 1,557 1,482Nissan.......................................... 360 453 1,143 1,166Subaru.......................................... 6 26 50 101Tesla........................................... 0 0 0 0Toyota.......................................... 125 597 655 978Volvo \*......................................... 714 634 603 551VWA \*........................................... 0 97 318 727 --------------------------------------------------------------- Total....................................... 330 524 759 1,000----------------------------------------------------------------------------------------------------------------\* Framework Manufacturer. Overall, EPA estimates the average costs of the final standards at $1,000 per vehicle in MY 2026 relative to meeting the No Action scenario in MY 2026. As discussed in Section VII of this preamble, there are benefits resulting from these costs including savings to consumers in the form of lower fuel costs. In RIA 4.1.3, we present the costs per vehicle extending out through MY 2050. The ***data*** presented there show that projected costs per vehicle rise somewhat beyond MY 2026 prior to[[Page 74484]]falling again due to the projected learning effects on technology costs. This helps to explain the higher present value and annualized costs in this final rule analysis (see Section VII.I of this preamble) compared to the proposed rule despite the MY 2026 cost per vehicle results being slightly lower in this final rule. The similarity of the cost per vehicle projections presented in the tables above and those projected in the proposal despite the more stringent final standards is due in large part to the lower battery costs projected in the final rule. Those lower costs result in higher penetrations of BEV and PHEV technology because, although more costly than non-plug-in technologies, they have such a significant effect on reducing fleet average emissions. In the modeling, the effect of higher penetrations of BEVs and PHEVs in turn results in other vehicles adding less technology toward meeting the fleet average emissions standards, thereby reducing per-vehicle costs on those vehicles as well.3. Technology Penetration Rates In this section we discuss the projected new sales technology penetration rates from EPA's updated analysis for the final standards. Additional detail on this topic can be found in the RIA. EPA's assessment, consistent with past EPA assessments, shows that the final standards can largely be met with increased sales of advanced gasoline vehicle technologies, and projects modest (17 percent) penetration rates of electrified vehicle technology. Table 31, Table 32, and Table 33 show the projected penetration rates of BEVs and PHEVs combined (BEV+PHEV) technology under the final standards, with the remaining share being traditional or advanced ICE technology. Values shown reflect absolute values of fleet penetration and are not increments from the No Action scenario or other standards. It is important to note that this is a projection and represents one out of many possible compliance pathways for the industry. The standards are performance-based and do not mandate any specific technology for any manufacturer or any vehicles. As the standards become more stringent over MYs 2023 to 2026, the projected penetration of plug-in electrified vehicles (BEV and PHEV combined) increases by approximately 10 percentage points over this 4-year period, from about 7 percent in MY 2023 to about 17 percent in MY 2026. This is a greater penetration of BEVs and PHEVs than projected in the proposed rule, and is driven by several factors, including the increased stringency of our final standards, the updated baseline fleet that includes more EVs in the baseline, and the updated battery costs (based on which the model is selecting more BEV+PHEV technology as the optimal least-cost pathway to meet the standards). Conversely, in MY 2026 about 83 percent of new light-duty vehicle sales will continue to utilize ICE technology. Table 31--Car BEV+PHEV Penetration Rates Under the Final Standards---------------------------------------------------------------------------------------------------------------- 2023 (%) 2024 (%) 2025 (%) 2026 (%)----------------------------------------------------------------------------------------------------------------BMW............................................. 4 9 22 29Daimler......................................... 15 18 18 19FCA............................................. 20 22 22 22Ford............................................ 13 13 16 21General Motors.................................. 11 11 11 13Honda........................................... 2 5 8 12Hyundai Kia-H................................... 10 10 18 18Hyundai Kia-K................................... 3 3 8 8JLR............................................. 0 3 3 3Mazda........................................... 7 13 13 13Mitsubishi...................................... 3 3 3 3Nissan.......................................... 3 3 17 17Subaru.......................................... 0 0 0 3Tesla........................................... 100 100 100 100Toyota.......................................... 2 6 9 9Volvo........................................... 3 3 4 11VWA............................................. 16 17 17 25 --------------------------------------------------------------- Total....................................... 10 12 16 17---------------------------------------------------------------------------------------------------------------- Table 32--Light Truck BEV+PHEV Penetration Rates Under the Final Standards---------------------------------------------------------------------------------------------------------------- 2023 (%) 2024 (%) 2025 (%) 2026 (%)----------------------------------------------------------------------------------------------------------------BMW............................................. 10 10 10 10Daimler......................................... 8 8 21 56FCA............................................. 13 13 13 18Ford............................................ 1 7 8 17General Motors.................................. 4 8 14 18Honda........................................... 0 13 17 17Hyundai Kia-H................................... 0 0 0 23Hyundai Kia-K................................... 11 11 11 11JLR............................................. 16 16 28 35Mazda........................................... 0 0 0 21Mitsubishi...................................... 0 0 16 16Nissan.......................................... 4 5 5 9Subaru.......................................... 1 1 1 1Tesla........................................... 100 100 100 100Toyota.......................................... 1 12 12 16[[Page 74485]] Volvo........................................... 22 22 23 23VWA............................................. 11 12 12 18 --------------------------------------------------------------- Total....................................... 5 9 11 17---------------------------------------------------------------------------------------------------------------- Table 33--Fleet BEV+PHEV Penetration Rates Under the Final Standards---------------------------------------------------------------------------------------------------------------- 2023 (%) 2024 (%) 2025 (%) 2026 (%)----------------------------------------------------------------------------------------------------------------BMW............................................. 6 10 18 22Daimler......................................... 12 14 20 36FCA............................................. 14 15 15 18Ford............................................ 5 9 10 18General Motors.................................. 6 9 13 16Honda........................................... 1 8 12 14Hyundai Kia-H................................... 9 9 17 19Hyundai Kia-K................................... 6 6 9 9JLR............................................. 15 15 26 34Mazda........................................... 3 7 7 17Mitsubishi...................................... 2 2 10 10Nissan.......................................... 3 4 14 15Subaru.......................................... 0 0 0 1Tesla........................................... 100 100 100 100Toyota.......................................... 2 9 10 12Volvo........................................... 17 17 18 20VWA............................................. 13 14 14 21 --------------------------------------------------------------- Total....................................... 7 10 14 17----------------------------------------------------------------------------------------------------------------C. Are the final standards feasible? The final standards are based on the extensive light-duty GHG technical analytical record developed over the past dozen years, as represented by EPA's supporting analyses for the 2010 and 2012 final rules, the Mid-Term Evaluation (including the Draft TAR, Proposed Determination and Final Determinations), as well as the updated analyses for this rule and the supporting analyses for the SAFE rule.\114\ Our conclusion that the program is feasible is based in part on a projection that the standards primarily will be met using the same advances in light-duty vehicle engine technologies, transmission technologies, electric drive systems, aerodynamics, tires, and vehicle mass reduction that have gradually entered the light-duty vehicle fleet over the past decade and that are already in use in today's vehicles. Further support that the technologies needed to meet the standards do not need to be developed but are already widely available and in use on vehicles can be found in the fact that five vehicle manufacturers, representing nearly 30 percent of U.S auto sales, agreed in 2019 with the State of California that their nationwide fleets would meet GHG emission reduction targets more stringent than the applicable EPA standards for MYs 2021 and 2022, and similar to the final EPA standards for MYs 2022 and 2023.--------------------------------------------------------------------------- \114\ Although the MTE 2018 Revised Final Determination ``withdrew'' the 2017 Final Determination, the D.C Circuit Court has noted that EPA did ``not erase[ ] the Draft Technical Assessment Report, Technical Support Document, or any of the other prior evidence [EPA] ***collected***.'' California v. EPA, 940 F.3d 1342, 1351 (D.C Cir. 2019).--------------------------------------------------------------------------- Our updated analysis projects that the final standards can be met with a fleet that achieves a gradually increasing market share of EVs and PHEVs, approximately 7 percent in MY 2023 up to about 17 percent in MY 2026 (see Section III.B.3 of this preamble and the following paragraph). While this represents an increasing penetration of zero-emission and near-zero emission vehicles into the fleet during the 2023-2026 model years, we believe that the growth in the projected rate of penetration is consistent with current trends and market forces, as discussed below. The proliferation of GHG-reducing technologies has been steadily increasing within the light-duty vehicle fleet. As of MY 2020, more than half of light-duty gasoline spark ignition engines use direct injection (GDI) engines and more than a third are turbocharged. Nearly half of all light-duty vehicles have planetary automatic transmissions with 8 or more gear ratios, and one-quarter are using continuously ***variable*** transmissions (CVT). The sales of vehicles with 12V start/stop systems has increased from approximately 7 percent to approximately 42 percent between MY 2015 and MY 2020. Significant levels of powertrain electrification of all types (HEV, PHEV, and EV) have increased more than 3-fold from MY 2015 to MY 2020. In MY 2015, hybrid electric vehicles accounted for approximately 2.4 percent of vehicle sales, which increased to approximately 6.5 percent of vehicle sales in MY 2020. Production of plug-in hybrid electric vehicles (PHEVs) and battery electric vehicles (EVs) together comprised 0.7 percent of vehicle production in MY 2015 and increased to about 2.2 percent for MY 2020 (projected to be 4.1 percent for MY 2021),\115\ and from January through September 2021 they represented 3.6 percent of total U.S light-duty vehicle sales.\116\ The pace of introduction of new EV and PHEV models is rapidly increasing. For[[Page 74486]]example, the number of EV and PHEV models available for sale in the U.S has more than doubled from about 24 in MY 2015 to about 60 in MY 2021.\117\ Even under the less stringent SAFE standards, manufacturers have indicated that the number of EV and PHEV models will increase to more than 80 by MY 2023, with many more expected to reach production before the end of the decade.\118\--------------------------------------------------------------------------- \115\ The 2021 EPA Automotive Trends Report, Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975,'' EPA-420R-21023, November 2021. \116\ Argonne National Laboratory, ``Light Duty Electric Drive Vehicles Monthly Sales Updates,'' September 2021, accessed on October 20, 2021 at: [*https://www.anl.gov/es/light-duty-electric-drive-vehicles-monthly-sales-updates*](https://www.anl.gov/es/light-duty-electric-drive-vehicles-monthly-sales-updates). \117\ Fueleconomy.gov, 2015 Fuel Economy Guide and 2021 Fuel Economy Guide. \118\ Environmental Defense Fund and M.J Bradley & Associates, ``Electric Vehicle Market Status--Update, Manufacturer Commitments to Future Electric Mobility in the U.S and Worldwide,'' April 2021.--------------------------------------------------------------------------- Despite the increased penetration of electrified vehicles that we are projecting for the final standards, the large majority (more than 80 percent) of vehicles projected to be produced by manufacturers in complying with the final standards would draw from the various advanced gasoline vehicle technologies already present in many vehicles within today's new vehicle fleet. This projection is consistent with EPA's previous conclusions that a wide variety of emission reducing technologies are already available at reasonable costs for manufacturers to incorporate into their vehicles within the timeframe of the final standards. Although the projected penetrations of BEVs and PHEVs are higher than in the proposal, we find they more accurately reflect the current momentum and direction of technological innovation in the automotive industry. By all accounts, a shift to zero-emission vehicle technologies is well underway, and it presents a strong potential for dramatic reductions in GHG and criteria pollutant emissions. Major automakers as well as many global jurisdictions and U.S states have announced plans to shift the light-duty fleet toward zero-emissions technology. As noted in the proposed rule, a proliferation of recent announcements from automakers signals a rapidly growing shift in investment away from internal-combustion technologies and toward high levels of electrification. These automaker announcements are supported by continued advances in automotive electrification technologies and are further driven by the need to compete in a global market as other countries implement aggressive zero-emission transportation policies. For example, in January 2021, General Motors announced plans to become carbon neutral by 2040, including an effort to shift its light-duty vehicles entirely to zero-emissions by 2035.\119\ In March 2021, Volvo announced plans to make only electric cars by 2030,\120\ and Volkswagen announced that it expects half of its U.S sales will be all-electric by 2030.\121\ In April 2021, Honda announced a full electrification plan to take effect by 2040, with 40 percent of North American sales expected to be fully electric or fuel cell vehicles by 2030, 80 percent by 2035 and 100 percent by 2040.\122\ In May 2021, Ford announced that they expect 40 percent of their global sales will be all-electric by 2030.\123\ In June 2021, Fiat announced a move to all electric vehicles by 2030, and in July 2021 its parent corporation Stellantis announced an intensified focus on electrification across all of its brands.\124\ \125\ Also in July 2021, Mercedes-Benz announced that all of its new architectures would be electric-only from 2025, with plans to become ready to go all-electric by 2030 where possible.\126\ In September 2021, Toyota announced large new investments in battery production and development to support an increasing focus on electrification,\127\ and in December 2021, announced plans to increase this investment as well as introduce 30 BEV models by 2030.\128\ On August 5, 2021, in conjunction with the announcement of Executive Order 14037, many of these automakers, as well as the United Auto Workers and the Alliance for Automotive Innovation, expressed continued commitment to these announcements and support for the goal of achieving 40 to 50 percent sales of zero emissions vehicles by 2030.\129\--------------------------------------------------------------------------- \119\ General Motors, ``General Motors, the Largest U.S Automaker, Plans to be Carbon Neutral by 2040,'' Press Release, January 28, 2021. \120\ Volvo Car Group, ``Volvo Cars to be fully electric by 2030,'' Press Release, March 2, 2021. \121\ Volkswagen Newsroom, ``Strategy update at Volkswagen: The transformation to electromobility was only the beginning,'' March 5, 2021. Accessed June 15, 2021 at [*https://www.volkswagen-newsroom.com/en/stories/strategy-update-at-volkswagen-the-transformation-to-electromobility-was-only-the-beginning-6875*](https://www.volkswagen-newsroom.com/en/stories/strategy-update-at-volkswagen-the-transformation-to-electromobility-was-only-the-beginning-6875). \122\ Honda News Room, ``Summary of Honda Global CEO Inaugural Press Conference,'' April 23, 2021. Accessed June 15, 2021 at [*https://global.honda/newsroom/news/2021/c210423eng.html*](https://global.honda/newsroom/news/2021/c210423eng.html). \123\ Ford Motor Company, ``Superior Value From EVs, Commercial Business, Connected Services is Strategic Focus of Today's `Delivering Ford+' Capital Markets Day,'' Press Release, May 26, 2021. \124\ Stellantis, ``World Environment Day 2021--Comparing Visions: Olivier Francois and Stefano Boeri, in Conversation to Rewrite the Future of Cities,'' Press Release, June 4, 2021. \125\ Stellantis, ``Stellantis Intensifies Electrification While Targeting Sustainable Double-Digit Adjusted Operating Income Margins in the Mid-Term,'' Press Release, July 8, 2021. \126\ Mercedes-Benz, ``Mercedes-Benz prepares to go all-electric,'' Press Release, July 22, 2021. \127\ Toyota Motor Corporation, ``Video: Media briefing & Investors briefing on batteries and carbon neutrality'' (transcript), September 7, 2021. Accessed on September 16, 2021 at [*https://global.toyota/en/newsroom/corporate/35971839.html#presentation*](https://global.toyota/en/newsroom/corporate/35971839.html#presentation). \128\ Toyota Motor Corporation, ``Video: Media Briefing on Battery EV Strategies,'' Press Release, December 14, 2021. Accessed on December 14, 2021 at [*https://global.toyota/en/newsroom/corporate/36428993.html*](https://global.toyota/en/newsroom/corporate/36428993.html). \129\ The White House, ``Statements on the Biden Administration's Steps to Strengthen American Leadership on Clean Cars and Trucks,'' August 5, 2021. Accessed on October 19, 2021 at [*https://www.whitehouse.gov/briefing-room/statements-releases/2021/08/05/statements-on-the-biden-administrations-steps-to-strengthen-american-leadership-on-clean-cars-and-trucks/.---------------------------------------------------------------------------*](https://www.whitehouse.gov/briefing-room/statements-releases/2021/08/05/statements-on-the-biden-administrations-steps-to-strengthen-american-leadership-on-clean-cars-and-trucks/.---------------------------------------------------------------------------) These announcements, and others like them, continue a pattern over the past several years in which many manufacturers have taken steps to aggressively pursue zero-emission technologies, introduce a wide range of zero-emission vehicle models, and reduce their reliance on the internal-combustion engine in various markets around the globe.\130\ \131\ These goals and investments have been coupled with a continuing increase in the market penetration of new zero-emission vehicles (3.6 percent of new U.S light-duty vehicle sales so far in calendar year 2021,\132\ projected to be 4.1 percent of production in MY 2021, up from 2.2 percent of production in MY 2020),\133\ as well as a rapidly increasing diversity of electrified vehicle models.\134\ For example, the number of EV and PHEV models available for sale in the U.S has more than doubled from about 24 in MY 2015 to about 60 in MY 2021, with offerings in a growing range of vehicle segments.\135\ Recent model announcements indicate that this number will increase to more than 80 models by MY 2023, with many more expected to reach production before the[[Page 74487]]end of the decade.\136\ Many of the zero-emission vehicles already on the market today cost less to drive than conventional vehicles,\137\ \138\ offer improved performance and handling,\139\ and can be charged at a growing network of public chargers \140\ as well as at home.--------------------------------------------------------------------------- \130\ Environmental Defense Fund and M.J Bradley & Associates, ``Electric Vehicle Market Status--Update, Manufacturer Commitments to Future Electric Mobility in the U.S and Worldwide,'' April 2021. \131\ International Council on Clean Transportation, ``The end of the road? An overview of combustion-engine car phase-out announcements across Europe,'' May 10, 2020. \132\ Argonne National Laboratory, ``Light Duty Electric Drive Vehicles Monthly Sales Updates,'' September 2021, accessed on October 20, 2021 at: [*https://www.anl.gov/es/light-duty-electric-drive-vehicles-monthly-sales-updates*](https://www.anl.gov/es/light-duty-electric-drive-vehicles-monthly-sales-updates). \133\ ``The 2021 EPA Automotive Trends Report: Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975,'' EPA-420r-21023, November 2021. \134\ Muratori et al., ``The rise of electric vehicles--2020 status and future expectations,'' Progress in Energy v3n2 (2021), March 25, 2021. Accessed July 15, 2021 at [*https://iopscience.iop.org/article/10.1088/2516-1083/abe0ad*](https://iopscience.iop.org/article/10.1088/2516-1083/abe0ad). \135\ Fueleconomy.gov, 2015 Fuel Economy Guide and 2021 Fuel Economy Guide. \136\ Environmental Defense Fund and M.J Bradley & Associates, ``Electric Vehicle Market Status--Update, Manufacturer Commitments to Future Electric Mobility in the U.S and Worldwide,'' April 2021. \137\ Department of Energy Vehicle Technologies Office, Transportation Analysis Fact of the Week #1186, ``The National Average Cost of Fuel for an Electric Vehicle is about 60% Less than for a Gasoline Vehicle,'' May 17, 2021. \138\ Department of Energy Vehicle Technologies Office, Transportation Analysis Fact of the Week #1190, ``Battery-Electric Vehicles Have Lower Scheduled Maintenance Costs than Other Light-Duty Vehicles,'' June 14, 2021. \139\ Consumer Reports, ``Electric Cars 101: The Answers to All Your EV Questions,'' November 5, 2020. Accessed June 8, 2021 at [*https://www.consumerreports.org/hybrids-evs/electric-cars-101-the-answers-to-all-your-ev-questions/*](https://www.consumerreports.org/hybrids-evs/electric-cars-101-the-answers-to-all-your-ev-questions/). \140\ Department of Energy Alternative Fuels ***Data*** Center, Electric Vehicle Charging Station Locations. Accessed on May 19, 2021 at [*https://afdc.energy.gov/fuels/electricity\_locations.html#/find/nearest?fuel=ELEC.---------------------------------------------------------------------------*](https://afdc.energy.gov/fuels/electricity_locations.html#/find/nearest?fuel=ELEC.---------------------------------------------------------------------------) At the same time, an increasing number of global jurisdictions and U.S states plan to take actions to shift the light-duty fleet toward zero-emissions technology. In 2020, California announced an intention to require increasing numbers of zero-emission vehicles to meet the goal that, by 2035, all new light-duty vehicles sold in the state be zero-emission vehicles.\141\ New York \142\ \143\ has adopted similar targets and requirements to take effect by 2035, with Massachusetts \144\ poised to follow. Several other states may adopt similar provisions by 2050 as members of the International Zero-Emission Vehicle Alliance.\145\ Globally, at least 12 countries, as well as numerous local jurisdictions, have announced similar goals to shift all new passenger car sales to zero-emission vehicles in the coming years, including Norway (2025); the Netherlands, Denmark, Iceland, Ireland, Sweden, and Slovenia (2030); Canada and the United Kingdom (2035); France and Spain (2040); and Costa Rica (2050).\146\ \147\ Together, these countries represent approximately 13 percent of the global market for passenger cars,\148\ in addition to that represented by the aforementioned U.S states and other global jurisdictions. Already, all-electric and plug-in vehicles together comprise about 18 percent of the new vehicle market in Western Europe,\149\ led by Norway which reached 77 percent all-electric and 91 percent plug-in sales in September 2021.\150\ \151\--------------------------------------------------------------------------- \141\ State of California Office of the Governor, ``Governor Newsom Announces California Will Phase Out Gasoline-Powered Cars & Drastically Reduce Demand for Fossil Fuel in California's Fight Against Climate Change,'' Press Release, September 23, 2020. \142\ New York State Senate, Senate Bill S2758, 2021-2022 Legislative Session. January 25, 2021. \143\ Governor of New York Press Office, ``In Advance of Climate Week 2021, Governor Hochul Announces New Actions to Make New York's Transportation Sector Greener, Reduce Climate-Altering Emissions,'' September 8, 2021. 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Accessed July 1, 2021 from [*https://www.reuters.com/world/americas/canada-ban-sale-new-fuel-powered-cars-light-trucks-2035-2021-06-29/*](https://www.reuters.com/world/americas/canada-ban-sale-new-fuel-powered-cars-light-trucks-2035-2021-06-29/). \148\ International Council on Clean Transportation, ``Growing momentum: Global overview of government targets for phasing out new internal combustion engine vehicles,'' posted 11 November 2020, accessed April 28, 2021 at [*https://theicct.org/blog/staff/global-ice-phaseout-nov2020*](https://theicct.org/blog/staff/global-ice-phaseout-nov2020). \149\ Ewing, J., ``China's Popular Electric Vehicles Have Put Europe's Automakers on Notice,'' New York Times, accessed on November 1, 2021 at [*https://www.nytimes.com/2021/10/31/business/electric-cars-china-europe.html*](https://www.nytimes.com/2021/10/31/business/electric-cars-china-europe.html). \150\ Klesty, V., ``With help from Tesla, nearly 80% of Norway's new car sales are electric,'' Reuters, accessed on November 1, 2021 at [*https://www.reuters.com/business/autos-transportation/tesla-pushes-norways-ev-sales-new-record-2021-10-01/*](https://www.reuters.com/business/autos-transportation/tesla-pushes-norways-ev-sales-new-record-2021-10-01/). \151\ Norwegian Information Council for Road Traffic (OFV), ``New car boom and electric car record in September,'' October 1, 2021, accessed on November 1, 2021 at [*https://ofv.no/aktuelt/2021/nybil-boom-og-elbilrekord-i-september.---------------------------------------------------------------------------*](https://ofv.no/aktuelt/2021/nybil-boom-og-elbilrekord-i-september.---------------------------------------------------------------------------) In addition to substantially reducing GHG emissions, a subsequent rulemaking for MY 2027 and beyond will address criteria pollutant and air toxics emissions from the new light-duty vehicle fleet--especially important considerations as the fleet transitions toward zero-emission vehicles. EPA expects that this subsequent rulemaking will take critical steps to continue the trajectory of transportation emission reductions needed to protect public health and welfare. Achieving this trajectory with increased fleet penetration of zero-emission vehicles would bring with it other advantages as well, such as potentially large reductions in roadway pollution and noise in overburdened communities, and potentially support for the future development of vehicle-to-grid services that could become a key enabler for increased utilization of renewable energy sources, such as wind and solar, across the grid.\152\--------------------------------------------------------------------------- \152\ Department of Energy Electricity Advisory Committee, ``Enhancing Grid Resilience with Integrated Storage from Electric Vehicles: Recommendations for the U.S Department of Energy,'' June 25, 2018.---------------------------------------------------------------------------D. How did EPA consider alternatives in selecting the final program? In Section II.C of this preamble, we described alternatives that we considered in addition to the final standards. See Figure 5 and Table 18 in Section II.C of this preamble. The analyses of the costs, GHG emission reductions, and technology penetrations for each alternative are presented in the RIA Chapters 4 and 5. The alternatives analyzed for the final rule, in addition to the standards we are finalizing, are the ``Proposal'', which are the proposed standards, and ``Alternative 2 minus 10'' which is the Alternative 2 standards reduced by 10 g/mile in MY 2026, on which EPA sought public comment. In comparing the per-vehicle costs of the final standards and the two alternatives, we first note that, in the updated analysis for this final rule, the estimated costs of both the proposed standards and final standards are lower than the estimated cost of the proposed standards as originally presented in the proposed rule, largely due to the updated battery costs used in our final rule analysis. For example, in the proposed rule the proposed standards were projected to cost about $1,044 per vehicle in MY 2026 whereas in the final rule analysis the costs for the proposed standards are estimated at $644 per vehicle, about $400 lower than in the proposed rule. Further, the cost of our final standards ($1,000 per vehicle) remains less than the costs for the proposed standards presented in the proposed rule, as well as being slightly less than the costs for Alternative 2 minus 10 standards ($1,070 per vehicle). In addition, while the final standards and Alternative 2 minus 10 standards have similar per-vehicle costs in MY 2026, it is important to consider the per-vehicle costs in MY 2023 and 2024--when available lead time is shorter. In these model years, the final standards are slightly more costly than the proposed standards (by about $55 per vehicle in 2023 and $140 per vehicle in 2024) and less costly than the Alternative 2 minus 10 standards (by more than $200 per vehicle in MYs 2023 and 2024). EPA believes that given lead time considerations for the early years of the program (MY 2023 and 2024), the lower per-vehicle cost to manufacturers of the final standards compared to the Alternative 2 minus 10 standards are an[[Page 74488]]important consideration. See Section VI of this preamble and RIA Chapter 6. In comparing the cumulative CO2emissions reductions of the final standards and the two alternatives, the final standards and the Alternative 2 minus 10 standards achieve essentially identical cumulative CO2 reductions through 2050, about 1.1 billion tons (about 50 percent) more than the proposed standards. See RIA Chapter 5.1.1.2 Finally, when comparing the combined BEV+PHEV technology penetrations across the alternatives, the final standards and the Alternative 2 minus 10 standards provide the same level of BEV+PHEV market penetration (17 percent) in MY 2026 and thus the same strong launching point for a more ambitious program for 2027 and later, which EPA will establish in a subsequent rulemaking. The proposed standards would achieve less penetration of BEV+PHEV (13 percent) in MY 2026. See RIA Table 4-26, and Table 4-31. EPA believes that the higher projected penetration of BEVs and PHEVs that would be achieved through the final standards or the Alternative 2 minus 10 standards represents a reasonable level of technology commensurate with industry projections for this time period and is feasible in this time frame as further discussed in Section III.B.3 and III.C of this preamble. EPA's updated analysis shows that the final standards and the Alternative 2 minus 10 standards achieve nearly the same cumulative CO2reductions and the same level of electric vehicle penetration in 2026--and thus provide the same strong launch point for the next phase of standards for MY 2027 and later. The important difference between the final standards and the Alternative 2 minus 10 standards is in the per-vehicle costs during the earlier years (MYs 2023 and 2024), where we believe the lower costs of the final standards are important considering the shorter lead time for manufacturers. EPA discusses further in Section VI of this preamble the reasons we believe the final standards represent the appropriate standards under the CAA.IV. How does this final rule reduce GHG emissions and their associated effects?A. Impact on GHG Emissions EPA used the CCEMS to estimate GHG emissions inventories including tailpipe emissions from light-duty cars and trucks and the upstream emissions associated with the fuels used to power those vehicles (both at the refinery and the electricity generating unit). The upstream emission factors used in this final rule modeling have been updated since EPA's proposed rule. The updated upstream emission factors are identical to those used in the recent NHTSA CAFE proposal and were generated using the DOE/Argonne GREET model.\153\ \154\--------------------------------------------------------------------------- \153\ U.S Department of Transportation National Highway Traffic Safety Administration, 2021. Technical Support Document: Proposed Rulemaking for Model Years 2024-2026 Light-Duty Vehicle Corporate Average Fuel Economy Standards, Section 5.2 \154\ U.S Department of Energy, Argonne National Laboratory, Greenhouse gases, Regulated Emissions, and Energy use in Transportation (GREET) Model, Last Update: 9 Oct. 2020, [*https://greet.es.anl.gov/.---------------------------------------------------------------------------*](https://greet.es.anl.gov/.---------------------------------------------------------------------------) The resultant annual GHG inventory estimates are shown in Table 34 for the calendar years 2023 through 2050. The table shows that the final program would result in significant net GHG reductions compared to the No Action scenario. The cumulative CO2, CH4 and N2O emissions reductions from the final program total 3,100 MMT, 3.3 MMT and 0.097 MMT, respectively, through 2050. Table 34--Estimated GHG Impacts of the Final Standards Relative to the No Action Scenario-------------------------------------------------------------------------------------------------------------------------------------------------------- Emission impacts relative to no action Percent change from no action ----------------------------------------------------------------------------------------------- Year CO2 (million metric tons) CH4 (metric N2O (metric CO2 (%) CH4 (%) N2O (%) tons) tons)--------------------------------------------------------------------------------------------------------------------------------------------------------2023.................................................... -5 -5,160 -145 0 0 02024.................................................... -10 -10,121 -293 -1 -1 -12025.................................................... -17 -17,385 -514 -1 -1 -12026.................................................... -27 -27,382 -818 -2 -2 -22027.................................................... -39 -39,716 -1,174 -3 -2 -22028.................................................... -51 -52,913 -1,558 -4 -3 -32029.................................................... -63 -65,083 -1,915 -5 -4 -42030.................................................... -74 -76,908 -2,263 -6 -5 -52031.................................................... -85 -88,128 -2,592 -7 -6 -62032.................................................... -95 -99,017 -2,912 -7 -6 -72033.................................................... -105 -109,272 -3,214 -8 -7 -82034.................................................... -114 -118,720 -3,498 -9 -8 -82035.................................................... -122 -127,397 -3,756 -10 -8 -92036.................................................... -129 -135,037 -3,989 -11 -9 -102037.................................................... -136 -141,600 -4,193 -11 -10 -112038.................................................... -141 -147,293 -4,371 -12 -10 -112039.................................................... -146 -152,481 -4,529 -12 -10 -122040.................................................... -150 -156,884 -4,663 -13 -11 -122041.................................................... -154 -160,588 -4,774 -13 -11 -132042.................................................... -156 -163,579 -4,863 -13 -11 -132043.................................................... -159 -166,077 -4,937 -14 -12 -132044.................................................... -161 -168,294 -4,998 -14 -12 -142045.................................................... -162 -170,147 -5,049 -14 -12 -142046.................................................... -163 -171,666 -5,090 -14 -12 -142047.................................................... -164 -172,863 -5,122 -15 -12 -142048.................................................... -165 -173,945 -5,150 -15 -13 -142049.................................................... -166 -176,188 -5,169 -15 -13 -142050.................................................... -166 -178,391 -5,187 -15 -13 -15 -----------------------------------------------------------------------------------------------[[Page 74489]] Sum................................................. -3,125 -3,272,234 -96,735 -9 -8 -8--------------------------------------------------------------------------------------------------------------------------------------------------------B. Climate Change Impacts From GHG Emissions Elevated concentrations of GHGs have been warming the planet, leading to changes in the Earth's climate including changes in the frequency and intensity of heat waves, precipitation, and extreme weather events, rising seas, and retreating snow and ice. The changes taking place in the atmosphere as a result of the well-documented buildup of GHGs due to human activities are changing the climate at a pace and in a way that threatens human health, society, and the natural environment. While EPA is not making any new scientific or factual findings with regard to the well-documented impact of GHG emissions on public health and welfare in support of this rule, EPA is providing some scientific background on climate change to offer additional context for this rulemaking and to increase the public's understanding of the environmental impacts of GHGs. Extensive additional information on climate change is available in the scientific assessments and the EPA documents that are briefly described in this section, as well as in the technical and scientific information supporting them. One of those documents is EPA's 2009 Endangerment and Cause or Contribute Findings for Greenhouse Gases Under section 202(a) of the CAA (74 FR 66496, December 15, 2009). In the 2009 Endangerment Finding, the Administrator found under section 202(a) of the CAA that elevated atmospheric concentrations of six key well-mixed GHGs--CO2, methane (CH4), nitrous oxide (N2O), HFCs, perfluorocarbons (PFCs), and sulfur hexafluoride (SF6)--``may reasonably be anticipated to endanger the public health and welfare of current and future generations'' (74 FR 66523). The 2009 Endangerment Finding, together with the extensive scientific and technical evidence in the supporting record, documented that climate change caused by human emissions of GHGs (including HFCs) threatens the public health of the U.S population. It explained that by raising average temperatures, climate change increases the likelihood of heat waves, which are associated with increased deaths and illnesses (74 FR 66497). While climate change also increases the likelihood of reductions in cold-related mortality, evidence indicates that the increases in heat mortality will be larger than the decreases in cold mortality in the U.S (74 FR 66525). The 2009 Endangerment Finding further explained that compared with a future without climate change, climate change is expected to increase tropospheric ozone pollution over broad areas of the U.S , including in the largest metropolitan areas with the worst tropospheric ozone problems, and thereby increase the risk of adverse effects on public health (74 FR 66525). Climate change is also expected to cause more intense hurricanes and more frequent and intense storms of other types and heavy precipitation, with impacts on other areas of public health, such as the potential for increased deaths, injuries, infectious and waterborne diseases, and stress-related disorders (74 FR 66525). Children, the elderly, and the poor are among the most vulnerable to these climate-related health effects (74 FR 66498). The 2009 Endangerment Finding also documented, together with the extensive scientific and technical evidence in the supporting record, that climate change touches nearly every aspect of public welfare \155\ in the U.S with resulting economic costs, including: Changes in water supply and quality due to changes in drought and extreme rainfall events; increased risk of storm surge and flooding in coastal areas and land loss due to inundation; increases in peak electricity demand and risks to electricity infrastructure; and the potential for significant ***agricultural*** disruptions and crop failures (though offset to some extent by carbon fertilization). These impacts are also global and may exacerbate problems outside the U.S that raise humanitarian, trade, and national security issues for the U.S (74 FR 66530).--------------------------------------------------------------------------- \155\ The CAA states in section 302(h) that ``[a]ll language referring to effects on welfare includes, but is not limited to, effects on soils, water, crops, vegetation, manmade materials, animals, wildlife, weather, visibility, and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being, whether caused by transformation, ***conversion***, or combination with other air pollutants.'' 42 U.S.C 7602(h).--------------------------------------------------------------------------- In 2016, the Administrator issued a similar finding for GHG emissions from aircraft under section 231(a)(2)(A) of the CAA.\156\ In the 2016 Endangerment Finding, the Administrator found that the body of scientific evidence amassed in the record for the 2009 Endangerment Finding compellingly supported a similar endangerment finding under CAA section 231(a)(2)(A), and also found that the science assessments released between the 2009 and the 2016 Findings ``strengthen and further support the judgment that GHGs in the atmosphere may reasonably be anticipated to endanger the public health and welfare of current and future generations'' (81 FR 54424).--------------------------------------------------------------------------- \156\ ``Finding that Greenhouse Gas Emissions From Aircraft Cause or Contribute to Air Pollution That May Reasonably Be Anticipated To Endanger Public Health and Welfare.'' 81 FR 54422, August 15, 2016. (``2016 Endangerment Finding'').--------------------------------------------------------------------------- Since the 2016 Endangerment Finding, the climate has continued to change, with new observational records being set for several climate indicators such as global average surface temperatures, GHG concentrations, and sea level rise. Additionally, major scientific assessments continue to be released that further advance our understanding of the climate system and the impacts that GHGs have on public health and welfare both for current and future generations. These updated observations and projections document the rapid rate of current and future climate change both globally and in the U.S \157\ \158\ \159\ \160\--------------------------------------------------------------------------- \157\ USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R , C.W Avery, D.R Easterling, K.E Kunkel, K.L.M Lewis, T.K Maycock, and B.C Stewart (eds.)]. U.S Global Change Research Program, Washington, DC, USA, 1515 pp. doi: 10.7930/NCA4.2018 [*https://nca2018.globalchange.gov*](https://nca2018.globalchange.gov). \158\ Roy, J., P. Tschakert, H. Waisman, S. Abdul Halim, P. Antwi-Agyei, P. Dasgupta, B. Hayward, M. Kanninen, D. Liverman, C. Okereke, P.F Pinho, K. Riahi, and A.G Suarez Rodriguez, 2018: Sustainable Development, Poverty Eradication and Reducing Inequalities. In: Global Warming of 1.5 [deg]C. An IPCC Special Report on the impacts of global warming of 1.5 [deg]C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. P[ouml]rtner, D. Roberts, J. Skea, P.R Shukla, A. Pirani, W. Moufouma-Okia, C. P[eacute]an, R. Pidcock, S. Connors, J.B.R Matthews, Y. Chen, X. Zhou, M.I Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. In Press. [*https://www.ipcc.ch/sr15/chapter/chapter-5*](https://www.ipcc.ch/sr15/chapter/chapter-5). \159\ National Academies of Sciences, Engineering, and Medicine. 2019. Climate Change and Ecosystems. Washington, DC: The National Academies Press. [*https://doi.org/10.17226/25504*](https://doi.org/10.17226/25504). \160\ NOAA National Centers for Environmental Information, State of the Climate: Global Climate Report for Annual 2020, published online January 2021, retrieved on February 10, 2021, from [*https://www.ncdc.noaa.gov/sotc/global/202013.---------------------------------------------------------------------------*](https://www.ncdc.noaa.gov/sotc/global/202013.---------------------------------------------------------------------------)[[Page 74490]]C. Global Climate Impacts and Benefits Associated With the Final Rule's Estimated GHG Emissions Reductions Transportation is the largest source of GHG emissions in the U.S , making up 29 percent of all emissions. Within the transportation sector, light-duty vehicles are the largest contributor, 58 percent, to transportation GHG emissions in the U.S , and 17 percent of all emissions.\161\ Reducing GHG emissions, including the four GHGs affected by this program, will contribute toward the goal of holding the increase in the global average temperature to well below 2 [deg]C above pre-industrial levels, and subsequently reducing the probability of severe climate change related impacts including heat waves, drought, sea level rise, extreme climate and weather events, coastal flooding, and wildfires. While EPA did not conduct modeling to specifically quantify changes in climate impacts resulting from this rule in terms of avoided temperature change or sea-level rise, we did quantify the climate benefits by monetizing the emission reductions through the application of the social cost of greenhouse gases (SC-GHGs), as described in Section VII.D of this preamble.--------------------------------------------------------------------------- \161\ Inventory of U.S Greenhouse Gas Emissions and Sinks: 1990-2019 (EPA-430-R-21-005, published April 2021).---------------------------------------------------------------------------V. How would the final rule impact non-GHG emissions and their associated effects?A. Impact on Non-GHG Emissions The model runs that EPA conducted estimated the inventories of non-GHG air pollutants resulting from tailpipe emissions from light-duty cars and trucks, and the upstream emissions associated with the fuels used to power those vehicles (both at the refinery and the electricity generating unit). The tailpipe emissions of PM2.5, NOX, VOCs, CO and SO2are estimated using emission factors from EPA's MOVES model. The tailpipe emission factors used have been updated since EPA's proposed rule to be identical to those used in NHTSA's recent CAFE NPRM.\162\ The upstream emissions are calculated using emission factors applied to the gallons of liquid fuels projected to be consumed and the kilowatt hours of electricity projected to be consumed. The upstream emission factors used in this final rule modeling have also been updated since EPA's proposed rule. The updated upstream emission factors are identical to those used in the recent NHTSA CAFE proposal and were generated using the DOE/Argonne GREET model.\163\ \164\ Table 35 presents the annual refinery and electricity generating unit upstream emission impacts for years 2023 through 2050. See RIA Chapter 5.1 for more information on emission impacts. We estimate that the final standards will lead to reductions in non-GHG pollutants from the refinery sector and increases in non-GHG pollutants from the EGU sector. The projected net upstream NOXand PM2.5reductions are smaller in the final rule compared to the proposal, and the projected net increase in upstream SO2emissions is larger in the final rule compared to the proposal.--------------------------------------------------------------------------- \162\ 86 FR 49602, September 3, 2021. \163\ U.S Department of Transportation National Highway Traffic Safety Administration, 2021. Technical Support Document: Proposed Rulemaking for Model Years 2024-2026 Light-Duty Vehicle Corporate Average Fuel Economy Standards, Section 5.2 \164\ U.S Department of Energy, Argonne National Laboratory, Greenhouse gases, Regulated Emissions, and Energy use in Transportation (GREET) Model, Last Update: 9 Oct. 2020, [*https://greet.es.anl.gov/.---------------------------------------------------------------------------*](https://greet.es.anl.gov/.---------------------------------------------------------------------------) On the whole, the final standards reduce non-GHG emissions and Section VII.A of this preamble details the substantial PM2.5-related health benefits associated with the non-GHG emissions reductions that this rule will achieve. Table 36 presents the annual tailpipe and total upstream inventory impacts for years 2023 through 2050 and Table 37 presents the net annual inventory impacts for those same years. Specifically, we project net reductions in emissions of non-GHG pollutants from upstream sources, except for SO2. For tailpipe emissions we project initial increases from most non-GHG pollutants, except SO2, followed by decreases in all non-GHG pollutants over time. The initial increases in non-GHG tailpipe emissions in the years after the rule's implementation are due to projections about the gasoline-fueled LD vehicle population in the final rule scenario, including decreased scrappage of older vehicles, see Section III of this preamble. Increases in total upstream SO2are due to increased EGU emissions associated with fleet penetration of electric vehicles. Table 35--Estimated Refinery and Electricity Generating Unit Non-GHG Emission Impacts of the Final Standards Relative to the No Action Scenario-------------------------------------------------------------------------------------------------------------------------------------------------------- PM2.5 (U.S tons) NOX (U.S tons) SO2 (U.S tons) VOC (U.S tons) CO (U.S tons) Year ----------------------------------------------------------------------------------------------------------------- EGU Refinery EGU Refinery EGU Refinery EGU Refinery EGU Refinery--------------------------------------------------------------------------------------------------------------------------------------------------------2023.................................. 111 -110 1,320 -1,226 1,154 -558 197 -1,941 699 -6882024.................................. 244 -222 2,898 -2,471 2,512 -1,118 437 -3,899 1,551 -1,3922025.................................. 417 -380 4,957 -4,231 4,260 -1,911 756 -6,713 2,681 -2,3912026.................................. 640 -595 7,601 -6,607 6,473 -2,984 1,174 -10,560 4,158 -3,7452027.................................. 857 -842 10,172 -9,329 8,577 -4,214 1,592 -15,010 5,632 -5,3022028.................................. 1,067 -1,099 12,667 -12,161 10,565 -5,494 2,011 -19,700 7,105 -6,9302029.................................. 1,291 -1,344 15,275 -14,850 12,836 -6,731 2,425 -24,132 8,571 -8,4752030.................................. 1,506 -1,581 17,773 -17,440 15,045 -7,930 2,821 -28,421 9,976 -9,9682031.................................. 1,704 -1,802 20,057 -19,858 17,106 -9,057 3,183 -32,456 11,262 -11,3682032.................................. 1,898 -2,018 22,283 -22,197 19,147 -10,154 3,536 -36,385 12,517 -12,7292033.................................. 2,078 -2,219 24,324 -24,373 21,060 -11,181 3,859 -40,068 13,669 -14,0002034.................................. 2,243 -2,408 26,254 -26,430 22,645 -12,139 4,187 -43,508 14,818 -15,1962035.................................. 2,389 -2,579 27,964 -28,286 24,029 -13,006 4,483 -46,623 15,853 -16,2782036.................................. 2,521 -2,732 29,497 -29,940 25,249 -13,781 4,753 -49,415 16,797 -17,2472037.................................. 2,636 -2,864 30,849 -31,373 26,304 -14,456 4,997 -51,846 17,646 -18,0892038.................................. 2,735 -2,979 31,996 -32,607 27,175 -15,040 5,210 -53,952 18,384 -18,819[[Page 74491]] 2039.................................. 2,806 -3,077 32,826 -33,659 27,772 -15,529 5,368 -55,763 18,930 -19,4432040.................................. 2,862 -3,159 33,480 -34,535 28,215 -15,938 5,498 -57,286 19,380 -19,9662041.................................. 2,900 -3,226 33,932 -35,240 28,481 -16,267 5,596 -58,526 19,716 -20,3912042.................................. 2,924 -3,277 34,212 -35,780 28,598 -16,520 5,667 -59,496 19,955 -20,7212043.................................. 2,939 -3,318 34,384 -36,211 28,621 -16,722 5,721 -60,285 20,134 -20,9892044.................................. 2,933 -3,349 34,312 -36,539 28,528 -16,869 5,719 -60,881 20,122 -21,1792045.................................. 2,921 -3,372 34,165 -36,788 28,371 -16,979 5,704 -61,342 20,067 -21,3232046.................................. 2,905 -3,389 33,977 -36,973 28,180 -17,058 5,682 -61,694 19,988 -21,4302047.................................. 2,883 -3,399 33,714 -37,083 27,927 -17,103 5,648 -61,923 19,866 -21,4952048.................................. 2,860 -3,407 33,436 -37,170 27,660 -17,137 5,612 -62,111 19,734 -21,5452049.................................. 2,851 -3,431 33,350 -37,475 27,512 -17,308 5,606 -62,238 19,706 -21,6332050.................................. 2,841 -3,454 33,249 -37,769 27,351 -17,473 5,597 -62,347 19,669 -21,713-------------------------------------------------------------------------------------------------------------------------------------------------------- Table 36--Estimated Upstream and Tailpipe Non-GHG Emission Impacts of the Final Standards Relative to the No Action Scenario------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------ Upstream (U.S tons) Tailpipe emissions (U.S tons) Year ---------------------------------------------------------------------------------------------------------------------------------- PM2.5 NOX SO2 VOC CO PM2.5 NOX SO2 VOC CO------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------2023......................................................... 1 94 596 -1,744 12 7 717 -37 1,003 6,5052024......................................................... 22 427 1,394 -3,462 159 9 1,173 -77 1,693 10,0482025......................................................... 37 726 2,349 -5,957 290 8 1,645 -133 2,424 13,2482026......................................................... 45 994 3,490 -9,386 413 4 2,090 -208 3,149 15,3562027......................................................... 15 843 4,363 -13,418 331 -4 2,399 -295 3,702 15,1502028......................................................... -32 505 5,072 -17,689 174 -21 2,383 -386 3,820 9,4752029......................................................... -53 425 6,105 -21,707 96 -46 2,108 -471 3,566 -4742030......................................................... -75 333 7,115 -25,601 8 -77 1,588 -554 2,962 -14,7862031......................................................... -99 199 8,049 -29,273 -106 -106 1,167 -633 2,469 -27,5212032......................................................... -120 85 8,994 -32,849 -212 -137 699 -709 1,896 -41,4842033......................................................... -141 -49 9,878 -36,209 -331 -168 228 -780 1,287 -55,7152034......................................................... -165 -177 10,506 -39,321 -377 -199 -241 -846 666 -70,1032035......................................................... -190 -322 11,023 -42,140 -425 -287 -1,250 -906 -2,905 -92,8482036......................................................... -211 -443 11,468 -44,661 -449 -321 -1,693 -959 -3,647 -106,8602037......................................................... -228 -524 11,848 -46,849 -444 -353 -2,079 -1,006 -4,323 -119,7402038......................................................... -244 -610 12,135 -48,742 -435 -383 -2,419 -1,046 -4,946 -131,6912039......................................................... -271 -833 12,243 -50,395 -512 -409 -2,698 -1,081 -5,495 -142,1212040......................................................... -297 -1,055 12,277 -51,788 -586 -434 -2,943 -1,110 -5,993 -151,5492041......................................................... -325 -1,308 12,214 -52,930 -674 -455 -3,138 -1,134 -6,422 -159,6282042......................................................... -353 -1,568 12,078 -53,829 -766 -473 -3,290 -1,153 -6,784 -166,4202043......................................................... -379 -1,827 11,899 -54,564 -855 -490 -3,416 -1,168 -7,117 -172,3142044......................................................... -415 -2,227 11,659 -55,162 -1,057 -503 -3,508 -1,178 -7,402 -177,0172045......................................................... -451 -2,624 11,392 -55,638 -1,256 -514 -3,575 -1,185 -7,660 -180,7832046......................................................... -483 -2,995 11,122 -56,012 -1,442 -523 -3,633 -1,191 -7,914 -184,0852047......................................................... -516 -3,368 10,823 -56,274 -1,629 -531 -3,675 -1,194 -8,135 -186,7832048......................................................... -548 -3,734 10,523 -56,499 -1,811 -538 -3,708 -1,196 -8,332 -189,0052049......................................................... -580 -4,124 10,204 -56,633 -1,926 -543 -3,729 -1,197 -8,488 -190,7122050......................................................... -613 -4,519 9,878 -56,749 -2,044 -547 -3,745 -1,198 -8,619 -192,095------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------ Table 37--Estimated Non-GHG Net Emission Impacts of the Final Standards Relative to the No Action Scenario------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------ Emission impacts relative to no action (U.S tons) Percent change from no action Year ---------------------------------------------------------------------------------------------------------------------------------- PM2.5 NOX SO2 VOC CO PM2.5 NOX SO2 VOC CO------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------2023......................................................... 9 811 559 -741 6,517 0 0 0 0 02024......................................................... 31 1,601 1,318 -1,769 10,207 0 0 1 0 02025......................................................... 45 2,371 2,217 -3,533 13,538 0 0 2 0 02026......................................................... 49 3,084 3,282 -6,237 15,769 0 0 2 0 02027......................................................... 11 3,242 4,068 -9,716 15,480 0 0 3 -1 02028......................................................... -53 2,889 4,686 -13,869 9,649 0 0 4 -1 02029......................................................... -99 2,534 5,633 -18,141 -378 0 0 4 -2 02030......................................................... -152 1,921 6,560 -22,639 -14,778 0 0 5 -2 02031......................................................... -205 1,366 7,416 -26,804 -27,627 -1 0 6 -3 02032......................................................... -256 785 8,285 -30,953 -41,695 -1 0 7 -4 -12033......................................................... -309 179 9,098 -34,922 -56,045 -1 0 7 -5 -12034......................................................... -364 -417 9,660 -38,656 -70,480 -1 0 8 -6 -12035......................................................... -477 -1,572 10,117 -45,045 -93,272 -2 0 8 -7 -22036......................................................... -532 -2,136 10,508 -48,309 -107,310 -2 -1 8 -8 -32037......................................................... -581 -2,603 10,842 -51,172 -120,183 -2 -1 9 -9 -32038......................................................... -627 -3,030 11,088 -53,688 -132,126 -2 -1 9 -10 -42039......................................................... -680 -3,531 11,162 -55,890 -142,633 -2 -1 9 -11 -52040......................................................... -731 -3,998 11,167 -57,781 -152,135 -3 -1 9 -11 -52041......................................................... -780 -4,445 11,080 -59,352 -160,302 -3 -1 9 -12 -62042......................................................... -826 -4,859 10,925 -60,612 -167,186 -3 -2 9 -13 -7[[Page 74492]] 2043......................................................... -869 -5,242 10,731 -61,681 -173,168 -3 -2 9 -13 -72044......................................................... -918 -5,735 10,481 -62,564 -178,073 -3 -2 9 -14 -82045......................................................... -964 -6,199 10,207 -63,298 -182,039 -4 -2 9 -14 -82046......................................................... -1,007 -6,629 9,931 -63,926 -185,527 -4 -2 8 -15 -92047......................................................... -1,047 -7,044 9,630 -64,409 -188,412 -4 -3 8 -15 -92048......................................................... -1,085 -7,441 9,326 -64,831 -190,816 -4 -3 8 -16 -102049......................................................... -1,123 -7,854 9,007 -65,121 -192,639 -4 -3 8 -16 -102050......................................................... -1,161 -8,264 8,680 -65,368 -194,139 -5 -3 7 -16 -11------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------B. Health and Environmental Effects Associated With Exposure to Non-GHG Pollutants Impacted by the Final Standards Along with reducing GHG emissions, these standards will also have an impact on non-GHG (criteria and air toxic pollutant) emissions from vehicles and non-GHG emissions that occur during the extraction, transport, distribution and refining of fuel and from power plants. The non-GHG emissions that will be impacted by the standards contribute, directly or via secondary formation, to concentrations of pollutants in the air which affect human and environmental health. These pollutants include particulate matter, ozone, nitrogen oxides, sulfur oxides, carbon monoxide and air toxics. Chapter 7 of the RIA includes more detailed information about the health and environmental effects associated with exposure to these non-GHG pollutants. This includes pollutant-specific health effect information, discussion of exposure to the mixture of traffic-related pollutants in the near road environment, and effects of particulate matter and gases on visibility, effects of ozone on ecosystems, and the effect of deposition of pollutants from the atmosphere to the surface.C. Air Quality Impacts of Non-GHG Pollutants Photochemical air quality modeling is necessary to accurately project levels of most criteria and air toxic pollutants, including ozone and PM. Air quality models use mathematical and numerical techniques to simulate the physical and chemical processes that affect air pollutants as they disperse and react in the atmosphere. Based on inputs of meteorological ***data*** and source information, these models are designed to characterize primary pollutants that are emitted directly into the atmosphere and secondary pollutants that are formed through complex chemical reactions within the atmosphere. Photochemical air quality models have become widely recognized and routinely utilized tools in regulatory analysis for assessing the impacts of control strategies. Section V.A of this preamble presents projections of the changes in non-GHG emissions due to the standards. Section VII.E of this preamble describes the monetized non-GHG health impacts of this final rule which are estimated using a reduced-form benefit-per-ton approach. The atmospheric chemistry related to ambient concentrations of PM2.5, ozone and air toxics is very complex, and making predictions based solely on emissions changes is extremely difficult. However, based on the magnitude of the emissions changes predicted to result from the standards, we expect that there will be very small changes in ambient air quality in most places. The changes in tailpipe and upstream non-GHG emissions that were inputs to the air quality modeling analysis for the 2012 rule were larger than the changes in non-GHG emissions projected for this final rule. The air quality modeling for the 2012 rule projected very small impacts across most of the country, with the direction of the small impact (increase or decrease) dependent on location.\165\ The next phase of LD standards will be considered in a separate, future multi-pollutant rulemaking for model years 2027 and beyond. We are considering how best to project air quality impacts from changes in non-GHG emissions in that future rulemaking analysis.--------------------------------------------------------------------------- \165\ U.S EPA, 2012. Regulatory Impact Analysis: Final Rulemaking for 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average fuel Economy Standards. EPA-420-R-12-016.---------------------------------------------------------------------------VI. Basis for the Final GHG Standards Under CAA Section 202(a) In this section, EPA discusses the basis for our final standards under our authority in CAA section 202(a), how we are balancing the factors considered in our assessment that the final standards are appropriate, how this balancing of factors differs from that used in the SAFE rule, and how further technical analysis and consideration of the comments we received has informed our decision on the final standards. This section draws from information presented elsewhere in this preamble, including EPA's statutory authority in Section II.A.3 of this preamble, our technical analysis in Section III of this preamble, GHG emissions impacts in Section IV of this preamble, non-GHG emissions impacts in Section V, and the total costs and benefits of the rule in Section VII of this preamble. EPA is finalizing standards for MYs 2023 and 2024 as proposed and more stringent standards than proposed for MYs 2025 and 2026. Supported by analytical updates that respond to public comments on battery costs and other model inputs, our analysis shows that ICE vehicles are projected to remain the large majority of new vehicles in this timeframe, and that together with moderate levels of electrification, the continued adoption of advanced gasoline vehicle GHG-reducing technologies already existing in the market will be sufficient to meet the final standards. Our technical analysis includes projections of increased BEV+PHEV penetration that are reasonable and commensurate with other industry projections for this same time period. Taking into consideration the full technical record, public comments on the proposal, and the available compliance flexibilities, we believe the final standards represent an appropriate level of stringency, considering relevant factors as discussed below. EPA has considered the technological feasibility and cost of the final standards, available lead time for manufacturers, and other relevant factors under section 202(a) of the CAA. Based on our analysis, discussed in greater detail in other sections of this preamble and Chapter 2 of the RIA, we believe that the final standards are reasonable and appropriate. Greater reductions in GHG emissions from light duty vehicles over these model years are[[Page 74493]]both feasible and warranted as a step to reduce the impacts of climate change on public health and welfare. In addition, the rule will achieve reductions in emissions of some criteria pollutants and air toxics that will achieve benefits for public health and welfare. Our analysis for this rule supports the conclusion that standards for MYs 2023-2026 are technologically feasible and the costs of compliance for manufacturers are reasonable. In addition, we project that there will be net savings to consumers over the lifetime of vehicles meeting the standards, which we think is a more significant consideration than the anticipated increase in the initial cost for new vehicles. We also note the benefits of the program are projected to significantly exceed the costs. In selecting the final standards, we considered a range of more- and less-stringent alternatives. Compared to the most stringent alternative that EPA considered (see Section III.D of this preamble), the final standards achieve nearly the same cumulative GHG, criteria pollutant, and air toxics emissions reductions, and a similar level of BEV+PHEV penetration in MY 2026. However, the final standards have lower costs during MYs 2023 and 2024, which EPA considered when determining the appropriate balance between emissions reductions and cost, in the limited lead time available in these earlier years. Compared to the less stringent proposed standards, the final standards achieve greater emissions reductions at similar costs to those we had estimated for the proposed standards in the proposed rule, given the updates to our cost estimates based on public comments and updated ***data***.A. Consideration of Technological Feasibility and Lead Time The technological readiness of the auto industry to meet the final standards for MYs 2023-2026 is best understood in the context of the decade-long light-duty vehicle GHG emission reduction program in which the auto industry has developed and introduced on an ongoing basis ever more effective GHG-reducing technologies. The result is that now manufacturers have access to a wide range of GHG-reducing technologies, many of which were in the early stages of development at the beginning of EPA's program in 2012, and which still have potential to reach greater penetration across all new vehicles. (See Sections III.B and III.C of this preamble and Chapter 2 of the RIA for a discussion of technological progression, status of technology penetration, and our assessment of continuing technology penetration across the fleet.) In addition to the technologies that were anticipated by EPA in the 2012 rule to make significant contributions toward compliance with standards for this timeframe, the recent technological advancements and successful implementations of electrification have been particularly significant and have greatly increased the available options for manufacturers to meet more stringent standards. Because BEVs and PHEVs have GHG emissions well below their vehicle footprint targets, even a relatively small number of these vehicles can have a large influence on a manufacturer's compliance credits in a given year. As part of EPA's evaluation of the technological feasibility of the final standards, we have modeled manufacturers' decisions in choosing among available emission reduction technologies to incorporate in their vehicles, taking into account both the projected costs and effectiveness of the technologies. This analytic approach is consistent with EPA's past analyses. See Section III.C of this preamble and Chapter 2 of the RIA. The analysis demonstrates that a wide variety of emission reducing technologies are already available for manufacturers to incorporate into their vehicles within the time frame of the final standards. Our updated analysis projects that about 17 percent of vehicles meeting the MY 2026 final standards will be BEVs or PHEVs (See Section III.B.3 of this preamble). In making this projection, we are considering both the influence of the standards in that year and the availability and cost of the various available technologies. Among the updates for this final rule analysis, our updated battery costs are one significant factor. For the final rule assessment, EPA is projecting lower battery costs over this timeframe compared to our projections in the proposed rule. We believe that together with other analysis updates (described further in Section III of this preamble and Chapter 2 of the RIA), the cost for manufacturers to implement BEV and PHEV technologies is more accurately represented. In addition to considering the contribution of BEV and PHEV technologies in the overall feasibility of the standards, EPA also considered the continued advancements and further fleet penetration of internal combustion engine (ICE) powertrain emissions-reducing technology. As was the case for each of the prior EPA assessments for this timeframe, the large majority of vehicles are projected to remain ICE (non-BEV+PHEVs) under the final standards (e.g , ICE levels are projected to be 83 percent in MY 2026). As shown in more detail in Chapter 4 of the RIA, together with moderate levels of electrification, the final standards can be met by continued adoption of advanced ICE technologies already existing in the market. We believe the penetrations of existing emissions-reducing ICE technologies projected by our analysis support our conclusion that the final standards are appropriate. EPA believes the technological achievements already developed and applied to vehicles within the current new vehicle fleet will enable the industry to achieve the final standards even without the development of new technologies beyond those already widely available. Rather, in response to the increased stringency of the final standards, automakers would be expected to adopt such technologies at an increasing pace across more of their vehicle fleets. As we discuss further below, our assessment shows that a large portion of the current fleet (MY 2021 vehicles), across a wide range of vehicle segments, already meets the MY 2023 footprint-based GHG targets being finalized here. Compliance with the final standards will necessitate greater implementation and pace of technology penetration through MY 2026 using existing GHG reduction technologies, including further deployment of BEV and PHEV technologies. Another factor in considering the feasibility of the final standards is the fact that five automakers voluntarily entered into the California Framework Agreements with the California Air Resources Board, first announced in July 2019, to meet more stringent GHG emission reduction targets nationwide than the relaxed standards in the SAFE rule.\166\ These voluntary actions by automakers that collectively represent nearly 30 percent of the U.S vehicle market speak directly to the feasibility of meeting standards at least as stringent as the emission reduction targets under the California Framework Agreements. As discussed in Section II.A.8 of this preamble, the California Framework Agreements were a consideration in our assessment of the revised EPA standards.--------------------------------------------------------------------------- \166\ [*https://ww2.arb.ca.gov/resources/documents/framework-agreements-clean-cars*](https://ww2.arb.ca.gov/resources/documents/framework-agreements-clean-cars) (last updated on May 22, 2021).--------------------------------------------------------------------------- In the SAFE rulemaking EPA concluded that the projected level of advanced technologies was ``too high from a consumer-choice perspective'' and ultimately could lead to automakers[[Page 74494]]changing the vehicle types they offer.\167\ EPA currently does not believe these conclusions are accurate, even with the higher technology penetration rates for BEVs and PHEVs that we project in this rulemaking compared to rates that we projected in the SAFE rulemaking. Rather, EPA's judgment is that the history of significant developments in automotive offerings over the last ten years supports the conclusion that automakers are capable of deploying a wide range of advanced technologies across the entire vehicle fleet, and that consumers remain interested and willing to purchase vehicles with advanced technologies. Reinforcing this updated judgment are the recent automaker announcements (reviewed in Section III.C of this preamble) signaling an accelerating transition to electrified vehicles across a wide range of vehicle segments, including not only passenger cars and SUVs but also including examples of light-duty pickup trucks and minivans. EPA sees no reason why the standards revised by this final rule would fundamentally alter such trends in technology deployment.--------------------------------------------------------------------------- \167\ 85 FR 25116.--------------------------------------------------------------------------- We believe that the continuation of trends already underway, as exemplified in part by the aforementioned public announcements about manufacturers' plans to transition to electrified vehicles, as well as continuing advancements in EV technology, support the feasibility of this level of BEV+PHEV penetration during the time period of the rule. EPA also believes that current levels and trends, which include significant ongoing and near-term growth, of public and private charging infrastructure are consistent with the projected levels of BEV+PHEV penetration.\168\ Moreover, EPA is committed to encouraging the rapid development and deployment of zero-emission vehicles, and we are finalizing compliance flexibilities and incentives to support this transition (see Section II.B.1 of this preamble).--------------------------------------------------------------------------- \168\ Brown, A., A. Schayowitz, and E. Klotz (2021). ``Electric Vehicle Infrastructure Trends from the Alternative Fueling Station Locator: First Quarter 2021.'' National Renewable Energy Laboratory Technical Report NREL/TP-5400-80684, [*https://afdc.energy.gov/files/u/publication/electric\_vehicle\_charging\_infrastructure\_trends\_first\_quarter\_2021.pdf*](https://afdc.energy.gov/files/u/publication/electric_vehicle_charging_infrastructure_trends_first_quarter_2021.pdf), accessed 11/3/2021.--------------------------------------------------------------------------- As noted above, we are projecting that BEVs and PHEVs can play a significant role in complying with the final standards. While not all manufacturers will introduce these technologies into their lineups at the same rate, a robust market exists for credit trading between manufacturers, as discussed further below, which has enabled more manufacturers to access the credits generated by the implementation of BEVs and PHEVs by other manufacturers. In our modeling of manufacturer decisions and technology applications, the current and previous assessments of potential standards for this timeframe have relied primarily on projections that do not account for credit trading between manufacturers. When credits are available for less than the marginal cost of compliance, EPA anticipates that an automaker might choose to adopt a compliance strategy relying on credits.\169\ As noted in the proposal, EPA recognizes that it previously considered that some manufacturers may be unwilling to design a compliance strategy based on purchase of credits from another manufacturer. However, based in part on our review of the evidence of active credit trading cataloged in the annual EPA Automotive Trends Report 170 171 and consideration of public comments, we conclude there is increased acceptance of credit trading among manufacturers and that it is appropriate to recognize that manufacturers consider credit trading as a compliance strategy. For both of these reasons, we believe it is appropriate to consider the effect of credit trading between firms in our assessment of the feasibility of the final standards.--------------------------------------------------------------------------- \169\ ``FCA historically pursued compliance with fuel economy and greenhouse gas regulations in the markets where it operated through the most cost effective combination of developing, manufacturing and selling vehicles with better fuel economy and lower GHG emissions, purchasing compliance credits, and, as allowed by the U.S federal Corporate Average Fuel Economy (``CAFE'') program, paying regulatory penalties. The cost of each of these components of FCA's strategy has increased and is expected to continue to increase in the future. The compliance strategy for the combined company is currently being assessed by Stellantis management.'' Stellantis N.V (2020). ``Annual Report and Form 20-F for the year ended December 31, 2020.'' \170\ More than 10 vehicle firms collectively have participated in 70 credit trading transactions since the inception of EPA's program through MY 2019, including many of the largest automotive firms. (See EPA Report 420-R-21-003 page 110 and Figure 5.15, January 2021). \171\ Credit trading between firms has occurred throughout the nearly ten year history of the EPA light-duty vehicle GHG program, including during MY 2012, the first year (See EPA Report 420-R-14-011, April 2014).--------------------------------------------------------------------------- The potential contribution of traded credits towards a manufacturer's compliance strategy is magnified as more BEVs and PHEVs are introduced into the fleet. Because the standards are largely set assuming the overall fleet will be largely ICE vehicles, a manufacturer who produces more than a moderate number of BEVs and PHEVs may end up with GHG credits that could expire if not used internally or sold to another manufacturer. EPA believes that credit trading will continue to be an important compliance flexibility that manufacturers will take advantage of, especially when differences and timing of product strategies are likely to persist across manufacturers. As an additional way to evaluate the potential effect of credit trading on the auto industry's compliance costs, EPA conducted a sensitivity analysis to evaluate the potential contribution of credit trading between manufacturers towards compliance in MYs 2023 and 2024 (as well as the later MYs), and the more realistic treatment of banked credits which are otherwise modeled as unused in our primary analysis which assumes no trading. Under this scenario, credits that are generated by one manufacturer can be used by another manufacturer if it results in an overall reduction in compliance costs.\172\ The results of this sensitivity analysis, presented in RIA 4.1.5.1 under the `perfect trading' case, show that by accounting for credit trading between manufacturers the projected vehicle costs are reduced dramatically from $330 without trading to $147 with trading in MY 2023, and from $534 to $360 in MY 2024. Considering lead-time for these earlier model years, these results illustrate how credit trading allows manufacturers to meet the standards in a more cost-effective manner from an overall industry perspective, which can involve some manufacturers applying additional technology and selling credits while other manufacturers might rely on purchasing credits in lieu of adding technology. We would consider any analysis which assumes all manufactures participate in a frictionless and transparent market to be a bounding representation of how credits might actually be traded between manufacturers. It is likely that the actual market behavior will lie somewhere between our no-trading (central case) and a frictionless market with all manufacturers. We believe our modeling of the `perfect trading' sensitivity case, with two groups of manufacturers participating in independent markets, will be closer to actual credit trading behavior than the no-trading case. Note that the results of our central case[[Page 74495]]analysis, even without accounting for trading between manufacturers, projects feasible compliance pathways for MYs 2023 and 2024.--------------------------------------------------------------------------- \172\ Note that the fleet was divided between non-Framework and Framework manufacturers, and trading was assumed to occur for manufacturers within those groups, but not between. This is a relatively more restrictive assumption than true ``perfect'' trading, that will tend to increase the likelihood of credits going unused or applied inefficiently, and thus potentially higher costs than in a true perfect trading scenario.--------------------------------------------------------------------------- EPA also received comments which cited independent analyses of how the industry's existing bank of credits can contribute towards meeting the proposed standards for MYs 2023 and 2024. UCS provided in their comments modeling results generated using a version of the CCEMS model which had been modified to include manufacturer credit trading. UCS also included the modeling restriction that non-Framework manufacturers would continue with technology adoption in MY2023 as projected under the less stringent SAFE standards. UCS concluded that with the use of existing banked credits and maintaining product plans projected under a no-action case, there is ``sufficient credit availability for manufacturers to comply with the proposed MY2023 and 2024 standards, even without resorting to additional technology deployment or credit carryback from improvements made post-MY2024.'' Similarly, EDF cited recent modeling results generated using the OMEGA model, concluding that ``the analysis demonstrates that automakers will be able to comply with the proposed MY 2023 standard largely through the application of existing credits.'' The commenter's analysis supported this conclusion even under the most conservative assumption where non-Framework manufacturers did not have access to credits held through MY2020 by Framework manufacturers, had limited use of off-cycle credits, and only reduced tailpipe GHG emissions along the trajectory of the SAFE rule's MY2021-2023 requirements. In other words, these commenters concluded that automakers could comply with the model year 2023 and 2024 standards without adjusting their existing product plans at all, simply by acquiring a portion of the large bank of available credits (and this analysis did not even consider the flexibilities available to manufacturers of carrying back credits earned in future years). EPA agrees with the commenters' central conclusion that the standards can be met in MYs 2023 and 2024 only with the technology deployment that would have been expected under the SAFE rule standards, the voluntary actions taken by some manufacturers beyond the SAFE standards (e.g , the California Framework agreements), and the effective utilization of existing credits. This further reinforces that the lead time for the MYs 2023 and 2024 standards is sufficient. In any given model year, some vehicles will be ``credit generators,'' over-performing compared to the footprint-based CO2target in that model year, while other vehicles will be ``debit generators'' and under-performing against their footprint-based targets. Together, an automaker's mix of credit-generator and debit-generator vehicles contribute to its sales-weighted fleet average CO2performance, compared to its standard, for that year. If a manufacturer's sales-weighted fleet CO2performance is better than its fleet average standard at the end of the model year, those credits can be banked for the automaker's future use in certain years (under the credit carry-forward provisions) or sold to other manufacturers (under the credit trading provisions). Likewise, if a manufacturer's sales-weighted fleet CO2performance falls short of its fleet average standard at the end of a model year, the automaker can use banked credits or purchased credits to meet the standard. These provisions of the GHG credit program were designed to recognize that automakers typically have a multi-year redesign cycle and not every vehicle will be redesigned every year to add GHG-reducing technology. Moreover, when GHG-reducing technology is added, it will generally not achieve emissions reductions corresponding exactly to a single year-over-year change in stringency of the standards. Furthermore, in recognition of the possibility that a manufacturer might comply with a standard for a given model year with credits earned in a future model year (under the allowance for ``credit carryback''), a manufacturer may also choose to carry a deficit forward up to three years before showing compliance with that model year. EPA examined manufacturer certification ***data*** to assess the extent to which MY 2021 vehicles already being produced and sold today would be credit generators compared to the model year 2023 targets (accounting for projected off-cycle and air conditioning credits). As detailed in Chapter 2.4 of the RIA, automakers are selling approximately 216 vehicle models (60 percent of which are advanced gasoline technology vehicles) that would be credit generators compared to the proposed model year 2023 targets, and they appear in nearly all light-duty vehicle market segments. This information supports our conclusion about the feasibility of vehicles with existing technologies meeting the MY 2023 standards. We also considered the ability of MY 2021 vehicles to generate credits based on the MY 2021 and MY 2022 standards relaxed in the SAFE rule. Of the 1370 distinct MY 2021 vehicle models, EPA's analysis (RIA, Chapter 2.4) indicates that 336 of these models (25 percent of today's new vehicle fleet offerings) are credit generators for the MY 2022 SAFE standards: It can be assumed that those models are also generating credits for the MY 2021 standards. This represents an opportunity for manufacturers to build their credit banks for both MY 2021 and MY 2022 and carry those credits forward to help meet the MY 2023-2026 standards. These ***data*** demonstrate that the technology to meet these standards is available today, as well as opportunities for manufacturers to sell more of the credit-generator vehicles as another available strategy to generate credits that will help them comply with the model year 2023 and later standards. Our analysis clearly shows this could be done within vehicle segments to maintain consumer choice (we would not expect that overall car/truck fleet mix would shift), as credit-generating vehicles exist across vehicle segments, representing 95 percent of vehicle sales. Under the fleet-average based standards, manufacturers have multiple feasible paths to compliance, including varying sales volumes of credit generating vehicles, adopting GHG-reducing technologies, and implementing other credit strategies and incentive provisions including those finalized in this rule. Pricing strategy is a well-documented approach \173\ to shifting a manufacturer's sales mix to achieve compliance. As UCS mentioned in their comments, General Motors published[[Page 74496]]literature \174\ on its own pricing strategy model it uses to make decisions on how best to motivate consumers into purchasing alternate vehicles that help achieve fleetwide CAFE compliance.--------------------------------------------------------------------------- \173\ E.g , When fuel economy standards were not footprint-based, less efficient vehicles were priced higher than more efficient vehicles to encourage sales of the latter. Austin, D., and T. Dinan (2004). ``Clearing the air: The costs and consequences of higher CAFE standards and increased gasoline taxes.'' Journal of Environmental Economics and Management 50: 562-582. Greene, D., P. Patterson, M. Singh, and J. Li (2005). ``Feebates, rebates, and gas-guzzler taxes: A study of incentives for increased fuel economy.'' Energy Policy 33: 757-775 found that automakers were more likely to add technology than use pricing mechanisms to achieve standards. Whitefoot, K., M. Fowlie, and S. Skerlos (2017). ``Compliance by Design: Influence of Acceleration Trade-offs on CO2Emissions and Costs of Fuel Economy and Greenhouse Gas Regulations.'' Environmental Science and Technology 51: 10307-10315 found evidence consistent with automakers using trade-offs with acceleration as yet another path to comply with fuel economy standards. However, EPA's Trends Report (420-R-21-003 Figure 3.11 and Figure 3.15) shows that manufacturers have proven capable of increasing both fuel economy and acceleration performance simultaneously. \174\ Biller, S., and Swann, J. (2006). ``Pricing for Environmental Compliance in the Auto Industry.'' Interfaces 36(2): 118-125. [*https://pubsonline.informs.org/doi/abs/10.1287/inte.1050.0174.---------------------------------------------------------------------------*](https://pubsonline.informs.org/doi/abs/10.1287/inte.1050.0174.---------------------------------------------------------------------------) The availability of current models across a range of vehicle segments meeting the final standards is notable. EPA recognizes that auto design and development is a multi-year process, which imposes some constraints on the ability of manufacturers to immediately redesign vehicles with new technologies. However, EPA also understands that this multi-year process means that the industry's product plans developed in response to EPA's 2012 GHG standards rulemaking for MYs 2017-2025 have largely continued, notwithstanding the SAFE rule that was published on April 30, 2020 and that did not relax standards until MY 2021. In their past comments on EPA's light-duty GHG programs, some automakers broadly stated that they generally require about five years to design, develop, and produce a new vehicle model.\175\ Under that schedule, it would follow that in most cases the vehicles that automakers will be selling during the first years of this MY 2023-26 program were already designed under the original, more stringent GHG standards finalized in 2012 for those model years. At the time of the proposal of these final standards, the relaxed GHG standards under the SAFE rule had been in place for little more than one year. During this time, the ability of the industry to commit to a change of plans to take advantage of the SAFE rule's relaxed standards, especially for MYs 2023 and later, was highly uncertain in light of pending litigation,\176\ and concern was regularly expressed across the auto industry over the uncertain future of the SAFE standards.--------------------------------------------------------------------------- \175\ For example, in its comments on the 2012 rule, Ford stated that manufacturers typically begin to firm up their product plans roughly five years in advance of actual production. (Docket OAR-2009-0472-7082.1, p. 10.) \176\ See Competitive Enterprise Institute v. NHTSA, D.C Cir. No. 20-1145 (and consolidated cases brought by several states, localities, environmental and public organizations, and others), filed on May 1, 2020 and later dates.--------------------------------------------------------------------------- In its comments, the Alliance emphasized ``the importance and significance of design cycles on real world response to changes proposed in today's policy. DOT and EPA jointly proposed the SAFE Vehicles Rule on August 24, 2018, signaling some probability of changes in federal regulations on GHG and CAFE. It is reasonable to expect that some manufacturers updated production plans for new vehicles accordingly, and consistent with the corporate strategies, for some of the affected model years in the SAFE proposal (MYs 2021-2024, for instance).'' If it were indeed the case that auto manufacturers updated product plans based on the SAFE proposed rule as a signal of policy changes, then it also seems reasonable that automakers might have similarly initiated production planning to prepare for potentially more stringent standards in response to the President's January 21, 2021 Executive Order 13990 directing EPA to review the SAFE rule standards, or if not then when EPA's proposed rule issued later in 2021. In any case, EPA's modeling reflects the significance of design cycles, and is not dependent on manufacturers having retained their pre-SAFE product strategies without change. While EPA anticipates that different manufacturers will adopt different compliance strategies for the standards established by this rule, EPA believes, based on the availability of technologies, the results of its modeling, and the flexibilities of the program, that these standards can be achieved by manufacturers at a reasonable cost. In fact, due in part to this uncertainty, five automakers voluntarily agreed to more stringent national emission reduction targets under the California Framework Agreements. Therefore, the automakers' own past comments regarding product plan development and the regulatory and litigation history of the GHG standards since 2012 support EPA's expectation that automakers remain largely on track in terms of technological readiness within their product plans to meet the approximate trajectory of increasingly stringent standards initially promulgated in 2012. Although we do not believe that automakers have significantly changed their product plans in response to the SAFE final rule issued in 2020, any that did would have done so relatively recently and there is reason to expect that, for any automakers that changed their plans after the SAFE rule, the automakers' earlier plans could be reinstated or adapted with little change. We also note that some automakers may have adopted product plans to over comply with the more stringent, pre-SAFE standards, with the intention of selling credits to other automakers. For these automakers, the final standards of this rule reduce or eliminate the sudden disruption to product plans caused by the SAFE rule. Despite the relaxed SAFE standards in the U.S , manufacturers have continued to advance technology deployment in response to steadily more stringent standards in other global markets. In comments referenced by CARB, Roush provided further justification that adequate lead time and available technology already exist, in part, due to global regulatory pressures. Roush indicates that, globally, manufacturers have been developing and implementing technology to meet international standards more stringent than in the U.S , and regularly incorporate these technologies into U.S products. EPA considers this an additional aspect of its analysis that mitigates concerns about lead time for manufacturers to meet the final standards beginning with the 2023 model year. We see no reason to expect that the major GHG-reducing technologies that automakers have already developed and introduced, or have already been planning for near-term implementation, will not be available for model year 2023-2026 vehicles. Thus, in contrast to the situation that existed prior to EPA's adoption of the initial light-duty GHG standards in the 2012 rule, automakers now have had the benefit of at least 8 to 9 years of planning and development for increasing levels of GHG-reducing technologies in preparation for meeting the final standards. EPA sought and received comment on generating credits against the MY 2021 and MY 2022 SAFE standards in the context of lead time for the standards in this rulemaking. The California Attorney General commented that for MY 2023, automakers can comply with standards at least as stringent as EPA's proposed preferred alternative without the use of the credit banks they will likely hold coming into that year. Those banks, including the windfall credits available under the SAFE standards, support EPA's consideration of its Alternative 2 standards for MY 2023 and underscore that EPA should not finalize standards less stringent than its preferred alternative for that model year. The California Attorney General commented further that if EPA were to adopt MY 2023 standards weaker than its preferred alternative (i.e , the Alternative 1 standards), they would support some form of discounting of the credits generated during MYs 2021-2022. In their comments, CARB argued that EPA should protect against what it views as windfall credits from manufacturers over-complying with the SAFE standards in MYs 2021 and 2022. CARB believes that auto manufacturers[[Page 74497]]were on a path to compliance with the original 2012 standards, those plans should not have been changed by the 2020 SAFE rule, and thus credits generated off the relaxed SAFE standards should be considered windfall and not be made available to offset future compliance. EPA has considered the comments but is not finalizing any changes to the existing credit generating or credit carry-forward provisions for the MY 2021 and 2022 standards. While we appreciate the view of commenters that manufacturers could have feasibly met more stringent standards in MYs 2021 and 2022, we believe the credit system is an integral part of the design of the GHG standards, which allow for multi-year compliance strategies. We think it would be inappropriate to deny any credits for manufacturers who outperformed their applicable footprint standards in those years, and choosing a more stringent compliance baseline now for credit generation would be difficult in light of the significant increase in stringency for MY 2023. In addition to CARB's comments, EPA also considered the recent performance of the auto industry in meeting the GHG standards; in MY 2020 the industry-wide average performance was 6 g/mile above the industry-wide average standard and compliance was achieved by many manufacturers through applying banked credits.\177\ Rather than denying or discounting credits, we have considered the relative stringency of the MY 2021 and MY 2022 standards as part of our consideration of the appropriate MY 2023-2026 standards. In light of the implementation timeframe of the final standards beginning in model year 2023, we are continuing to allow manufacturers to generate credits against the SAFE standards in model years 2021 and 2022. We are not changing the existing 5-year credit carry-forward provision for credits generated in model years 2021 and 2022, so those credits can be carried forward under the existing regulations to facilitate the transition from the SAFE standards to the final standards. We believe our approach in this rulemaking on revising credit provisions appropriately balances the benefits of credits, especially for compliance in earlier model years, with the benefits of achieving greater emissions reductions. EPA will consider future program provisions for credits in the context of future standards and timing.--------------------------------------------------------------------------- \177\ Trends Report, Figure ES-8.--------------------------------------------------------------------------- In summary, manufacturers have access to a wide range of GHG-reducing technologies and have made significant technological advances in recent years, which together provide ample evidence of the technological feasibility of the final standards particularly in light of the wide range of credit and flexibility strategies, as well as fleet mix strategies, that manufacturers can marshal to comply with the standards. In considering feasibility of the final standards EPA also considered the impact of available compliance flexibilities on automakers' compliance options, including the additional four compliance flexibility options we are finalizing primarily to address lead time considerations in MYs 2023 and 2024 (See Section II of this preamble). EPA is adopting a one-year credit life extension for credits earned in MYs 2017 and 2018 so they can be used in MYs 2023 and 2024, respectively. EPA is finalizing the extension of advanced technology vehicle multiplier incentives for MYs 2023 and 2024, which offer the potential for an additional cumulative 10 g/mi of emission credits. EPA is finalizing a 20 g/mi incentive for full-size pickup trucks equipped with strong hybrid technology or achieving 20 percent better GHG performance compared to their footprint targets for MYs 2023 and 2024. And finally, and EPA is providing 5 g/mi of additional credit generation opportunity for off-cycle credits from the menu. As we discuss above, the advanced technologies that automakers are continuing to incorporate in vehicle models today directly contribute to each company's compliance plan (i.e , these vehicle models have lower GHG emissions). In addition, automakers widely utilize the program's established ABT provisions which provide a variety of flexible paths to plan compliance (See more detail in Section II.A.4 of this preamble). EPA's annual Automotive Trends Report illustrates how different automakers have chosen to make use of the GHG program's various credit features.\178\ It is clear that manufacturers are widely utilizing the various credit programs available, and we have every expectation that manufacturers will continue to take advantage of the compliance flexibilities and crediting programs to their fullest extent, thereby providing them with additional powerful tools in finding the lowest cost compliance solutions in light of the final standards.--------------------------------------------------------------------------- \178\ ``The 2020 EPA Automotive Trends Report, Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975,'' EPA-420-R-21-003 January 2021.---------------------------------------------------------------------------B. Consideration of Vehicle Costs of Compliance In addition to technological feasibility and lead time, EPA considered the cost for the auto industry to comply with the final standards. See Section III.B of this preamble and Chapter 2 of the RIA for our analysis of compliance costs. As shown in Section III.B.2 of this preamble and Chapter 4.1.3 of the RIA, our updated estimate of the average per-vehicle cost increase for a MY 2026 vehicle is $1,000 compared to the No Action scenario. Average per-vehicle costs are projected to rise from $330 in MY 2023 to $1,000 in MY 2026. EPA has also evaluated costs by manufacturer (see Section III.B.2 of this preamble) and finds the range of costs to be similarly reasonable. EPA has also projected the cost impacts for MYs beyond 2026 due to the revised final standards, and those per-vehicle cost increases are in the range of $1,000 to $1,200, which EPA also believes is a reasonable cost increase. EPA also considered the cost impacts across a number of sensitivity cases using a range of input assumptions (see RIA Chapter 4.1.5). We conclude that per-vehicle costs are also reasonable for these cases, including those with higher cost impacts. For example, in the higher battery cost sensitivity case, per-vehicle costs are $1,396 in MY 2026, and in the MYs beyond, up to as $1,590 in MY 2028. As part of these cost estimates, we continue to project significant increases in the use of advanced gasoline technologies (including mild and strong hybrids), comprising 83 percent of the fleet (see Section III.B.3 of this preamble). EPA has considered the feasibility of the standards under several different assumptions about future fuel prices, technology application or credit trading (see RIA Chapters 4 and 10), which shows very small variations in average per-vehicle cost or technology penetration mix. Our conclusion that there are multiple ways the MY 2023-2026 standards can be met given the wide range of technologies at reasonable cost, and predominantly with advanced gasoline engine and vehicle technologies, holds true across all these alternative assumptions and scenarios. EPA concludes that the costs of the standards are reasonable.C. Consideration of Impacts on Consumers Another important consideration for EPA is the impact of the standards on consumers. EPA concludes that the standards will be beneficial for consumers because the lower operating[[Page 74498]]costs from significant fuel savings will offset the vehicle costs. Total fuel savings for consumers through 2050 are estimated at $210 billion to $420 billion (7 percent and 3 percent discount rates, see Section VII.I of this preamble, Table 44, ``Retail Fuel Savings''). For an individual consumer on average, we project that over the lifetime of a MY 2026 vehicle, the reduction in fuel costs will exceed the increase in vehicle costs by $1,083. Thus, the standards will result in significant savings for consumers, as further described in Section VII.J of this preamble. The Administrator also carefully considered the affordability impacts of these standards, especially considering E.O 14008 and EPA's increasing focus on environmental justice and equity. EPA examined the impacts of the standards on the affordability of new and used cars and trucks in Section VII.M of this preamble and Chapter 8.4 of the RIA. Because lower-income households spend a larger share of their household income on gasoline than do higher-income households, the effects of reduced operating costs may be especially important for these households. EPA recognizes that in the SAFE rulemaking we placed greater weight on the upfront costs of vehicles, and little weight on total cost of ownership. In part, that rulemaking explained that approach on the ground that ``[n]ew vehicle purchasers are not likely to place as much weight on fuel savings that will be realized by subsequent owners.'' \179\ However EPA now believes that in assessing the benefits of these standards it is more appropriate to consider the fuel savings of the vehicle, over its lifetime, including those fuel savings that may accrue to later owners, consistent with the approach EPA took in both the 2010 and 2012 light-duty vehicle GHG standard final rules. Disregarding those savings for consumers, which often accrue to lower income households, who more often purchase used cars, would provide a less accurate picture of total benefits to society.--------------------------------------------------------------------------- \179\ 85 FR 25114.--------------------------------------------------------------------------- Likewise, EPA has reconsidered the weight placed in the SAFE rulemaking on promoting fleet turnover as a standalone factor and is now considering the influence of turnover in the context of the full range effects of the proposed standards. As discussed in Section VII.B of this preamble and RIA Chapter 8.1, EPA estimates a reduction in new vehicle sales associated with these standards of one percent or less, though we also describe why sales impacts may be even less negative, or potentially positive. For comparison, the SAFE standards were estimated to increase sales by up to 1.7 percent.\180\ Thus, while recognizing that standards can influence purchasing decisions, EPA finds that the emissions reductions from these final standards far outweigh any temporary effect from delayed purchases.--------------------------------------------------------------------------- \180\ U.S Department of Transportation and U.S Environmental Protection Agency (2020). Final Regulatory Impact Analysis: The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Year 2021-2026 Passenger Cars and Light Trucks. Table VI-189, p. 875. [*https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/final\_safe\_fria\_web\_version\_200330.pdf*](https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/final_safe_fria_web_version_200330.pdf), accessed 11/9/21.---------------------------------------------------------------------------D. Consideration of Emissions of GHGs and Other Air Pollutants An essential factor that EPA considered in determining the appropriate level of the standards is the reductions in emissions that would result from the program. This primarily includes reductions in vehicle GHG emissions, given the increased urgency of the climate crisis. We also considered the effects of the standards on criteria pollutant and air toxics emissions and associated public health and welfare impacts. The GHG emissions reductions from our standards are projected to be 3,100 MMT of CO2, 3.3 MMT of CH4 and 97,000 metric tons of N2O, as the fleet turns over year-by-year to new vehicles that meet the standards, in an analysis through 2050.\181\ See Section IV.A of this preamble, Table 34. EPA recognizes there are a number of limitations and uncertainties with respect to quantifying the benefits of GHG reductions. EPA estimates the monetized benefit of these GHG reductions through 2050 at $31 billion to $390 billion across a range of discount rates and values for the social cost of greenhouse gases (SC-GHG) carbon (see Section VII.I of this preamble, Table 47). Under Section 202 of the CAA, EPA is required to establish standards to reduce air pollution that endangers public health and welfare, taking into consideration the cost of compliance and lead time. EPA is not required to conduct formal cost benefit analysis to determine the appropriate standard under Section 202. EPA weighed the relevant statutory factors to determine the appropriate standard and the analysis of monetized GHG benefits was not material to the choice of that standard. E.O 12866 requires EPA to perform a cost-benefit analysis, including monetizing costs and benefits where practicable, and the EPA has conducted such an analysis. The monetized GHG benefits are included in the cost-benefit analysis. That cost-benefit analysis provides additional support for the EPA's final standards.--------------------------------------------------------------------------- \181\ These emission reductions have increased compared to the proposed rule due to the increased stringency of the final standards.--------------------------------------------------------------------------- These GHG reductions projected to result from the standards are important to continued progress in addressing climate change. In fact, EPA believes that we will need to achieve far deeper GHG reductions from the light-duty sector in future years beyond the compliance timeframe for the standards, which is why we are initiating a rulemaking in the near future to consider establishing more stringent standards after MY 2026. The criteria pollutant emissions reductions expected to result from the standards are also a factor considered by the Administrator. The standards would result in emissions reductions of some criteria pollutants and air toxics and associated benefits for public health and welfare. Public health benefits through 2050 from reducing these pollutants are estimated to total $8.1 billion to $19 billion (7 percent and 3 percent discount rates, see Section VII.I of this preamble, Table 46).\182\ EPA concludes that this rule is important in reducing the public health and welfare impacts of air pollution, including GHG, criteria, and air toxics emissions.--------------------------------------------------------------------------- \182\ Similar to the GHG emission reductions, public health and welfare benefits have increased compared to the proposed rule due to the increased stringency of the final standards.---------------------------------------------------------------------------E. Consideration of Energy, Safety and Other Factors EPA also evaluated the impacts of the final standards on energy, in terms of fuel consumption and energy security. This final rule is projected to reduce U.S gasoline consumption by more than 440 million barrels through 2050, a roughly 15 percent reduction in U.S gasoline consumption (see Section VII.C of this preamble). EPA considered the impacts of this projected reduction in fuel consumption on energy security, specifically the avoided costs of macroeconomic disruption (See Section VII.F of this preamble). We estimate the energy security benefits of the final rule at $7 billion to $14 billion (7 percent and 3 percent discount rate, see Section VII.I of this preamble, Table 45). EPA considers this final rule to be beneficial from an energy security perspective. Section 202(a)(4)(A) of the CAA specifically prohibits the use of an emission control device, system or element of design that will cause or contribute to an unreasonable risk to public health, welfare, or safety. We have concluded that no device, system,[[Page 74499]]or element of design adopted for the purposes of complying with these standards will impact vehicle operation or function in such a way as to increase risk. However, we have also more broadly considered effects beyond vehicle operation and function. For example, we considered the estimated societal costs of fatal and non-fatal injuries due to projected changes in overall VMT and changes in the relative usage of vehicles due to rebound, and scrappage effects on fleet mix. EPA has a long history of considering the safety implications of its emission standards,\183\ up to and including the more recent light-duty GHG regulations: The 2010 rule which established the MY 2012-2016 light-duty vehicle GHG standards, the 2012 rule which first established MY 2017-2025 light-duty vehicle GHG standards, the MTE 2016 Proposed Determination and the 2020 SAFE rule. The relationship between GHG emissions standards and safety is multi-faceted, and can be influenced not only by control technologies, but also by consumer decisions about vehicle ownership and use. EPA has estimated safety implications of this rule by accounting for changes in new vehicle purchase, changes in vehicle scrappage, fleet turnover, and VMT, and changes in vehicle weight as an emissions control strategy. EPA finds that under this rule, the estimated risk of fatal and non-fatal injuries per distance traveled will remain virtually unchanged (see Section VII.H of this preamble).--------------------------------------------------------------------------- \183\ See, e.g , 45 FR 14496, 14503 (1980) (``EPA would not require a particulate control technology that was known to involve serious safety problems.'').--------------------------------------------------------------------------- This rule also projects that as the costs of driving declines due to the improvement in fuel economy, consumers overall will choose to drive more miles (this is the ``VMT rebound'' effect). As a result of this personal decision by consumers to drive more due to the reduced cost of driving, EPA also projects this will result in an increase in accidents, injuries, and fatalities. EPA recognizes that in the SAFE rulemaking EPA placed emphasis on the estimated total number of fatal and non-fatal injuries. However, EPA currently believes it is more appropriate to consider the risk of injuries per mile traveled. The risk of injuries per mile traveled is a measure of how safe driving as an activity is (and whether this rule is projected to impact that safety). Assessing whether the risk of injury per mile traveled has changed is a better means of attributing any projected changes in fatal and nonfatal injuries between the effects of this rule and other contributing factors such as voluntary decisions to drive more. In addition, by focusing on whether the technologies applied by manufacturers to meet the standards established by this rule will make use of a car more dangerous (rather than whether people will use their cars more), we believe that considering risk of injury per vehicle mile traveled is more consistent with the statutory direction in section 202(a)(4)(A) prohibiting ``an emission control device, system or element of design that will cause or contribute to an unreasonable risk.'' Two commenters (CARB, Center for Biological Diversity) expressed support for the use of this metric. Even in the SAFE rule EPA recognized that ``EPA's intention is not to restrict mobility, or to discourage driving, based on the level of the standards.'' \184\ For these reasons, EPA finds that the most important safety considerations are EPA's conclusions that the rule will not increase risk, as calculated on an injury per mile traveled basis.--------------------------------------------------------------------------- \184\ 85 FR 25119. See also 85 FR 24826 (``For the proposal, the agencies assumed that, in deciding to drive more, drivers internalize the full cost to themselves and others, including the cost of accidents, associated with their additional driving.'').---------------------------------------------------------------------------F. Balancing of Factors Under CAA 202(a) Under CAA section 202(a) EPA has statutory authority providing considerable discretion in setting or revising vehicle emission standards with adequate lead time for the development and application of technology to meet the standards. EPA's final standards properly implement this statutory provision, as discussed above. As discussed throughout this preamble, and consistent with the proposed rule, the emission reduction technologies needed to meet the standards are already available at reasonable cost, and a significant fraction of new vehicles today already meets these standards. Moreover, the flexibilities already available under EPA's existing regulations, including fleet average standards and the ABT program--in effect enabling manufacturers to spread the compliance requirement for any particular model year across multiple model years--and the additional flexibilities finalized in this rule further support EPA's conclusion that the standards provide sufficient time for the development and application of technology, giving appropriate consideration to cost. The Administrator in this rule is balancing the factors differently than in the SAFE rule in reaching the conclusion about what standards to finalize. In the SAFE rulemaking, EPA promulgated relaxed GHG standards that were projected to result in increases in GHG and criteria pollutant emissions and adverse public health impacts (e.g , increases in premature mortality and illnesses due to increased air pollution). The SAFE rulemaking was the most significant weakening of mobile source emissions standards in EPA's history. It is particularly notable that the rationale for the revision was not that the standards prior to the SAFE rulemaking had turned out to be technologically infeasible or that they would impose unexpectedly high costs on society. As we have noted, the estimated per-vehicle costs in the SAFE rulemaking for more stringent standards were not significantly different from the costs estimated in the 2012 rule or for this rulemaking. Rather, in considering the factors for the SAFE rulemaking, EPA placed greatest weight on reducing the per-vehicle cost of compliance on the regulated industry and the upfront (but not total) cost to consumers and placed little weight on reductions in GHGs and other pollutants, contrary to EPA's traditional approach to adopting standards under CAA section 202(a). Although EPA continues to believe that the Administrator has significant discretion to weigh various factors under CAA section 202(a), the Administrator notes, consistent with the proposal, that the purpose of adopting standards under that provision is to address air pollution that may reasonably be anticipated to endanger public health and welfare and that reducing air pollution has traditionally been the focus of such standards. In this action, the Administrator is setting more stringent standards based on a weighing of factors under consideration different from that in the SAFE rulemaking, which the Administrator believes is more consistent with the purpose of the CAA.\185\ The Administrator finds it is appropriate to place greater weight on the importance of reducing GHG emissions and the primary purpose of CAA section 202, to reduce the threat posed to human health and the environment by air pollution, and to adopt standards that, when implemented, would result in[[Page 74500]]significant reductions of light duty vehicle emissions both in the near term and over the longer term, while giving appropriate consideration to costs of compliance and lead time.--------------------------------------------------------------------------- \185\ See, e.g , CAA sections 101(a)(2) (finding that ``the increasing use of motor vehicles[ ] has resulted in mounting dangers to the public health and welfare''); 101(b)(1) (declaring one purpose of the CAA is ``to protect and enhance the quality of the Nation's air resources, so as to promote the public health and welfare''); 101(c) (``a primary goal of this chapter is to encourage or otherwise promote reasonable Federal . . . actions . . . for pollution prevention'').--------------------------------------------------------------------------- In addition to the greater consideration of emissions reductions, several technological developments since the SAFE rule was promulgated have informed the Administrator's decision on what level of standards are appropriate. These developments include technological advancements (including reductions in battery costs) and successful introductions of electric vehicles, recent manufacturer announcements signaling an accelerated transition to electrified vehicles, and further evidence of credit trading which has now been demonstrated as an important compliance strategy. The Administrator's consideration of these technological developments support his conclusion that greater emissions reductions can be achieved in the near term at reasonable costs and within the lead time provided by each model year of the revised standards. EPA estimates net benefits of this rule at $120 billion to $190 billion (7 percent and 3 percent discount rates, with 3 percent SC-GHG) (see Section VII.I of this preamble, Table 48).\186\ Our projection that the estimated benefits exceed the estimated costs of the program reinforces our view that the final standards represent an appropriate weighing of the statutory factors and other relevant considerations. EPA is presenting a range of net benefits which reflect our best estimates for SC-GHG and health benefits. EPA acknowledges that the best available estimates do not eliminate uncertainties. We consider potential variation in costs in part through sensitivity analyses, as we recognize that the cost estimates also contain uncertainties. For example, as noted above, we did a sensitivity analysis considering costs of the program if battery costs are higher than we project.\187\ EPA notes that even with these uncertainties in quantified estimates of costs and benefits taken into account, the Administrator finds that the final standards are appropriate when considering the full range of potential costs and other impacts assessed in this rulemaking.--------------------------------------------------------------------------- \186\ Net benefits of this final rule are higher than those estimated for the proposed rule, as well as those estimated for the SAFE rule. \187\ See section VI.B of this preamble and RIA Chapter 4.1.5 for further discussion of the sensitivity analyses.--------------------------------------------------------------------------- In summary, the Administrator has selected standards which achieve appropriate emissions reductions in light of the need to reduce emissions and taking into account the potential for, and cost of, the application of emissions reducing technologies for the model years at issue and other relevant factors. In the Administrator's judgment, the final standards are appropriate under EPA's CAA section 202(a) authority.VII. What are the estimated cost, economic, and other impacts of the rule? This section discusses EPA's assessment of a variety of impacts related to the standards, including impacts on vehicle sales, fuel consumption, energy security, additional driving, and safety. It presents an overview of EPA's estimates of GHG reduction benefits and non-GHG health impacts and a summary of aggregate costs through 2050, drawing from the per-vehicle cost estimates presented in Section III of this preamble, and estimated program benefits. Finally, it discusses EPA's assessment of the potential impacts on consumers and employment. The RIA presents further details of the analyses presented in this section.A. Conceptual Framework for Evaluating Consumer Impacts A significant question in analyzing consumer impacts from vehicle GHG standards has been why there have appeared to be existing technologies that, if adopted, would reduce fuel consumption enough to pay for themselves in short periods, but which were not widely adopted. If the benefits to vehicle buyers outweigh the costs to those buyers of the new technologies, conventional economic principles suggest that automakers would provide them, and people would buy them. Yet engineering analyses have identified a number of technologies whose costs are quickly covered by their fuel savings, such as downsized-turbocharged engines, gasoline direct injection, and improved aerodynamics, that were not widely adopted before the issuance of standards, but which were adopted rapidly afterwards.\188\ Why did markets fail, on their own, to adopt these technologies? This question, termed the ``energy paradox'' or ``energy efficiency gap,'' \189\ has been discussed in detail in previous rulemakings.\190\ As discussed in what follows, and in more detail in RIA Chapter 8.1.1, EPA has evaluated whether the efficiency gap exists, as well as potential explanations for why the gap might exist.--------------------------------------------------------------------------- \188\ U.S Environmental Protection Agency (2021). 2020 EPA Automotive Trends Report: Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975, Chapter 4. EPA-420-R-21-003, [*https://www.epa.gov/automotive-trends/download-automotive-trends-report#Full%20Report*](https://www.epa.gov/automotive-trends/download-automotive-trends-report#Full%20Report), accessed 4/15/2021. \189\ Jaffe, A.B , and Stavins, R.N (1994). ``The Energy Paradox and the Diffusion of Conservation Technology.'' Resource and Energy Economics 16(2): 91-122. \190\ 75 FR 25510-25513; 77 FR 62913-62917; U.S Environmental Protection Agency (2016), Proposed Determination on the Appropriateness of the Model Year 2022-2025 Light-Duty Vehicle Greenhouse Gas Emissions Standards under the Midterm Evaluation, EPA-420-R-16-020, Appendix B.1.2; 85 FR 24603-24613.--------------------------------------------------------------------------- Whether the efficiency gap exists depends on the assessment of fuel savings relative to technology costs and ``hidden costs,'' i.e , any adverse effects on other vehicle attributes. In the Midterm Evaluation,\191\ EPA evaluated both the costs and the effectiveness for reducing fuel consumption (and GHG emissions) of technologies used to meet the emissions standards to date; the agency found that the estimates used in the original rulemakings were generally correct.--------------------------------------------------------------------------- \191\ [*https://www.epa.gov/regulations-emissions-vehicles-and-engines/midterm-evaluation-light-duty-vehicle-greenhouse-gas.---------------------------------------------------------------------------*](https://www.epa.gov/regulations-emissions-vehicles-and-engines/midterm-evaluation-light-duty-vehicle-greenhouse-gas.---------------------------------------------------------------------------) EPA also examined the relationship between the presence of fuel-saving technologies and negative evaluations of vehicle operating characteristics, such as performance and noise, in auto reviews and found that the presence of the technologies was more often correlated with positive evaluations than negative ones.\192\ Preliminary work with ***data*** from recent purchasers of new vehicles found similar results.\193\ While these studies cannot prove that the technologies pose no problems to other vehicle attributes, they suggest that it is possible to implement the technologies without imposing hidden costs.--------------------------------------------------------------------------- \192\ Helfand, G., et al. (2016). ``Searching for Hidden Costs: A Technology-Based Approach to the Energy Efficiency Gap in Light-Duty Vehicles.'' Energy Policy 98: 590-606; Huang, H., et al. (2018). ``Re-Searching for Hidden Costs: Evidence from the Adoption of Fuel-Saving Technologies in Light-Duty Vehicles.'' Transportation Research Part D 65: 194-212. \193\ Huang, H., G. Helfand, and K. Bolon (2018a). ``Consumer Satisfaction with New Vehicles Subject to Greenhouse Gas and Fuel Economy Standards.'' Presentation at the Society for Benefit-Cost Analysis annual conference, March. [*https://benefitcostanalysis.org/docs/G.4\_Huang\_Slides.pdf*](https://benefitcostanalysis.org/docs/G.4_Huang_Slides.pdf), accessed 4/7/2021.--------------------------------------------------------------------------- A few public comments addressed perspectives on the issue of potential tradeoffs among vehicle attributes. The National Automobile Dealers Association (NADA) raises concerns that vehicle buyers must give up vehicle attributes, especially performance, to get improved fuel economy. NYU IPI, on the other hand, finds no evidence of tradeoffs and notes that some fuel-saving technologies improve other vehicle attributes, including[[Page 74501]]performance. In response to these comments, EPA notes that we have evaluated the relationship between performance and fuel economy, in light of research arguing that fuel consumption must come at the expense of other vehicle attributes.\194\ Research in progress from Watten et al. (2021) \195\ distinguishes between technologies that improve, or do not adversely affect, both performance and fuel economy and technologies that reduce engine displacement, which does trade off improved fuel economy for performance. Thus, EPA does not agree with NADA that vehicle buyers must give up performance to get better fuel economy; it is possible to get more of both. Following Moskalik et al. (2018),\196\ Watten et al. observe that the ``marginal rate of attribute substitution'' between power and fuel economy has changed substantially over time. In particular, it has become relatively more costly to improve efficiency by reducing power, and relatively less costly to add technologies that improve efficiency. These technology improvements do not reduce power and in some cases may enhance it. This research supports the concept that automakers take consumer preferences into account in identifying where to add technology.--------------------------------------------------------------------------- \194\ Knittel, C.R (2011). ``Automobiles on Steroids: Product Attribute Trade-Offs and Technological Progress in the Automobile Sector.'' American Economic Review 101(7): pp. 3368-3399; Klier, T. and Linn, J. (2016). ``The Effect of Vehicle Fuel Economy Standards on Technology Adoption.'' Journal of Public Economics 133: 41-63; McKenzie, D. and Heywood, J.B (2015). ``Quantifying efficiency technology improvements in U.S cars from 1975-2009.'' Applied Energy 157: 918-928. \195\ Watten, A., S. Anderson, and G. Helfand (2021). ``Attribute Production and Technical Change: Rethinking the Performance and Fuel Economy Trade-off for Light-duty Vehicles.'' Working paper. \196\ Moskalik, A., K. Bolon, K. Newman, and J. Cherry (2018). ``Representing GHG Reduction Technologies in the Future Fleet with Full Vehicle Simulation.'' SAE Technical Paper 2018-01-1273. doi:10.4271/2018-01-1273.--------------------------------------------------------------------------- EPA does not reject the observation that the energy efficiency gap has existed for light-duty vehicles--that is, it appears that markets on their own have not led to incorporation by manufacturers, and purchase by new vehicle buyers, of a number of technologies whose fuel savings quickly outweigh the costs in the absence of standards. As discussed in RIA Chapter 8.1.1.2, EPA has previously identified a number of hypotheses to explain this apparent market failure.\197\ Some relate to consumer behavior, such as putting little emphasis on future fuel savings compared to up-front costs (a form of ``myopic loss aversion''), not having a full understanding of potential cost savings, or not prioritizing fuel consumption in the complex process of selecting a vehicle. Explanations of these kinds tend to draw on the conceptual and empirical literature in behavioral economics, which emphasizes the importance of limited attention, the relevance of salience, ``present bias'' or myopia, and loss aversion. (Some of these are described as contributing to ``behavioral market failures.'') Other potential explanations relate to automaker behaviors that grow out of the large fixed costs of investments involved with switching to new technologies, as well as the complex and uncertain processes involved in technological innovation and adoption.--------------------------------------------------------------------------- \197\ 75 FR 25510-25513; 77 FR 62913-62917; U.S Environmental Protection Agency (2016), Proposed Determination on the Appropriateness of the Model Year 2022-2025 Light-Duty Vehicle Greenhouse Gas Emissions Standards under the Midterm Evaluation, EPA-420-R-16-020, Appendix B.1.2; 85 FR 24603-24613.--------------------------------------------------------------------------- We note that it is challenging to identify which of these hypotheses for the efficiency gap explain its apparent existence. On the consumer side, EPA has explored the evidence on how consumers evaluate fuel economy in their vehicle purchase decisions.\198\ As noted, there does not appear to be consensus in that literature on that behavior; the variation in estimates is very large. Even less research has been conducted on producer-side behavior. The reason there continues to be limited adoption of cost-effective fuel-saving technologies before the implementation of more stringent standards remains an open question. Yet, more stringent standards have been adopted without apparent disruption to the vehicle market after they become effective.\199\ NYU IPI commented that EPA should include additional potential market failures in its assessment, as well as additional evidence related to the market failures already mentioned. The American Enterprise Institute, in contrast, asserts based on economic theory, but without evidence, that failures in the market for fuel savings do not exist. EPA agrees with NYU IPI that evidence on technology costs, fuel savings, and the absence of hidden costs suggest that there are market failures in the provision of fuel-saving technologies, though we cannot demonstrate at this time which specific failures operate in this market. Adding additional possible market failures to the list of hypotheses is useful for suggesting future research activities, but does not change the finding that market failures appear to exist in the provision of fuel economy.--------------------------------------------------------------------------- \198\ U.S Environmental Protection Agency (2010). ``How Consumers Value Fuel Economy: A Literature Review.'' EPA-420-R-10-008, [*https://cfpub.epa.gov/si/si\_public\_file\_download.cfm?p\_download\_id=499454&Lab=OTAQ*](https://cfpub.epa.gov/si/si_public_file_download.cfm?p_download_id=499454&Lab=OTAQ) (accessed 4/15/2021); U.S Environmental Protection Agency (2018). ``Consumer Willingness to Pay for Vehicle Attributes: What is the Current State of Knowledge?'' EPA-420-R-18-016, [*https://cfpub.epa.gov/si/si\_public\_file\_download.cfm?p\_download\_id=536423&Lab=OTAQ*](https://cfpub.epa.gov/si/si_public_file_download.cfm?p_download_id=536423&Lab=OTAQ) (accessed 4/15/2021); Greene, D., A. Hossain, J. Hofmann, G. Helfand, and R. Beach (2018). ``Consumer Willingness to Pay for Vehicle Attributes: What Do We Know?'' Transportation Research Part A 118: 258-279. \199\ ``The 2020 EPA Automotive Trends Report, Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975,'' EPA-420-R-21-003 January 2021. See Table 2-1 for total vehicle production by model year.---------------------------------------------------------------------------B. Vehicle Sales Impacts As discussed in Section III.A of this preamble, EPA utilized the CCEMS model for this analysis. For this final rule as with the proposed rule, we have continued to estimate vehicle sales impacts through this model.\200\ First, the model projects future new vehicle sales in the reference case based on projections of macroeconomic ***variables***. Second, it applies a demand elasticity (that is, the percent change in quantity associated with a one percent increase in price) to the change in net price, where net price is the difference in technology costs less an estimate of the change in fuel costs over 2.5 years. This approach assumes that both automakers and vehicle buyers take into consideration the fuel savings that buyers might expect to accrue over the first 2.5 years of vehicle ownership.--------------------------------------------------------------------------- \200\ U.S Department of Transportation and U.S Environmental Protection Agency (2020). Final Regulatory Impact Analysis: The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Year 2021-2026 Passenger Cars and Light Trucks.'' [*https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/final\_safe\_fria\_web\_version\_200701.pdf*](https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/final_safe_fria_web_version_200701.pdf), accessed 11/1/2021, p. 871.--------------------------------------------------------------------------- As discussed in Section VII.A of this preamble, and in more detail in RIA Chapter 8.1.2, there does not yet appear to be consensus around the role of fuel consumption in vehicle purchase decisions, and the assumption that 2.5 years of fuel consumption is the right number for both automakers and vehicle buyers deserves further evaluation. As noted there, Greene et al. (2018) provides a reference value of $1,150 for the value of reducing fuel costs by $0.01/mile over the lifetime of an average vehicle; for comparison, 2.5 years of fuel savings is only about 30 percent of that value, or about $334.\201\[[Page 74502]]This $334 is within the large standard deviation in Greene et al. (2018) for the willingness to pay to reduce fuel costs, but it is far lower than both the mean of $1,880 (160 percent of that value) and the median of $990 (85 percent of that value) per one cent per mile in the paper. On the other hand, the 2021 NAS report, citing the 2015 NAS report, observed that automakers ``perceive that typical consumers would pay upfront for only one to four years of fuel savings'' (pp. 9-10),\202\ a range of values within that identified in Greene et al. (2018) for consumer response, but well below the median or mean. Thus, it appears possible that automakers operate under a different perception of consumer willingness to pay for additional fuel economy than how consumers actually behave. Both NYU IPI and Consumer Reports comment that new vehicle buyers care more about fuel consumption than the use of 2.5 years suggests. Consumer Reports comments that EPA should model automaker adoption of fuel-saving technologies based on historical actions. While EPA considers these concerns as deserving additional consideration for future actions, the CCEMS model used for this rulemaking uses 2.5 years for both automaker perception and consumer perception of the value of additional fuel economy in its sales modeling. The decision to use the CCEMS model is further discussed in Section III.A of this preamble.--------------------------------------------------------------------------- \201\ See Greene et al. (2018), Footnote 198. Greene et al. (2018) cite a ballpark value of reducing driving costs by $0.01/mile as $1150, but does not provide enough detail to replicate their analysis perfectly. The 30% estimate is calculated by assuming, following assumptions in Greene et al. (2018), that a vehicle is driven 15,000 miles per year for 13.5 years, 10% discount rate. Those figures produce a ``present value of miles'' of 108,600; thus, a $0.01/mile change in the cost of driving would be worth $1086. In contrast, saving $0.01/mile for 2.5 years using these assumptions is worth about $318, or 29% of the value over 13.5 years. Multiplying Greene et al.'s 29 percent to $1150 = $334. \202\ National Research Council (2015). Cost, Effectiveness, and Deployment of Fuel Economy Technologies for Light-Duty Vehicles. Washington, DC: The National Academies Press. [*https://doi.org/10.17226/21744*](https://doi.org/10.17226/21744), p. 9-10.--------------------------------------------------------------------------- In addition, setting the elasticity of demand at -1 in the SAFE FRIA was based on literature more than 25 years old. In the proposed rule, EPA mentioned that it was sponsoring a review of more recent estimates of the elasticity of demand for new vehicles and requested comment on using an elasticity value of -1. As discussed further in RIA Chapter 8.1.2, EPA recently completed the report reviewing this literature.\203\ The report also describes a method based in economic principles to examine the effects of changes in new vehicle prices, taking into account changes in the used vehicle market and scrappage of used vehicles. Several commenters (CARB, NYU IPI, and a coalition of environmental NGOs) provide assessments of the literature. These commenters all observe that the value of -1 is based on older studies that focus on short-term changes in the new vehicle market and suggest using an elasticity no larger (in absolute value) than -0.4 EPA agrees that more recent evidence incorporating longer-term effects, such as interactions with the used vehicle market, suggests that -0.4 may be an upper limit (in absolute value) for this elasticity, and values as low as -0.15 are plausible. A smaller elasticity does not change the direction of sales effects, but it does reduce the magnitude of the effects.--------------------------------------------------------------------------- \203\ U.S Environmental Protection Agency (2021). ``The Effects of New-Vehicle Price Changes on New- and Used-Vehicle Markets and Scrappage.'' EPA-420-R-21-019, [*https://cfpub.epa.gov/si/si\_public\_record\_Report.cfm?dirEntryId=352754&Lab=OTAQ*](https://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=352754&Lab=OTAQ) (accessed 10/06/2021).--------------------------------------------------------------------------- The CCEMS model also makes use of a dynamic fleet share model (SAFE FRIA p. 877) that estimates, separately, the shares of passenger cars and light trucks based on vehicle characteristics, and then adjusts them so that the market shares sum to one. The model also includes the effects of the standards on vehicle scrappage based on a statistical analysis (FRIA starting p. 926). The model looks for associations between vehicle age, change in new vehicle prices, fuel prices, cost per mile of driving, and macroeconomic measures and the scrappage rate, with different equations for cars, SUVs/vans, and pickups. EPA's report to review new vehicle demand elasticities also includes a review of the literature on the relationship between new and used vehicle markets and scrappage. For this final rule, EPA is maintaining the previous assumptions for its modeling, with the exception of updating the new-vehicle demand elasticity to -0.4 based on more recent evidence. As EPA's recently issued literature review and public commenters have noted, -0.4 appears to be the largest estimate (in absolute value) for a long-run new vehicle demand elasticity in recent studies. Further, EPA's report examining the relationship between new and used vehicle markets shows that, for plausible values reflecting that interaction, the new vehicle demand elasticity varies from -0.15 to -0.4 The proposed rule presented results with -0.4, and for the final rule we are using this value in our central case, with sensitivities of -0.15 (a lower value from the report) and -1 (for continuity with the proposed rule). See Section III.A of this preamble and the Response to Comments document for further discussion of our updated approach. With the modeling assumptions that both automakers and vehicle buyers consider 2.5 years of future fuel consumption in the purchase decision and that the demand elasticity is -0.4, vehicle sales are projected to decrease by roughly one-half to one percent compared to sales under the SAFE standards, as discussed in more detail in RIA Chapter 8.1.3 In contrast, when modeled using a demand elasticity of -0.15, sales decrease by no more than 0.3 percent; and, using a demand elasticity of -1, sales decrease by about 2 percent. These results show how the value of the elasticity affects sales impacts. If, however, automakers underestimate consumers' valuation of fuel economy, then sales may increase relative to the baseline under the standards. NADA commented that EPA underestimated adverse sales impacts but does not provide analytical support for that statement. For reasons noted above, including the limited consideration of fuel consumption in consumer vehicle purchase decisions, EPA disagrees that adverse sales impacts are underestimated. How easily new vehicle buyers will be willing to substitute EVs for internal combustion engine (ICE) vehicles is a matter of some uncertainty. With up-front costs dropping, the total cost of ownership for EVs is also dropping and becoming more competitive with ICE vehicles. Some commenters, including the California Attorney General Office, Consumer Reports, the National Coalition for Advanced Technology, Southern Environmental Law Center, Tesla, and some EV owners, expect EVs to be attractive to many new vehicle buyers as their costs drop, ranges improve, and more charging infrastructure is developed. Other commenters, including many automakers, Alliance for Automotive Innovation, Center for Climate and Energy Solutions, Environmental Protection Network, and Motor & Equipment Manufacturers Association, raise the role of complementary policies outside of this rule, such as purchase subsidies and more development of charging infrastructure, to facilitate consumer acceptance of EVs. As discussed in Section III.B.3 of this preamble, our analysis suggests that EV penetration under these standards is projected to increase from about 7 percent in MY 2023 to about 17 percent in MY 2026. Consistent with the objectives of E.O 14037, EPA believes that the transition to zero emission vehicles is an important pathway in addressing the climate crisis; in addition, as discussed in Section VII.K[[Page 74503]]of this preamble, increasing domestic production of EVs will be important for future leadership and competitiveness of the U.S auto industry as other markets also make this transition.C. Changes in Fuel Consumption The final standards will reduce not only GHG emissions but also fuel consumption. Reducing fuel consumption is a significant means of reducing GHG emissions from the transportation fleet. EPA received comments on fuel consumption and savings in the sales and net benefits analysis as summarized in Sections 13, 17, and 17.1 of the RTC document for this rulemaking. Table 38 shows the estimated fuel consumption changes under the final standards relative to the No Action scenario and include rebound effects, credit usage and advanced technology multiplier use. The largest changes in fuel consumption come from gasoline, which follows from our projection that improvements to gasoline vehicles will be the primary way that manufacturers meet the final standards. Through 2050, our rule will reduce gasoline consumption by more than 360,000 million gallons--reaching a 15 percent reduction in annual U.S gasoline consumption in 2050. Roughly 17 percent of the fleet is projected to be either EV or PHEV by MY 2026 to meet the final standards for which we project smaller percentage changes in the U.S electricity consumption to fuel these vehicles. Table 38--Change in Fuel Consumption From the Light-Duty Fleet---------------------------------------------------------------------------------------------------------------- Gasoline equivalents Percent of Electricity Percent of (million 2020 U.S (gigawatt 2020 U.S gallons) consumption hours) consumption----------------------------------------------------------------------------------------------------------------2023............................................ 582 0 3,631 02026............................................ 3,245 -3 23,196 12030............................................ 8,680 -7 59,241 22035............................................ 14,203 -11 95,798 32040............................................ 17,424 -14 118,225 32050............................................ 18,860 -15 128,625 3Sum............................................. -361,438 .............. 2,457,336 ..............----------------------------------------------------------------------------------------------------------------Notes: The CCEMS reports all liquid fuels as gasoline equivalents; according to the Energy Information Administration (EIA), U.S gasoline consumption in 2020 was 123.73 billion gallons, roughly 16 percent less (due to the coronavirus pandemic) than the highest consumption on record (2018). According to the Department of Energy, there are 33.7 kWh of electricity per gallon gasoline equivalent, the metric reported by CCEMS for electricity consumption and used here to convert to kWh. According to EIA, the U.S consumed 3,800,000 gigawatt hours of electricity in 2020. With changes in fuel consumption come associated changes in the amount of time spent refueling vehicles. Consistent with the assumptions used in the proposed rule (and presented in Table 39 and Table 40), the costs of time spent refueling are calculated as the total amount of time the driver of a typical vehicle would spend refueling multiplied by the value of their time. If less time is spent refueling vehicles under the final standards, then a refueling time savings would be incurred. Table 39--CCEMS Inputs Used To Estimate Liquid Refueling Time Costs---------------------------------------------------------------------------------------------------------------- Cars Vans/SUVs Pickups---------------------------------------------------------------------------------------------------------------- Fixed Component of Average Refueling Time in Minutes (by Fuel Type)----------------------------------------------------------------------------------------------------------------Gasoline........................................................ 3.5 3.5 3.5Ethanol-85...................................................... 3.5 3.5 3.5Diesel.......................................................... 3.5 3.5 3.5Electricity..................................................... 3.5 3.5 3.5Hydrogen........................................................ 0 0 0Compressed Natural Gas.......................................... 0 0 0Average Tank Volume Refueled.................................... 65% 65% 65%Value of Travel Time per Vehicle (2018 $/hour).................. 20.46 20.79 20.79---------------------------------------------------------------------------------------------------------------- Table 40--CCEMS Inputs Used To Estimate Electric Refueling Time Costs---------------------------------------------------------------------------------------------------------------- Cars Vans/SUVs Pickups---------------------------------------------------------------------------------------------------------------- Electric Vehicle Recharge Thresholds (BEV200)----------------------------------------------------------------------------------------------------------------Miles until mid-trip charging event............................. 2,000 1,500 1,600Share of miles charged mid-trip................................. 6.00% 9.00% 8.00%Charge rate (miles/hour)........................................ 67 67 67---------------------------------------------------------------------------------------------------------------- Electric Vehicle Recharge Thresholds (BEV300)----------------------------------------------------------------------------------------------------------------Miles until mid-trip charging event............................. 5,200 3,500 3,800Share of miles charged mid-trip................................. 3.00% 4.00% 4.00%[[Page 74504]] Charge rate (miles/hour)........................................ 100 100 100----------------------------------------------------------------------------------------------------------------Note that the values presented in this table were also used in the August 2021 EPA proposed rule, but this table was inadvertently not presented then.D. Greenhouse Gas Emission Reduction Benefits EPA estimated the climate benefits for the final standards using measures of the social cost of three GHGs: Carbon, methane, and nitrous oxide. While the program also accounts for reduction in HFCs through the AC credits program, EPA has not quantified the associated emission reductions. The social cost of each gas (i.e , the social cost of carbon (SC-CO2), methane (SC-CH4), and nitrous oxide (SC-N2O)) is the monetary value of the net harm to society associated with a marginal increase in emissions in a given year, or the benefit of avoiding that increase. Collectively, these values are referenced as the ``social cost of greenhouse gases'' (SC-GHG). In principle, SC-GHG includes the value of all climate change impacts, including (but not limited to) changes in net ***agricultural*** productivity, human health effects, property damage from increased flood risk and natural disasters, disruption of energy systems, risk of conflict, environmental migration, and the value of ecosystem services. The SC-GHG therefore, reflects the societal value of reducing emissions of the gas in question by one metric ton. We estimate the global social benefits of CO2, CH4, and N2O emission reductions expected from the final rule using the SC-GHG estimates presented in the February 2021 Technical Support Document (TSD): Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under E.O 13990 (IWG 2021). These SC-GHG estimates are interim values developed under E.O 13990 for use in benefit-cost analyses until an improved estimate of the impacts of climate change can be developed based on the best available climate science and economics. We have evaluated the SC-GHG estimates in the TSD and have determined that these estimates are appropriate for use in estimating the global social benefits of CO2, CH4, and N2O emission reductions expected from this final rule. After considering the TSD, and the issues and studies discussed therein, EPA finds that these estimates, while likely an underestimate, are the best currently available SC-GHG estimates. As discussed in Chapter 3.3 of the RIA, these interim SC-GHG estimates have a number of limitations, including that the models used to produce them do not include all of the important physical, ecological, and economic impacts of climate change recognized in the climate-change literature and that several modeling input assumptions are outdated. As discussed in the February 2021 TSD, the Interagency Working Group on the Social Cost of Greenhouse Gases (IWG) finds that, taken together, the limitations suggest that these SC-GHG estimates likely underestimate the damages from GHG emissions. We received comments on the use and application of the interim SC-GHG estimates as summarized in the RTC document for this rulemaking. The IWG is currently working on a comprehensive update of the SC-GHG estimates (to be released by January 2022 under E.O 13990) taking into consideration recommendations from the National Academies of Sciences, Engineering and Medicine, recent scientific literature, public comments received on the February 2021 TSD and other input from experts and diverse stakeholder groups. See Section VII.I of this preamble for a summary of the monetized GHG benefits and Chapter 3.3 of the RIA for more on the application of SC-GHG estimates.E. Non-Greenhouse Gas Health Impacts It is important to quantify the non-GHG health and environmental impacts associated with the final program because a failure to adequately consider ancillary impacts could lead to an incorrect assessment of a program's costs and benefits. Moreover, the health and other impacts of exposure to criteria air pollutants and airborne toxics tend to occur in the near term, while most effects from reduced climate change are likely to occur over a time frame of several decades or longer. Ideally, human health benefits would be estimated based on changes in ambient PM2.5and ozone as determined by full-scale air quality modeling. However, the projected non-GHG emissions impacts associated with the final program are expected to contribute to very small changes in ambient air quality (see Preamble Section V.C of this preamble for more detail). EPA intends to develop a future rule to control emissions of GHGs, criteria pollutants, and air toxic pollutants from light-duty vehicles for model years beyond 2026. We are considering how to project air quality impacts, and associated health benefits, from the changes in non-GHG emissions for that future rulemaking. In lieu of air quality modeling, we use a reduced-form benefit-per-ton (BPT) approach to inform our assessment of PM2.5-related health impacts, which is conceptually consistent with EPA's use of BPT estimates in several previous RIAs.204 205 In this approach, the PM2.5-related BPT values are the total monetized human health benefits (the sum of the economic value of the reduced risk of premature death and illness) that are expected from reducing one ton of directly-emitted PM2.5or PM2.5precursor such as NOXor SO2. We note, however, that the complex, non-linear photochemical processes that govern ozone formation prevent us from developing reduced-form ozone BPT values for mobile sources. This is an important limitation to recognize when using the BPT approach.--------------------------------------------------------------------------- \204\ U.S Environmental Protection Agency (U.S EPA). 2015. Regulatory Impact Analysis for the Final Revisions to the National Ambient Air Quality Standards for Ground-Level Ozone. EPA452/R-15-007. Office of Air Quality Planning and Standards, Health and Environmental Impacts Division, Research Triangle Park, NC. December. Available at: [*http://www.epa.gov/ttnecas1/regdata/RIAs/finalria.pdf*](http://www.epa.gov/ttnecas1/regdata/RIAs/finalria.pdf). \205\ U.S Environmental Protection Agency (U.S EPA). (2012). Regulatory Impact Analysis: Final Rulemaking for 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, Assessment and Standards Division, Office of Transportation and Air Quality, EPA-420-R-12-016, August 2012. Available on the internet at: [*http://www3.epa.gov/otaq/climate/documents/420r12016.pdf.---------------------------------------------------------------------------*](http://www3.epa.gov/otaq/climate/documents/420r12016.pdf.---------------------------------------------------------------------------) EPA received comment about the use of BPT values to estimate the PM-related health benefits of the program. EPA agrees with commenters that the use of BPT values to estimate the PM-related health benefits of the program ``is a well-established approach'' that nonetheless omits a number of other health and environmental benefits, such as ozone-related benefits. Commenters expressed concern that because the BPT approach leaves these benefits unquantified, the analysis undercounts air quality benefits. EPA believes that using the reduced-form BPT approach to benefits estimation was reasonable for the analysis conducted for this[[Page 74505]]rulemaking though less robust than an analysis based on photochemical air quality modeling. EPA continues to refine our reduced form methods. We note that criteria pollutant-related health benefits are typically driven by reductions in PM-related mortality risk, which are reflected in the BPT-based analysis of benefits associated with the final rule. We would expect that monetizing the full suite of health and environmental benefits associated with the final rule would increase total benefits, and benefits would increase in proportion to the criteria pollutant emissions reductions achieved, for both the final program and the alternatives that were considered. However, as explained earlier in this section, we are limited to the use of PM2.5-related BPT values for this analysis. We do not expect that the omission of unquantified benefits would meaningfully change how the impacts of the final program compare to the alternatives, though the rule would be even more beneficial on net (compared to costs) if all benefits were quantified and monetized. For tailpipe emissions, we apply national PM2.5-related BPT values that were recently derived for the ``Onroad Light Duty Vehicle'' sector.\206\ The onroad light-duty vehicle BPT values were derived using detailed mobile sector source-apportionment air quality modeling, and apply EPA's existing method for using reduced-form tools to estimate PM2.5-related benefits.207 208--------------------------------------------------------------------------- \206\ Wolfe, P.; Davidson, K.; Fulcher, C.; Fann, N.; Zawacki, M.; Baker, K.R 2019. Monetized Health Benefits Attributable to Mobile Source Emission Reductions across the United States in 2025. Sci. Total Environ. 650, 2490-2498. [*https://doi.org/10.1016/J.SCITOTENV.2018.09.273*](https://doi.org/10.1016/J.SCITOTENV.2018.09.273). Also see [*https://www.epa.gov/benmap/mobile-sector-source-apportionment-air-quality-and-benefits-ton*](https://www.epa.gov/benmap/mobile-sector-source-apportionment-air-quality-and-benefits-ton). \207\ Zawacki, M.; Baker, K.R ; Phillips, S.; Davidson, K.; Wolfe, P. 2018. Mobile Source Contributions to Ambient Ozone and Particulate Matter in 2025. Atmos. Environ. 188, 129-141. \208\ Fann, N.; Fulcher, C.M ; Baker, K. 2013. The Recent and Future Health Burden of Air Pollution Apportioned across U.S Sectors. Environ. Sci. Technol. 47 (8), 3580-3589. [*https://doi.org/10.1021/es304831q.---------------------------------------------------------------------------*](https://doi.org/10.1021/es304831q.---------------------------------------------------------------------------) To monetize the PM2.5-related impacts of upstream emissions, we apply BPT values that were developed for the refinery and electric generating unit (EGU) sectors.\209\ While upstream emissions also include petroleum extraction, storage and transport sources, as well as sources upstream from the refinery, the modeling tool used to support this analysis only provides estimates of upstream emissions impacts aggregated across refinery and EGU sources. We believe that for purposes of this rule the separate accounting of refinery and EGU impacts adequately monetizes upstream PM-related health impacts.--------------------------------------------------------------------------- \209\ U.S Environmental Protection Agency (U.S EPA). 2018. Technical Support Document: Estimating the Benefit per Ton of Reducing PM2.5Precursors from 17 Sectors. 2018. Office of Air Quality Planning and Standards. Research Triangle Park, NC.--------------------------------------------------------------------------- EPA received comment about the use of refinery-related BPT values as a surrogate for the monetization of all upstream emissions impacts. EPA agrees with the commenters that sector-specific BPT values are preferable to monetize sector-specific emissions. For the final rule, upstream emissions have been apportioned to the refinery and EGU sectors and we apply corresponding BPT values to monetize those emissions impacts. More information on non-GHG emissions impacts of the final rule can be found in Preamble Section V. EPA bases its benefits analyses on peer-reviewed studies of air quality and health effects and peer-reviewed studies of the monetary values of public health and welfare improvements. Recently, EPA updated its approach to estimating the benefits of changes in PM2.5and ozone.210 211 These updates were based on information drawn from the recent 2019 PM2.5and 2020 Ozone Integrated Science Assessments (ISAs), which were reviewed by the Clean Air Science Advisory Committee (CASAC) and the public.212 213 As part of the update, EPA identified PM2.5-related long-term premature mortality risk estimates from two studies deemed most appropriate to inform a benefits analysis: A retrospective analysis of Medicare beneficiaries (Medicare) and the American Cancer Society Cancer Prevention II study (ACS CPS-II).214 215 216--------------------------------------------------------------------------- \210\ U.S Environmental Protection Agency (U.S EPA). 2021. Regulatory Impact Analysis for the Final Revised Cross-State Air Pollution Rule (CSAPR) Update for the 2008 Ozone NAAQS. EPA-452/R-21-002. \211\ U.S Environmental Protection Agency (U.S EPA). 2021. Estimating PM2.5- and Ozone-Attributable Health Benefits. Technical Support Document (TSD) for the Final Revised Cross-State Air Pollution Rule Update for the 2008 Ozone Season NAAQS. EPA-HQ-OAR-2020-0272. \212\ U.S Environmental Protection Agency (U.S EPA). 2019. Integrated Science Assessment (ISA) for Particulate Matter (Final Report, 2019). U.S Environmental Protection Agency, Washington, DC, EPA/600/R-19/188, 2019. \213\ U.S Environmental Protection Agency (U.S EPA). 2020. Integrated Science Assessment (ISA) for Ozone and Related Photochemical Oxidants (Final Report). U.S Environmental Protection Agency, Washington, DC, EPA/600/R-20/012, 2020. \214\ Di, Q, Wang, Y, Zanobetti, A, Wang, Y, Koutrakis, P, Choirat, C, Dominici, F and Schwartz, JD (2017). Air pollution and mortality in the Medicare population. New Engl J Med 376(26): 2513-2522. \215\ Turner, MC, Jerrett, M, Pope, A, III, Krewski, D, Gapstur, SM, Diver, WR, Beckerman, BS, Marshall, JD, Su, J, Crouse, DL and Burnett, RT (2016). Long-term ozone exposure and mortality in a large prospective study. Am J Respir Crit Care Med 193(10): 1134-1142. \216\ The Harvard Six Cities Study (Lepeule et al., 2012), which had been identified for use in estimating mortality impacts in previous PM benefits analyses, was not identified as most appropriate for the benefits update due to geographic limitations.--------------------------------------------------------------------------- EPA has not had an opportunity to update its mobile source BPT estimates to reflect these updates in time for this analysis. Instead, we use PM2.5BPT estimates that are based on the review of the 2009 PM ISA \217\ and 2012 PM ISA Provisional Assessment \218\ and include a mortality risk estimate derived from the Krewski et al. (2009) \219\ analysis of the ACS CPS-II cohort and nonfatal illnesses consistent with benefits analyses performed for the analysis of the final Tier 3 Vehicle Rule,\220\ the final 2012 PM NAAQS Revision,\221\ and the final 2017-2025 Light-duty Vehicle GHG Rule.\222\ We expect this lag in updating our BPT estimates to have only a small impact on total PM benefits, since the underlying mortality risk estimate based on the Krewski study is identical to the updated PM2.5mortality risk estimate derived from an expanded analysis of[[Page 74506]]the same ACS CPS-II cohort.\223\ The Agency is currently working to update its mobile source BPT estimates to reflect these recent updates for use in future rulemaking analyses. More information on the BPT approach to valuing PM-related benefits can be found in RIA Chapter 7.2 --------------------------------------------------------------------------- \217\ U.S Environmental Protection Agency (U.S EPA). 2009. Integrated Science Assessment for Particulate Matter (Final Report). EPA-600-R-08-139F. National Center for Environmental Assessment--RTP Division, Research Triangle Park, NC. December. Available at: [*https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=216546*](https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=216546). \218\ U.S Environmental Protection Agency (U.S EPA). 2012. Provisional Assessment of Recent Studies on Health Effect of Particulate Matter Exposure. EPA/600/R-12/056F. National Center for Environmental Assessment--RTP Division, Research Triangle Park, NC. December. Available at: [*https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=247132*](https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=247132). \219\ Krewski D., M. Jerrett, R.T Burnett, R. Ma, E. Hughes, Y. Shi, et al. 2009. Extended Follow-Up and Spatial Analysis of the American Cancer Society Study Linking Particulate Air Pollution and Mortality. HEI Research Report, 140, Health Effects Institute, Boston, MA. \220\ U.S Environmental Protection Agency. (2014). Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards Final Rule: Regulatory Impact Analysis, Assessment and Standards Division, Office of Transportation and Air Quality, EPA-420-R-14-005, March 2014. Available on the internet: [*http://www3.epa.gov/otaq/documents/tier3/420r14005.pdf*](http://www3.epa.gov/otaq/documents/tier3/420r14005.pdf). \221\ U.S Environmental Protection Agency. (2012). Regulatory Impact Analysis for the Final Revisions to the National Ambient Air Quality Standards for Particulate Matter, Health and Environmental Impacts Division, Office of Air Quality Planning and Standards, EPA-452-R-12-005, December 2012. Available on the internet: [*http://www3.epa.gov/ttnecas1/regdata/RIAs/finalria.pdf*](http://www3.epa.gov/ttnecas1/regdata/RIAs/finalria.pdf). \222\ U.S Environmental Protection Agency (U.S EPA). (2012). Regulatory Impact Analysis: Final Rulemaking for 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, Assessment and Standards Division, Office of Transportation and Air Quality, EPA-420-R-12-016, August 2012. Available on the internet at: [*http://www3.epa.gov/otaq/climate/documents/420r12016.pdf*](http://www3.epa.gov/otaq/climate/documents/420r12016.pdf). \223\ Turner, MC, Jerrett, M, Pope, A, III, Krewski, D, Gapstur, SM, Diver, WR, Beckerman, BS, Marshall, JD, Su, J, Crouse, DL and Burnett, RT (2016). Long-term ozone exposure and mortality in a large prospective study. Am J Respir Crit Care Med 193(10): 1134-1142.--------------------------------------------------------------------------- EPA received comments asserting that quantifying and monetizing the health benefits of reduced emissions of particulate matter is not consistent with the available scientific evidence and that EPA did not consider the advice made by some members of CASAC that reviewed the 2019 PM ISA. We disagree that our estimates are not consistent with the available scientific evidence and the advice of the Clean Air Science Advisory Committee. In determining which health outcomes to quantify and monetize, EPA relies on the weight-of-evidence evaluation of relationships between PM2.5exposure and health effects conducted within the ISAs, which are the scientific basis of the NAAQS review process. ISAs represent thorough evaluations and syntheses of the most policy-relevant science. EPA uses a structured and transparent process for evaluating scientific information and determining the causal nature of relationships between air pollution exposures and health effects. The ISA development process is detailed in the Preamble of the Integrated Science Assessments,\224\ which describes approaches for literature searches, criteria for selecting and evaluating relevant studies, and a framework for evaluating the weight of evidence and forming causality determinations. EPA quantifies and monetizes health effects that the ISA determines are ``causal'' or ``likely to be causal.'' The focus on categories identified as having a ``causal'' or ``likely to be causal'' relationship with the pollutant of interest allows for the estimation of pollutant-attributable human health benefits in which the Agency is most confident.--------------------------------------------------------------------------- \224\ See [*https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=310244.---------------------------------------------------------------------------*](https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=310244.---------------------------------------------------------------------------) As part of the process of developing an ISA, the Clean Air Scientific Advisory Committee (CASAC) is statutorily required to review the science underlying decisions about the NAAQS. CASAC provides independent review of draft ISA documents for scientific quality and sound implementation of the causal framework that informs the ISA before it is finalized. The 2020 PM NAAQS review was completed without the benefit of a PM-specific panel supporting the CASAC, as had been done in prior reviews. However, CASAC did have access to a pool of consultants who were available to respond in writing to questions from CASAC members. With limited access to relevant expertise, CASAC did not reach consensus on the determination that there is a causal relationship for PM2.5exposure (i.e , both short- and long-term) and mortality presented within the draft PM ISA. After the disbandment of the 20-member CASAC PM panel, CASAC noted that ``Additional expertise is needed for [CASAC] to provide a thorough review of the [PM NAAQS] documents'' and recommended the Administrator reappoint ``the previous CASAC PM panel or panel with similar expertise.'' \225\ In his final decision to retain the PM standards, after considering CASAC's advice, the EPA Administrator, ``placing the greatest weight on evidence of effects for which the ISA determined there is a causal or likely causal relationship with long- and short-term PM2.5exposures,'' \226\ concluded that the current PM NAAQS are necessary to protect public health. Thus, the Administrator fully considered CASAC's recommendations with respect to assessing the health risks of PM in the review of the PM NAAQS and EPA is being consistent with the conclusions of the PM NAAQS review in this action.--------------------------------------------------------------------------- \225\ In the time since the previously chartered CASAC, EPA has recognized the significant accumulation of new scientific studies since the cutoff date of the 2019 PM ISA (January 2018) and published a draft supplement to the 2019 PM ISA. The Supplement found that recent studies further support, and in some instances extend, the evidence that formed the basis of the causality determinations presented within the 2019 PM ISA that characterizes relationships between PM exposure and health, including mortality. \226\ 85 FR 82715. The effects for which the 2019 ISA determined there is a causal or likely causal relationship with long- and short-term PM2.5exposures include respiratory effects, cardiovascular effects, and mortality.--------------------------------------------------------------------------- Commenters also asserted that health benefits from reductions in human exposure to ambient concentrations of PM2.5only occur above the level of the primary health-based NAAQS, and that accounting for the health benefits of PM2.5at all represents double counting given other regulatory measures promulgated under the Clean Air Act to reduce ambient concentrations of PM2.5. The EPA disagrees with this assertion. First, it is important to recognize that the NAAQS ``shall be ambient air quality standards . . . which in the judgment of the Administrator'' are ``requisite'' to protect public health with an ``adequate margin of safety'' (CAA Section 109). ``Requisite'' means sufficient but not more than necessary while an ``adequate margin of safety'' is intended to address uncertainties associated with inconclusive evidence and to provide a reasonable degree of protection against hazards that research has not yet identified. The CAA does not require eliminating all risk, and therefore, the NAAQS does not represent a zero-risk standard. Additionally, EPA is reconsidering the 2020 decision to retain the PM standards because available scientific evidence and technical information suggests that the current standards may not be adequate to protect public health and welfare, as required by the Clean Air Act. As detailed in the 2019 PM ISA and previous assessments in support of the PM NAAQS, EPA's review of the science has consistently found no evidence of a threshold below which exposure to PM2.5yields no health response. Specifically, the 2019 p.m ISA found that ``extensive analyses across health effects continues to support a linear, no-threshold concentration-response (C-R) relationship.'' This conclusion in the 2019 PM ISA is supported by the more recent evaluation of the health effects evidence detailed in the recently released Draft Supplement to the PM ISA which found ``continued evidence of a linear, no-threshold concentration-response (C-R) relationship.'' Regarding double-counting, the emissions attributed to this final rulemaking are incremental to all other currently promulgated air pollution regulations and can therefore be monetized without double-counting previously achieved benefits from mobile source emissions reductions. The PM-related BPT estimates used in this analysis are provided in Table 41. We multiply these BPT values by projected national changes in NOX, SO2and directly-emitted PM2.5, in tons, to estimate the total PM2.5-related monetized human health benefits associated with the final program. As the table indicates, these values differ among pollutants and depend on their original source, because emissions from different sources can result in different degrees of population exposure and resulting health impacts. The BPT values for emissions of non-GHG pollutants from both onroad light-duty vehicle use and upstream sources such as fuel refineries will increase over time. These projected increases reflect rising income levels, which increase affected individuals' willingness to pay for[[Page 74507]]reduced exposure to health threats from air pollution. The BPT values also reflect future population growth and increased life expectancy, which expands the size of the population exposed to air pollution in both urban and rural areas, especially among older age groups with the highest mortality risk.\227\--------------------------------------------------------------------------- \227\ For more information about income growth adjustment factors and EPA's population projections, please refer to the following: [*https://www.epa.gov/sites/production/files/2015-04/documents/benmap-ce\_user\_manual\_march\_2015.pdf*](https://www.epa.gov/sites/production/files/2015-04/documents/benmap-ce_user_manual_march_2015.pdf). Table 41--PM2.5-Related Benefit-Per-Ton Values [2018$] \a\-------------------------------------------------------------------------------------------------------------------------------------------------------- Onroad light duty vehicles \b\ Upstream sources--refineries \c\ Upstream sources--EGUs \c\ -------------------------------------------------------------------------------------------------------------------------- Year Direct PM2.5 Direct Direct SO2 NOX PM2.5 SO2 NOX PM2.5 SO2 NOX-------------------------------------------------------------------------------------------------------------------------------------------------------- Estimated Using a 3 Percent Discount Rate--------------------------------------------------------------------------------------------------------------------------------------------------------2020......................... $600,000 $150,000 $6,400 $380,000 $81,000 $8,100 $160,000 $44,000 $6,6002025......................... 660,000 170,000 6,900 420,000 90,000 8,800 180,000 49,000 7,1002030......................... 740,000 190,000 7,600 450,000 98,000 9,600 190,000 52,000 7,6002035......................... 830,000 210,000 8,400 ........... ........... ........... ........... ........... ...........2040......................... 920,000 230,000 9,000 ........... ........... ........... ........... ........... ...........2045......................... 1,000,000 250,000 9,600 ........... ........... ........... ........... ........... ...........-------------------------------------------------------------------------------------------------------------------------------------------------------- Estimated Using a 7 Percent Discount Rate--------------------------------------------------------------------------------------------------------------------------------------------------------2020......................... 540,000 140,000 5,800 350,000 74,000 7,300 150,000 40,000 5,9002025......................... 600,000 150,000 6,200 380,000 80,000 7,900 160,000 43,000 6,4002030......................... 660,000 170,000 6,800 410,000 88,000 8,600 170,000 48,000 6,9002035......................... 750,000 190,000 7,500 ........... ........... ........... ........... ........... ...........2040......................... 830,000 210,000 8,200 ........... ........... ........... ........... ........... ...........2045......................... 900,000 230,000 8,600 ........... ........... ........... ........... ........... ...........--------------------------------------------------------------------------------------------------------------------------------------------------------Notes:\a\ The benefit-per-ton estimates presented in this table are based on estimates derived from the American Cancer Society cohort study (Krewski et al., 2009). They also assume either a 3 percent or 7 percent discount rate in the valuation of premature mortality to account for a twenty-year segmented premature mortality cessation lag.\b\ Benefit-per-ton values for onroad light duty vehicles were estimated for the years 2020, 2025, 2030, 2035, 2040, and 2045. We hold values constant for intervening years (e.g , the 2020 values are assumed to apply to years 2021-2024; 2025 values for years 2026-2029; and 2045 values for years 2046 and beyond).\c\ Benefit-per-ton values for upstream sources were estimated only for the years 2020, 2025 and 2030. We hold values constant for intervening years and 2030 values are applied to years 2031 and beyond. The monetized PM2.5health impacts of the final standards are presented in Table 46. Using PM2.5-related BPT values to monetize the non-GHG impacts of the final standards omits ozone-related impacts, unquantified PM-related health impacts, as well as other impacts associated with reductions in exposure to air toxics, ecosystem benefits, and visibility improvement. Section V of this preamble provides a qualitative description of both the health and environmental effects of the non-GHG pollutants impacted by the final program.F. Energy Security Impacts This final rule will require reductions in the GHG emissions from light-duty vehicles and, thereby, reduce fuel consumption. In turn, this final rule will help to reduce U.S petroleum imports. A reduction of U.S petroleum imports reduces both financial and strategic risks caused by potential sudden disruptions in the supply of imported petroleum to the U.S , thus increasing U.S energy security. In other words, reduced U.S oil imports act as a ``shock absorber'' when there is a supply disruption in world oil markets. Given that the U.S is projected to be a net exporter of crude oil and product over the time frame of the analysis of this final rule (2023-2050), one could surmise that the U.S no longer has a significant energy security problem. However, U.S refineries still rely on significant imports of heavy crude oil from potentially unstable regions of the world. Also, oil exporters with a large share of global production have the ability to raise or lower the price of oil by exerting market power through the Organization of Petroleum Exporting Countries (OPEC) to alter oil supply relative to demand. These factors contribute to the vulnerability of the U.S economy to episodic oil supply shocks and price spikes, even when the U.S is projected to be an overall net exporter of crude oil and product. In order to understand the energy security implications of reducing U.S oil imports, EPA has worked with Oak Ridge National Laboratory (ORNL), which has developed approaches for evaluating the social costs and energy security implications of oil use. When conducting this analysis, ORNL considers the full cost of importing petroleum into the U.S The full economic cost (i.e , oil security premiums, as labeled below) is defined to include two components in addition to the purchase price of petroleum itself. These are: (1) The higher costs/benefits for oil imports resulting from the effect of changes in U.S demand on the world oil price (i.e , the ``demand'' or ``monopsony'' costs/benefits); and (2) the risk of reductions in U.S economic output and disruption to the U.S economy caused by sudden disruptions in the supply of imported oil to the U.S (i.e , the avoided macroeconomic disruption/adjustment costs). One commenter (American Enterprise Institute) suggests that there are no energy security benefits associated with this rule, since there is only one price in the international petroleum market, confronted equally by economies importing all or none of their oil. We disagree and believe that there are energy security benefits to the U.S from decreased exposure to volatile world oil prices. We respond to this comment in more detail in the RTC. For this final rule, EPA is using oil security premiums estimated using ORNL's methodology, which incorporates oil price projections and energy market and economic trends from the EIA's Annual Energy Outlook (AEO). Specifically, we are using oil security premiums based on AEO 2021, updating the oil security premiums from the AEO 2018 used in the proposed rule. In addition, for this final rule, EPA and ORNL have worked together to revise the oil security premiums based[[Page 74508]]upon recent energy security literature (see Chapter 3.2.5 of the RIA accompanying this rule for how the macroeconomic oil security premiums have been updated based upon a review of recent energy security literature on this topic). These revisions have lowered the estimated oil security premiums since the proposal of this rule. However, this modest decrease in oil security premiums is offset by an increase in fuel savings since the proposal, resulting in an overall increase in energy security benefits for this final rule compared to the proposal. In our analysis, we only consider the avoided macroeconomic disruption/adjustment costs in the oil security premiums (i.e , labeled macroeconomic oil security premiums below), since the monopsony impacts are considered transfer payments. Two commenters (Center for Biological Diversity et al., CARB) suggest that EPA is underestimating the energy security benefits of the final rule by not accounting for the monopsony oil security impacts. EPA continues to believe that the monopsony impacts of this rule are transfer payments. Therefore, EPA disagrees that the energy security benefits of this final rule are underestimated for this reason. See more discussion of the monopsony oil security premiums in the RIA and RTC. Three commenters (Center for Biological Diversity et al., CARB, SAFE) suggest that EPA understates the energy security benefits of the final rule by not considering military cost impacts. One commenter (American Enterprise Institute) suggests that reductions in military costs from the rule would be imperceptible. While EPA believes that military costs are important considerations, we continue to believe that there are methodological limitations in our ability to quantify these impacts (e.g , how a reduction of U.S oil imports would incrementally reduce oil supply protection forces). As a result, we do not quantify military cost impacts for this final rule. (See Chapter 3.2.3 of the RIA for a review of the literature on the military costs impacts of U.S oil import reductions). In addition, some commenters (Attorney General of Missouri, et al., SAFE, Alliance for Automotive Innovation, an energy company, private citizens) express concern that these standards would reduce U.S security by increasing the U.S 's reliance on foreign countries (i.e , China) for electric vehicle components such as electric batteries. We respond to both sets of comments, military cost impacts and U.S security implications of this final rule, in more detail in the RTC. To calculate the energy security benefits of this final rule, EPA is using the ORNL oil security premium methodology with: (1) Estimated oil savings calculated by EPA and (2) an oil import reduction factor of 91 percent, which represents how much U.S oil imports are reduced resulting from changes in U.S oil consumption. One commenter (Center for Biological Diversity et al.) requests more explanation of how EPA estimates the oil import reduction factor. The Alliance for Automotive Innovation believes that U.S refiners and oil producers may see a greater reduction in fuel demand than EPA is estimating as a result of this final rule. We continue to believe that EPA's use of the most recent AEO 2021 provides a reasonable estimate of the oil import reduction factor being used in this rule and also the impacts of this rule on U.S oil producers and refineries. We respond to both of these comments in more detail in the RTC. Each of the assumptions used to calculate the energy security benefits of this final rule, oil savings and the oil import reduction factor, are discussed in more detail in Chapter 3.2 of the RIA. EPA presents the macroeconomic oil security premiums used for the final standards for selected years from 2023-2050 in Table 42. Table 42--Macroeconomic Oil Security Premiums for Selected Years From 2023-2050 [2018$/Barrel] \*------------------------------------------------------------------------ Macroeconomic oil security Year (range) premiums (range)------------------------------------------------------------------------2023...................................... $3.15 ($0.92-$5.71).2026...................................... $3.23 ($0.74-$6.00).2030...................................... $3.41 ($0.62-$6.41).2035...................................... $3.76 ($0.70-$7.05).2040...................................... $4.21 ($1.04-$7.77).2050...................................... $4.94 ($1.46-$8.91).------------------------------------------------------------------------\* Top values in each cell are the midpoints, the values in parentheses are the 90 percent confidence intervals.G. Impacts of Additional Driving As discussed in Chapter 3.1 of the RIA, the assumed rebound effect might occur when an increase in vehicle fuel efficiency encourages people to drive more as a result of the lower cost per mile of driving. Along with the safety considerations associated with increased vehicle miles traveled (described in Section VII.H of this preamble), additional driving can lead to other costs and benefits that can be monetized. For a discussion of these impacts--Drive Value, Congestion, Noise--all of which are calculated in the same way as done in the proposed rule, see RIA Chapter 3.4 EPA did not receive any comments on these elements of our proposal.H. Safety Considerations in Establishing GHG Standards Consistent with previous light-duty GHG analyses, EPA has assessed the potential of the final MY 2023-2026 standards to affect vehicle safety. EPA applied the same historical relationships between mass, size, and fatality risk that were established and documented in the SAFE rulemaking. These relationships are based on the statistical analysis of historical crash ***data***, which included an analysis performed by using the most recently available crash studies based on ***data*** for model years 2007 to 2011. EPA used the findings of this analysis to estimate safety impacts of the modeled mass reductions over the lifetimes of new vehicles in response to MY 2023-2026 standards. As in the initial promulgation of the GHG standards and the MTE Proposed Determination, EPA's assessment in this rulemaking is that manufacturers can achieve the MY 2023-2026 standards while using modest levels of mass reduction as one technology option among many. On the whole, EPA considers safety impacts in the context of all projected health impacts from the rule including public health benefits from the projected reductions in air pollution. Based on the findings of our safety analysis, we concluded there are no changes to the vehicles themselves, nor the combined effects of fleet composition and vehicle design, that will have a statistically significant impact on safety. All fatalities that are statistically significant are due to changes in use (VMT) rather than changes to the vehicles themselves. The projected change in risk of fatal and non-fatal injuries is influenced by changes in fleet mix (car/truck share), vehicle scrappage rates, distribution of VMT among vehicles in the fleet and vehicle mass. Because the empirical analysis described previously did not produce any mass-safety coefficients with a statistically significant difference from zero, we analyzed safety results over the range of coefficient values. We project that the effect of the final standards on annual fatalities per billion miles driven ranges from a decrease of 0.25 percent to an increase of 0.36 percent, with a central estimate of a 0.06 percent increase.\228\--------------------------------------------------------------------------- \228\ These fatality risk values are the average of changes in annual risk through 2050. The range of values is based on the 5% to 95% confidence interval of mass-safety coefficients presented in the SAFE FRM.---------------------------------------------------------------------------[[Page 74509]] In addition to changes in risk, EPA also considered the projected impact of the standards on the absolute number of fatal and non-fatal injuries. The majority of the fatalities projected would result from the projected increased driving--i.e , people choosing to drive more due to the lower operating costs of more efficient vehicles. Our cost-benefit analysis accounts for both the value of this additional driving and its associated risk, which we assume are considerations in the decision to drive. The risk valuation associated with this increase in driving partially offsets the associated increase in societal costs due to increased fatalities and non-fatal injuries. This analysis projects that there will be an increase in VMT under the standards of 304 billion miles compared to the No Action scenario through 2050 (an increase of about 0.3 percent). EPA estimates that vehicle safety, in terms of risk measured as the total fatalities per the total distance traveled over this period, will remain almost unchanged at 5.012 fatalities per billion miles under the final rule, compared to 5.010 fatalities per billion miles for the no-action scenario. EPA has also estimated, over the same 30 year period, that total fatalities will increase by 1,780, with 1,348 deaths attributed to increased driving and 432 deaths attributed to the increase in fatality risk. In other words, approximately 75 percent of the change in fatalities under these standards is due to projected increases in VMT and mobility (i.e , people driving more). Our analysis also considered the increase in non-fatal injuries. Consistent with the SAFE FRM, EPA assumed that non-fatal injuries scale with fatal injuries. EPA also estimated the societal costs of these safety impacts using assumptions consistent with the SAFE FRM (see Table 43.) Specifically, we are continuing to use the cost associated with each fatality of $10.4 million (2018 dollars). We have also continued to use a scalar of approximately 1.6 applied to fatality costs to estimate non-fatal injury costs. In addition, we have accounted for the driver's inherent valuation of risk when making the decision to drive more due to rebound. This risk valuation partially offsets the fatal and non-fatal injury costs described previously, and, consistent with the SAFE FRM, is calculated as 90 percent of the fatal and non-fatal injury costs due to rebound to reflect the fact that consumers do not fully evaluate the risks associated with this additional driving.I. Summary of Costs and Benefits This section presents a summary of costs, benefits, and net benefits of the program. Table 43 shows the estimated annual monetized costs of the program for the indicated calendar years. The table also shows the present-values (PV) of those costs and the annualized costs for the calendar years 2021-2050 using both 3 percent and 7 percent discount rates.\229\ The table includes an estimate of foregone consumer sales surplus, which measures the loss in benefits attributed to consumers who would have purchased a new vehicle in the absence of the final standards.--------------------------------------------------------------------------- \229\ For the estimation of the stream of costs and benefits, we assume that after implementation of the MY 2023-2026 standards, the 2026 standards apply to each year thereafter. Table 43--Costs Associated With the Final Program [Billions of 2018 dollars]-------------------------------------------------------------------------------------------------------------------------------------------------------- Foregone Calendar year consumer sales Technology Congestion Noise Fatality costs Non-fatal Total costs surplus \a\ costs crash costs--------------------------------------------------------------------------------------------------------------------------------------------------------2023.................................... $0.029 $5.6 $0.03 $0.00045 $0.13 $0.23 $6.12026.................................... 0.11 16 0.12 0.002 0.42 0.7 172030.................................... 0.093 17 0.4 0.0067 0.44 0.73 192035.................................... 0.078 17 0.68 0.011 0.27 0.44 192040.................................... 0.063 16 0.84 0.014 0.15 0.25 172050.................................... 0.052 15 0.9 0.015 0.16 0.25 16PV, 3%.................................. 1.3 280 9.6 0.16 4.9 8.1 300PV, 7%.................................. 0.84 160 4.8 0.08 3.2 5.3 180Annualized, 3%.......................... 0.069 14 0.49 0.0082 0.25 0.42 15Annualized, 7%.......................... 0.068 13 0.39 0.0065 0.26 0.43 14--------------------------------------------------------------------------------------------------------------------------------------------------------\a\ ``Foregone Consumer Sales Surplus'' refers to the difference between a vehicle's price and the buyer's willingness to pay for the new vehicle; the impact reflects the reduction in new vehicle sales described in Section VII.B of this preamble. See Section 8 of CAFE\_Model\_Documentation\_FR\_2020.pdf in the docket for more information. Table 44 shows the undiscounted annual monetized fuel savings of the program. The table also shows the present- and annualized-values of those fuel savings for the same calendar years using both 3 percent and 7 percent discount rates. The net benefits calculations use the aggregate value of fuel savings (calculated using pre-tax fuel prices) since savings in fuel taxes do not represent a reduction in the value of economic resources utilized in producing and consuming fuel. Note that the fuel savings shown in Table 44 result from reductions in fleet-wide fuel use (including rebound effects, credit usage and advanced technology multiplier use). Thus, fuel savings grow over time as an increasing fraction of the fleet is projected to meet the standards. Table 44--Fuel Savings Associated With the Final Program [Billions of 2018 dollars]---------------------------------------------------------------------------------------------------------------- Retail fuel Fuel tax Pre-tax fuel Calendar year savings savings savings----------------------------------------------------------------------------------------------------------------2023............................................................ $0.94 $0.31 $0.622026............................................................ 5.1 1.7 3.32030............................................................ 16 4.5 12[[Page 74510]] 2035............................................................ 28 7.1 212040............................................................ 37 8.5 292050............................................................ 42 8.6 33PV, 3%.......................................................... 420 100 320PV, 7%.......................................................... 210 51 150Annualized, 3%.................................................. 21 5.1 16Annualized, 7%.................................................. 17 4.1 12----------------------------------------------------------------------------------------------------------------Note: Electricity expenditure increases are included. Table 45 presents estimated annual monetized benefits from non-emission sources for the indicated calendar years. The table also shows the present- and annualized-value of those benefits for the calendar years 2021-2050 using both 3 percent and 7 percent discount rates. Table 45--Benefits From Non-Emission Sources [Billions of 2018 dollars]---------------------------------------------------------------------------------------------------------------- Energy Total non- Calendar year Drive value Refueling time security emission savings benefits benefits----------------------------------------------------------------------------------------------------------------2023............................................ $0.035 -$0.0052 $0.031 $0.0612026............................................ 0.14 -0.12 0.18 0.22030............................................ 0.55 -0.27 0.51 0.792035............................................ 1 -0.47 0.92 1.52040............................................ 1.3 -0.67 1.3 1.92050............................................ 1.5 -0.83 1.6 2.3PV, 3%.......................................... 15 -7.4 14 21PV, 7%.......................................... 7.2 -3.6 7 11Annualized, 3%.................................. 0.75 -0.38 0.73 1.1Annualized, 7%.................................. 0.58 -0.29 0.56 0.85----------------------------------------------------------------------------------------------------------------\* See Section VII.G, Section VII.C and Section VII.F of this preamble for more on drive value, refueling time and energy security, respectively. Table 46 presents estimated annual monetized benefits from non-GHG emission sources for the indicated calendar years. The table also shows the present- and annualized-values of those benefits for the calendar years 2021-2050 using both 3 percent and 7 percent discount rates. Table 46--PM2.5-Related Emission Reduction Benefits [Billions of 2018 dollars] \a\ \b\-------------------------------------------------------------------------------------------------------------------------------------------------------- Tailpipe benefits Upstream benefits Total PM2.5-related benefits ---------------------------------------------------------------- Calendar year ------------------------------- 3% DR 7% DR 3% DR 7% DR 3% DR 7% DR--------------------------------------------------------------------------------------------------------------------------------------------------------2023.................................................... -$0.0034 -$0.0031 $0.02 $0.018 $0.016 $0.0152026.................................................... 0.018 0.016 0.097 0.088 0.11 0.12030.................................................... 0.15 0.13 0.45 0.41 0.6 0.542035.................................................... 0.44 0.4 0.79 0.72 1.2 1.12040.................................................... 0.68 0.62 1 0.95 1.7 1.62050.................................................... 0.89 0.8 1.4 1.3 2.3 2.1PV...................................................... 6.7 2.8 12 5.3 19 8.1Annualized.............................................. 0.34 0.22 0.61 0.43 0.96 0.65--------------------------------------------------------------------------------------------------------------------------------------------------------Notes:\a\ Note that the non-GHG impacts associated with the standards presented here do not include the full complement of health and environmental effects that, if quantified and monetized, would increase the total monetized benefits. Instead, the non-GHG benefits are based on benefit-per-ton values that reflect only human health impacts associated with reductions in PM2.5 exposure.\b\ Calendar year non-GHG benefits presented in this table assume either a 3 percent or 7 percent discount rate in the valuation of PM-related premature mortality to account for a twenty-year segmented cessation lag. Note that annual benefits estimated using a 3 percent discount rate were used to calculate the present and annualized values using a 3 percent discount rate and the annual benefits estimated using a 7 percent discount rate were used to calculate the present and annualized values using a 7 percent discount rate. Table 47 shows the benefits of reduced GHG emissions, and consequently the annual quantified benefits (i.e , total GHG benefits), for each of the four interim social cost of GHG (SC-GHG) values estimated by the interagency working group. As discussed in the RIA Chapter 3.3, there are some limitations to the SC-GHG analysis, including the incomplete way in which the integrated assessment models capture catastrophic and non-[[Page 74511]]catastrophic impacts, their incomplete treatment of adaptation and technological change, uncertainty in the extrapolation of damages to high temperatures, and assumptions regarding risk aversion. Table 47--Climate Benefits From Reductions in GHG Emissions [Billions of 2018 dollars]---------------------------------------------------------------------------------------------------------------- Discount rate and statistic --------------------------------------------------------------- Calendar year 3% 95th 5% average 3% average 2.5% average percentile----------------------------------------------------------------------------------------------------------------2023............................................ $0.081 $0.27 $0.4 $0.82026............................................ 0.48 1.6 2.3 4.72030............................................ 1.5 4.6 6.7 142035............................................ 2.8 8.4 12 252040............................................ 3.9 11 16 342050............................................ 5.5 14 20 44PV.............................................. 31 130 200 390Annualized...................................... 2 6.6 9.5 20----------------------------------------------------------------------------------------------------------------Notes: The present value of reduced GHG emissions is calculated differently than other benefits. The same discount rate used to discount the value of damages from future emissions (SC-GHGs at 5, 3, 2.5 percent) is used to calculate the present value of SC-GHGs for internal consistency. Annual benefits shown are undiscounted values. Table 48 presents estimated annual net benefits for the indicated calendar years. The table also shows the present and annualized value of those net benefits for the calendar years 2021-2050 using both 3 percent and 7 percent discount rates. The table includes the benefits of reduced GHG emissions (and consequently the annual net benefits) for each of the four SC-GHG values considered by EPA. We estimate that the total benefits of the program far exceed the costs and would result in a net present value of benefits that ranges between $27-$450 billion, depending on which SC-GHG and discount rate is assumed. Table 48--Net Benefits (Emission Benefits + Non-Emission Benefits + Fuel Savings-Costs) Associated With the Final Program [Billions of 2018 dollars] \a\ \b\---------------------------------------------------------------------------------------------------------------- Net benefits, Net benefits, Net benefits, Net benefits, with climate with climate with climate with climate benefits based Calendar year benefits based benefits based benefits based on 3% discount on 5% discount on 3% discount on 2.5% rate, 95th rate rate discount rate percentile SC- GHG----------------------------------------------------------------------------------------------------------------2023............................................ -$5.3 -$5.1 -$5 -$4.62026............................................ -13 -12 -11 -9.12030............................................ -4.6 -1.4 0.63 7.92035............................................ 7.8 13 17 302040............................................ 19 26 31 492050............................................ 27 36 41 66PV, 3%.......................................... 88 190 260 450PV, 7%.......................................... 27 120 190 390Annualized, 3%.................................. 4.9 9.5 12 23Annualized, 7%.................................. 1.7 6.2 9.2 20----------------------------------------------------------------------------------------------------------------Notes:\a\ The present value of reduced GHG emissions is calculated differently than other benefits. The same discount rate used to discount the value of damages from future emissions (SC-GHG at 5, 3, 2.5 percent) is used to calculate present value of SC-GHGs for internal consistency, while all other costs and benefits are discounted at either 3% or 7%. Annual costs and benefits shown are undiscounted values.\b\ Note that the non-GHG impacts associated with the standards presented here do not include the full complement of health and environmental effects that, if quantified and monetized, would increase the total monetized benefits. Instead, the non-GHG benefits are based on benefit-per-ton values that reflect only human health impacts associated with reductions in PM2.5 exposure.J. Impacts on Consumers of Vehicle Costs and Fuel Savings Although the primary purpose of this regulatory action is to reduce GHG emissions, the impact of EPA's standards on consumers is an important consideration for EPA. This section discusses the impact of the standards on consumer net costs for purchasing and fueling vehicles. For further discussion of impacts on vehicle sales, see Section VII.B of this preamble and for impacts on affordability, see Section VII.M of this preamble. EPA estimates that the average cost of a new MY 2026 vehicle will increase by $1,000 due to the final standards, while we estimate that the average per-mile fuel cost in the first year will decrease by 0.73 cents.\230\ Over time, reductions[[Page 74512]]in fuel consumption will offset the increase in upfront costs. For instance, EPA estimates that, over the lifetime of a MY 2026 vehicle,\231\ the reduction in fuel costs will exceed the increase in vehicle costs by $1,083, using a 3 percent discount rate.\232\--------------------------------------------------------------------------- \230\ See U.S Environmental Protection Agency, ``Fuel Savings Offset to Vehicle Costs\_20211031.xlsx,'' in the docket for this and the other calculations in this section. Fuel prices are based on AEO2021 and change over time; for the Reference Case, the average retail fuel price for years 2026-2036 ranged from $2.53 to $2.98/gallon (2020$) for gasoline and $0.118 to $0.119/kWh of electricity (2020$). U.S Energy Information Administration (EIA), U.S Department of Energy (DOE), Annual Energy Outlook, 2021. For the analysis involving 5-year ownership periods, we use the fuel costs associated with the initial year of purchase for each owner, i.e , 2026, 2031, 2036. The analysis includes the program flexibilities of credit banking, fleet averaging, advanced technology multipliers, and air conditioning and off-cycle credits. \231\ The CCEMS models vehicles over a 30 year lifetime; however, it includes scrappage rates such that fewer and fewer vehicles of any vintage remain on the road year after year, and those vehicles that remain are driven fewer and fewer miles year after year. \232\ EPA Guidelines for Preparing Economic Analysis, Chapter 6.4, suggests that a 3 percent discount rate is appropriate for calculations involving consumption, instead of the opportunity cost of capital. Here, the discount rate is applied, beginning in 2026 when the vehicle is purchased new, to the stream of fuel costs over the vehicle lifetime. U.S Environmental Protection Agency (2010). ``Guidelines for Preparing Economic Analysis,'' Chapter 6. [*https://www.epa.gov/sites/production/files/2017-09/documents/ee-0568-06.pdf*](https://www.epa.gov/sites/production/files/2017-09/documents/ee-0568-06.pdf), accessed 6/14/2021.--------------------------------------------------------------------------- Another way to look at the effects on vehicle buyers is to examine how the costs are distributed among new and used vehicle owners. Because depreciation occurs over the lifetime of the vehicle, the net purchase cost to an owner will depend on the vehicle age when it was bought, and, if sold, the length of time that the vehicle was owned. A study from Argonne National Laboratory provides estimates for the depreciation of light-duty vehicles by age, as summarized in Table 49.\233\ If the additional cost of fuel-saving technology depreciates at the same rates, then a person who buys a new vehicle and sells it after 5 years would incur 60 percent of the upfront costs (100 percent of the original value, less 40 percent paid back). Analogously, the person who buys the vehicle at age 5 would incur 20 percent of those costs (40 percent, less 20 percent paid back), and the purchaser of the 10-year-old vehicle would face a net 10 percent of the cost of the technology after it is sold five years later at vehicle age 15. A person purchasing a new vehicle, driving the average fleetwide VMT for the given age and facing the fuel prices used in this analysis, would face an estimated net cost of $60, shown in Table 50, which reflects fuel savings that offset 91 percent of the depreciation cost. The buyer of that 5-year-old used vehicle would see an estimated reduction in net cost--that is, a net saving--of $357, while the buyer of that same 10-year-old used vehicle would see an estimated reduction of net cost of $430. In general, the purchasers of older vehicles will see a greater portion of their depreciation costs offset by fuel savings.--------------------------------------------------------------------------- \233\ Argonne National Laboratory (2021). ``Comprehensive Total Cost of Ownership Quantification for Vehicles with Different Size Classes and Powertrains.'' ANL/ESD-21/4, Figure ES-2. [*https://publications.anl.gov/anlpubs/2021/05/167399.pdf*](https://publications.anl.gov/anlpubs/2021/05/167399.pdf), accessed 6/8/2021. Table 49--Depreciation Estimates for Light Duty Vehicles-------------------------------------------------------------------------------------------------------------------------------------------------------- Vehicle age 1 2 3 4 5 10 15--------------------------------------------------------------------------------------------------------------------------------------------------------Fraction of original value retained................... 0.70 0.61 0.53 0.475 0.40 0.20 0.10--------------------------------------------------------------------------------------------------------------------------------------------------------Estimated by Argonne National Laboratory using Edmunds ***data*** for MYs 2013-2019 vehicles (see figure ES-2).\233\Table 50--Impact of Standards on Depreciation and Fuel Costs for MY 2026 Vehicle Over 5 Years of Ownership------------------------------------------------------------------------ Portion of Vehicle depreciation depreciation costs offset plus fuel by fuel costs savings (%)------------------------------------------------------------------------Vehicle Purchased New................... $60 91Vehicle Purchased at Age 5.............. ($357) 257Vehicle Purchased at Age 10............. ($430) 478------------------------------------------------------------------------Calculated using analysis VMT assumptions for standards, using a 3% discount rate from year of purchase. Because the use of vehicles varies widely across vehicle owners, another way to estimate the effects of the standards is to examine the ``break even'' number of miles--that is, the number of miles driven that would result in fuel savings matching the increase in up-front costs. For example, if operating costs of a MY 2026 vehicle decrease by 0.73 cents per mile due to reduced fuel consumption, the upfront costs (when purchased new) would be recovered after 137,000 miles of driving, excluding discounting.\234\ As this measure makes clear, the financial effect on a new vehicle owner depends on the amount that the vehicle is driven. Mobility service providers, such as taxis or ride-sharing services, are likely to accumulate miles more quickly than most people who use their vehicles for personal use. As discussed in Section VII.M of this preamble, the lower per-mile cost for these vehicles may reduce the importance of up-front costs in the charge for mobility as a service, and thus further enable use of that service.--------------------------------------------------------------------------- \234\ This estimate is calculated as the increase in cost, $1,000, divided by the reduced per-mile cost, $0.0073, to get miles until cost is recovered.--------------------------------------------------------------------------- Table 51 shows, for purchasers of different-age MY 2026 vehicles, how the degree to which fuel savings offset depreciation costs will depend on vehicle use levels.\235\ Cost recovery is again higher for older vehicles, and faster for vehicles that accumulate VMT more quickly. For example, a consumer who purchases a 5-year old used MY 2026 vehicle would recover their vehicle costs through fuel savings after only 23,000 miles of driving.--------------------------------------------------------------------------- \235\ The up-front costs for each purchaser are based on the cost to the owner based on the depreciated price for the vehicle's age, with recovery of some further depreciated cost after 5 years of ownership. Cost recovery per mile is $0.0073, and is multiplied by the number of miles in the second column. The remaining columns are cost recovery divided by the relevant cost. Discounting is not used to abstract from the VMT occurring during a specified timeframe.[[Page 74513]]Table 51--Proportion of Depreciation Costs Offset by Fuel Savings, for New and Used Vehicle Purchasers, for a MY 2026 Vehicle---------------------------------------------------------------------------------------------------------------- When vehicle When vehicle When vehicle purchased at 5 purchased at purchased new years old 10 years old----------------------------------------------------------------------------------------------------------------Portion of vehicle depreciation At 10,000 miles............ 12% 43% 93% cost offset by fuel savings (own vehicle for 5 years). At 50,000 miles............ 61% 214% 467% At 100,000 miles........... 122% 428% 933%Miles where fuel savings fully Owned vehicle for 5 years.. 82,000 23,000 11,000 offset the vehicle owner's depreciation cost. Owned vehicle for full 137,000 47,000 21,000 remaining lifetime.---------------------------------------------------------------------------------------------------------------- Thus, the financial effects on a vehicle buyer depend on how much that person drives, as well as whether the vehicle is bought new or used. Importantly, all people receive the benefits of reduced GHG emissions, the primary focus of this rule.K. Employment Impacts Several commenters, including the Alliance, Blue-Green Alliance, International Union, United Automobile, Aerospace & ***Agricultural*** Implement Workers of America (UAW), SAFE (Securing America's Future Energy), and a coalition of 25 Great Lakes and Midwest environmental organizations, indicated that domestic employment effects, especially in the auto industry, are an important impact of the standards. The Blue-Green Alliance, Ceres, Environmental Entrepreneurs, EDF, Environmental Law and Policy Center, EOS at Federated Hermes, New Mexico Environment Department, New York State Department of Environmental Conservation, and the coalition of organizations argue that strong standards contribute to job-supporting domestic manufacturing. CBD et al. considers EPA's employment estimates to be too low, by not considering impacts in the broader economy. National Coalition for Advanced Transportation, SAFE and Alliance discuss the role of domestic supply chains for electric vehicles in promoting domestic employment. The UAW notes their involvement in building these ``vehicles of the future.'' Volkswagen describes its partnership with Chattanooga State Community College to train workers in next-generation auto manufacturing skills. EPA acknowledges these comments and recognizes employment impacts as an important impact to be assessed, and thus we present an assessment of impacts of these standards on employment. If the U.S economy is at full employment, even a large-scale environmental regulation is unlikely to have a noticeable impact on aggregate net employment.\236\ Instead, labor would primarily be reallocated from one productive use to another, and net national employment effects from environmental regulation would be small and transitory (e.g , as workers move from one job to another).\237\ Affected sectors may nevertheless experience transitory effects as workers change jobs. Some workers may retrain or relocate in anticipation of new requirements or require time to search for new jobs, while shortages in some sectors or regions could bid up wages to attract workers. These adjustment costs can lead to local labor disruptions. Even if the net change in the national workforce is small, localized reductions in employment may adversely impact individuals and communities just as localized increases may have positive impacts.--------------------------------------------------------------------------- \236\ Full employment is a conceptual target for the economy where everyone who wants to work and is available to do so at prevailing wages is actively employed. The unemployment rate at full employment is not zero. \237\ Arrow et al. (1996). ``Benefit-Cost Analysis in Environmental, Health, and Safety Regulation: A Statement of Principles.'' American Enterprise Institute, The Annapolis Center, and Resources for the Future. See discussion on bottom of p. 6. In practice, distributional impacts on individual workers can be important, as discussed later in this section.--------------------------------------------------------------------------- If the economy is operating at less than full employment, economic theory does not clearly indicate the direction or magnitude of the net impact of environmental regulation on employment; it could cause either a short-run net increase or short-run net decrease.\238\ At the level of individual companies, employers affected by environmental regulation may increase their demand for some types of labor, decrease demand for other types of labor, or for still other types, not change it at all. The uncertain direction of labor impacts is due to the different channels by which regulations affect labor demand.--------------------------------------------------------------------------- \238\ Schmalensee, Richard, and Stavins, Robert N. ``A Guide to Economic and Policy Analysis of EPA's Transport Rule.'' White paper commissioned by Excelon Corporation, March 2011.--------------------------------------------------------------------------- Morgenstern et al. (2002) \239\ decompose the labor consequences in a regulated industry facing increased abatement costs into three separate components. First, there is a demand effect caused by higher production costs raising market prices. Higher prices reduce consumption (and production), reducing demand for labor within the regulated industry. Second, there is a cost effect where, as production costs increase, plants use more of all inputs, including labor, to produce the same level of output. Third, there is a factor-shift effect where post-regulation production technologies may have different labor intensities. Other researchers use different frameworks along a similar vein.\240\--------------------------------------------------------------------------- \239\ Morgenstern, R.D ; Pizer, W.A ; and Shih, J.-S. (2002). ``Jobs Versus the Environment: An Industry-Level Perspective.'' Journal of Environmental Economics and Management 43: 412-436. 2002. \240\ Berman, E. and Bui, L. T. M. (2001). ``Environmental Regulation and Labor Demand: Evidence from the South Coast Air Basin.'' Journal of Public Economics 79(2): 265-295; Desch[ecirc]nes, O. (2018). ``Balancing the Benefits of Environmental Regulations for Everyone and the Costs to Workers and Firms.'' IZA World of Labor 22v2. [*https://wol.iza.org/uploads/articles/458/pdfs/environmental-regulations-and-labor-markets.pdf*](https://wol.iza.org/uploads/articles/458/pdfs/environmental-regulations-and-labor-markets.pdf), accessed 4/19/2021.--------------------------------------------------------------------------- RIA Chapter 8.2 discusses the calculation of employment impacts in the model used for this analysis. The estimates include effects on three sectors: Automotive dealers, final assembly labor and parts production, and fuel economy technology labor. The first two of these are examples of Morgenstern et al.'s (2002) demand-effect employment, while the third reflects cost-effect employment. For automotive dealers, the model estimates the hours involved in each new vehicle sale. To estimate the labor involved in final assembly, the model used average labor hours per vehicle at a sample of U.S assembly plants, adjusted by the ratio of vehicle assembly manufacturing employment to employment for total[[Page 74514]]vehicle and equipment manufacturing for new vehicles. Finally, for fuel economy technology labor, DOT calculated the average revenue per job-year for automakers. The new-vehicle demand elasticity, among other factors, affects employment impacts because it affects the estimated changes in new vehicle sales due to the standards. In the proposed rule, EPA's central analysis used a new-vehicle demand elasticity of -1, with a sensitivity analysis using -0.4 as the demand elasticity. As discussed in Section VII.B of this preamble, in this FRM, EPA's central case uses a new-vehicle demand elasticity of -0.4, with sensitivities of -0.15 and -1, due to evidence that the value of -1 used in the proposed rule, from older studies, is no longer supported by recent studies. EPA's assessment of employment impacts, in RIA Chapter 8.2.3, using the sales assumptions of both automakers and consumers using 2.5 years of fuel consumption in vehicle decisions and a demand elasticity of -0.4, shows an increase in employment of between about 1 and 2.4 percent due to the labor involved in producing the technologies needed to meet the standards. If, instead, we use the sensitivity analysis with a demand elasticity of -0.15, employment is higher for both the no-action alternative and the standards, but the percent change is almost the same. In contrast, in our sensitivity analysis using the -1 demand elasticity, which EPA now believes is outdated, employment increases by between 0 and 0.7 percent. If automakers underestimate consumers' valuation of fuel economy, as noted in Section VII.B of this preamble, then demand-effect employment is likely to be higher, and employment impacts are likely to be more positive. Note that these are employment impacts in the directly regulated sector, plus the impacts for automotive dealers. These do not include economy-wide labor impacts. As discussed earlier, economy-wide impacts on employment are generally driven by broad macroeconomic effects. It also does not reflect employment effects due to reduced spending on fuel consumption. Those changes may lead to some reductions in employment in gas stations, and some increases in other sectors to which people reallocate those expenditures. Electrification of the vehicle fleet is likely to affect both the number and the nature of employment in the auto and parts sectors and related sectors, such as providers of charging infrastructure. The kinds of jobs in auto manufacturing are expected to change: For instance, there will be no need for engine and exhaust system assembly for EVs, while many assembly tasks will involve electrical rather than mechanical fitting. Batteries represent a significant portion of the manufacturing content of an electrified vehicle, and some automakers are likely to purchase the cells, if not pre-assembled modules or packs, from suppliers. The effect on total employment for auto manufacturing is uncertain: Some suggest that fewer workers will be needed because BEVs have fewer moving parts,\241\ while others estimate that the labor-hours involved in BEVs are almost identical to that for ICE vehicles.\242\ Effects in the supply chain, as Securing America's Energy Future (SAFE) and Alliance noted, depend on where goods in the supply chain are developed. Blue-Green Alliance, BICEP, Ceres, Environmental Entrepreneurs, Elders Climate Action, SAFE, and the UAW all argue that developing EVs in the U.S is critical for domestic employment and for the global competitiveness of the U.S in the future auto industry. EPA agrees that these concerns are important and will continue to assess changes in employment associated with electrification of the auto industry.--------------------------------------------------------------------------- \241\ Krisher, T., and Seewer, J. (2021). ``Autoworkers face uncertain future in an era of electric cars.'' [*https://abcnews.go.com/US/wireStory/autoworkers-face-dimmer-future-era-electric-cars-75828610*](https://abcnews.go.com/US/wireStory/autoworkers-face-dimmer-future-era-electric-cars-75828610), accessed 10/20/2021. \242\ Kupper, D., K. Kuhlmann, K. Tominaga, A. Arora, and J. Schlageter (2020). ``Shifting Gears in Auto Manufacturing.'' [*https://www.bcg.com/publications/2020/transformative-impact-of-electric-vehicles-on-auto-manufacturing*](https://www.bcg.com/publications/2020/transformative-impact-of-electric-vehicles-on-auto-manufacturing), accessed 10/20/2021.---------------------------------------------------------------------------L. Environmental Justice Executive Order 12898 (59 FR 7629, February 16, 1994) establishes federal executive policy on environmental justice. It directs federal agencies, to the greatest extent practicable and permitted by law, to make achieving environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations in the U.S EPA defines environmental justice as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.\243\--------------------------------------------------------------------------- \243\ Fair treatment means that ``no group of people should bear a disproportionate burden of environmental harms and risks, including those resulting from the negative environmental consequences of industrial, governmental and commercial operations or programs and policies.'' Meaningful involvement occurs when ``(1) potentially affected populations have an appropriate opportunity to participate in decisions about a proposed activity [e.g , rulemaking] that will affect their environment and/or health; (2) the public's contribution can influence [EPA's rulemaking] decision; (3) the concerns of all participants involved will be considered in the decision-making process; and (4) [EPA will] seek out and facilitate the involvement of those potentially affected'' A potential EJ concern is defined as ``the actual or potential lack of fair treatment or meaningful involvement of minority populations, low-income populations, tribes, and indigenous peoples in the development, implementation and enforcement of environmental laws, regulations and policies.'' See ``Guidance on Considering Environmental Justice During the Development of an Action.'' Environmental Protection Agency, [*www.epa.gov/environmentaljustice/guidanceconsidering-environmental-justice-duringdevelopment-action*](http://www.epa.gov/environmentaljustice/guidanceconsidering-environmental-justice-duringdevelopment-action). See also [*https://www.epa.gov/environmentaljustice.---------------------------------------------------------------------------*](https://www.epa.gov/environmentaljustice.---------------------------------------------------------------------------) Executive Order 14008 (86 FR 7619, February 1, 2021) also calls on federal agencies to make achieving environmental justice part of their respective missions ``by developing programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts.'' It also declares a policy ``to secure environmental justice and spur economic opportunity for disadvantaged communities that have been historically marginalized and overburdened by pollution and under-investment in housing, transportation, water and wastewater infrastructure and health care.'' Under Executive Order 13563 (76 FR 3821, January 21, 2011), federal agencies may consider equity, human dignity, fairness, and distributional considerations in their regulatory analyses, where appropriate and permitted by law. EPA's 2016 ``Technical Guidance for Assessing Environmental Justice in Regulatory Analysis'' provides recommendations on conducting the highest quality analysis feasible, recognizing that ***data*** limitations, time and resource constraints, and analytic challenges will vary by media and regulatory context.\244\--------------------------------------------------------------------------- \244\ ``Technical Guidance for Assessing Environmental Justice in Regulatory Analysis.'' Epa.gov, Environmental Protection Agency, [*https://www.epa.gov/sites/production/files/2016-06/documents/ejtg\_5\_6\_16\_v5.1.pdf.---------------------------------------------------------------------------*](https://www.epa.gov/sites/production/files/2016-06/documents/ejtg_5_6_16_v5.1.pdf.---------------------------------------------------------------------------) When assessing the potential for disproportionately high and adverse health or environmental impacts of regulatory actions on populations of color, low-income populations, tribes, and/or indigenous peoples, EPA strives[[Page 74515]]to answer three broad questions: (1) Is there evidence of potential EJ concerns in the baseline (the state of the world absent the regulatory action)? Assessing the baseline will allow EPA to determine whether pre-existing disparities are associated with the pollutant(s) under consideration (e.g , if the effects of the pollutant(s) are more concentrated in some population groups). (2) Is there evidence of potential EJ concerns for the regulatory option(s) under consideration? Specifically, how are the pollutant(s) and its effects distributed for the regulatory options under consideration? (3) Do the regulatory option(s) under consideration exacerbate or mitigate EJ concerns relative to the baseline? It is not always possible to quantitatively assess these questions. EPA's 2016 Technical Guidance does not prescribe or recommend a specific approach or methodology for conducting an environmental justice analysis, though a key consideration is consistency with the assumptions underlying other parts of the regulatory analysis when evaluating the baseline and regulatory options. Where applicable and practicable, the Agency endeavors to conduct such an analysis. Going forward, EPA is committed to conducting environmental justice analysis for rulemakings based on a framework similar to what is outlined in EPA's Technical Guidance, in addition to investigating ways to further weave environmental justice into the fabric of the rulemaking process. EPA greatly values input from EJ stakeholders and communities and looks forward to engagement as we consider the impacts of light-duty vehicle emissions.1. GHG Impacts In 2009, under the Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act (``Endangerment Finding''), the Administrator considered how climate change threatens the health and welfare of the U.S population. As part of that consideration, she also considered risks to minority and low-income individuals and communities, finding that certain parts of the U.S population may be especially vulnerable based on their characteristics or circumstances. These groups include economically and socially disadvantaged communities; individuals at vulnerable lifestages, such as the elderly, the very young, and pregnant or nursing women; those already in poor health or with comorbidities; the disabled; those experiencing homelessness, mental illness, or substance abuse; and/or Indigenous or minority populations dependent on one or limited resources for subsistence due to factors including but not limited to geography, access, and mobility. Scientific assessment reports produced over the past decade by the U.S Global Change Research Program (USGCRP),\245\ \246\ the Intergovernmental Panel on Climate Change (IPCC),\247\ \248\ \249\ \250\ and the National Academies of Science, Engineering, and Medicine \251\ \252\ add more evidence that the impacts of climate change raise potential environmental justice concerns. These reports conclude that poorer or predominantly non-White communities can be especially vulnerable to climate change impacts because they tend to have limited adaptive capacities and are more dependent on climate-sensitive resources such as local water and food supplies, or have less access to social and information resources. Some communities of color, specifically populations defined jointly by ethnic/racial characteristics and geographic location, may be uniquely vulnerable to climate change health impacts in the U.S In particular, the 2016 scientific assessment on the Impacts of Climate Change on Human Health \253\ found with high confidence that vulnerabilities are place- and time-specific, lifestages and ages are linked to immediate and future health impacts, and social determinants of health are linked to greater extent and severity of climate change-related health impacts.--------------------------------------------------------------------------- \245\ USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R , C.W Avery, D.R Easterling, K.E Kunkel, K.L.M Lewis, T.K Maycock, and B.C Stewart (eds.)]. U.S Global Change Research Program, Washington, DC, USA, 1515 pp. doi: 10.7930/NCA4.2018 \246\ USGCRP, 2016: The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. Crimmins, A., J. Balbus, J.L Gamble, C.B Beard, J.E Bell, D. Dodgen, R.J Eisen, N. Fann, M.D Hawkins, S.C Herring, L. Jantarasami, D.M Mills, S. Saha, M.C Sarofim, J. Trtanj, and L. Ziska, Eds. U.S Global Change Research Program, Washington, DC, 312 pp. [*http://dx.doi.org/10.7930/J0R49NQX*](http://dx.doi.org/10.7930/J0R49NQX). \247\ Oppenheimer, M., M. Campos, R.Warren, J. Birkmann, G. Luber, B. O'Neill, and K. Takahashi, 2014: Emergent risks and key vulnerabilities. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B , V.R Barros, D.J Dokken, K.J Mach, M.D Mastrandrea, T.E Bilir, M. 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Revich, and R. Sauerborn, 2014: Human health: Impacts, adaptation, and co-benefits. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B , V.R Barros, D.J Dokken, K.J Mach, M.D Mastrandrea, T.E Bilir, M. Chatterjee, K.L Ebi, Y.O Estrada, R.C Genova, B. Girma, E.S Kissel, A.N Levy, S. MacCracken, P.R Mastrandrea, and L.L White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 709-754. \250\ IPCC, 2018: Global Warming of 1.5 [deg]C. An IPCC Special Report on the impacts of global warming of 1.5 [deg]C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. P[ouml]rtner, D. Roberts, J. Skea, P.R Shukla, A. Pirani, W. Moufouma-Okia, C. P[eacute]an, R. Pidcock, S. Connors, J.B.R Matthews, Y. Chen, X. Zhou, M.I Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. In Press. \251\ National Research Council. 2011. America's Climate Choices. Washington, DC: The National Academies Press. [*https://doi.org/10.17226/12781*](https://doi.org/10.17226/12781). \252\ National Academies of Sciences, Engineering, and Medicine. 2017. Communities in Action: Pathways to Health Equity. Washington, DC: The National Academies Press. [*https://doi.org/10.17226/24624*](https://doi.org/10.17226/24624). \253\ USGCRP, 2016: The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment.---------------------------------------------------------------------------i. Effects on Specific Populations of Concern Individuals living in socially and economically disadvantaged communities, such as those living at or below the poverty line or who are experiencing homelessness or social isolation, are at greater risk of health effects from climate change. This is also true with respect to people at vulnerable lifestages, specifically women who are pre- and perinatal, or are nursing; in utero fetuses; children at all stages of development; and the elderly. Per the Fourth National Climate Assessment, ``Climate change affects human health by altering exposures to heat waves, floods, droughts, and other extreme events; vector-, food- and waterborne infectious diseases; changes in the quality and safety of air, food, and water; and stresses to mental health and well-being.'' \254\ Many health conditions[[Page 74516]]such as cardiopulmonary or respiratory illness and other health impacts are associated with and exacerbated by an increase in GHGs and climate change outcomes, which is problematic as these diseases occur at higher rates within vulnerable communities. Importantly, negative public health outcomes include those that are physical in nature, as well as mental, emotional, social, and economic.--------------------------------------------------------------------------- \254\ Ebi, K.L , J.M Balbus, G. Luber, A. Bole, A. Crimmins, G. Glass, S. Saha, M.M Shimamoto, J. Trtanj, and J.L White-Newsome, 2018: Human Health. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R , C.W Avery, D.R Easterling, K.E Kunkel, K.L.M Lewis, T.K Maycock, and B.C Stewart (eds.)]. U.S Global Change Research Program, Washington, DC, USA, pp. 539-571. doi: 10.7930/NCA4.2018.CH14 --------------------------------------------------------------------------- To this end, the scientific assessment literature, including the aforementioned reports, demonstrates that there are myriad ways in which these populations may be affected at the individual and community levels. Individuals face differential exposure to criteria pollutants, in part due to the proximities of highways, trains, factories, and other major sources of pollutant-emitting sources to less-affluent residential areas. Outdoor workers, such as construction or utility crews and ***agricultural*** laborers, who frequently are comprised of already at-risk groups, are exposed to poor air quality and extreme temperatures without relief. Furthermore, individuals within EJ populations of concern face greater housing, clean water, and food insecurity and bear disproportionate economic impacts and health burdens associated with climate change effects. They have less or limited access to healthcare and affordable, adequate health or homeowner insurance. Finally, resiliency and adaptation are more difficult for economically disadvantaged communities: They have less liquidity, individually and collectively, to move or to make the types of infrastructure or policy changes to limit or reduce the hazards they face. They frequently are less able to self-advocate for resources that would otherwise aid in building resilience and hazard reduction and mitigation. The assessment literature cited in EPA's 2009 and 2016 Endangerment Findings, as well as Impacts of Climate Change on Human Health, also concluded that certain populations and life stages, including children, are most vulnerable to climate-related health effects. The assessment literature produced from 2016 to the present strengthens these conclusions by providing more detailed findings regarding related vulnerabilities and the projected impacts youth may experience. These assessments--including the Fourth National Climate Assessment (2018) and The Impacts of Climate Change on Human Health in the United States (2016)--describe how children's unique physiological and developmental factors contribute to making them particularly vulnerable to climate change. Impacts to children are expected from heat waves, air pollution, infectious and waterborne illnesses, and mental health effects resulting from extreme weather events. In addition, children are among those especially susceptible to allergens, as well as health effects associated with heat waves, storms, and floods. Additional health concerns may arise in low-income households, especially those with children, if climate change reduces food availability and increases prices, leading to food insecurity within households. The Impacts of Climate Change on Human Health \253\ also found that some communities of color, low-income groups, people with limited English proficiency, and certain immigrant groups (especially those who are undocumented) live with many of the factors that contribute to their vulnerability to the health impacts of climate change. While difficult to isolate from related socioeconomic factors, race appears to be an important factor in vulnerability to climate-related stress, with elevated risks for mortality from high temperatures reported for Black or African American individuals compared to White individuals after controlling for factors such as air conditioning use. Moreover, people of color are disproportionately exposed to air pollution based on where they live, and disproportionately vulnerable due to higher baseline prevalence of underlying diseases such as asthma, so climate exacerbations of air pollution are expected to have disproportionate effects on these communities. Native American Tribal communities possess unique vulnerabilities to climate change, particularly those impacted by degradation of natural and cultural resources within established reservation boundaries and threats to traditional subsistence lifestyles. Tribal communities whose health, economic well-being, and cultural traditions depend upon the natural environment will likely be affected by the degradation of ecosystem goods and services associated with climate change. The IPCC indicates that losses of customs and historical knowledge may cause communities to be less resilient or adaptable.\255\ The Fourth National Climate Assessment (2018) noted that while Indigenous peoples are diverse and will be impacted by the climate changes universal to all Americans, there are several ways in which climate change uniquely threatens Indigenous peoples' livelihoods and economies.\256\ In addition, there can institutional barriers to their management of water, land, and other natural resources that could impede adaptive measures.--------------------------------------------------------------------------- \255\ Porter et al., 2014: Food security and food production systems. \256\ Jantarasami, L.C , R. Novak, R. Delgado, E. Marino, S. McNeeley, C. Narducci, J. Raymond-Yakoubian, L. Singletary, and K. Powys Whyte, 2018: Tribes and Indigenous Peoples. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R , C.W Avery, D.R Easterling, K.E Kunkel, K.L.M Lewis, T.K Maycock, and B.C Stewart (eds.)]. U.S Global Change Research Program, Washington, DC, USA, pp. 572-603. doi: 10.7930/NCA4.2018.CH15 --------------------------------------------------------------------------- For example, Indigenous ***agriculture*** in the Southwest is already being adversely affected by changing patterns of flooding, drought, dust storms, and rising temperatures leading to increased soil erosion, irrigation water demand, and decreased crop quality and herd sizes. The Confederated Tribes of the Umatilla Indian Reservation in the Northwest have identified climate risks to salmon, elk, deer, roots, and huckleberry habitat. Housing and sanitary water supply infrastructure are vulnerable to disruption from extreme precipitation events. NCA4 noted that Indigenous peoples often have disproportionately higher rates of asthma, cardiovascular disease, Alzheimer's, diabetes, and obesity, which can all contribute to increased vulnerability to climate-driven extreme heat and air pollution events. These factors also may be exacerbated by stressful situations, such as extreme weather events, wildfires, and other circumstances. NCA4 and IPCC AR5 \257\ also highlighted several impacts specific to Alaskan Indigenous Peoples. Coastal erosion and permafrost thaw will lead to more coastal erosion, exacerbated risks of winter travel, and damage to buildings, roads, and other infrastructure--these impacts on archaeological sites, structures, and objects that will lead to a loss of cultural heritage for Alaska's Indigenous people. In terms of food security, the NCA discussed reductions in suitable ice conditions for hunting, warmer temperatures impairing the use of traditional ice cellars for food storage, and declining shellfish populations due to warming and acidification. While the NCA also noted that climate change provided more opportunity to hunt from[[Page 74517]]boats later in the fall season or earlier in the spring, the assessment found that the net impact was an overall decrease in food security.--------------------------------------------------------------------------- \257\ Porter et al., 2014: Food security and food production systems.--------------------------------------------------------------------------- In addition, the U.S Pacific Islands and the indigenous communities that live there are also uniquely vulnerable to the effects of climate change due to their remote location and geographic isolation. They rely on the land, ocean, and natural resources for their livelihoods, but face challenges in obtaining energy and food supplies that need to be shipped in at high costs. As a result, they face higher energy costs than the rest of the nation and depend on imported fossil fuels for electricity generation and diesel. These challenges exacerbate the climate impacts that the Pacific Islands are experiencing. NCA4 notes that Indigenous peoples of the Pacific are threatened by rising sea levels, diminishing freshwater availability, and negative effects to ecosystem services that threaten these individuals' health and well-being.2. Non-GHG Impacts In addition to significant climate change benefits, the final rule will also affect non-GHG emissions. In general, we expect small non-GHG emissions reductions from upstream sources related to refining petroleum fuels. We also expect small increases in emissions from upstream electricity generating units (EGUs). An increase in emissions from coal- and NG-fired electricity generation to meet increased EV electricity demand could result in adverse EJ impacts. For on-road light duty vehicles, the final rule will reduce total non-GHG tailpipe emissions, though we expect small increases in some non-GHG emissions in the years immediately following implementation of the standards, followed by growing decreases in emissions in later years. This is due to our projections about the gasoline-fueled LD vehicle population in the final rule scenario, including decreased scrappage of older vehicles. See Table 35, Table 36, and Table 37 for more detail on the estimated non-GHG emissions impacts of the rule.\258\ As discussed in Section III.C of this preamble, future EPA regulatory actions that would result in increased zero-emission vehicles and cleaner energy generation may have greater non-GHG impacts for transportation and electricity generation, and those impacts will be analyzed in more detail in those future actions.--------------------------------------------------------------------------- \258\--------------------------------------------------------------------------- There is evidence that communities with EJ concerns are disproportionately impacted by the non-GHG emissions associated with this rule.\259\ Numerous studies have found that environmental hazards such as air pollution are more prevalent in areas where populations of color and low-income populations represent a higher fraction of the population compared with the general population.\260\ \261\ \262\ Consistent with this evidence, a recent study found that most anthropogenic sources of PM2.5, including industrial sources, and light- and heavy-duty vehicle sources, disproportionately affect people of color.\263\--------------------------------------------------------------------------- \259\ Mohai, P.; Pellow, D.; Roberts Timmons, J. (2009) Environmental justice. Annual Reviews 34: 405-430. [*https://doi.org/10.1146/annurev-environ-082508-094348*](https://doi.org/10.1146/annurev-environ-082508-094348). \260\ Rowangould, G.M (2013) A census of the near-roadway population: Public health and environmental justice considerations. Trans Res D 25: 59-67. [*http://dx.doi.org/10.1016/j.trd.2013.08.003*](http://dx.doi.org/10.1016/j.trd.2013.08.003). \261\ Marshall, J.D , Swor, K.R ; Nguyen, N.P (2014) Prioritizing environmental justice and equality: Diesel emissions in Southern California. Environ Sci Technol 48: 4063-4068. [*https://doi.org/10.1021/es405167f*](https://doi.org/10.1021/es405167f). \262\ Marshall, J.D (2000) Environmental inequality: Air pollution exposures in California's South Coast Air Basin. Atmos Environ 21: 5499-5503. [*https://doi.org/10.1016/j.atmosenv.2008.02.005*](https://doi.org/10.1016/j.atmosenv.2008.02.005). \263\ C.W Tessum, D.A Paolella, S.E Chambliss, J.S Apte, J.D Hill, J.D Marshall, PM2.5polluters disproportionately and systemically affect people of color in the United States. Sci. Adv. 7, eabf4491 (2021).--------------------------------------------------------------------------- Analyses of communities in close proximity to upstream sources, such as EGUs, have found that a higher percentage of communities of color and low-income communities live near these sources when compared to national averages.\264\ Vulnerable populations near upstream refineries may experience potential disparities in pollution-related health risk from that source.\265\ We expect that small increases in non-GHG emissions from EGUs and small reductions in petroleum-sector emissions would lead to small changes in exposure to these non-GHG pollutants for people living in the communities near these facilities.--------------------------------------------------------------------------- \264\ See 80 FR 64662, 64915-64916 (October 23, 2015). \265\ U.S EPA (2014). Risk and Technology Review--Analysis of Socio-Economic Factors for Populations Living Near Petroleum Refineries. Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. January.--------------------------------------------------------------------------- There is also substantial evidence that people who live or attend school near major roadways are more likely to be of a non-White race, Hispanic ethnicity, and/or low socioeconomic status.\266\ \267\ We would expect that communities near roads will benefit from reductions of non-GHG pollutants as fuel efficiency improves and the use of zero-emission vehicles (such as full battery electric vehicles) increases, though projections about the gasoline-fueled LD vehicle population in the final rule scenario, including decreased scrappage of older vehicles, may offset some of these emission reductions, especially in the years immediately after finalization of the standards.--------------------------------------------------------------------------- \266\ Tian, N.; Xue, J.; Barzyk. T.M (2013) Evaluating socioeconomic and racial differences in traffic-related metrics in the United States using a GIS approach. J Exposure Sci Environ Epidemiol 23: 215-222. \267\ Boehmer, T.K ; Foster, S.L ; Henry, J.R ; Woghiren-Akinnifesi, E.L ; Yip, F.Y (2013) Residential proximity to major highways--United States, 2010. Morbidity and Mortality Weekly Report 62(3): 46-50.--------------------------------------------------------------------------- Although proximity to an emissions source is a useful indicator of potential exposure, it is important to note that the impacts of emissions from both upstream and tailpipe sources are not limited to communities in close proximity to these sources. The effects of potential increases and decreases in emissions from the sources affected by this final rule might also be felt many miles away, including in communities with EJ concerns. The spatial extent of these impacts from upstream and tailpipe sources depend on a range of interacting and complex factors including the amount of pollutant emitted, atmospheric chemistry and meteorology. In summary, we expect this rule will, over time, result in reductions of non-GHG tailpipe emissions and emissions from upstream refinery sources. We also project that the rule will result in small increases of non-GHG emissions from upstream EGU sources. Overall, there are substantial PM2.5-related health benefits associated with the non-GHG emissions reductions that this rule will achieve. The benefits from these emissions reductions, as well as the adverse impacts associated with the emissions increases, could potentially impact communities with EJ concerns, though not necessarily immediately and not equally in all locations. For this rulemaking, the air quality information needed to perform a quantified analysis of the distribution of such impacts was not available. We therefore recommend caution when interpreting these broad, qualitative observations. We note in Section I.A.2 of this preamble that EPA intends to develop a future rule to control emissions of GHGs as well as criteria and air toxic pollutants from light-duty vehicles for model years beyond 2026. We are considering how to project air quality impacts from the changes in non-GHG emissions for that future rulemaking (see Section V.C of this preamble).[[Page 74518]]M. Affordability and Equity Impacts The impacts of the standards on social equity depend in part on their effects on the affordability of vehicles and transportation services, especially for lower-income households. Access to transportation improves the ability of people, including those with low income, to pursue jobs, education, health care, and necessities of daily life such as food and housing. This section discusses how these standards might affect affordability of vehicles. We acknowledge that vehicles, especially household ownership of vehicles, are only a portion of the larger issues concerning access to transportation and mobility services, which also take into consideration public transportation and land use design. Though these issues are inextricably linked, the following discussion focuses on effects related to private vehicle ownership and use. We also acknowledge that the emissions of vehicles, both local pollutants and GHGs, can have disproportionate impacts on lower-income and minority communities; see Preamble Sections I.E and VII.L for further discussion of these topics. Finally, we note that social equity involves issues beyond income and affordability, including race, ethnicity, gender, gender identification, and residential location; EPA will continue to examine such impacts. Affordability is not a well-defined concept in academic literature. As discussed in Cassidy et al. (2016),\268\ researchers have generally applied the term to necessities such as food, housing, or energy, and have identified some themes related to:--------------------------------------------------------------------------- \268\ Cassidy, A., G. Burmeister, and G. Helfand. ``Impacts of the Model Year 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards on Vehicle Affordability.'' Working paper. Instead of focusing on the traditional economic concept of willingness to pay, any consideration of affordability must also consider the ability to pay for a socially defined minimum level of a good, especially of a necessity. Although the ability to pay is often based on the proportion of income devoted to expenditures on a particular good, this ratio approach is widely criticized for not considering expenditures on other possibly necessary goods, quality differences in the good, and heterogeneity of consumer preferences for the good. Assessing affordability should take into account both the short-term costs and long-term costs associated with consumption of a particular good. As noted in Cassidy et al., (2016), there is very little literature applying the concept of affordability to transportation, much less to vehicle ownership. It is not clear how to identify a socially acceptable minimum level of transportation service. However, it seems reasonable that some minimum level of transportation services is necessary to enable households' access to employment, education, and basic services such as buying food. It also seems reasonable to assume that transportation requirements vary substantially across populations and geographic locations, and it is not clear when consumption of transportation moves from being a necessity to optional. Normatively defining the minimum adequate level of transportation consumption is difficult given the heterogeneity of consumer preferences and living situations. As a result, it is challenging to define how much residual income should remain with each household after transportation expenditures. It is therefore not surprising that academic and policy literature have largely avoided attempting to define transportation affordability. As with the proposed rule, we are following the approach in the 2016 EPA Proposed Determination for the Midterm Evaluation \269\ of considering four questions that relate to the effects of the final standards on new vehicle affordability: How the standards affect lower-income households; how the standards affect the used vehicle market; how the standards affect access to credit; and how the standards affect the low-priced vehicle segment. See RIA Chapter 8.3 for further detail.--------------------------------------------------------------------------- \269\ U.S Environmental Protection Agency (2016). Proposed Determination on the Appropriateness of the Model Year 2022-2025 Light-Duty Vehicle Greenhouse Gas Emissions Standards under the Midterm Evaluation, Chapter 4.3.3 EPA-420-R-16-020. [*https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100Q3DO.pdf*](https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100Q3DO.pdf), accessed 4/26/2021.--------------------------------------------------------------------------- Americans for Prosperity, Attorneys General of Missouri and Ohio, Competitive Enterprise Institute, some individual commenters, NADA, Taxpayers Protection Alliance, and Valero Energy Corporation express concern that increases in new vehicle prices will hurt low- and middle-income households by making new vehicles more expensive. EPA notes that the effects of the standards on lower-income households depend on the responses not just to up-front costs but also to the reduction in fuel and operating costs associated with the standards. These responses will affect not only the sales of new vehicles, as discussed in Section VII.B of this preamble, but also the prices of used vehicles as well as the costs associated with ride-hailing and ride-sharing services. Consumer Reports, Dream Corps Green for All, and Center for Biological Diversity et al. say that, although up-front costs are higher, the total cost of ownership is lower. In addition, they say that lower-income households may disproportionately benefit, as they observe that low-income households typically buy used vehicles, whose up-front cost increases are more modest compared to the fuel savings; because fuel costs are a larger proportion of household income for lower-income people, these savings are especially important. Hutchens et al. (2021) \270\ find that lower-income households spend more on used vehicles than new ones. A recent study notes that lower-income households spend more on gasoline as a proportion of their income than higher-income households,\271\ suggesting the importance of operating costs for these households. If the per-mile costs of services such as ride hailing and ride sharing decrease to reflect lower operating costs, those who do not own vehicles may benefit. The National Coalition for Advanced Technology comments that Uber and Lyft have a target in 2030 of going all-electric; if those lower operating and maintenance costs are passed along to users, these services may become more affordable.--------------------------------------------------------------------------- \270\ Hutchens, A., A. Cassidy, G. Burmeister, and G. Helfand. ``Impacts of Light-Duty Vehicle Greenhouse Gas Emission Standards on Vehicle Affordability.'' Working paper. \271\ Vaidyanathan, S., P. Huether, and B. Jennings (2021). ``Understanding Transportation Energy Burdens.'' Washington, DC: American Council for an Energy-Efficient Economy White Paper. [*https://www.aceee.org/white-paper/2021/05/understanding-transportation-energy-burdens*](https://www.aceee.org/white-paper/2021/05/understanding-transportation-energy-burdens), accessed 5/24/2021.--------------------------------------------------------------------------- Most people who buy vehicles purchase used vehicles, instead of new.\272\ If sales of new vehicles decrease, then prices of used vehicles, which are disproportionately purchased by lower-income households, would be expected to increase; the reverse would happen if new vehicle sales increase. These effects in the used vehicle market also affect how long people hold onto their used vehicles. This effect, sometimes termed the ``Gruenspecht effect'' after Gruenspecht (1982),\273\ would lead to both slower adoption of vehicles subject to the new standards, and more use of older vehicles not subject to the new standards, with[[Page 74519]]associated higher emissions, if new vehicle sales decrease. The Gruenspecht effect, therefore, may have the additional consequence of increased concentrations of older vehicles in some communities in the short term, and may delay benefits associated with advanced vehicle technologies for those communities. As discussed in Section VII.B of this preamble, new vehicle sales are projected to show a roughly one-half to one percent decrease from sales under the SAFE rule; that value depends on the uncertain assumption that vehicle buyers consider just a small share of future fuel consumption in the purchase decision. Changes in the new vehicle market are expected not only to have immediate effects on the prices of used vehicles, but also to affect the market over time, as the supply of used vehicles in the future depends on how many new vehicles are sold.\274\ As discussed in Section VII.J of this preamble, because the prices of used vehicles depreciate more rapidly than fuel savings, buyers of used vehicles will recover any increase in up-front costs more rapidly than buyers of new vehicles.--------------------------------------------------------------------------- \272\ U.S Department of Transportation, Bureau of Transportation Statistics. ``New and Used Passenger Car and Light Truck Sales and Leases.'' National Transportation Statistics Table 1-17. [*https://www.bts.gov/content/new-and-used-passenger-car-sales-and-leases-thousands-vehicles*](https://www.bts.gov/content/new-and-used-passenger-car-sales-and-leases-thousands-vehicles), accessed 11/3/2021. \273\ Gruenspecht, H. (1982). ``Differentiated Regulation: The Case of Auto Emissions Standards.'' American Economic Review 72: 328-331. \274\ U.S Environmental Protection Agency (2021). ``The Effects of New-Vehicle Price Changes on New- and Used-Vehicle Markets and Scrappage.'' EPA-420-R-21-019, [*https://cfpub.epa.gov/si/si\_public\_record\_Report.cfm?dirEntryId=352754&Lab=OTAQ*](https://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=352754&Lab=OTAQ) (accessed 10/06/2021).--------------------------------------------------------------------------- Access to credit is a potential barrier to purchase of vehicles whose up-front costs have increased; access may also be affected by race, ethnicity, gender, gender identity, residential location, religion, or other factors. If lenders are not willing to provide financing for buyers who face higher prices, perhaps because the potential buyers are hitting a maximum on the debt-to-income ratio (DTI) that lenders are willing to accept, then those buyers may not be able to purchase new vehicles. NADA in its comments provided results of two surveys of financial institutions, which were asked whether they would increase credit for a more expensive vehicle with lower cost of ownership. With about half of those surveyed responding, over 80 percent of respondents replied that they would not; the remainder said they would. These survey results do not contradict EPA's observation, discussed in the proposed rule, that some lenders are willing to give discounts on loans to purchase more fuel-efficient vehicles.\275\ Subsidies exist from the federal government, and some state governments, for plug-in electric vehicles.\276\ In addition, the DTI does not appear to be a fixed obstacle for access to finance; from 2007 to 2019, 40 percent of lower-income households and 8 percent of higher-income households who both had a DTI of over 36 percent and purchased at least one new vehicle financed their vehicle purchases.\277\--------------------------------------------------------------------------- \275\ Helfand, Gloria (2021). ``Memorandum: Lending Institutions that Provide Discounts for more Fuel Efficient Vehicles.'' U.S EPA Office of Transportation and Air Quality, Memorandum to the Docket. \276\ U.S Department of Energy and U.S Environmental Protection Agency. ``Federal Tax Credits for New All-Electric and Plug-in Hybrid Vehicles.'' [*https://www.fueleconomy.gov/feg/taxevb.shtml*](https://www.fueleconomy.gov/feg/taxevb.shtml), accessed 4/28/2021. \277\ Hutchens, A., et al. (2021). ``Impacts of Light-Duty Vehicle Greenhouse Gas Emission Standards on Vehicle Affordability.'' Working paper.--------------------------------------------------------------------------- Low-priced vehicles may be considered an entry point for people into buying new vehicles instead of used ones; automakers may seek to entice people to buy new vehicles through a low price point. It is possible that higher costs associated with standards could affect the ability of automakers to maintain vehicles in this value segment. At the same time, this segment historically tended to include more fuel-efficient vehicles that assisted automakers in achieving CAFE standards.\278\ The footprint-based standards, by encouraging improvements in GHG emissions and fuel economy across the vehicle fleet, reduce the need for low-priced vehicles to be a primary means of compliance with the standards. This change in incentives for the marketing of this segment may contribute to the increases in the prices of vehicles previously in this category. Low-priced vehicles still exist; the Chevrolet Spark, for example, is listed as starting at $13,400.\279\ At the same time, this segment is gaining more content, such as improved entertainment systems and electric windows; they may be developing an identity as a desirable market segment without regard to their previous purpose in enabling the sales of less efficient vehicles and compliance with CAFE standards.\280\ Whether this segment continues to exist, and in what form, may depend on the marketing plans of manufacturers: whether benefits are greater from offering basic new vehicles to first-time new-vehicle buyers, or from making small vehicles more attractive by adding more desirable features to them.--------------------------------------------------------------------------- \278\ Austin, D., and T. Dinan (2005). ``Clearing the Air: The Costs and Consequences of Higher CAFE Standards and Increased Gasoline.'' Journal of Environmental Economics and Management 50(3): 562-82; Kleit, A. (2004). ``Impacts of Long-Range Increases in the Fuel Economy (CAFE) Standard.'' Economic Inquiry 42(2): 279-294. \279\ Motortrend (2021). ``These Are the 10 Cheapest Cars You Can Buy in 2021.'' [*https://www.motortrend.com/features-****collections****/top-10-cheapest-new-cars/*](https://www.motortrend.com/features-collections/top-10-cheapest-new-cars/), accessed 4/28/2021; Chevrolet Spark, [*https://www.chevrolet.com/cars/spark*](https://www.chevrolet.com/cars/spark), accessed 5/27/2021. \280\ See Note 268.--------------------------------------------------------------------------- The updated analysis for the final rule projects that, although the vast majority of vehicles produced in the time frame of the standards will be gasoline-fueled vehicles, EVs and PHEVs increase with each MY up to about 17 percent total market share by MY 2026, compared to about 7 percent MY 2023; see Table 33. New EVs and PHEVs have lower operating costs than gasoline vehicles, but currently have higher up-front costs and require access to a means of charging. EPA has heard from some environmental justice groups and Tribes that limited access to electric vehicles and charging infrastructure can be a barrier for purchasing EVs. Comments received on the proposed rule cited both the higher up-front costs of EVs as challenges for adoption, and their lower operating and maintenance costs as incentives for adoption. A number of auto manufacturers commented on the importance of consumer education, purchase incentives, and charging infrastructure development for promoting adoption of electric vehicles. Some NGOs commented that EVs have lower total cost of ownership than ICE vehicles, and that EV purchase incentives should focus on lower-income households, because they are more responsive to price incentives than higher-income households. Access to charging infrastructure may be especially challenging for those who do not have easy access to home charging, such as people living in multi-unit dwellings, unless public charging infrastructure or charging at workplaces becomes more widespread. On the other hand, a recent report from the National Renewable Energy Laboratory estimated that public and workplace charging is keeping up with projected needs, based on Level 2 and fast charging ports per plug-in vehicle.\281\ EPA acknowledges the comments received. As the up-front costs of EVs drops, as discussed in Section III.A of this preamble, EPA expects consumer acceptance of EVs to increase; as more EVs enter the new vehicle market, those EVs will gradually move into the used vehicle fleet and become more accessible to lower-income households. In addition, as adoption of EVs increases, EPA expects greater development of charging[[Page 74520]]infrastructure. EPA will continue to monitor and further study affordability issues related to electric vehicles as their prevalence in the vehicle fleet increases. We respond to these comments in more detail in the RTC.--------------------------------------------------------------------------- \281\ Brown, A., A. Schayowitz, and E. Klotz (2021). ``Electric Vehicle Infrastructure Trends from the Alternative Fueling Station Locator: First Quarter 2021.'' National Renewable Energy Laboratory Technical Report NREL/TP-5400-80684, [*https://afdc.energy.gov/files/u/publication/electric\_vehicle\_charging\_infrastructure\_trends\_first\_quarter\_2021.pdf*](https://afdc.energy.gov/files/u/publication/electric_vehicle_charging_infrastructure_trends_first_quarter_2021.pdf), accessed 11/3/2021.--------------------------------------------------------------------------- In sum, as with the effects of the standards on vehicle sales discussed in Section VII.B of this preamble, the effects of the standards on affordability depend on two countervailing effects: the increase in the up-front costs of the vehicles, and the decrease in operating costs. As discussed here, different commenters emphasize one or the other aspect of this tradeoff. The increase in up-front costs has the potential to increase the prices of used vehicles, to make credit more difficult to obtain, and to make the least expensive new vehicles less desirable compared to used vehicles. The reduction in operating costs has the potential to mitigate or reverse all these effects. Lower operating costs on their own increase mobility (see RIA Chapter 3.1 for a discussion of rebound driving). It is possible that lower-income households may benefit more from the reduction in operating costs than the increase in up-front costs, because they own fewer vehicles per household, spend more on fuel than on vehicles on an annual basis, and those fuel expenditures represent a higher fraction of their household income. See RIA Chapter 8.4 for more detailed discussion of these issues.VIII. Statutory and Executive Order ReviewsA. Executive Order 12866: ``Regulatory Planning and Review and Executive Order 13563: Improving Regulation and Regulatory Review'' This action is an economically significant regulatory action that was submitted to OMB for review. Any changes made in response to OMB recommendations have been documented in the docket. EPA prepared an analysis of the potential costs and benefits associated with this action. This analysis is in the Regulatory Impact Analysis, which can be found in the docket for this rule and is briefly summarized in Section VII of this preamble.B. Paperwork Reduction Act This action does not impose any new information ***collection*** burden under the PRA. OMB has previously approved the information ***collection*** activities contained in the existing regulations and has assigned OMB control number 2127-0019. This final rule changes the level of the existing emission standards and revises several existing credit provisions, but imposes no new information ***collection*** requirements.C. Regulatory Flexibility Act I certify that this action will not have a significant economic impact on a substantial number of small entities under the RFA. This action will not impose any requirements on small entities. EPA's existing regulations exempt from the GHG standards any manufacturer, domestic or foreign, meeting Small Business Administration's size definitions of small business in 13 CFR 121.201 EPA is not finalizing any changes to the provisions for small businesses under this rule, and thus they would remain exempt. For additional discussion see Chapter 9 of the RIA.D. Unfunded Mandates Reform Act This final rule contains no federal mandates under UMRA, 2 U.S.C 1531-1538, for State, local, or tribal governments. The final rule imposes no enforceable duty on any State, local or tribal government. This final rule contains a federal mandate under UMRA that may result in expenditures of $100 million or more for the private sector in any one year. Accordingly, the costs and benefits associated with the final rule are discussed in Section VII of this preamble and in the RIA, which are in the docket for this rule. This action is not subject to the requirements of section 203 of UMRA because it contains no regulatory requirements that might significantly or uniquely affect small governments.E. Executive Order 13132: ``Federalism'' This action does not have federalism implications. It will not have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government.F. Executive Order 13175: ``Consultation and Coordination With Indian Tribal Governments'' This action does not have tribal implications as specified in Executive Order 13175. Thus, Executive Order 13175 does not apply to this action. However, EPA has engaged with our tribal stakeholders in the development of this rulemaking by offering a tribal workshop and offering government-to-government consultation upon request.G. Executive Order 13045: ``Protection of Children From Environmental Health Risks and Safety Risks'' With respect to GHG emissions, EPA has determined that this rule will not have disproportionate impacts on children (62 FR 19885, April 23, 1997). This rule will reduce emissions of potent GHGs, which as noted earlier in Section IV of this preamble, will reduce the effects of climate change, including the public health and welfare effects on children. GHGs contribute to climate change and the GHG emissions reductions resulting from implementation of this final rule would further improve children's health. The assessment literature cited in EPA's 2009 and 2016 Endangerment Findings concluded that certain populations and life stages, including children, the elderly, and the poor, are most vulnerable to climate-related health effects. The assessment literature since 2016 strengthens these conclusions by providing more detailed findings regarding these groups' vulnerabilities and the projected impacts they may experience. These assessments describe how children's unique physiological and developmental factors contribute to making them particularly vulnerable to climate change. Impacts to children are expected from heat waves, air pollution, infectious and waterborne illnesses, and mental health effects resulting from extreme weather events. In addition, children are among those especially susceptible to most allergic diseases, as well as health effects associated with heat waves, storms, and floods. Additional health concerns may arise in low-income households, especially those with children, if climate change reduces food availability and increases prices, leading to food insecurity within households. More detailed information on the impacts of climate change to human health and welfare is provided in Section IV.B of this preamble. We expect this rule would, on net, result in both small reductions and small increases in non-GHG emissions that could impact children, though not necessarily immediately and not equally in all locations. However, with respect to non-GHG emissions, EPA has concluded that it is not practicable to determine whether there would be disproportionate impacts on children. As mentioned in Section I.A.2 of this preamble, EPA intends to initiate another rulemaking to further reduce emissions of GHGs from light-duty vehicles for model years beyond 2026. We are considering how to project air quality and health impacts from the[[Page 74521]]changes in non-GHG emissions for that future rulemaking (see Section V.C of this preamble).H. Executive Order 13211: ``Energy Effects'' This action is not a ``significant energy action'' because it is not likely to have a significant adverse effect on the supply, distribution, or use of energy. EPA has outlined the energy effects in Table 5-7 of the Regulatory Impact Analysis (RIA), which is available in the docket for this action and is briefly summarized here. This action reduces CO2for passenger cars and light trucks under revised GHG standards, which will result in significant reductions of the consumption of petroleum, will achieve energy security benefits, and have no adverse energy effects. Because the GHG emission standards result in significant fuel savings, this rule encourages more efficient use of fuels. Table 5-10 in the RIA shows over 360 billion gallons of retail gasoline reduced through 2050 or nearly seven billion barrels of oil reduced through 2050.I. National Technology Transfer and Advancement Act and 1 CFR Part 51 This rulemaking involves technical standards. The Agency conducted a search to identify potentially applicable voluntary consensus standards. For CO2emissions, we identified no such standards and none were identified in comments; EPA is therefore ***collecting*** ***data*** over the same tests that are used for the current CO2standards and for the CAFE program. This will minimize the amount of testing done by manufacturers, since manufacturers are already required to run these tests. For A/C credits, EPA is using the test specified in 40 CFR 1066.845 EPA knows of no voluntary consensus standard for the A/C test and none were identified in comments. In accordance with the requirements of 1 CFR 51.5, we are incorporating by reference the use of a test method from SAE International, specifically SAE J1711, ``Recommended Practice for Measuring the Exhaust Emissions and Fuel Economy of Hybrid-Electric Vehicles, Including Plug-in Hybrid Vehicles'', Revised June 2010. The Recommended Practice establishes uniform chassis dynamometer test procedures for hybrid electric vehicles to allow for measuring and calculating exhaust emissions and fuel economy when vehicles drive over specified duty cycles. We adopted regulatory requirements in an earlier rulemaking, but did not complete all the steps necessary to formally incorporate this test method by reference into the EPA regulation. The referenced test method may be obtained through the SAE International website ([*www.sae.org*](http://www.sae.org)) or by calling SAE at (877) 606-7323 (U.S and Canada) or (724) 776-4970 (outside the U.S and Canada).J. Executive Order 12898: ``Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations'' For this final action, EPA is only able to qualitatively evaluate the extent to which this action may result in disproportionately high and adverse human health or environmental effects on minority populations, low income populations, and/or indigenous peoples, as specified in Executive Order 12898 (59 FR 7629, February 16, 1994). With respect to GHG emissions, EPA has determined that this rule will benefit all U.S populations, including communities of color, low-income populations and/or indigenous peoples. While this final rule will substantially reduce GHG emissions, future impacts of climate change are still expected in the baseline and will likely be unevenly distributed in ways that uniquely impact these communities. EPA has not quantitatively assessed these effects. For non-GHG pollutants, EPA has concluded that it is not practicable given the timing of this final action to determine the extent to which effects on communities of color, low-income populations and/or indigenous peoples are differentially distributed. We expect this final rule will result in both small reductions and small increases of non-GHG emissions that could impact communities with EJ concerns in the near term, though not necessarily immediately and not equally in all locations. It was not practicable to develop the air quality information needed to perform a quantified analysis of the distribution of such non-GHG impacts. EPA intends to initiate a future rule to further reduce emissions of GHGs and criteria and toxic pollutants from light-duty vehicles for model years beyond 2026. We are considering how to project air quality impacts from the changes in non-GHG emissions for that future rulemaking (see Section V.C of this preamble). Section VII.L of this preamble describes how we considered environmental justice in this action.K. Congressional Review Act (CRA) This action is subject to the CRA, and the EPA will submit a rule report to each House of the Congress and to the Comptroller General of the United States. This action is a ``major rule'' as defined by 5 U.S.C 804(2).L. Judicial Review This final action is ``nationally applicable'' within the meaning of CAA section 307(b)(1) because it is expressly listed in the section (i.e , ``any standard under section [202] of this title''). Under section 307(b)(1) of the CAA, petitions for judicial review of this action must be filed in the United States Court of Appeals for the District of Columbia Circuit within 60 days from the date this final action is published in the Federal Register. Filing a petition for reconsideration by the Administrator of this final action does not affect the finality of the action for the purposes of judicial review, nor does it extend the time within which a petition for judicial review must be filed and shall not postpone the effectiveness of such rule or action.IX. Statutory Provisions and Legal Authority Statutory authority for this final rule is found in section 202(a) (which authorizes standards for emissions of pollutants from new motor vehicles which emissions cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare), 202(d), 203-209, 216, and 301 of the Clean Air Act, 42 U.S.C 7521(a), 7521(d), 7522-7525, 7541-7543, 7550, and 7601.List of Subjects40 CFR Part 86 Environmental protection, Administrative practice and procedure, Confidential business information, Incorporation by reference, Labeling, Motor vehicle pollution, Reporting and recordkeeping requirements.40 CFR Part 600 Environmental protection, Administrative practice and procedure, Electric power, Fuel economy, Labeling, Reporting and recordkeeping requirements.Michael S. Regan,Administrator. For the reasons set out in the preamble, we are amending title 40, chapter I of the Code of Federal Regulations as set forth below.PART 86--CONTROL OF EMISSIONS FROM NEW AND IN-USE HIGHWAY VEHICLES AND ENGINES01. The authority citation for part 86 continues to read as follows: Authority: 42 U.S.C 7401-7671q.02. Amend Sec. 86.1 by redesignating paragraphs (g)(3) through (27) as (g)(4)[[Page 74522]]through (28) and adding a new paragraph (g)(3) to read as follows:Sec. 86.1 Incorporation by reference.\* \* \* \* \* (g) \* \* \* (3) SAE J1711, Recommended Practice for Measuring the Exhaust Emissions and Fuel Economy of Hybrid-Electric Vehicles, Including Plug-in Hybrid Vehicles, Revised June 2010, IBR approved for Sec. 86.1866-12(b).\* \* \* \* \*03. Amend Sec. 86.1806-17 by revising paragraph (a) introductory text to read as follows:Sec. 86.1806-17 Onboard diagnostics.\* \* \* \* \* (a) Vehicles must comply with the 2013 OBD requirements adopted for California as described in this paragraph (a). California's 2013 OBD-II requirements are part of Title 13, Sec. 1968.2 of the California Code of Regulations, approved on July 31, 2013 (incorporated by reference in Sec. 86.1). We may approve your request to certify an OBD system meeting a later version of California's OBD requirements if you demonstrate that it complies with the intent of this section. The following clarifications and exceptions apply for vehicles certified under this subpart:\* \* \* \* \*04. Amend Sec. 86.1818-12 by revising paragraph (c)(2)(i), (c)(3)(i), and (e)(3)(ii)(A) to read as follows:Sec. 86.1818-12 Greenhouse gas emission standards for light-duty vehicles, light-duty trucks, and medium-duty passenger vehicles.\* \* \* \* \* (c) \* \* \* (2) \* \* \* (i) Calculation of CO2 target values for passenger automobiles. A CO2target value shall be determined for each passenger automobile as follows: (A) For passenger automobiles with a footprint of less than or equal to 41 square feet, the gram/mile CO2target value shall be selected for the appropriate model year from the following table: Table 1 to Sec. 86.1818-12(c)(2)(i)(A)------------------------------------------------------------------------ CO2 target Model year value (grams/ mile)------------------------------------------------------------------------2012.................................................... 244.02013.................................................... 237.02014.................................................... 228.02015.................................................... 217.02016.................................................... 206.02017.................................................... 195.02018.................................................... 185.02019.................................................... 175.02020.................................................... 166.02021.................................................... 161.82022.................................................... 159.02023.................................................... 145.62024.................................................... 138.62025.................................................... 130.52026 and later.......................................... 114.3------------------------------------------------------------------------ (B) For passenger automobiles with a footprint of greater than 56 square feet, the gram/mile CO2target value shall be selected for the appropriate model year from the following table: Table 2 to Sec. 86.1818-12(c)(2)(i)(B)------------------------------------------------------------------------ CO2 target Model year value (grams/ mile)------------------------------------------------------------------------2012.................................................... 315.02013.................................................... 307.02014.................................................... 299.02015.................................................... 288.02016.................................................... 277.02017.................................................... 263.02018.................................................... 250.02019.................................................... 238.02020.................................................... 226.02021.................................................... 220.92022.................................................... 217.32023.................................................... 199.12024.................................................... 189.52025.................................................... 179.42026 and later.......................................... 160.9------------------------------------------------------------------------ (C) For passenger automobiles with a footprint that is greater than 41 square feet and less than or equal to 56 square feet, the gram/mile CO2target value shall be calculated using the following equation and rounded to the nearest 0.1 gram/mile:Target CO2= [a x f] + bWhere:f is the vehicle footprint, as defined in Sec. 86.1803; and a and b are selected from the following table for the appropriate model year: Table 3 to Sec. 86.1818-12(c)(2)(i)(C)------------------------------------------------------------------------ Model year A B------------------------------------------------------------------------2012.................................................. 4.72 50.52013.................................................. 4.72 43.32014.................................................. 4.72 34.82015.................................................. 4.72 23.42016.................................................. 4.72 12.72017.................................................. 4.53 8.92018.................................................. 4.35 6.52019.................................................. 4.17 4.22020.................................................. 4.01 1.92021.................................................. 3.94 0.22022.................................................. 3.88 -0.12023.................................................. 3.56 -0.42024.................................................. 3.39 -0.42025.................................................. 3.26 -3.22026 and later........................................ 3.11 -13.1------------------------------------------------------------------------\* \* \* \* \* (3) \* \* \* (i) Calculation of CO2 target values for light trucks. A CO2target value shall be determined for each light truck as follows: (A) For light trucks with a footprint of less than or equal to 41 square feet, the gram/mile CO2target value shall be selected for the appropriate model year from the following table: Table 4 to Sec. 86.1818-12(c)(3)(i)(A)------------------------------------------------------------------------ CO2 target Model year value (grams/ mile)------------------------------------------------------------------------2012.................................................... 294.02013.................................................... 284.02014.................................................... 275.02015.................................................... 261.02016.................................................... 247.02017.................................................... 238.02018.................................................... 227.02019.................................................... 220.02020.................................................... 212.02021.................................................... 206.52022.................................................... 203.02023.................................................... 181.12024.................................................... 172.12025.................................................... 159.32026 and later.......................................... 141.8------------------------------------------------------------------------ (B) For light trucks with a footprint that is greater than 41 square feet and less than or equal to the maximum footprint value specified in the table below for each model year, the gram/mile CO2target value shall be calculated using the following equation and rounded to the nearest 0.1 gram/mile, except as specified in paragraph (c)(3)(i)(D) of this section:Target CO2= (a x f) + bWhere:f is the footprint, as defined in Sec. 86.1803; and a and b are selected from the following table for the appropriate model year:[[Page 74523]] Table 5 to Sec. 86.1818-12(c)(3)(i)(B)---------------------------------------------------------------------------------------------------------------- Maximum Model year footprint A B----------------------------------------------------------------------------------------------------------------2012............................................................ 66.0 4.04 128.62013............................................................ 66.0 4.04 118.72014............................................................ 66.0 4.04 109.42015............................................................ 66.0 4.04 95.12016............................................................ 66.0 4.04 81.12017............................................................ 50.7 4.87 38.32018............................................................ 60.2 4.76 31.62019............................................................ 66.4 4.68 27.72020............................................................ 68.3 4.57 24.62021............................................................ 68.3 4.51 21.52022............................................................ 68.3 4.44 20.62023............................................................ 74.0 3.97 18.42024............................................................ 74.0 3.77 17.42025............................................................ 74.0 3.58 12.52026 and later.................................................. 74.0 3.41 1.9---------------------------------------------------------------------------------------------------------------- (C) For light trucks with a footprint that is greater than the minimum footprint value specified in the table below and less than or equal to the maximum footprint value specified in the table below for each model year, the gram/mile CO2target value shall be calculated using the following equation and rounded to the nearest 0.1 gram/mile, except as specified in paragraph (c)(3)(i)(D) of this section:Target CO2= (a x f) + bWhere:f is the footprint, as defined in Sec. 86.1803; and a and b are selected from the following table for the appropriate model year: Table 6 to Sec. 86.1818-12(c)(3)(i)(C)---------------------------------------------------------------------------------------------------------------- Minimum Maximum Model year footprint footprint A b----------------------------------------------------------------------------------------------------------------2017............................................ 50.7 66.0 4.04 80.52018............................................ 60.2 66.0 4.04 75.0---------------------------------------------------------------------------------------------------------------- (D) For light trucks with a footprint greater than the minimum value specified in the table below for each model year, the gram/mile CO2target value shall be selected for the appropriate model year from the following table: Table 7 to Sec. 86.1818-12(c)(3)(i)(D)------------------------------------------------------------------------ CO2 target Model year Minimum value (grams/ footprint mile)------------------------------------------------------------------------2012.................................... 66.0 395.02013.................................... 66.0 385.02014.................................... 66.0 376.02015.................................... 66.0 362.02016.................................... 66.0 348.02017.................................... 66.0 347.02018.................................... 66.0 342.02019.................................... 66.4 339.02020.................................... 68.3 337.02021.................................... 68.3 329.42022.................................... 68.3 324.12023.................................... 74.0 312.12024.................................... 74.0 296.52025.................................... 74.0 277.42026 and later.......................... 74.0 254.4------------------------------------------------------------------------\* \* \* \* \* (e) \* \* \* (3) \* \* \* (ii) \* \* \* (A) The alternative compliance schedule is as described in this paragraph (e)(3)(ii)(A). In lieu of the standards in paragraph (c) of this section that would otherwise be applicable to the model year shown in the first column of table 8 to Sec. 86.1818-12(e)(3)(ii)(A), a qualifying manufacturer may comply with the standards in paragraph (c) of this section determined for the model year shown in the second column of the table. In the 2021 and later model years the manufacturer must meet the standards designated for each model year in paragraph (c) of this section.[[Page 74524]]Table 8 to Sec. 86.1818-12(e)(3)(ii)(A) follows: Table 8 to Sec. 86.1818-12(e)(3)(ii)(A)------------------------------------------------------------------------ Applicable Model year standards------------------------------------------------------------------------2017.................................................... 20162018.................................................... 20162019.................................................... 20182020.................................................... 2019------------------------------------------------------------------------\* \* \* \* \*05. Amend Sec. 86.1865-12 by revising paragraphs (k)(2), (3), and (6) to read as follows:Sec. 86.1865-12 How to comply with the fleet average CO2 standards.\* \* \* \* \* (k) \* \* \* (2) There are no property rights associated with CO2credits generated under this subpart. Credits are a limited authorization to emit the designated amount of emissions. Nothing in this part or any other provision of law shall be construed to limit EPA's authority to terminate or limit this authorization through a rulemaking. (3) Each manufacturer must comply with the reporting and recordkeeping requirements of paragraph (l) of this section for CO2credits, including early credits. The averaging, banking and trading program is enforceable as provided in paragraphs (k)(7)(ii), (k)(9)(iii), and (l)(1)(vi) of this section through the certificate of conformity that allows the manufacturer to introduce any regulated vehicles into U.S commerce.\* \* \* \* \* (6) Unused CO2credits generally retain their full value through five model years after the model year in which they were generated; credits remaining at the end of the fifth model year after the model year in which they were generated may not be used to demonstrate compliance for later model years. However, in the case of model year 2017 and 2018 passenger cars and light trucks, unused CO2credits retain their full value through six model years after the year in which they were generated.\* \* \* \* \*06. Amend Sec. 86.1866-12 by revising the section heading and paragraph (b) and adding paragraph (c)(3) to read as follows:Sec. 86.1866-12 CO2 credits for advanced technology vehicles.\* \* \* \* \* (b) For electric vehicles, plug-in hybrid electric vehicles, fuel cell vehicles, dedicated natural gas vehicles, and dual-fuel natural gas vehicles as those terms are defined in Sec. 86.1803-01, that are certified and produced for U.S sale in the specified model years and that meet the additional specifications in this section, the manufacturer may use the production multipliers in this paragraph (b) when determining additional credits for advanced technology vehicles. Full size pickup trucks eligible for and using a production multiplier are not eligible for the strong hybrid-based credits described in Sec. 86.1870-12(a)(2) or the performance-based credits described in Sec. 86.1870-12(b). (1) The following production multipliers apply for model year 2017 through 2025 vehicles: Table 1 to Paragraph (b)(1)---------------------------------------------------------------------------------------------------------------- Electric Dedicated and vehicles and Plug-in hybrid dual-fuel Model year fuel cell electric natural gas vehicles vehicles vehicles----------------------------------------------------------------------------------------------------------------2017............................................................ 2.0 1.6 1.62018............................................................ 2.0 1.6 1.62019............................................................ 2.0 1.6 1.62020............................................................ 1.75 1.45 1.452021............................................................ 1.5 1.3 1.32022............................................................ .............. .............. 2.02023-2024....................................................... 1.5 1.3 ..............---------------------------------------------------------------------------------------------------------------- (2) The minimum all-electric driving range that a plug-in hybrid electric vehicle must have in order to qualify for use of a production multiplier is 10.2 miles on its nominal storage capacity of electricity when operated on the highway fuel economy test cycle. Alternatively, a plug-in hybrid electric vehicle may qualify for use of a production multiplier by having an equivalent all-electric driving range greater than or equal to 10.2 miles during its actual charge-depleting range as measured on the highway fuel economy test cycle and tested according to the requirements of SAE J1711 (incorporated by reference in Sec. 86.1). The equivalent all-electric range of a PHEV is determined from the following formula:EAER = RCDAx (CO2CS- CO2CD/CO2CS)Where:EAER = the equivalent all-electric range attributed to charge-depleting operation of a plug-in hybrid electric vehicle on the highway fuel economy test cycle.RCDA= The actual charge-depleting range determined according to SAE J1711 (incorporated by reference in Sec. 86.1).CO2CS= The charge-sustaining CO2emissions in grams per mile on the highway fuel economy test determined according to SAE J1711 (incorporated by reference in Sec. 86.1).CO2CD= The charge-depleting CO2emissions in grams per mile on the highway fuel economy test determined according to SAE J1711 (incorporated by reference in Sec. 86.1). (3) The actual production of qualifying vehicles may be multiplied by the applicable value according to the model year, and the result, rounded to the nearest whole number, may be used to represent the production of qualifying vehicles when calculating average carbon-related exhaust emissions under Sec. 600.512 of this chapter. (c) \* \* \* (3) Multiplier-based credits for model years 2022 through 2025 may not exceed credit caps, as follows: (i) Calculate a nominal annual credit cap in Mg using the following equation, rounded to the nearest whole number:[GRAPHIC] [TIFF OMITTED] TR30DE21.005[[Page 74525]]Where:Pauto = total number of certified passenger automobiles the manufacturer produced in a given model year for sale in any state or territory of the United States.Ptruck = total number of certified light trucks (including MDPV) the manufacturer produced in a given model year for sale in any state or territory of the United States. (ii) Calculate an annual g/mile equivalent value for the multiplier-based credits using the following equation, rounded to the nearest 0.1 g/mile:[GRAPHIC] [TIFF OMITTED] TR30DE21.006Where:annual credits = a manufacturer's total multiplier-based credits in a given model year from all passenger automobiles and light trucks as calculated under this paragraph (c). (iii) Calculate a cumulative g/mile equivalent value for the multiplier-based credits in 2022 through 2025 by adding the annual g/mile equivalent values calculated under paragraph (c)(3)(ii) of this section. (iv) The cumulative g/mile equivalent value may not exceed 10.0 in any year. (v) The annual credit report must include for every model year from 2022 through 2025, as applicable, the calculated values for the nominal annual credit cap in Mg and the cumulative g/mile equivalent value.07. Revise the section heading for Sec. 86.1867-12 to read as follows:Sec. 86.1867-12 CO2 credits for reducing leakage of air conditioning refrigerant.\* \* \* \* \*08. Amend Sec. 86.1869-12 by revising paragraphs (b)(2) and (b)(4)(v), (vi), and (x) and (d)(2)(ii)(A) to read as follows:Sec. 86.1869-12 CO2 credits for off-cycle CO2 reducing technologies.\* \* \* \* \* (b) \* \* \* (2) The maximum allowable decrease in the manufacturer's combined passenger automobile and light truck fleet average CO2emissions attributable to use of the default credit values in paragraph (b)(1) of this section is 15 g/mi for model years 2023 through 2026 and 10 g/mi in all other model years. If the total of the CO2g/mi credit values from paragraph (b)(1) of this section does not exceed 10 or 15 g/mi (as applicable) for any passenger automobile or light truck in a manufacturer's fleet, then the total off-cycle credits may be calculated according to paragraph (f) of this section. If the total of the CO2g/mi credit values from paragraph (b)(1) of this section exceeds 10 or 15 g/mi (as applicable) for any passenger automobile or light truck in a manufacturer's fleet, then the gram per mile decrease for the combined passenger automobile and light truck fleet must be determined according to paragraph (b)(2)(ii) of this section to determine whether the applicable limitation has been exceeded. (i) Determine the gram per mile decrease for the combined passenger automobile and light truck fleet using the following formula:[GRAPHIC] [TIFF OMITTED] TR30DE21.007Where:Credits = The total of passenger automobile and light truck credits, in Megagrams, determined according to paragraph (f) of this section and limited to those credits accrued by using the default gram per mile values in paragraph (b)(1) of this section.ProdC= The number of passenger automobiles produced by the manufacturer and delivered for sale in the U.S ProdT= The number of light trucks produced by the manufacturer and delivered for sale in the U.S (ii) If the value determined in paragraph (b)(2)(i) of this section is greater than 10 or 15 grams per mile (as applicable), the total credits, in Megagrams, that may be accrued by a manufacturer using the default gram per mile values in paragraph (b)(1) of this section shall be determined using the following formula:[GRAPHIC] [TIFF OMITTED] TR30DE21.008Where:ProdC= The number of passenger automobiles produced by the manufacturer and delivered for sale in the U.S ProdT= The number of light trucks produced by the manufacturer and delivered for sale in the U.S (iii) If the value determined in paragraph (b)(2)(i) of this section is not greater than 10 or 15 grams per mile (as applicable), then the credits that may be accrued by a manufacturer using the default gram per mile values in paragraph (b)(1) of this section do not exceed the allowable limit, and total credits may be determined for each category of vehicles according to paragraph (f) of this section. (iv) If the value determined in paragraph (b)(2)(i) of this section is greater than 10 or 15 grams per mile (as applicable), then the combined passenger automobile and light truck credits, in Megagrams, that may be accrued using the calculations in paragraph (f) of this section must not exceed the value determined in paragraph (b)(2)(ii) of this section. This limitation should generally be done by reducing the amount of credits attributable to the vehicle category that caused the limit to be exceeded such that the total value does not exceed the value determined in paragraph (b)(2)(ii) of this section.\* \* \* \* \* (4) \* \* \* (v) Active transmission warm-up means one of the following: (A) Through model year 2022, active transmission warm-up means a system that uses waste heat from the vehicle to[[Page 74526]]quickly warm the transmission fluid to an operating temperature range using a heat exchanger, increasing the overall transmission efficiency by reducing parasitic losses associated with the transmission fluid, such as losses related to friction and fluid viscosity. (B) Starting in model year 2023, active transmission warm-up means a system that uses waste heat from the vehicle's exhaust to warm the transmission fluid to an operating temperature range using a dedicated heat exchanger. Active transmission warm-up may also include coolant systems that capture heat from a liquid-cooled exhaust manifold if the coolant loop to the transmission heat exchanger is not shared with other heat-extracting systems and it starts heat transfer to the transmission fluid immediately after engine starting, consistent with designs that exchange heat directly from exhaust gases to the transmission fluid. (vi) Active engine warm-up means one of the following: (A) Through model year 2022, active engine warm-up means a system that uses waste heat from the vehicle to warm up targeted parts of the engine so it reduces engine friction losses and enables closed-loop fuel control to start sooner. (B) Starting in model year 2023, active engine warm-up means a system that uses waste heat from the vehicle's exhaust to warm up targeted parts of the engine so it reduces engine friction losses and enables closed-loop fuel control to start sooner. Active engine warm-up may also include coolant systems that capture heat from a liquid-cooled exhaust manifold.\* \* \* \* \* (x) Passive cabin ventilation means one of the following: (A) Through model year 2022, passive cabin ventilation means ducts, devices, or methods that utilize convective airflow to move heated air from the cabin interior to the exterior of the vehicle. (B) Starting in model year 2023, passive cabin ventilation means methods that create and maintain convective airflow through the body's cabin by keeping windows or sunroof open to prevent excessive interior temperatures when the vehicle is parked outside in direct sunlight.\* \* \* \* \* (d) \* \* \* (2) \* \* \* (ii) \* \* \* (A) A citation to the appropriate previously approved methodology, including the appropriate Federal Register Notice and any subsequent EPA documentation of the Administrator's decision;\* \* \* \* \*09. Amend Sec. 86.1870-12 by revising the section heading and paragraphs (a)(2) and (b)(2) to read as follows:Sec. 86.1870-12 CO2 credits for qualifying full-size pickup trucks.\* \* \* \* \* (a) \* \* \* (2) Full-size pickup trucks that are strong hybrid electric vehicles and that are produced in 2017 through 2021 model years are eligible for a credit of 20 grams/mile. This same credit is available again for those vehicles produced in 2023 and 2024 model years. To receive this credit in a model year, the manufacturer must produce a quantity of strong hybrid electric full-size pickup trucks such that the proportion of production of such vehicles, when compared to the manufacturer's total production of full-size pickup trucks, is not less than 10 percent in that model year. Full-size pickup trucks earning credits under this paragraph (a)(2) may not earn credits based on the production multipliers described in Sec. 86.1866-12(b).\* \* \* \* \* (b) \* \* \* (2) Full-size pickup trucks that are produced in 2017 through 2021 model years and that achieve carbon-related exhaust emissions less than or equal to the applicable target value determined in Sec. 86.1818-12(c)(3) multiplied by 0.80 (rounded to the nearest gram/mile) in a model year are eligible for a credit of 20 grams/mile. This same credit is available again for qualifying vehicles produced in 2023 and 2024 model years. A pickup truck that qualifies for this credit in a model year may claim this credit for a maximum of four subsequent model years (a total of five consecutive model years) if the carbon-related exhaust emissions of that pickup truck do not increase relative to the emissions in the model year in which the pickup truck first qualified for the credit. This credit may not be claimed in model year 2022 or in any model year after 2024. To qualify for this credit in a model year, the manufacturer must produce a quantity of full-size pickup trucks that meet the emission requirements of this paragraph (b)(2) such that the proportion of production of such vehicles, when compared to the manufacturer's total production of full-size pickup trucks, is not less than 10 percent in that model year. A pickup truck that qualifies for this credit in a model year and is subject to a major redesign in a subsequent model year such that it qualifies for the credit in the model year of the redesign may be allowed to qualify for an additional five years with EPA approval (not to go beyond the 2024 model year). Use good engineering judgment to determine whether a pickup truck has been subject to a major redesign.\* \* \* \* \*PART 600--FUEL ECONOMY AND GREENHOUSE GAS EXHAUST EMISSIONS OF MOTOR VEHICLES010. The authority citation for part 600 continues to read as follows: Authority: 49 U.S.C 32901-23919q, Pub. L. 109-58.011. Amend Sec. 600.510-12 by revising paragraphs (j)(2)(v) introductory text and (j)(2)(vii)(A) introductory text to read as follows:Sec. 600.510-12 Calculation of average fuel economy and average carbon-related exhaust emissions.\* \* \* \* \* (j) \* \* \* (2) \* \* \* (v) For natural gas dual fuel model types, for model years 2012 through 2015, the arithmetic average of the following two terms; the result rounded to the nearest gram per mile:\* \* \* \* \* (vii)(A) This paragraph (j)(2)(vii) applies to model year 2016 and later natural gas dual fuel model types. Model year 2021 and later natural gas dual fuel model types may use a utility factor of 0.5 or the utility factor prescribed in this paragraph (j)(2)(vii).\* \* \* \* \*[FR Doc. 2021-27854 Filed 12-29-21; 8:45 am]BILLING CODE 6560-50-P

**Load-Date:** December 31, 2021

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[***Federal Register: Reissuance and Modification of Nationwide Permits Pages 73522 - 73583 [FR DOC #2021-27441]***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:64D9-35T1-JDG9-Y42T-00000-00&context=1516831)

Impact News Service

December 27, 2021 Monday

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**Length:** 54858 words

**Body**

Washington: Office of the Federal Register has issued the following notice:Department of Defense-----------------------------------------------------------------------Department of the Army, Corps of Engineers-----------------------------------------------------------------------33 CFR Chapter IIReissuance and Modification of Nationwide Permits; Final RuleFederal Register / Vol. 86 , No. 245 / Monday, December 27, 2021 / Rules and Regulations[[Page 73522]]-----------------------------------------------------------------------DEPARTMENT OF DEFENSEDepartment of the Army, Corps of Engineers33 CFR Chapter II[Docket Number: COE-2020-0002]RIN 0710-AB29Reissuance and Modification of Nationwide PermitsAGENCY: Army Corps of Engineers, DoD.ACTION: Final rule.-----------------------------------------------------------------------SUMMARY: Nationwide Permits (NWPs) authorize certain activities under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899 that have no more than minimal individual and cumulative adverse environmental effects. In a proposed rule published in the September 15, 2020, issue of the Federal Register, the Corps proposed to reissue 52 existing NWPs and issue five new NWPs, plus the NWP general conditions and definitions. In a final rule published in the January 13, 2021, issue of the Federal Register, the Corps reissued 12 of the 52 existing NWPs and four of the five new NWPs, as well as the NWP general conditions and definitions. In this final rule, the Corps is reissuing the remaining 40 existing NWPs and issuing the remaining one new NWP. The NWP general conditions and definitions published in the January 13, 2021, issue of the Federal Register apply to the 41 NWPs reissued or issued in this final rule.DATES: The 41 NWPs in this final rule go into effect on February 25, 2022. The 41 NWPs in this final rule expire on March 14, 2026.ADDRESSES: U.S Army Corps of Engineers, Attn: CECW-CO-R, 441 G Street NW, Washington, DC 20314-1000.FOR FURTHER INFORMATION CONTACT: Mr. David Olson at 202-761-4922 or access the U.S Army Corps of Engineers Regulatory Home Page at [*https://www.usace.army.mil/Missions/Civil-Works/Regulatory-Program-and-Permits/.SUPPLEMENTARY*](https://www.usace.army.mil/Missions/Civil-Works/Regulatory-Program-and-Permits/.SUPPLEMENTARY) INFORMATION: Table of ContentsI. Background A. General B. Overview of Proposed Rule C. Overview of This Final Rule E. Nationwide Permit VerificationsII. Discussion of Public Comments A. Overview B. Responses to General Comments C. Comments on Regional Conditioning of Nationwide Permits D. Response to Comments on Specific Nationwide Permits in This Final Rule E. Responses to Comments on the Nationwide Permit General Conditions F. Responses to Comments on the District Engineer's Decision G. Discussion of Proposed Modifications to Section F, DefinitionsIII. Compliance With Relevant Statutes A. National Environmental Policy Act Compliance B. Compliance With Section 404(e) of the Clean Water Act C. 2020 Revisions to the Definition of ``Waters of the United States'' (i.e , the Navigable Waters Protection Rule) D. Compliance With the Endangered Species Act E. Compliance With the Essential Fish Habitat Provisions of the Magnuson-Stevens Fishery Conservation and Management Act F. Compliance With Section 106 of the National Historic Preservation Act G. Section 401 of the Clean Water Act H. Section 307 of the Coastal Zone Management Act (CZMA)IV. Economic ImpactV. Administrative RequirementsVI. ReferencesList of AcronymsBMP Best Management PracticeCEQ Council on Environmental QualityCWA Clean Water ActDA Department of the ArmyEFH Essential Fish HabitatESA Endangered Species ActFWS U.S Fish and Wildlife ServiceGC General ConditionNEPA National Environmental Policy ActNHPA National Historic Preservation ActNMFS National Marine Fisheries ServiceNPDES National Pollutant Discharge Elimination SystemNWP Nationwide PermitPCN Pre-construction NotificationRGL Regulatory Guidance LetterList of Nationwide Permits Issued in This Final Rule1. Aids to Navigation2. Structures in Artificial Canals3. Maintenance4. Fish and Wildlife Harvesting, Enhancement, and Attraction Devices and Activities5. Scientific Measurement Devices6. Survey Activities7. Outfall Structures and Associated Intake Structures8. Oil and Gas Structures on the Outer Continental Shelf9. Structures in Fleeting and Anchorage Areas10. Mooring Buoys11. Temporary Recreational Structures13. Bank Stabilization14. Linear Transportation Projects15. U.S Coast Guard Approved Bridges16. Return Water From Upland Contained Disposal Areas17. Hydropower Projects18. Minor Discharges19. Minor Dredging20. Response Operations for Oil or Hazardous Substances22. Removal of Vessels23. Approved Categorical Exclusions24. Indian Tribe or State Administered Section 404 Programs25. Structural Discharges27. Aquatic Habitat Restoration, Establishment, and Enhancement Activities28. Modifications of Existing Marinas30. Moist Soil Management for Wildlife31. Maintenance of Existing Flood Control Facilities32. Completed Enforcement Actions33. Temporary Construction, Access, and Dewatering34. Cranberry Production Activities35. Maintenance Dredging of Existing Basins36. Boat Ramps37. Emergency Watershed Protection and Rehabilitation38. Cleanup of Hazardous and Toxic Waste41. Reshaping Existing Drainage Ditches45. Repair of Uplands Damaged by Discrete Events46. Discharges in Ditches49. Coal Remining Activities53. Removal of Low-Head Dams54. Living Shorelines59. Water Reclamation and Reuse FacilitiesI. BackgroundA. General The U.S Army Corps of Engineers (Corps) issues nationwide permits (NWPs) to authorize activities under Section 404 of the Clean Water Act (33 U.S.C 1344) and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C 403), where those activities will result in no more than minimal individual and cumulative adverse environmental effects. NWPs were first issued by the Corps in 1977 (42 FR 37122) to authorize categories of activities that have minimal adverse effects on the aquatic environment with conditions to minimize those adverse effects, without requiring individual permits for those activities. After 1977, NWPs have been issued or reissued in 1982 (47 FR 31794), 1984 (49 FR 39478), 1986 (51 FR 41206), 1991 (56 FR 59110), 1995 (60 FR 38650), 1996 (61 FR 65874), 2000 (65 FR 12818), 2002 (67 FR 2020), 2007 (72 FR 11092), 2012 (77 FR 10184), 2017 (82 FR 1860), and 2021 (86 FR 2744). Section 404(e) of the Clean Water Act provides the statutory authority for the Secretary of the Army, after notice and opportunity for public hearing, to issue general permits on a nationwide basis for any category of activities involving discharges of dredged or fill material into waters of the United States that will cause only minimal individual and cumulative adverse environmental effects for a period of no more than five years after the date of issuance (33 U.S.C 1344(e)). The Secretary's authority to issue permits has been[[Page 73523]]delegated to the Chief of Engineers and designated representatives of the Chief of Engineers. Nationwide permits are a type of general permit issued by the Chief of Engineers and are designed to regulate with little, if any, delay or paperwork certain activities in federally jurisdictional waters and wetlands, where those activities would have no more than minimal adverse environmental impacts (see 33 CFR 330.1(b)). The categories of activities authorized by NWPs must be similar in nature, cause only minimal adverse environmental effects when performed separately, and have only minimal cumulative adverse effect on the environment (see 33 U.S.C 1344(e)(1)). NWPs can be issued for a period of no more than 5 years (33 U.S.C 1344(e)(2)), and the Corps has the authority to modify, reissue, revoke, or suspend the NWPs before they expire. NWPs can also be issued to authorize activities pursuant to Section 10 of the Rivers and Harbors Act of 1899 (see 33 CFR 322.2(f)). The NWP program is designed to provide timely authorizations for the regulated public while protecting the Nation's aquatic resources. On September 15, 2020, the Corps published a proposed rule in the Federal Register (85 FR 57298) to reissue 52 existing NWPs with modifications, to issue five new NWPs, and to reissue the NWP general conditions and definitions with modifications. On January 13, 2021, the Corps published a final rule in the Federal Register (86 FR 2744). In that final rule, the Corps reissued the following NWPs: NWP 12 (oil or natural gas pipeline activities); NWP 21 (surface coal mining activities); NWP 29 (residential developments); NWP 39 (commercial and institutional developments); NWP 40 (***agricultural*** activities); NWP 42 (recreational facilities); NWP 43 (stormwater management facilities); NWP 44 (mining activities); NWP 48 (commercial shellfish mariculture activities); NWP 50 (underground coal mining activities); NWP 51 (land-based renewable energy generation facilities); and NWP 52 (water-based renewable energy generation pilot projects). The Corps issued four new NWPs: NWP 55 (seaweed mariculture activities); NWP 56 (finfish mariculture activities); NWP 57 (electric utility line and telecommunications activities); and NWP 58 (utility line activities for water and other substances). In the final rule published on January 13, 2021, the Corps stated that it would issue a separate final rule for its decisions on the proposed reissuance of the other 40 proposed NWPs and the issuance of proposed new NWP E for water reclamation and reuse facilities. The 16 NWPs issued or reissued in the final rule that was published in the January 13, 2021, issue of the Federal Register expire on March 14, 2026. The 41 NWPs published in today's final rule will also expire on March 14, 2026, so that all of the NWPs issued or reissued in 2021 expire on the same date. Under Section 404(e) of the Clean Water Act (33 U.S.C 1344(e)), an NWP cannot be issued for a period of more than five years, and the Corps has discretion to establish an expiration date for an NWP that is less than five years after the date the NWP goes into effect. Establishing the same expiration date for 16 NWPs issued in January 2021 and the 41 NWPs issued in today's final rule will help provide consistency and clarity to the regulated public and the Corps, and align all of the NWPs in terms of scheduling the next rulemaking to issue or reissue the NWPs. At its discretion, the Corps may rescind, revise, or suspend one or more NWPs prior to that time. Consistent with E.O 13990, Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis, the Army is also considering whether additional steps should be taken to ensure the Nationwide Permits program aligns with this Administration's policies and priorities moving forward. Nationwide permits authorize categories of activities that are similar in nature and will cause only minimal adverse environmental effects when performed separately, and will have only minimal cumulative adverse effect on the environment. See 33 U.S.C 1344(e)(1). The phrase ``minimal adverse environmental effects when performed separately'' refers to the direct and indirect adverse environmental effects caused by a specific activity authorized by an NWP. The phrase ``minimal cumulative adverse effect on the environment'' refers to the ***collective*** direct and indirect adverse environmental effects caused by all the activities authorized by a particular NWP during the time period when the NWP is in effect (a period of no more than 5 years) in a specific geographic region (e.g , 40 CFR 230.7(b)(3)). These concepts are defined in paragraph 2 of section D, ``District Engineer's Decision.'' The appropriate geographic area for assessing cumulative effects is determined by the decision-making authority for the general permit (generally, the district engineer). Some NWPs include pre-construction notification (PCN) requirements. PCNs give the Corps the opportunity to evaluate certain proposed NWP activities on a case-by-case basis to ensure that they will cause no more than minimal adverse environmental effects, individually and cumulatively. Except for activities conducted by non-federal permittees that require PCNs under paragraph (c) of the ``Endangered Species'' and ``Historic Properties'' general conditions (general conditions 18 and 20, respectively), if the Corps district does not respond to the PCN within 45 days of a receipt of a complete PCN, the activity is deemed authorized by the NWP (see 33 CFR 330.1(e)(1)). In fiscal year 2018, the average processing time for an NWP PCN was 45 days and the average processing time for a standard individual permit was 264 days. This difference in processing time can incentivize project proponents to reduce the adverse effects of their planned activities that would otherwise require an individual permit under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899, in order to qualify for NWP authorization. This reduction in adverse effects can therefore reduce a project's impact on the Nation's aquatic resources. There are 38 Corps district offices and 8 Corps division offices. The district offices administer the NWP program on a day-to-day basis by reviewing PCNs for proposed NWP activities. The division offices oversee district offices and are managed by division engineers. Division engineers have the authority, after public notice and comment, to modify, suspend, or revoke NWP authorizations on a regional basis to take into account regional differences among aquatic resources and to ensure that the NWPs authorize only those activities that result in no more than minimal individual and cumulative adverse environmental effects in a region (see 33 CFR 330.5(c)). When a Corps district receives a PCN, the district engineer reviews the PCN and determines whether the proposed activity will result in no more than minimal individual and cumulative adverse environmental effects, consistent with the criteria in paragraph 2 of section D, ``District Engineer's Decision.'' At this point, the district engineer may add conditions to the NWP authorization to ensure that the verified NWP activity results in no more than minimal individual and cumulative adverse environmental effects and that it is not contrary to the public interest, consistent with processes and requirements set out in 33 CFR 330.5(d). See section II.G for more[[Page 73524]]information on regional conditions for the NWPs. For some NWPs, when submitting a PCN, an applicant may request a waiver for a particular limit specified in the NWP's terms and conditions. If the applicant requests a waiver of an NWP limit and the district engineer determines, after coordinating with the resource agencies under paragraph (d) of NWP general condition 32, that the proposed NWP activity will result in no more than minimal adverse environmental effects, the district engineer may grant such a waiver. Following the conclusion of the district engineer's review of a PCN, the district engineer prepares an official, publicly available decision document. This document discusses the district engineer's findings as to whether a proposed NWP activity qualifies for NWP authorization, including compliance with all applicable terms and conditions, and the rationale for any waivers granted, and activity-specific conditions needed to ensure that the activity being authorized by the NWP will have no more than minimal individual and cumulative adverse environmental effects and will not be contrary to the public interest (see Sec. 330.6(a)(3)(i)). The case-by-case review of PCNs often results in district engineers adding activity-specific conditions to NWP authorizations to ensure that the adverse environmental effects are no more than minimal. These can include permit conditions such as time-of-year restrictions and/or use of best management practices and/or compensatory mitigation requirements to offset authorized losses of jurisdictional waters and wetlands so that the net adverse environmental effects caused by the authorized activity are no more than minimal. Any compensatory mitigation required for NWP activities must comply with the Corps' compensatory mitigation regulations at 33 CFR part 332. Review of a PCN may also result in the district engineer asserting discretionary authority to require an individual permit from the Corps for the proposed activity, if the district engineer determines, based on the information provided in the PCN and other available information, that the adverse environmental effects will be more than minimal, or otherwise determines that ``sufficient concerns for the environment or any other factor of the public interest so requires'' consistent with 33 CFR 330.4(e)(2)). During the review of PCNs, district engineers assess cumulative adverse environmental effects caused by NWP activities at an appropriate regional scale. Cumulative effects are the result of the accumulation of direct and indirect effects caused by multiple activities that persist over time in a particular geographic area (MacDonald 2000), such as a watershed or ecoregion (Gosselink and Lee 1989). Therefore, the geographic and temporal scales for cumulative effects analysis are larger than the analysis of the direct and indirect adverse environmental effects caused by specific NWP activities. For purposes of the NWP program, cumulative effects are the result of the combined effects of activities authorized by NWPs during the period the NWPs are in effect. The cumulative effects are assessed against the current environmental setting (environmental baseline) to determine whether the cumulative adverse environmental effects are more than minimal. The district engineer uses his or her discretion to determine the appropriate regional scale for evaluating cumulative effects. For the NWPs, the appropriate regional scale for evaluating cumulative effects may be a waterbody, watershed, county, state, or a Corps district, as appropriate. The appropriate regional scale is dependent, in part, on where the NWP activities are occurring. For example, for NWPs that authorize structures and/or work in navigable waters of the United States under Section 10 of the Rivers and Harbors Act of 1899, the appropriate geographic region for assessing cumulative effects may be a specific navigable waterbody or a seascape. For NWPs that authorize discharges of dredged or fill material into non-tidal jurisdictional wetlands and streams, the appropriate geographic region for assessing cumulative effects may be a watershed, county, state, or Corps district. The direct individual adverse environmental effects caused by activities authorized by NWPs are evaluated within the project footprint, and the indirect individual adverse environmental effects caused by activities authorized by NWPs are evaluated within the geographic area to which those indirect effects extend. When the district engineer reviews a PCN and determines that the proposed activity qualifies for NWP authorization, the district engineer will issue a written NWP verification to the permittee (see 33 CFR 330.6(a)(3)). If an NWP verification includes multiple authorizations using a single NWP (e.g , linear projects with crossings of separate and distant waters of the United States authorized by NWPs 12, 14, 57, or 58) or non-linear projects authorized with two or more different NWPs (e.g , an NWP 28 for reconfiguring an existing marina basin plus an NWP 19 for minor dredging within that marina basin), the district engineer will evaluate the cumulative effects of the applicable NWP authorizations within the geographic area that the district engineer determines is appropriate for assessing cumulative effects caused by activities authorized by that NWP. As discussed above, the geographic area may be a waterbody, watershed, county, state, Corps district, or other geographic area such as a seascape. The Corps' regulations for its ``public interest review'' at 33 CFR 320.4(a)(1) require consideration of cumulative impacts for the issuance of DA permits. Since the required public interest review and 404(b)(1) Guidelines cumulative effects analyses are conducted by Corps Headquarters in its decision documents for the issuance of the NWPs, district engineers do not need to do comprehensive cumulative effects analyses for NWP verifications. For an NWP verification, the district engineer needs only to include a statement in the administrative record stating whether the proposed activity to be authorized by an NWP, plus any required mitigation, will result in no more than minimal individual and cumulative adverse environmental effects. If the district engineer determines, after considering mitigation, that a proposed NWP activity will result in more than minimal cumulative adverse environmental effects, the district engineer will exercise discretionary authority and require an application for an individual permit for the proposed activity that requires Department of the Army (DA) authorization. There may be activities authorized by NWPs that cross more than one Corps district or more than a single state. On May 15, 2018, the Director of Civil Works at Corps Headquarters issued a Director's Policy Memorandum titled: ``Designation of a Lead USACE District for Permitting of Non-USACE Projects Crossing Multiple Districts or States.'' \1\ This Director's Policy Memorandum identified lead districts for states that have more than one Corps district and established a policy for designating a lead district for activities that require DA permits that cross district or state boundaries. Under this policy, when the Corps receives an NWP PCN or individual permit application for such activities, a lead Corps district will be designated by the applicable Corps[[Page 73525]]division office(s) using the criteria in the 2018 Director's Policy Memorandum, and that district will be responsible for serving as a single point of contact for each permit applicant, forming a Project Delivery Team comprising representatives of each of the affected districts, ensuring consistent reviews by the affected districts, and taking responsibility for identifying and resolving inconsistencies that may arise during the review. The list of lead districts for states is also used during the regional conditioning process for the NWPs. For that process the lead district is responsible for coordinating the development of the regional conditions and preparing the supplemental documents required by 33 CFR 330.5(c)(1)(iii).--------------------------------------------------------------------------- \1\ This document is available at: [*https://usace.contentdm.oclc.org/digital/****collection****/p16021coll11/id/2757/*](https://usace.contentdm.oclc.org/digital/collection/p16021coll11/id/2757/) (accessed 3/12/2020).---------------------------------------------------------------------------B. Overview of Proposed Rule On September 15, 2020, the Corps published in the Federal Register (85 FR 57298) a proposed regulation to reissue with modification the existing NWPs and associated general conditions and definitions and to create five new NWPs (2020 Proposal). The Corps provided a 60-day public comment period which closed on November 16, 2020. Among other things, the Corps proposed the following: (1) To reissue all existing permits (some with proposed modifications); (2) to issue two new NWPs to authorize certain categories of mariculture activities (i.e , seaweed and finfish mariculture) that are not currently authorized by NWP 48; (3) to issue three NWPs that authorize separate categories of utility line based on the substances they convey; (4) to issue a new NWP which would authorize discharges of dredged or fill material into jurisdictional waters for the construction, expansion, and maintenance of water reuse and reclamation facilities; and (5) to remove the 300 linear foot limit for losses of stream bed from 10 NWPs (NWPs 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52). The Corps requested comment on these and all other aspects of the proposal. The final rule published in the January 13, 2021, issue of the Federal Register (86 FR 2744) finalized 12 of the existing permits and addressed items (2), (3), and (5), as well as the NWP general conditions and definitions.C. Overview of This Final Rule This final rule reissues the 40 existing NWPs that were previously issued in the January 6, 2017, final rule (82 FR 1860) but not finalized on January 13, 2021 and issues one new NWP (NWP 59 for water reclamation and reuse facilities). This final rule does not address the 16 NWPs, general conditions, and definitions that were finalized on January 13, 2021. In response to the 2020 Proposal, the Corps received approximately 22,700 comments. Those comments relating to the January 13, 2021 final rule were addressed as part of that action; those comments relating to the NWPs in this final rule are discussed below together with the modifications made in response to those comments. The January 13, 2021, final rule addressed the comments received in response to the 2020 Proposal on the NWP general conditions and definitions. The NWP general conditions and definitions from the final rule published in the January 13, 2021, issue of the Federal Register apply to the NWPs published in today's final rule. The text of the NWP general conditions and definitions are provided in the January 13, 2021, final rule on pages at 86 FR 2867-2877. The 41 NWPs in today's final rule expire on March 14, 2026, the same date as the 16 NWPs published in the January 13, 2021, issue of the Federal Register expire.D. Status of Existing Permits When the Corps modifies existing NWPs, the modified NWPs replace the prior versions of those NWPs so that there are not two sets of NWPs in effect at the same time. Having two sets of NWPs in effect at the same time would create regulatory uncertainty if each set of those NWPs has different limits, requirements, and conditions because permittees may be unclear as to which limits, requirements, and conditions apply to their authorized activities. In addition, differences in NWP limits, requirements, and conditions between two sets of NWPs can create challenges for district engineers in terms of enforcement and compliance efforts. The Corps is modifying the expiration date for 40 existing NWPs (i.e , NWPs 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, 25, 27, 28, 30, 31, 32, 33, 34, 35, 36, 37, 38, 41, 45, 46, 49, 53, and 54) that are issued in this final rule to the day before February 25, 2022. The expiration date for the 40 existing NWPs and the new NWP issued in this final rule is March 14, 2026. Under 33 CFR 330.6(a)(3)(ii), if the NWP is reissued without modification or the activity complies with any subsequent modification of the NWP authorization, the NWP verification letter (i.e , the written confirmation from the district engineer that the proposed activity is authorized by an NWP) should include a statement that the verification will remain valid for a period of time specified in the verification letter. The specified period of time is usually the expiration date of the NWP. In other words, if the previously verified activity continues to qualify for NWP authorization under any of the 40 existing NWPs reissued in this final rule, that verification letter continues to be in effect until March 18, 2022, unless the district engineer specified a different expiration date in the NWP verification letter. For most activities authorized by the 2017 NWPs, where the district engineer issued an NWP verification letter, the verification letter identified March 18, 2022, as the expiration date. As long as the verified NWP activities continue to comply with the terms and conditions of the 40 existing NWPs reissued in this final rule, those activities continue to be authorized by the applicable NWP(s) until March 18, 2022, unless a district engineer modifies, suspends, or revokes a specific NWP authorization. Under 33 CFR 330.6(b), Corps Headquarters may modify, reissue, suspend, or revoke the NWPs at any time. Activities that were authorized by the 2017 NWPs, but no longer qualify for authorization under any of the 40 existing NWPs that are reissued in this final rule, continue to be authorized by the 2017 NWP(s) for 12 months as long as those activities have commenced (i.e , are under construction) or are under contract to commence in reliance upon an NWP prior to the date on which the NWP expires. That authorization is contingent on the activity being completed within twelve months of the date of an NWP's expiration, modification, or revocation, unless discretionary authority has been exercised by a division or district engineer on a case-by-case basis to modify, suspend, or revoke the authorization in accordance with 33 CFR 330.4(e) and 33 CFR 330.5(c) or (d). This provision applies to activities that were previously verified by the district engineer as qualifying for NWP authorization, but no longer qualify for NWP authorization under the modified or reissued NWP. The 41 NWPs issued in this final rule go into effect on February 25, 2022. The 2017 versions of the 40 existing NWPs reissued in this final rule expire on the day before February 25, 2022. The 40 existing NWPs reissued in this final rule and the new NWP issued in this final rule (i.e , NWP 59) expire on March 14, 2026.E. Nationwide Permit Verifications Certain NWPs require the permittee to submit a PCN, and thus request confirmation from the district engineer[[Page 73526]]prior to commencing the proposed NWP activity, to ensure that the NWP activity complies with the terms and conditions of the NWP, including any conditions the district engineer adds to the NWP authorization in accordance with 33 CFR 330.6(a)(3)(i). The requirement to submit a PCN is identified in the NWP text, as well as certain general conditions. General condition 18 requires non-federal permittees to submit PCNs for any proposed activity that might affect Endangered Species Act (ESA)-listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation), if listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation) are in the vicinity of the proposed activity, or if the proposed activity is located in critical habitat or critical habitat proposed for such designation. General condition 20 requires non-federal permittees to submit PCNs for any proposed activity that might have the potential to cause effects to any historic properties listed in, determined to be eligible for listing in, or potentially eligible for listing in, the National Register of Historic Places. In the PCN, the project proponent must specify which NWP or NWPs the project proponent wants to use to provide the required DA authorization under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899. For voluntary NWP verification requests (where a PCN is not required), the request should also identify the NWP(s) the project proponent wants to use. The district engineer should verify the activity under the NWP(s) requested by the project proponent, as long as the proposed activity complies with all applicable terms and conditions, including any applicable regional conditions imposed by the division engineer. All NWPs have the same general requirements: That the authorized activities may only cause no more than minimal individual and cumulative adverse environmental effects. Therefore, if the proposed activity complies with the terms and all applicable conditions of the NWP the applicant wants to use, then the district engineer should issue the NWP verification unless the district engineer exercises discretionary authority and requires an individual permit. If the proposed activity does not meet the terms and conditions of the NWP identified in the applicant's PCN, and that activity meets the terms and conditions of another NWP identified by the district engineer, the district engineer will process the PCN under the NWP identified by the district engineer. If the district engineer exercises discretionary authority, the district engineer should explain the reasons for determining that the proposed activity raises sufficient concern for the environment or otherwise may be contrary to the public interest. PCN requirements may be added to NWPs by division engineers through regional conditions to require PCNs for additional activities. For an activity where a PCN is not required, a project proponent may submit a PCN voluntarily, if the project proponent wants written confirmation that the activity is authorized by an NWP. Some project proponents submit permit applications without specifying the type of authorization they are seeking. In such cases, the district engineer will review those applications and determine if the proposed activity qualifies for NWP authorization or another form of DA authorization, such as a regional general permit (see 33 CFR 330.1(f)). In response to a PCN or a voluntary NWP verification request, the district engineer reviews the information submitted by the prospective permittee. If the district engineer determines that the activity complies with the terms and conditions of the NWP, the district engineer will notify the permittee. Activity-specific conditions, such as compensatory mitigation requirements, may be added to an NWP authorization to ensure that the activity to be authorized under the NWP will result in no more than minimal individual and cumulative adverse environmental effects and will not be contrary to the public interest. The activity-specific conditions are incorporated into the NWP verification, along with the NWP text and the NWP general conditions. In general, NWP verification letters will expire on the date the NWP expires (see 33 CFR 330.6(a)(3)(ii)), although district engineers have the authority to issue NWP verification letters that will expire before the NWP expires, if it is in the public interest to do so. If the district engineer reviews the PCN or voluntary NWP verification request and determines that the proposed activity does not comply with the terms and conditions of an NWP, the district engineer will notify the project proponent and provide instructions for applying for authorization under a regional general permit or an individual permit. District engineers will respond to NWP verification requests, submitted voluntarily or as required through PCNs, within 45 days of receiving a complete PCN. Except for NWP 49, and for proposed NWP activities that require ESA Section 7 consultation and/or NHPA Section 106 consultation, if the project proponent has not received a reply from the Corps within 45 days, the project proponent may assume that the project is authorized, consistent with the information provided in the PCN. For NWP 49, and for proposed NWP activities that require ESA Section 7 consultation and/or NHPA Section 106 consultation, the project proponent cannot begin work before receiving a written NWP verification. If the project proponent requested a waiver of a limit in an NWP, the waiver is not granted unless the district engineer makes a written determination that the proposed activity will result in no more than minimal individual and cumulative adverse environmental effects and issues an NWP verification.II. Discussion of Public CommentsA. Overview In response to the 2020 Proposal, the Corps received approximately 22,700 comment letters, of which approximately 22,330 were form letters. In addition to the various form letters, the Corps received a few hundred individual comment letters. Those individual comment letters, as well as examples of the various form letters, are posted in the [*www.regulations.gov*](http://www.regulations.gov) docket (COE-2020-0002) for this rulemaking action. The Corps reviewed and fully considered all comments received in response to the 2020 Proposal. The Corps' responses to the comments received on the proposed removal of the 300 linear foot limit for losses of stream bed from 10 existing NWPs, the proposed changes to NWPs 21 and 50, the proposed reissuance of NWP 48, the proposed reissuance of NWP 12, and the proposed issuance of four new NWPs (NWPs 55, 56, 57, and 58) are summarized and addressed in the final rule published in the January 13, 2021, issue of the Federal Register (86 FR 2744). The sections below discuss the comments received and the Corps responses on the 40 existing NWPs and one new NWP being finalized in this rule.B. Responses to General Comments A summary of general comments submitted to the Corps in response to the 2020 Proposal, and responses to those general comments, are provided in the final rule published in the January 13, 2021, issue of the Federal Register at 86 FR 2750-2753.[[Page 73527]](1) Status of Existing Permits In response to the 2020 Proposal, the Corps received comments concerning the status of existing NWP authorizations and how the issuance of the final rule may affect those existing authorizations. The Corps also invited public comment on changing the expiration date for the 2017 NWPs to avoid having two sets of NWPs in effect at the same time. These comments were summarized and addressed in the final rule published in the January 13, 2021, issue of the Federal Register at 86 FR 2753-2754.(2) Pre-Construction Notification Requirements Comments on PCN requirements for the NWPs in the 2020 Proposal were addressed in the final rule published in the January 13, 2021, issue of the Federal Register at 86 FR 2754-2755.(3) Climate Change Comments on climate change and the NWPs in the 2020 Proposal were addressed in the final rule published in the January 13, 2021, issue of the Federal Register at 86 FR 2755. The Corps recognizes the importance of climate change resiliency and both mitigation and adaptation efforts to address climate change. The Corps discusses climate change in the context of the NWP reissuance in each of the national decision documents for the 41 NWPs. Some activities authorized by various NWPs may be associated with energy production (including the energy production through solar, wind, and other renewable resources), distribution, and use, while other activities authorized by the NWPs may contribute to adaptation to climate change and help increase the resilience of communities to the adverse effects of climate change.(4) Environmental Justice In response to the 2020 Proposal, the Corps received comments concerning environmental justice and how it was considered during development of the final rule. The Corps recognizes the importance of environmental justice to the Administration and incorporated consideration of impacts to communities with environmental justice interests to the extent practicable within its regulatory authorities in the issuance of this rule. The NWPs issuance are not expected to have any discriminatory effect or disproportionate negative impact on any community or group, and therefore are not expected to cause any disproportionately high and adverse impacts to minority or low-income communities. The NWPs issued in this final rule can be used by communities with environmental justice interests that want to conduct activities that require DA authorization that will help improve environmental quality within their communities (e.g , NWP 13 for bank stabilization activities; NWP 27 for aquatic habitat restoration, establishment, and enhancement activities; NWP 31 for the maintenance of existing flood control facilities; and NWP 38 for hazardous and toxic waste clean-up activities).C. Comments on Regional Conditioning of Nationwide Permits Under Section 404(e) of the Clean Water Act, NWPs can only be issued for those activities that result in no more than minimal individual and cumulative adverse environmental effects. For activities that require authorization under Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C 403), the Corps' regulations at 33 CFR 322.2(f) have a similar requirement. Since it can be difficult for the Corps to draft national NWPs in such a way that they account for regional differences, an important mechanism for ensuring compliance with these requirements is regional conditions imposed by division engineers to address local environmental concerns. Effective regional conditions help protect local aquatic ecosystems and other resources and help ensure that the NWPs authorize only those activities that result in no more than minimal individual and cumulative adverse effects on the environment and are not contrary to the public interest. Prior to the effective date of the 41 NWPs published in this final rule, division engineers will complete supplemental documents for these NWPs, which will include the final regional conditions for these NWPs. Concurrent with the publication of the 2020 Proposal in the Federal Register, Corps districts issued public notices seeking comment on proposed regional conditions for the proposed NWPs. The division engineers' supplemental documents for the 41 NWPs will summarize the comments Corps districts received on the proposed regional conditions for those NWPs, provide responses to those comments, and provide the division engineers' decisions on whether to approve some or all of the regional conditions that were proposed by district engineers in their public notices. After the division engineers approve the regional conditions and sign the supplemental documents for these 41 NWPs, Corps districts will issue public notices on their websites announcing the final Corps regional conditions and when those regional conditions go into effect (see 33 CFR 330.5(c)(1)(v)). Copies of the district public notices are also sent to interested parties that are on each district's public notice mailing list via email or the U.S mail. The public notice will also describe, if appropriate, a time period to complete an authorized activity as specified by 33 CFR 330.6(b) for those who have commenced work under the NWP or are under contract to commence work under the NWP (see 33 CFR 330.5(c)(1)(iv)). A copy of all Corps regional conditions approved by the division engineers for the NWPs are forwarded to Corps Headquarters (see 33 CFR 330.5(c)(3)). Copies of district public notices announcing final regional conditions for these 41 NWPs will be posted in the [*www.regulations.gov*](http://www.regulations.gov) docket for the 2021 NWPs (docket number COE-2020-0002), under Supporting and Related Information so that copies of all district public notices and regional conditions are available at a central location. If, during implementation of the 41 NWPs in this final rule, division or district engineers identify the need for additional regional conditions, or changes to existing regional conditions, the procedures at 33 CFR 330.5(c)(1) must be followed, including the issuance of district public notices to provide the public with the opportunity to submit comments on the proposed new regional conditions or proposed modifications to existing regional conditions. Comments on regional conditioning for the NWPs in the 2020 Proposal were addressed in the final rule published in the January 13, 2021, issue of the Federal Register at 86 FR 2758-2760.D. Response to Comments on Specific Nationwide Permits in This Final Rule NWP 1. Aids to Navigation. The Corps did not propose any changes to this NWP. No comments were received on the proposed NWP. This NWP is reissued as proposed. NWP 2. Structures in Artificial Canals. The Corps did not propose any changes to this NWP. No comments were received on the proposed NWP. This NWP is reissued as proposed. NWP 3. Maintenance. The Corps proposed to modify paragraph (a) of this NWP to authorize the repair, rehabilitation, or replacement of any currently serviceable structure or fill that did not require DA authorization at the time it was constructed. The Corps also proposed to modify paragraph (a) of this NWP to authorize the placement of new or additional riprap to protect the structure, provided the placement of riprap is the minimum necessary to[[Page 73528]]protect the structure or to ensure the safety of the structure, to reinstate a provision was in the 2007 version of NWP 3 (see 72 FR 11181). Several commenters stated that they support modifying paragraph (a) of this NWP to authorize the repair, rehabilitation, or replacement of any currently serviceable structure that did not require DA authorization of the time it was constructed. A few commenters expressed opposition to the proposed modification of this NWP and said that the text of the 2017 version of this NWP that limits maintenance to previously authorized and currently serviceable structures should be retained. Several commenters expressed opposition to the authorization of any currently serviceable fills that were installed prior to the Clean Water Act without requiring a PCN because those fills have not been evaluated under current environmental regulations. One commenter said that the maintenance of any structures or fills that existed prior to the Clean Water Act should not require any authorization from the Corps. One commenter stated that a timeframe should be added to NWP 3 to specify a maximum length of time the structure has been in disrepair in order to use this NWP to authorize maintenance of the structure. After considering the comments received in response to the 2020 Proposal, the Corps is reissuing this NWP without modifying paragraph (a) of this NWP to authorize the repair, rehabilitation, or replacement of any currently serviceable structure that did not require DA authorization at the time it was constructed. The repair, rehabilitation, or replacement of any currently serviceable structure that did not require DA authorization of the time it was constructed may be authorized by other forms of DA authorization, such as regional general permits and individual permits. The NWP is limited to the repair, rehabilitation, or replacement of currently serviceable structures or fills, so it is not necessary to impose a timeframe for NWP 3 eligibility during which the need for repair, rehabilitation, or replacement activity must be completed in order to be eligible for NWP 3 authorization. The term ``currently serviceable'' is defined in section F of the NWPs. This NWP does not authorize the reconstruction of structures or fills that are no longer currently serviceable. In addition, changes to a structure or fill that prompt the need for repair, rehabilitation, or replacement may occur gradually or abruptly, or at some intermediate rate. The timeframe in which the structure or fill requires some degree of repair, rehabilitation, or replacement is not as relevant to ensuring no more than minimal adverse environmental effects than the constraints imposed by the ``currently serviceable'' and ``minor deviations'' provisions of this NWP. The Corps does not agree that PCNs should be required for maintenance activities authorized by paragraph (a) of this NWP because of the limitations in that paragraph. One commenter stated that the text of this NWP should be modified to allow for maintenance of any existing infrastructure provided it does not change the intended use of the structure or fill. A few commenters requested clarification as to what the term ``currently serviceable structure'' means, including whether or not the structure or fill has to be operational. One commenter requested clarification on the differences between ``replacement'' and ``reconstruction.'' A few commenters asked for changes in the text of NWP 3 to clarify that any structures or fill that were previously permitted by the Corps may utilize NWP 3 for maintenance and repair activities. This NWP authorizes the repair, rehabilitation, or replacement of existing infrastructure while allowing minor deviations due to due to changes in materials, construction techniques, requirements of other regulatory agencies, or current construction codes or safety standards. In addition, the NWP requires the structure or fill to not be put to uses that differ from the uses originally contemplated for it when the structure or fill was originally constructed. Repair, rehabilitation, or replacement activities that exceed the ``minor deviations'' provision of this NWP may be authorized by individual permits, regional general permits, or another NWP. The term ``currently serviceable'' is currently defined in section F of the NWPs as: ``useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.'' Therefore, there must be some degree of operability associated with the structure or fill in order for repair, rehabilitation, and replacement activities to be authorized by this NWP. The difference between ``replacement'' and ``reconstruction'' is based on the concept of ``currently serviceable.'' A currently serviceable structure or fill retains some degree of operability but can be replaced before it degrades to the extent where it is no longer operable (i.e , incapable of performing its intended function). In contrast, a structure or fill that is no longer capable of providing any degree of operability would have to be reconstructed to perform its intended function. This NWP can be used to repair, rehabilitate, or replace existing, currently serviceable structures or fills as long as the proposed activities satisfy the requirements in the text of the NWP, including any applicable NWP general conditions, regional conditions imposed by division engineers, and activity-specific conditions imposed by district engineers. The Corps declines to modify the text of this NWP to state that it can be used for maintenance and repair activities for previously permitted structures or fills because some of those maintenance and repair activities might not qualify for NWP 3 authorization and may require individual permits or other forms of DA authorization. One commenter expressed opposition to authorizing the rehabilitation or replacement of structures that are derelict or not operational without a PCN and analyses of individual cumulative effects. One commenter recommended modifying this NWP to authorize regular maintenance of drainages to reduce exposed pipelines and pipeline spans. One commenter stated that without individual permit review, the Corps has no way of knowing if the structures are being replaced in kind, and whether those structures would have adverse environmental effects. This commenter also said that there need to be practicable alternatives if adverse effects are anticipated by these activities. This NWP does not authorize the repair, rehabilitation, or replacement of structures and fills that are no longer currently serviceable. If a derelict or non-operational structure requires repair, rehabilitation, or replacement, and those activities require DA authorization, they may be authorized by individual permits or regional general permits. Discharges of dredged or fill material into waters of the United States that are necessary to rebury pipelines exposed in drainages or repair pipeline spans that extend over drainages may be authorized by this NWP or other NWPs, such as NWP 18, which authorizes minor discharges into waters of the United States. Corps district staff may conduct compliance actions for activities authorized by NWP 3, to ensure that authorized activities comply with the conditions of the NWP, including in-kind replacement. Because this NWP is limited to the repair, rehabilitation, and replacement of existing, currently serviceable structures or fills, there are usually no practicable alternatives for repairing, rehabilitating, or replacing these structures or fills. Relocating or reconstructing the[[Page 73529]]structure or fill in a different location has the potential to result in more adverse environmental effects than the incremental impact caused by the repair, rehabilitation, or replacement of the structure or fill, and might not serve the intended purpose as the original structure or fill. Many commenters stated that they support the proposed modification that authorizes the placement of new or additional riprap to protect the structure. Several commenters said that authorization of the placement of riprap under NWP 3 should require a PCN. Some commenters objected to this proposed modification. One commenter objected to this proposed modification, stating that it could be used to authorize substantial amounts of riprap to protect an existing structure or fill, such as a beach house. One commenter stated that the phrase ``minimum necessary'' is ambiguous and unquantifiable and NWP 3 activities should be limited to ensure that no significant adverse effects occur as a result of the placement of the riprap. One commenter said that riprap placed to protect the structure or fill should be limited to 25 cubic yards. One commenter said that riprap placed above the ordinary high water mark should be covered with topsoil and revegetated, and that stream-side areas at the ordinary high water mark should be revegetated with acceptable bioengineering techniques. A few commenters stated that using the term ``riprap'' in the proposed modification will result in preferential use of this technique when other forms of protection, such as bioengineering, may be feasible and less environmentally damaging. After considering the comments received in response to the 2020 Proposal, the Corps is not reissuing NWP 3 with the proposed modification that would authorize the placement of new or additional riprap to protect the structure or fill, as long as the placement of riprap is the minimum necessary to protect the structure or fill and to ensure the safety of the structure or fill. The placement of new or additional riprap to protect the structure or fill may be authorized by other forms of DA authorization, such as regional general permits and individual permits. If a project proponent wants to place riprap to protect a building, such as a beach house constructed in uplands, then the project proponent can use NWP 13, which may require submittal of a PCN to the district engineer, or seek DA authorization through the individual permit process. Riprap placed in uplands landward of the ordinary high water mark does not require DA authorization, so the Corps does not have the authority to require the permittee place topsoil in those upland areas and install plants in the topsoil. Bioengineering might not be a practicable alternative to riprap for the purposes of protecting a repaired, rehabilitated, or replaced structure or fill, or ensuring its safe operation. A permittee can choose to use bioengineering to protect a structure or fill from erosion, if appropriate, and bioengineering activities that require DA authorization may be authorized by NWP 3 if it is considered a minor deviation due to changes in materials, construction techniques, requirements of other regulatory agencies, or current construction codes or safety standards. Bioengineering for bank stabilization may also be authorized by NWP 13, which authorizes a variety of bank stabilization techniques. A few commenters requested clarification on what constitutes a minor deviation, and what constitutes a small amount of riprap. One commenter suggested replacing the term ``small'' with ``minor'' when referring the amount of riprap that can be used to protect the structure or fill, to be consistent with the 1996 NWP. One of these commenters said that NWP 3 should have quantitative limits. One commenter requested that the Corps further restrict the NWP by adding text that states that the placement of riprap may be used to ensure the safety of the design, but not for other safety purposes. As discussed above, the Corps is not reissuing this NWP with modifications that would authorize the placement of new or additional riprap to protect the existing structure or fill. What constitutes a ``minor deviation'' is dependent on the degree to which changes in the structure's configuration or filled area would occur as a result of the repair, rehabilitation, or replacement activity relative to the size and shape of the existing structure or fill, as well as any deviations that are necessary because of changes in materials, construction techniques, the requirements of other regulatory agencies, or current construction codes or safety standards. Because this NWP authorizes structures and work in navigable waters of the United States and discharges of dredged or fill material into waters of the United States for the repair, rehabilitation, or replacement of existing, currently serviceable structures or fills, and only allows minor deviations, it would not be appropriate to add quantitative limits to the text of the NWP other than the quantitative limits currently in paragraph (b) (i.e , the 200 foot limit for the removal of accumulated sediments and debris). The safety of the structure or fill may be dependent on more than the design of the structure or fill. For example, the safety of the structure or fill may be dependent on the types of materials used for the structure or fill, to help provide greater stability and help ensure that the structure or fill withstands expected erosive forces or other forces. Many commenters stated that they support the removal of ``previously authorized'' from the Note and replacing it with ``currently serviceable.'' Several commenters suggested retaining in the ``Note'' the text that refers to ``previously authorized'' structures or fills to allow for maintenance of previously authorized structures or fills. One commenter said that in the Note the phrase ``previously authorized'' should be replaced with the term ``existing.'' In the Note for this NWP, the Corps has retained ``previously authorized'' because the Corps is not reissuing this NWP with the proposed changes to paragraph (a), which would have authorized the repair, rehabilitation, or replacement of any currently serviceable structure or fill that did not require a permit at the time it was constructed. If the structure or fill is ``currently serviceable'' it is an existing structure or fill. Therefore, it is not necessary to replace the phrase ``previously authorized'' with ``existing.'' One commenter said that the removal of accumulated sediments within 200 feet of a structure is excessive and should be evaluated on a case-by-case basis. One commenter stated that the provisions allowing removal of sediment could result in more than minimal impacts on aquatic organisms. One commenter stated that the PCN requirement for activities authorized under (b) of this NWP for sediment and debris removal is unnecessary unless the dredged material is proposed to be redeposited or retained within waters of the United States. Paragraph (b) authorizes the removal of accumulated sediments and debris outside the immediate vicinity of existing structures (e.g , bridges, culverted road crossings, water intake structures, etc.) for a distance of no more than 200 feet from the structure. All activities authorized by paragraph (b) of this NWP require a PCN to district engineers. Therefore, district engineers will review these proposed activities to determine whether removal of accumulated sediments up to 200 feet from the structure will result in no more than minimal individual and cumulative adverse environmental[[Page 73530]]effects. The removal of accumulated sediment and debris is likely to have temporary impacts on aquatic organisms because those activities occur on a periodic basis in response to the accumulation of sediment and debris in these dynamic waterbodies. Communities of aquatic organisms are likely to recover in the waterbody between sediment and debris removal activities. Division engineers may add regional conditions to this NWP to reduce the 200-foot limit in regions where shorter limits are necessary to ensure that the adverse environmental effects caused by these activities are no more than minimal. The Corps is retaining the PCN requirement for activities authorized by paragraph (b) of this NWP because of the potential for some of these activities to result in more than minimal adverse environmental effects. Therefore, district engineers should have the opportunity to review these proposed activities so that they can exercise discretionary authority when necessary to require individual permits for certain activities. One commenter said that rebuilding existing electric utility lines should continue to be covered under NWP 3 even though NWP 57 would also authorize these activities. Numerous commenters stated that PCNs should be required for all activities authorized by this NWP. Many commenters stated this permit causes significant adverse impacts which are a violation of the Clean Water Act, and that this NWP should be withdrawn or stricter impact limitations should be imposed. One commenter said that NWP 3 authorizes activities that are not similar in nature, which violates Section 404(e) of the Clean Water Act. One commenter stated the draft decision document does not provide enough information to determine the full extent of impacts associated with this NWP. This NWP can be used to repair, rehabilitate, or replace electric utility lines, as well as other structures or fills, as long as those electric utility lines are currently serviceable. If the electric utility line must be rebuilt because of destruction or damage by a storm, flood, fire, or other discrete event, this NWP can be used to authorize discharges of dredged or fill material into waters of the United States or structures as well as work in navigable waters of the United States for those rebuilding activities. Those electric utility line rebuilding activities may also be authorized by NWP 57. Because this NWP authorizes structures and work in navigable waters of the United States and discharges of dredged or fill material into waters of the United States for the repair, rehabilitation, or replacement of existing, currently serviceable structures or fills, and only authorizes minor deviations, the Corps does not believe that PCNs should be required for activities authorized by paragraph (a). The activities authorized by NWP 3 are similar in nature, because they are limited to the repair, rehabilitation, and replacement of currently serviceable structures or fills, or structures or fills damaged or destroyed by storms, floods (including tidal floods), fires, or other discrete events. The current qualitative and quantitative limits in the text of this NWP are sufficient to ensure that the NWP authorizes only those activities that result in no more than minimal individual and cumulative adverse effects, and no additional limits are necessary. The final decision document for this NWP provides an assessment of activities that may be authorized by this NWP during the 5-year period it is anticipated to be in effect, as well as an evaluation of potential environmental impacts that is commensurate with the anticipated degree and severity of those environmental impacts. The decision document has been prepared in compliance with the requirements of the National Environmental Policy Act (NEPA), the Corps' public interest review regulations, and the Clean Water Act Section 404(b)(1) Guidelines. This NWP is reissued without the proposed modifications. NWP 4. Fish and Wildlife Harvesting, Enhancement, and Attraction Devices and Activities. The Corps did not propose any changes to this NWP. No comments were received on the proposed reissuance of this NWP. This NWP is reissued as proposed. NWP 5. Scientific Measurement Devices. The Corps did not propose any changes to this NWP. No comments were received on the proposed reissuance of this NWP. This NWP is reissued as proposed. NWP 6. Survey Activities. The Corps did not propose any changes to this NWP. One commenter expressed support for the reissuance of this NWP with no changes. One commenter stated that the Corps should clarify the nature and extent of seismic exploratory operations that qualify for authorization under this NWP and modify this NWP to require PCNs for all seismic exploratory operations. This commenter said that seismic exploration operations may use vehicles that can compact wetland soils, create tire ruts in wetlands, and cause regulated discharges of dredged or fill material. A few commenters said seismic exploratory operations cause adverse effects to waters of the United States, endangered species, and marine mammals, and should require authorization through individual permits. One commenter stated that if seismic testing activities continue to be authorized by this NWP, then limits should be placed on the amount of exploratory trenching. One commenter said that this NWP should be modified to impose a 25 cubic yard limit for discharges of fill material for shot holes, and that survey activities involving numerous small pads in excess of 25 cubic yards should require individual permits. This NWP authorizes survey activities, including seismic exploratory activities, that involve structures or work in navigable waters of the United States that require DA authorization under Section 10 of the Rivers and Harbors Act of 1899 and discharges of dredged or fill material into waters of the United States that require DA authorization under Section 404 of the Clean Water Act. Seismic exploratory operations may be conducted in a manner that does not require DA authorization under any of the Corps' permitting authorities. Seismic exploratory operations may be conducted using equipment on or attached to vessels in navigable waters and vehicles used on land that involve no structures or work in navigable waters or discharges of dredged or fill material into waters of the United States. For example, seismic surveying activities in marine waters may be conducted from vessels carrying or towing seismic surveying equipment, with no structures or work requiring DA authorization under Section 10 of the Rivers and Harbors Act of 1899. Those types of seismic surveying activities in marine waters do not require DA authorization. Land-based seismic surveying activities are often conducted from vehicles that generate the seismic waves and vehicles or other devices that carry the sensors that receive the seismic waves for analysis. Driving vehicles in wetlands may cause the formation of ruts as the wheels move through wet or moist soils. However, driving vehicles such as trucks, cars, off-road vehicles, or farm tractors through a wetland in a manner in which such vehicles is designed to be used generally is not subject to regulation under Section 404 of the Clean Water Act (see 66 FR 4568). Land-based seismic surveying activities may also be conducted by drilling shot holes and detonating explosive charges in those shot holes to produce sound that is received by sensors. If those shot holes are drilled in jurisdictional[[Page 73531]]wetlands, backfilling the shot holes in jurisdictional wetlands with fill material may require DA authorization under Section 404 of the Clean Water Act. If survey activities proposed to be conducted by non-federal permittees involve structures or work in navigable waters of the United States and/or discharges of dredged or fill material into waters of the United States, pre-construction notification is required for the proposed NWP activity if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed such designation) might be affected or is in the vicinity of the activity, or if the proposed activity is located in designated critical habitat or critical habitat proposed for such designation (see paragraph (c) of general condition 18, endangered species). District engineers will review PCNs submitted under paragraph (c) of general condition 18 and determine whether ESA Section 7 consultation is required for proposed NWP 6 activities. Project proponents who undertake survey activities that may result in a take of marine mammals may be required to obtain an incidental take authorization from the National Marine Fisheries Service pursuant to the Marine Mammal Protection Act. The Corps does not agree that quantitative limits should be placed on exploratory trenching because the NWP requires restoration of the area of waters of the United States in which the exploratory trench is dug to preconstruction elevations upon completion of the survey work. In addition, the NWP does not authorize exploratory trenching activities that drain waters of the United States. The Corps also declines to impose a 25-cubic-yard limit on discharges of dredged or fill material into waters of the United States for plugging shot holes, because plugging shot holes helps restore affected areas to pre-construction elevations. Plugging shot holes also provides safety benefits by filling holes in the soil that can cause injury to people and wildlife. This NWP has a 1/10-acre limit for losses of waters of the United States for temporary pads used for survey activities, so the Corps does not believe that an additional 25-cubic-yard limit is necessary to help ensure that this NWP authorizes only those survey activities that result in no more than minimal adverse environmental effects. This NWP is reissued as proposed. NWP 7. Outfall Structures and Associated Intake Structures. The Corps did not propose any changes to this NWP. One commenter stated this NWP should be reissued with no changes. This NWP is reissued as proposed. NWP 8. Oil and Gas Structures on the Outer Continental Shelf. The Corps did not propose any changes to this NWP. One commenter stated that this NWP should be reissued with no changes. One commenter said that the Corps must analyze impacts to marine mammals through an environmental impact statement and consult with NMFS through the ESA Section 7 consultation process before verifying activities under this NWP. A commenter stated that the Corps should categorically exclude the state of Oregon from this NWP because oil and gas drilling activities in federal waters near Oregon are prohibited, and all activities authorized by this NWP should require PCNs to provide the necessary coordination between the district engineer and the state. Project proponents that use NWP 8 to authorize oil or natural gas structures on the outer continental shelf under Section 10 of the Rivers and Harbors Act of 1899 are responsible for complying with the Marine Mammal Protection Act, including any requirement to obtain incidental take authorizations from the NMFS. When a district engineer receives a PCN for a proposed NWP 8 activity, a district engineer will evaluate potential effects of the proposed structures on marine mammals that are listed as endangered or threatened under the ESA, as well as marine mammals species proposed for listing under the ESA. The district engineer will also evaluate potential effects of the proposed structures on designated critical habitat, and if applicable, critical habitat proposed for such designation. If the district engineer determines the proposed NWP 8 activity may affect listed species or designated critical habitat, including listed marine mammals and designated critical habitat for marine mammals, he or she will initiate ESA Section 7 consultation with the NMFS and, if appropriate, the U.S FWS, unless ESA Section 7 consultation has already been conducted by another federal agency for the proposed oil and gas structures. This NWP authorizes structures in federal waters overlying the outer continental shelf; it does not authorize structures in the territorial seas. Therefore, if a project proponent wants to conduct oil or natural gas drilling activities in the territorial seas, he or she would need to obtain DA authorization through the individual permit process, or through a regional general permit if the Corps district has issued a regional general permit that authorizes oil or gas structures in the territorial seas. All activities authorized by this NWP require PCNs, and the district engineer can elect to coordinate the review of the PCN with the state. This NWP is reissued as proposed. NWP 9. Structures in Fleeting and Anchorage Areas. The Corps did not propose any changes to this NWP. No comments were received on the proposed reissuance of this NWP. This NWP is reissued as proposed. NWP 10. Mooring Buoys. The Corps did not propose any changes to this NWP. Several commenters said that PCNs should be required for all activities authorized by this NWP. Several commenters stated they oppose the installation of mooring buoys within tribal lands without coordinating with the tribes. One commenter requested clarification as to how this NWP will interface with regional conditions. The Corps does not agree that PCNs should be required for all non-commercial, single-boat mooring buoys authorized by this NWP because the installation of these structures in navigable waters of the United States is unlikely to result in more than minimal individual and cumulative adverse environmental effects. Certain NWP general conditions, such as general condition 18 for endangered species and general condition 20 for historic properties, may trigger PCN requirements for some mooring buoys proposed to be installed by non-federal permittees. For example, under paragraph (c) of general condition 18 non-federal permittees are required to submit PCNs to the district engineer if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed such designation) might be affected or is in the vicinity of the proposed mooring buoy, or if the proposed mooring buoy is located in designated critical habitat or critical habitat proposed for such designation. Activities authorized by this NWP must comply with general condition 17, tribal rights. During the process for reissuing this NWP, Corps districts consulted with tribes and those consultation efforts may have resulted in regional conditions or coordination procedures with tribes to help ensure compliance with general condition 17. This NWP interfaces with regional conditions in the same manner as any other NWP interfaces with regional conditions. If a division engineer imposed a regional condition on this NWP, in order to qualify for NWP authorization, the proposed activity must comply with that regional condition as well as any requirements in the text of the NWP and applicable NWP general conditions. This NWP is reissued as proposed.[[Page 73532]] NWP 11. Temporary Recreational Structures. The Corps did not propose any changes to this NWP. No comments were received on the proposed reissuance of this NWP. This NWP is reissued as proposed. NWP 13. Bank Stabilization. The Corps proposed to modify this NWP by adding a ``Note'' that states that in coastal waters and the Great Lakes, living shorelines may be an appropriate option for bank stabilization, and may be authorized by NWP 54. Many commenters objected to the proposed reissuance of NWP 13, stating that that bank stabilization using bulkheads, revetments, and other hard structures has deleterious effects on shoreline ecosystems. Several commenters stated that this NWP should not be reissued so that bank stabilization activities can be limited to bioengineering or the construction of living shorelines. Many commenters said that the proposed NWP would result in significant adverse impacts, and violate Section 404(e) of the Clean Water Act, the Clean Water Act Section 404(b)(1) Guidelines, the NEPA, and the ESA. One commenter stated that the reissuance of this NWP should require an environmental impact statement. This NWP authorizes a wide variety of bank stabilization activities because bioengineering and living shorelines are effective bank stabilization approaches in limited circumstances. This NWP authorizes both hard bank stabilization activities (e.g , revetments, riprap, bulkheads) and soft bank stabilization activities (e.g , bioengineering, other forms of vegetative stabilization). Living shorelines may be authorized by NWP 54, as indicated by the Note proposed to be added to this NWP. Hard bank stabilization activities may be necessary in riverine, lacustrine, estuarine, and marine environments subject to strong erosive forces. Soft bank stabilization activities may be effective at reducing erosion in aquatic habitats subject to moderate to low erosive forces. This NWP has been issued in compliance with Section 404(e) of the Clean Water Act (including the Section 404(b)(1) Guidelines), NEPA, and the ESA. In the national decision document for the reissuance of this NWP, the Corps prepared an environmental assessment with a finding of no significant impact to comply with NEPA requirements. Therefore, the reissuance of this NWP does not require the preparation of an environmental impact statement. In the national decision document, the Corps prepared a Clean Water Act Section 404(b)(1) Guidelines compliance analysis, which also addresses the requirements of Section 404(e) of the Clean Water Act. In section 8.0 of the national decision document for this NWP, the Corps discusses compliance with the ESA, including the requirements of general condition 18 and 33 CFR 330.4(f). Many commenters said that the secondary, indirect, and cumulative effects associated with bank stabilization activities authorized by this NWP are adverse. A few commenters stated that the activities authorized by this NWP have negative adverse effects on ESA-listed fish and their critical habitat. One commenter said that bulkheads have more than minimal cumulative adverse impacts and that the Corps should not reissue this NWP because it does not know how many NWP 13 activities occur each year. One commenter said that the activities authorized by this NWP have substantial sediment-related impacts. One commenter stated that the Corps should develop a means to measure, monitor, and enforce sediment limits. While bank stabilization activities may have adverse effects on the aquatic environment, to be authorized by this NWP those adverse effects must be no more than minimal on an individual and cumulative basis. Activities authorized by this NWP must comply with general condition 18 and 33 CFR 330.4(f), which address compliance with the ESA. Under paragraph (c) of general condition 18, non-federal permittees are required to submit a PCN to the district engineer if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed such designation) might be affected by the proposed activity or is in the vicinity of the proposed activity, or if the proposed activity is located in designated critical habitat or critical habitat proposed for such designation. District engineers will review all PCNs for proposed NWP 13 activities for potential effects to species and critical habitats covered under the ESA and will initiate ESA Section 7 consultation for any proposed activity that may affect listed species or designated critical habitat, including ESA-listed fish species and their designated critical habitat. This NWP requires a PCN for any proposed activity that: (1) Involves discharges into special aquatic sites; (2) is in excess of 500 feet in length; or (3) will involve the discharge of greater than an average of one cubic yard per running foot as measured along the length of the treated bank, below the plane of the ordinary high water mark or the high tide line. District engineers will review proposed bulkheads constructed in wetlands and other special aquatic sites, as well as proposed bulkheads that are longer than 500 feet in length or involve the discharge of greater than one cubic yard per running foot as measured along the bank. The Corps tracks the use of this NWP through the required and voluntary PCNs for proposed NWP 13 activities that are submitted to district offices. While not all proposed NWP 13 activities involving the construction or replacement of bulkheads require PCNs, consistent with other NWPs that do not require PCNs for all authorized activities the Corps estimates the number of PCN and non-PCN activities anticipated to occur during the 5-year period the NWP is expected to be in effect. Bank stabilization activities can have adverse effects on sediment processes in aquatic ecosystems, and this NWP authorizes only those bank stabilization activities that have no more than minimal individual and cumulative adverse environmental effects. Bank stabilization activities may be necessary to reduce erosion to protect buildings and other structures, as well as infrastructure (e.g , utility lines). Bank stabilization activities may also help reduce sediment loads to waterbodies, by reducing erosion caused by flowing water and other sediment inputs to waterbodies. Under its procedures at 33 CFR part 326, the Corps can take actions to address situations where permittees do not comply with the terms and conditions of this NWP, including the cubic yard limit for discharges of dredged or fill material into waters of the United States. One commenter said that the Corps needs to consider secondary effects of structures such as bulkheads in its minimal effects determination. One commenter suggested limiting use of this NWP to emergency situations when other bank stabilization techniques, such as living shorelines and bioengineering, are not available. One commenter recommended adding emergency provisions to NWP 13. One commenter expressed opposition to the complete removal of non-native plant species. In its national decision document for the reissuance of this NWP, including the environmental assessment, public interest review, and Clean Water Act Section 404(b)(1) Guidelines analysis, the Corps evaluates potential indirect or secondary effects caused by activities authorized by this NWP. When reviewing required PCNs, as well as voluntary PCNs, for proposed NWP 13 activities, district engineers consider the site-specific direct and indirect effects that may be caused by those activities,[[Page 73533]]as required by paragraph 2 of section D, District Engineer's Decision. As discussed above, living shorelines and bioengineering are effective bank stabilization techniques under certain circumstances, and therefore this NWP should not limit the use of hard bank stabilization measures to emergency situations. The Corps does not believe it is necessary to add provisions to this NWP to address emergency situations. Not all activities authorized by NWP 13 require PCNs, and some emergency bank stabilization measures may be undertaken without the need to submit a PCN to the Corps. If an emergency situation arises where bank stabilization activities require review by the Corps, those bank stabilization activities may be authorized through the Corps' emergency authorization procedures at 33 CFR 325.2(e)(4). The Corps did not propose any changes to this NWP regarding the removal of non-native plant species. While paragraph (g) of this NWP requires the use of native plants appropriate for current site conditions, including salinity, for bioengineering or vegetative bank stabilization, it does not require the permittee to remove individuals of non-native plant species that may become established in the project area through natural processes. Many commenters suggested reducing the linear foot limits of this NWP. One commenter recommended removing the 500 linear foot limit from this NWP. One commenter suggested removing the 1,000-foot limit for waivers for bulkheads, to allow district engineers to issue waivers that authorize bulkheads greater than 1,000 feet in length. One commenter stated that the waiver provision should be removed from this NWP because it includes no performance standards and it can be abused. One commenter said that the Corps should not require permits for longer reaches of stream banks that would be temporarily impacted. The Corps is retaining the 500 and 1,000 linear foot limits in this NWP. The 500 linear foot limit can be waived by the district engineer, if he or she determines after reviewing a PCN that the proposed activity will result in no more than minimal individual and cumulative adverse environmental effects and issues a written verification for the proposed NWP activity. For proposed bulkheads, the 500 linear foot limit can be waived up to the 1,000 linear foot limit. If a project proponent wants to construct more than 1,000 linear feet of bulkhead, then he or she will need to submit an application for an individual permit, unless the Corps district has issued a regional general permit that authorizes bulkheads longer than 1,000 feet in length. Division engineers can add regional conditions to this NWP to impose lower linear foot limits on bank stabilization activities, including the maximum length for bulkheads. The only performance standard that applies to waivers of the 500 linear foot limit is requirement that the district engineer issue a written determination that concludes that the proposed activity will result in no more than minimal individual and cumulative adverse environmental effects. DA authorization is required for permanent and temporary impacts to stream banks within the Corps' jurisdiction if those impacts involve discharges of dredged or fill material into waters of the United States or structures and work in navigable waters of the United States. A few commenters said that this NWP should not authorize discharges of dredged or fill material below the ordinary high water mark or mean high water line. One commenter suggested prohibiting building out to pre-existing bank lines. A few commenters stated that impacts to special aquatic sites should not be authorized by this NWP. The purpose of this NWP is to authorize discharges of dredged or fill material into waters of the United States and structures and work in navigable waters of the United States for bank stabilization activities that have no more than minimal individual and cumulative adverse environmental effects. Prohibiting discharges of dredged or fill material into waters of the United States below the ordinary high water mark in jurisdictional non-tidal rivers and streams, or below the high tide line in tidal streams and other tidal waters would preclude NWP authorization for many bank stabilization activities that result in minimal individual and cumulative adverse environmental effects. In addition, such a prohibition would result in ineffective protection against erosion since flowing waters and tidal waters would be likely to undercut the bank stabilization activity. Bank stabilization activities constructed under that prohibition would likely collapse after the stream or river bank, lake shore, estuary shore, or ocean shore is undermined through erosional processes. If there are no jurisdictional wetlands landward of the bank or shore, then the Corps has no authority to prevent landowners from discharging fill material to construct buildings near the banks of streams or rivers, or the shores of lakes, estuaries, and oceans. All discharges of dredged or fill material into special aquatic sites require PCNs to the Corps, and district engineers will review those PCNs to determine whether the proposed activities will result in no more than minimal individual and cumulative adverse environmental effects. If the district engineer reviews a PCN for a proposed discharge of dredged or fill material into a special aquatic site, and after considering mitigation proposed by the applicant, determines that the proposed activity will result in more than minimal individual and cumulative adverse environmental effects, he or she will exercise discretionary authority and require an individual permit for that activity. Many commenters said that PCNs should be required for all activities authorized by this NWP. Many commenters stated that PCNs should be required for activities less than 500 feet in length. One commenter requested clarification regarding when pre-construction notification is required for activities authorized by this NWP, because there is a perception that bank stabilization activities in excess of 500 linear feet require authorization by individual permits. One commenter said that the PCN requirement for discharges into special aquatic sites should be removed. One commenter stated that PCNs should be required for all activities authorized by this NWP to ensure that those activities will not jeopardize ESA-listed species. One commenter said that all NWP 13 activities should require agency coordination. The Corps believes that it has established appropriate PCN thresholds for this NWP, so that PCNs are required for proposed bank stabilization activities that have the potential to result in more than minimal individual and cumulative adverse environmental effects. The PCN review process allows for case-specific review of proposed activities so that district engineers can determine whether those proposed activities can be authorized by this NWP. Division engineers can impose regional conditions on this NWP to require PCNs for proposed activities that are less than 500 linear feet in length or would involve the discharge of less than one cubic yard per running foot as measured along the length of the bank. The district engineer can waive the 500 linear foot limit if she or he determines in writing, after evaluating the PCN and any comments received during the agency coordination conducted under paragraph (d) of general condition 32, that the proposed activity will result in no more than minimal individual and[[Page 73534]]cumulative adverse environmental effects. This NWP requires PCNs for all discharges of dredged or fill material into special aquatic sites so that district engineers can review all of these proposed activities to determine whether they will result in no more than minimal adverse environmental effects. Under paragraph (c) of general condition 18, non-federal permittees are required to submit a pre-construction notification to the district engineer if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed such designation) might be affected or is in the vicinity of the proposed activity, or if the proposed activity is located in designated critical habitat or critical habitat proposed for such designation. The district engineer will review the PCN and determine whether ESA Section 7 consultation or conference with the U.S FWS and/or NMFS is required for the proposed activity. If ESA Section 7 consultation or conference is required, the activity is not authorized by NWP until the district engineer notifies the project proponent that those processes are completed. Certain activities authorized by NWP 13 require agency coordination, specifically activities for which permittees are requesting waivers of the quantitative limits of this NWP or for discharges into special aquatic sites. The Corps does not agree that agency coordination should be required for all NWP 13 activities that require pre-construction notification. Several commenters expressed support for adding the Note to this NWP to make permittees aware of the availability of NWP 54 (Living Shorelines) for bank stabilization activities in coastal waters. Many commenters suggested modifying this NWP to require a preferential hierarchy for bioengineering and living shorelines over bank hardening activities to satisfy requirements to authorize the least environmentally damaging practicable alternative. The Corps has added the proposed Note to this NWP. The Corps encourages waterfront property owners and other project proponents to use living shorelines, bioengineering, vegetative stabilization, and other soft bank stabilization approaches in coastal areas and other waterbodies where those methods are likely to be successful in managing erosion along coastal waters, along river and stream banks, and shorelines in lakes and other waterbodies. The use of living shorelines, bioengineering, vegetative stabilization, and other soft bank stabilization approaches can help increase the resilience of waterfront properties, as well as the structures and infrastructure located on those properties, to the adverse effects of climate change. The increased use of nature-based approaches such as living shorelines and bioengineering to bank stabilization is a priority in the Administration's climate resiliency efforts. Noting this, the Corps provides that such soft bank stabilization techniques should generally be considered first when project proponents consider the use of NWP 13. There are many factors, however, that should be taken into account in both the proposed and verified bank stabilization project. The appropriate approach to managing shoreline or bank erosion in coastal areas and other waterbodies must be determined on a site-specific basis after considering a variety of factors. Examples of factors relevant to the planning and design of bank stabilization activities include, but are not limited to: Bank height; bank condition; the energy of the tides, waves, currents, or other water flows that the bank is exposed to; fetch; nearshore water depths; the potential for storm surges; sediment or substrate type; tidal range in areas subject to the ebb and flow of the tide; shoreline configuration and orientation; whether there is infrastructure in the vicinity of the proposed bank stabilization activity that needs to be protected; the width of the waterway; the presence of trees in the vicinity of the bank and whether those trees need to be maintained or protected; and the distance from a navigation channel or navigable fairway in the waterbody. With respect to living shorelines, factors to consider regarding the appropriateness of living shorelines to manage bank erosion in coastal areas include the fetch of the waterbody, shore morphology, depth gradients of nearshore waters, the stability of the existing substrate, tidal range, and marsh elevations (Saleh and Weinstein 2016). Project proponents may hire coastal engineers and other consultants to help determine which bank stabilization techniques might be feasible and successful at a specific site. District engineers are available to discuss potential bank stabilization options with waterfront property owners and their consultants, including the use of living shorelines, bioengineering, and other soft bank stabilization approaches that may be effective at controlling erosion at a particular site, as well as more environmentally beneficial. The Corps cannot mandate the use of a particular bank stabilization technique at a specific site. District engineers can require minor project modifications to proposed activities to reduce adverse environmental impacts (see 33 CFR 320.4(r)(1)(i)). However, district engineers cannot require completely different designs of proposed activities that require DA authorization without agreement from the applicant. In addition to the factors identified in the previous paragraph, there are other factors to consider when selecting a bank stabilization method, including costs and maintenance requirements, which can vary substantially among different bank stabilization approaches. In addition, requiring specific approaches to bank stabilization may also negatively affect disadvantaged communities. District engineers will review PCNs for proposed bank stabilization activities, and if the district engineer determines that a proposed bank stabilization activity will result in more than minimal adverse environmental effects, the district engineer will exercise discretionary authority and require an individual permit. During the individual permit review process, an alternatives analysis is required and the alternatives evaluated during the individual permit review process may include soft bank stabilization approaches. Waterfront property owners and other project proponents are responsible for proposing bank stabilization activities for their properties, and under the NWP program, district engineers review PCNs for those proposed activities. If a district engineer reviews a PCN for a proposed bank stabilization activity and determines that the proposed activity will result in more than minimal adverse environmental effects, the district engineer will exercise discretionary authority and require an individual permit for that proposed activity. The Corps encourages waterfront property owners to first consider the use of living shorelines, vegetative stabilization, bioengineering, and other soft bank stabilization approaches before considering hard bank stabilization techniques such as bulkheads and revetments; however, the Corps acknowledges that living shorelines and bioengineering are not effective or appropriate approaches to bank stabilization in all conditions. For certain types of aquatic ecosystems and site conditions, such as environments subjected to high energy erosive forces, hard structural bank stabilization measures such as revetments and bulkheads may be necessary to reduce erosion and protect people, buildings,[[Page 73535]]and infrastructure. The requirement in the Clean Water Act Section 404(b)(1) Guidelines to permit the least environmentally damaging practicable alternative applies to activities authorized by individual permits, not to activities authorized by general permits. The Corps will include in their NWP 13 verification decision document a summary of the rationale for the verified bank stabilization measures reflecting the engineering, cost, technology and other considerations above, to include discussion of soft bank stabilization techniques and why it was or was not appropriate for the subject site. One commenter said that the Corps' draft decision document for this NWP did not provide an adequate analysis of the direct, indirect, and cumulative impacts caused by these activities and did not use adequate scientific information to describe the affected environment and the impacts of bank stabilization activities. One commenter asserted that this NWP does not comply with the 404(b)(1) Guidelines. One commenter said that the Corps should prepare an environmental impact statement for the proposed reissuance of this NWP. One commenter stated that activities authorized by this NWP cause significant degradation of aquatic ecosystems. One commenter suggested that the Corps include sea level rise in its analysis of this NWP, including its assessment of cumulative impacts. The final decision document prepared by Corps Headquarters for the reissuance of this NWP provides a general analysis of the impacts expected to be caused by activities authorized by this NWP during the 5-year period it is anticipated to be in effect. In the environmental assessment, the Corps evaluated the effects or impacts on the human environment that are reasonably foreseeable and have a reasonably close causal relationship to the activities authorized by this NWP, consistent with the Council on Environmental Quality's definition of ``effects or impacts'' at 40 CFR 1508.1(g). In the national decision document, the Corps also addressed the elements required for a Clean Water Act Section 404(b)(1) Guidelines analysis for the issuance of a general permit, including a cumulative effects analysis conducted in accordance with 40 CFR 230.7(b)(3) and a conclusion that the reissuance of this NWP would not cause or contribute to significant degradation of the aquatic environment. The affected environment of the United States is described in section 4.0 of the national decision document, using available information at a national scale to describe the current environmental baseline. The Corps complied with the requirements of NEPA by preparing an environmental assessment with a finding of no significant impact. Therefore, an environmental impact statement is not required for the reissuance of this NWP. The national decision document for this NWP has been revised to provide more discussion of sea level rise, including the need for bank stabilization activities to protect buildings and infrastructure from increased risks of erosion that may be caused by rising sea levels. Bank stabilization activities authorized by this NWP can help protect existing buildings and infrastructure and reduce risks associated with rising sea levels, as a means of adapting to climate change. Rising sea levels are an effect of climate change. One commenter suggested adding a definition of ``bioengineering'' to this NWP. One commenter requested that the Corps enforce current guidelines to remove non-biodegradable fabric used in previous projects. One commenter said that the Corps needs to develop functional assessment tools to better assess individual and cumulative impacts of bank stabilization on channel and floodplain processes. The Corps declines to add a definition of ``bioengineering'' to this NWP to because adding such a definition might impose unnecessary constraints on potential bioengineering approaches to bank stabilization that may be authorized by this NWP. Bioengineering approaches can vary by region, may involve a variety of techniques and materials, and may vary by resource type. Non-biodegradable fabric may be used as a component for a variety of bank stabilization techniques and that fabric needs to permanently remain in place to control erosion at the site. Requiring the removal of fabric that is used for bank stabilization activities would likely undermine the efficacy of bank stabilization projects and their structural integrity because fabric is often necessary to ensure that soil under revetments and other bank stabilization structures is not washed away by tidal waters or by water moving through the soil to the bank or shoreline. If the soil under revetments and other bank stabilization structures is moved away from the project site, then those structures may collapse and erosion may be exacerbated. Adjacent uplands may also collapse or subside, posing a potential danger to people who live at or use the project site. While functional assessment tools may be useful in assessing the individual and cumulative environmental impacts of bank stabilization activities within a project site, a waterbody, or within a geographic region, those environmental impacts can be assessed through other means. When reviewing PCNs for proposed NWP 13 activities, district engineers will apply the 10 criteria in paragraph 2 of section D, District Engineer's Decision to determine whether a proposed NWP 13 activity qualifies for NWP authorization. If an appropriate functional assessment is available, that tool may be used by district engineers when evaluating PCNs and determining whether a proposed bank stabilization activity qualifies for NWP 13 authorization. This NWP is reissued as proposed. NWP 14. Linear Transportation Projects. The Corps proposed to modify this NWP by adding ``driveways'' to the list of examples of activities authorized by this NWP. Several commenters expressed support for the addition of ``driveways'' to the list of examples of the types of projects authorized by this NWP. One commenter said that adding ``driveways'' to the list of examples for the types of projects authorized by this NWP could confuse applicants and result in an increase of PCNs submitted to the Corps, and requested that the Corps provide a more detailed explanation of the type of driveway authorized by this NWP. A commenter said the text of this NWP should be revised to clarify if NWP 14 would be used to authorize driveways when a project proponent is using other NWPs such as NWP 29 (Residential Development) or NWP 39 (Commercial and Institutional Developments) to authorize a development project that may include one or more driveways. One commenter stated that driveways should be limited to vehicle access to a facility and not to large-scale transportation projects, with an acreage limit that applies to the driveway. The Corps has adopted the proposed modification of this NWP to include ``driveways'' in the list of examples of the types of projects authorized by this NWP. The term ``driveways'' applies broadly to include features that are used by vehicles to move to and from buildings and other facilities, and is not limited to driveways associated with single unit or multiple unit residences, or driveways used to go to and from commercial buildings, institutional buildings, or other types of buildings. Discharges of dredged or fill material into waters of the United States for the construction or expansion of driveways may also be authorized by NWPs 29 and 39 as attendant features to residential developments and commercial and institutional developments. Adding ``driveways'' to the list of examples of[[Page 73536]]the types of projects that may be authorized by NWP 14 can provide some clarity to the regulated public because the construction of a driveway may be the only activity that requires DA authorization if a residential development or commercial or institutional development is constructed in uplands, and the driveway is needed to cross waters of the United States to provide vehicular access to the upland development. There is usually no need to combine NWP 14 with NWP 29 or NWP 39 to authorize the construction or expansion of driveways within residential or commercial or institutional developments, unless the construction of the driveway involves discharges of dredged or fill material into waters of the United States that are not authorized by NWPs 29 or 39. For example, the construction or expansion of a driveway that crosses tidal waters or non-tidal wetlands adjacent to tidal waters, may be authorized by NWP 14 because NWPs 29 and 39 do not authorize discharges of dredged or fill material into tidal waters. A driveway serves a specific purpose that may be different than other types of linear transportation projects. Driveways are subject to the same acreage limits as other linear transportation projects authorized by this NWP, including larger scale linear transportation projects: 1/2-acre for losses of non-tidal waters of the United States and 1/3-acre for losses of tidal waters. One commenter stated that the cumulative impacts of authorizing large residential driveways in waters of the United States threatens nearshore benthic habitat that is important to salmonids. One commenter recommended modifying this NWP to include a definition for ``stand-alone project.'' One commenter suggested modifying NWP 14 to authorize any structure or fill that would facilitate the movement of people and/or goods, including moving sidewalks, stationary sidewalks, streetcars, trams, and trollies. One commenter stated that this NWP should authorize the construction, expansion, or modification of ferry terminals. When reviewing PCNs for proposed driveways authorized by this NWP, the district engineer will determine whether a proposed activity may affect ESA-listed species or designated critical habitat, including listed salmon species and their designated critical habitat. If the district engineer determines a proposed NWP activity may affect listed species or designated critical habitat, he or she will initiate ESA Section 7 consultation with the NMFS and/or U.S FWS as appropriate. The proposed activity cannot be authorized by NWP until the ESA Section 7 consultation process has been concluded. A non-federal permittee must submit a pre-construction notification to the district engineer if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed such designation) might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat or critical habitat proposed for such designation (see paragraph (c) of general condition 18). The Corps declines to add a definition of ``stand-alone project'' to this NWP because that phrase is not used in this NWP. The first sentence of this NWP provides examples of linear transportation projects that may be authorized by this NWP, and those examples include railways and trails. The list of examples is not an exhaustive list, so other types of linear transportation projects that require DA authorization may be authorized by this NWP, including streetcars, trams, and trollies. Sidewalks may be authorized other NWPs, such as NWPs 29 and 39 if those sidewalks are attendant features of the types of developments authorized by those NWPs. This NWP does not authorize discharges of dredged or fill material into waters of the United States or structures or work in navigable waters of the United States for the construction, modification, expansion, or improvement of ferry terminals because ferry terminals are not linear transportation projects. A ferry terminal is a single point within a ferry transportation system, and is a non-linear feature. One commenter said that the term ``crossing'' should be defined or changed to ``placement of dredge or fill and structures'' or ``impacts to waters of the United States.'' This commenter stated that the term ``crossing'' has been viewed strictly as a crossing or bisecting of waters of the United States rather than allowing roadway fill in a wetland along the linear transportation project since the road only filled a portion of the wetland rather than crossing it. The NWP uses the term ``crossing'' because linear transportation projects have a point of origin and a terminal point and may involve multiple crossings of waterbodies at separate and distant locations to move people, goods, or services between the point of origin and the terminal point. A crossing does not have to bisect a water of the United States. For example, a crossing can consist of dredged or fill material placed in waters of the United States along the edge of the linear transportation project without bisecting the waterbody. A crossing constructed in such a manner can be considered to minimize impacts to waters of the United States in compliance with paragraph (a) of general condition 23, mitigation, without a loss of connectivity within the remaining extent of the waterbody. Paragraph (a) of general condition 23 requires project proponents to design and construct their NWP activities to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e , on site). One commenter said that linear transportation projects authorized by this NWP have devastating impacts on animal populations resulting from habitat loss, habitat fragmentation, creation of migration barriers, and increased impervious surface runoff. This commenter said these impacts must be assessed through the preparation of an environmental impact statement and through ESA Section 7 consultation. General condition 2 (aquatic life movements) states that no NWP activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. General condition 2 also requires all permanent and temporary crossings of waterbodies to be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species. For terrestrial animals, linear transportation projects can be designed and constructed to provide corridors for animal movement (e.g , tunnels, bridges) so that target species can safely move from one side of the linear transportation project to the other side. The construction of linear transportation projects may trigger a requirement by state or local governments to provide stormwater management facilities to reduce adverse effects to changes in watershed hydrology that may be caused by the construction of roads and other impervious surfaces in the watershed. Stormwater management facilities can reduce surface runoff that may adversely affect rivers, streams, and other waterbodies. District engineers will conduct ESA Section 7 consultation for proposed NWP 14 activities when they determine that those activities may affect listed species or designated critical habitat. This NWP authorizes[[Page 73537]]only activities that have no more than minimal individual and cumulative adverse environmental effects, and NEPA compliance was completed through the preparation of an environmental assessment by Corps Headquarters in the national decision document for the reissuance of this NWP. The Corps concluded the environmental assessment with a finding of no significant impact. Therefore, the reissuance of this NWP does not require the preparation of an environmental impact statement. One commenter said the 1/2-acre limit for losses of non-tidal waters of the United States and the 1/3-acre limit for losses of tidal waters is not consistent with other NWPs. One commenter stated that both acreage limits for this NWP should be reduced to 1/10-acre. One commenter said the phrase ``minimum necessary'' is ambiguous in the context of limiting stream channel modifications and recommended limiting stream channel modifications to 300 linear feet or 1/10-acre. One commenter said that this NWP should not authorize linear projects that are more than a few hundred feet in length. One commenter expressed agreement that an individual permit is required for an entire linear project if one crossing of waters of the United States does not satisfy the terms and conditions of the NWP. The 1/2-acre limit for losses of non-tidal waters of the United States in this NWP is consistent with the 1/2-acre limit in other NWPs that authorize discharges of dredged or fill material into non-tidal waters of the United States, such as NWP 21 (surface coal mining activities), NWP 29 (residential developments), NWP 39 (commercial and institutional developments), NWP 40 (***agricultural*** activities), NWP 42 (recreational facilities), NWP 43 (stormwater management facilities), NWP 44 (mining activities), NWP 50 (underground coal mining activities), NWP 51 (land-based renewable energy generation facilities), and NWP 52 (water-based renewable energy generation pilot projects). The 1/3-acre limit for losses of tidal waters for NWP 14 was adopted in 1991 (see 56 FR 59142), and the 1/3-acre limit applied to losses of tidal waters and non-tidal waters. When the Corps issued 5 new NWPs and modified 6 existing NWPs to replace NWP 26 in 2000 (see 65 FR 12818), it modified NWP 14 by increasing the acreage limit for losses of non-tidal waters for public linear transportation projects to 1/2-acre. The 1/2-acre and 1/3-acre limits, plus the PCN requirements for this NWP, are sufficient to ensure that activities authorized by this NWP result in no more than minimal individual and cumulative adverse environmental effects. In addition, division engineers can add regional conditions to this NWP to lower the acreage limits in a particular geographic area to ensure compliance with the ``no more than minimal adverse environmental effects'' requirement for the NWPs. The use of the phrase ``to the minimum necessary'' for stream channel modifications for linear transportation projects requires project proponents to minimize their stream channel modifications while providing flexibility to allow district engineers and project proponents to take into account for project-specific circumstances as well as design and construction constraints that may be imposed by site-specific conditions, including stream channel geomorphology, the topography of the surrounding area, and the purpose of the linear transportation project. Any loss of stream bed due to filling or excavation is also subject to the 1/2-acre and 1/3-acre limits of this NWP, so the Corps does not believe it is necessary to add a 300 linear foot limit for stream channel modifications. The Corps also declines to impose an overall linear foot limit to linear transportation projects since there can be substantial distances between crossings of waters of the United States, and those crossings may involve different waterbodies and watersheds. The Corps has retained Note 1 in this NWP, which references 33 CFR 330.6(d). Section 330.6(d) addresses how NWPs may or may not be combined with individual permits for activities that require DA authorization. One commenter said that for a linear transportation project with multiple crossings of waters of the United States, the overall linear transportation project should be considered as the single and complete project, not the individual crossings of jurisdictional waters and wetlands. One commenter stated that allowing up to 1/2-acre of losses of waters of the United States for each single and complete project could result in extensive cumulative impacts and recommended that the Corps impose a single, overall limit to the entire linear transportation project. One commenter stated that linear transportation projects may cause cumulative impacts not captured in the NWP cumulative impact analysis because some activities are authorized by NWP 14 without a requirement to submit PCNs. One commenter said that allowing the expansion, modification, or improvement of previously authorized projects for linear transportation projects could result in cumulative impacts above the acreage limits and therefore these activities should only be authorized when losses of waters of the United States for the previously authorized projects plus the losses of waters of the United States for the proposed expansion, modification, or improvement project do not exceed the 1/2-acre or 1/3-acre limits. One commenter said that all crossings of waters of the United States in a major watershed should be evaluated together as a single and complete project because the cumulative impacts are to one system, or alternatively that all activities authorized by this NWP should require PCNs to allow for the evaluation of cumulative impacts. The practice for providing NWP authorization for single and complete linear project, where each separate and distant crossing of waters of the United States may qualify for its own NWP authorization, is consistent with the Corps' NWP regulations at 33 CFR 330.2(i), which were published in the November 22, 1991, issue of the Federal Register (56 FR 59110)). District engineers will evaluate the separate and distant crossings of waters of the United States that require PCNs for linear transportation projects, as well as the additional information provided in the PCNs for crossings of waters of the United States authorized by NWP that do not require PCNs. Paragraph (b)(4)(i) of general condition 32 requires the prospective permittee to identify in the PCN any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings for linear projects that require DA authorization but do not require pre-construction notification. In addition, paragraph (b)(4)(ii) requires the prospective permittee to include in the PCN the quantity of anticipated losses of wetlands, other special aquatic sites, and other waters for each single and complete crossing of those wetlands, other special aquatic sites, and other waters (including those single and complete crossings authorized by an NWP but do not require PCNs). Because of the requirements of paragraph (b)(4) of general condition 32, it is not necessary to require PCNs for all activities authorized by NWP for linear transportation projects. The district engineer will use the information in the PCN to evaluate the individual and cumulative adverse environmental effects of the proposed linear transportation project that are authorized by NWP. The district engineer determines the appropriate[[Page 73538]]geographic scale for evaluating cumulative impacts. The cumulative effects may be evaluated on a watershed-basis, or by using other types of geographic regions, such as a Corps district, state, county, or other geographic area deemed appropriate by the district engineer. Cumulative effects accrue from multiple uses of an NWP in a geographic area. Separate and distant crossings of waters of the United States for a linear transportation project may occur in different waterbodies within a single watershed, or various waterbodies in more than one watershed, depending on the length of the linear transportation project, the distribution of waterbodies in a watershed, and the size of the watershed(s). Separate and distant crossings authorized by NWP may also occur in a single waterbody (e.g , a meandering stream), as long as there is sufficient distance between crossings of waters of the United States. When evaluating PCNs for proposed NWP 14 activities, district engineers may also consider previously authorized losses of the United States for linear transportation projects when a project proponent wants to expand, modify, or improve a previously authorized linear transportation project. Since the NWPs can be issued for a period of no more than five years, the cumulative effects caused by an NWP are limited to the number of times that NWP is used during the five year period it is in effect (see 40 CFR 230.7(b)(3)). Therefore, if the proposed expansion, modification, or improvement is for a linear transportation project that was authorized in the current five-year cycle for the NWP, the district engineer should take the previously authorized losses of waters of the United States into account when determining if the proposed changes to the linear transportation project will result in no more than minimal individual and cumulative adverse environmental effects and qualify for NWP 14 authorization. On the other hand, if the proposed expansion, modification, or improvement is for a linear transportation project that was authorized by a previous version of NWP 14 that has expired, the district engineer does not need to take the previously authorized losses of waters of the United States into account, because the previously authorized activities have become part of the current environmental baseline for evaluating the individual and cumulative adverse environmental effects of the NWP currently in effect. One commenter requested clarification regarding whether the PCN requirement for losses of greater than 1/10-acre of waters of the United States applies to the overall linear project or each single and complete project. One commenter stated that agency coordination should be required for proposed activities in special aquatic sites or that would result in the loss of greater than 1/10-acre of waters of the United States. One commenter said that agency coordination should be required for stream losses of stream bed greater than 300 linear feet. The PCN thresholds for this NWP apply to each single and complete project authorized by NWP. However, if the linear transportation project involves multiple separate and distant crossings of waters of the United States, and some of those crossings do not require pre-construction notification, paragraph (b)(4) of general condition 32 requires the project proponent to identify the crossings authorized by NWP that do not require PCNs, as well as quantity of anticipated losses of waters of the United States expected to be caused by those non-PCN NWP activities. The Corps does not agree that agency coordination is necessary to provide the district engineer with information to assist in his or her determination whether the proposed activity qualifies for NWP authorization. District engineers will determine whether proposed NWP 14 activities qualify for NWP authorization after reviewing the information in PCNs. One commenter stated that all linear transportation projects previously authorized by NWP 14 should require PCNs if the project proponent wants to use NWP 3 to authorize maintenance activities for the previously authorized NWP activities. One commenter said there should be more consistency between NWPs 12 and 14 in terms of acreage limits, PCN thresholds, and allowing the use of temporary mats, because both NWPs authorize single and complete linear projects with separate and distant crossings of waters of the United States that do not have independent utility. This NWP can be used to authorize the maintenance of linear transportation projects, including the replacement of structures and fills for linear transportation projects that may not qualify NWP 3 authorization. Those replacement activities may not qualify for NWP 3 authorization because the current linear transportation project is not currently serviceable, or because the project proponent wants to change the design and/or size of the linear transportation project to accommodate changes in water flow, improve connectivity for the movement of aquatic organisms upstream and downstream of the road crossing, or for other reasons. Changing the size and/or configuration of the structures and fills for a linear transportation project may be comprised of more than a minor deviation, which may preclude the use of NWP 3 for the replacement activity. For example, replacing an undersized or perched culvert with a larger culvert structure that improves the passage of aquatic organisms and connectivity may be considered an improvement of a linear transportation project. NWP 3 may be more appropriate for certain repair, rehabilitation, or replacement activities for linear transportation projects, as well as the removal of accumulated sediment within and near water crossings. The NWP program provides flexibility to permittees to determine which applicable NWP to use to provide the required DA authorization under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899. The acreage limits for NWPs 12 and 14 have some similarities, with a 1/2-acre limit for losses of non-tidal waters of the United States. The 1/2-acre limit for NWP 12 also applies to tidal waters, while NWP 14 has a 1/3-acre limit for losses of tidal waters. Nationwide permits 12 and 14 have somewhat different PCN thresholds because of differences between oil or natural gas pipeline activities and linear transportation projects. Both NWPs have a PCN threshold for losses of greater than 1/10-acre of waters of the United States. Both NWP 12 and 14 have provisions authorizing the use of temporary mats, when the use of those mats requires DA authorization. This NWP is reissued as proposed. NWP 15. U.S Coast Guard Approved Bridges. The Corps did not propose any changes to this NWP. No comments were received in response to the proposed reissuance of this NWP. This NWP is reissued as proposed. NWP 16. Return Water From Upland Contained Disposal Areas. The Corps did not propose any changes to this NWP. One commenter stated that the NWP should require the applicant to ensure toxic substances are not released back into the water column through re-exposure from dredging activities. One commenter said that the applicant should properly characterize the quality and quantity of return water to ensure state water quality standards are not violated. This NWP authorizes only the return water from upland contained disposal areas for dredged material, which is defined as a ``discharge of dredged material'' under 33 CFR 323.2(d)(1)(ii).[[Page 73539]]This NWP does not authorize the dredging activity itself. Discharges into waters of the United States require water quality certification from the appropriate certifying authority unless a waiver of the water quality certification requirement occurs. The certifying authority will determine whether a discharge into waters of the United States will comply with applicable water quality requirements. This NWP is reissued as proposed. NWP 17. Hydropower Projects. The Corps proposed to modify this NWP to authorize discharges of dredged or fill material into waters of the United States associated with hydropower projects with a generating capacity of less than 10,000 kilowatts (kW), to be consistent with the current definition of ``small hydroelectric power project.'' Several commenters stated they support the changing the threshold for ``small hydroelectric projects'' to 10,000 kW or less. Many commenters objected to the proposed reissuance of this NWP, stating that hydropower projects typically result in significant adverse effects and should not be authorized by an NWP. Several commenters stated that they do not support increasing the threshold for hydroelectric projects under criterion (a) of this NWP to 10,000 kW. One commenter said the Corps is not obligated to modify the NWP to be consistent with the Federal Energy Regulatory Commission's (FERC) definition of ``small hydroelectric project'' and stated that the Corps should not increase the threshold for total generating capacity to 10,000 kW. This NWP is limited to the authorization of discharges of dredged or fill material into waters of the United States associated with the construction of hydropower facilities that satisfy criteria (a) or (b) in the first paragraph of the NWP. The FERC licenses the construction and operation of hydropower facilities, and is the lead for conducting the environmental review for these hydropower projects. Permit requirements for structures and work in navigable waters of the United States for non-federal hydropower development are met through the FERC's licensing process under the Federal Power Act of 1920, as amended. Therefore, separate authorization from the Corps under Section 10 of the Rivers and Harbors Act of 1899 is not required for structures and work in navigable waters of the United States. Because criterion (a) of this NWP applies only to existing reservoirs, the NWP is limited to authorizing discharges of dredged or fill material into waters of the United States to install the hydropower generation unit with a total generating capacity of up to 10,000 kW in the existing reservoir. The modification of this NWP is intended to provide consistency with FERC's definition of ``small hydroelectric project'' and reduce duplication of agency reviews for these projects. In addition, hydropower is a renewable energy source and increasing the threshold for small hydroelectric projects from 5,000 kW to 10,000 kW will provide NWP authorization for activities that can help provide more electricity to a community or region, and may help decrease reliance on energy generation facilities that rely on the combustion of fossil fuels to produce electricity. Therefore, increasing the energy generation capacity of hydroelectric facilities can help reduce emissions of greenhouse gases that contribute to global climate change. One commenter stated that activities authorized under criterion (b) of this NWP would exceed the development at existing dams and related infrastructure and would result in adverse effects. One commenter said that in certain circumstances, hydropower projects are exempt from FERC licensing and subsequently do not require authorization under Section 404 of the Clean Water Act or water quality certification from the applicable certifying authority. One commenter said that the Corps failed to provide sufficient explanation as to how the proposed change would continue to authorize activities that have no more than minimal individual and cumulative adverse environmental effects. A few commenters said that the text of the NWP should be revised to protect tribal and village fisheries. One commenter stated that the NWP should be revised to clarify that the NWP does not authorize the construction of new dams. This NWP was issued in 1982 to reduce duplication between the reviews conducted by FERC and the Corps for small hydropower projects (see 47 FR 31798). For hydropower projects, the Corps' regulatory authority is limited to discharges of dredged or fill material into waters of the United States under Section 404 of the Clean Water Act. The FERC conducts a review when it grants a licensing exemption under the statutes identified in criterion (b) of this NWP (i.e , Section 406 of the Energy Security Act of 1980 (16 U.S.C 2705 and 2708) and Section 30 of the Federal Power Act, as amended (16 U.S.C 823)). The NWP authorization covers the discharges of dredged or fill material into waters of the United States may be necessary to construct the hydropower project. This NWP requires pre-construction notification for all authorized activities, and district engineers will review each proposed NWP 17 activity to determine if the proposed discharge of dredged or fill material into waters of the United States will result in no more than minimal individual and cumulative adverse environmental effects. If the district engineer determines a proposed discharge of dredged or fill material into waters of the United States will result in more than minimal adverse environmental effects after considering mitigation proposed by the applicant, he or she will exercise discretionary authority and require an individual permit for the proposed activity. During the review of the PCN, the district engineer will also assess compliance with general condition 17, tribal rights. This NWP does not authorize the construction of new dams for hydropower projects. The FERC may issue an exemption at an existing dam or project, or within an existing conduit that was constructed for purposes other than power production. This NWP is reissued as proposed. NWP 18. Minor Discharges. The Corps did not propose any changes to this NWP. One commenter expressed support for the reissuance of this NWP with no changes. One commenter said that the limits of this NWP should be increased to 50 cubic yards to match the proposed increase in the cubic yard limit for minor dredging activities authorized by NWP 19. One commenter stated that this NWP should require PCNs for all proposed activities, so that the district engineer can evaluate potential impacts from sediment and other pollutants. The Corps is retaining the 25-cubic-yard limit for this NWP. Activities authorized by NWP 18 may convert wetlands and other waters to uplands. The Corps is also retaining the 25-cubic-yard limit for NWP 19 as discussed below so NWPs 18 and 19 will remain consistent. The Corps disagrees that PCNs should be required for all activities authorized by this NWP. This NWP requires PCNs for discharges of dredged or fill material into special aquatic sites and discharges of dredged or fill material into waters of the United States greater than 10 cubic yards below the plane of the ordinary high water mark or the high tide line, and those PCN thresholds are sufficient to help ensure that activities authorized by this NWP result in no more than minimal adverse environmental effects. Division engineers can add regional conditions to this NWP to require PCNs for additional activities authorized by[[Page 73540]]this NWP, if such regional conditions are necessary to provide district engineer review for proposed activities that may result in more than minimal individual and cumulative adverse environmental effects. The Corps does not have the authority to regulate pollutants other than discharges of dredged or fill material. Discharges of dredged or fill material into waters of the United States authorized by this NWP require water quality certification or waivers to comply with Section 401 of the Clean Water Act. Certifying authorities may issue, deny, or waive water quality certification for discharges authorized by this NWP. When certifying pursuant to section 401, certifying authorities may include conditions to ensure that authorized discharges comply with applicable water quality requirements. This NWP is reissued as proposed. NWP 19. Minor Dredging. The Corps proposed to modify this NWP by changing the cubic yard limit from 25 cubic yards to 50 cubic yards. Several commenters expressed opposition to increasing the cubic yard limit for this NWP from 25 cubic yards to 50 cubic yards. Several commenters voiced their support for the proposed change. One commenter recommended increasing the cubic yard limit to 100 cubic yards. A couple of commenters said that the Corps did not provide sufficient explanation as to why increasing the cubic yard limit to 50 cubic yards would ensure that the activities authorized by this NWP will result in no more than minimal adverse environmental effects. After considering the comments received in response to the 2020 Proposal, the Corps is retaining the 25 cubic yard limit for this NWP. Where the 25-cubic-yard limit would be exceeded, those activities may be authorized under regional general permits or individual permits, including under letters of permission where those tools are available. In geographic areas where minor dredging activities removing up to 25 cubic yards have the potential to result in more than minimal individual and cumulative adverse environmental effects, division engineers can impose regional conditions to reduce the cubic yard limit from 25 yards to a smaller number of cubic yards. Division engineers can also add regional conditions to this NWP to require PCNs for some or all NWP 19 activities to provide district engineers the opportunity to review these minor dredging activities on a case-by-case basis and determine whether they qualify for NWP authorization. One commenter said that applicants should be required to ensure that toxic substances are not released back into the water column through re-exposure from the dredging activity. One commenter objected to the proposed reissuance of this NWP, stating that the authorized dredging activities will have adverse effects on shellfish beds, infaunal invertebrates, and macroalgal beds, as well as biogenic structures such as shell rubble and large woody debris that provide ecologically valuable habitat, forage areas, or refuge areas for fish, shellfish, or shorebirds. Minor dredging activities authorized by this NWP may require water quality certification under Section 401 of the Clean Water Act. For a proposed minor dredging activity that may result in a discharge into waters of the United States, the certifying authority may issue, waive, or deny water quality certification. The certifying authority may add conditions to the water quality certification to ensure that the discharge complies with applicable water quality requirements. This NWP does not authorize the dredging or degradation through siltation of coral reefs, sites that support submerged aquatic vegetation, anadromous fish spawning areas, or wetlands. Bivalve molluscs inhabiting shellfish beds may be harvested through dredging activities authorized by other NWPs, such as NWP 4 for fish and wildlife harvesting, enhancement, and attraction devices and activities, or NWP 48 for commercial shellfish mariculture activities. Infaunal invertebrates, beds of macroalgae, and shell rubble areas may be impacted by activities authorized by this NWP, but those impacts are likely to be no more than minimal in the highly dynamic marine and estuarine environments in which those organisms and features are located, where they are subjected to a variety of natural and anthropogenic disturbances, such as disturbances caused by storms, vessels, anchors, and fishing activities. The removal of large woody debris from waterbodies is usually accomplished through snagging rather than dredging. One commenter said that federal and state natural resource agency coordination should be required for proposed activities that occur in non-tidal waters inhabited by state and/or federally listed threatened and endangered freshwater mussels. A commenter stated that project proponents could piecemeal a number of smaller dredging projects under this NWP to dredge a larger overall area and such activities may negatively affect fish spawning habitat and water quality. One commenter said that this NWP should require the use of silt fences, booms, and bubblers to protect fish, and other natural resources. Paragraph (c) of general condition 18 requires non-federal permittees to submit a pre-construction notification to the district engineer if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed such designation) might be affected or is in the vicinity of the proposed activity, or if the proposed activity is located in designated critical habitat or critical habitat proposed for such designation. The district engineer will review the proposed activity and if he or she determines that it may affect federally-listed mussel species or other federally-listed endangered or threatened species, the district engineer will initiate ESA Section 7 consultation with the U.S FWS and/or NMFS as appropriate. Potential impacts to state-listed mussel species are more appropriately addressed through the permittee's compliance with applicable state natural resource or wildlife laws and regulations. General condition 15 states that the same NWP cannot be used more than once to authorize the same single and complete project. Therefore, this NWP cannot be used multiple times to dredge larger volumes of material from a specific waterbody as part of a larger overall dredging project. The applicant should apply for an individual permit to obtain DA authorization for the larger dredging project unless a different general permit is available to authorize that project. Activities authorized by this NWP can occur in a wide variety of waters, including ocean waters, estuaries, and rivers, and the use of silt fences, booms, and bubblers may be appropriate for some minor dredging activities but not for other minor dredging activities. Therefore, the Corps declines to modify this NWP at a national level to require these mitigation measures for all activities authorized by this NWP. This NWP is reissued without proposed modification. NWP 20. Response Operations for Oil or Hazardous Substances. The Corps did not propose any changes to this NWP. One commenter expressed support for the reissuance of this NWP with no changes. This NWP is reissued as proposed. NWP 22. Removal of Vessels. The Corps did not propose any changes to this NWP. One commenter recommended changing the text of this NWP to state that land-based alternatives should be considered first for vessel disposal. This commenter also said that intentional ocean disposal of[[Page 73541]]vessels at sea requires a permit from EPA issued under the Marine, Protection, Research and Sanctuaries Act, and should only be pursued when land-based alternatives are not available. This NWP authorizes temporary structures in navigable waters of the United States or minor discharges of dredged or fill material into waters of the United States required for the removal of wrecked, abandoned, or disabled vessels, or the removal of man-made obstructions to navigation. The consideration of off-site alternatives is not required for activities authorized by NWPs (see 40 CFR 230.7(b)(1)). If a project proponent intends to dispose of the vessel in ocean waters then a separate authorization from EPA may be required under the Marine, Protection, Research and Sanctuaries Act. Note 1 has been revised to clarify EPA requirements for intentional ocean disposal of vessels under the Marine, Protection, Research and Sanctuaries Act. The project proponent has an independent responsibility to apply to EPA for that authorization. This NWP is reissued as proposed. NWP 23. Approved Categorical Exclusions. The Corps did not propose any changes to this NWP. Several commenters requested that the Corps update Regulatory Guidance Letter 05-07 to include all current Federal Transit Administration, Federal Rail Administration, and Federal Highway Administration categorical exclusions so that NWP 23 can be used to authorize regulated activities covered by those categorical exclusions. One commenter stated that this NWP violates the public participation requirements of Section 404(e) of the Clean Water Act because it does not explain how the Chief of Engineers will solicit public comment on categorical exclusions proposed to be added for authorization by this NWP. This commenter also objected to the proposed reissuance of this NWP, stating that it does not authorize categories of activities that are similar in nature, and does not identify which categories of activities are authorized by the NWP. In addition, this commenter said that this NWP authorizes activities that result in more than minimal adverse environmental effects. As stated in the Note in this NWP, federal agencies may submit requests to Corps Headquarters to seek approval for their categorical exclusions to be authorized by this NWP. The Note also states that, upon receipt of a request from a federal agency to add, modify, or remove categorical exclusions for authorization under this NWP, Corps Headquarters will solicit public comment on the request, and determine which categorical exclusions involving discharges of dredged or fill material into waters of the United States and/or structures or work in navigable waters of the United States will be authorized by the NWP. This NWP provides two opportunities for public participation in the identification of categories of activities authorized by this NWP: (1) The public notice and comment process associated with the proposal to reissue this NWP, and (2) the public notice and comment process associated with the review and approval for specific categorical exclusions to be authorized by this NWP through the issuance of a Regulatory Guidance Letter issued by Corps Headquarters. This NWP authorizes categories of activities that are similar in nature-- that is activities regulated by the Corps that are undertaken, assisted, authorized, regulated, funded, or financed, in whole or in part, by another federal agency or department--where those activities are determined by the federal agency or department to be categorically excluded from the requirement to prepare an environmental impact statement or environmental assessment. The categorical exclusions approved for use with this NWP are identified in a Regulatory Guidance Letter issued by the Corps after a public notice and comment process. Some of these approved categorical exclusions require submittal of PCNs to Corps districts before commencing the authorized activities, so that district engineers can review those activities on a case-by-case basis to ensure that the authorized activities result in no more than minimal individual and cumulative adverse environmental effects. The activities associated with approved categorical exclusions that do not require PCNs were determined by the Corps to result in no more than minimal individual and cumulative adverse environmental effects when the Corps approved those categorical exclusions for use with NWP 23. For those approved categorical exclusions that do not require PCNs, district engineers retain the ability to exercise discretionary authority on a case-by-case basis to modify, suspend, or revoke the NWP authorization if they determine those activities will result in more than minimal adverse environmental effects. This NWP is reissued as proposed. NWP 24. Indian Tribe or State Administered Section 404 Programs. The Corps did not propose any changes to this NWP. No comments were received on the proposed reissuance of this NWP. After the comment period for the 2020 Proposal ended on November 16, 2020, the State of Florida was granted approval by the U.S Environmental Protection Agency to assume the Clean Water Act Section 404 permit program in Florida. Therefore, the Corps has modified Note 1 of this NWP to include Florida in the list of states with approved Clean Water Act Section 404 permit programs. This NWP is reissued with the modification discussed above. NWP 25. Structural Discharges. The Corps did not propose any changes to this NWP. One commenter objected to the proposed reissuance of this NWP, stating that it contains no limits or other constraints to ensure that it authorizes only activities that have no more than minimal individual and cumulative adverse environmental effects. This NWP does not have any quantitative limits because it authorizes discharges of dredged or fill material into tightly sealed forms that are used to construct structural components for pile supported structures such as bridges or for mooring cells for general navigation. The losses of waters of the United States authorized by this NWP are limited by the dimensions of the piles, mooring cells, or other structures for general navigation. The dimensions of these tightly sealed forms for supported structures or structures for general navigation will be determined by engineering standards for safe and functional structures, as well as the purpose of the proposed supported structure or navigational structure. These limited size of these structures help ensure that the authorized discharges of dredged or fill material into waters of the United States result in no more than minimal individual and cumulative adverse environmental effects. In addition, as stated in the text of the NWP, structures in navigable waters of the United States subject to Section 10 of the Rivers and Harbors Act of 1899 require separate authorization because this NWP authorizes only discharges of dredged or fill material into waters of the United States. The section 10 permit process would address the potential impacts of the structure, including the size of the proposed structure, on navigation, the aquatic environment, and the Corps' other public interest review factors. This NWP is reissued as proposed. NWP 27. Aquatic Habitat Restoration, Establishment, and Enhancement Activities. The Corps proposed to modify this NWP by changing the second sentence of the second paragraph of this NWP to state that an[[Page 73542]]ecological reference may be based on the characteristics of one or more intact aquatic habitats or riparian areas. The Corps also proposed to modify this NWP by adding coral restoration or relocation activities to the list of examples of activities authorized by this NWP and stating that PCNs are not required for permittees that propose to conduct coral restoration or relocation activities in accordance with a binding agreement with the NMFS or any of its designated state cooperating agencies. In addition, the Corps proposed to add ``releasing sediment from reservoirs to restore downstream habitat'' to the list of examples of aquatic restoration or enhancement activities that may be authorized by this NWP. One commenter expressed support for the reissuance of this NWP because it allows for expedited permitting for much needed aquatic habitat restoration and enhancement projects, especially in coastal areas. One commenter stated that broad application of this NWP supports proactive state planning efforts on resiliency and flooding master plans. One commenter recommended revising the text of this NWP to make it clear that it provides approval for restoration projects, particularly those activities that will provide documented net ecological uplifts and have already undergone federal and/or state review through integrated and advance planning activities. One commenter also suggested modifying this NWP to authorize the removal of low-head dams and culverts for stream mitigation credits. The Corps acknowledges that this NWP provides an expedited authorization process for aquatic habitat restoration, enhancement, and establishment activities that result in net increases in aquatic resource functions and services and have no more than minimal individual and cumulative adverse environmental effects. The aquatic resource restoration, enhancement, and establishment activities authorized by this NWP can be located in coastal areas. The aquatic habitat restoration, enhancement, and establishment activities authorized by this NWP can also provide water retention and storage functions that contribute to ecological services such as natural hazard mitigation, including water storage to reduce flood hazards. The activities authorized by this NWP may have also been reviewed by state agencies and other federal agencies, but review by these agencies is not required before the Corps authorizes these activities under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. The removal of low-head dams to produce stream mitigation credits may be authorized by NWP 53. In the third paragraph of NWP 27, the removal of stream barriers (such as undersized culverts, fords, and grade control structures) is included in the list of examples of activities authorized by this NWP. The removal of undersized or perched culverts may be authorized by this NWP and successful completion of those activities may generate stream compensatory mitigation credits. A few commenters expressed support for allowing the use of more than one ecological reference site. One commenter said that this NWP should be modified to address inconsistences in triggering mitigation requirements. One commenter said that the word ``delineation'' be replaced with ``description'' in the text of this NWP. Commenter stated preparing an aquatic resources delineation per the Corps' delineation standards and guidelines is a costly and time-consuming component of project planning and does not seem to provide any additional protection to waters and wetlands. The Corps has adopted the proposed change regarding the use of one or more intact aquatic habitats or riparian areas as an ecological reference site. The sixth paragraph of this NWP states that compensatory mitigation is not required for activities authorized by this NWP because the authorized activities must result in net increases in aquatic resource functions and services. Therefore, there should be no compensatory mitigation requirements for aquatic habitat restoration, enhancement, or establishment activities authorized by this NWP. The reports required for NWP 27 activities that do not require PCNs must include a delineation of wetlands, streams, and/or other aquatic habitats on the project site. Delineation is necessary to provide district engineers with a sufficient description of the baseline ecological conditions for that site to assist the Corps in determining whether the reported activity is likely to result in net increases in aquatic resource functions and services. A description of aquatic resources on the project site is not sufficient to help district engineers determine whether a proposed activity will satisfy the requirements of this NWP. The project plans for the proposed aquatic habitat restoration, enhancement, or establishment activity, plus the delineation of aquatic resources on the project site, are necessary for making certain determinations. Those determinations are whether net gains in aquatic resource functions and services are likely to occur as a result of the discharges of dredged or fill material into waters of the United States and/or structures or work in navigable waters of the United States, and whether any potential changes to existing aquatic resources on the project site will help ensure that such net gains will occur. One commenter said that this NWP should be changed to clarify that it authorizes actions by a third-party ecological restoration provider in connection with a compensatory mitigation project, a restoration project, or a resiliency-focused project that generates net ecological uplift. One commenter stated that this NWP should be modified to allow waters and wetland conversions to natural conditions for a different aquatic habitat type if the proposed activity as a whole will result in a net increase in aquatic resource functions and services. As stated in the ``Note'' in this NWP, this NWP authorizes aquatic habitat restoration, enhancement, and establishment activities that are conducted by third-party ecological restoration providers for the purposes of compensatory mitigation for NWPs and other forms of DA authorization, such as individual permits and regional general permits. This NWP can also be used to authorize aquatic habitat restoration projects that are conducted for the purpose of increasing the functions and services provided by degraded aquatic habitat, but are not being conducted for providing compensatory mitigation for NWPs or other types of DA permits. Resiliency projects may be authorized by this NWP as long as they are aquatic habitat restoration, enhancement, or establishment projects, result in net gains in aquatic resource functions and services and resemble ecological references. Some resiliency projects, such as nature-based solutions that are modified ecosystems designed and constructed to provide ecosystem functions and services (National Academy of Sciences 2019), might not resemble ecological references because they consist of combinations of natural and engineered components. Living shorelines are an example of resiliency projects in coastal areas that do not resemble ecological references because they may include engineered structures such as sills or breakwaters. Living shorelines can be authorized by NWP 54. Green infrastructure projects constructed to manage stormwater, such as rain gardens or constructed wetlands, might not resemble ecological references and may be authorized by NWP 43 or other NWPs, or by individual permits. The Corps is retaining the current prohibitions on conversions of streams or natural wetlands to other aquatic[[Page 73543]]habitat types because those conversions typically focus on increasing a specific aquatic resource function or service while resulting in net losses in most of the other ecological functions and services performed by the impacted aquatic habitat type. These converted aquatic habitats may also result in hybrid aquatic habitats that do not resemble ecological references. This NWP also retains the prohibitions on the ***conversion*** of tidal waters and tidal wetlands to other aquatic uses, to ensure that activities authorized by NWP 27 result in no more than minimal individual and cumulative adverse environmental effects. Conversions of natural wetlands, streams, and other types of waters to different aquatic habitat types result in artificial conditions, not natural conditions, and project proponents can seek DA authorization for these activities through other means, such as the individual permit process, other NWPs, or if available, regional general permits. One commenter said that the Corps should issue a separate NWP for voluntary wetland restoration projects to distinguish those projects from development projects. One commenter stated that the text of this NWP should include a definition for voluntary wetland restoration projects that includes restoration projects that occur in altered, degraded, and former wetlands. A commenter said that a new federal process should be established for permitting voluntary wetland restoration projects. One commenter said that to ensure that voluntary wetland restoration projects result in net increases of wetland functions and services, those projects should be prohibited as serving to fulfilling mitigation requirements. One commenter stated that this NWP should clarify that it authorizes permittee-responsible mitigation activities. This NWP authorizes both voluntary wetland restoration projects and wetland restoration projects that are required by regulatory agencies or other agencies. This NWP does not authorize development activities. Other NWPs, such as NWP 29 (residential developments) and NWP 39 (commercial and institutional developments), may be used to authorize development activities. The Corps declines to add a definition of ``voluntary wetland restoration project,'' because this NWP does not distinguish between voluntary wetland restoration projects and wetland restoration projects that may be conducted for other reasons, such as wetland restoration requirements imposed by other federal, tribal, state, or local government agencies. There is no need to establish a new federal permitting process for voluntary wetland restoration projects because the Corps currently authorizes wetland restoration projects through its permitting authorities under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. While this NWP can be used to authorize discharges of dredged or fill material into waters of the United States and/or structures or work in navigable waters of the United States for wetland restoration projects, those activities can also be authorized by individual permits and regional general permits. Voluntary wetland restoration projects are conducted by people or organizations for the purpose of increasing wetland acreage and the associated wetland functions and services, or the level of wetland functions and services performed by areas of existing, degraded wetlands. Wetland restoration for compensatory mitigation serves a different purpose, which is to offset losses of wetland functions and services caused by permitted activities. Third-party mitigation providers (e.g , mitigation bank sponsors and in-lieu fee program sponsors) may conduct wetland restoration projects to provide compensatory mitigation for NWPs and other DA permits, or to fulfill other federal, state, or local government mitigation requirements without being driven to do so by regulatory requirements. Both voluntary wetland restoration projects and wetland compensatory mitigation projects are expected to result in net increases in wetland functions and services, which is a basic requirement of this NWP. This NWP can be used to authorize permittee-responsible mitigation projects, including advance permittee-responsible mitigation projects where there is no DA permit to authorize discharges of dredged or fill material into waters of the United States or structures or work in navigable waters of the United States for the advance permittee-responsible mitigation project. One commenter said that this NWP should be modified to explicitly add the restoration of vegetated and unvegetated intertidal and subtidal areas--including mudflats, sandflats, and submerged aquatic vegetation--to the list of examples of activities authorized by this NWP. Commenter said that the activities authorized by this NWP will alter and destroy open water habitats in tidal estuaries and convert them to types of habitat that were never historically present in those waters. This commenter also stated that the activities authorized by this NWP would make open water sites unusable by fishermen and species that currently rely on those open water habitats. One commenter said that the authorization of structures and fills by this NWP creates overlap between NWP 27 and NWP 54 (living shorelines) and should be revised. One commenter stated that the text of this NWP should be clarified regarding the degradation of downstream waters. As stated in the first paragraph of this NWP, it authorizes the rehabilitation and enhancement of tidal streams, tidal wetlands, and tidal open waters as long as those activities result in net increases in aquatic resource functions and services. This includes vegetated and unvegetated intertidal areas (e.g , mud flats and sand flats) and vegetated and unvegetated subtidal areas (e.g , submerged aquatic vegetation). Tidal open waters include mud flats and sand flats. Tidal wetlands include submerged aquatic vegetation. The fifth paragraph of this NWP states that it does not authorize activities that convert tidal waters, including tidal wetlands, to other aquatic uses. Therefore, this NWP cannot be used to authorize discharges of dredged or fill material that convert tidal waters into uplands or non-tidal aquatic habitats. In addition, because the text of this NWP states that it authorizes the rehabilitation and enhancement of tidal open waters, it limits the authorized activities to those that improve either the suite of functions or a smaller number of functions performed by tidal waters. It does not authorize activities that degrade or destroy tidal waters, or render them unusable by fishermen. Aquatic habitat restoration and enhancement activities may alter which species use the restored or enhanced site, and which habitat functions support or deter certain species. Activities authorized by NWP 27 must result in an aquatic habitat that resembles an ``ecological reference,'' consistent with the definition of that term in section F of the NWPs. A living shoreline usually consists of living components (e.g , marsh grasses, oysters) and engineered components (e.g , sills or breakwaters constructed from stone), and may not resemble an ecological reference. There is no overlap between NWP 27 and NWP 54, although tidal wetlands restored or enhanced as a result of the activities authorized by this NWP may help reduce erosion as an ecological service. Several commenters stated that NWP 27 has PCN thresholds that are inconsistent with, and more stringent than, the PCN thresholds for other NWPs, such as NWP 12 and the two[[Page 73544]]new NWPs 57 and 58 that were issued in the final rule published in the January 13, 2021, issue of the Federal Register (86 FR 2744). Some of these commenters suggested that this NWP should be modified to require PCNs for proposed discharges of dredged or fill material into non-wetland special aquatic sites or if the proposed activity results in loss of greater than 1/10-acre of wetland. One commenter stated support of the PCN notification exemption to continue to allow statewide aquatic habitat restoration and enhancement activities to be conducted in an efficient and timely manner. One commenter said that in order to reduce unnecessary delays and expenses from the PCN process, this NWP should be modified by removing the exception from the requirement to submit PCNs for activities on non-federal public lands and private lands conducted under agreements between the landowner and federal agencies or their designated state cooperating agencies. The PCN thresholds for this NWP are no more stringent that the PCN thresholds for many other NWPs. All activities authorized by this NWP require some form of advance notification to district engineers before commencing authorized activities, to provide district engineers with the opportunity to take action on those proposed activities that do not comply with the requirements of the NWP, such as activities that are not expected to result in net gains in aquatic resource functions and services or activities that are not likely to resemble ecological references. The advance notification takes the form of either: (1) Pre-construction, or (2) reporting. The activities identified in the ``Notification'' paragraph require PCNs and reports are required for the activities identified in the ``Reporting'' paragraph. Most of the NWPs require PCNs for all authorized activities, or for a subset of authorized activities. The suggested PCN thresholds for discharges of dredged or fill material into non-wetland special aquatic sites or for losses of greater than 1/10-acre of wetland are not appropriate for an NWP that authorizes discharges of dredged or fill material or structures or work into all types of waters of the United States. Wetlands are a subset of jurisdictional waters in which this NWP can be used to authorize regulated activities associated with aquatic habitat restoration, enhancement, and establishment. This NWP authorizes activities in tidal and non-tidal wetlands, rivers and streams, lakes, estuaries, and ocean waters. Some form of case-by-case review is needed for all authorized activities to ensure their compliance with the NWP and that they will result in no more than minimal individual and cumulative adverse environmental effects. This NWP does not have an acreage or other quantitative limits. Instead of a quantitative limit, this NWP requires that aquatic habitat restoration, enhancement, and establishment activities result in net increases in aquatic resource functions and services and resemble ecological references. Aquatic habitat restoration, enhancement, and establishment activities can occur over large or small areas, and the PCN and reporting requirements facilitate the expedited review process for activities that provide benefits for the aquatic environment, as well as ecological services for people. The reporting requirement was established for certain NWP 27 activities on non-federal public lands and private lands to reduce costs associated with preparing PCNs, while providing district engineers with the opportunity to review proposed activities that do not require PCNs. The reporting requirement provides district engineers with the opportunity to take action if they determine that a proposed activity does not qualify for NWP 27 authorization because it is not an aquatic habitat restoration, enhancement, or establishment activity; it is not likely to result in net gains in aquatic resource functions and services; or it does not resemble an ecological reference. Several commenters expressed support for adding coral restoration activities to the list of examples of activities that may be authorized by NWP 27. One commenter stated that authorizing coral restoration activities under this NWP would streamline and simplify restoration activities and reduce burdens on the local agencies. The Corps has added coral restoration activities and coral relocation activities to the list of examples of activities authorized by this NWP when those activities require DA authorization under Section 10 of the Rivers and Harbors Act of 1899 and/or Section 404 of the Clean Water Act. Many commenters stated opposition to the proposed inclusion of reservoir sediment releases as an example of an activity authorized by NWP 27 while many commenters expressed support for the proposed inclusion of that activity as an example of activities authorized by this NWP. A few commenters stated that controlled sediment releases can benefit downstream river and stream beds and embankments. One commenter asserted that these activities should require individual permits. One commenter suggested rewording the proposed modification to the following: ``reservoir sediment management to provide continuity in sediment transport through reservoirs.'' The Corps is adding ``releases of sediment from reservoirs to maintain sediment transport continuity to restore downstream habitats'' to the list of examples of activities authorized by this NWP instead of the proposed text of ``releasing sediment from reservoirs to restore downstream habitat.'' These activities can be conducted in a manner that improves the functions and services performed by downstream river and stream habitats and results in no more than minimal individual and cumulative adverse environmental effects. The revised text is intended to emphasize the notion of rehabilitating downstream habitats and improving the functions and services performed by those habitats by maintaining continuity of sediment transport through reservoirs rather than emphasizing reservoir management activities. Sediment releases from reservoirs must have the purpose of maintaining sediment transport through rivers that sustains or improves downstream habitat that is adversely affected by the reservoir because that reservoir disrupts normal sediment transport processes in the river. The Corps declines to revise the text to refer to reservoir sediment management activities because the modification of this NWP addresses only one approach to reservoir sediment management. The movement of sediment via flowing water through watersheds and river and stream networks is a natural watershed process (Black 1997). Reservoirs trap sediment and disrupt the continuity of sediment transport though the river network in a watershed, which reduces the amount of sediment transported downstream that helps maintain river channel form as well as adjacent riparian areas and floodplains (Kondolf et al. 2014). Periodic releases of sediment stored in reservoirs can help maintain the continuity of sediment transport in riverine systems and help sustain or enhance downstream riverine and riparian habitats, including floodplains. In coastal areas, periodic releases of sediment from reservoirs can provide sediment that helps sustain coastal wetlands and unvegetated coastal habitats (Kondolf et al. 2014). Those sediments can accrete in coastal wetlands and help those wetlands adjust to sea level rise. The activities authorized by this NWP require either PCNs or reports to district engineers, so[[Page 73545]]it is not necessary to add a PCN requirement specific to releases of sediment from reservoirs to maintain sediment transport continuity in riverine systems to restore or enhance downstream habitats. District engineers will review these proposed activities through either PCNs or reporting documentation submitted by project proponents to Corps district offices. Releases of sediment from reservoirs may or may not require DA authorization, depending on how those sediment releases are conducted. Guidance is provided in Regulatory Guidance Letter (RGL) 05-04: ``Guidance on the Discharge of Sediments From or Through a Dam and the Breaching of Dams, for Purposes of Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899.'' The RGL explains the circumstances in which sediment releases from reservoir do not require DA authorization, and how reservoir sediment releases can be conducted without the need to obtain Clean Water Act Section 404 authorization from the Corps. In general, releases of sediments that are incidental to normal reservoir operations--such as releases of water through the dam to restore reservoir capacity during events like spring run-off, flooding, or storms--are considered de minimis discharges of dredged material. They do not require DA authorization under section 404 so long as the sediment loads of waters released from reservoirs are consistent with the sediment loads entering the reservoir from the upstream waters. The modification of this NWP clarifies that this NWP can be used to provide DA authorization under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act for sediment releases from reservoirs that require such authorization, as long as those sediment releases rehabilitate downstream habitats and result in net gains in aquatic resource functions and services. Several commenters stated that sediment releases from reservoirs authorized by this NWP should have quantitative limits to ensure that no more than minimal adverse impacts occur as a result of these activities. One commenter said that the text of this NWP should clarify that sediment releases from reservoirs must be linked to a clear restoration action or plan and should not be authorized by this NWP solely for the purpose of reservoir management or dam maintenance. Many commenters stated that PCNs should be required for all sediment releases authorized by this NWP. Several commenters objected to the proposed modification, stating that sediment release activities under NWP 27 should require PCNs when dam removal projects would result in large amounts of sediments being released. One commenter said that a PCN threshold should be added to this NWP to address discharges associated with sediment releases and the frequency of those sediment releases, to ensure that those activities result in no more than minimal adverse environmental effects. The Corps does not agree that there should be quantitative limits for reservoir sediment releases authorized by this NWP because of the variability in hydrology and sediment transport in rivers and streams across the country and the variability in reservoir characteristics, such as their dimensions, how they are operated, and the hydrologic and sediment regimes of the watershed in which a reservoir is located. In addition, the appropriate amount of sediment that may be released from a reservoir to maintain continuity of sediment transport to restore downstream habitats is affected by a number of factors, which makes it infeasible to establish a national quantitative limit for these activities. Such factors include water and sediment inputs to the river, including upstream, lateral, and downstream inputs; valley geometry, substrate, and vegetation; river geometry, including the cross sectional geometry, planform, and gradient; and the disturbance regime of the river (Wohl et al. 2015). These factors vary considerably among rivers across the United States. Therefore, the appropriate amount of sediment to be released from reservoirs, as well as the timing of those releases, to provide sediment transport continuity and rehabilitate downstream habitats needs to be determined on a case-by-case basis. Activities authorized by NWP 27, including wetland and stream restoration and enhancement activities, do not require formal restoration plans, although a project proponent may provide restoration plans with the PCN or report if she or he believes that information would help the district engineer determine whether the proposed activity is authorized by this NWP. The Corps does not believe it is necessary to require more information for proposed releases of sediment from reservoirs than it requires for other aquatic habitat restoration, enhancement, or establishment activities authorized by this NWP. Wetland and stream restoration activities can involve substantial amounts of earth moving and sediment releases, and the Corps believes that proposed releases of sediment from reservoirs do not require a higher information standard than wetland and stream restoration activities. The sediment releases from reservoirs to rehabilitate downstream habitats do not require a formal restoration plan, but the reservoir operator may develop an operations plan that establishes protocols for sediment releases that are intended to maintain sediment transport continuity to restore downstream habitats. The project proponent can provide a copy of that plan with the PCN or report. To be authorized by this NWP, the sediment releases from reservoirs must result in net gains in aquatic habitat functions and services. This NWP does not authorize sediment releases that are conducted primarily for the purpose of reservoir management or maintenance. The primary purpose of the authorized activity must be to restore downstream habitats. However, controlled releases of sediment from reservoirs to maintain sediment transport continuity to restore or enhance downstream habitats may have a secondary benefit of prolonging the operational life of reservoirs and reducing the need to construct additional reservoirs in a region (Kondolf et al. 2014). This NWP does not authorize releases of large amounts of sediment from reservoirs that would adversely affect downstream habitats and result in net losses, rather than net gains, in aquatic resource functions and services. Several commenters said that the text of this NWP should clarify whether the sediment releases from reservoirs are one-time activities or they can be conducted on a recurring, routine basis. One commenter said that PCNs for proposed sediment releases from reservoirs should indicate whether the proposed release is part of a single event or proposed as a routine management technique and should include a plan describing the amount, frequency, timing, and duration of sediment to be released. A few commenters support adding releases of sediment from reservoirs into downstream habitats to the examples in NWP 27, but said that sediment releases should have established criteria as determined by state resource managers to maintain balanced sediment levels within individual watersheds. The timing and frequency of sediment releases from reservoirs to restore downstream habitats are likely to differ because of the variability in climate, watersheds, and rivers across the country, and the variability in water and sediment regimes in rivers. Sediment releases from reservoirs that trigger a[[Page 73546]]requirement for DA authorization under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899 may occur during multiple times during the 5-year period this NWP is in effect. This NWP includes a number of examples of authorized activities that may occur more than once during the 5-year period the NWP is in effect, such as the removal of accumulated sediments from waterbodies, shellfish seeding activities, plowing or discing activities for seeding and planting wetland species, and mechanized land clearing to remove non-native invasive, exotic, or nuisance vegetation. If the project proponent anticipates conducting multiple sediment releases during the period this NWP authorization is in effect, in the PCN or report for the proposed activity he or she should provide information on the anticipated number of releases during that time. If the proposed activity requires a PCN, the description of the proposed activity required by paragraph (b)(4)(i) of general condition 32 should including the number of anticipated sediment releases from the reservoir and their timing. Sediment transport in rivers typically occurs in a non-linear, episodic manner (Wohl et al. 2015), and releasing sediments in smaller pulses may more closely mimic non-linear, episodic natural sediment transport processes. This NWP does not authorize large sediment releases that will cause losses of aquatic resource functions and services. The Corps does not agree that there should be coordination of proposed activities between district engineers and state resource managers. None of the other aquatic habitat restoration, enhancement, and establishment activities authorized by this NWP require coordination between district engineers and state resource managers. Therefore, releases of sediment to restore or enhance downstream habitat should not be subject to a coordination requirement between district engineers and state resource managers. However, district engineers have the discretion to coordinate proposed NWP 27 activities requiring DA authorization with other federal, tribal, state, or local resource agencies on a case-by-case basis, within the timeframes for reviewing PCNs (generally 45 days) and reports (30 days), if they want assistance with their evaluations of those PCNs and reports. A few commenters stated that sediment releases authorized by this NWP should be clearly linked to a restoration plan and not be solely for the purpose of reservoir or dam maintenance. Several commenters stated that PCNs for proposed sediment releases from reservoirs should include study results that evaluated and addressed the volume of sediment to be released, sediment size and distribution, reach conditions, downstream habitat and aquatic species impacts, and the time of year for releases. Another commenter stated that PCNs for sediment release activities authorized by this NWP should include the plan used for sediment releases and the benefits of each activity must be clarified regarding the resulting changes on hydrology, geomorphology, and habitat, as well as watershed stability. Aquatic habitat restoration, enhancement, and establishment activities authorized by NWP 27 do not require comprehensive restoration plans. Releases of sediment from reservoirs to maintain sediment transport continuity to restore downstream habitats that require DA authorization will require either PCNs or reporting to district engineers. The Corps does not agree that it is necessary to establish information requirements for releases of sediment from reservoirs that differ from the information requirements for the wide variety of other aquatic habitat restoration, enhancement, or establishment activities authorized by this NWP. The Corps is applying the same PCN information requirements for proposed sediment releases from reservoirs that it requires for all other aquatic habitat restoration, enhancement, and establishment activities authorized by this NWP. Those other aquatic habitat restoration, enhancement, and establishment activities, including wetland and stream restoration activities, can involve substantial amounts of discharges of dredged or fill material into waters of the United States and other regulated activities to restore, enhance, or establish aquatic habitats so that they provide net increases in aquatic resource functions and services after completion of the authorized activities. For those activities that require PCNs, paragraph (b)(4)(i) of general condition 32 requires the following: A description of the proposed activity; the activity's purpose; direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of wetlands, other special aquatic sites, and other waters expected to result from the NWP activity; and a description of any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed activity. The amount and type of information to be provided in the description of the proposed activity in the PCN should be appropriate to the type of aquatic habitat restoration, enhancement, or establishment activity the project proponent wants to conduct under the NWP 27 authorization. For example, for proposed sediment releases to restore downstream aquatic habitats, in the description of the proposed activity the project proponent should describe the amount, frequency, timing, and duration of sediment to be released from the reservoir. A formal study is not required for a complete PCN. The project description should be in sufficient detail to provide the district engineer with enough information to determine whether the proposed activity will result in a net increase in aquatic resource functions and services. For releases of sediment from reservoirs that may be authorized by this NWP, the PCN should also describe any mitigation measures the project proponent intends to implement to reduce adverse environmental effects and ensure that the authorized activity results in net gains in aquatic resource functions and services. Mitigation measures may include releasing sediment in pulses during periods of sufficient water flow so that the released sediments restore or enhance, rather than degrade, downstream habitats. Releases of sediment from reservoirs to maintain continuity of sediment transport and restore downstream habitats can have a secondary benefit of helping maintain the water storage capacity of reservoirs. However, if the PCN or report states that primary purpose of the sediment releases are for reservoir maintenance, then the district engineer should notify the project proponent that the proposed activity is not authorized by NWP 27, and that another type of DA authorization will be needed for the proposed reservoir or dam maintenance activities. The sediment releases from reservoirs authorized by this NWP are not likely to result in substantial changes in hydrology, geomorphology, aquatic habitat, or watershed stability because they are intended to maintain continuity in sediment transport to restore or enhance downstream habitats that have been adversely affected by the disruption in sediment transport processes caused by the construction of a reservoir. The activities authorized by this NWP must result in net gains in aquatic resource functions and services. These activities are likely to improve watershed functioning and the sustainability of aquatic habitats within the watershed to some degree by maintaining the continuity of sediment transport in rivers within the watershed. One commenter stated additional clarification on the definition for the[[Page 73547]]term ``release'' is needed to encourage natural sediment transport downstream if that is the intent of the proposed change to this NWP. One commenter expressed concern with authorizing sediment releases from reservoirs under this NWP because of uncertainty of the objectives and nature of potential sediment releases. One commenter said that releasing sediment from reservoirs to restore downstream habitat is not suitable for NWP authorization because while it can improve habitat, it can also result in adverse effects on wetlands and riparian areas. The term ``release'' applies to discharges of dredged or fill material regulated under Section 404 of the Clean Water Act and ``work'' regulated under Section 10 of the Rivers and Harbors Act of 1899 because those are the types of activities authorized by this NWP under the permitting authorities for NWP 27. There are circumstances where releases of sediment from reservoirs do not require DA authorization (see Regulatory Guidance Letter 05-04). The intent of adding ``releases of sediment from reservoirs to maintain sediment transport continuity to restore downstream habitats'' to the list of examples of activities authorized by this NWP is to clarify that this NWP can be used to authorize sediment releases from reservoirs that require DA authorization as long as those activities result in net gains in aquatic resource functions and services and have no more than minimal adverse environmental effects. The third paragraph of this NWP is a list of examples of aquatic habitat restoration, enhancement, and establishment activities that may be authorized by this NWP when those activities require DA authorization. This addition to the list of examples of activities authorized by this NWP is highly specific; it is limited to sediment releases from reservoirs that maintain sediment transport continuity to restore downstream habitat. It does not cover sediment releases from reservoirs for other purposes, such as maintaining the designed water storage capacity of the reservoir. The objective of this addition to the list of examples of activities authorized by this NWP is to provide sediment for downstream habitats that have been adversely affected by the disruption of sediment transport caused by the dam that created the reservoir, so that continuity of sediment transport is maintained to a degree that helps sustain or improve the structure, functions, and dynamics of downstream riverine and riparian habitats, and in coastal areas, downstream coastal habitats. Sediment releases from reservoirs can be conducted in a manner that does not require DA authorization. Sediment releases from reservoirs can also be conducted in a manner so that they result in no more than minimal individual and cumulative adverse environmental effects. This NWP requires that releases of sediment from reservoirs that require DA authorization result in net gains in aquatic resource functions and services. Sediment releases from reservoirs that require DA authorization but do not result in net gains in aquatic resource functions and services are not authorized by this NWP. The construction of reservoirs disrupts sediment transport to downstream habitats, including wetlands and riparian areas. When sediment transport processes are disrupted by the construction of a dam across a river, downstream riverine wetlands and riparian areas may erode when sediment supplies from upstream waters diminish as sediment is trapped by the reservoir. Coastal wetlands also require periodic inputs of sediment to sustain their structure and function, and sediment releases from reservoirs in coastal areas can help sustain these wetlands (Kondolf et al. 2014). While this NWP may authorize the removal of small water control structures, it does not authorize the removal of large dams. Low-head dam removals may be authorized by NWP 53. Several commenters stated that the timing, location, and magnitude of sediment releases are crucial factors, as they could be beneficial for some species that require turbidity for spawning, or harmful for species that require clean substrate for nest building. One commenter said that the Corps' decision document for this NWP should provide further clarification of the positive and negative impacts on the aquatic environment downstream from sediment releases and that the NWP should provide a mechanism that will carefully consider these potential impacts and offer practices aimed to reduce negative impacts. One commenter stated that the NWPs are designed for minor discharges with no more than minimal adverse environmental impacts and that individual permits should be required for discharges of sediment for habitat improvement. One commenter said that large amounts of sediments being released downstream should require full evaluation of best management options. The Corps agrees that the timing, location, and magnitude of sediment releases are crucial factors, and that these activities need to be carefully planned and implemented to ensure that the sediment releases from reservoirs result in net increases in aquatic resource functions and services. The degrees to which some species may benefit from the sediment released from reservoirs and other species may be adversely affected weighs into the determination as to whether the sediment releases result in net gains in aquatic resource functions and services. As with many aquatic habitat restoration, enhancement, and establishment activities, there may be short-term, temporary adverse effects while authorized activities such as discharges of dredged or fill material into waters of the United States are conducted. But over the long-term, as the aquatic habitat responds to the restoration, enhancement, or establishment activities through ecosystem development processes, there should be more permanent, sustainable gains in aquatic habitat functions and services. The Corps has revised its national decision document for this NWP to provide additional discussion of the positive and negative impacts of releases of sediment from reservoirs to maintain sediment transport continuity to rehabilitate downstream aquatic habitats. If the district engineer reviews the PCN or report and determines the proposed activity may affect listed species or designated critical habitats, the district engineer will conduct ESA Section 7 consultation with the U.S FWS and/or NMFS as appropriate, unless another federal agency has conducted ESA Section 7 consultation for the proposed activity. The information requirements for these activities are similar to the information requirements for other aquatic habitat restoration, enhancement, and establishment activities authorized by this NWP, and project proponents can provide additional information voluntarily if they think that additional information will help with receiving an NWP verification letter from the district engineer. When evaluating PCNs for proposed NWP 27 activities, district engineers will consider the 10 criteria in paragraph 2 of section D, District Engineer's Decision to determine whether a proposed activity will result in no more than minimal individual and cumulative adverse environmental effects. Aquatic habitat restoration, enhancement, and establishment activities can vary substantially in size, and in the amount of dredged or fill material that is discharged into waters of the United States to conduct those activities. For aquatic habitat restoration, enhancement, and[[Page 73548]]establishment projects, the quantity of discharges of dredged or fill material into waters of the United States is not indicative of whether the completed activity will result in net gains in aquatic habitat functions and services. It is the longer-term outcomes of the aquatic habitat restoration, enhancement, or establishment activities that determine whether net gains in aquatic resource functions and services occur after the temporary impacts associated with the permitted activities are supplanted by the ecosystem development processes that occur over time to produce gains in aquatic resource functions and services. These concepts apply to releases of sediment from reservoirs to maintain sediment transport continuity to restore downstream habitats. Many commenters expressed concern with possible levels of pollutants and water quality impairments from sediment releases. One commenter stated that dam removal projects require sediment contaminant testing to ensure sediment contaminants to be released downstream would not negatively impact the environment, and that this NWP should have a similar requirement for sediment releases from reservoirs. One commenter stated that release of sediments from reservoirs as part of a restoration activity should not contain actionable levels of pollutants such as nitrates, phosphorus, metals, or pesticides. Many commenters said that PCNs for proposed releases of sediment from reservoirs should require sediment analysis to determine contaminant levels. One commenter said that sediment load and the concentrations of any contaminants relative to background levels are key parameters for determining downstream environmental impacts of these activities. Many commenters said that there is potential for contaminants and pollutants that have accumulated in reservoir sediments to be released which may cause significant ecosystem impacts downstream. A few commenters stated that sediment releases from reservoirs would result in water quality violations and disperse contaminated sediments. Dam removal projects do not always require sediment testing. The need for sediment testing for sediments to be released via dam removal project is determined on a case-by-case basis by applying the criteria at 40 CFR 230.60 The same approach applies to releases of sediment from reservoirs to maintain sediment transport continuity to restore downstream habitats. In addition, sediment releases from reservoirs authorized by this NWP may require water quality certification under Section 401 of the Clean Water Act. The applicable certifying authority determines whether a discharge may occur, and if the certifying authority determines that a discharge into waters of the United States may occur it notifies the project proponent that water quality certification or waiver is required before conducting the proposed discharge. Decisions to require testing of sediments released from reservoirs are more appropriately made by the agencies responsible for making water quality certification decisions under Section 401 of the Clean Water Act. If the proposed release of sediment from a reservoir requires DA authorization, the district engineer should defer to the applicable certifying authority regarding whether sediment testing is necessary to ensure compliance with applicable water quality requirements. If a release of sediments from a reservoir will result in a regulated discharge of dredged or fill material, the district engineer has the discretion to determine that there is a need to test sediment that might be stored in the reservoir for contaminants, based on a ``reason to believe'' approach similar to the EPA's inland testing manual for dredged material. One commenter expressed concern for authorizing sediment releases under an NWP because there is little opportunity for coordination with natural resource agencies. A few commenters said that the Corps should develop appropriate general and/or regional conditions for reservoir sediment releases through coordination with natural resource agencies and reservoir operators. One commenter stated that the Corps should require project proponents proposing sediment releases from reservoirs to notify downstream drinking water utilities of potential sediment releases when necessary to benefit downstream habitat. One commenter said that PCNs for proposed sediment releases from reservoirs should require consultation with state resource agencies to ensure potential sediment contamination and changes in dissolved oxygen levels are considered because suspended and embedded sediment has been shown to affect aquatic species, such as fish, through direct physiological effects, decreased water clarity, or sediment deposition. The Corps does not believe it is necessary to require agency coordination for PCNs or reports submitted to district engineers for releases of sediment from reservoirs to maintain the continuity of sediment transport in riverine systems, when those activities are authorized by this NWP. District engineers have the discretion to coordinate PCNs and reports with their counterparts at federal, tribal, state, or local resource agencies. Sediment transport in rivers and streams is a natural process, with a suspended load conveying finer sediment in the water column and a bed load conveying coarser sediment along the river or stream bed. Therefore, the Corps does not believe that it is necessary to notify downstream drinking water utilities of proposed releases of sediment from reservoirs. Potential concerns about sediment contamination and changes in dissolved oxygen levels are more appropriately addressed by certifying authorities through the Clean Water Act Section 401 water quality certification process. Sediment transport is a natural river function, and fish that live in rivers are adapted to cope with suspended sediments and sediments on the river bed. The activities authorized by this NWP must result in net gains in aquatic resource functions and services and result in no more than minimal individual and cumulative adverse environmental effects. District engineers will review PCNs and reports for these proposed activities, and if they determine that adverse effects to fish and other aquatic organisms will be more than minimal after considering mitigation proposed by project proponents, they will exercise discretionary authority and require individual permits for these activities. One commenter recommended modifying this NWP to allow longer reaches of stream be allowed to be temporarily impacted without need for a permit to help to facilitate more streambank stabilization and restoration activities, because of the high costs for designing, engineering, and permitting these activities. This commenter said that these administrative costs often exceed the actual cost of implementing the beneficial improvement work. One commenter said that the Corps must assess the potential for NWP 27 activities to affect ESA-listed species, and that potential impacts from those activities must be analyzed through programmatic ESA Section 7 consultations. This NWP has no quantitative limits, so there are no limits on the amount of stream bed that can be restored or enhanced by activities authorized by this NWP. There are no exemptions from Clean Water Act Section 404 permitting requirements for stream restoration activities. Paragraph (c) of general condition 18, endangered species, requires non-federal permittees to submit a pre-construction notification[[Page 73549]]to the district engineer if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed such designation) might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat or critical habitat proposed for such designation. District engineers will review those PCNs and determine whether the proposed activity may affect listed species or designated critical habitat. If the district engineer determines a proposed activity may affect ESA-listed species or designated critical habitat, then she or he will conduct ESA Section 7 consultation with the U.S FWS and/or NMFS as appropriate. Compliance with ESA Section 7 may be achieved through activity-specific formal or informal ESA Section 7 consultations or formal or informal regional programmatic ESA Section 7 consultations. One commenter stated that the scope of projects authorized by NWP 27 should be broadened to expedite the review and permitting process to help support the growing ecological restoration industry. One commenter requested that Corps be required to issue an NWP 27 verification concurrent with the execution of a mitigation banking instrument in states where a state has assumed the responsibilities for permitting discharges of dredged or fill material into waters of the United States. This NWP authorizes a wide variety of aquatic habitat restoration, enhancement, and establishment activities. Those activities can be conducted by the ecological restoration industry, government agencies, non-governmental organizations, private individuals, and other entities. If a state has assumed the responsibilities for implementing the Clean Water Act Section 404 permit program, this NWP likely cannot be used to authorize discharges of dredged or fill material into waters of the United States in waters that have been assumed by that state. A state permit would be required to authorize those discharges of dredged or fill material into waters of the United States. This NWP is reissued, with the modifications discussed above. NWP 28. Modifications of Existing Marinas. The Corps did not propose any changes to this NWP. No comments were received on the proposed reissuance of this NWP. This NWP is reissued as proposed. NWP 30. Moist Soil Management for Wildlife. The Corps did not propose any changes to this NWP. One commenter objected to the proposed reissuance of this NWP because it does not require PCNs for proposed activities. This commenter said that not requiring PCNs for the authorized activities prevents the Corps from tracking the use of this NWP and adding conditions to the authorization. The purpose of this NWP is to authorize discharges of dredged or fill material into non-tidal waters of the United States to manage wildlife habitat and to provide feeding areas for wildlife. The activities authorized by this NWP cannot cause net losses of aquatic resource functions and services, and it does not authorize the ***conversion*** of wetlands or streams to other types of habitat. Since this activities authorized by this NWP help sustain wildlife and cannot result in net losses of aquatic resource functions and services, the Corps does not believe it is necessary to require PCNs for authorized activities. In geographic areas where division engineers have concerns about the potential uses of this NWP, they can add regional conditions to require PCNs for some or all activities authorized by this NWP. This NWP is reissued as proposed. NWP 31. Maintenance of Existing Flood Control Facilities. The Corps did not propose any changes to this NWP. A few commenters requested that the Corps not reissue this NWP because they said it authorizes activities that cause more than minimal individual and cumulative adverse environmental effects. A few commenters said that the Corps should impose quantitative limits on this NWP. One commenter stated that relatively small acreage losses authorized by this NWP can cause significant impacts. A few commenters said that the Corps should restrict this NWP so that it authorizes activities that are similar in nature. This NWP authorizes the maintenance of existing flood control facilities, as long as those activities are conducted within the maintenance baseline established for each flood control facilities. While this NWP does not have a quantitative limit, maintenance activities that require DA authorization are limited to the maintenance baseline that is approved by the district engineer for each existing flood control facility. This NWP does not authorize any expansion or new construction for existing flood control facilities. The existing flood control facilities covered by this NWP were either previously authorized by a Corps permit after the Corps conducted an environmental review (if a Corps permit was required for the original construction of the flood control facility), or constructed by the Corps after completing an environmental review process similar to the Corps' permit review process. Flood control facilities are located in dynamic environments and require periodic maintenance to sustain their intended flood risk management functions. Aquatic resources located in the existing flood control facilities covered by this NWP provide ecological functions and services, and while periodic maintenance activities can disrupt those functions and services to some degree for a period of time, those aquatic resources usually recover their ability to perform those ecological functions and services. Since this NWP authorizes only maintenance activities, and the aquatic resources in these existing facilities usually recover after disturbances caused by periodic maintenance activities, the Corps believes the activities authorized by this NWP result in no more than minimal adverse environmental effects. Significant impacts are unlikely to occur as a result of these recurring maintenance activities because of the ecological recovery that occurs between each maintenance activity. That ecological recovery likely is the reason why recurring maintenance is needed, because the recovery of biotic and abiotic components within an existing flood control facility, such as vegetation and sediment, may be diminishing the capacity of the flood control facility to perform its intended flood control functions. The activities authorized by this NWP are similar in nature because the NWP is limited to maintenance of existing flood control facilities, within the constraints of a maintenance baseline approved by the district engineer. Several commenters said that the activities authorized by this NWP can cause adverse impacts to natural and beneficial floodplain functions, including adjacent and downstream impacts of floodwaters on communities and properties. One commenter stated that this NWP inhibits comprehensive basin-wide flood risk management planning and restoration approaches that will help to safeguard communities and protect the nation's natural defenses. The activities authorized by this NWP are limited to maintenance of existing flood control facilities within a maintenance baseline established by the district engineer. Therefore, the activities authorized by this NWP are unlikely to adversely affect natural floodplain functions because those natural floodplain functions were previously altered by the original construction of the flood control facility. Adverse effects to natural and beneficial[[Page 73550]]floodplain functions were initially addressed through the authorization process when the flood control facility was originally constructed if the construction of the flood control facility required authorization under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899 or through the process for approving federal water resource development projects. Maintenance of these existing flood control facilities is necessary to ensure that these facilities continue to provide their intended flood risk management objectives and continue to protect local residences, business, and others from floods. Since this NWP authorizes only maintenance activities, it does not affect efforts to undertake comprehensive, watershed-based flood risk management planning and restoration activities. Watershed-based flood risk management planning and restoration activities can be conducted through other mechanisms, such as cooperative efforts between federal, tribal, state, and local government agencies and interested stakeholders, regardless of whether the Corps reissues this NWP. Several commenters stated that mitigation should not be limited to one-time-only because maintenance activities could be carried out on multiple occasions and each maintenance activity can cause adverse impacts. One commenter said that the one-time mitigation limit could lead to significant harm to the environment. This NWP authorizes only maintenance activities for existing flood control facilities that were previously authorized, or did not require DA authorization at the time they were originally constructed. Mitigation, including compensatory mitigation, may have been required for the original construction of the flood control facility. Mitigation may also be required for the original approval of the maintenance baseline by the district engineer. Subsequent recurring maintenance activities to return the existing flood control facility to the maintenance baseline should not require mitigation because those maintenance activities generally have temporary impacts. The aquatic resources within these existing flood control facilities are likely to recover their ability to perform ecological functions and services after each maintenance activity is conducted to return the flood control to the maintenance baseline established by the district engineer. The one-time maintenance limit recognizes the temporary nature of the impacts to waters of the United States that typically occur as a result of these recurring maintenance activities, including the recovery of aquatic resources that usually occurs between those recurring maintenance activities. The recovery of those aquatic resources generally occurs through natural processes, such as sediment transport and deposition in a waterbody within the existing flood control facility and the re-establishment and growth of plants after vegetation is removed from waterbody or lands next to the waterbody. A few commenters said that vegetation removal should be addressed by a regional approach based on science and authorized through the individual permit process, with state and federal interagency consultation. One commenter stated that the research points to multiple benefits of vegetation on levees. One commenter said that the Corps' one-size-fits all approach to removal of levee vegetation is opposed by a broad array of states, scientists, members of Congress, and members of the public. This NWP authorizes discharges of dredge or fill material into waters of the United States and/or work in navigable waters of the United States to return an existing flood control facility to its maintenance baseline so that it can continue to perform its intended flood control functions. A maintenance baseline is established for each existing flood control facility regardless of whether this NWP might be used, and restoring the flood control facility to its maintenance baseline may require the removal of vegetation. Interagency consultation is not required for the activities authorized by this NWP because it is a maintenance activity, and in most cases these maintenance activities must take place on a recurring basis to ensure that the existing flood control facility continues to perform its intended flood control functions and protect the people and property served by that flood control facility. The presence or absence of vegetation within the existing flood control facilities may be addressed through the maintenance baseline. This NWP does not impose any specific requirements regarding vegetation on levees, and it does not prescribe any approach to managing (or not managing) levee vegetation. Whether or not vegetation is allowed to continue to exist on levees or needs to be removed to ensure the structural integrity and continuing functioning of the levee is dependent on the maintenance baseline approved for the flood control facility, as well as any discretion the entity responsible for maintaining the existing flood control facility may have regarding vegetation in that facility. One commenter stated that it is not possible to determine the full extent of the significance of the impacts caused by activities authorized by this NWP because the draft decision document provides no information on the types of waters affected, the location of those waters, or other activities that have or are likely to affect those waters. One commenter stated that the draft decision document for this NWP demonstrates that the activities authorized by this result in more than minimal impacts, because approximately 225 activities impacted 500 acres of jurisdictional waters and wetlands. One commenter said that the decision document for this NWP should include impacts quantified in linear feet. This NWP can be used to authorize discharges of dredged or fill material into all waters of the United States and structures and work in all navigable waters of the United States to return the existing flood control to its maintenance baseline. Flood control facilities could be located in any type of waters of the United States, such riverine, lacustrine, palustrine, estuarine, and marine waters. The decision document for this NWP discusses, in general terms, the potential impacts of the authorized activities on all waters of the United States, including navigable waters of the United States. The national decision document also considers the potential benefits of maintaining these existing flood control management facilities so that they continue to perform their intended functions. The estimated impact acreages in the national decision document for this NWP include both permanent and temporary impacts to waters of the United States, including navigable waters of the United States. Because this NWP authorizes only maintenance activities within the maintenance baselines established by district engineers, and the aquatic resources within the existing flood control facility generally recover after each maintenance activity is completed in accordance with the maintenance baseline that was previously approved by the district engineer, the activities authorized by this NWP generally result in temporary losses of waters of the United States. Permanent losses of waters of the United States caused by the original construction of these flood control facilities would have been addressed in the DA permit or other the authorization for the federal water resources development project, if such authorization was required for that construction. Therefore, most impacts to[[Page 73551]]waters of the United States authorized by this NWP will be temporary impacts to return these existing flood control facilities to their maintenance baselines. The impacts of activities authorized by this NWP are more appropriately and accurately quantified in acres rather than linear feet, because these maintenance activities occur over areas of waters of the United States. Accurate quantification of impacts to waters of the United States is important aspect of tracking the individual and cumulative impacts of activities authorized by this NWP, to make more defensible determinations as to whether the individual and cumulative adverse environmental effects are no more than minimal. This NWP is reissued as proposed. NWP 32. Completed Enforcement Actions. The Corps did not propose any changes to this NWP. No comments were received on the proposed reissuance of this NWP. This NWP is reissued as proposed. NWP 33. Temporary Construction, Access, and Dewatering. The Corps did not propose any changes to this NWP. One commenter stated that this NWP should be reissued with no changes. One commenter said that this NWP should have a 1/10-acre limit for losses of waters of the United States and a 300 linear foot limit for losses of stream bed. One commenter said that this NWP contains vague language that gives the permittee discretion to determine how stringently various provisions will be followed, which may result in activities that cause more than minimal environmental effects. One commenter said that this NWP should be modified to include matting as a temporary fill for access, consistent with NWP 12 and the proposed new NWP C. One commenter stated that for activities in areas where state and/or federal threatened or endangered freshwater mussels are known to occur, this NWP should require pre-construction notification, as well as coordination with federal and state natural resource agencies. This NWP authorizes only temporary construction, access, and dewatering activities, and does not authorize discharges of dredged or fill material into waters of the United States or structures or work in navigable waters of the United States that may result in permanent losses of waters of the United States. Permanent structures in navigable waters of the United States require separate DA authorization, either through individual permits, other NWPs, or regional general permits. The text of the NWP requires, after completion of construction, the removal of temporary fill material to an area that has no waters of the United States. If the authorized activity involves dredged material, the NWP requires the dredged material to be returned to its original location, and the affected area restored to pre-constructed elevations. Because of these specific requirements, the Corps believes that adding quantitative limits to this NWP is unnecessary. These specific requirements also help ensure that authorized activities result in no more than minimal individual and cumulative adverse environmental effects. Because this authorizes temporary fills for construction access for utility lines, as well as the use of mats for temporary access for utility lines when such mats require DA authorization, it is unnecessary to impose quantitative limits on this NWP. Paragraph (c) of general condition 18 requires non-federal permittees to submit a pre-construction notification to the district engineer if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed such designation) might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat or critical habitat proposed for such designation. Furthermore, paragraph (c) states that the permittee cannot begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. Paragraph (c) of general condition 18 applies to mussel species that are listed, or proposed for listing, as endangered or threatened under the federal ESA. Potential effects to state-listed mussel species should be addressed through the permittee's compliance with state laws and regulations for state-listed species. This NWP is reissued as proposed. NWP 34. Cranberry Production Activities. The Corps did not propose any changes to this NWP. One commenter objected to the proposed reissuance of this NWP, stating it authorizes activities that will result in more than minimal adverse environmental effects and it does not require wetland functions to be maintained. Cranberry production activities require maintenance of wetland conditions because cranberry plants are wetland-dependent species. This NWP authorizes discharges of dredged or fill material into waters of the United States that may temporarily disturb wetlands used for cranberry production, but this NWP does not authorize activities that may result in losses of wetlands. The wetlands used for cranberry production will continue to perform wetland functions, especially hydrologic and biogeochemical cycling functions. The habitat functions of the affected wetlands may be altered by the management of these wetlands to produce cranberries, with some species utilizing the habitat functions performed by cranberry wetlands, and other species not being able to use the habitat functions in cranberry wetlands. The species that cannot inhabit the cranberry production wetlands may use other wetlands in the vicinity of the cranberry farm for habitat. This NWP is reissued as proposed. NWP 35. Maintenance Dredging of Existing Basins. The Corps did not propose any changes to this NWP. One commenter said that permittees should be required to ensure that toxic substances are not released back into the water column through re-exposure during dredging activities. A few commenters stated that maintenance dredging at existing basins does not result in a discharge into waters of the United States, and should not require water quality certification from states. One commenter said that requiring dredged material to be discharged into areas that do not contain waters of the United States precludes using the dredged material from enhancing aquatic habitat, such as coastal marshes and freshwater marshes, through natural processes or through beneficial use projects. This commenter said that this NWP should be modified to allow dredged materials to be discharged into waters of the United States for beneficial uses, after federal and state natural resource agency coordination. During dredging activities, chemical substances that were buried by sediments or attached to dredged sediments may be resuspended in the water column or may become solutes within the water column. Those chemical substances may have adverse effects to water quality. Those adverse effects are likely to be temporary because the suspended sediments are likely to settle back onto the benthos and chemicals present as solutes in the water column are likely to be dispersed by currents, tides, and other causes of water movement. Under Section 401 of the Clean Water Act, certifying authorities may determine that a dredging activity may result in a discharge into waters of the United States and require the project proponent to obtain an individual water quality certification or waiver unless the certifying authority has issued water quality certification for the issuance of a general permit that authorizes the dredging activity. Water quality certifications for activities authorized by this NWP will help ensure that any[[Page 73552]]discharges that may be caused by those dredging activities comply with applicable water quality requirements. Since it was first issued in 1991 (56 FR 59144), this NWP has been issued only under the authority of Section 10 of the Rivers and Harbors Act of 1899. This NWP has never been issued or reissued under the authority of Section 404 of the Clean Water Act. Therefore, this NWP does not authorize discharges of dredged or fill material into waters of the United States, including activities involving redepositing the dredged material into waters of the United States for beneficial uses or other purposes. Beneficial use of material dredged under the section 10 authorization provided by NWP 35 may be authorized by other NWPs issued under the authority of section 404, such as NWP 27, or other forms of DA authorization under section 404, including individual permits and regional general permits. If an individual permit is required for the beneficial use of dredged material, then there will be coordination with federal and state agencies under the individual permit review process. This NWP is reissued as proposed. NWP 36. Boat Ramps. The Corps did not propose any changes to this NWP. One commenter recommended reinstating the restriction for one boat ramp for contiguous properties under the same ownership to reduce the potential for fragmentation of nearshore habitats. One commenter said that for previously permitted structures, the Corps should also specify that repair and replacement activities are limited to the minimum necessary to accomplish the function of the original boat ramp. This commenter also stated that for new boat ramps, or for expansions of existing boat ramps, the Corps should impose conditions to ensure that new or modified boat ramps result in no more than minimal individual and cumulative adverse environmental effects. This NWP was first issued in 1991 (see 56 FR 59144), and it never had a provision limiting the number of boat ramps to one boat ramp per set of contiguous properties under the same ownership. Therefore, the change suggested by the commenter would be a new provision for this NWP. The Corps does not believe that such a provision is necessary to ensure that the construction of boat ramps authorized by this NWP will result in no more than minimal individual and cumulative adverse environmental effects. During the review of PCNs for proposed NWP 36 activities, district engineers will evaluate potential adverse environmental effects, including the possible fragmentation of shoreline habitats and potential disruptions on the movements of aquatic organisms along the shore. This NWP has two quantitative limits for authorized activities: A 50 cubic yard limit for discharges of dredged or fill material into waters of the United States, and a 20-foot limit for the width of the boat ramp. Both of these quantitative limits can be waived by district engineers after they review PCNs for proposed boat ramps under this NWP. Waivers of these quantitative limits may only occur when district engineers make written determinations, after conducting agency coordination under paragraph (d) of general condition 32, that the proposed activities will result in no more than minimal individual and cumulative adverse environmental effects. The Corps has modified the first paragraph of this NWP to clarify that in addition to the construction of new boat ramps, it also authorizes the repair or replacement of existing boat ramps. As with the construction of new boat ramps, to be authorized by NWP the repair or replacement of boat ramps must comply with the requirements of this NWP, including the quantitative limits, and result in no more than minimal individual and cumulative adverse environmental effects. This NWP is reissued with the modification discussed above. NWP 37. Emergency Watershed Protection and Rehabilitation. The Corps did not propose any changes to this NWP. No comments were received on the proposed reissuance of this NWP. This NWP is reissued as proposed. NWP 38. Cleanup of Hazardous and Toxic Waste. The Corps did not propose any changes to this NWP. No comments were received on the proposed reissuance of this NWP. This NWP is reissued as proposed. NWP 41. Reshaping Existing Drainage and Irrigation Ditches. The Corps proposed to modify this NWP by adding irrigation ditches. Several commenters expressed support for the proposed changes to this NWP. Several commenters stated that the Corps should make additional changes to this NWP to ensure that it is consistent with the current regulatory definition of ``waters of the United States'' for the purposes of the Clean Water Act at 33 CFR part 328. Several commenters said that the Corps should clarify in the final rule that the addition of irrigation ditches to this NWP does not affect the Clean Water Act Section 404(f) exemption for irrigation ditches. These commenters requested that the Corps explain how reshaping ditches for the purpose of improving water quality aligns with the current interpretation of the Clean Water Act Section 404(f) exemption for ditch maintenance, which allows for minor changes to cross sections of ditches to conform to current engineering standards, as long as the ditch modifications do not result in the drainage, degradation, or destruction of additional jurisdictional waters. The purpose of this NWP is to authorize discharges of dredged or fill material into waters of the United States to reshape existing drainage and irrigation ditches to improve water quality by regrading the drainage or irrigation ditch with gentler side slopes that can reduce erosion, increase growth of vegetation within the ditch, and increase uptake of nutrients and other substances by vegetation. This NWP applies to drainage ditches and irrigation ditches that are waters of the United States. If a drainage ditch or irrigation ditch is not subject to Clean Water Act jurisdiction under the current regulations defining ``waters of the United States'' at 33 CFR part 328, then DA authorization (including the DA authorization provided by this NWP) is not required for discharges of dredged or fill material that reshape the drainage or irrigation ditch to improve water quality. This NWP does not authorize ditch maintenance activities specifically, because it authorizes discharges of dredged or fill material into waters of the United States to change the shape of existing drainage or irrigation ditches to facilitate the removal of nutrients, other chemicals, and sediments from the water column to improve water quality. This NWP authorizes discharges of dredged or fill material into waters of the United States to change the shape of jurisdictional ditches to improve water quality, which is a different purpose than the purpose identified in the current memorandum interpreting the Clean Water Act Section 404(f) exemption for ditch maintenance (i.e , conforming with current engineering standards to improve ditch stability). Therefore, the activities authorized by this NWP are distinct from the activities identified in the current guidance interpreting the Clean Water Act Section 404(f)(1)(C) exemption for ditch maintenance. One commenter said that there may be no projects that might utilize the proposed changes to this NWP and requested that the Corps provide specific examples of projects involving the reshaping of irrigation ditches to improve water quality. One commenter stated that the Corps should add a provision to this NWP that prohibits the[[Page 73553]]reshaping of irrigation ditches that increases diversions of water that are not allowed under existing water rights or do not conform with state water law. As discussed in the Regulatory Impact Analysis for this final rule, the Corps anticipates that there may be a small number of irrigation ditches (estimated to be five per year) that may be reshaped to improve water quality through the authorization provided by this NWP. The Corps declines to add restrictions to this NWP regarding quantities of diverted water, potential impacts to existing water rights, or situations where irrigation ditch reshaping activities might not conform with state water law. State government authorities are the appropriate entities for enforcing water rights and other provisions of state water laws. One commenter objected to the proposed reissuance of this NWP, as well as the proposed modification, stating that the activities authorized by this NWP may adversely affect salmon and trout that inhabit ditches. This commenter said that PCNs should be required for all activities authorized by this NWP so that the Corps can evaluate potential effects on salmon and trout, and if necessary add conditions to the NWP authorization to protect those species. This commenter also stated that the Corps should add quantitative limits to this NWP to limit the length of ditch reshaped and the frequency of ditch reshaping activities. Activities authorized by this NWP are subject to the requirements of general condition 18, which addresses compliance with the federal ESA. Paragraph (c) of general condition 18 requires a non-federal permittee to submit a pre-construction notification to the district engineer if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed such designation) might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat or critical habitat proposed for such designation. This includes salmon and trout species listed as endangered or threatened under the ESA, as well as salmon and trout species that may be proposed for listing under the ESA. The Corps does not believe it is necessary to impose quantitative limits on this NWP, because this NWP is limited to reshaping existing drainage and irrigation ditches to improve water quality, and these activities do not result in permanent losses of waters of the United States. One commenter stated that the Corps should modify the NWP to cite the statutory exemptions that could apply under Clean Water Act Section 404(f). Several commenters recommended adding a Note to this NWP similar to the Notes in NWPs 3, 12, 14, 30, and 40, stating that certain discharges may qualify for an exemption under Section 404(f) of the Clean Water Act and therefore do not require DA authorization under section 404. The purpose of this NWP is to authorize discharges of dredged or fill material into waters of the United States for reshaping existing drainage and irrigation ditches when those activities are not eligible for any of the exemptions in Section 404(f) of the Clean Water Act. The Corps declines to add the suggested Note to this NWP because it would be contrary to the reason the NWP was first issued in 2000 (see 65 FR 12891). This NWP was issued to provide an incentive for landowners to reshape their ditches to improve water quality, rather than maintaining those ditches in a manner that qualifies for the Clean Water Act Section 404(f)(1)(C) exemption. Adding the suggested Note may discourage landowners from reshaping existing ditches to improve water quality by highlighting the availability of the ditch maintenance exemption. This NWP is reissued as proposed. NWP 45. Repair of Uplands Damaged by Discrete Events. The Corps did not propose any changes to this NWP. One commenter said that the restoration of upland areas should be accomplished with fill material taken from uplands, and limit minor dredging to no more than 25 cubic yards to be consistent with the limit in NWP 19. One commenter stated that for shoreline erosion, the establishment of living shorelines should be encouraged over the reclamation of eroded lands through the use of fill material and hard structures. The Corps does not agree that the restoration of uplands damaged by storms and other discrete events should be required to utilize only fill material taken from upland sites. Sediment that moved from adjacent uplands into the waterbody because of erosion or mass wasting caused by storms or other discrete events should be available for repairing the damaged uplands. Using that sediment to repair the affected uplands can help restore the waterbody by removing sediment that may be blocking the waterbody or covering aquatic habitat within that waterbody. It can also help reduce downstream sediment loads, by putting that sediment back onto the damaged upland areas where it can be stabilized before it is transported downstream and potentially impair downstream water quality. The NWP limits dredging to the amount necessary to restore the damaged upland area, restricting the amount of material dredged so that it is proportional to the amount of upland damaged by the discrete event. That dredging limit provides flexibility to address the amount of damaged uplands, and prevents situations where the amount of authorized dredging needed to effectively repair the damaged uplands and the waterbody would require individual permits. In other words, limiting dredging to 25 cubic yards may discourage effective means of repairing the damaged uplands and restoring adjacent portions of the waterbody. This NWP limits bank stabilization activities to the contours or ordinary high water mark that existed before the damage to the uplands occurred. In many circumstances, this limit precludes the use of living shorelines as a bank stabilization measure in coastal areas. If a landowner wants to install a living shoreline next to uplands repaired through activities authorized by NWP 45, then he or she may submit a PCN under NWP 54, which authorizes living shorelines. Bank stabilization within the limits of NWP 45 can be accomplished through other approaches, such as bioengineering or other forms of vegetative stabilization. This NWP is reissued as proposed. NWP 46. Discharges in Ditches. The Corps did not propose any changes to this NWP. Several commenters stated that the text of this NWP should clarify when this NWP can be used for discharges of dredged or fill material into upland ditches because it seems to be inconsistent with the current definition of ``waters of the United States'' in the Corps' regulations at 33 CFR part 328. A few commenters said that the provisions of this NWP should be consistent with the current regulations defining ``waters of the United States'' and the current guidance on ditches and the exemptions under Section 404(f) of the Clean Water Act. Several commenters stated that the Corps should modify this NWP to acknowledge that certain discharges related to activities in ditches may qualify for exemptions from permitting under Section 404(f) of the Clean Water Act. These commenters suggested adding a Note to this NWP similar to the notes regarding the Clean Water Act Section 404(f) exemptions in NWPs 3, 12, 14, 30 and 40. This NWP authorizes discharges of dredged or fill material into non-tidal ditches that meet the four criteria in the[[Page 73554]]first paragraph of the NWP, including the fourth criterion (i.e , the ditch must be a water of the United States). If the ditch constructed in uplands is not a water of the United States, in accordance with the Corps' current regulations at 33 CFR part 328 that define ``waters of the United States,'' then DA authorization (including the DA authorization provided by NWP 46) is not necessary to discharge dredged or fill material into that ditch. This NWP authorizes activities that are not eligible for any of the exemptions under Section 404(f) of the Clean Water Act. Therefore, it is not necessary to add a Note to this NWP that address the section 404(f) exemptions. This NWP was issued in 2007 (see 72 FR 11190) to provide DA authorization to fill a category of ditches constructed in uplands that meet the four criteria listed in the first paragraph of the NWP. Filling these ditches to convert them back to uplands would likely trigger the recapture provision of Section 404(f)(2) of the Clean Water Act and therefore not be exempt from section 404 permitting requirements. If the project proponent wants to discharge dredged or fill material to maintain the ditch, and not convert it into uplands, the proposed discharge might be eligible for an exemption under section 404(f) depending on case-specific circumstances. Therefore, the Corps does not believe that there would be any benefit to adding a Note to this NWP that discusses the section 404(f) exemptions. One commenter said that the acreage limit of this NWP should be reduced to 1/2-acre to ensure that the activities authorized by this NWP result in no more than minimal individual and cumulative adverse environmental effects. One commenter stated that compensatory mitigation should be required for losses of waters of the United States greater than 1/10-acre. The Corps is retaining the 1-acre limit that was established for this NWP when it was first issued in 2007. During the years this NWP has been in effect, the one acre limit has been effective in ensuring that discharges of dredged or fill material into the non-tidal ditches that satisfy four criteria in the first paragraph of this NWP result in losses of waters of the United States that have no more than minimal individual and cumulative adverse environmental impacts. Division engineers can add regional conditions to this NWP to impose an acreage limit that is less than one acre, to ensure that activities authorized in the region will have no more than minimal individual and cumulative adverse environmental effects. During the review of PCNs for proposed NWP 46 activities, district engineers can require compensatory mitigation to offset the permitted losses of waters of the United States, in accordance with 33 CFR 330.1(e)(3) and general condition 23. This NWP is reissued as proposed. NWP 49. Coal Remining Activities. The Corps proposed to modify this NWP by removing the provision that requires the permittee to obtain written verification from the district engineer before proceeding with the authorized activity to make this NWP consistent with the other NWPs that have a default authorizations when a district engineer does not respond to a complete PCN within 45 days of receiving that PCN from the project proponent. The Corps also proposed to remove the text referring to integrated permit processing procedures. One commenter stated support for reissuing this NWP. Many commenters expressed opposition to the proposal to remove the provision that requires the permittee to obtain written verification from the district engineer before commencing the authorized activity. Several commenters said they support removing the requirement for the permittee to obtain written verification from the district engineer before proceeding with the authorized activity, so that a default authorization occurs if the district engineer does not respond to a complete PCN within 45 days. The Corps has retained the provision that requires the permittee to obtain written authorization from the district engineer prior to commencing the authorized activity because coal remining activities can vary substantially in size and can cover large areas. Additional time may be needed for the project proponent to demonstrate to the district engineer that the authorized activity will result in a net increase in aquatic resource functions. This NWP has no acreage limit for losses of waters of the United States. In contrast, NWP 21 (surface coal mining activities) and NWP 50 (underground coal mining activities) have a 1/2-acre limit for losses of waters of the United States. The requirement for permittees to obtain written authorization before proceeding with the NWP 21 or 50 activity was removed in the final rule published in the January 13, 2021, issue of the Federal Register (86 FR 2744) because these NWPs have the additional safeguard of the 1/2-acre limit if a default authorization occurs through a district engineer not responding to a complete PCN within 45 days. One commenter opposed to the removal of stream mitigation requirements from this NWP. One commenter said that PCNs should not be required for the activities authorized by this NWP. One commenter supported removing the text referring to integrated permit processing procedures. The Corps did not propose to remove any stream mitigation requirements from this NWP. The activities authorized by this NWP must result in net increases in aquatic resource functions. Stream or wetland rehabilitation or enhancement may be a component of the coal remining activity that helps achieve the required net increase in aquatic resource functions. Mitigation requirements for NWP activities is determined by district engineers on a case-by-case basis through the provisions of 33 CFR 330.1(e)(3) and general condition 23. The Corps believes that PCNs are necessary for all activities authorized by this NWP to provide district engineers the opportunity to review proposed activities and ensure that the activities that comprise the overall mining plan result in net increases in aquatic resource functions. The Corps has removed the text that refers to integrated permit processing procedures because those procedures were not developed for past versions of NWP 49. One commenter recommended modifying the text of this NWP to state that new mining must not exceed 40 percent of the remined area and the additional area necessary to carry out the reclamation of a previously mined area. One commenter noted that no work can begin under this NWP unless the coal remining activity is approved by the Department of the Interior Office of Surface Mining Reclamation or Enforcement, or by states with approved programs under Title IV or V of the Surface Mining Control and Reclamation Act of 1977, and that final approval by these agencies is not necessary before submitting a PCN to the district engineer. The Corps is retaining the text in the NWP that states that the total area disturbed by new mining must not exceed 40 percent of the total acreage covered by both the remined area and the additional area necessary to carry out the reclamation of the previously mined area. The Corps acknowledges that permittees should not begin the authorized work if the activities authorized by this NWP also require authorization by other federal, state, or local government agencies (see paragraph 2 of Section E, Further Information) and those other required authorizations have not been issued. The project proponent can submit a PCN for a proposed NWP 49 activity to the district engineer prior to obtaining[[Page 73555]]required authorizations from either the Office of Surface Mining Reclamation or Enforcement, or a state with an approved program under Title IV or V of the Surface Mining Control and Reclamation Act of 1977. This NWP is reissued with the modification discussed above. NWP 53. Removal of Low-Head Dams. The Corps did not propose any changes to this NWP. Several commenters expressed support for the reissuance of this NWP. One commenter said that the Corps should revise this NWP so that it clearly states that it may be used to authorize compensatory mitigation projects that generate stream mitigation credits, because dam removal and stream restoration projects help spur economic activity in rural regions, improve water quality, and deliver resiliency benefits to communities. One commenter said that the removal of low-head dams could affect water rights determined by the state. One commenter stated that this NWP should be modified to include requirements for management of accumulated sediment prior to and during removal of low-head dams to ensure that downstream water quality is minimally adversely impacted by the removal of low-head dams. The Corps does not believe it is necessary to modify this NWP to state that it can be used to authorize discharges of dredged or fill material into waters of the United States and/or structures and work in navigable waters of the United States for low-head dam removals conducted to rehabilitate rivers and streams to provide compensatory mitigation for DA permits. Low-head dam removals can be conducted for permittee-responsible mitigation, mitigation banks, or in-lieu fee projects to generate compensatory mitigation credits that offset losses of aquatic resource functions and services caused by activities authorized by DA permits. The Corps recognizes that stream restoration projects, including removals of low-head dams, provide a variety of ecological and economic benefits to communities. However, it is not necessary to explicitly identify those benefits in the text of the NWPs. Concerns about potential impacts of low-head dam removals on state issued water rights are more appropriately addressed through the state laws and regulations that govern those water rights, and the effects that specific activities may have on water rights. Permittees are responsible for complying with applicable federal, tribal, state, and local government laws, regulations, and other requirements. The text of this NWP does not include requirements for the management of sediments that may be released after the removal of a low-head dam. Requirements for the management of sediments that may be released downstream after the low-head dam is removed is more appropriately determined on a case-by-case basis when the district engineer reviews the PCN for the proposed NWP 53 activity. In general, low-head dams have low storage capacities and large amounts of sediment are unlikely to be released to downstream waters when the low-head dam is partially or completely removed. In addition, sediment releases caused by the removal of low-head dams generally have temporary impacts because the sediment is transported downstream by flowing water and over time those sediments will be distributed throughout downstream tributaries as the stream network recovers from the removal of the low-head dam. Water quality concerns, including water quality concerns regarding sediment releases that may occur during the removal of the low-head dam and after the low-head dam is removed, are more appropriately addressed through the water quality certification process under Section 401 of the Clean Water Act. For those activities where the certifying authority denied water quality certification for the reissuance of NWP 53, the project proponent must obtain a water quality certification or waiver for any discharges into waters of the United States that may occur as a result of the removal of the low-head dam (see general condition 25). The water quality certification may include conditions, such as sediment management requirements, to ensure that those discharges comply with applicable water quality requirements. A few commenters stated that the Corps should clarify the definition of low-head dam to be more expansive in the types of structures that can be removed under this NWP. One of these commenters suggested broadening the definition of ``low-head dam'' to include different low-head dam configurations or to add a specific height to the definition of ``low-head dam.'' Two of these commenters suggested modifying the definition of ``low-head dam'' as follows: For the purposes of this NWP, the term ``low-head dam'' is generally defined as a dam or weir built across a stream to pass flows from upstream over all, or nearly all, of the width of the dam crest and does not have a separate spillway or spillway gates, but it may have an uncontrolled spillway. The dam crest is the top of the dam from left abutment to right abutment and will most often be less than 15 feet in height for small streams and 25 feet in height for medium-sized tributaries. A low-head dam may have been built for a range of purposes (e.g , check dam, mill dam, irrigation, water supply, recreation, hydroelectric, or cooling pond), but in all cases, it provides little to no storage function. In response to these comments, the Corps has modified the definition of ``low-head dam'' that is in the text of this NWP. The Corps has adopted much of the definition suggested above, except for the recommended maximum height requirements for dams in small streams and medium-sized tributaries. The Corps declines to include maximum height requirements because the heights suggested by commenters might apply to dams that are not low-head dams. In addition, the terms ``small stream'' and ``medium-sized tributary'' are difficult to define. ``Small'' versus ``medium'' are relative terms and are likely to pose additional challenges in implementing a clear, consistent definition of ``low-head dam.'' The definition of ``low-head dam'' with the modifications made in response to public comments focuses on structural features characteristic of most low-head dams, instead of dimensions that represent types of dams other than low-head dams. District engineers have discretion in determining whether proposed dam removal involves a low-head dam and thus qualifies for NWP 53 authorization. Even with the exclusion of the suggested maximum height requirements, the revised definition of ``low-head dam'' may broaden the utility of this NWP to facilitate the removal of low-head dams that may not have been covered by the 2017 version of this NWP. One commenter stated that other federal and state natural resource agencies should be provided opportunities for review and comment on all PCNs for this NWP that are submitted to district engineers. One commenter requested clarification on whether any specific removals of low-head dams have resulted in increases in ecological functions. One commenter asked that the Corps explain the basis for establishing the 1/2-acre limit for this NWP. This commenter asked whether there is a limit to either the area of the impoundment that is dewatered as a result of the removal of a low-head dam, or the area where significant hydrological changes would occur as a result of the removal of a low-head dam. This commenter also requested clarification on how the Corps calculates the impact acreage for activities authorized by this NWP, including impacts that may occur upstream and downstream of the low-[[Page 73556]]head dam and its impoundment after the low-head dam is removed. The Corps declines to modify this NWP to require district engineers to coordinate PCNs for this NWP with federal and state natural resource agencies. Corps district staff have the capability to review these proposed activities and determine whether they qualify for NWP authorization. District engineers have the discretion to coordinate with federal and state resource agencies on a case-by-case basis, if they believe such coordination would be beneficial in reaching a decision on a particular PCN. Coordination with federal and state agencies may also occur in other circumstances, such as the water quality certification process for discharges into waters of the United States authorized by this NWP. District engineers will review PCNs for proposed activities, and if a district engineer determines that the proposed removal of a low-head dam may affect endangered or threatened species or designated critical habitat, he or she will conduct ESA Section 7 consultation with the U.S Fish and Wildlife Service and/or the National Marine Fisheries Service, as appropriate. The potential increases in ecological functions that may result from the removal of low-head dams are discussed in the national decision document for the reissuance of this NWP. The national decision document cites a number of reviews and studies that have evaluated the ecological benefits that can result from the removal of low-head dams. This NWP has no acreage limit because the removal of low-head dams helps restore the structure, functions, and dynamics of rivers and streams. The removal of low-head dams also benefits public safety by reducing potential drowning risks for swimmers and users of small watercraft, such as kayaks. The 1/2-acre limit that is in other NWPs, such as NWP 29 for residential developments and NWP 39 for commercial and institutional developments, does not apply to this NWP. The impact acreages for activities authorized by this NWP are generally calculated by determining the acreage of the footprint of the low-head dam, the acreage of the former impoundment that will be restored to a free-flowing river or stream channel, and any additional acreage of the impoundment that will dewatered after the low-head dam is removed. The dewatered areas of the former impoundment may develop riparian areas and floodplains, including adjacent riverine wetlands. There may be other indirect effects upstream and downstream of the low-head dam and its impoundment, but the acreage of waters subject to those indirect effects would not normally be calculated because of the difficulties in quantifying those indirect effects. This NWP is reissued with the modification discussed above. NWP 54. Living Shorelines. The Corps did not propose any changes to this NWP. One commenter stated support for the reissuance of this NWP because living shorelines provide environmental, societal, and economic benefits that are not provided by hard bank stabilization structures. One commenter stated that paragraph (d) of this NWP should be modified to add elevation as a factor for determining which native plants are appropriate for current site conditions if the permittee is planting the living shoreline. One commenter said that the requirement for living shorelines to include a substantial biological component provides no meaningful guidance and would result in the authorization of any project that includes a minor amount of vegetation planting. The Corps is reissuing this NWP with minor changes made in response to comments received on the 2020 Proposal. The Corps has added ``elevation'' to paragraph (d) of this NWP because elevation is another factor to consider when deciding which native species to plant in a living shoreline if the biological component of the living shoreline consists of plants. The NWP takes a qualitative approach to characterizing living shorelines (i.e , having a substantial biological component) rather than specifying a minimum quantitative requirement because there can be considerable variability in the designs for living shorelines. The types of biological components used for living shorelines can also vary, from various types of plants (e.g , marsh grasses, mangroves) and different types of animals (e.g , oysters). There is no one-size-fits-all approach to living shorelines that would support a stringent quantitative approach for the determining the minimum amount of biological components in a bank stabilization activity to be considered for a living shoreline. A few commenters objected to the proposed reissuance of this NWP, stating that it has the potential to cause extensive destruction and alteration of irreplaceable nearshore habitats. These commenters said that these activities should require individual permits. One commenter said that this NWP violates Section 404(e) of the Clean Water Act because it authorizes activities that are not similar in nature. This NWP provides DA authorization for an approach to managing shoreline erosion that can provide more aquatic resource functions and services than other approaches to managing shoreline erosion control, such as bulkheads and revetments. While the construction of living shorelines can involve placing considerable amounts of dredged or fill material into jurisdictional waters and wetlands, completed living shorelines can provide habitat functions, as well as other ecological functions such as biogeochemical cycling functions. There may be trade-offs when the construction of living shorelines changes subtidal habitats (e.g , unvegetated shallow waters) into intertidal habitats (e.g , intertidal marshes). Riparian landowners have an inherent right to protect their properties from erosion (see 33 CFR 320.4(g)(2), and living shorelines provide an alternative means of managing shore erosion that can provide greater environmental benefits such as intertidal wetland habitat and shellfish reef habitat compared to bulkheads and revetments. This NWP authorizes a specific category of activities: discharges of dredged or fill material into waters of the United States and structures or work in navigable waters of the United States for the construction and maintenance of living shorelines. Those activities are similar in nature because they serve a common purpose (i.e , managing shoreline erosion) and involve a common set of activities (e.g , fills to construct wetlands, fills to protect constructed and existing wetlands, and fills and structures to construct reefs) that dissipate wave energy and reduce erosion. In addition, these fills and structures are generally limited to nearshore areas, where they help manage shoreline erosion. One commenter said that this NWP should be modified to include the authorization of temporary structures, fill, and work, similar to the text provided in NWP 13. One commenter stated that the text of the NWP allows concrete and other artificial structures, which are not native materials. One commenter said that the NWP should require the permittee to ensure that the activity maintain the natural continuity of the land-water interface, retain, or enhance shoreline ecological processes, and not result in undue harm to recognized aquatic resources located within or adjacent to the proposed project sites. Nationwide permit 33 can be used to authorize temporary structures, fill, and work to assist in the construction of living shorelines authorized by NWP 54. All NWP 54 activities involving the[[Page 73557]]construction of new living shorelines require PCNs, whereas the construction of bank stabilization measures under NWP 13 require PCNs only in certain circumstances, such as discharges of dredged or fill material into special aquatic sites or bank stabilization activities greater than 500 linear feet in length. The text authorizing temporary structures, fills, and work was added to NWP 13 because not all NWP 13 activities require PCNs, and that text provides efficiency because permittees no longer need to use NWP 33 (which may require PCNs) with the NWP 13 authorization to construct the bank stabilization activity. Retaining the ability to use NWP 33 to authorize temporary structures, fills, and work for new living shorelines authorized by NWP 54 does not impose additional burdens on the regulated public. The text of this NWP requires that the living shoreline consist mostly of native material. It does not completely prohibit the use of artificial materials. While the text of the NWP does not explicitly identify concrete as an acceptable material for use in living shorelines, it does not prohibit the use of concrete because concrete may be a component of artificial reef structures that are used for some types of living shorelines. Living shorelines may include artificial structures (e.g , sills, reefs, coir logs or mats) that do not completely resemble structural features found in nature, but those artificial structures can consist of native materials (e.g , stone, oyster shells, natural fibers) to a large degree. Living shorelines are an example of nature-based solutions, which are actions to address societal problems such as erosion in coastal communities using natural or modified ecosystems. Living shorelines are modified ecosystems that are comprised of a combination of living and engineered components. Living shorelines provide varying degrees of ecological functions and services and help maintain to some extent the natural continuity of the interface between coastal lands and coastal waters. With the exception of maintenance activities, all activities authorized by this NWP requires PCNs to district engineers. District engineers will review those PCNs to determine whether the proposed activities will result in no more than minimal individual and cumulative adverse environmental effects, including adverse effects to coastal aquatic resources. One commenter stated that the 30 foot limit for structures and filled areas extending into the waterway from the mean low water line in tidal waters or the ordinary high water mark in non-tidal waters is arbitrary, and that the Corps should establish the limit for structures and fills extending into the waterway to a depth contour appropriate for attenuating wave energy consistent with the slope of the shoreline. One commenter said that the Corps should replace the 30-foot and 500 linear foot limits with a 1/2-acre limit. The Corps is retaining the 30 foot limit for structures and fills extending into the waterway and the 500 linear foot limit for the length of shoreline along which a living shoreline can be constructed. The Corps is also retaining the ability for district engineers to waive these 30-foot and 500 linear foot limits when a district engineer reviews the PCN for a proposed NWP 54 activity and determines that the proposed activity will result in no more than minimal individual and cumulative adverse environmental effects. These quantitative limits and the ability of district engineers to waive these limits are intended to provide flexibility for the design and construction of living shorelines that are expected to be effective in reducing erosion at a specific site, taking into numerous ***variables***. For living shorelines, those ***variables*** include, but are not limited to: Fetch, water depths near the shore, substrate characteristics, site topography, and the extent of coastal development in the project area (Saleh and Weinstein 2016). Activities authorized by this NWP must comply with paragraph (a) of general condition 23, which requires permittees to design and construct authorized activities to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e , on site). The Corps believes the 30 foot and 500 linear foot limits are more appropriate for living shorelines than a 1/2-acre limit because living shorelines are constructed along the shore. In addition, paragraph (e) of the NWP requires discharges of dredged or fill material into waters of the United States and the construction of structures in navigable waters of the United States to be the minimum necessary for the establishment and maintenance of the living shoreline, to reduce the amount of encroachment into the waterway. One commenter said that while the NWP might be beneficial for coastal resources found along the Gulf of Mexico or the Atlantic Coast, it is not appropriate for the Puget Sound or the Washington coast because it allows for construction of structures and fill that would adversely affect significant nearshore resources and habitats and does not have minimal direct, indirect, or cumulative impacts. This commenter expressed support for streamlining a process to install shoreline stabilization that protects nearshore habitat for salmon and shellfish. Landowners that want to reduce erosion at their shorelines are not required to construct living shorelines. They can choose to use other techniques to manage erosion at their waterfront properties. Potential adverse effects to nearshore resources and habitats caused by discharges of dredged or fill material into waters of the United States or structures or work in navigable waters of the United States are similar along the various coasts of the United States in terms of functional impacts (e.g , filling or altering nearshore habitats or installing reef structures that alter subtidal habitat), although the species that may be affected by these activities may differ by region. If a landowner on the west coast wants to construct a living shoreline to manage erosion at his or her property, a PCN must be submitted to the district engineer. The district engineer will review the PCN and determine whether the proposed activity will result in no more than minimal individual and cumulative adverse environmental effects. Living shorelines have been used in the west coast of the United States, including Washington State. NOAA has established a living shorelines project map to provide information on more than 150 living shoreline projects around the country.\2\ Three living shoreline projects in Washington State were shown on that map when it was viewed by the Corps on July 14, 2021. In other areas of the west coast, living shorelines consisting of eelgrass and Olympia oysters have been implemented in San Francisco Bay (Boyer et al. 2017). Green shores (Emmett et al. 2017) is another approach to shore erosion management has been implemented in Washington State, and green shore projects may qualify for authorization under NWP 54 if they include a substantial biological component, such as plantings in tidal waters subject to the Corps' jurisdiction. Green shores use materials such as coarse sand, gravel, cobbles, logs, and plantings, as well as slope modifications to dissipate wave energy, to control shoreline erosion while providing habitat and other ecological functions along the shoreline while reducing erosion and potential risks to buildings and infrastructure. Proposed green[[Page 73558]]shores activities that do not have the substantial biological component required for authorization under NWP 54 may be authorized by NWP 13, which authorizes a variety of techniques for bank stabilization.--------------------------------------------------------------------------- \2\ [*https://www.habitatblueprint.noaa.gov/living-shorelines/project-map/*](https://www.habitatblueprint.noaa.gov/living-shorelines/project-map/) (accessed July 14, 2021).--------------------------------------------------------------------------- Living shorelines can provide habitat that is utilized by salmon and shellfish. Bank stabilization activities can be designed to provide intertidal habitat (e.g , pocket beaches) and subtidal habitat that is utilized by salmon and other fish species for foraging and nursery activities (e.g , Toft et al. 2013). Living shorelines can include pocket beaches and may have unvegetated beaches protected by reef structures inhabited by oysters or other aquatic organisms. Living shorelines can be another means of managing shore erosion while providing intertidal habitat and shallow subtidal habitat for fish and other aquatic species for refuge, feeding, and nursery functions (Gittman et al. 2016). Reef structures used as part of a living shoreline, as well as other habitats such as wetlands that may be components of living shorelines, can provide habitat for colonization by bivalve molluscs (Bilkovic and Mitchell 2013). One commenter said that PCNs should be required for the repair and maintenance of existing living shorelines. One commenter stated that waivers should not be issued by district engineers without coordination with federal and state natural resource agencies. One commenter expressed concern about waivers because they would remove any limits on how far living shorelines can extend into the waterway, how long those living shorelines are, and how much dredged or fill material is placed into special aquatic sites. The Corps maintains its position that PCNs should not be required for maintenance of existing living shorelines because the adverse environmental effects caused by these maintenance activities are likely to be no more than minimal, individually and cumulatively. In addition, periodic maintenance is an important component of sustaining the effectiveness of living shorelines in managing erosion and sustaining the living components of a living shoreline. An exception occurs for maintenance activities that require DA authorization that trigger the PCN requirements in paragraph (c) of general condition 18, which addresses compliance with the ESA. Paragraph (c) of general condition 18 requires non-federal permittees to submit a pre-construction notification to the district engineer if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed such designation) might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat or critical habitat proposed for such designation. For proposed NWP 54 activities in which the project proponent is requesting a waiver of the 30 foot or 500 linear foot limits, district engineers will coordinate the PCNs with federal and state agencies in accordance with the procedures in paragraph (d) of general condition 32. The federal and state agencies will provide their views on whether the proposed activity will result in no more than minimal individual and cumulative adverse environmental effects. For NWP 54 activities where agency coordination is not required, district engineers will apply the 10 criteria in paragraph 2 of section D, District Engineer's Decision, to determine whether the proposed activities will result in no more than minimal individual and cumulative adverse environmental effects. This NWP is reissued with the modification discussed above. NWP E. Water Reclamation and Reuse Facilities. The Corps proposed to issue this new NWP to authorize discharges of dredged or fill material into waters of the United States for the construction, expansion, and maintenance of water reclamation and reuse facilities. Several commenters stated that although discharges of dredged or fill material into waters of the United States for the construction, expansion, and maintenance of water reclamation and reuse facilities may be authorized by other existing NWPs, they support the issuance of proposed new NWP E because it provides additional clarity and streamlines the authorization process for these facilities. A few commenters said that there is no need to issue proposed new NWP E because water reclamation and reuse facilities may be constructed, expanded, or maintained through existing NWPs. One commenter stated that water reuse facilities are typically attendant features of larger developments and should be permitted as part of the overall development. Several commenters expressed their support for the issuance of proposed NWP E as long as it applies to groundwater recharge and replenishment projects without restrictions on the origin or mix of sources of water being recharged, including water from outside of the watershed. The Corps is issuing this new NWP to authorize discharges of dredged or fill material into waters of the United States for water reclamation and reuse facilities, to help streamline the authorization process for the construction, expansion, and maintenance of these facilities. The water reclamation and reuse facilities constructed, expanded, or maintained through the discharges of dredged or fill material into waters of the United States authorized this NWP may be for non-potable water reuse and potable water reuse. Water reclamation and reuse facilities can be an important tool for adapting to the effects of climate change, such as changes in precipitation patterns that may affect water availability in areas of the country. Water reclamation and reuse facilities help conserve water, which may be beneficial as water availability changes or increases in water demand occur. The Corps recognizes that water reclamation and reuse facilities can be authorized as attendant features of other activities authorized by NWP, such as residential developments (NWP 29), commercial and institutional developments (NWP 39), ***agricultural*** activities (NWP 40), and recreational facilities (NWP 42). Despite the potential for water reclamation and reuse facilities to be authorized along with buildings and other features authorized by other NWPs, the Corps believes that issuing a new NWP to authorize discharges of dredged or fill material into waters of the United States for water reclamation and reuse facilities would be beneficial to the regulated public, especially when these facilities are stand-alone facilities and not attendant features of resident developments, commercial developments, or other activities. For water reclamation and reuse facilities, the Corps regulates discharges of dredged or fill material into waters of the United States for the construction, expansion, or maintenance of those facilities. In general, the Corps does not have the authority to regulate the operation of these facilities after they are constructed, expanded, or maintained through discharges of dredged or fill material into waters of the United States authorized by this NWP. The Corps does not have the authority to regulate releases of water to recharge or replenish groundwater, to regulate the mixing of water from various sources, or to regulate the movement of water between watersheds. The Corps reminds project proponents that any project including underground injection may be subject to permit requirements of the Underground Injection Control Program, administered under the Safe Drinking Water Act by the U.S Environmental Protection[[Page 73559]]Agency or states, territories, or tribes to which it has delegated primacy. One commenter objected to the proposed 1/2-acre limit for proposed new NWP E. A commenter recommended adding a 300 linear foot limit for losses of stream bed. One commenter said that this NWP should not be limited to non-tidal waters, and it should not prohibit discharges of dredged or fill material into non-tidal wetlands adjacent to tidal waters. This commenter stated that proposed new NWP E should also authorize discharges of dredged or fill material into non-tidal wetlands adjacent to tidal waters as well as tidal waters. One commenter said that mitigation should not be required for activities authorized by this NWP because the NWP authorizes beneficial activities. The Corps is issuing this new NWP with a 1/2-acre limit to be consistent with other NWPs that may be used to authorizes discharges of dredged or fill material into waters of the United States to construct, expand, or maintain water reclamation and reuse facilities as attendant features of other activities authorized by NWP, such as NWP 29 (residential developments), NWP 39 (commercial and institutional developments), NWP 40 (***agricultural*** activities), and NWP 42 (recreational facilities). Losses of stream bed caused by discharges of dredged or fill material into waters of the United States are also subject to the 1/2-acre limit. Pre-construction notification is required for all activities authorized by this NWP, and district engineers will evaluate proposed losses of stream bed to determine whether those losses, plus any other losses of waters of the United States caused by discharges of dredged or fill material, will result in no more than minimal individual and cumulative adverse environmental effects, and thus eligible for authorization under this NWP. Because of the PCN requirement and the ability of district and division engineers to modify, suspend, or revoke this NWP when appropriate, the Corps does not believe that it is necessary to impose an additional quantitative limit on this NWP that is specific to losses of stream bed. In geographic areas where there are regional concerns about cumulative losses of stream bed, division engineers can add regional conditions to this NWP to impose smaller acreage limits on losses of stream bed. If, during the review of a PCN for a proposed activity, the district engineer determines the proposed activity will result in more than minimal individual and cumulative adverse environmental effects after considering mitigation proposed by the applicant, he or she will exercise discretionary authority and require an individual permit for the proposed losses of stream bed and any other losses of non-tidal waters and wetlands caused by discharges of dredged or fill material. The Corps is issuing this NWP with the same scope of applicable waters (i.e , non-tidal waters of the United States, excluding non-tidal wetlands adjacent to tidal waters) as some other NWPs that can be used to authorize discharges of dredged or fill material into waters of the United States for water reclamation and reuse facilities. The scope of applicable waters is consistent with NWPs 29, 39, 40, and 42. This NWP does not authorize discharges of dredged or fill material into tidal waters of the United States and non-tidal wetlands adjacent to tidal waters because discharges into those waters have greater potential to result in adverse environmental effects that are more than minimal, individually and cumulatively. Project proponents that want to discharge dredged or fill material into tidal waters of the United States and non-tidal wetlands adjacent to tidal waters to construct, expand, or maintain water reclamation and reuse facilities can seek DA authorization through the individual permit process, unless a Corps district has issued a regional general permit to authorize those activities. General condition 23 addresses the mitigation requirements for this NWP and other NWPs. District engineers have discretion to require mitigation, including compensatory mitigation, for activities authorized by this NWP when they determine that such mitigation is necessary to ensure that the authorized activities result in no more than minimal individual and cumulative adverse environmental effects. Proposed new NWP E is issued as NWP 59.E. Responses to Comments on the Nationwide Permit General Conditions The NWPs issued in this final rule are subject to the NWP general conditions in the final rule that was published in the January 13, 2021, issue of the Federal Register (86 FR 2867-2874). The final rule published in the January 13, 2021, issue of the Federal Register includes summaries of comments received on the NWP general conditions for the 2020 Proposal, as well as responses to those comments. See 86 FR 2820-2838 for the comment summaries and responses to comments on the general conditions for the 2021 NWPs.F. Responses to Comments on the District Engineer's Decision The NWPs issued in this final rule are subject to the District Engineer's Decision section (section D) in the final rule that was published in the January 13, 2021, issue of the Federal Register (86 FR 2874-2875). The final rule published in the January 13, 2021, issue of the Federal Register includes summaries of comments received on the NWP general conditions for the 2020 Proposal, as well as responses to those comments. See 86 FR 2838 for the comment summaries and responses to comments on the ``District Engineer's Decision'' section for the 2021 NWPs.G. Discussion of Proposed Modifications to Section F, Definitions The NWPs issued in this final rule are subject to the NWP definitions in the final rule that was published in the January 13, 2021, issue of the Federal Register (86 FR 2875-2877). The final rule published in the January 13, 2021, issue of the Federal Register includes summaries of comments received on the NWP general conditions for the 2020 Proposal, as well as responses to those comments. See 86 FR 2838-2841 for the comment summaries and responses to comments on the definitions for the 2021 NWPs.III. Compliance With Relevant StatutesA. National Environmental Policy Act Compliance The Corps has prepared a decision document for each NWP issued in this final rule. Each decision document contains an environmental assessment (EA) to fulfill the requirements of NEPA. The EA includes the public interest review described in 33 CFR part 320.4 The EA generally discusses the anticipated impacts the NWP will have on the human environment and the Corps' public interest review factors. If a proposed NWP authorizes discharges of dredged or fill material into waters of the United States, the decision document also includes an analysis conducted pursuant to the Clean Water Act Section 404(b)(1), in particular 40 CFR part 230.7 These decision documents evaluate, from a national perspective, the environmental effects of each NWP. The final decision document for each NWP is available on the internet at: [*www.regulations.gov*](http://www.regulations.gov) (docket ID number COE-2020-0002) as Supporting and Related Materials for this final rule. The final decision documents prepared for each NWP fulfill the environmental documentation requirements of NEPA.[[Page 73560]] Before the 41 NWPs in this final rule go into effect, division engineers will issue supplemental documents to evaluate environmental effects on a regional basis (e.g , a state or Corps district) and to determine whether regional conditions are necessary to ensure that the NWPs will result in no more than minimal individual and cumulative adverse environmental effects on a regional basis. The supplemental documents are prepared by Corps districts, but must be approved and issued by the appropriate division engineer, since the NWP regulations at 33 CFR 330.5(c) state that the division engineer has the authority to modify, suspend, or revoke NWP authorizations in a specific geographic area within his or her division. For some Corps districts, their geographic area of responsibility covers an entire state. For other Corps districts, their geographic area of responsibility may be based on watershed boundaries. For some states, there may be more than one Corps district responsible for implementing the Corps regulatory program, including the NWP program. In states with more than one Corps district, there is a lead Corps district responsible for preparing the supplemental documents for all of the NWPs. The supplemental documents will also discuss regional conditions imposed by division engineers to protect the aquatic environment and other public interest review factors and ensure that any adverse environmental effects resulting from NWP activities in that region will be no more than minimal, individually and cumulatively. The Corps solicited comments on the draft national decision documents for each proposed NWP, and any comments received were considered when preparing the final decision documents for the NWPs. Before the final NWPs go into effect, division engineers will issue supplemental documents to evaluate environmental effects on a regional basis (e.g , state or Corps district). The supplemental documents are prepared by Corps districts but must be approved and formally issued by the appropriate division engineer, since the NWP regulations at 33 CFR 330.5(c) state that the division engineer has the authority to modify, suspend, or revoke NWP authorizations for any specific geographic area within his or her division. For some Corps districts, their geographic area of responsibility covers an entire state. For other states, there is more than one Corps district responsible for implementing the Corps Regulatory Program, including the NWP program. In those states, there is a lead Corps district responsible for preparing the supplemental documents for all of the NWPs. The supplemental documents will discuss regional conditions imposed by division engineers to protect the aquatic environment and ensure that any adverse environmental effects resulting from NWP activities in that region will be no more than minimal, individually and cumulatively. For the NWPs, the assessment of cumulative effects under the Corps' public interest review occurs at three levels: National, regional, and the verification stage. Each national NWP decision document includes a national-scale cumulative effects analysis under the Corps' public interest review. Each supplemental document has a cumulative effects analysis under the Corps' public interest review conducted for a region, which is usually a state or Corps district. When a district engineer issues a verification letter in response to a PCN or a voluntary request for a NWP verification, the district engineer prepares a brief document that explains the decision on whether to issue a verification letter for the proposed NWP activity or exercise discretionary authority to require an individual permit for that proposed activity. The district engineer's document explains whether the proposed NWP activity, after considering permit conditions such as mitigation requirements, will result in no more than minimal individual and cumulative adverse environmental effects. If the NWP is not suspended or revoked in a state or a Corps district, the supplemental document includes a certification that the use of the NWP in that district, with any applicable regional conditions, will result in no more than minimal cumulative adverse environmental effects. After the NWPs are issued or reissued and go into effect, district engineers will monitor the use of these NWPs on a regional basis (e.g , within a watershed, county, state, Corps district or other appropriate geographic area), to ensure that the use of a particular NWP is not resulting in more than minimal cumulative adverse environmental effects. The Corps staff that evaluate NWP PCNs that are required by the text of the NWP or by NWP general conditions or regional conditions imposed by division engineers, or voluntarily submitted to the Corps district by project proponents to receive written NWP verifications, often work in a particular geographic area and have an understanding of the activities that have been authorized by NWPs, regional general permits, and individual permits over time, as well as the current environmental setting for that geographic area. If the Corps district staff believe that the use of an NWP in that geographic region may be approaching a threshold above which the cumulative adverse environmental effects for that category of activities may be more than minimal, the district engineer may make a recommendation to the division engineer to modify, suspend, or revoke the NWP authorization in that geographic region in accordance with the procedures in 33 CFR 330.5(c). Alternatively, under the procedures at 33 CFR 330.5(d), the district engineer may also modify, suspend, or revoke NWP authorizations on a case-by-case basis to ensure that the NWP does not authorize activities that result in more than minimal cumulative adverse environmental effects. Comments on compliance with NEPA for the 2020 Proposal are addressed in the final rule published in the January 13, 2021, issue of the Federal Register at 86 FR 2842-2843.B. Compliance With Section 404(e) of the Clean Water Act The NWPs are issued in accordance with Section 404(e) of the Clean Water Act and 33 CFR part 330. These NWPs authorize categories of activities that are similar in nature. The ``similar in nature'' requirement does not mean that activities authorized by an NWP must be identical to each other. The Corps believes that the ``categories of activities that are similar in nature'' requirement in Clean Water Act Section 404(e) is to be interpreted broadly, for practical implementation of this general permit program. The Corps has applied this interpretation for many years (see the NWPs issued in 2000 (64 FR 39263-39264 and 65 FR 12821), 2007 (72 FR 11095), 2012 (77 FR 10186), and 2017 (82 FR 1868)). Nationwide permits, as well as other general permits, are intended to reduce administrative burdens on the Corps and the regulated public while maintaining environmental protection, by efficiently authorizing activities that have no more than minimal adverse environmental effects, consistent with Congressional intent expressed in the 1977 amendments to the Federal Water Pollution Control Act, specifically 33 U.S.C 1344(e). The NWPs provide incentives for project proponents to minimize impacts to jurisdictional waters and wetlands to qualify for NWP authorization instead of having to apply for individual permits. Keeping the number of NWPs manageable is a key component for making the NWPs[[Page 73561]]protective of the environment and streamlining the authorization process for those general categories of activities that have no more than minimal individual and cumulative adverse environmental effects. The various terms and conditions of these NWPs, including the NWP regulations at 33 CFR 330.1(d) and 330.4(e), allow district engineers to exercise discretionary authority to modify, suspend, or revoke NWP authorizations or to require individual permits, and ensure compliance with Section 404(e) of the Clean Water Act. For each NWP that may authorize discharges of dredged or fill material into waters of the United States, the national decision document prepared by Corps Headquarters includes a 404(b)(1) Guidelines analysis. A 404(b)(1) Guidelines analysis is not required when a specific activity is authorized by an NWP (see 40 CFR 230.6(d)).C. 2020 Revisions to the Definition of ``Waters of the United States'' (i.e , the Navigable Waters Protection Rule) Corps general permits are not intended to make or imply a conclusion or determination regarding what water bodies are or are not subject to CWA jurisdiction. Instead, a Corps general permit merely states that, if a person complies with all of the terms and conditions of the general permit, that person's proposed discharges of dredged or fill material into the waterbody will be consistent with the CWA, on the ground that any such discharges either (1) are legally authorized under the CWA (to the extent that the waterbody is subject to CWA jurisdiction) or (2) are otherwise consistent with the CWA to the extent that the waterbody is not jurisdictional under the CWA. The Corps acknowledges that some members of the public may seek to comply with the conditions of a general permit even for water bodies that are not jurisdictional or may not be jurisdictional under the CWA. Such practice, though not required, is not unlawful. The Corps is not required to make a formal determination whether a particular wetland or water is subject to jurisdiction under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act of 1899 before issuing an individual permit or a general permit verification. Many project proponents prefer the time savings that can occur when the Corps issues an individual permit or general permit verification without expending the time and resources needed to make a formal, definitive determination whether those wetlands and waters are in fact jurisdictional and thus regulated under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899. On April 21, 2020, the U.S Environmental Protection Agency (EPA) and the Department of the Army published the Navigable Waters Protection Rule (NWPR) which became effective on June 22, 2020,\3\ revising the definition of ``waters of the United States'' (85 FR 22250). Specifically, this final rule revises the Corps' regulations at 33 CFR part 328.3, where the definition of ``waters of the United States'' is located for the purposes of implementing Section 404 of the Clean Water Act.--------------------------------------------------------------------------- \3\ On June 22, 2020, the NWPR became effective except in the State of Colorado due to a federal district court-issued stay in that state. The stay in Colorado has since been lifted so the NWPR is now in effect in all 50 states and U.S territories. The rule has also been challenged in several other federal district courts.--------------------------------------------------------------------------- On January 21, 2021, President Biden signed the E.O 13990, ``Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis,'' which directs federal agencies to ``immediately review and, as appropriate and consistent with applicable law, take action to address the promulgation of Federal regulations and other actions during the last 4 years that conflict with these important national objectives, and to immediately commence work to confront the climate crisis.'' EPA and the Department of the Army have completed their review of the NWPR and announced in June 2021 their intention to initiate a new rulemaking process that restores the protections in place prior to the 2015 WOTUS implementation, and develops a new rule to establish a durable definition of ``waters of the United States.'' As authorization under Section 404 of the Clean Water Act is only needed when regulated activities occur in WOTUS, any new definition of ``Waters of the United States'' could impact when an NWP may or may not be needed; however, it would not alter the terms and conditions in either this final rule or the NWP rule issued January 13, 2021. Please note that some of the NWPs could authorize activities that involve the discharge of dredged or fill material into water bodies that are not subject to CWA jurisdiction, or that may not be subject to CWA jurisdiction. For example, a project proponent could proceed with an NWP activity that does not require submission of a PCN to the Corps in a non-jurisdictional water without getting a definitive determination from the Corps that the wetland or waterbody is not a water of the United States and thus not subject to CWA jurisdiction. As another example, if a proposed NWP activity requires pre-construction notification, the district engineer could issue the NWP verification based on the delineation of wetlands, other special aquatic sites, and other waters provided with the PCN in accordance with paragraph (b)(5) of NWP general condition 32, without the Corps making any formal determination as to whether those wetlands, special aquatic sites, and other waters are ``waters of the United States.'' During the pendency of any litigation challenging the Navigable Waters Protection Rule, the NWPs will continue to authorize discharges of dredged or fill material in all water bodies that are subject to CWA jurisdiction, or that may be subject to CWA jurisdiction, at the time those discharges occur. Where a particular waterbody into which a person proposes to discharge dredged or fill material is subject to CWA jurisdiction, compliance with the terms and conditions of one or more NWPs, or an individual permit, will be necessary. A person with legal interest in a parcel (e.g , a permit applicant, landowner, or a lease, easement, or option holder) has the opportunity to request an approved jurisdictional determination from the Corps if that person would like the Corps' formal determination on the jurisdictional status of a water or feature under the CWA.''D. Compliance With the Endangered Species Act The NWP regulations at 33 CFR 330.4(f) and NWP general condition 18, endangered species, ensure that all activities authorized by NWPs comply with ESA section 7. Those regulations and general condition 18 require non-federal permittees to submit PCNs for any activity that might affect listed species or designated critical habitat, as well as species proposed for listing and critical habitat proposed for such designation. When the district engineer evaluates a PCN, he or she determines whether the proposed NWP activity may affect listed species or designated critical habitat. The Corps established the ``might affect'' threshold in 33 CFR 330.4(f)(2) and paragraph (c) of general condition 18 because it is more stringent than the ``may affect'' threshold for ESA Section 7 consultation in the U.S Fish and Wildlife Service's (FWS) and National Marine Fisheries Service's (NMFS) ESA Section 7 consultation regulations at 50 CFR part 402. The word ``might'' is defined as having ``less probability or possibility'' than the word ``may'' (Merriam-Webster's Collegiate[[Page 73562]]Dictionary, 10th edition). Since ``might'' has a lower probability of occurring, it is below the threshold (i.e , ``may affect'') that triggers the requirement for ESA Section 7 consultation for a proposed Federal action. As discussed below, each year the Corps conducts thousands of ESA Section 7 consultations with the FWS and NMFS for activities authorized by NWPs. In recent years, an average of more than 10,800 formal, informal, and programmatic ESA Section 7 consultations are conducted each year between the Corps and the FWS and/or NMFS in response to NWP PCNs, including those activities that required PCNs under paragraph (c) of general condition 18 under the ``might affect'' threshold. If the project proponent is required to submit a PCN and the proposed activity might affect listed species or designated critical habitat, species proposed for listing, or critical habitat proposed for such designation, the activity is not authorized by an NWP until either the district engineer makes a ``no effect'' determination or makes a ``may affect'' determination and completes formal or informal ESA Section 7 consultation. The district engineer may also use a regional programmatic consultation to comply with the requirements of ESA Section 7. When evaluating a PCN, where necessary and appropriate, the Corps district will either make a ``no effect'' determination or a ``may affect'' determination. If the district engineer makes a ``may affect'' determination, she or he will notify the non-federal project proponent and the activity is not authorized by the NWP until ESA Section 7 consultation has been completed. In making these determinations, the district engineer will apply the definition of ``effects of the action'' in the FWS's and NMFS's ESA consultation regulations at 50 CFR 402.02 If the district engineer initiates ESA Section 7 consultation with the FWS and/or NMFS, that consultation will also consider ESA Section 7 cumulative effects, in accordance with the definition of ``cumulative effects'' at 50 CFR 402.02 If the non-federal project proponent does not comply with 33 CFR 330.4(f)(2) and general condition 18, and does not submit the required PCN, then the activity is not authorized by an NWP. In such situations, it is an unauthorized activity and the Corps district will determine an appropriate course of action under its regulations at 33 CFR part 326 to respond to the unauthorized activity, if and when the Corps learns about that unauthorized activity. Federal agencies, including state agencies (e.g , certain state Departments of Transportation) to which the Federal Highway Administration has assigned its responsibilities for ESA Section 7 consultation pursuant to 23 U.S.C 327(a)(2)(B), are required to follow their own procedures for complying with ESA Section 7 (see 33 CFR 330.4(f)(1) and paragraph (b) of general condition 18). This includes circumstances where an NWP activity is part of a larger overall federal project or action. The federal agency's ESA Section 7 compliance covers the NWP activity because it is undertaking the NWP activity and possibly other related activities that are part of a larger overall federal project or action. For those NWPs that require pre-construction notification for proposed activities, the federal permittee is required to provide the district engineer with the appropriate documentation to demonstrate compliance with ESA Section 7. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation has not been submitted, additional ESA Section 7 consultation may be necessary for the proposed activity to fulfill both the federal agency's and the Corps' obligations to comply with ESA Section 7. The only activities that potentially could be immediately authorized by NWPs, assuming they meet all other applicable NWP conditions, are activities that would have ``no effect'' on listed species or designated critical habitat within the meaning of Section 7 of the ESA and its implementing regulations at 50 CFR part 402. Therefore, the issuance or reissuance of NWPs does not require ESA Section 7 consultation because no activities authorized by any NWPs ``may affect'' listed species or critical habitat without first completing activity-specific ESA Section 7 consultations with the Services, as required by general condition 18 and 33 CFR 330.4(f). Regional programmatic ESA Section 7 consultations may also be used by district engineers to satisfy the requirements of the NWPs in general condition 18 and 33 CFR 330.4(f) if a proposed NWP activity is covered by that regional programmatic consultation. In the August 27, 2019, issue of the Federal Register (84 FR 44976) the FWS and NMFS published a final rule that amended their regulations for interagency cooperation under Section 7 of the ESA. That final rule went into effect on October 28, 2019. With respect to making effects determinations for proposed federal actions, such as activities authorized by NWPs, the FWS and NMFS made two important changes to 50 CFR part 402: (a) Introducing the term ``consequences'' to help define what is an effect under ESA Section 7, and (b) emphasizing that to be considered an ``effect of the action'' under ESA Section 7 consultation, the consequences caused by the action would not occur but for the proposed action and must be reasonably certain to occur (see 84 FR 44977). Further clarification of ``activities that are reasonably certain to occur'' and ``consequences caused by the proposed action'' were provided by the FWS and NMFS in rule text added at 50 CFR 402.17(a) and (b), respectively. Applying the 2019 amendments to the ESA Section 7 regulations to the NWP program, consequences to listed species and designated critical habitat caused by proposed NWP activities must be reasonably certain to occur. In the preamble to their final rule, the FWS and NMFS stated that for a ``consequence of an activity to be considered reasonably certain to occur, the determination must be based on clear and substantial information'' (see 84 FR 44977). The FWS and NMFS explained that ``clear and substantial'' means that there has to be a firm basis for supporting a conclusion that a consequence of a federal action is reasonably certain to occur. The determination that a consequence is reasonably certain to occur should not be based on speculation or conjecture, and the information used to make that determination should have a ``degree of certitude'' (see 84 FR 44977). The Corps will apply these considerations when evaluating pre-construction notifications for proposed NWP activities. When the district engineer receives a pre-construction notification for a proposed NWP activity, he or she is responsible for applying the current definition of ``effect of the action'' to the proposed NWP activity and to determine the consequences caused by the proposed action and which activities are reasonably certain to occur. The district engineer determines whether the proposed NWP activity ``may affect'' listed species or designated critical habitat and initiates formal or informal ESA Section 7 consultation, unless she or he determines that the proposed NWP activity will have ``no effect'' on listed species or designated critical habitat. As a general rule, the district engineer documents his or her ``no effect'' determination in writing for every pre-construction notification that the[[Page 73563]]district engineer receives and responds to. The NWP program has been structured, through the requirements of NWP general condition 18 and 33 CFR 330.4(f), to focus ESA Section 7 compliance at the activity-specific and regional levels. Each year, an average of more than 10,800 formal, informal, and regional programmatic ESA Section 7 consultations are conducted by Corps districts with the FWS and/or NMFS in response to NWP PCNs for specific NWP activities (see below). Focusing ESA Section 7 compliance at the activity-specific scale and regional programmatic scale is more efficient for the permittees, the Corps, and the FWS and NMFS, than doing so at the national level because of the similarities in ecosystem characteristics and associated listed species and critical habitat within a particular region. For a proposed NWP activity that may affect listed species or designated critical habitat, a biological opinion with an incidental take statement is needed for the NWP activity to go forward unless the FWS or NMFS issued a written concurrence that the proposed NWP activity is not likely to adversely affect listed species or designated critical habitat. It is through activity-specific ESA Section 7 consultations and regional programmatic ESA Section 7 consultations between the Corps and the FWS and NMFS that effective protection of listed species and their designated critical habitat is achieved. After applying the current ESA Section 7 regulations at 50 CFR part 402 to the NWP rulemaking process, the Corps continues to believe that the issuance or reissuance of the NWPs has ``no effect'' on listed species or designated critical habitat, and that the ESA Section 7 compliance is most effectively achieved by applying the requirements of general condition 18 and 33 CFR 330.4(f) to specific proposed NWP activities that are identified after the NWPs are issued and go into effect. Compliance with the requirements of ESA Section 7 can also be achieved by district engineers applying appropriate formal or informal regional programmatic ESA Section 7 consultations that have been developed by Corps districts with regional offices of the FWS and NMFS. Section 7 of the ESA requires each federal agency to ensure, through consultation with the Services, that ``any action authorized, funded, or carried out'' by that agency ``is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species.'' (See 16 U.S.C 1536(a)(2).) Accordingly, the Services' ESA Section 7 regulations specify that an action agency must ensure that the action ``it authorizes,'' including authorization by permit, does not cause jeopardy or adverse modification. (See 50 CFR 402.01(a) and 402.02). Thus, in assessing application of ESA Section 7 to NWPs issued or reissued by the Corps, the proper focus is on the nature and extent of the specific activities ``authorized'' by the NWPs and the timing of that authorization. The issuance or reissuance of the NWPs by the Chief of Engineers imposes express limitations on activities authorized by these NWPs. These limitations are imposed by the NWP terms and conditions, including the general conditions that apply to all NWPs regardless of whether pre-construction notification is required by a specific NWP. With respect to listed species and critical habitat, general condition 18 expressly prohibits any activity ``which `may affect' a listed species or designated critical habitat, unless ESA Section 7 consultation addressing the effects of the proposed activity has been completed.'' General condition 18 also states that if an activity ``might affect'' a listed species or designated critical habitat (or a species proposed for listing or critical habitat proposed for such designation), a non-federal applicant must submit a PCN and ``shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized.'' In addition, 33 CFR 330.4(f)(2) imposes a PCN requirement for proposed NWP activities by non-federal permittees where listed species (or species proposed for listing) or critical habitat might be affected or are in the vicinity of the proposed NWP activity. Section 330.4(f)(2) also prohibits those permittees from beginning the NWP activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. Permit applicants that are federal agencies must and will follow their own requirements for complying with the ESA (see 33 CFR 330.4(f)(1)). Thus, because no NWP can or does authorize an activity that may affect a listed species or critical habitat absent an activity-specific ESA Section 7 consultation or applicable regional programmatic ESA Section 7 consultation, and because any activity that may affect a listed species or critical habitat must undergo an activity-specific consultation or be in compliance with a regional programmatic ESA Section 7 consultation before the district engineer can verify that the activity is authorized by an NWP, the issuance or reissuance of NWPs has ``no effect'' on listed species or critical habitat. Accordingly, the action being ``authorized'' by the Corps (i.e , the issuance or re-issuance of the NWPs themselves) has no effect on listed species or critical habitat. To help ensure protection of listed species and critical habitat, general condition 18 and 33 CFR 330.4(f) establish a more stringent threshold than the threshold set forth in the Services' ESA Section 7 regulations for initiation of ESA Section 7 consultation. Specifically, while ESA Section 7 consultation must be initiated for any activity that ``may affect'' listed species or critical habitat, for non-federal permittees general condition 18 require submission of a PCN to the Corps if ``any listed species (or species proposed for listing) or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat'' or critical habitat proposed for such designation, and prohibits work until ``notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized.'' (See paragraph (c) of general condition 18.) The PCN must ``include the name(s) of the endangered or threatened species (or species proposed for listing) that might be affected by the proposed work or that utilize the designated critical habitat (or critical habitat proposed for such designation) that might be affected by the proposed work.'' (See paragraph (b)(7) of the ``Pre-Construction Notification'' general condition.) Paragraph (g) of general condition 18 notes that information on the location of listed species and their critical habitat can be obtained from the Services directly or from their websites. General condition 18 makes it clear to project proponents that an NWP does not authorize the ``take'' of an endangered or threatened species. Paragraph (e) of general condition 18 also states that a separate authorization (e.g , an ESA Section 10 permit or a biological opinion with an ``incidental take statement'') is required to take a listed species. In addition, paragraph (a) of general condition 18 states that no activity is authorized by an NWP which is likely to ``directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation'' or ``which will directly or indirectly[[Page 73564]]destroy or adversely modify the critical habitat of such species.'' Such activities would require district engineers to exercise their discretionary authority and subject the proposed activity to the individual permit review process, because an activity that would jeopardize the continued existence of a listed species, or a species proposed for listing, or that would destroy or adversely modify the critical habitat of such species would not result in no more than minimal adverse environmental effects and thus cannot be authorized by an NWP. The Corps' NWP regulations at 33 CFR 330.1(c) state that an ``activity is authorized under an NWP only if that activity and the permittee satisfy all of the NWP's terms and conditions.'' Thus, if a project proponent moves forward with an activity that ``might affect'' an ESA listed species without complying with the PCN or other requirements of general condition 18, the activity is not authorized under the CWA. In this case, the project proponent could be subject to enforcement action and penalties under the CWA. In addition, if the unauthorized activity results in a ``take'' of listed species as defined by the ESA and its implementing regulations, then he or she could be subject to penalties, enforcement actions, and other actions by the FWS or NMFS under Section 11 of the ESA. For listed species (and species proposed for listing) under the jurisdiction of the FWS, information on listed species that may be present in the vicinity of a proposed activity is available through the Information Planning and Consultation (IPaC) system,\4\ an on-line project planning tool developed and maintained by the FWS.--------------------------------------------------------------------------- \4\ [*https://ecos.fws.gov/ipac/.---------------------------------------------------------------------------*](https://ecos.fws.gov/ipac/.---------------------------------------------------------------------------) During the process for developing regional conditions, Corps districts collaborate with FWS and/or NMFS regional or field offices to identify regional conditions that can provide additional assurance of compliance with general condition 18 and 33 CFR 330.4(f)(2). Such regional conditions can add PCN requirements to one or more NWPs in areas inhabited by listed species or where designated critical habitat occurs. Regional conditions can also be used to establish time-of-year restrictions when no NWP activity can take place to ensure that individuals of listed species are not adversely affected by such activities. Corps districts will continue to consider through regional collaborations and consultations, local initiatives, or other cooperative efforts additional information and measures to ensure protection of listed species and critical habitat, the requirements established by general condition 18 (which apply to all uses of all NWPs), and other provisions of the Corps regulations ensure full compliance with ESA Section 7. Corps district office personnel meet with local representatives of the FWS and NMFS to establish or modify existing procedures, where necessary, to ensure that the Corps has the latest information regarding the existence and location of any threatened or endangered species or their critical habitat, including species proposed for listing or critical habitat proposed for such designation. Corps districts can also establish, through local procedures or other means, additional safeguards that ensure compliance with the ESA. Through formal ESA Section 7 consultation, or through other coordination with the FWS and/or the NMFS, as appropriate, the Corps establishes procedures to ensure that NWP activities will not jeopardize any threatened and endangered species or result in the destruction or adverse modification of designated critical habitat. Such procedures may result in the development of regional conditions added to the NWP by the division engineer, or in activity-specific conditions to be added to an NWP authorization by the district engineer. The Corps has prepared a biological assessment for this rulemaking action. The biological assessment concludes that the issuance or reissuance of NWPs has ``no effect'' on listed species and designated critical habitat and does not require ESA Section 7 consultation. This conclusion was reached because no activities authorized by any NWPs ``may affect'' listed species or critical habitat without first completing activity-specific ESA Section 7 consultations with the Services, as required by general condition 18 and 33 CFR 330.4(f). Based on the fact that NWP issuance or reissuance of the NWPs is contingent upon any proposed NWP activity that ``may affect'' listed species or critical habitat undergoing an activity-specific or regional programmatic ESA Section 7 consultation, there is no requirement that the Corps undertake consultation for the NWP program. The national programmatic consultations conducted in the past for the NWP program were voluntary consultations despite the inclusion of procedures to ensure consultation under ESA Section 7 for proposed NWP activities that may affect listed species or designated critical habitat. Regional programmatic consultations can be conducted voluntarily by Corps districts and regional or local offices of the FWS and/or NMFS to tailor regional conditions and procedures to ensure the ``might affect'' threshold is implemented consistently and effectively. Examples of regional programmatic consultations currently in effect, with the applicable Service the Corps consulted with, include: The Standard Local Operating Procedures for Endangered Species in Mississippi (2017--FWS); the Endangered Species Act Section 7 Programmatic Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Tidal Area Restoration Authorized, Funded, or Implemented by the Corps of Engineers, Federal Emergency Management Agency, and Federal Highways Administration, in Oregon and the Lower Columbia River (NMFS--2018); the U.S Army Corps of Engineers Jacksonville District's Programmatic Biological Opinion (JAXBO) (NMFS--2017); Missouri Bat Programmatic Informal Consultation Framework (FWS--2019); Revised Programmatic Biological/Conference Opinion for bridge and culvert repair and replacement projects affecting the Dwarf Wedgemussel, Tar River Spinymussel, Yellow Lance and Atlantic Pigtoe. Programmatic Conference Opinion (PCO) for Bridge and Culvert Replacement/Repairs/Rehabilitations in Eastern North Carolina, NCDOT Divisions 1-8 (FWS--2018); and the Corps and NOAA Fisheries Greater Atlantic Regional Fisheries Office (GARFO) Not Likely to Adversely Affect Program Programmatic Consultation (NMFS--2017). The programmatic ESA Section 7 consultations that the Corps conducted for the 2007 and 2012 NWPs were voluntary consultations. The voluntary programmatic consultation conducted with the NMFS for the 2012 NWPs resulted in a biological opinion issued on February 15, 2012, which was replaced by a new biological opinion issued on November 24, 2014. A new biological opinion was issued by NMFS after the proposed action was modified and triggered re-initiation of that programmatic consultation. The programmatic consultation on the 2012 NWPs with the FWS did not result in a biological opinion. For the 2017 NWPs, the Corps did not request a national programmatic consultation. In the Corps Regulatory Program's automated information system (ORM), the Corps ***collects*** ***data*** on all individual permit applications, all NWP PCNs, all voluntary requests for NWP verifications where the NWP or general conditions do not require PCNs, and all[[Page 73565]]verifications of activities authorized by regional general permits. For all written authorizations issued by the Corps, the ***collected*** ***data*** include authorized impacts and required compensatory mitigation, as well as information on all consultations conducted under ESA Section 7. Every year, the Corps evaluates approximately 35,000 NWP PCNs and requests for NWP verifications for activities that do not require PCNs, and provides written verifications for those activities when district engineers determine those activities result in no more than minimal adverse environmental effects. During the evaluation process, district engineers assess potential impacts to listed species and critical habitat and conduct ESA Section 7 consultations whenever they determine proposed NWP activities ``may affect'' listed species or critical habitat. District engineers will exercise discretionary authority and require individual permits when proposed NWP activities will result in more than minimal adverse environmental effects. Each year, the Corps conducts thousands of ESA Section 7 consultations with the FWS and NMFS for activities authorized by NWPs. These ESA Section 7 consultations are tracked in ORM. In FY 2018 (October 1, 2017 to September 30, 2018), Corps districts conducted 640 formal consultations and 3,048 informal consultations under ESA Section 7 for NWP PCNs. During that time period, the Corps also used regional programmatic consultations for 7,148 NWP PCNs to comply with ESA Section 7. Therefore, each year an average of more than 10,800 formal, informal, and programmatic ESA Section 7 consultations are conducted between the Corps and the FWS and/or NMFS in response to NWP PCNs, including those activities that required PCNs under paragraph (c) of general condition 18. For a linear project authorized by NWPs 12, 14, 57, or 58 where the district engineer determines that one or more crossings of waters of the United States that require Corps authorization ``may affect'' listed species or designated critical habitat, the district engineer initiates a single ESA Section 7 consultation with the FWS and/or NMFS for all of those crossings that he or she determines ``may affect'' listed species or designate critical habitat. The number of ESA Section 7 consultations provided above represents the number of NWP PCNs that required some form of ESA Section 7 consultation, not the number of single and complete projects authorized by an NWP that may be included in a single PCN. A single NWP PCN may include more than one single and complete project, especially if it is for a linear project such as a utility line or road with multiple separate and distant crossings of jurisdictional waters and wetlands from its point of origin to its terminal point. During the process for reissuing the NWPs, Corps districts coordinated with regional and field offices of the FWS and NMFS to discuss whether new or modified regional conditions should be imposed on the NWPs to improve implementation of the ``might effect'' threshold and improve protection of listed species and designated critical habitat and ensure that the NWPs only authorize activities with no more than minimal individual and cumulative adverse environmental effects. Regional conditions must comply with the Corps' regulations at 33 CFR 325.4 for adding permit conditions to DA authorizations. The Corps decides whether suggested regional conditions identified during this coordination are appropriate for the NWPs. During this coordination, other tools, such as additional regional programmatic consultations or standard local operating procedures, might be developed by the Corps, FWS, and NMFS to facilitate compliance with the ESA while streamlining the process for authorizing activities under the NWPs. ESA Section 7 consultation on regional conditions occurs only when a Corps districts makes a ``may affect'' determination and initiates formal or informal ESA Section 7 consultation with the FWS and/or NMFS, depending on the species that may be affected. Otherwise, the Corps district coordinates the regional conditions with the FWS and/or NMFS. Regional conditions, standard local operating procedures, and regional programmatic consultations developed by the Corps, FWS, and NMFS are important tools for protecting listed species and critical habitat and helping to tailor the NWP program to address specific species, their habitats, and the stressors that affect those species. Comments on compliance with the ESA for the 2020 Proposal are addressed in the final rule published in the January 13, 2021, issue of the Federal Register at 86 FR 2848-2849.

**Load-Date:** December 28, 2021

**End of Document**



[***TOP 50 FUNDS Bargain shares***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:63K1-WSF1-JCBW-N02R-00000-00&context=1516831)

Investors Chronicle - magazine and web content

September 10, 2021

Edition 1, National Edition

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**Section:** NEWS; Pg. 20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39

**Length:** 18007 words

**Body**

We reveal our 2021 selection of the UK's best actively managed funds

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very year we present our selection of top funds, which we whittle down from the thousands available to private investors. The aim of our list is to help investors with their own research by highlighting what we believe to be some of the best and most interesting funds. The list can be used as a starting point for building or expanding a portfolio, as a source of ideas for exposure to certain sectors or as a way to compare your own holdings against alternatives.

We put together the list of funds using the knowledge of our team, and other sources such as research by other analysts. We consider the fund strategies and the manager record and we look at how the funds have performed against relevant indices and fund sector averages. We check any news or changes affecting the fund and we look at its ongoing charge and any performance fees.

We also look at the comments our expert panel make. This year's expert panel comprises nine investment professionals. Six panel members reviewed the whole list and three only reviewed the investment trusts.

This year the biggest change we have made is to cut our favourite funds list from 100 to 50. We hope that by making the list more concentrated, picking good options will be easier.

Typically, an investment portfolio could be made up of anything between about one and 20 funds, depending on its size and the nature of the funds held. Read more on this in How many portfolio holdings should you have? (IC, 19.06.20). If you hold too many investments you are likely - at best - to end up with returns similar to a tracker fund but for a far higher cost. But many investors, including some featured in our Portfolio Clinics, find it hard to keep their number of investments down.

Our IC Top 50 Funds - and other favourite funds lists - are not the be all and end all. Favourite funds lists can be useful but are only one of many sources of information you should consult. We have always written about funds that are not on our list in our articles and weekly fund ideas, and will continue to. There are many good funds that merit inclusion in investment portfolios, if they are right for that investor's asset allocation. But there may not be space for them in a list of 50 or 100 funds. There are some areas of the market where there are many good funds, but as our list looks

to include funds from many categories we cannot necessarily have all the good funds in one area because we have to leave space for other types.

Which brings me to what this list is: a selection highlighting good options in pretty much all the main fund categories. But it is not your portfolio - many of these funds may not be suitable for your personal investment purposes. So before considering investing in any of them, determine what your objectives and investment profile are, and then come up with a suitable asset allocation for them. You could maybe use a few of the funds highlighted in our list to implement this asset allocation, alongside other suitable options that we do not include.

Cutting our list down was difficult and we had to remove good funds. Sometimes deciding which ones would stay was difficult because there was not much to choose between them and the others in their category and, at the end of the day, no one can know which individual funds will go on to deliver the best returns in the years ahead.

Examples of good funds that have not made the list include RIT Capital Partners (RCP), a multi-asset investment trust that has helped to preserve investors' wealth over the long term. In the shorter term, its volatility is perhaps not as low as that of some other wealth preservation funds, so in keeping with the purpose of this category we removed it. But it doesn't mean that RIT Capital Partners can't help to protect your wealth or diversify your portfolio over the long term.

BlackRock Continental European Income (GB00B3Y7MQ71) has delivered good performance and income. But we did not have space for two European equity income funds so went with European Assets Trust (EAT), very much for structural reasons. As an investment trust, it can build up a revenue reserve to compensate for years when the income from its holdings is not enough to pay its intended level of dividends and also draw on capital to do this. We appreciate that for some readers, especially those who are retired, a steady and reliable income is very important. But there are still arguments for holding BlackRock Continental European Income - especially if you can tolerate the possibility of a slightly lower income in some years.

Perhaps our most high-profile departure is Fundsmith Equity (GB00B41YBW71). which has delivered excellent returns and still appears to be doing so. But its large and increasing size - £27.8bn as of 31 August - has been a concern among investment specialists for a number of years and something that we have been monitoring. So with a number of good global equity funds to decide between, now seemed like the right time to take it offthe list.

Of course, this doesn't mean that it will not continue to perform well - we and various investment analysts could be wrong. So if you hold Fundsmith Equity you need to evaluate the evidence for yourself and decide whether an allocation to this fund is right for your portfolio.

More generally, a fund that might not fit on our list could be great in your portfolio. The IC Top 50 Funds are not your personal portfolio, or a personal recommendation or advice for you.

THE PANEL

¦ Genevra Banszky von Ambroz, fund manager at Smith & Williamson Investment Management ¦ David Liddell, chief executive, IpsoFacto Investor ¦ Darius McDermott, managing director, and Juliet Schooling Latter, research director, Chelsea Financial Services and FundCalibre ¦ Rob Morgan, chief analyst, Charles Stanley ¦ Ben Yearsley, investment director, Shore Financial Planning ¦ James Carthew, head of investment company research, QuotedData (investment trusts only) ¦ Shavar Halberstadt, research analyst, Winterflood Securities (investment trusts only) ¦ Priyesh Parmar, associate director, investment companies research, Numis Securities (investment trusts only)

OVERSEAS EQUITY INCOME UK investors tend to have a bias to their home market, but overseas exposure is important, and this matters for dividends too. Over the past few years the UK market has become more reliant on just a few dividend payers. This means that if any one of these cuts their dividends it can have a substantial impact on the UK's overall dividend opportunities. And by not investing overseas, you miss out on the many attractive opportunities outside the UK. You can get exposure to overseas income via global equity income funds or, if you have a large portfolio and a high enough risk appetite, some regional equity income funds, which could provide stronger returns than broader funds.

Fidelity Global Dividend (GB00B7778087) Fidelity Global Dividend is well-diversified across sectors and geographies mainly via developed market-listed large-cap companies and has a good record of outperforming the Investment Association Global Equity Income sector average, although can lag at times because of its defensive positioning. But this means that it can also outperform in difficult periods such as in 2018 when it made positive returns in contrast to its peer group average's and MSCI World index's negative returns.

The fund's manager, Daniel Roberts, likes to invest in companies with a healthy yield, growing level of income and the potential for capital growth. When considering potential investments, he places a large emphasis on dividend sustainability and whether the share price provides an adequate margin of safety. Roberts also manages risk conservatively, focusing on companies with predictable, consistent cash flows and simple, understandable business models, with little or no debt on their balance sheets.

The fund's largest holdings at the end of July were consumer stables companies Unilever (ULVR) and Procter & Gamble (US:PG), which accounted for 4.3 per cent and 3.9 per cent of its assets, respectively.

Schroder Oriental Income Fund (SOI) Schroder Oriental Income Fund was run by highly respected Asia manager Matthew Dobbs between its launch in 2005 and the end of last year, during which time it largely delivered strong performance. Since then, it has been run by Richard Sennitt, who is

also an experienced Asian equities manager and has run Schroder Asian Income Fund (GB00BDD29849) since its launch in 2006. He had worked with Mr Dobbs on his Asian funds for 13 years and continues to be supported by a team of analysts in Asia.

Sennitt and his team pick holdings according to their individual merits rather than because of broader factors such as being in a particular industry sector. They favour what they consider to be good companies where there is both a strong income case and potential for capital growth. The trust's largest holdings at the end of July were Taiwan Semiconductor Manufacturing (TAI:2330) and Samsung Electronics (KOR: 005930), which accounted for 8.9 per cent and 8.4 per cent of its assets, respectively.

The trust has grown its dividend every year since launch in 2005 and in the first half of its current financial year has paid two dividends of 3.8p each - the same as the year before. The trust used some of its revenue reserves to make the increase last year and its chairman says it will do the same again if necessary. The trust had revenue reserves of £30.24m at the end of its last financial year, which could cover 1.1 years' worth of dividends in its current financial year, according to the Association of Investment Companies (AIC).

In its last financial year, the trust paid a dividend of 10.3p per share, an increase of 2 per cent on what it paid the year before.

A downside to Schroder Oriental Income Fund is its performance fee of 10 per cent of any outperformance of its NAV over an annual hurdle of 107 per cent of the NAV at the end of the previous calculation period. This was not triggered in the trust's last financial year to 31 August 2020, so its ongoing charge was 0.87 per cent. But in years when it is, the two charges have added up to

a considerably higher cost, for example 1.95 per cent in the year to 31 August 2017.

However, when this happens Schroder Oriental Income Fund's shareholders have been compensated with strong returns. And they have been consistently paid an attractive income.

European Assets Trust (EAT) European Assets Trust invests in smaller companies and can pay dividends out of capital, if the income from its investments is not enough to meet its aim of paying a dividend of 6 per cent of its NAV on 31 December each year. This has proved useful since the outbreak of the pandemic, during which time many of the trust's holdings have reduced or cancelled their dividends. European Assets Trust's chairman said: "While we have seen some rebound in dividend receipts during the first half of this year, our total dividend income remains subdued. [But] we remain confident of paying an annual dividend equivalent to 6 per cent of NAV at the end of the preceding year. To fund its dividends, the [trust] can use a combination of currentyear profits and the distributable reserve."

As at 30 June 2021, the distributable reserve was worth £335.8m. In 2020, the trust paid total dividends of 70.2p per share, up 17.2 per cent on the 59.9p it paid in 2019. Dividends are paid in four instalments a year. As of mid August this year, the trust had a yield of over 5 per cent.

Since last year, the trust has declared its dividends in sterling rather than euros, and to manage sterling/euro exchange rate exposure it may use hedging contracts.

The trust's annual total returns can be volatile from year to year and it can undergo periods of underperformance. However, its long-term total returns have been good.

The trust's manager, Sam Cosh, and his team, look to take advantage of market inefficiencies they say arise as a result of smalland medium-sized companies being less researched. They look to own high-quality companies with proven business models that are defended by scale, intellectual property and brand or market positions. They also like them to have higher growth rates, margins and returns on capital than the market, and superior cash flow generation and strong balance sheets that provide stability and opportunity for value-added deployment. They will not invest in companies if they do not think that they are reasonably valued.

At the end of July, the trust's largest

holdings were Ringkjoebing Landbobank (DEN:RILBA), a regional bank that provides services to private and corporate customers, and software company Lectra (FRA:LSS). They accounted for accounted for 3.1 per cent and 2.9 per cent of the trust's assets, respectively.

JPMorgan Global Emerging Markets Income Trust (JEMI) JPMorgan Global Emerging Markets Income Trust aims to provide a dividend income with the potential for long-term growth. It aims for its ***collection*** of investments overall to pay a dividend yield higher than that of MSCI Emerging Markets index.

The trust's managers, Omar Negyal, Jeffrey Roskell and Isaac Thong, look to invest in sustainable businesses with good dividend growth prospects. When picking stocks they assess attributes such as return on capital, free cash flow and dividend policies. They also consider financially material environmental, social and governance factors in their investment analysis and decisions.

The trust typically has 50 to 80 holdings, mainly larger companies.

In its financial year to 31 July 2020, the trust paid dividends worth 5.1p per share, the same amount as the year before. This was not fully covered by income from its holdings so it used revenue reserves to maintain this level. When the trust reported its half-year results in April it had revenue reserves worth £7.6m, equivalent to 50 per cent of future annual dividends at the current annual level. It has maintained or increased its dividend in every full year since its launch in 2010. It had a yield of 3.4 per cent at the end of August.

The trust has performed well against MSCI Emerging Markets index, but can undergo periods of volatility, so is not an option unless you have a high-risk appetite and long-term investment horizon. Its income objective means that the composition of its portfolio is significantly different to that of MSCI Emerging Markets index, so its returns may be very different to those of the index.

At the end of July, the trust had 32 per cent of its assets in information technology companies and 28 per cent in financials - substantial overweights relative to MSCI Emerging Markets index. And it was relatively underweight in areas including communication services and materials. Geographically, it is overweight in markets including Taiwan and Russia, relative to this index.

As of 1 August, the trust has cut its annual management fee from 0.9 per cent to 0.75

per cent of its portfolio's NAV, per year. This follows a cut on 1 August 2020 from 1 per cent to 0.9 per cent of its NAV per [*www.year.UK*](http://www.year.UK) EQUITY INCOME The economic effects of the coronavirus outbreak resulted in a number of UK companies cutting, axing or suspending their dividends last year, including historically reliable payers. But some UK companies did not stop generating and growing payouts, and there has been a recovery among some of those that did. A good way to get exposure to these is an active fund run by an experienced investment team which can, among other things, assess how sustainable these opportunities are going forward.

Investment trusts, meanwhile, have the benefit of being able to hold back dividend income in good years to build up reserves that enable them to maintain or even increase dividends in leaner years.

Finsbury Growth & Income Trust (FGT) Finsbury Growth & Income Trust has been run by highly regarded manager Nick Train since 2000. He runs a concentrated portfolio of companies with strong brands and/or powerful market franchises. The trust typically doesn't hold more than 30 stocks and at the end of June had just 25. It tends to have a significant portion of its assets in consumer goods companies - about two-thirds at the end of June.

Train aims to buy stocks priced below his estimate of their true worth and hold them for the long term, regardless of short-term volatility, in the hope that their value will double or do even better over time. He only sells them if he no longer considers that they are quality companies or an increase in value causes them to become too large a proportion of the trust's assets. This investment approach results in low turnover and saves transaction costs, so that these detract less from the trust's returns.

At the end of July, the trust's largest holdings were alcoholic drinks company Diageo (DGE) and information and analytics provider RELX (REL), which accounted for 11.4 per cent and 10.6 per cent of its assets, respectively.

Finsbury Growth & Income Trust has an outstanding long-term performance record relative to the FTSE All-Share index and other UK equity income investment trusts and has proved to be a defensive choice, including during last year's volatility.

However, this means that it can also underperform when value and recovery stocks are doing well as it does not hold them. For example, over the first seven months of this year, Finsbury Growth & Income Trust made a NAV return of 9.9 per cent against 11.7 per cent for the FTSE All-Share index.

The trust also typically has a low yield - about 1.8 per cent as of mid August. But its board aims to increase or maintain its total dividend each year and in respect of its financial year ended 30 September 2020 maintained its dividend at 16.6p - despite widespread cuts by UK companies. This was partly funded by drawing on its revenue reserve, which was worth £45.44m at the end of its last financial year, equivalent to 1.22 years' worth of dividends in its current financial year, according to the Association of Investment Companies (AIC).

Finsbury Growth & Income Trust had increased its dividend in each of the seven years prior to 2020.

Diverse Income Trust (DIVI) Diverse Income Trust can invest in companies of all sizes, including those listed on Aim and typically has a bias to smaller- and medium-sized companies. This differentiates it from many other UK equity income funds, which typically focus on large-caps. At the end of June, Diverse Income Trust had 35.3 per cent of its assets in Aim, 22 per cent in FTSE 100, 19.6 per cent in FTSE 250 and 15.2 per cent in FTSE Small Cap listed companies.

At the end of July, the trust's largest holdings were online trading company CMC Markets (CMCX) and business services provider K3 Capital (K3C), which accounted for 3.4 per cent and 2.4 per cent of its assets, respectively.

Diverse Income Trust's primary objective is to pay a good and growing dividend. The trust paid 3.75p per share in respect of its year ending 31 May 2021, up 1.4 per cent on the 3.7p it paid out the year before. This was partly funded by drawing on its revenue reserve, which was worth £15.2m at the end of its last financial year, on 31 May 2021, in respect of which it distributed dividends worth £14.8m.

It has increased its dividend nearly every year since its launch in 2011. The trust's managers look to maximise the potential for dividend growth as they believe that companies that generate the greatest longterm dividend growth are often those that deliver the best capital return.

The trust had a yield of around 3 per cent in mid August.

Diverse Income Trust has also made good total returns. Between its launch in April 2011 and the end of May 2021, it made NAV and share price total returns of 239.7 per cent and 227.1 per cent, respectively. This is in contrast to respective total returns for the FTSE All Share, FTSE SmallCap excluding investment trusts and FTSE Aim All-Share indices of 83 per cent, 202.2 per cent and 52.9 per cent. Despite Diverse Income Trust's exposure to smaller companies and Aim, it has been defensive. For example, in 2020 the trust made respective NAV and share price total returns of 7.57 and 8.6 per cent, during which year the FTSE All-Share index fell 9.82 per cent.

Diverse Income Trust has been run since launch in 2011 by Gervais Williams, a highly experienced UK smaller companies manager, alongside Martin Turner.

As well as investing in equities, its managers also sometimes make use of FTSE 100 put options - contracts that give purchasers the opportunity to sell a specified amount of a security at a pre-determined price within a specified time frame. For example, in March 2020, Williams and Turner sold a FTSE 100 put option at a profit giving them capital to invest in additional income shares when their prices were weak. They have recently bought another FTSE 100 put option which they can sell between now and December 2022.

Law Debenture Corporation (LWDB) As well as investing in listed equities, Law Debenture Corporation owns a professional services business, differentiating it from other UK equity income funds. This accounts for around 16 per cent of its NAV, and the additional revenue it generates helps the trust to pay a decent income. Over the 10 years to 31 December 2020, 36 per cent of the trust's dividends have been funded by its professional services business and it has maintained or increased its dividend every year for 42 years. The trust paid total dividends of 27.5p per share in respect of 2020 and its board intends to pay a higher level for 2021.

The trust's investment portfolio is run by highly experienced manager James Henderson, who has made very strong returns with the funds he runs, alongside Laura Foll. They aim for long-term capital growth in real terms and a steadily increasing income via a contrarian investment style. They seek out-of-favour equities trading at valuation discounts to their long-term historical averages, and favour high quality companies with strong competitive advantages.

The income generated by the professional services business means that Henderson and Foll don't have to invest in high-dividend-yield sectors they think don't have the potential to offer attractive total returns. This has helped the trust to make good total returns versus the FTSE All-Share index and other UK equity income investment trusts.

Examples of its largest holdings at the end of July include GlaxoSmithKline (GSK) and Royal Mail (RMG), which accounted for 2.5 per cent and 1.6 per cent of its assets, respectively. Although Royal Mail only has a dividend yield of around 2 per cent and was the largest detractor from the trust's returns in July, Henderson and Foll argue that there has been a structural shift in ecommerce adoption versus pre-pandemic levels that will continue to benefit this company.

The trust's contrarian, value investment style means that its returns can be volatile from year to year and undergo periods of underperformance.

Troy Trojan Ethical Income (GB00BKTW4V58) Troy Trojan Ethical Income's total returns have a typically defensive profile, in keeping with Troy Asset Management's investment approach. This prioritises the avoidance of permanent capital loss via conservative asset allocations. So, for example, when the FTSE All-Share index fell nearly 10 per cent last year and the Investment Association UK Equity Income sector average return was -10.73 per cent, Troy Trojan Ethical Income fell less than 6 per cent.

Its longer-term cumulative total returns are also ahead of these benchmarks, but its defensive profile means that it can lag when markets and more aggressively positioned funds are rising, such as over the 12 months to 13 August.

The fund excludes investments in areas including armaments, tobacco, fossil fuels and

high-interest-rate lending. It still has exposure to a variety of sectors, in particular consumer companies, which accounted for 31 per cent of its assets at the end of July, as well as financials and industrials, which accounted for 18 per cent and 16 per cent, respectively. Two of its largest holdings at the end of July were RELX (REL) and Unilever (ULVR).

The fund paid a total dividend of 2.4961p per share in respect of its financial year ending 31 January 2021 - 28 per cent lower than the 3.4471p it paid in its previous financial year. Its manager, Hugo Ure, says that this was due to cuts, delays and deferrals in UK company dividends. But he expects an improvement because some of the fund's holdings' profits are starting to recover. And he thinks that other holdings have the potential for dividend growth supported by free cash flow so could deliver going ahead.

GLOBAL GROWTH A global equity fund should be at the heart of pretty much every investor's portfolio, whether the core of a larger portfolio that also includes specialist funds, or the entire equity allocation of small and start-up portfolios. We have a selection of funds that should cover the different risk appetites and needs of a variety of investors. However, the idea here is not to hold many of these alongside each other but choose the one that best suits your requirements and hold other types of funds, maybe in smaller allocations, that offer exposure to different investments from these.

Scottish Mortgage Investment Trust (SMT) Scottish Mortgage Investment Trust has an outstanding record of outperforming other global equities funds and broad global equity indices such as FTSE World and MSCI World and its ongoing charge of 0.34 per cent is one of the lowest of all active funds. It could be a good core holding in portfolios with a long-term investment horizon and higher-risk profile.

Although its long-term returns are outstanding, it can be volatile over shorter time periods, such as earlier this year for example. And its risk profile is arguably higher than that of many other global funds because as well as investing in listed equities, it also invests in unquoted companies. At the end of June it held 51 of these, which accounted for 21 per cent of its assets. Scottish Mortgage is also very concentrated with its 10 largest holdings accounting for

43 per cent of its assets at the end of June and it has substantial allocations to what are considered to be more volatile sectors, such as technology.

For example, the trust's largest holdings at the end of July were coronavirus vaccine producer Moderna (US:MRNA) and biotech company Illumina (US:ILMN), which accounted for 8.5 per cent and 6.6. per cent of its assets, respectively.

The trust's investment team select investments based on their individual characteristics. They favour strong, well-run businesses that offer the best potential durable growth opportunities, and look to hold them for the long term. They assess attributes such as the strength of companies' managements, their competitive and financial positions, and the prospects for sales and margins.

A concern for investors is the forthcoming retirement of co-manager James Anderson at the end of April 2022, who has run the trust since 2000.

However, Baillie Gifford funds tend to be run via a team approach rather than just by one individual and remaining co-manager Tom Slater is also very experienced. He is head of US equities at Baillie Gifford, which account for a significant part of Scottish Mortgage Investment Trust's assets, and he has worked at Baillie Gifford since 2000. His areas of investment specialism include high-growth companies on public markets and private companies.

Mr Slater will be supported by Lawrence Burns, who was appointed deputy manager of the trust in March. He has worked at Baillie Gifford since 2009 and became a partner at the firm last year. His investment specialism is transformative growth companies.

Analysts at Winterflood commented at the time of Anderson's retirement announcement in March: "We do not believe that James's retirement should be a matter of concern for existing or potential shareholders in Scottish Mortgage Investment Trust. Tom Slater, the fund's co-manager since 2015, is an experienced investor and we rate him highly. We do not foresee any change to the fund's investment approach or rationale as a result of the forthcoming change to its management."

Rathbone Global Opportunities (GB00BH0P2M97) Rathbone Global Opportunities has a strong track record of outperforming global indices such as MSCI World and FTSE World, and many other global equities funds. Its lead manager, James Thomson, and co-manager,

Sammy Dow, look to invest in innovative and scalable businesses listed in developed markets that are growing fast and shaking up their industries. They want to hold companies that are easy to understand, different to their competitors, durable against change and difficult to imitate. And they like them to have a plan to grow rapidly without running out of money or overstretching their resources.

They are willing to invest in companies of all sizes and at the end of June the fund had about three-quarters of its assets in large companies and 22 per cent in mid-sized ones, an area the managers particularly favour.

To reduce risk, Thomson and Dow hold a defensive bucket of companies with slow and steady growth that should be less sensitive to the economy.

Although Rathbone Global Opportunities has a global remit, nearly two-thirds of its assets were in the US at the end of July, but it is well-diversified across sectors. Consumer companies accounted for about a quarter of its assets, technology firms 19 per cent, financials 17 per cent and industrials 16 per cent. Examples of holdings at the end of July are Sartorius Stedim Biotech (FRA:DIM) and PayPal (US:PYPL) which accounted for 2.9 per cent and 2.61 per cent of assets, respectively.

Lindsell Train Global Equity (IE00BJSPMJ28) Lindsell Train Global Equity's short-term cumulative performance figures don't look good against those of broad global indices such as MSCI World and the Investment Association (IA) Global sector average. This is largely due to slight underperformance so far this year, and in 2020 and 2019, for reasons including the fund's focus on resilient, high-quality businesses rather than economically sensitive sectors. It also has very

little exposure to tech stocks and no exposure to the so-called FAANGs - Facebook (US:FB), [*www.Amazon.com*](http://www.Amazon.com) (US:AMZN), Apple (US:AAPL), Netflix (US:NFLX) and Alphabet (US:GOOGL). Rather, its largest holdings at the end of July included Diageo (DGE), Heineken (NET:HEIA) and London Stock Exchange (LSEG) which accounted for 8.73 per cent, 7.57 per cent and 7.17 per cent of its assets, respectively.

Over the long term, the fund, which is run by Nick Train alongside Michael Lindsell and James Bullock, has a strong performance record. So it is still worth considering as a reasonably defensive core portfolio holding if you have a long-term investment horizon and can sit through periods of relative underperformance. Also don't hold both it and another fund run by the same manager such as Finsbury Growth & Income Trust (FGT), which we also include in this list, as they have a number of holdings in common.

Lindsell Train Global Equity's managers look to invest in companies with sustainable business models and/or established brands. And they like them to have a record of long-term durability in cash and profit generation.

The fund has a particularly heavy weighting to consumer companies, which accounted for half of its assets at the end of July. It typically has a very concentrated list of between 20 and 30 holdings. Although this increases concentration risk, this is mitigated by the fact that these are typically large, global liquid companies. Its managers also don't often buy and sell investments, meaning that trading costs eat less into returns.

Jupiter Global Value Equity (GB00BF5DRJ63) Jupiter Global Value Equity Fund's managers, Ben Whitmore and Dermot Murphy, invest in companies they think trade at prices that do not reflect their value. As not all lowly-valued shares make good longterm investments, the fund's investment team carefully weighs up the price they pay for a share against their view of the quality of the company's business. And they pay great attention to the broader environmental, social and governance characteristics of companies, seeking firms that can balance a variety of stakeholder interests and achieve attractive sustainable returns.

Their investment process includes looking in depth at a stock's financial history and franchise quality, with an emphasis on

balance sheet strength, strong ***conversion*** of profits into free cash and high standards of corporate governance. And to manage risk they focus on companies that can demonstrate both strong balance sheets and low valuations, while ensuring that the fund's overall portfolio has a diverse set of uncorrelated risks.

Jupiter Global Value Equity only launched in March 2018 but Whitmore, who is head of strategy for value equities at Jupiter, is a seasoned value investor who has outperformed even when this style of investing isn't in favour, as demonstrated by funds such as Jupiter UK Special Situations (GB00B4KL9F89).

Jupiter Global Value Equity offers exposure to different stocks and has a fairly different geographic allocation to many other global funds. For example, only 15 per cent of its assets were in North America at the end of July. Its 10 largest holdings included Finnish technology company Nokia (FIN: NOK1V), oil major BP (BP.) and financial services provider AIB (IRE:A5G) which accounted for 4.1 per cent, 3.6 per cent and 3.1 per cent of its assets, respectively.

The fund, perhaps not surprisingly in view of its value investment approach, has done well over the past year against broad global indices and the IA Global sector average. But value investing goes through periods of underperformance and has generally not done well over the past decade. It can also take time for value equities' prices to reflect their worth. So if you invest in this fund you should have an investment horizon of five years or preferably longer, and a high-risk appetite.

Stewart Investors Worldwide Sustainability (GB00B7W30613) Stewart Investors Worldwide Sustainability aims for growth over the long term and is run by Nick Edgerton and Asia specialist David Gait. They invest in companies they think are good quality and can benefit from and contribute to the sustainable development of the countries they operate in. When trying to select such companies, they assess the quality of their managements, social usefulness, environmental impacts and efficiency, responsible business practices, finances and financial performance.

At the end of June the fund was largely invested in companies with net cash balance sheets. The managers also reported that their holdings "are not over-reliant on government action or support, and

the [fund] is predominantly invested in companies that historically show strong pricing power and resilience in a variety of economic conditions. About 45 per cent of [its assets] remain invested in companies with some form of shareholding steward, either a family, founder or foundation, who has guided their company through cycles and sometimes generations."

As well as taking sustainability criteria into consideration, this fund differs from global funds and indices in terms of its asset allocation and holdings. For example, at the end of July the fund had 31.5 per cent of its assets in North America but shares listed in this region accounted for over 62.5 per cent of MSCI AC World index, according to First Sentier Investors. And Stewart Investors Worldwide Sustainability had 30.3 per cent of its assets in Europe and the Middle East in contrast to the index's weighting to these areas of 13.2 per cent.

The fund was also overweight information technology and healthcare relative to the index, and its 10 largest holdings were completely different.

This means that it could also be an option for investors looking for something different with a more defensive profile. In keeping with the Stewart Investors investment style, the fund tends to do better in falling markets and can lag strongly rising ones. For example, in 2018 when MSCI World index and the IA sector average recorded negative returns, Stewart Investors Worldwide Sustainability returned 0.51 per cent and lagged them in 2019 albeit with a double-digit return of 12.4 per cent. But the fund can also do well when markets are rising, for example with a return of 20.86 per cent against 12.32 per cent for MSCI World in [*www.2020.UK*](http://www.2020.UK) EQUITY GROWTH The UK economy has been severely impacted by the coronavirus pandemic and is only starting to feel the negative economic effects of leaving the EU. However, stocks do not necessarily follow the fate of the country they are listed in, particularly the types of large multinationals included in the FTSE 100 index, and there are many good companies of various other sizes listed in London. Investing in the home market also eliminates some of the currency risk for end investors.

Liontrust Special Situations (GB00BG0J2688) Liontrust Special Situations has been managed since launch in November 2005 by Anthony Cross and co-manager Julian Fosh since 2008. They run the fund according to an investment process that involves identifying companies that have a durable

economic advantage that allows them to sustain a higher than average level of profitability for longer than expected.

They like companies to have characteristics such as intellectual property, strong distribution channels and significant recurring business, and will not invest in them unless they have at least one of these attributes. Examples of the fund's holdings at the end of July included alcoholic drinks company Diageo (DGE), information and analytics provider RELX (REL) and Spirax- Sarco Engineering (SPX) which accounted for 3.7 per cent, 3.4 per cent and 3.2 per cent of its assets, respectively. This investment process has resulted in an outstanding record of outperformance of the FTSE All-Share index and other UK equities funds.

Liontrust Special Situations offers exposure to UK-listed companies of various sizes. At the end of June, it had 40.4 per cent of its assets in FTSE 100 companies, 27.9 per cent in FTSE 250 companies and 23.3 per cent in Aim companies.

One concern is the fund's large size, which was over £6bn at the end of June. However, so far this does not appear to be detracting from performance.

Slater Recovery (GB00B90KTC71) Slater Recovery aims for growth by investing in companies that have low price/earnings ratios in relation to their earnings growth, and strong cash flows and financial positions. The fund's investment team looks for companies that trade at discounts to their net assets and cash, and what they consider to be turnaround situations. But they still want companies to have strong balance sheets, powerful competitive positions and high returns on capital.

They describe their investment process as "growth at a reasonable price" (Garp), although do not believe that growth necessarily means expensive or that value is cheap and hopeless.

They select holdings by examining companies' accounts and analysts' forecasts and like to see positive recent trading statements and that companies' directors hold their shares. They also meet companies' senior managers. They only invest in a company if it meets all their criteria.

Slater Recovery is very well-diversified across industry sectors and had 71 holdings at the end of July. It invests in companies of various sizes, although nearly three-quarters of its assets were in smaller companies at the end of July.

The fund's 10 largest holdings at the end of July included digital publisher Future (FUTR), life insurer Prudential (PRU) and pharmaceutical company Clinigen (CLIN) which accounted for 7.35 per cent, 3.68 per cent and 3.12 per cent of its assets, respectively.

The fund has a very strong performance record and beats many other UK equity funds and indices such as the FTSE All-Share and FTSE Small Cap. But its yearto-year returns can be volatile.

Henderson Smaller Companies Investment Trust (HSL) Neil Hermon runs Henderson Smaller Companies Investment Trust via a quality Garp approach. He has run the trust since 2002, since when it has outperformed the Numis Smaller Companies ex Investment Companies index in 16 of its past 18 financial years, and also has a good record against other UK smaller companies investment trusts.

Mr Hermon and his team take a longterm view with their investments and try to avoid unnecessary turnover. The trust's average holding period for an investment is over five years. They look to add stocks with good growth prospects, sound financial characteristics and strong management at a valuation level that does not reflect these strengths.

Despite its name, Henderson Smaller Companies Investment Trust has historically had more of a focus on mid-caps. Its managers define smaller companies as any company outside the FTSE 100 Index. The trust had 58 per cent of its assets in FTSE 250 stocks, 12 per cent in FTSE Small Cap stocks and 28 per cent in Aim stocks at the end of its last financial year on 31 May, according to Numis Securities.

"The fund's universe for new purchases is stocks in the bottom 10 per cent of the UK stock market," comment analysts at Numis Securities. "Hermon tends to focus on the larger more liquid stocks in the universe and is willing to hold onto the winners, albeit top-slicing to maintain diversity."

Its 10 largest holdings at the end of July included Impax Asset Management (IPX), Future and housebuilder Bellway (BWY).

Henderson Smaller Companies has a performance fee. However, its base fee of 0.35 per cent is very low and there is a cap on its total management fees of 0.9 per cent a year. So even in years when its performance fee is triggered it doesn't add up to unreasonable amounts. For example, in its financial year ended 31 May 2021 its ongoing charge (the base fee and some other costs) of 0.39

per cent plus the performance fee amounted to 0.98 per cent.

"Henderson Smaller Companies is one of the largest, most liquid UK smaller company trusts and an attractive core holding for investors seeking exposure to this asset class," say analysts at Numis Securities. "Hermon has a strong long-term track record through building a diversified portfolio with a focus on growth at a reasonable price, delivering NAV total returns over the past 10 years of 358 per cent (16.4 per cent a year) versus 176 per cent (10.7 per cent a year) for Numis Smaller Companies ex Investment Companies index."

BlackRock Smaller Companies Trust (BRSC) BlackRock Smaller Companies Trust has an excellent long-term record of beating its benchmark, Numis Smaller Companies plus Aim ex Investment Companies index, and many other UK smaller companies funds. But in its last financial year to 28 February, it underperformed this benchmark for the first time in 15 years, albeit with a double-digit NAV return of 13.5 per cent against 23.1 per cent. Much of the strong long-term performance is attributable to a previous manager, Mike Prentis, who stepped down in June 2019. Since then, the trust's lead manager has been Roland Arnold, who had been a co-manager on the trust since April 2018.

However, one year's underperformance is not a reason to write offa fund or manager. Arnold is an experienced smaller companies manager who worked with Mr Prentis on BlackRock's UK small- and mid-cap UK equity portfolios for 14 years and is supported by BlackRock's UK small- and mid-cap team. They continue to run the trust along the lines that Mr Prentis did.

"The manager looks to construct a well-diversified portfolio of high-quality companies with superior long-term growth prospects and strong management teams," explain analysts at Investec Securities. "The team is well-resourced and works closely with a network of brokers, while BlackRock's depth of resource, including strategists, economists and a risk team, represents a strong competitive advantage. Portfolio construction is a function of high-conviction stock selection that focuses on companies with proven, trustworthy managements, strong market positions, a clear record of earnings growth, good ***conversion*** of earnings into cash and a sound balance sheet. Valuation is a key component of the investment process."

The trust's 10 largest holdings at

the end of June included Watches of Switzerland (WOSG), Treatt (TET) and Impax Asset Management which accounted for 2.5 per cent, 2.3 per cent and 2.2 per cent of its assets, respectively.

Part of the reason for the underperformance over the trust's last financial year was substantial exposure to the UK domestic economy, but if Covid-19 comes under better control it could pick up and be beneficial. Arnold and his team have added to holdings that should benefit from a recovery but maintained the trust's focus on quality, favouring companies with strong balance sheets that generate cash.

The trust is also different to some smaller companies funds in that it invests in Aim shares, which accounted for just under 50 per cent of its assets at the end of its last financial year. The trust was previously not able to invest more than 50 per cent of its assets in Aim shares, but this cap was removed following shareholder approval at the company's annual general meeting in June. The trust's board said many of the Aim holdings have performed well in recent years, and it does not want to have to dispose of holdings just to comply with this limit. Arnold says that keeping the 50 per limit in place could result in the trust missing out on good investment opportunities.

While Aim-traded companies are arguably higher-risk, the trust has around 120 holdings which helps to mitigate the risk of each individual holding. And Mr Arnold says that tighter regulations applicable to Aim companies over recent years have resulted in higher standards of governance and transparency.

DEVELOPED MARKETS EQUITY GROWTH It is important to diversify the equity portions of portfolios geographically, and overseas developed equity markets can play a role in doing this in many types of growth investors' portfolios. Although these countries do not have the economic growth potential of some emerging economies, companies listed on their markets can deliver very strong growth - especially smaller ones. Some of the world's leading companies are listed on markets in Europe, while good Japanese companies and funds have made strong returns. And although in recent years active funds have struggled to beat large mainstream US indices such as the S&P 500, there are some that do, such as the one highlighted below. There are also areas of the US market, such as smaller companies, where active managers are able to add value.

BlackRock European Dynamic (GB00BCZRNN30) BlackRock European Dynamic has an outstanding performance record but much of this was generated during the tenure of lead manager Alister Hibbert, who left the fund at the end of last year. The fund is now run by Giles Rothbarth, who had been co-manager alongside Hibbert between February 2019 and the start of this year.

The departure of the manager of a successful fund is never good news, but Rothbarth had worked with Hibbert on the fund since 2015 and is a senior member of BlackRock's Fundamental Active Equities Financials research group. He also runs other funds, such as BlackRock Continental European (GB00B4VY9893) since 2017, and has worked at BlackRock since 2010.

When Mr Hibbert's departure was announced last year, Becci McKinley-Rowe, co-head of Fundamental Equity at BlackRock, said: "The Fundamental European Equity team is focused on delivering alpha. Our ability to do this consistently has been driven by a focus on the development of strong talent over many years and close teamwork across our range of products. Giles Rothbarth has taken on expanded portfolio management roles in recognition of his strong performance and increased experience."

Juliet Schooling Latter, research director of FundCalibre, said: "Giles Rothbarth has been co-manager for 18 months and is another impressive manager from a very strong BlackRock European team who stands out from his peers. I have no concerns about the manager change."

Rothbarth looks to invest in companies that are undervalued and/or have good growth potential. Although BlackRock European Dynamic can invest in companies of all sizes, it tends to focus on larger ones, which accounted for over three-quarters of its assets at the end of July.

The fund's largest holdings at the end of July included ASML (NET:ASML) and LVMH Moet Hennessy Louis Vuitton (FRA:MC) which accounted for 7.01 per cent and 5.99 per cent of its assets, respectively.

Marlborough European Multi-Cap (GB00B90VHJ34) Marlborough European Multi-Cap invests in companies of all sizes but has a bias to smaller companies, which accounted for about 60 per cent of its assets at the start of August, including 16.5 per cent in microcaps.

Its manager, David Walton, and his team aim to invest in undervalued businesses that they think have above-average growth potential. They maintain a list of 240 companies which they think are promising potential investments, out of a potential universe of 3,700, and the fund holds around 90 of these.

They tend to select companies on the basis of their individual merits rather than due to sector or geographic considerations. But Walton aims to reduce volatility by ensuring that the fund is well-diversified by industry sector and geography. The fund's largest holdings at the end of July included sauna company Harvia (FIN: HARVIA) and software company Sesa (ITA:SES) which accounted for 5.3 per cent and 4.2 per cent of its assets, respectively. Walton also thinks that the quality of a company's management team is very important and aims to meet them at least once a year.

This investment approach has resulted in strong returns for the fund, which has a good record of outperforming broad European indices such as FTSE Europe ex UK and MSCI Europe ex UK, smaller companies indices and other Europe ex UK funds.

Artemis US Select (GB00BMMV5105) Artemis US Select is a rare example of an active US equity fund that beats the S&P 500 index most of the time. It also has a good record of beating the Investment Association (IA) North America sector average. Between the start of this year and late August, the fund was slightly behind the S&P 500 index albeit with a double-digit return of nearly 16 per cent against 19 per cent for the index.

The fund was launched in 2014 but its manager, Cormac Weldon, has a much longer record of outperformance: he previously ran the Threadneedle American (GB00B7T2FK07) and Threadneedle American Select (GB00B7HJLD86) funds, the latter for over 12 years. During that time, he beat the S&P 500 and the IA North America sector average with a return of 84 per cent, against 64 per cent and 51 per cent, respectively. He has over 20 years' experience and has invested through many market cycles.

Mr Weldon and his team pay as much attention to evaluating potential financial, market and economic risks as they do to investment opportunities. They invest in stocks where they think the potential upside greatly outweighs downside risk. They also take a pragmatic approach, changing their

focus as the economic and market cycle changes. So, for example, if growth stocks are doing well they invest in them and if there is an opportunity for value to outperform they aim to hold those types of stocks.

Examples of holdings at the end of July include Google owner Alphabet (US:GOOGL), transportation company Norfolk Southern (US:NSC) and home improvement retailer Lowe's (US:LOW).

JPMorgan US Smaller Companies Investment Trust (JUSC) JPMorgan US Smaller Companies Investment Trust aims for growth by investing in smaller companies that its managers, Don San Jose, Daniel Percella and Jonathan Brachle, think have sustainable competitive advantages and a successful record. They like to invest in businesses they believe are good quality but trading at a discount to their intrinsic value, and have strong management teams who are good stewards of capital.

Its largest holdings at the end of July were Willscot Mobile Mini (US:WSC), a provider of modular space and portable storage solutions, and electronic components producer Power Integrations (US:POWI), which each accounted for 1.7 per cent of its assets.

The trust has had a good record of beating its benchmark, the Russell 2000 index, in most years so has also made good cumulative total returns over the long term. However, over the first half of this year the trust underperformed the Russell 2000 index's 16.2 per cent return with a NAV total return of 10.9 per cent.

Part of the reason for this was because stocks that don't pay dividends and/or are lower quality outperformed the types of quality stocks JPMorgan US Smaller Companies Investment Trust focuses on. But the trust's managers commented in August: "Despite the risk-on rally of lower-quality stocks, we remain confident that fundamentals will return to favour as we move deeper into the recovery. We are staying true to our

process, focusing on quality businesses at reasonable relative valuations, taking advantage of any weakness as opportunities to add to the names we think will benefit the most in the long term. We continue to focus on finding companies with durable franchises, good management teams and stable earnings that trade at a discount to intrinsic value.

"This year, we have added slightly more cyclicality to the portfolio in select names across consumer discretionary and industrials while also adding to other names we like on weakness with strong secular tailwinds. However, the portfolio's positioning remains relatively unchanged. Our main exposures are in the industrials and financials sectors which make up over 40 per cent of the portfolio.

"We expect a strong rebound in company earnings for the remainder of 2021. The companies we invest in [should] be able to navigate inflationary pressures from higher prices well and future upside should be driven by earnings."

Analysts at Numis Securities said: "It is unsurprising that there was a period of underperformance in a strong market led by cyclical and low-quality stocks which rallied strongly. The managers' bottom-up process is focused on quality US companies with resilient franchises and growth potential, and the [trust] typically outperforms in tougher market conditions and lags in strong market rallies. Performance has relatively improved since 30 June.

"JPMorgan US Smaller Companies has an impressive track record since 2008 under JPMorgan Asset Management's small cap core team in New York, headed by San Jose. JPMorgan US Smaller Companies is an attractive way to gain exposure to US small caps [via] an experienced team."

San Jose will become chief investment officer of JPMorgan Asset Management's US value team on 1 October and his team, which helps him manage the trust, will also move across to this group. However, JPMorgan US Smaller Companies Investment Trust's board says that they will continue to manage the trust in the same way.

Baillie Gifford Japan Trust (BGFD) Baillie Gifford Japan Trust aims for growth over the long term by investing principally in medium- to smaller-sized Japanese companies. Its manager, Matthew Brett, and deputy manager, Praveen Kumar, invest in companies they think have above-average prospects for growth due to innovative business models, disrupting traditional Japanese practices or opportunities such as growth from overseas. They aim to take a three- to five-year view with their investments and typically hold between 40 and 70.

"The managers share the typical Baillie Gifford approach of tending to run with successful investments if their investment case remains intact," comment analysts at Charles Stanley. "They pay less attention to current valuation and more to long-term potential value, so there tends to be relatively little turnover of stocks in the portfolio. The focus on growth results in a higher-risk ***collection*** of holdings, which is exacerbated by gearing (borrowing to invest)."

The trust is also well-diversified across industry sectors.

The trust's largest holdings at the end of July were telecoms company Softbank ( JAP:9984) and internet services provider Rakuten ( JAP:4755) which accounted for 4.4 per cent and 3.6 per cent of its assets.

Baillie Gifford Japan Trust's investment approach has worked well over the years and it has made good returns. Much of this was under the management of Sarah Whitley, who ran it between 1991 and the end of April 2018, although Brett and Kumar are also experienced investors with longerterm track records of running other funds. Baillie Gifford funds are also run very much via a team approach rather than by just one manager. And, so far, the trust is still performing well with its NAV total returns ahead of the Topix index in 2019, 2020 and over the first seven months of this year.

FTF Martin Currie Japan Equity (GB00B8JYLC77) FTF Martin Currie Japan Equity, which was called Legg Mason IF Japan Equity before Legg Mason was acquired by Franklin Templeton last year, has an outstanding performance record. It beats the Topix index and IA Japan sector average over most time periods, so is often among the top-performing funds in its sector.

Its manager since 1996, Hideo Shiozumi, invests according to a thematic bias driven by Japan's economic position, although picks companies on the basis of their own merits. He thinks that Japan is in the process of moving from being a regulated to deregulated economy, and from a manufacturing to service-orientated economy. So he seeks to exploit the investment opportunities that this throws up.

FTF Martin Currie Japan Equity is focused on domestic-oriented sectors that Shiozumi and his team believe will be major beneficiaries of work-style reforms. These include medical and nursing care services, consumer lifestyle and internet-enabled companies. The fund's holdings at the end of July included Nihon M&A Center ( JAP:2127) and healthcare company M3 ( JAP:2413) which both accounted for over 7 per cent of its assets.

At the end of July, the fund had around half of its assets in mid-caps and about 43 per cent in larger companies, according to fund research company Morningstar.

However, while FTF Martin Currie Japan Equity has made excellent long-term returns, it can undergo periods of extreme volatility and underperform. For example, the fund made a total return of 40.5 per cent last year but as of late August this year was down nearly 9 per cent. Similarly, it returned 24.9 per cent in 2019 after having fallen 10.6 per cent in 2018. And its 10 largest holdings accounted for over half of its assets at the

end of July, meaning that the largest positions' returns could have a significant impact on the fund's overall returns.

So if you invest in this fund you need to be able to tolerate bouts of volatility and, as with all equity funds, have a minimum investment time horizon of at least five years.

ASIAN EQUITY GROWTH Asia has some of the most dynamic economies and arguably the greatest growth potential of all geographic regions. It includes China and India, the countries with the world's largest populations, where growing affluence is driving many areas such as consumer and financial services. While economic growth is not always reflected in stock markets, the ones in this part of the world are growing and it is home to highgrowth and quality companies which good investment teams should be able to find. So it is not an area that long-term growth investors can afford to ignore, as long as they are comfortable with higher risks and exposure to potentially volatile emerging markets.

Stewart Investors Asia Pacific Leaders Sustainability (GB0033874768) Stewart Investors Asia Pacific Leaders' managers, David Gait and Sashi Reddy, look to invest in companies that are positioned to benefit from, and contribute to, the sustainable development of the countries in which they operate. They like them to have good quality managements and score well in terms of social usefulness, environmental impact and efficiency, and responsible business practices. They also like companies to have sound finances and financial performance.

The fund typically invests in large and mid-sized companies with a market cap of at least $1bn (£728.66m).

Unlike a number of other broad Asia funds, it is very focused on India, which accounted for 42.4 per cent of its assets at the end of July, in contrast to just 10.5 per cent of MSCI AC Asia Pacific ex Japan Index. And it was very underweight China, in which it had 7.5 per cent of its assets against 33.9 per cent for the index. The fund also has an allocation to Japan, unlike many other Asian funds.

Examples of companies held by the fund include healthcare products provider Hoya ( JAP:7741) and Australian biotechnology company CSL (AUS:CSL) which accounted for 5.8 per cent and 5.2 per cent of the fund's assets at the end of July.

Stewart Investors Asia Pacific Leaders Sustainability's focus on quality companies means that it typically outperforms in falling markets - it made a positive return in 2018, for example - and lags strongly rising markets, such as in 2019. But it mostly delivers good positive annual returns and over the long term - the timescale you should have if you invest in Asian equities - this approach has resulted in strong total returns.

Fidelity Asia Pacific Opportunities (GB00BQ1SWL90) Since its launch in 2014, Fidelity Asia Pacific Opportunities has had an outstanding record of outperforming Asian indices such as MSCI AC Asia Pacific ex Japan and the Investment Association (IA) Asia Pacific excluding Japan sector average.

Anthony Srom has managed the fund since launch in 2014 and runs a high-conviction portfolio where each holding can meaningfully contribute to overall fund performance. At the end of July the fund only had 34 holdings. However, Srom aims to mitigate concentration risk by diversifying the fund, for example by trying not to have holdings with high correlations to each other.

Srom selects holdings on the basis of investor sentiment, valuation and research. He is prepared to wait for his holdings to perform well and has an average holding period of more than two years. Although he has a broadly style-neutral approach, he will take contrarian and value positions.

The fund holds a number of stocks that are not included in MSCI AC Asia Pacific ex Japan index, differentiating it from other Asian active and passive funds. At the end of July, these included some of the trust's largest holdings such as Beijing Oriental Yuhong (CHI:002271), Franco Nevada (CAN: FNV), ASML (NET:ASML) and HDFC Bank (IND:HDFCBANK).

Goldman Sachs India Equity Portfolio (LU0858290173) Goldman Sachs India Equity's managers, Hiren Dasani and his team, aim to invest in good businesses of various sizes at a substantial discount to their true worth. They also like companies to have strong or improving fundamentals. The fund's managers are based in India and Singapore and company meetings are an important part of their investment process.

Goldman Sachs India Equity's managers "start by evaluating the attractiveness

of a company's industry", explain analysts at FundCalibre. "Highly competitive, capital-intensive industries with low returns may be ignored entirely. They then focus on the valuation of a business. Real cash flows are prioritised over paper profits and Dasani only invests where he sees the opportunity for a substantial gain. The [managers] never say no to a meeting as [they] can always learn something about the industry."

This investment process has proved to be successful: the fund has consistently outperformed MSCI India index and generated good cumulative total returns. However, it can experience periods of volatility and sharp falls, as demonstrated by its year-to-year returns.

Over half of its assets were in large companies and a quarter in mid-sized ones at the end of July, according to fund research company Morningstar. The fund typically holds 70 to 100 stocks and had 96 at the end of July, which helps to mitigate stock-specific risk.

Fidelity China Special Situations (FCSS) Fidelity China Special Situations mainly invests in companies listed in China and Hong Kong, and about a quarter of its assets were in mainland listed 'A-shares' at the end of July. The trust can also invest up to 15 per cent of its assets in unquoted companies and these accounted for 10 per cent of its assets at the end of July.

The trust's manager, Dale Nicholls, likes to invest in smaller companies as these tend to be less well-researched and so more mispriced. Because smaller companies tend to be higher-risk, to help manage this Nicholls and his team spend a lot of time meeting company managers to understand them and monitor their progress.

Nicholls seeks companies that have good long-term prospects, are cash-generative and managed by strong teams. He likes companies that are likely to benefit from China's growth and changing economy, that

are undervalued and can deliver over the long term. So, for example, he invests in companies that provide goods and services to the growing Chinese middle class whose wealth is increasing. The trust's largest holdings at the end of July included technology infrastructure and marketing provider Alibaba (HK:9988), and internet and technology company Tencent (HK:700) which both accounted for more than 10 per cent of its assets.

The trust has a good record of outperforming MSCI China index. However, it is a very high-risk option due to its focus on one emerging market economy, exposure to smaller and unquoted companies, and (at time of writing) a substantial level of gearing (debt).

Since April, the trust has charged a basic management fee of 0.9 per cent on the first £1.5bn of its net assets and 0.7 per cent on net assets over £1.5bn. Before this, it charged all assets at 0.9 per cent. It also levies a variation fee of plus or minus 0.2 per cent based on the trust's NAV per share performance relative to MSCI China index. For its financial year ended 31 March 2021, its basic ongoing charge was 0.97 per cent and the ***variable*** fee was 0.12 per cent.

EMERGING MARKETS Perhaps the most important area for longterm growth is emerging markets because populations and wealth in these parts of the world are growing as the countries, economies and markets develop. These markets are also less researched than developed markets so should give active managers more opportunities to find good companies. But along with growth potential comes a lot of risk, as these areas are often less politically stable and have lower standards of corporate governance than developed economies. So funds focused on these areas are better suited to investors with long-term investment horizons and high-risk appetites.

Fidelity Emerging Markets (GB00B9SMK778) Fidelity Emerging Markets' managers, Nick Price, who has run the fund since 2010, and Amit Goel focus on buying quality companies at a reasonable price. They like companies with strong market positions and competitive advantages that can deliver attractive returns throughout the economic cycle. They also like them to

deliver superior returns on their assets and have well-capitalised balance sheets so that they can fund internal growth without diluting shareholder earnings by issuing new shares.

Price and his team set a target price for every stock they are considering investing in.

The fund typically invests in companies with market capitalisations greater than $1bn (£726.76m) and at the end of July was mainly focused on larger companies. It typically has 50 to 100 holdings.

At the end of July, about two-thirds of its assets were in emerging Asian economies with over 40 per cent in China and Taiwan. Information technology, financials and consumer companies each accounted for around a quarter of its assets.

The fund has a very good record of beating MSCI Emerging Markets index and the Investment Association Global Emerging Markets sector average.

JPMorgan Emerging Markets Investment Trust (JMG) JPMorgan Emerging Markets Investment Trust has a solid record of beating MSCI Emerging Markets index and other global emerging market investment trusts. It has been managed by Austin Forey since 1994 and in April this year John Citron was added as a named investment manager. Citron manages a number of other JPMorgan Asset Management emerging markets funds and has been part of that company's emerging markets and Asia Pacific equities team since 2012. They are backed by a team of more than 90 emerging markets analysts based in the regions they cover.

"We understand that John's appointment represents business continuity planning and, along with normal portfolio management responsibilities, he will help [to market] the fund," comment analysts at Numis Securities. "This change is consistent with most other JPMorgan investment company mandates which have introduced second named managers in recent years."

The trust's managers look to invest in high-quality companies that can deliver sustainable returns over the long term. They like them to have strong governance and sustainable business models and be profitable.

The trust mainly invests in larger companies and, at the end of July, had about a third of its assets in China and 17 per cent in India. Consumer companies accounted for 28 per cent of its assets, information technology 27 per cent and financials 22 per cent.

The trust's board says that its managers have always taken environmental, social and governance (ESG) considerations into account, but more recently have formalised this process. For example, the trust has attained an externally measured ESG rating from MSCI that gave it an ESG Quality Score of 6.8 out of 10.

"Given the manager's bias towards capital-light businesses, the [trust] naturally has a carbon-light profile," comment analysts at Stifel. "The trust's carbon footprint, as measured by MSCI, is only around 4 per cent of the footprint of [MSCI Emerging Markets Index]."

The trust has a very good record of outperforming MSCI Emerging Markets index and global emerging markets investment trusts.

Since 1 July 2021, the trust has charged a fee of 0.75 per cent on the value of its assets. Before this it charged that rate on assets over £500m and 1 per cent on assets up to £500m.

BlackRock Frontiers Investment Trust (BRFI) BlackRock Frontiers Investment Trust invests in areas including frontier markets that are even less developed and higher-risk than emerging markets, but have the potential for strong growth. The trust can invest in countries that are neither part of MSCI World index nor one of the eight largest countries by market capitalisation in MSCI Emerging Markets index, such as China and India.

Its largest geographic allocations at the end of July were Saudi Arabia, Greece, Vietnam and Indonesia, which respectively accounted for 18.8 per cent, 8.8 per cent, 8.6 per cent and 7.3 per cent of its assets. The trust's largest sector exposures were financials, which accounted for over a third of its assets, and consumer companies, which accounted for about 21 per cent.

Sam Vecht, head of BlackRock's emerging Europe and frontiers active equity team, and Emily Fletcher, who is part of the company's emerging markets specialist team, manage the trust. They look to invest in mis-priced companies that generate high cash flows and have good management teams that they think will create long-term value.

The trust might also be of interest to income investors with a high risk appetite and long-term investment horizon. It does not actively target income but had a yield of 4 per cent at the end of August and paid dividends worth $0.07 per share in respect of its last financial year, albeit down 9.7 per cent on the $0.0775 it paid the year before.

It paid a dividend of $0.0275 in its half year to 31 March 2021, the same level as for its half-year to 31 March 2020. This was partly funded by its revenue reserves as its revenue return per share over the six months to the end of March was $0.0198 per share. The trust's chairman said that the board "is cognisant that there may be a reduction over the course of the financial year in dividends received from the companies in the portfolio due to the impact of Covid-19. However, [we are] confident that the current pressure on income within the portfolio does not represent a structural change and should prove short-lived".

The trust has a strong long-term performance record but has had periods when it underperformed MSCI Frontier Markets index, such as in 2019. Its year-to-year returns can also be very volatile. However, the trust has performed well recently because its "pro-recovery positioning paid off" as frontier markets' performance caught up with the recovery in the rest of the world, according to its managers.

Between its launch in 2010 and 31 March 2021, BlackRock Frontiers Investment Trust made a NAV total return of 61.4 per cent, compared with 41.3 per cent for MSCI Frontier Markets index and 51.4 per cent for MSCI Emerging Markets index in US dollar terms, according to its managers.

SPECIALIST EQUITY FUNDS Specialist funds allow investors to gain exposure to sectors that play a key role in the modern world. Technology, for example, plays such a big part in everyday life that it's difficult not to be drawn to stocks and funds in this sector. If you want exposure to physical assets have a look at the IC Top 50 ETFs for funds that hold metals such as gold, or the alternative assets and property sections of the IC Top 50 Funds.

Impax Environmental Markets (IEM) Impax Environmental Markets aims to get exposure to the growth of cleaner or more efficient delivery of energy, water and waste. It invests in listed companies that provide or are involved with technology-based systems, products or services in environmental markets. These include companies operating in areas such as alternative energy, energy efficiency, water treatment, pollution control, waste technology and resource management.

At the end of July, the trust had 29 per cent of its assets in energy efficiency, 18 per cent in water infrastructure and technologies, and 17 per cent in food, ***agriculture*** and forestry. It is mainly invested in developed markets-listed companies and had nearly half its assets in the US and 35 per cent in Europe at the end of July.

The trust's investment team is led by John Forster and Bruce Jenkyn-Jones who have run it since launch in 2002. They include ESG considerations within their 10-step investment process.

Despite its specialist focus, the trust has a good record of beating broad global indices such as FTSE World and MSCI World, and conventional global equities investment trusts.

At the end of July, its holdings included utility company American Water Works (US:AWK) and Koninklijke DSM (NET:DSM), which supplies nutritional ingredients to the animal feed, food and personal care industries that help to make them more sustainable and efficient.

"Impax Environmental Markets benefits from an experienced management team with a good long-term track record in a strategy that appears to be attracting interest from [private] investors," comment analysts at Numis Securities. "2021 was a strong period for relative performance versus the FTSE Environmental Technologies 100 Index due to not holding technology stocks, although this was a drag in 2020. The trust also outperformed MSCI AC World Index. There is significant attention on environmental investments as part of a wider focus on ESG factors and Impax Environmental Markets is well-placed to continue to benefit from this theme. [It] has significantly rerated in recent years with the help of share buybacks, which represented nearly 30 per cent of its share capital. In January 2019, its board adopted a zero-discount policy and the trust has since moved to a premium and issued more than 107m shares - around 60 per cent of opening share capital - to satisfy ongoing market demand."

Worldwide Healthcare Trust (WWH) Worldwide Healthcare Trust invests in both the healthcare and higher-return, higher-risk biotechnology sector. It is well-diversified across various healthcare sub-sectors and at the end of July had 29 per cent of its assets in biotechnology companies, 26.5 per cent in pharmaceutical companies, 18 per cent in providers and services companies and 17 per cent in equipment and supplies

companies. It had 70 per cent of its assets in North American listed companies and 20 per cent in emerging markets.

It can also invest up to 10 per cent of its assets in unquoted companies and had 7 per cent in these at the end of July.

The trust is run by OrbiMed Capital, a dedicated healthcare investment company founded in 1989. The trust's managers are Sven Borho, founder and managing partner, and Trevor Polischuk, partner, at OrbiMed. They try to identify companies that could outperform, especially in areas such as therapeutics. Reasons for outperformance can include the publication of clinical trial ***data***, drug approvals by US, European and Japanese regulatory authorities, legal events and mergers and acquisitions (M&A). The trust's managers particularly like to invest in companies with underappreciated products in their pipelines, high-quality management teams and adequate financial resources.

The trust has a good historic record of outperforming MSCI World Health Care index and last year and in 2019, for example, was well ahead of it. However, over the first seven months of this year it has lagged this index considerably for reasons including the outperformance of large-cap companies, a market rotation from growth to value stocks, underperformance of emerging biotechnology stocks and extreme volatility among emerging market healthcare stocks. Compared with MSCI World Health Care index, the trust is underweight large-cap pharma and biotech stocks and has meaningful overweight exposures to emerging markets and emerging biotech companies.

So at the end of August its cumulative total returns did not look good. However, it has undergone periods of underperformance in the past from which it has bounced back.

A downside to this trust is its performance fee of 15 per cent of any outperformance over MSCI World Healthcare index. Over its financial year to 31 March 2021, for example, this plus its basic ongoing charge of 0.87 per cent added up to 2.37 per cent. However, specialist funds, especially those with exposure to unquoted investments, can charge more. And the performance fee is only levied in years when the trust performs well and more than compensates its shareholders.

Polar Capital Technology Trust (PCT) Polar Capital Technology Trust aims for growth over the long term by investing in the shares of technology companies. Although it can invest globally, at the end of July around three-quarters of its assets were in North America and 14 per cent in Asia. It is well-diversified across technology sub-sectors with about a quarter of its assets in software companies, 20 per cent in interactive media and services and 18 per cent in semiconductor companies at the end of July. It is mainly invested in large companies.

The fund's investment team is led by Ben Rogof, who has managed the trust since 2006. It invests in companies on the basis of their ability to make good returns rather than purely because of the type of technology they are involved with. When choosing potential investments the team assesses factors such as management quality, potential new growth markets and globalisation of major technology trends, and look to exploit international valuation anomalies and sector volatility.

The trust's cumulative numbers versus its benchmark, Dow Jones Global Technology Index, don't look good at the moment due to underperformance last year and over the first seven months of this year. However, over the longer term it has a good record of beating this index.

"Relative performance over the past 10 years has been strong, with NAV total returns of 603 per cent (21.5 per cent a year) versus 584 per cent (21.2 per cent a year) for Dow Jones World Technology index," commented analysts at Numis Securities. "Polar Capital Technology is an attractive way to gain diversified exposure to global technology stocks focused on themes that are driving future growth, rather than the industry incumbents."

BlackRock World Mining Trust (BRWM) BlackRock World Mining Trust mainly invests in the shares of companies that mine or are involved with metals and minerals. Up to 10 per cent of its gross assets may also be invested in physical metals and up to 20 per cent in unquoted investments. For example, it had two royalty investments that accounted for 5.8 per cent of its assets at the end of June.

The trust's managers, Evy Hambro and Olivia Markham, aim to get exposure to themes that should deliver growth over the long term, such as decarbonisation, digitalisation and the development of renewable energy sources. They believe that the increased focus on sustainability and regulation of pollution and carbon emissions are creating good investment opportunities in mining companies that produce materials that help advance these changes. These include metals such as nickel, cobalt and lithium, which are used in batteries for devices such as iPads and electric vehicles.

Hambro and Markham also invest in more traditional areas such as gold and precious metals for long-term capital growth and a diversifying income stream.

The trust could be of interest to income investors with a higher risk appetite and long-term investment horizon because its board has a policy of paying substantially all of the year's available income as dividends. BlackRock World Mining Trust can also hold fixed income and unquoted investments to enhance its revenue.

The trust paid dividends of 20.3p per share in respect of its 2020 financial year, a slight decrease on the 22p per share it paid the year before. So far this year, it has declared two dividends worth 10p in total, a 25 per cent increase on the 8p it paid out during the first half of 2020. The trust's chairman said that although dividends have come under pressure in wider equity markets due to Covid-19, income from the trust's investments has remained relatively robust, particularly for iron-ore-exposed diversified miners. The trust had a yield of 3.9 per cent at the end of August. Two of the trust's holdings are Brazilian miner Vale (BR:VALE3) and BHP (BHP).

It also has a good record of outperforming its benchmark, MSCI ACWI Metals & Mining 30% Buffer 10/40 Index.

However, mining shares typically experience greater average volatility than broader markets and this trust also has exposure to developing economies, which are higher risk and can be more volatile. This means that the trust's yearto-year returns can be highly volatile.

BONDS Many investors' portfolios should have an allocation to assets other than equities for diversification. And with cash rates so low bonds can be a useful component in income portfolios. But although bonds can be less volatile than equities they are far from riskfree, so you need to be selective about the types of bond funds you invest in. For this reason, we mainly include strategic bond funds in our selection. Their managers can invest across the fixed-income spectrum in an unconstrained way, focusing on the areas that look best and avoiding less desirable ones. However, strategic bond funds can be higher-risk than traditional corporate bond funds so are not necessarily suitable for lower-risk investors.

Allianz Strategic Bond (GB00B06T9362) Government bonds have had quite the ride in 2021, selling offheavily in the first quarter before recovering strongly in the summer. With government bonds in particular looking vulnerable to the threat of inflation, we continue to favour flexible bond funds as a potential diversifier to equities.

These include Allianz Strategic Bond fund, which struggled this year after posting an astonishing return of 31 per cent in 2020. Yet this is still a good option due to its flexible investment approach. Its manager, Mike Riddell, uses a variety of tools, from government and corporate bonds to currency exposures and derivatives, to provide genuine diversification to equity markets.

It can be difficult to understand exactly what is happening in the fund from its factsheets alone, but it has a good record of protecting investors' money at points of equity market volatility such as during the sell-offs in early 2020 and final quarter of 2018.

Towards the end of July, Riddell noted he had seen no signs of longer-term inflationary pressures. At the time, he was cutting exposure to government bonds in the wake of strong performance. Riddell and his team's "highest conviction views" were that currencies and local currency government bonds in emerging markets looked relatively cheap, while corporate bonds in developed markets looked "exceptionally expensive".

See 'How bond funds are facing the inflation threat' (IC, 06.08.21) for further details on how strategic bond funds were positioned for an inflation threat in summer 2021. DB

Jupiter Strategic Bond (GB00BN8T5596) The largest fund in the Investment Association (IA) Sterling Strategic Bond sector, Jupiter Strategic Bond seeks to provide income with the prospect of capital growth and had an attractive distribution yield of 3.6 per cent at the end of July. That said, its investment team takes a relatively cautious approach, making good use of more defensive debt alongside riskier bonds. Jupiter's head of strategy for fixed income, Ariel Bezalel, has long argued that interest rates will be lower for longer, with inflationary pressures kept in check over the longer term by factors including high levels of global debt, ageing demographics and disruption from globalisation, technology and low-cost labour. So he tends to take a flexible, "barbell" approach when running this fund with a mixture of different exposures.

The fund has had a mixed record during periods of market volatility, performing strongly in the final quarter of 2018 but taking a hit in the 2020 sell-off. But Jupiter Strategic Bond can be a good compromise between seeking income and looking to manage risks. DB MI TwentyFour Dynamic Bond (GB00B57TXN82) Another option that might appeal to income investors is MI TwentyFour Dynamic Bond, which had a distribution yield of 4.15 per cent at the end of July. But this strategic bond fund also stands out because of its flexibility: its investments span various corners of the fixed-income market, from government bonds to high yield, financial debt, assetbacked securities and emerging market debt.

It has fared less well than Allianz Strategic Bond and Jupiter Strategic Bond in recent major equity sell-offs, but may present an interesting option for investors worried about the outlook for government bonds. MI TwentyFour Dynamic Bond had just 16 per cent of its assets in government bonds at the end of July, and notable exposure to debt issued by banks and insurers.

As of summer of 2021, the fund's investment team appeared more concerned about the longer-term prospect of inflation than the managers of Allianz Strategic Bond and Jupiter Strategic Bond. MI TwentyFour Dynamic Bond's managers were notably upbeat on the outlook for corporate bonds at the time. DB

Royal London Sterling Extra Yield Bond (IE00BJBQC361) A punchier option when it comes to strategic bond funds, Royal London Sterling Extra Yield Bond holds riskier bonds in the pursuit of a high income. A good 43 per cent of its assets were in riskier high-yield bonds at the end of July and the fund offered a gross income yield of between 4.33 and 5.29 per cent, depending on the share class.

With its ability to hold higher-quality bonds, Royal London Sterling Extra Yield Bond should be able to limit some of the volatility experienced by dedicated highyield bond funds, but it will also lag some high-yield bond funds at times of strength for riskier debt. DB Rathbone Ethical Bond (GB00B7FQJT36) This fund's total returns may appeal as much as its ethical slant: it has fairly consistently generated much better returns than the IA Sterling Corporate Bond sector average. The fund delivered a total return of 37.84 per cent in the five years to 27 August, making it the second-best performer out of some 90 funds in its sector.

While its managers focus on total returns rather than just income, the fund recently had an historical distribution yield of 3.2 per cent. With regard to its ethical criteria, Rathbone Greenbank assesses the fund's potential investments using positive and negative social and environmental criteria.

As with any ethical or environmental, social and governance (ESG) fund, investors might be picky about what they view as suitable holdings. With that in mind, this fund has tended to have a significant focus on debt issued by banks and insurers, which made up more than 70 per cent of its assets at the end of July. DB

PROPERTY Commercial property has been a useful asset for diversifying away from equities and as a source of income. Although there are concerns about what effects the coronavirus pandemic and the UK's departure from the EU will have on areas of UK commercial property such as offices, a good actively managed fund should be able to allocate away from areas that are negatively affected.

TR Property Investment Trust (TRY) This trust differs from most property funds

because it predominantly holds shares in property companies rather than directly investing in buildings. This should give its managers a level of flexibility when it comes to making asset allocation changes as listed equities tend to be much easier to buy and sell than buildings.

TR Property Investment Trust mainly holds Europe-listed property shares, with some big bets on its largest holdings. For example, Vonovia (GER:VNA) made up more than a tenth of the trust's assets at the end of July.

The trust made a good share price total return of 42 per cent over the 12 months to 31 August. This puts it ahead of many UK commercial property trusts even though they have also rebounded over this period.

If investors with an appetite for risk are tempted to play any further recovery, they should note that there were other potential bargains at time of writing. TR Property Investment Trust traded on a 1.6 per cent discount to net asset value (NAV) on 31 August, a much more expensive entry point than its 12-month average discount of 6 per cent.

By contrast, names such as UK physical property fund BMO Commercial Property Trust (BCPT) continue to trade on big discounts to NAV - even after huge share price gains in the past year. Brave investors may wish to bank on further recovery with an investment in BMO Commercial Property Trust, although it is heavily exposed to offices and retail outlets and the uncertainty this brings. DB Standard Life Investments Property Income Trust (SLI) If BMO Commercial Property Trust looks too exposed to the uncertainties of a post-pandemic property sector, Standard Life Investments Property Income Trust might be an interesting compromise for investors keen to tap into a recovery for the asset class. It made a share price total return of 43 per

cent over the 12 months to 31 August, but it still recently traded at a discount to NAV of 14.3 per cent, also offering a dividend yield of 5.1 per cent. Importantly, this trust is much less heavily exposed to office and retail space than BMO Commercial Property Trust and has a greater focus on industrial assets. DB Tritax Big Box REIT (BBOX) This trust's shares continued a strong run over the past year, reflecting buoyant demand for the logistics facilities it lets or pre-lets. Like many other specialist property trusts it focuses on a lucrative trend, in this case indirectly tapping into the boom in online shopping by letting facilities to online retailers. For example, Amazon (US:AMZN) was the trust's biggest customer at the end of June, representing 19.2 per cent of its contracted rent roll.

With its strong fundamentals, Tritax Big Box REIT continues to stand out. But as we noted last year, exposure does not come cheap, with its shares trading at an eye-watering 23 per cent premium to NAV. This leaves it exposed to potential falls if its sub-sector goes out of favour.

Similarly, the trust's dividend yield of 2.7 per cent on 31 August has notably fallen from the 4.5 per cent it was at when we last updated our top funds list towards the end of summer 2020. DB

ALTERNATIVE ASSETS It is important to diversify your portfolio so that if one area goes down, hopefully other parts won't. Funds focused on alternative assets can also boost your returns. Private equity investments, for example, offer the prospect of high growth and diversification away from equities because they are unlisted. Private investors generally can't access this asset class directly, but there are a number of investment trusts focused on this area. Infrastructure, by contrast, is a lowerrisk and high-yielding way to get exposure to alternative investments.

HgCapital Trust (HGT) HgCapital Trust is a direct play on software and services businesses, and its share price and net asset value (NAV) total returns have continued to perform well. The trust's holdings include Visma, an Oslo-headquartered firm with a focus on accounting, resource planning and payroll software; and business management software specialist Access.

The trust is fairly concentrated, with Visma and Access making up more than a fifth of its assets at the end of March and the top 20 holdings representing around 80 per cent. That said, its holdings are diversified in terms of the industries they work with, while the trust invests across different geographies.

As with other popular trusts, a sticking point is that its shares appear relatively expensive. At the end of August, they traded on a 21.8 per cent premium to NAV. Some would also caution that its investment managers focus on a highly valued sector that could be subject to a pullback. DB

HarbourVest Global Private Equity (HVPE) While private equity trusts have shown great resilience, both during the pandemic and over the longer term, this is an asset class that can carry greater risk than listed equities. Investors who worry about the concentrated nature of some private equity funds may prefer a more diversified offering.

Harbourvest Global Private Equity ticks this box, with a focus on holding other private equity funds - something that significantly boosts its number of underlying holdings. The trust had 51 per cent of its assets in primary private equity funds at the end of July, with 28 per cent in secondary assets and 21 per cent in direct investments.

Like many other private equity trusts, it has held up well in part because of a focus on growth sectors such as technology. Harbourvest Global Private Equity's shares have performed extremely well over the past year, notably outpacing rivals such as Pantheon International (PIN). However, HarbourVest has a greater focus on areas such as venture capital so might carry greater risk.

It can be tricky to keep track of the underlying holdings of more diversified private equity trusts as much of their exposure is via other funds. But the risk of things going wrong should be lower than with trusts that invest directly in private equity - especially when it comes to stock-specific risk. DB Oakley Capital Investments (OCI) A common complaint among private equity trust managers has been that their shares still languish on substantial discounts to NAV, even after strong share price performance both during the pandemic and in the longer run.

This may be a hangover from the problems certain private equity trusts ran into during the financial crisis, or a lingering perception

of private equity investors as predators. But it means that investors can access many of these trusts at fairly cheap entry points.

Several private equity trusts stand out in this respect, including Oakley Capital Investments. The trust offers a concentrated portfolio of companies with a big focus on technology-enabled businesses. This approach has paid offnicely during the pandemic: in a trading update for the first half of 2021, the trust's board noted that 14 of the companies it holds had grown their revenues at or above expectations. Four companies had experienced a modest impact on their financial performance due to the Covid-19 pandemic and three companies took a significant hit from Covid-related restrictions.

Oakley Capital Investments focuses on the technology, consumer and education sectors and, like many peers, has done well by backing businesses that have flourished during the pandemic. The trust also has a strong balance sheet and has managed to exit investments at a good uplift. Although its discount to NAV had tightened significantly as of the end of August, it was still around 15 per cent.

The high quality of the companies it invests in, a stubborn discount to NAV and a concentrated portfolio that is relatively straightforward to keep track of make this trust a compelling option. However, concentrated funds are more vulnerable to problems with individual holdings. This trust could also run into tougher times if investors become less keen on digitally enabled businesses. DB HICL Infrastructure (HICL) HICL Infrastructure aims to deliver sustainable income by investing in core infrastructure projects. Over 70 per cent of its assets were in public private partnership (PPP) projects at the end of its last financial year on 31 March and included assets such as roads, hospitals and railways. Health and transport-related

projects each accounted for 29 per cent of its assets and it had 116 holdings.

Its managers look to invest in public sector, government-backed or regulated revenues; concessions that are predominantly availability-based because their payments don't generally depend on the level of the project asset's use; and companies in the regulated utilities sector. They like to invest in projects with stable revenues and lower levels of debt. They favour projects in areas with high barriers to entry so that there is limited competition and which involve assets essential to the operation of public services and that operate with a strong social licence. They take environmental, social and goveranance factors into consideration when investing.

Nearly three-quarters of the trust's assets were in the UK and 18 per cent in EU countries at the end of March. Most of the projects are fully operational so are not exposed to construction risk. And the trust had a correlation with inflation of 0.8x at the end of its last financial year.

HICL Infrastructure aims to pay a dividend of at least 7p per share a year and preserve the capital value of its investment portfolio over the long term, with potential for growth. The trust's board said in July that cash generation from the trust's investments remains in line with its forecasts. So it is still aiming to pay a dividend of 8.25p per share for the trust's financial year to 31 March 2022, which should be fully cash covered, as well as in the financial year after that.

The trust had steadily increased its annual dividend payouts in most years since 2007, the year after its launch. But its investment manager thinks that it is appropriate to more closely link future dividend increases with the recovery of dividend cash cover. This is for reasons including the macroeconomic environment and the proposed increase in UK corporation tax from 1 April 2023.

But the trust's managers are also trying to improve the trust's long-term earnings profile to support dividend growth over the longer term. And even at this level the trust still had an attractive yield of 4.8 per cent at the end of August.

The trust's investments are managed by InfraRed Capital Partners, which has invested in and managed core infrastructure assets for more than 20 years.

Renewables Infrastructure Group (TRIG) Unlike a number of other renewable energy infrastructure funds, Renewables

Infrastructure Group doesn't just invest in one sub-sector of this area. This means that it does not rely on the fortunes of one particular type of energy so is more diverse and spreads risk.

At the end of June, it had 79 investments - 50 wind projects, 28 solar photovoltaic projects and one battery storage project. Onshore wind accounted for 59 per cent of its assets, offshore wind 32 per cent and solar 8 per cent. Some 61 per cent of its assets were in the UK, where it cannot have less than 35 per cent of its portfolio value, alongside investments in Sweden, Germany, France and Ireland.

The assets receive revenues from government support and electricity sales. This year, the trust's managers expect three-quarters of its revenues to come from government subsidies, mostly index-linked, providing good revenue stability.

The trust's long-term project revenues have inflation linkage via regulated incentives and exposure to energy prices. And most of its investments are operational, as projects under construction cannot account for more than 15 per cent of its portfolio value.

The trust aims to generate sustainable, income-based returns from infrastructure that contributes towards a zero-carbon future. It has made an annualised total return of 8.1 per cent between its launch in 2013 and the end of 2020. The trust's NAV annual returns have proved to be defensive, with positive numbers in every full calendar year since its launch in 2013, including in 2018 when the FTSE World and FTSE All-Share indices made negative returns.

The trust's board aims to pay a dividend of 6.76p a share in respect of this year, the same level as it paid last year. At the end of August it had a yield of 5.4 per cent.

The trust's board and managers take ESG factors into consideration. Its ESG objectives are to: mitigate climate change, preserve the natural environment, positively impact the communities in which the trust works and maintain ethics and integrity in governance.

A downside to the trust is that it sometimes trades at a very high premium to NAV, although at the end of August it was on 11.8 per cent - one of its lower levels. If you want to invest new money in Renewables Infrastructure Group you could look out for when it is on a lower rating - as long as this is not because there is something wrong with the trust. Or invest when it does a share issue as these are typically issued at lower premiums.

WEALTH PRESERVATION A fund that limits downside can be helpful in balanced portfolios in all market environments. Ongoing uncertainty, due to factors such as the coronavirus pandemic and the UK's departure from the EU, means that limiting downside is more important than ever.

Capital Gearing Trust (CGT) Capital Gearing Trust does exactly what wealth preservation funds should do, having made positive NAV total returns for the past 10 calendar years and positive share price total returns in all but one. The fund delivers a different pattern of returns to mainstream equity markets and can make positive returns when the latter are falling. In 2020, for example, the trust made NAV and share price total returns of 8 per cent, while the FTSE All-Share index fell nearly 10 per cent.

The trust aims to preserve, and over time to grow, its shareholders' real wealth and places greater emphasis on avoiding loss than maximising returns. Capital Gearing Trust also has a discount control policy whereby it uses share buybacks or issues in normal market conditions to try to make its shares trade as close as possible to NAV. This has proved successful and the trust typically trades at a slight premium to NAV.

Capital Gearing Trust invests directly in assets such as index-linked government bonds, which accounted for 30 per cent of its assets at the end of July, and gets a lot of its exposure to other assets via funds. The trust can also use derivatives such as warrants, options, swaps and forward contracts.

Personal Assets Trust (PNL) Personal Assets Trust has a good record of delivering positive returns, in line with its aim of protecting and increasing the value of its shareholders' funds over the long term. For example, last year when the FTSE All-Share index fell nearly 10 per cent, this trust made NAV and share price total returns of about 8 per cent.

Personal Assets Trust invests in a range of assets and at the end of June it had 43 of its assets in equities and 32 per cent in fixed income. Gold also features in the trust's asset allocation because its manager, Sebastian Lyon, believes that it plays an important role in protecting capital. In July he commented that gold had "generated returns of over 11 per cent a year (in sterling terms) since we first invested for the strategy in 2005, and continues to provide a rare store of value

in the form of an alternative currency that cannot be printed".

The trust had 11 per cent of its assets in gold-related investments at the end of June.

Personal Assets Trust typically trades at a slight premium to NAV, in line with its policy of trying to keep its shares trading at a price close to its NAV via share buybacks at a small discount and issues at a small premium to NAV.

"Under Sebastian Lyon's management (since 2009) the fund has exhibited considerably lower volatility than the FTSE All-Share," comment analysts at Winterflood. "The fund's significant exposure to government bonds and gold means that it is likely to lag equity market rises. However, it should also continue to preserve capital in difficult markets and [is] a low-volatility vehicle that [should] deliver attractive absolute returns over the long term. While [its] asset allocation can reflect [Lyon's] cautious outlook, stock selection is focused on equity growth companies. This bias has helped to drive Personal Assets Trust's long-term performance."

Janus Henderson Absolute Return (GB00B5KKCX12) Janus Henderson UK Absolute Return has made a positive return in nearly every full calendar year since its launch in 2009, including in years when markets are down. Last year, for example, when the FTSE All-Share index fell nearly 10 per cent this fund made a total return of 2.43 per cent.

The fund aims for a return greater than zero, regardless of market conditions, over any 12-month period. It seeks to outperform the UK base interest rate, after charges, over any three-year period.

The fund invests in shares its managers think will rise and uses derivatives to take short positions in shares they think will fall.

Typically, at least 60 per cent of the fund's exposure to long and short positions is to UK companies of any size and in any industry. Up to 40 per cent of the long and short exposure can be to non-UK companies.

A downside to this fund is its performance fee of 20 per cent of any returns it makes over the UK base interest rate, which can take its basic ongoing charge higher. For example, in the fund's financial year to 31 May 2020, in addition to the 1.05 per cent ongoing charge it levied a performance fee of 0.15 per cent.

However, the fund makes consistent positive returns, something many wealth preservation funds fail to do.

THE AIM OF OUR LIST IS TO HELP INVESTORS WITH THEIR OWN RESEARCH BY HIGHLIGHTING WHAT WE BELIEVE TO BE SOME OF THE BEST AND MOST INTERESTING FUNDS BY NOT INVESTING OVERSEAS, YOU MISS OUT ON THE MANY ATTRACTIVE OPPORTUNITIES OUTSIDE THE UK RATHBONE GLOBAL OPPS HAS A GLOBAL REMIT, NEARLY TWO-THIRDS OF ITS ASSETS WERE IN THE US AT THE END OF JULY ASIA IS NOT AN AREA THAT LONG-TERM GROWTH INVESTORS CAN AFFORD TO IGNORE INFRASTRUCTURE IS A LOWER-RISK AND HIGH-YIELDING WAY TO GET EXPOSURE TO ALTERNATIVE INVESTMENTS LISTED EQUITIES TEND TO BE MUCH EASIER TO BUY AND SELL THAN BUILDINGS "GOLD CONTINUES TO PROVIDE A RARE STORE OF VALUE IN THE FORM OF AN ALTERNATIVE CURRENCY THAT CANNOT BE PRINTED"

**Graphic**

A structural shift in should benefit Royal MailCommercial property has been a useful asset for diversifying away from equitiesRenewables Infrastructure Group had 50 wind farm projects at the end of June

**Load-Date:** September 10, 2021

**End of Document**



[***Administrative Appeals Tribunal of Australia Decision: Emanuel Exports Pty Ltd; EMS Rural Exports Pty Ltd and Secretary, Department of Agriculture, Water and the Environment [2021] AATA 4393 (26 November 2021)***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:6477-1SR1-JDG9-Y442-00000-00&context=1516831)

Baltic Legal Updates

December 4, 2021 Saturday

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**Length:** 45386 words

**Body**

Canberra: Administrative Appeals Tribunal of Australia has issued the following decision:

Division: GENERAL DIVISION

File Numbers: 2018/5307; 2018/5541

Re: Emanuel Exports Pty Ltd; EMS Rural Exports Pty Ltd

APPLICANTS

And Secretary, Department of ***Agriculture***, Water and the Environment

RESPONDENT

DECISION

Tribunal: Deputy President Britten-Jones

Senior Member Dr M Evans-Bonner

Date: 26 November 2021

Place: Perth

1. The reviewable decision (application 2018/5307) of the First Assistant Secretary dated 21 August 2018, to cancel the live-stock export licence held by Emanuel Exports Pty Ltd (Emanuel ’ s Licence), is set aside. The Tribunal substitutes a new decision that Emanuel ’ s Licence is suspended from 22 June 2018 to 3 December 2021, being seven calendar days from the date of this decision.

2. The reviewable decision (application 2018/5541) of the First Assistant Secretary dated 5 September 2018, to cancel the live-stock export licence of EMS Rural Exports Pty Ltd (EMS ’ s Licence), is set aside. The Tribunal substitutes a new decision that EMS ’ s Licence is suspended from 11 July 2018 to 3 December 2021, being seven calendar days from the date of this decision.

..................[Sgd]......................................................

Deputy President Britten-Jones

CATCHWORDS

***AGRICULTURE***, WATER AND THE ENVIRONMENT – application 2018/5307 – live export of sheep – cancellation of live-stock export licence – export permits – carriage of sheep by sea – show cause notices issued – integrity and competence – whether Emanuel ceased to be a body corporate of integrity – Emanuel through its managing director, provided incorrect pen air turnover (PAT) ***data*** for the vessel MV Awassi Express – whether Emanuel knew PAT values incorrect or should have known they were incorrect – whether Emanuel knew PAT values would affect the acceptable loading capacity of vessel – attribution of the actions of a person to a corporation – vessel ***data*** file for heat stress assessment software program (HotStuff) based on incorrect PAT values – whether any person who participates in management or control of the live-stock export business of Emanuel has ceased to be a person of integrity – whether Emanual contravened a condition of its licence – whether Emanuel committed multiple alleged breaches of Australian Standards for the Export of Livestock (ASEL) – alleged breaches of ASEL after licence cancellation at Peel Feedlot – whether sufficient changes to management and control of Emanuel to demonstrate it is a body corporate of integrity – First Reviewable Decision set aside and substituted with a new decision that the licence should be suspended for the period 22 June 2018 to 3 December 2021

***AGRICULTURE***, WATER AND THE ENVIRONMENT – application 2018/5541 – EMS ’ s live-stock export licence cancelled due to association with Emanuel – no adverse findings by Secretary against EMS – whether the degree of association with Emanuel warrants cancellation of EMS ’ s licence – Second Reviewable Decision set aside and substituted with a new decision that the licence should be suspended from 11 July 2018 to 3 December 2021

JURISDICTION – nature and scope of the Tribunal ’ s review – whether Tribunal ’ s review should be restricted to the content of the show cause notices – formulation of the statutory questions

APPLICABLE LAW – legislative regime changed before proceedings finalised – whether Tribunal should apply law as at date of Tribunal ’ s decision or as at the time the reviewable decisions were made – transitional provisions – accrued rights – review concerned with rights and liabilities at anterior date – held that applicable legislation is the version in force at the time of the export licence cancellations

EVIDENCE AND PROCEDURE – applicability of rules of evidence in the Tribunal – former Applicants ’ managing director not called as a witness – whether adverse inference should be drawn – rule in Jones v Dunkel – self-incrimination privilege

STATUTORY INTERPRETATION – meaning of “integrity” – meaning of “competence” – use of the present tense – temporal element – “person who participates” held to describe the person participating in the management or control of the business at any time

LEGISLATION

Acts Interpretation Act 1901 (Cth) ss 7(2), 7(2)(c), 7(2)(e)

Administrative Appeals Tribunal Act 1975 (Cth) ss 33(1), 33(1)(c), 39, 43(1), 62(4)

Australian Meat and Live-stock Industry Act 1997 (Cth) ss 7, 8, 8(1), 10, 11, 12, 12(1)(b)(i), 12(1)(c), 16, 17, 17(1), 17(5), 17(5)(a), 23, 23(1), 23(1)(b), 23(1)(b)(i), 23(1)(b)(ii), 23(1)(d), 23(1)(g), 23(3), 23(3)(a), 23(3)(aa), 23(3)(b), 24, 24(1), 24(1)(b), 24(1)(b)(i), 24(1)(c), 24(4), 25A, 51, part 2, part 2A

Australian Meat and Live-stock Industry (Conditions on live-stock export licenses) Order 2012 (Cth) s 3

Australian Meat and Live-stock Industry (Export of Sheep by Sea to Middle East) Order 2018 (Cth) s 9

Australian Meat and Live-stock Industry (Export of Sheep by Sea to Middle East – Northern Winter) Order 2018 (Cth) s 9

Australian Meat and Live-stock Industry (Standards) Order 2005 (Cth) s 3(1)

Corporations Act 2001 (Cth) ss 206F(1), 206F(1)(b)

Export Control Act 1982 (Cth) ss 3, 7

Export Control Act 2020 (Cth)

Export Control (Animals) Order 2004 (Cth)

Export Control (Consequential Amendments and Transitional Provisions) Act 2020 (Cth) s 2, sch 1 s 1, sch 2 s 4, sch 3 s 2, sch 3 s 37(3)

Health Insurance Act 1973 (Cth) ss 23DL, 23DL(1)

CASES

Australian Broadcasting Tribunal v Bond [1990] HCA 33; (1990) 170 CLR 321

Collector of Customs (NSW) v Brian Lawlor Automotive Pty Ltd [1979] FCA 21; (1979) 2 ALD 1

Commissioner for Corporate Affairs (Vic) v Bracht [1989] VicRp 72; [1989] VR 821

Costello and Department of Transport [1979] AATA 184; (1979) 2 ALD 934

Drake v Minister for Immigration and Ethnic Affairs [1979] FCA 39; (1979) 2 ALD 60

Esber v Commonwealth [1992] HCA 20; (1992) 174 CLR 430

Frugtniet v Australian Securities and Investments Commission [2019] HCA 16; (2019) 266 CLR 250

Grant v Repatriation Commission [1999] FCA 1629; (1997) 57 ALD 1

Gribbles Pathology (Vic) Pty Ltd v Cassidy [2002] FCA 859; (2002) 122 FCR 78

Jones v Dunkel [1959] HCA 8; (1959) 101 CLR 298

Merrimack College v KPMG LLP 480 Mass 614 (2018)

Mikasa (NSW) v Festival Stores [1972] HCA 69; (1972) 127 CLR 617

Minister for Immigration and Border Protection v SZMTA [2019] HCA 3; (2019) 264 CLR 421

Mottaghi and Migration Agents Registration Authority [2007] AATA 60; (2007) 98 ALD 424

Muller v Dalgety & Company Ltd [1909] HCA 67; (1909) 9 CLR 693

Murdaca v Australian Securities and Investments Commission [2009] FCAFC 92; (2009) 178 FCR 119

Salomonn and Migration Agents Registration Authority [2013] AATA 146

Shi v Migration Agents Registration Authority [2008] HCA 31; (2008) 235 CLR 286

Tay v Minister for Immigration and Citizenship [2010] FCAFC 23; (2010) 183 FCR 163

Uelese v Minister for Immigration [2015] HCA 15; (2015) 256 CLR 203

SECONDARY MATERIALS

Australian Standards for the Export of Livestock (version 2.3) 2011, 27 April 2011

Inquiry under section 143 of the Casino Control Act 1992 (NSW) Report dated 1 February 2021, volume 1, pages 337, 338

Macquarie Dictionary (online 26 November 2021)

Oxford English Dictionary (online 26 November 2021)

REASONS FOR DECISION

Deputy President Britten-Jones

Senior Member Dr M Evans-Bonner

26 November 2021

OVERVIEW OF THE FACTS

1. On 1 August 2017, the MV Awassi Express (Vessel) set sail from Fremantle, Western Australia to the Middle East. The ship was loaded with live sheep being exported by Emanuel Exports Pty Ltd (Emanuel), one of Australia ’ s largest exporters of live-stock. There were 63,804 sheep on board. Hot and humid conditions greeted the Vessel at its first port of discharge in Qatar where the ship was delayed. The captain of the Vessel described how the “crisis conditions on board” were managed but hundreds of sheep died in a short period from 16 August 2017 onwards. The Vessel continued to Kuwait where 733 carcasses were disposed of. There were further delays. The final port was Dubai, where the last consignment was discharged on 24 August 2017.

2. A total of 2,400 sheep died during the voyage. Decomposing carcasses accumulated on board the vessel until they could be disposed of on 26 August 2017.

3. The current affairs television program, “60 Minutes”, obtained video footage from the animal welfare organisation, Animals Australia, showing the conditions on board the Vessel. A report was prepared and broadcast on 8 April 2018. Emanuel ’ s export licence was suspended by the First Assistant Secretary (who, for convenience, we will refer to as the Secretary) on 22 June 2018 and then cancelled on 21 August 2018. Subsequently, the licence of EMS Rural Exports Pty Ltd (EMS) was suspended by the Secretary on 11 July 2018 and then cancelled on 5 September 2018 based on EMS ’ s association with Emanuel as a wholly owned subsidiary.

4. The primary ground for cancellation of Emanuel ’ s export licence was that Emanuel had ceased to be a body corporate of integrity because Emanuel, through its managing director Mr Graham Daws, had provided misleading information about Pen Air Turnover (PAT) values (also referred to as “PAT scores”) for the Vessel to a consultant, Dr Conrad Stacey, who used that information to create a vessel ***data*** file. It was not in dispute that Mr Graham Daws had incorrectly doubled the PAT values back in 2014.

5. Expert evidence was provided regarding the PAT values. The experts agreed that overstating the PAT values was a serious issue and, regardless of the exact details of the weather, would significantly increase risk (of mortality) at the hottest times of the voyage. The experts also agreed that the voyage exceeded risk limits and that the Vessel was effectively overloaded and required de-stocking to meet the appropriate risk limits.

6. There is no significant dispute regarding the key events we have set out above in relation to the death of sheep on board the voyage to the Middle East in August 2017 and the earlier events of 2014 when Mr Graham Daws incorrectly doubled the PAT values. However, there is significant dispute with respect to the inferences we should draw from those facts and with respect to how the relevant legislative regime should be interpreted and the penalties, if any, that should be applied.

7. The Secretary submitted that we, the Tribunal, should affirm the cancellation decision primarily due to the seriousness of the historical events, the ongoing involvement of Mr Graham Daws in Emanuel ’ s business and the failure by Emanuel to show it has taken sufficient steps to rehabilitate itself. The Applicants submitted that they are bodies corporate of integrity and that their licences should not be cancelled. The Applicants submitted that Mr Graham Daws resigned as managing director and that they have set up new corporate governance procedures designed to ensure compliance with regulations in the live-stock export industry and to ensure animal welfare.

OVERVIEW OF THE LICENCE CANCELLATIONS

8. Since the company ’ s incorporation in Western Australia in 1955, Emanuel was carrying on the business of exporting live-stock. From 2 July 1973 until 29 June 2018, Mr Graham Daws was a director of Emanuel. From 1 June 1982 until 29 June 2018, Mr Graham Daws was also the company secretary. His son, Mr Nicholas Daws was appointed as a director of Emanuel on 25 January 2018 and replaced his father as company secretary and Managing Director on 29 June 2018.

9. Emanuel was the holder of live-stock export licence number L006 (Emanuel ’ s Licence), issued by the Secretary under Part 2 of the Australian Meat and Live-stock Industry Act 1997 (Cth) (AMLI Act). Subsequent legislative references are to the AMLI Act unless otherwise indicated, although we have sometimes included reference to the AMLI Act where it is required for clarity.

10. Emanuel ’ s Licence was for the period of 16 November 2017 to 15 November 2022.

11. On 21 August 2018, the Secretary cancelled Emanuel ’ s Licence under s 24(1)(c) (the First Reviewable Decision) because she was satisfied that Emanuel had:

(a) ceased to be a body corporate of integrity;

(b) ceased to be competent to hold a live-stock export licence; and

(c) contravened the condition of its licence that it comply with the Australian Meat and Live-stock Industry (Standards) Order 2005 (Standards Order) requiring it not to export live-stock except in accordance with Australian Standards for the Export of Livestock (Version 2.3) 2011 (ASEL).12. On 18 September 2018, Emanuel applied to this Tribunal for a review of the First Reviewable Decision.

13. Like Emanuel, EMS was carrying on the business of exporting live-stock since it was incorporated in Western Australia in 1988. Mr Graham Daws was a director and the company secretary of EMS from 12 July 1988 until 29 June 2018. His son, Mr Nicholas Daws, was appointed as a director of EMS on 25 January 2018 and replaced his father as company secretary on 29 June 2018.

14. EMS was the holder of live-stock export licence number L366 (EMS ’ s Licence) which was also issued by the Secretary under Part 2 of the AMLI Act. EMS is a wholly owned subsidiary of Emanuel.

15. On 5 September 2018, the Secretary cancelled EMS ’ s Licence pursuant to s 24(1)(c) (Second Reviewable Decision), based on “the nature and gravity of the findings made against Emanuel” and on “the action taken against Emanuel ’ s licence”. Further, the Secretary found that “the close and enduring association between Emanuel and EMS” meant that there was a significant risk that Emanuel may seek to frustrate its licence cancellation by relying on EMS ’ s licence.

16. On 26 September 2018, EMS applied to this Tribunal for a review of the Second Reviewable Decision.

BACKGROUND FACTS

17. We will now provide a more detailed outline of the facts leading up to the reviewable decisions to cancel Emanuel ’ s Licence and EMS ’ s Licence.

18. On 5 April 2018, the animal rights organisation, Animals Australia, wrote to the Secretary to make a formal complaint regarding serious breaches of the ASEL. The complaint letter particularised alleged breaches of the ASEL and World Organisation for Animal Health (OIE) animal welfare guidelines during five separate sea voyages of the Vessel (Voyages 23 to 27), with each voyage carrying between 59,000 and 67,000 Australian sheep to the Middle East during the months of May 2017 to November 2017.

19. The Animals Australia complaint letter attached 320 video files of the alleged breaches as supporting evidence, which were taken on the mobile telephone of one of the crew members of the Vessel during each of the voyages between May 2017 to November 2017. Some of these video files were included in the 60 Minutes report on 8 April 2018.

First Show Cause Notice: findings and response from Emanuel

20. On 1 May 2018, the Secretary issued a show cause notice to Emanuel under s 23 (First Show Cause Notice). The Secretary stated that she was considering cancelling or suspending Emanuel ’ s Licence or issuing a reprimand.

21. The “background” section in the First Show Cause Notice refers to Voyage 25. The Secretary stated that:

The Department ... has received information that indicates that Emanuel has breached a number of conditions of its export licence.

This information relates to a voyage of the Awassi Express (V025 LNC 9602) (the Voyage), which loaded its cargo, relevantly more than 63,000 sheep, in Fremantle on 31 July to 1 August 2017, and which completed discharge of that cargo in Dubai, United Arab Emirates on 21 to 24 August 2017. By the end of the Voyage, 2,400 sheep on board the vessel were reported dead.

This represents a mortality rate of 3.76%, which is above the reportable level of 2% prescribed by Australian Standards for the Export of Livestock (Version 2.3) 2011 (ASEL).22. The Secretary found reasonable grounds for believing that Emanuel contravened a condition of its export licence (s 23(1)(g)) because of multiple breaches of ASEL standards relating to the onboard management and welfare of live-stock and because the accredited veterinarian and accredited stockperson departed the Vessel prior to its complete discharge.

23. The Secretary also found reasonable grounds for believing that Emanuel had ceased to be a body corporate of integrity (s 23(1)(b)(i)) because Mr Nicholas Daws, who was at that time the managing director of Emanuel, was aware that the accredited veterinarian and accredited stockperson had left the Vessel early.

24. Finally, the Secretary found that persons who participate in the management and control of a live-stock export business, namely Mr Graham Daws and Mr Nicholas Daws, had ceased to be persons of integrity (s 23(1)(d)). This was on the basis that, as directors of Emanuel, they knew or ought to have known about the breach of the ASEL concerning the accredited veterinarian and accredited stockperson departing the Vessel early, but they did not disclose the breaches to the Department.

25. Emanuel responded to the First Show Cause Notice by letter dated 15 May 2018. Emanuel disputed many of the findings of the Secretary, including that the evidence did not support a reasonable inference that Emanuel failed to do everything it could to ensure ASEL standards were met. Emanuel submitted that there were factors outside of its control on Voyage 25, such as extreme weather conditions of heat and humidity. In this preliminary response, Emanuel also disputed that either Mr Graham Daws or Mr Nicholas Daws had any knowledge of the accredited stockperson and the accredited veterinarian departing before the complete discharge of the Vessel.

26. Emanuel made further submissions and provided further evidence in a letter to the Secretary dated 31 July 2018. Attached to the letter was a report from Professor Shane Maloney and a “substance of opinion” from Dr Ben Madin. In its submissions, Emanuel stated that:

Emanuel does not dispute the catastrophic outcome of Voyage 25. The outcome however was not caused by any systemic failures by Emanuel ’ s compliance systems.

The outcome was caused by a confluence of events whilst in the Persian Gulf, that is, the onset of the severe weather on 15/16 August 2017, being the rapid rise in extreme temperature and humidity, compounded by the delay in awaiting pilotage of 3 hours and 32 minutes in the port of Hamad, Qatar, the first port of discharge ...27. Emanuel considered that “Voyage 25 was in fact an aberration”.

Findings of Dr Conrad Stacey

28. On 1 June 2018, the Secretary issued a notice to Dr Conrad Stacey of Stacey Agnew Pty Ltd. Dr Stacey is a leading authority on the interaction of weather, ventilation and animal tolerance relating to heat stress on live export voyages. He provided information to Emanuel in relation to the Vessel in 2014. The notice required Dr Stacey provide information including calculations and communications regarding the Vessel and Emanuel.

29. Dr Stacey provided the email correspondence between himself and Mr Graham Daws from June 2014. These emails revealed that Mr Graham Daws provided incorrect PAT values.

30. Standard 4.12 of the ASEL requires that stocking densities and pen-group weight-range tolerances for live-stock must be in accordance with the heat stress assessment using an agreed heat stress risk assessment (HSRA). In his statutory declaration dated 14 August 2018, Dr Stacey explained that HSRA ’ s are produced using computer software called “HotStuff”:

... computer software called ‘HotStuff ’ ... is used to assess the risk of heat stress on live export voyages to the Middle East. HotStuff is the accepted software that produces Heat Stress Risk Assessments (HSRA) for the purpose of S4.12 of the Australian Standards for the Export of Livestock (Version 2.3) 2011 (ASEL). The Department of ***Agriculture*** and Water Resources (Department) has been supervising the live export industry using outputs from HotStuff (Version 4), since July 2011.

Users of HotStuff import a vessel file into the software, create a new voyage, and enter in their voyage plan, including the dates of voyage, ports of departure and arrival, and for each line of livestock: the type and breed, weight, fat score, acclimatisation zone, and number of animals of each line in each deck space and the area occupied. The HotStuff output is the HSRA that is submitted by the exporter in support of the export permit application for that voyage and consignment. If the mortality risk exceeds the industry-nominated 2% probability of 5% mortality for any of the lines of livestock, the exporter can make adjustments to the voyage plan, for example by reducing the number of animals proposed to be loaded.31. The vessel file includes the PAT values for each deck of the vessel where the live-stock are kept during the voyage. Dr Stacey explained that the PAT values for a deck determine the number of stock that can safely be carried on that deck in the hottest Middle Eastern weather. Further, he explained that PAT values are calculated by dividing the air volume flow (m3/hour) supplied to a deck space by the pen area (m2) in that deck space.

32. Following the receipt of this information from Dr Stacey, another show cause notice was issued to Emanuel on 22 June 2018 (Second Show Cause Notice).

Second Show Cause Notice: findings and response from Emanuel

33. In the Second Show Cause Notice, the Secretary relied upon the inflation of the PAT values by Mr Graham Daws, which had the effect of increasing the stocking density on the Vessel and exceeding the acceptable mortality risk. The Secretary explained:

... Mr Graham Daws provided incorrect PAT scores to Mr Conrad Stacey on 27 and 30 June 2014 and that they were incorrect by an error factor ranging from 1.997166 to 2.005627

According to Mr Conrad Stacey, the inflation of the PAT scores provided by Mr Graham Daws, if forming the basis of HotStuff calculations, would have had the practical result of increasing wet bulb temperatures by 1 or 2 degrees Celsius on Awassi voyages, in turn exceeding the acceptable mortality risk. Mr Conrad Stacey considers that had the correct PAT scores been used, stocking density would have been reduced by up to 50% in some areas of the Awassi.

The Department has subsequently received HSRA plans generated by Mr Conrad Stacey using the incorrect PAT scores provided by Emanuel and the correct PAT scores calculated by Mr Conrad Stacey for Voyage 025 of the Awassi. Those HSRA plans indicate that a total of 65,050 livestock were loaded onto the vessel for Voyage 025, resulting in 8 decks exceeding the acceptable mortality risk. They also indicate that in order for all decks to meet the acceptable mortality risk, only 60,816 livestock should have been loaded onto the vessel. This means that 4,234 additional livestock were loaded.

Emanuel has submitted 9 HSRA plans with incorrect PAT scores to the Secretary in connection with an application for an export permit for the Awassi Express. Each of those applications for an export permit were granted.34. The Secretary found reasonable grounds for believing that Emanuel was not a body corporate of integrity and was not competent to hold an export licence:

For these reasons, I have reasonable grounds for believing that Emanuel knew or ought to have known that the PAT scores provided to Stacey Agnew and the Secretary for the purpose of it obtaining export permits were incorrect.

On that basis, I have reasonable grounds for believing that Emanuel has ceased to be: (a) a body corporate of integrity; and (b) competent to hold the licence, and that paragraphs 23(1)(b)(i) and (ii) of the Act therefore apply.35. The Secretary made a further finding in the Second Show Cause Notice with respect to Mr Graham Daws:

There is evidence to suggest that Mr Graham Daws knew or ought to have known that the PAT figures he provided to Mr Conrad Stacey and the Secretary for the purposes of obtaining export permits were incorrect. This resulted in the Secretary approving export permits for Emanuel to export livestock in a manner that exceeded acceptable stocking density and mortality risk.

On that basis, I have reasonable grounds for believing that Mr Graham Daws, a person who participates in the management or control of Emanuel, has ceased to be a person of integrity and that paragraph 23(1)(d) of the Act therefore applies.36. Noting that the First Show Cause Notice had already been issued to Emanuel, the Secretary concluded that it was necessary to immediately suspend Emanuel ’ s Licence:

The provision of incorrect PAT scores that affect the calculation of stocking density, and therefore the level of acceptable mortality risk, jeopardises the interests of the industry as a whole, insofar as it impacts upon the protection of the health and welfare of animals, and the maintenance of the industry, and its integrity, as an international trade. Given my view that there are reasonable grounds to believe that Emanuel has provided incorrect PAT scores in circumstances where it knew or ought to have known that they were incorrect, I cannot be confident that any representations by Emanuel in relation to PAT scores and HSRAs are accurate.

On that basis, it is necessary or desirable in the interests of the industry to immediately suspend Emanuel ’ s licence under subsection 23(4) of the Act.37. Emanuel responded to the Second Show Cause Notice in a letter dated 6 July 2018 and submitted that the initial suspension of its licence should be immediately revoked because there was “no basis to find that Emanuel or Mr Graham Daws has ceased to be a body corporate or person of integrity under subsection 23(1)(b) or (d) of the Act or that Emanuel has ceased to be competent to hold a licence under subsection 23(1)(b) of the Act”. Emanuel ’ s submissions included that:

... calculation of PAT scores was not a matter that was within the ordinary business of Emanuel or its employees. As a result, there was no expertise or business system within Emanuel in relation to the determination of the Awassi PATs.

The provision of the Awassi PATs to Stacey Agnew was a one-off task undertaken by Graham Daws to assist a longstanding client for the purpose of creating an initial vessel file for Hotstuff. In providing the PATs, Graham Daws relied in part, in good faith, on information obtained from the company responsible for installing ventilation on the Awassi, his knowledge of industry practice and the advice of the consultant with expertise in ship design who had a detailed knowledge of the Awassi, having been involved in its ***conversion*** to a livestock carrier.

Importantly, there is no evidence that, in submitting subsequent HSRA plans to the Secretary as part of subsequent applications for export permits for the Awassi, management or employees of Emanuel responsible for submission of HSRA plans knew or should have known that the PAT ***data*** for the Awassi vessel file in Hotstuff was incorrect. In circumstances where there had been no material changes to the design of the Awassi, it was not unreasonable for Emanuel ’ s management and employees not to review the original ***data*** file each time a new application for an export permit was granted.38. In the letter dated 6 July 2018, Emanuel further submitted that, “Graham Daws formed an honest and reasonable belief that accepted industry practice was to add together air supply and exhaust fans, which would lead to original PAT-scores being multiplied by a factor of 2”. Additionally, it was submitted, “based on his limited knowledge of PAT scores and his understanding of accepted industry practice, Mr Graham Daws provided what he understood to be the correct Awassi PAT scores” and “made an honest and reasonable but mistaken attempt to calculate the Awassi PAT scores”. Emanuel ’ s letter also stated:

The provision by Emanuel to Mr Conrad Stacey of PAT scores on behalf of the owners of the Awassi was a one-off occurrence. It was not a function ordinarily undertaken by Emanuel in the course of its business. As a result, there were no processes in place at Emanuel in June 2014 to confirm the methodology used to determine PAT scores or the accuracy of PAT scores.39. Emanuel further submitted that:

For the reasons addressed in this Response, Emanuel stands by its corporate integrity and competence and the integrity of its former managing director, Mr Graham Daws. For the reasons set out [above], Emanuel strongly denies that it knowingly provided incorrect information to the [Department] or that the [Department] cannot be confident of the accuracy of representations made by Emanuel in relation to export permit applications or HSRA is in particular.40. Emanuel stated that there was no significant risk of future breaches because the Department was at that point requiring independent audits of PAT values for all ships, and because Emanuel would in future be employing a compliance officer experienced in the live-stock industry to ensure regulatory compliance.

41. Finally, Emanuel made further submissions to reiterate that Mr Nicholas Daws was not advised and was not aware of the fact that the accredited veterinarian and accredited stockperson left the Vessel early, and that there were no other communications or reports to alert him as such. It was submitted that he was not aware of this until shortly before the release of the 60 Minutes report on 8 April 2018.

EMS Show Cause Notice

42. The Secretary issued a show cause notice to EMS on 11 July 2018 (EMS Show Cause Notice) based on the matters in the show cause notices issued to Emanuel, because EMS was a wholly owned subsidiary of Emanuel and Mr Nicholas Daws was sole director and secretary of both Emanuel and EMS. The Secretary stated that:

In light of the matters set out in the two show cause notices against Emanuel referred to above, and the immediate suspension of Emanuel ’ s licence upon issuance of the second SCN [show cause notice], I find that it is necessary or desirable in the interests of the industry to immediately suspend EMS ’ s licence under section 23(4) of the Act, given (i) Emanuel ’ s total ownership and control of EMS, (ii) the integrity concerns relating to Emanuel and Mr Nicholas Daws and (iii) the risk of the suspension against Emanuel being frustrated by its reliance on EMS ’ s licence.43. EMS responded to the EMS Show Cause Notice by a letter dated 23 July 2018. EMS submitted that there was no reasonable basis for the Secretary to continue the suspension of EMS ’ s Licence and requested the Secretary immediately revoke the suspension. EMS did not dispute its corporate relationship with Emanuel but disputed the integrity concerns relating to Emanuel and Mr Nicholas Daws. EMS referred to the resignation of Mr Graham Daws as a director of Emanuel and EMS, stating that, “the management of Emanuel and EMS has been undergoing a substantial review and restructure”. EMS submitted that there was no evidence of “ongoing or repeated disregard by EMS for its regulatory obligations”.

44. Emanuel informed the Secretary on 9 August 2018 of the changes it proposed to make to its corporate governance, compliance, and risk mitigation measures. Emanuel advised that Mr Graham Daws had resigned as a director in late June and that Mr Nicholas Daws had been appointed as the sole director of both Emanuel and EMS. The letter advised, amongst other things, that Mr Nicholas Daws had resolved to appoint two new independent directors to the board of Emanuel. The letter advised that Emanuel was in the process of appointing “a Compliance and Corporate Governance/Company Secretary with both industry and regulatory experience”.

45. On 14 August 2018, the Secretary notified Emanuel of alleged ASEL breaches for Voyages 24, 25 and 26 and provided a copy of the statutory declaration from Dr Stacey dated 14 August 2018.

46. Emanuel responded by letter dated 20 August 2018. It stated that the alleged breaches on Voyages 24 and 26 were not relevant to the grounds on which the Secretary formed the belief for the First Show Cause Notice, and for that reason only Voyage 25 was relevant. The letter further denied breaches and submitted that the breaches were minor and were caused by factors beyond Emanuel ’ s control, such as extreme weather conditions. The letter also made a further submission that, with respect to Mr Graham Daws providing incorrect PAT values to Dr Stacey, there was “confusion and a general lack of understanding as to how PAT scores ought to be calculated”.

REVIEWABLE DECISIONS

47. In a decision dated 21 August 2018, being the First Reviewable Decision, the Secretary decided to cancel Emanuel ’ s Licence on the basis that she was satisfied that:

Emanuel has ceased to be a body corporate of integrity because it has provided misleading PAT values to the Department in circumstances where: (i) Emanuel knew they were incorrect or should have known they were incorrect, and (ii) Emanuel was aware that the PAT values would affect the acceptable loading capacity of the Awassi; andEmanuel has ceased to be competent to hold a live-stock export licence because Emanuel has not been able to provide correct information concerning PAT values and/or committed multiple contraventions of ASEL.48. The Secretary ’ s reasons for deciding to cancel Emanuel ’ s Licence included the following:

The conduct of Emanuel in providing misleading PAT values is very serious in that it had the potential to significantly impact the welfare of the live-stock being exported by Emanuel. I note, and do not dispute, the evidence of Professor Shane Maloney that by his estimates, the conditions experienced on Voyage 25 were hotter than anything in the historical record. However, I place more weight on the fact that had the correct PAT values been provided, significantly fewer sheep could have been loaded, resulting in a lower stocking density. I am satisfied that this may have resulted in an exacerbation of the effect of the severe weather events confronted by Voyage 25. This undermines the effect of the regulatory scheme, which has as one of its central components, the welfare of live-stock.

I am satisfied that Emanuel ’ s actions in providing incorrect PAT values jeopardises the interests of the industry as a whole as it impacts upon the protection of the health and welfare of animals, and the maintenance of the industry, and its integrity, as an export industry.

In determining the appropriate action to take under s 24 of the AMLI Act, I have had regard to Emanuel ’ s indication that it will appoint a compliance officer to ensure the provision of correct PAT values in the future, that Mr Graham Daws is no longer a director of Emanuel, and that Emanuel proposes to appoint two independent directors. However, I afford limited weight to this consideration in circumstances where, as found above, I am satisfied that Emanuel ’ s actions in providing incorrect PAT values was not limited to the actions of Mr Graham Daws.

I am not satisfied that the structural changes proposed by Emanuel mean that Emanuel is a body corporate of integrity and/or competent to hold the licence. Emanuel ’ s willingness to provide incorrect PAT values when it knew or should have known that they were incorrect shows its willingness to disregard or manipulate the regulatory regime in order to advance its commercial interests or obtain a commercial benefit. ...

I note that the negative health and welfare outcomes of Voyage 25 resulted in significant public criticism of the live export trade to the Middle-East as a whole and brought the industry into disrepute. Furthermore, I find that it is in the interests of the industry that exporters comply with the licence conditions, including ASEL, and, particularly the proper and honest provision of information to the Department, including PAT values. As noted above, the PAT value is an essential component of the HSRA that is submitted by the exporter in support of the export permit application for a voyage and consignment and is relevant to the calculation of the mortality risk (noting that industry-nominated standard is a 2 per cent probability of 5 per cent mortality for any of the lines of live-stock).49. The Secretary was not, however, satisfied that Mr Nicholas Daws had ceased to be a person of integrity.

50. The Secretary also stated that:

... whilst it is clear that Mr Graham Daws was a person in management or control of Emanuel at the time of his relevant conduct, I am not satisfied on the evidence before me that Mr Graham Daws is a person who currently participates in the management and control of Emanuel the purpose of s 23(1)(d) of the AMLI Act.51. On 5 September 2018, the Secretary made the Second Reviewable Decision to cancel EMS ’ s Licence pursuant to s 24(1)(c). The Secretary was satisfied that EMS was an associate of Emanuel, and given this association, the Secretary concluded:

There is a significant risk, in light of the close and enduring connection between Emanuel and EMS, that Emanuel may seek to frustrate its licence cancellation by relying on EMS ’ s licence. I am satisfied that cancellation of EMS ’ s licence would be consistent with the interests of industry and would promote compliance with the regulatory regime – particularly those aspects directed to the observance of licence conditions and the protection of animal health and welfare.52. As noted above, on 18 September 2018, Emanuel lodged an application for review of the First Reviewable Decision, and on 26 September 2018, EMS lodged an application for review of the Second Reviewable Decision in this Tribunal.

ISSUES

53. In the section titled, “jurisdiction” below, we have considered the scope of our jurisdiction in detail, and specifically the questions raised by the statute for consideration (Shi v Migration Agents Registration Authority [2008] HCA 31; (2008) 235 CLR 286 (Shi); Frugtniet v Australian Securities and Investments Commission [2019] HCA 16; (2019) 266 CLR 250 (Frugtniet)).

54. These “questions”, or in other words the issues that require our determination, are whether there are reasonable grounds for believing that:

(a) Emanuel has ceased to be a body corporate of integrity (s 23(1)(b)(i)) (Issue 1);

(b) a person who participates in the management or control of Emanuel (that is, Mr Graham Daws) has ceased to be a person of integrity (s 23(1)(d)) (Issue 2);

(c) Emanuel contravened a condition of Emanuel ’ s Licence (s 23(1)(g)) (Issue 3);

(d) Emanuel has ceased to be competent to hold Emanuel ’ s Licence (s 23(1)(b)(ii)) (Issue 4);

(e) if the answer to one or more of Issues 1 through to 4 is in the affirmative, whether Emanuel has taken sufficient steps to rehabilitate itself, that is, to address the concerns or issues that led to the integrity, competence and non-compliance concerns (Issue 5); and

(f) depending on our findings with respect to Issue 5, whether the power in s 24(1) should be exercised, and if so, how. This involves a consideration of whether: the licence should be cancelled; the licence should be suspended for a period; or whether Emanuel should be reprimanded (Issue 6).55. With respect to EMS, the issue that requires determination is whether the degree of association of Emanuel and EMS warranted the cancellation of EMS ’ s Licence and the regulatory action that should be applied to this licence following the Tribunal ’ s findings on Issues 5 and 6 (Issue 7).

THE HEARING AND THE EVIDENCE

56. The hearing of these applications took place from Monday 22 February 2021 to Friday 5 March 2021, with closing submissions initially commencing on Wednesday 17 March 2021.

57. The hearing was originally scheduled for an eight-day hearing in approximately mid to late April 2020 but was vacated due to difficulties associated with the COVID-19 pandemic. The hearing was then scheduled for an eight-day hearing from mid to late November 2020 but was vacated by consent after the Tribunal granted leave to the Secretary to file additional evidence.

58. Written closing submissions were received and further oral closing submissions were heard by the Tribunal from Wednesday 5 May 2021 to Friday 7 May 2021.

59. During the closing submissions we noted that the AMLI Act was amended by the Export Control (Consequential Amendments and Transitional Provisions) Act 2020 (Cth) (Transitional Act) with effect from 28 March 2021. We requested submissions from the parties regarding the law that we should apply in deciding the applications. The parties requested time to make written submissions on this issue and we formally directed that they do so. We received written submissions on the applicable law from the parties in May 2021.

THE WITNESSES WHO GAVE EVIDENCE AT THE HEARING

Witnesses called by the Applicants

60. The Applicants called the following witnesses who provided witness statements and gave evidence at the hearing.

Mr Nicholas Daws

61. Mr Nicholas Daws is the managing director of both Emanuel and EMS. He commenced working for Emanuel and EMS in 1997 as a live-stock clerk. Prior to taking over the role of managing director from his father, Mr Graham Daws, Mr Nicholas Daws was general manager and finance manager of both entities.

Mr Ben Stanton

62. Mr Ben Stanton is the commercial manager of Emanuel (and previously the export manager). He commenced working for Emanuel during his school holidays from 1996 to 1999 and commenced fulltime employment with Emanuel in 2002. He is the son of Mr Mike Stanton, who was previously a director of Emanuel.

63. In 2008, Mr Ben Stanton became the export manager of Emanuel, and, at the time of the hearing, he was the commercial manager. He reported to Mr Graham Daws until Mr Daws resigned as managing director of the companies in June 2018.

Mr John Edwards

64. Mr John Edwards is the export services manager, and shared live-stock manager of Emanuel. He commenced employment with Emanuel in May 2016 as export services manager. Until the time that Emanuel ’ s Licence was cancelled, this role involved ensuring compliance with the Exporter Supply Chain Assurance System (ESCAS), which is a method of tracing live-stock through the supply chain (which we explain further below in the “Legislative framework” section). Following the licence cancellation, his role became broader, including by sharing the role of live-stock manager with Mr Nicholas Daws, Dr Ludeman and Mr Ben Stanton. His role now involves ensuring that animals are compliant with state and federal regulations when they enter the Peel Feedlot (a feedlot of which Emanuel is the registered operator). Mr Edwards has also been a board member of the Australian Live Exporters Council since 2003, where he represents the sheep export industry (as opposed to one specific company, such as Emanuel).

Dr Robert Macpherson

65. Dr Robert Macpherson is an Australian government accredited veterinarian, whose company, RA Veterinary Services, is engaged by Rural Export and Trading (WA) Pty Ltd (RETWA) at the Peel Feedlot. RETWA is a subsidiary of the Kuwait Livestock Trading Company (KLTT), which owns the Peel Feedlot. Since approximately 2003, he has provided sheep export inspection services. Dr Macpherson undertook inspections at the Peel Feedlot.

Dr Holly Ludeman

66. Dr Holly Ludeman is the corporate governance and compliance officer for Diverse Management Group Pty Ltd, of which Emanuel and EMS are subsidiary companies. Dr Ludeman commenced her employment on 10 December 2018 after Emanuel ’ s Licence and EMS ’ s Licence had been cancelled.

Dr Ben Madin

67. Dr Ben Madin is the managing director Ausvet Pty Ltd. His expert reports were admitted into evidence. Dr Madin attended the Peel Feedlot on three occasions in December 2020 for the purpose of preparing his second report.

Witnesses called by the Secretary

68. The Secretary called the following witnesses who both provided sworn statements and gave evidence at the hearing.

Dr Karen Dowd

69. Dr Karen Dowd has been the senior veterinary officer for the West Region, Exports and Veterinary Services Division of the Department since 2019. As part of this role, Dr Dowd undertakes inspections of animals for export for the purpose of providing a health certificate. Dr Dowd undertook inspections at the Peel Feedlot.

Ms Cristina Hutchison

70. Ms Cristina Hutchison is the Assistant Secretary, live animal exports, of the Secretary.

Implications of Mr Graham Daws not being called to give evidence

71. Allegations regarding the conduct of Mr Graham Daws were relevant to the statutory questions before us, including whether he ceased to be a person of integrity and whether he is a person who continues to participate in the control or management of Emanuel or EMS. This raises the issue of what we should make of the absence of Mr Graham Daws as a witness. In this regard, the Applicants ’ raised a “question of jeopardy” (transcript of closing submissions/36), or in other words, a claim of self-incrimination privilege. The parties also made submissions regarding whether the rule in Jones v Dunkel [1959] HCA 8; (1959) 101 CLR 298 should be applied. We will now consider these issues.

72. With respect to the self-incrimination privilege claim, we observe that the proper course would be that when the person is in the witness box, they can refuse to answer any questions that may tend to incriminate them (see s 62(4) of the AAT Act). We now turn to the rule in Jones v Dunkel.

73. In summary, the rule is that the failure of a party in a civil action to give evidence under oath may give rise to an adverse inference that the evidence they would have given would not assist their case. The rule was stated by Kitto J, at 308, as follows:

... any inference favourable to the plaintiff for which there was ground in the evidence might be more confidently drawn when a person presumably able to put a true complexion on the facts relied on as the ground for the inference has not been called as a witness by the defendant and the evidence provides no sufficient explanation of his absence.74. The rule was more particularly described by Menzies J at 312:

In my opinion a proper direction in the circumstances should have made three things clear: (i) that the absence of the defendant as a witness cannot be used to make up any deficiency in evidence; (ii) that evidence which might have been contradicted by the defendant can be accepted the more readily if the defendant fails to give evidence; (iii) that where an inference is open from the facts proved by direct evidence and the question is whether it should be drawn, the circumstance that the defendant disputing it might have proved the contrary had he chosen to give evidence is properly to be taken into account as a circumstance in favour of drawing the inference.75. The parties made similar submissions that the extent of any inference that could be drawn would be that any evidence that Mr Graham Daws would have given, had he been called as a witness, would not have assisted the Applicants ’ case.

76. We may have been assisted in making findings of fact if Mr Graham Daws had been called as a witness because of his past role as managing director at the time of the events leading to the cancellation of the licences. It was certainly open to the Applicants to call Mr Graham Daws, as their former managing director, and to do so may have assisted them in contradicting aspects of the Secretary ’ s case. For example, Mr Graham Daws would have been able to give evidence relating to issues such as whether he continued to control or to manage the Applicants ’ business after his resignation as managing director.

77. However, the Applicants were able to address some of the issues in these proceedings through leading other evidence. For example, several of the Applicants ’ witnesses gave evidence confirming that Mr Nicholas Daws had entirely taken over from Mr Graham Daws as managing director, and that Mr Graham Daws no longer had any role in the management of either company.

78. Further, with respect to the provision of incorrect PAT values, there is other evidence before the Tribunal, including email correspondence between Mr Graham Daws and Dr Stacey from which we have been able to infer what Mr Graham Daws knew or ought to have known concerning the incorrect PAT values.

79. Whilst we may have been assisted in making findings of fact if Mr Graham Daws was called to give evidence, we do not place much weight on his failure to give evidence. In these circumstances, it is appropriate for us to simply draw an inference that nothing Mr Graham Daws would have said in evidence would have assisted the Applicants ’ case.

LEGISLATIVE FRAMEWORK

Applicable law

80. As previously noted, the AMLI Act was amended by the Transitional Act with effect from 28 March 2021.

81. The Transitional Act repealed the Export Control Act 1982 (Cth) (Export Control Act) and Parts 2 and 2A of the AMLI Act were replaced with new export licence provisions contained in the Export Control Act 2020 (Cth).

82. The parties agreed, in their written submissions on the applicable law, that the questions for determination in this review remain unchanged by the repeal of Parts 2 and 2A, and that the Tribunal should determine the correct or preferable decision under s 24(1) of the AMLI Act which was the applicable provision at the time of the Secretary ’ s decisions. That is, the applicable legislation is the version of the AMLI Act in force at the time of the licence cancellations.

83. We agree, and note s 7(2) of the Acts Interpretation Act 1901 (Cth) (Interpretation Act) which provides, in part:

(2) If an Act, or an instrument under an Act, repeals or amends an Act (the affected Act) or a part of an Act, then the repeal or amendment does not: ...(c) affect any right, privilege, obligation or liability acquired, accrued or incurred under the affected Act or part; or ...

(e) affect any investigation, legal proceeding or remedy in respect of any such right, privilege, obligation, liability, penalty, forfeiture or punishment.Any such investigation, legal proceeding or remedy may be instituted, continued or enforced, and any such penalty, forfeiture or punishment may be imposed, as if the affected Act or part had not been repealed or amended.84. Relevantly, sch 3 s 2 of the Transitional Act provides: “This Schedule does not limit the effect of section 7 of the Acts Interpretation Act 1901 as it applies in relation to the repeals and amendments made by this Act”.

85. We find that the Applicants have an accrued right (Re Costello and Department of Transport [1979] AATA 184; (1979) 2 ALD 934, 939 – 945; Esber v Commonwealth [1992] HCA 20; (1992) 174 CLR 430) to have the Tribunal review the Secretary ’ s decisions made under s 24(4) of the AMLI Act. Subsections 7(2)(c) and 7(2)(e) of the Interpretation Act preserve the Applicants ’ accrued right for the Tribunal to review the Secretary ’ s decisions, namely the First Reviewable Decision and the Second Reviewable Decision.

86. Further, sch 3 s 37(3) of the Transitional Act is also consistent with the preservation of accrued rights, pursuant to ss 7(2)(c) and 7(2)(e) of the Interpretation Act (notwithstanding the fact that sch 3 s 37(3) concerns an export licence suspension). Schedule 3 s 37(3) states:

(3) If:(a) the export licence had been suspended under subsection 23(5) or paragraph 24(1)(e) or (f) of old Part 2 of the AMLI Act; and

(b) the suspension was in force immediately before the commencement time;then the export licence is taken to be suspended after the commencement time under subsection 205(1) of the new Export Control Act.

Note 1: The suspension may be revoked (see section 209 of the new Export Control Act).

Note 2: Applications may be made to the Administrative Appeals Tribunal for review of decisions made in relation to an export licence under section 23 or subsection 24(1) of old Part 2 of the AMLI Act (see subsections 23(8) and 24(4) of old Part 2 of the AMLI Act and section 7 of the Acts Interpretation Act 1901).87. Therefore, we accept the contention of the parties that the applicable law for the current applications was the law in force as at the time that the Secretary made the First Reviewable Decision and the Second Reviewable Decision.

Prohibition on the export of live-stock

88. Section 7 of the Export Control Act provides for the prohibition by regulations of the export of “prescribed goods” which includes live-stock.

89. Section 3 of the Export Control Act provides that “regulations includes orders”.

90. The export of live-stock is subject to the following conditions in s 1A.01 of the Export Control (Animals) Order 2004 (Cth) (Animals Order):

The export of live‑stock is prohibited unless the following conditions are complied with:(a) the exporter holds a live‑stock export licence under the AMLI Act;

(b) the Secretary has approved an ESCAS, unless an ESCAS is not required because of subsection 1A.19(4);

(c) an NOI for the export has been approved under section 1A.25A, the approval is in force and, if the exporter was required to vary the NOI under section 1A.26, the NOI has been varied as required;

(d) if the export is by sea—the live‑stock are held before export, and assembled for export, in registered premises; ...

(f) if the live‑stock are held before export, and assembled for export, in registered premises—the exporter has given the operator of the registered premises information as required by section 1A.28;

(g) an approved arrangement for the exporter is in effect in relation to the live‑stock;

(h) the live‑stock have been prepared in accordance with the approved arrangement and any conditions on the approval of the arrangement;

(ha) the exporter is the holder of an approved export program in force under Subdivision A of Division 1A.7 that applies to some or all of the export activities of the exporter in relation to the live‑stock;(i) an export permit for the export by the exporter is in force;

(j) the live‑stock are exported to the place, and by the means, specified in the export permit;

(k) the exporter complies with the approved arrangement, the approved ESCAS and any condition on the approval of either;(l) the exporter complies with any condition of the export permit.

91. In summary, the Animals Order prohibits the export of live-stock unless:

(a) the exporter holds a live-stock export licence;

(b) an export permit for the export by the exporter is in force;

(c) there is an approved arrangement in effect; and

(d) the exporter complies with any condition of the export permit.Live-stock export licence

92. The AMLI Act establishes the licensing regime for the grant of an export licence.

93. Section 11 concerns the application process for an export licence. It provides:

(1) An application for an export licence must be made in accordance with the regulations.

(2) An applicant for an export licence must pay the prescribed fee in respect of the application:(a) when the application is lodged; or

(b) at any later time permitted under the regulations.

(3) If a person has given the Secretary information or a document in connection with an application for an export licence and, before the application is granted or refused:(a) a change happens so that the information, or anything stated in the document, ceases to be correct in relation to a matter; or

(b) the person becomes aware that the information, or anything stated in the document, is incorrect in relation to a matter;the person must, within 7 days after the change happens or the person becomes so aware, as the case may be, give the Secretary a written statement setting out the correct particulars of the matter.(4) A person who fails to comply with subsection (3) commits an offence punishable, on conviction, by imprisonment for not longer than 12 months.

(Notes omitted.)

94. It is the Secretary who grants the export licence under s 10.

95. Section 12 sets out the requirements for the grant of an export licence:

(1) The Secretary must not grant an export licence unless satisfied that:(a) if the applicant is an individual, the applicant is:(i) a person of integrity; and

(ii) competent to hold the licence; and

(iii) a person of sound financial standing; and

(b) if the applicant is a body corporate, the applicant is:(i) a body corporate of integrity; and

(ii) competent to hold the licence; and

(iii) a body corporate of sound financial standing; and

(c) each person who participates or would participate, in the management or control of the applicant ’ s meat or live-stock export business or proposed meat or live-stock export business is a person of integrity; and

(d) the applicant is, and is likely to continue to be, able to comply with the conditions to which the licence, if granted, would be subject; and

(e) the granting of the licence to the applicant would not, for any other reason, be contrary to the interests of the industry.(2) The regulations may prescribe the matters to which the Secretary is to have regard for the purpose of satisfying himself or herself about the matters referred to in subsection (1).

(3) Without limiting subsection (2), for the purpose of satisfying himself or herself about the matters referred to in subsection (1) in relation to an application for a live-stock export licence, the Secretary may have regard to the extent to which the applicant has complied with any requirements of or under the Export Control Act 1982 , including any conditions or restrictions:(a) to which a licence or permission under that Act, to export prescribed goods that are live-stock, was subject; or

(b) that otherwise relate to the export of prescribed goods that are live-stock.96. Section 8 provides that, in the circumstances described in that section, a person is taken to be a person who participates, or would participate, in the management or control of a meat or live-stock business. Section 8(1) provides:

(1) For the purposes of this Part, a person is taken to be a person who participates, or who would participate, in the management or control of the meat or live-stock export business, or proposed meat or live-stock export business, of another person if:(a) the first-mentioned person has or would have authority to direct the operations, or an important or substantial part of the operations, of the business or proposed business; or

(b) the first-mentioned person has or would have authority to direct a person who has or would have authority of the kind referred to in paragraph (a) in the exercise of that authority or proposed authority.97. The Secretary may issue a show cause notice to the holder of an export licence in the circumstances set out in s 23. The relevant parts of s 23 are as follows:

(1) If the Secretary has reasonable grounds for believing, in relation to an export licence, that: ...(b) if the licence is held by a body corporate, the holder of the licence has ceased to be:(i) a body corporate of integrity; or

(ii) competent to hold the licence; or

(iii) a body corporate of sound financial standing; or ...

(d) a person who participates in the management or control of the meat or live-stock export business of the holder of the licence has ceased to be a person of integrity; or

(e) information or a document given to the Secretary in connection with the application for the licence was false or misleading and, if the information or document has not been false or misleading, the licence would not have been granted; or

(ea) if the licence is a licence to export live-stock and the holder was required to make a declaration of a kind mentioned in subsection 7(3B) of the Export Control Act 1982 as a condition subject to which a licence or permission to export under that Act was granted—the holder made any such declaration falsely; or ...

(g) the holder of the licence has contravened a condition of the licence;the Secretary may give a written notice under this section to the holder of the licence.(1A) Without limiting subsection (2), for the purpose of determining whether a circumstance mentioned in subsection (1) has occurred in relation to a live-stock export licence, the Secretary may have regard to the extent to which the holder has complied with any requirements of or under the Export Control Act 1982, including any conditions or restrictions:

(a) to which a licence or permission under that Act, to export prescribed goods that are live-stock, was subject; or

(b) that otherwise relate to the export of prescribed goods that are live-stock.(2) The regulations may prescribe the matters to which the Secretary is to have regard in determining whether a circumstance referred to in paragraph (1)(a), (b), (c) or (d) has occurred.

(2A) If paragraph 25A(2)(b) applies, the Secretary may give a written notice to the holder of the licence mentioned in that paragraph.

(3) A show cause notice must:

(a) if subsection (1) applies—state the grounds on which the Secretary formed the belief because of which the notice is given; and

(aa) if subsection (2A) applies—state the grounds on which the Secretary gives the notice; and

(b) include a statement to the effect that the holder of the relevant licence may, within 14 days after the day on which the notice is given to the holder, give the Secretary a written statement showing cause why the licence should not be dealt with under subsection 24(1). ...(Emphasis added.)

98. The powers of the Secretary after issuing the show cause notice are set out in s 24. Relevantly, s 24(1) provides:

(1) If the Secretary:(a) has given a show cause notice to the holder of an export licence; and

(b) after considering any written statement by the holder of the licence given within the period mentioned in paragraph 23(3)(b), is satisfied:(i) if subsection 23(1) applies—of any of the matters mentioned in subsection 23(1); or

(ii) if subsection 23(2A) applies—that he or she should take action in relation to the licence under any of paragraphs (c) to (g) of this subsection;

the Secretary may, by written notice given to the holder of the licence:(c) cancel the licence; or

(d) if the licence is about to expire—determine that the licence not be renewed; or

(e) if the licence is not already suspended—suspend the licence for the period specified in the notice; or

(f) if the licence is already suspended—further suspend the licence for the period specified in the notice; or

(g) reprimand the holder of the licence.99. The Secretary also has powers in relation to the licensing of associates. Section 25A provides:

(1) This section applies if:(a) the Secretary:(i) refuses to grant a live-stock export licence to a person; or

(ii) determines that a person ’ s live-stock export licence not be renewed; or

(iii) suspends, further suspends or cancels a person ’ s live-stock export licence; and

(b) another person is an associate of the person.(2) If this section applies, the Secretary may do either or both of the following, on any one or more occasions:(a) if the other person is or becomes an applicant for the grant of a live-stock export licence—refuse to grant the licence;

(b) if the other person is or becomes the holder of a live-stock export licence—give a written notice under subsection 23(2A) to the other person.

(3) To avoid doubt, the Secretary may do as mentioned in subsection (2) whether or not the other person is still an associate at the time the Secretary does so.100. Section 24(4) provides that decisions of the Secretary made under s 24(1) can be appealed to the Tribunal.

101. We discuss the interpretation of ss 23 and 24 in more detail below under the headings “Jurisdiction” at [153] – [161] and, “The interpretation of section 23 of the AMLI Act”.

The Standards Order, the Conditions Order, the Animals Order and the ASEL

102. The Secretary may make orders to be complied with by holders of an export licence and may give written directions under s 17(1) of the AMLI Act.

103. Pursuant to s 17(1), the Secretary has made the following Orders:

(a) the Standards Order; and

(b) Australian Meat and Live-stock Industry (Conditions on live-stock export licenses) Order 2012 (Cth) (Conditions Order).104. The holder of a licence must comply with the orders and directions made under s 17(1). This is stated in s 17(5):

(5) An export licence is subject to the condition that the holder of the licence must comply with:(a) orders made under this section; and

(b) any directions given from time to time to the holder under this section.105. Section 3(1) of the Standards Order provides that the holder of a live-stock export licence must not export live-stock except in accordance with the relevant ASEL.

106. The version of the ASEL that is applicable to these proceedings is version 2.3, April 2011. Broadly speaking, the ASEL sets out the following six standards for the export of live-stock from farm through to sea or air voyage:

Standard 1 Sourcing and on-farm preparation of livestock ...

Standard 2 Land transport of livestock ...

Standard 3 Management of livestock in registered premises ...

Standard 4 Vessel preparation and loading ...

Standard 5 Onboard management of livestock ...

Standard 6 Air transport of livestock ...107. Section 3 of the Conditions Order provides that the holder of a live-stock export licence must comply with any relevant provisions of the Animals Order.

Approved arrangements

108. Under s 1A.02 of the Animals Order, an exporter who wants to export live-stock must also apply to the Secretary for approval of arrangements for the preparation of live-stock.

109. The Secretary may approve the arrangement if the Secretary is satisfied of the matters set out in s 1A.05(1) of the Animals Order, which provides:

(1) The Secretary may, by written notice given to the applicant, approve the arrangement for the preparation of live‑stock for export if the Secretary is satisfied that:(a) the arrangement covers each step of the preparation; and

(b) acting in accordance with the arrangement will ensure compliance with:(i) this Order; and

(ii) the Australian Standards for the Export of Live‑stock; and

(iii) conditions to which the applicant ’ s live‑stock export licence under the AMLI Act covering the proposed export is subject or will be, or is likely to be, subject if the applicant is granted such a licence; and

(iv) importing country requirements for the live‑stock; and

(c) preparation of live‑stock for export in accordance with the arrangement will provide a sound basis for giving an export permit and health certificate for the live‑stock; and

(e) the applicant will act in accordance with the arrangement.Notice of intention

110. Section 1A.24(1) of the Animals Order requires that an exporter must give the Secretary a Notice of Intention to Export (NOI) before the proposed export.

111. Relevantly, s 1A.25A(2) sets out the approval criteria for an NOI:

(2) The criteria for approval of an NOI for a proposed export of live‑stock are:(a) whether the proposed export complies with the following:(i) the requirements of this Order;

(ii) the requirements of the AMLI Act and regulations under that Act;

(iii) orders and directions under the AMLI Act;

(iv) the conditions of the exporter ’ s live‑stock export licence under the AMLI Act; and

(b) whether the international transport arrangements for the live‑stock are adequate for their health and welfare.112. Under s 1A.26 the exporter must notify the Secretary if circumstances change after an NOI is given.

Exporter Supply Chain Assurance System (ESCAS)

113. Generally, an ESCAS must be given to the Secretary 10 working days before the first export to which the ESCAS will apply (s 1A.20(1)(b) of the Animals Order).

114. Section 1A.19(2) of the Animals Order specifies that the ESCAS must contain details about the supply chain of the live-stock.

Heat stress risk assessment (HSRA)

115. ASEL Standard 4.12 provides in part that:

Stocking densities and pen-group weight-range tolerances for species of livestock must be in accordance with specifications in Appendix 4.1 and heat stress assessment using an agreed heat stress risk assessment unless a variation is required and approved by the relevant government agency...116. In an Export Advisory Notice 2012 – 08 dated 8 May 2012 (2012 EA Notice), exporters were advised that they were required to submit an HSRA to the Department with their NOI and consignment risk management plan (CRMP).

117. In summary, the 2012 EA Notice set out instructions which required exporters to use a software program called “HotStuff Version 4” to calculate the HSRA, which was to be attached to the NOI/CRMP with the “vessel ***data*** file” (or to organise the vessel owner to submit the vessel ***data*** file directly to the Department). The instructions also stated that the exporter was required to “ensure the HSRA risk output is less than a 2% risk of a 5% mortality”.

Export permit and health certificate

118. Section 1A.01(i) of the Animals Order prohibits the export of live-stock unless an export permit for the export by the exporter is in force. An exporter may apply to the Secretary for an export permit and must also give a declaration which addresses the criteria set out in s 1A.29(3) of the Animals Order:

(3) The declaration by the exporter must state that:(a) the exporter has complied with:(i) any requirements under any other Commonwealth law, or the law of a State or Territory, that the exporter must comply with; and

(ii) the Australian Standards for the Export of Live‑stock; and

(iii) the approved ESCAS that applies to the export; and

(iv) all importing country requirements relating to the consignment that the exporter must comply with; and

(b) the live‑stock have been prepared for export by the exporter in accordance with the approved arrangement for the exporter; and

(ba) an accredited veterinarian has undertaken the activities in the approved export program held by the exporter under Subdivision A of Division 1A.7 that apply in relation to the preparation of the live‑stock; and

(c) no relevant circumstances have changed in relation to the approved ESCAS or approved NOI that applies to the export.119. The Secretary may grant an export permit if the various conditions set out in ss 1A.30(1) and 1A.30(2) are satisfied. These sections provide:

(1) The Secretary may grant an export permit for live‑stock if:(aa) an NOI for the export of the live‑stock has been approved under section 1A.25A and the approval is in force; and

(a) the exporter has applied for the permit under section 1A.29; and

(b) the exporter holds a live‑stock export licence under the AMLI Act; and

(c) if another Commonwealth law requires the exporter to hold an authorisation (whatever it is called) for the export—the exporter holds such an authorisation; and

(d) the exporter has made the declaration mentioned in subsection 7(3C) of the Export Control Act 1982 (about compliance with conditions of such a live‑stock export licence under the AMLI Act and other requirements under that Act about export of live‑stock); and

(e) if the relevant importing country requirements include a requirement for a health certificate—a health certificate for the live‑stock has been issued or will be issued when the permit is granted; and

(f) the Secretary is satisfied that:(i) the live‑stock have been prepared in accordance with the approved arrangement and any conditions on the approval of the arrangement; and

(ia) an accredited veterinarian has undertaken the activities in the approved export program held by the exporter under Subdivision A of Division 1A.7 that apply in relation to the preparation of the live‑stock; and(ii) the exporter has complied with importing country requirements in relation to the live‑stock; and

(iii) no relevant circumstances have changed since the live‑stock were inspected under section 1A.33 for the purposes of the issue of the health certificate (if required); and

(iv) the Australian Standards for the Export of Live‑stock have been, and will continue to be, complied with in relation to the live‑stock; and

(v) the exporter has complied, and is in a position to comply, with the approved ESCAS that applies to the export, unless an ESCAS is not required because of subsection 1A.19(4); and

(g) the live‑stock are fit enough to undertake the proposed export voyage without any significant impairment of their health; and

(h) the travel arrangements for the live‑stock are adequate for their health and welfare.Note: Paragraph (1)(a) has the effect that the Secretary may grant an export permit only if the exporter has made an application for the permit that includes the declaration required by paragraph 1A.29(2)(b).(2) In deciding whether to grant an export permit to an exporter, the Secretary may take into account whether the exporter has complied with:

(a) any conditions to which a live‑stock export licence under the AMLI Act was subject; and

(b) any requirements under that Act that otherwise relate to the export of live‑stock.Registered premises

120. Prior to their export, live-stock may be held and assembled at registered premises. The Animals Order provides that these premises must be registered and sets out requirements for an application for registration in s 2.04

121. Section 2.04(3)(d) of the Animals Order refers to an application for registration having to include a copy of an operations manual. Section 2.05 sets out the requirements for the operations manual.

122. Section 2.10 of the Animals Order sets out specified conditions for the registration of premises. It provides in part:

(1) The registration of premises is subject to the following conditions:(a) that the operator must not accept an animal for holding and assembling for export except in accordance with the registration;

(b) that, subject to subsection (2), operations at the premises, and the maintenance of the premises, are carried out in accordance with the approved operations manual for the premises; ...JURISDICTION

123. The Applicants submitted that the scope of the Tribunal ’ s review should be restricted to the content of the show cause notices.

124. Generally speaking, a show cause notice must state the grounds on which the Secretary formed the belief that resulted in the notice being given (see ss 23(3)(a) and 23(3)(aa)). The export licence holder is then given an opportunity to respond in the form of a written statement (s 23(3)(b)). After giving the show cause notice and considering the written statement of the export licence holder, the Secretary may, by written notice to the licence holder take action, including to cancel or suspend the licence, or to issue a reprimand (s 24(1)).

125. The Applicants submitted that the effect of these provisions is that the scope of the Tribunal ’ s review is limited to the grounds raised in the Secretary ’ s show cause notice.

The core of the Applicants ’ submission is that the requirement to afford procedural fairness under the AMLI Act, through the process of the Secretary giving a show cause notice, and the consideration of the written statement from the export licence holder by the Secretary, is a precondition to the Secretary ’ s exercise of power under s 24(1). The Applicants also submitted that the Tribunal is subject to those same preconditions that were determined by the Secretary in the show cause notice.

126. If this submission were to be accepted, the Tribunal would have no jurisdiction to consider allegations that were not contained in the grounds in the show cause notices. The Tribunal could not then, for example, consider subsequent allegations of non-compliance with s 23(1) against the Applicants, such as the allegations concerning the Peel Feedlot, except to the extent that those alleged events were relevant to the grounds originally stated in the show cause notice.

127. In the Applicants ’ Amended Closing Submissions, the Applicants summarised their submissions about the Tribunal ’ s jurisdiction as follows:

39. Since the Tribunal ’ s power is subject to the same constraints as the Respondent ’ s power, the ultimate question before the Tribunal, in determining whether the Respondent ’ s decision to cancel Emanuel Exports ’ licence was the correct or preferable decision, is whether the Tribunal is satisfied of one or more of the matters mentioned in s 23(1) of the AMLI Act on the grounds set out in the show cause notices issued by the Respondent to Emanuel Exports.

40. In considering whether it is satisfied of one or more of the matters mentioned in s 23(1) on the grounds alleged in the show cause notices the Tribunal may, if relevant, have regard to evidence of events which have occurred since the Respondent ’ s decision, where that evidence is relevant to those grounds. But to consider allegations and evidence concerning grounds not raised in the show cause notices for being satisfied of one or more of the matters mentioned in s 23(1) of the AMLI Act would be to change the nature of the decision under review and would result in jurisdictional error by the Tribunal.

(Original emphasis.)128. These submissions were further articulated by counsel for the Applicants at the hearing (transcript/20):

... coming back to what the High Court said in the Frugtniet case what is before the tribunal for determination cannot be any wider than what was before the respondent under section 24. That means that the grounds given in the original notices to show cause are the touchstone of determining what the issues are in these proceedings. You can ’ t, as the respondent seeks to do, come along years later and start bolting on more and more issues and more and more reasons why they consider that the - one or both of the applicants has ceased to be a body corporate of integrity and competence.

You have to go back to the original grounds given in the original show cause notice and ask is the material relevant to determining that question. It ’ s not a free willy inquiry into whether or not today a licence can be given to Emanuel Exports. The focus here is - the assumption is it is a licence-holder, it is a body corporate of integrity and competence. The question is whether it ceased to be based on the evidence before the Tribunal. Ceased on the grounds given in 2018, not on some other grounds given in 2021 or 2020.129. Counsel for the Secretary submitted that the scope of the Tribunal ’ s jurisdiction is not confined by the grounds or the reasoning contained within the show cause notices or the facts or evidence referred to in those notices. She submitted that this does not mean, however, that there are no limits to the Tribunal ’ s jurisdiction. This was more particularly explained in the Secretary ’ s Amended Closing Submissions as follows:

(a) The Tribunal is required to step into the shoes of the Secretary, and exercise afresh the powers of the Respondent under s 24 of the AMLI Act on the basis of the material before the Tribunal;

(b) The statutory questions raised by s 24 of the AMLI Act for decision by the Respondent determine what considerations the Tribunal must or must not take into account in reviewing those decisions;

(c) The Tribunal must review the actual decisions made by the Respondent namely the decisions to cancel the Applicants ’ licences, and is not constrained by the reasoning of the Respondent when making its decision to cancel the Applicants ’ licences;

(d) The Tribunal must itself determine the substantive issues raised by the material and evidence before it. The obligation upon the Tribunal to consider relevant material and evidence is not dependent upon whether an applicant for review argues that those matters are, or are not, relevant as part of its case.130. We will now discuss the relevant case law concerning the nature and scope of the Tribunal ’ s review.

131. In Drake v Minister for Immigration and Ethnic Affairs [1979] FCA 39; (1979) 2 ALD 60 (Drake No 1), Bowen CJ and Deane J provided guidance as to the question for determination that is before the Tribunal. Their Honours clarified that the Tribunal is subject to the same general constraints as the decision-maker, stating, at 68 – 69, that:

The question for the determination of the Tribunal is not whether the decision which the decision maker made was the correct or preferable one on the material before him. The question for the determination of the Tribunal is whether that decision was the correct or preferable one on the material before the Tribunal. The Act offers little general guidance on the criteria and rules which the Tribunal is to apply in the performance of its task of reviewing administrative decisions which are subjected to its surveillance. Even in a case such as the present where the legislation under which the relevant decision was made fails to specify the particular criteria or considerations which are relevant to the decision, the Tribunal is not, however, at large. In its proceedings, it is obliged to act judicially, that is to say, with judicial fairness and detachment. In its review of an administrative decision, it is subject to the general constraints to which the administrative officer whose decision is under review was subject, namely, that the relevant power must not be exercised for a purpose other than that for which it exists ..., that regard must be had to the relevant considerations, and that matters ‘absolutely apart from the matters which by law ought to be taken into consideration ’ must be ignored ....

(Emphasis added.)132. In a separate judgment in Drake No 1, Smithers J commented that it is the reviewable decision itself that the Tribunal must review, and not the reasons given by the decision-maker. His Honour stated, at 77 – 78:

It might be thought that it would be open to the Administrative Appeals Tribunal not to decide for itself whether a decision made by an administrator was the right decision which ought to have been made in the circumstances but rather to satisfy itself that the decision of the administrator was one which an administrator acting reasonably might have made. But to do this would be to review the reasons for the decision rather than the decision itself. It is the actual decision which by virtue of

s 25(1) and (4) of the Administrative Appeals Tribunal Act the Tribunal is authorized and required to review. The duty of the Tribunal is to satisfy itself whether a decision in respect of which an application for review is duly instituted is a decision which in its view, was objectively, the right one to be made. Merely to examine whether the administrator acted reasonably in relation to the facts, either as accepted by him or as found by the Tribunal may not reveal this. In this connection the observations of Sheppard J in Horne v Locke [1978] 2 NSWLR 88 at 98 – 100 are in point. It is to permit implementation of the function of the Tribunal, as so understood, that there has been conferred upon the Tribunal extensive powers of investigation. Those powers are conferred so that the Tribunal may equip itself to make an appropriate recommendation or affirm the decision: see s 43 of the Administrative Appeals Tribunal Act and Pt XXII of the Schedule thereto.133. In the more recent decision of Frugtniet, Bell, Gageler, Gordon and Edelman JJ considered what standing in the shoes of the decision-maker required the Tribunal to do. Their Honours clarified that the Tribunal has the same powers and constraints as the decision-maker, and that the statutory question before the decision-maker marks the boundary of the Tribunal ’ s review powers:

51. ... the jurisdiction conferred on the AAT by ss 25 and 43 of the AAT Act, where application is made to it under an enactment, is to stand in the shoes of the decision-maker whose decision is under review so as to determine for itself on the material before it the decision which can, and which it considers should, be made in the exercise of the power or powers conferred on the primary decision-maker for the purpose of making the decision under review. The AAT exercises the same power or powers as the primary decision-maker, subject to the same constraints. The primary decision, and the statutory question it answers, marks the boundaries of the AAT's review. The AAT must address the same question the primary decision-maker was required to address, and the question raised by statute for decision by the primary decision-maker determines the considerations that must or must not be taken into account by the AAT in reviewing that decision. A consideration which the primary decision-maker must take into account in the exercise of statutory power to make the decision under review must be taken into account by the AAT. Conversely, a consideration which the primary decision-maker must not take into account must not be taken into account by the AAT.

(Emphasis added.)134. In a separate judgment in Frugtniet, Kiefel CJ, Keane and Nettle JJ explained that, subject to the statute in question, the Tribunal can consider new evidence that was not before the original decision-maker, including evidence of subsequent events, provided that they are relevant to decide the same statutory question that was before the original decision-maker:

15. Depending on the nature of the decision the subject of review, the AAT may sometimes take into account evidence that was not before the original decision-maker, including evidence of events subsequent to the original decision. But subject to any clearly expressed contrary statutory indication, the AAT may do so only if and to the extent that the evidence is relevant to the question which the original decision-maker was bound to decide; really, as if the original decision-maker were deciding the matter at the time that it is before the AAT. The AAT cannot take into account matters which were not before the original decision-maker where to do so would change the nature of the decision or, put another way, the question before the original decision-maker. As Kiefel J observed in Shi, identifying the question raised by the statute for consideration will usually determine the facts that may be taken into account in connection with the decision. The issue is one of relevance, to be determined by reference to the elements of the question necessary to be addressed in reaching a decision.

(Emphasis added.)135. At this point, we note that s 43(1) of the Administrative Appeals Tribunal Act 1975 (Cth) (AAT Act) provides some guidance about the Tribunal ’ s role in undertaking merits review of a decision:

(1) For the purpose of reviewing a decision, the Tribunal may exercise all the powers and discretions that are conferred by any relevant enactment on the person who made the decision and shall make a decision in writing:(a) affirming the decision under review;

(b) varying the decision under review; or

(c) setting aside the decision under review and:(i) making a decision in substitution for the decision so set aside; or

(ii) remitting the matter for reconsideration in accordance with any directions or recommendations of the Tribunal.

(Emphasis added.)136. Section 43(1) of the AAT Act was discussed by Kiefel J (now Kiefel CJ) in Shi. Her Honour stated that:

134. Section 43(1) expresses clearly that the Tribunal may exercise all of the powers and discretions conferred upon the original decision-maker. The Tribunal has been said to stand in the shoes of the original decision-maker, for the purpose of its review. In Minister for Immigration and Ethnic Affairs v Pochi Smithers J said that, in reaching a decision on review of a decision of the original decision-maker, the Tribunal should consider itself as though it were performing the function of that administrator in accordance with the law as it applied to that person. In Liedig v Federal Commissioner of Taxation, Hill J adopted, as applicable to the Tribunal, what Kitto J said of the Taxation Board of Review in Mobil Oil Australia Pty Ltd v Federal Commissioner of Taxation, namely that its function is ‘merely to do over again ... what the Commissioner did in making the assessment ’ , within the limits of the taxpayer ’ s objection.

(Footnotes omitted, emphasis added.)137. Consistent with the approach of Smithers J in Drake No 1, Kiefel J observed at [141] – [142] of Shi that it is the reviewable decision itself that the Tribunal is reviewing, and not the reasons for making that decision stated by the decision-maker. Further, her Honour confirmed that the Tribunal must address the same statutory question as the original decision-maker:

140. The term ‘merits review ’ does not appear in the AAT Act, although it is often used to explain that the function of the Tribunal extends beyond a review for legal error, to a consideration of the facts and circumstances relevant to the decision. The object of the review undertaken by the Tribunal has been said to be to determine what is the ‘correct or preferable decision ’ . ‘Preferable ’ is apt to refer to a decision which involves discretionary considerations. A ‘correct ’ decision, in the context of review, might be taken to be one rightly made, in the proper sense. It is, inevitably, a decision by the original decision-maker with which the Tribunal agrees. Smithers J, in Collector of Customs (NSW) v Brian Lawlor Automotive Pty Ltd, said that it is for the Tribunal to determine whether the decision is acceptable, when tested against the requirements of good government. This is because the Tribunal, in essence, is an instrument of government administration.

141. The reasons of the members of the Full Court of the Federal Court in Drake v Minister for Immigration and Ethnic Affairs confirm what is apparent from s 43(1), that the Tribunal reaches its conclusion, as to what is the correct decision, by conducting its own, independent, assessment and determination of the matters necessary to be addressed. To the contrary of the argument put by the respondent on this appeal, that the Tribunal's exercise of power is dependent upon the existence of error in the original decision, Smithers J denied that the Tribunal was limited to something of a supervisory role. As his Honour said, the Tribunal is authorised and required to review the actual decision, not the reasons for it.

142. In considering what is the right decision, the Tribunal must address the same question as the original decision-maker was required to address. Identifying the question raised by the statute for decision will usually determine the facts which may be taken into account in connection with the decision. The issue is then one of relevance, determined by reference to the elements in the question, or questions, necessary to be addressed in reaching a decision. It is not to be confused with the Tribunal ’ s general procedural powers to obtain evidence. The issue is whether evidence, so obtained, may be taken into account with respect to the specific decision which is the subject of review.

(Footnotes omitted, emphasis added.)138. The Tribunal ’ s role is to undertake an inquisitorial review, and it is therefore not obliged to limit its consideration to the case as articulated by the parties. In Grant v Repatriation Commission [1999] FCA 1629; (1997) 57 ALD 1, the Full Court of the Federal Court explained, at 6:

18. An inquisitorial review conducted by the AAT, as with the Refugee Review Tribunal, is one in which the tribunal is required to determine the substantive issues raised by the material and evidence advanced before it and, in doing so, it is obliged not to limit its determination to the ‘case ’ articulated by an applicant if the evidence and material which it accepts, or does not reject, raises a case on a basis not articulated by the applicant ...139. Further, the inquisitorial nature of the Tribunal ’ s review powers means that it has more flexibility than a court and is not confined to the issues articulated in the pleadings. In Uelese v Minister for Immigration [2015] HCA 15; (2015) 256 CLR 203 (Uelese) French CJ, Kiefel, Bell and Keane JJ observed:

62. ... the Minister ’ s submission seeks to import into the inquisitorial review function of the Tribunal notions appropriate to adversarial proceedings conducted in accordance with formal rules of pleading. That approach is inappropriate to the kind of review undertaken by the Tribunal.140. Unlike a court undertaking judicial review, the Tribunal is not limited to only being able to consider issues raised in the case articulated by the Applicant if other issues are raised by the evidence. The following passage from the joint judgment of Bowen CJ and Deane J in Drake No 1 at 68, is also relevant:

The function of the Tribunal is, as we have said, an administrative one. It is to review the administrative decision that is under attack before it. In that review, the Tribunal is not restricted to consideration of the questions which are relevant to a judicial determination of whether a discretionary power allowed by statute has been validly exercised. Except in a case where only one decision can lawfully be made, it is not ordinarily part of the function of a court either to determine what decision should be made in the exercise of an administrative discretion in a given case or, where a decision has been lawfully made in pursuance of a permissible policy, to adjudicate upon the merits of the decision or the propriety of the policy. That is primarily an administrative rather than a judicial function. It is the function which has been entrusted to the Tribunal.

(Emphasis added.)141. Similarly, in Collector of Customs (NSW) v Brian Lawlor Automotive Pty Ltd [1979] FCA 21; (1979) 2 ALD 1, Smithers J stated at 23:

It is important to observe that the Tribunal is not constituted as a body to review decisions according to the principles applicable to judicial review. In essence the Tribunal is an instrument of government administration and designed to act where decisions have been made in the course of government administration but which are in the view of the Tribunal not acceptable when tested against the requirements of good government.142. In summary, the Tribunal ’ s role is not to find flaws in the reviewable decision or the reasons for the reviewable decision. Instead, the Tribunal considers the matter “de novo”, with the Tribunal ’ s task being “to do over again” what the original decision-maker did (Shi at 315). For this reason, often, Tribunal members will have little or no regard to the reasons given by the decision-maker and will often determine an application on a different basis from that of the original decision-maker. This also has some practical benefit because, in reviewing the matter “de novo”, the Tribunal is required to make its own independent findings based on the facts and evidence before it and should not be influenced by the original decision-maker ’ s reasoning.

143. The Tribunal is not, however, “at large” and has the same powers and constraints as the original decision maker. The Tribunal must confine its review to the same statutory question that was before the original decision-maker. However, in doing so, it can consider new evidence that was not before the original decision-maker, including evidence of subsequent events that are relevant to the statutory question, provided that the statutory question does not change. In undertaking a de novo review on the merits, (subject to the statute in question) the Tribunal is not limited to the grounds, reasons or facts set out in the decision-maker ’ s reasons.

144. These general principles are, however, subject to the express wording of the statutory provision or provisions in question in an individual case. As Kiefel J observed in Shi, at 324 [132], “The nature of the review conducted by the Tribunal depends upon the terms of the statute conferring the right”. In this regard, the Applicants have referred to two cases in support of their submission that the scope of the Tribunal ’ s review is limited to the grounds identified in the show cause notices. We will now discuss these cases.

145. Firstly, the Applicants referred to Murdaca v Australian Securities and Investments Commission [2009] FCAFC 92; (2009) 178 FCR 119 (Murdaca). This case concerned the power of the Australian Securities and Investments Commission (ASIC) under s 206F(1)(b) of the Corporations Act 2001 (Cth) (Corporations Act) to disqualify a person from managing a corporation. In distinguishing the case of Murdaca from the present applications, the Applicants submitted that s 206F(1)(b) of the Corporation Act can be contrasted with ss 23(3) and 24(1)(b) of the AMLI Act because s 206F(1)(b) did not require ASIC to specify the grounds upon which they were considering disqualifying the person. Section 206F(1) of the Corporations Act provided:

(1) ASIC may disqualify a person from managing corporations for up to 5 years if:(a) within 7 years immediately before ASIC gives a notice under paragraph (b)(i):(i) the person has been an officer of 2 or more corporations; and

(ii) while the person was an officer, or within 12 months after the person ceased to be an officer of those corporations, each of the corporations was wound up and a liquidator lodged a report under subsection 533(1) ... about the corporation ’ s inability to pay its debts; and

(b) ASIC has given the person:(i) a notice in the prescribed form requiring them to demonstrate why they should not be disqualified; and

(ii) an opportunity to be heard on the question; and

(c) ASIC is satisfied that the disqualification is justified.146. The Full Court of the Federal Court decided that ASIC was not confined to the areas of concern identified in the prescribed form and that it could make disqualification orders in relation to companies that were not identified in the prescribed form. The Court reasoned at 146 – 147:

121. We will now address the requirements of the notice contemplated by s 206F(1).

122. Section 206F(1)(b)(i) refers to “a” notice. That is to say, the subsection refers to one single notice — not to notices (plural). In our view, the subsection contemplates the giving of only one notice.

123. In addition, as already mentioned ... the notice has to be in the prescribed form. The prescribed form is Form 5249 in Sch 2 to the Corporations Regulations. That form makes clear that the recipient of the notice may avail himself or herself of the opportunity to be heard which is outlined in the form or may choose to remain silent. The form invites the recipient to demonstrate why he or she should not be disqualified from managing corporations.

124. Both the terms of s 206F and the language used in Form 5249 contemplate that a notice recipient may wish to put material and submissions before ASIC in support of his or her contention that he or she should not be disqualified and may also wish to attend a hearing before a delegate of ASIC.

125. That process, the possibility of further s 533 reports and the very real prospect that additional relevant material may come to ASIC ’ s attention after the s 206F(1)(b) notice has been given all tend to negate the proposition that the show cause notice must contain everything upon which ASIC will or may rely when undertaking the third stage of the process. Such an approach is unduly restrictive and is not warranted by the terms of s 206F.

126. That is not to say that s 206F(1)(b) is a complete statement of the content of the duty to afford procedural fairness owed by ASIC to the person under consideration for disqualification. In our view, the general law would oblige ASIC to accord procedural fairness to such a person prior to making any decision to disqualify him or her (see Commissioner for ACT Revenue v Alphaone Pty Ltd [1994] FCA 1074; (1994) 49 FCR 576 at 589-592). The proper discharge of that obligation would compel ASIC to ensure that, immediately before it set about deciding the question of disqualification, the person affected was well aware of the allegations made against him or her and was well aware of the material that ASIC intends to rely upon in coming to a view about those allegations. ASIC would also be obliged to ensure that that person had had a fair opportunity to be heard in respect of those matters. Very often, in any event, it will not be possible for ASIC to comply fully with that duty at the time when the show cause notice is issued.

127. For these reasons, we do not agree that ASIC must refer to and address in the show cause notice all matters upon which it might rely in support of disqualification and we do not agree that ASIC is confined to such matters as are contained in the show cause notice when it comes to consider disqualification.

128. The fact that, when deciding the question of disqualification, ASIC may have regard to the relevant person ’ s conduct in relation to the management, business or property of any corporation, to the public interest and to any other matter that ASIC considers appropriate (see s 206F(2)(b)) supports the conclusions which we have reached.

(Emphasis added.)147. In contrast, the Secretary submitted that the reasoning of the Full Court of the Federal Court in Murdaca is “directly applicable to ss 23 and 24 of the AMLI Act”. The Secretary further submitted that although s 23(1) requires the Secretary to have “reasonable grounds for believing”, s 24 does not state (either expressly or impliedly) that when the Secretary gives written notice to the licence holder under s 24(1) that they are limited to the “reasonable grounds” set out in the show cause notice. The Secretary further submitted that Murdaca is illustrative that procedural fairness can still be afforded to an export licence holder if the show cause notice procedure in the AMLI Act is understood in a similar manner to Murdaca. The Secretary also noted, as per the Court ’ s observation in Murdaca, that the “reasonable grounds” may change once additional relevant material is submitted to the decision-maker after issuing the show cause notice. We agree with the similarities referred to by the Secretary in both statutory regimes. We further agree that Murdaca is in fact supportive of the Secretary ’ s case, rather than that of the Applicants ’ case.

148. The Applicants also referred to the case of Gribbles Pathology (Vic) Pty Ltd v Cassidy [2002] FCA 859; (2002) 122 FCR 78 (Gribbles) in support of their submissions concerning jurisdiction. Gribbles concerned a statutory regime where the only grounds that could be relied upon in a second notice, and in a subsequent review by the Medicare Participation Review Committee (MPRC), were those specified in the first notice (s 23DL of the Health Insurance Act 1973 (Cth) (HIA); Gribbles at 81 – 82). The notice procedure under s 23DL of the HIA was outlined by the Federal Court, at 81, as follows:

8. ... If the Minister has ‘reasonable grounds ’ for ‘believing that such an authority has breached an undertaking ’ , given for the purpose of s 23DF, he must give notice in writing to that authority ‘setting out particulars of those grounds ’ and inviting it to make submissions as to why further action should not be taken against it. Such a notice is given pursuant to s 23DL(1) (the first notice).

9. The approved pathology authority then has 28 days within which to make any submissions: see s 23DL(2).

10. If the Minister, having had regard to any such submissions, remains satisfied that there are reasonable grounds ‘(being grounds that were specified in the notice referred to in subsection (1)) ’ for believing that there has been a breach of the undertaking, he must, pursuant to s 23DL(4)(c), give notice in writing to a chairperson of an MPRC setting out particulars of those grounds (the second notice).

11. Where the Minister has made a decision pursuant to s 23DL(4) in relation to a person, he is required by s 23DL(5) to give that person notice in writing of the decision (the third notice).

12. Part VB makes provision for the establishment of MPRCs. Section 124E(3) provides that, upon receiving a notice under s 23DL(4) in relation to an approved pathology authority, a chairperson must establish an MPRC. Section 124C makes provision for the appointment of chairpersons, while s 124EA makes provision for the appointment of members.

13. Section 124FC(1)(c) provides that where an MPRC is established in relation to an approved pathology authority, or has made a determination that it should consider whether such an authority has breached an undertaking, it shall determine whether that authority has breached the undertaking given by it to the Minster [sic]. If the MPRC determines that there has been such a breach, it has available to it a number of options. These include taking no action against the authority, counselling or reprimanding the authority, or revoking any undertaking previously given by it and directing that no further undertaking given by it should be accepted by the Minister for a period of up to five years.149. The Court later explained the importance of the grounds stated in the first notice, which determined the content of the second notice and the validity of the subsequent notices, at 102:

132. The giving by the Minister of a notice under s 23DL(1) [the first notice], and his genuine consideration of any submissions in response to that notice, are preconditions to the giving of a notice under s 23DL(4)(c) [the second notice]. The first notice sets the outer limits of the second notice. The ‘reasonable grounds ’ upon which the Minister relies in giving the second notice must be the very same grounds as are specified in the first notice. The giving by the Minister of a third notice, under s 23DL(5), is the final stage of the procedure for the establishment of an MPRC. The validity of that notice must, in turn, be dependent upon the validity of the antecedent notices upon which it rests.150. The Court in Gribbles further explained how a first notice made under s 23DL(1) is a precondition to the subsequent stages of the regulatory regime in the HIA, at 103:

136. A notice under s 23DL(1) [the first notice] clearly serves a number of purposes. It gives the approved pathology authority notice that the Minister has reasonable grounds for believing that it has breached its undertaking. It provides the basis upon which that authority can make submissions as to why the Minister should take no further action. Finally, it sets the outer limits for any subsequent notice to the MPRC, and for its inquiry and determination.151. We do not accept the Applicants ’ submissions with respect to Gribbles being a similar statutory regime to that under ss 23 and 24 of the AMLI Act. The show cause regime in Gribbles was instead, as submitted by the Secretary, “materially different from ss 23 and 24 of the AMLI Act”. Specifically, under the relevant provisions of the HIA, being the relevant statutory regime in Gribbles, there are two notices issued by the Minister, whereas under the AMLI Act, only one notice is issued by the Secretary. Importantly, and unlike the AMLI Act, the HIA requires that a second notice is given to the chairperson of an MPRC which sets out particulars of the grounds upon which the Minister relies. No such notice to the Tribunal is required under the AMLI Act.

152. Additionally, the express wording of s 23DL of the HIA and s 24 of the AMLI Act differs. The first show cause notice under the HIA requires the Minister to provide “particulars” of the “reasonable grounds” the Minister has for believing the authority has breached an undertaking. No such “particulars” are required under s 23(3) of the AMLI Act, which merely provides that the show cause notice must “state the grounds on which the Secretary formed the belief”. As mentioned in the preceding paragraph, the HIA also provides for a second notice, unlike the AMLI Act. If the approved pathology authority has not made submissions to the Minister, the Minister is required to give the second notice to the chairperson of the MPRC “setting out particulars of the grounds referred to in subsection (1)”. If the approved pathology authority did make submissions to the Minister, and the Minister is satisfied there are reasonable grounds for believing there had been a breach of the undertaking “being the grounds that were specified in the notice referred to in subsection (1)”, the Minister is required to give the second notice to the chairperson of the MPRC. This second notice is a further difference between the two statutory regimes that is of significance, because the express wording of s 23DL(4) of the HIA indicates that the only grounds that can be referred to in the second notice to the chairperson of the MPRC were those specified in the first notice, which, as the Court observed, set the outer limits for the MPRC ’ s inquiry and determination. Thus, as well as there being no equivalent second notice in the AMLI Act, the AMLI Act is more general in its reference to “grounds” as distinct from the HIA also requiring “particulars” of those grounds. As such, the Tribunal is not of the opinion that Gribbles is helpful because it is not analogous to the show cause notice regime under the AMLI Act.

153. We will now consider the provisions of ss 23 and 24 of the AMLI Act. There are two stages both of which require satisfaction with respect to the matters in s 23(1) before the Secretary can move to cancelling or suspending the licence or reprimanding the licence holder.

154. The first stage requires that, before issuing a show cause notice, the Secretary must have reasonable grounds for believing, in relation to an export licence, any of the matters listed in the sub-sections of s 23(1).

155. The second stage applies after the show cause notice has been given and after the Secretary has considered any written statement by the holder of the licence in response to the show cause notice. At this second stage, s 24(1)(b)(i) requires the Secretary to be satisfied of any of the matters mentioned in s 23(1) before moving to cancel, suspend or reprimand.

156. The Tribunal is to stand in the shoes of the Secretary exercising the powers in s 24(1). As a pre-condition to the Tribunal exercising those powers, there must have been a show cause notice issued by the Secretary under s 23(1). The process of the Secretary issuing a show cause notice and the licence holder having the opportunity to respond is anterior to the application to the Tribunal. That anterior process of the show cause notice and a response provides procedural fairness to the licence holder before the Secretary can act to cancel, suspend or reprimand.

157. However, as one moves along the “administrative continuum” (Frugtniet at [53]) of the decision-making process from the Secretary to the Tribunal, there is nothing in s 24(1) which suggests that the Tribunal is confined to consideration of matters raised in the show cause notice. The show cause notice has served its purpose as being a requirement of procedural fairness before the Secretary may make the original decision. The procedure with respect to the show cause notice is not repeated before the Tribunal and it is not necessary for the purposes of achieving procedural fairness before the Tribunal for its decision to be confined to matters raised in the show cause notice. To the contrary, the role of the Tribunal is to determine what is the correct or preferable decision by considering the matters mentioned in s 23(1). Rather than being confined to the factual matters raised in the show cause notices, the Tribunal is confined to the same statutory questions that were before the original decision-maker. Those statutory questions were expressly stated in the show cause notices as whether:

(a) the holder of the licence has ceased to be a body corporate of integrity (s 23(1)(b)(i));

(b) the holder of the licence has ceased to be competent to hold the licence (s 23(1)(b)(ii));

(c) a person who participates in the management or control of the meat or live-stock export business of the holder of the licence has ceased to be a person of integrity: (s 23(1)(d)); and/or

(d) the licence holder has contravened a condition of the licence (s 23(1)(g)).158. In making the First Reviewable Decision, the Secretary considered these statutory questions. These same statutory questions are raised before the Tribunal. The Tribunal may consider facts relevant to these statutory questions. For example, the Tribunal may have regard to facts that have become known or have arisen that are relevant to these statutory questions.

159. These statutory questions include issues which relate to the integrity and competency of the licence holder and participants in the business of the licence holder. It is evident from a reading of the AMLI Act as a whole, and in particular, ss 11, 12, 16, 17, 23 and 24, that it is an object of the AMLI Act that licence holders have qualities of integrity and competency. To achieve that object, the Tribunal must be able to consider all matters relevant to those qualities up to the date of its decision, even if they were not raised in the show cause notice. For example, if facts arose after the show cause notice that suggested the licence holder lacked integrity, then it would be appropriate for the Tribunal to consider that matter, but subject to the obligation to afford procedural fairness to the licence holder. The Tribunal has a statutory obligation under s 39 of the AAT Act to ensure that a party is given a reasonable opportunity to present their case. A material breach of the obligation to accord procedural fairness will give rise to a jurisdictional error (Minister for Immigration and Border Protection v SZMTA [2019] HCA 3; (2019) 264 CLR 421). The Tribunal will adopt a procedure pursuant to s 33(1) of the AAT Act consistent with that obligation by, for example, requiring allegations to be articulated in a Statement of Facts, Issues and Contentions (SFIC) before the hearing.

160. In this case, the Applicants objected to evidence of their recent conduct relating to animal welfare issues at the Peel Feedlot as being beyond jurisdiction. Given that the Applicants still participate in the animal live export industry (albeit not as an exporter, since their licences were cancelled), their recent conduct is relevant to the issue of their integrity.

161. Based on our analysis of the authorities outlining the fundamental principles of the nature of the review by the Tribunal, as well as our analysis of Murdaca, Gribbles and ss 23 and 24, we find that the correct approach is that the Tribunal ’ s review is not limited to the grounds and the reasons stated by the Secretary in the show cause notices. The relevant statutory questions are broader than suggested by the Applicants. We have set out the correct formulation of the statutory questions in the “issues” section above.

THE INTERPRETATION OF SECTION 23 OF THE AMLI ACT

162. We turn now to address the interpretation of ss 23(1)(b) and 23(1)(d) of the AMLI Act. The relevant parts of s 23 are as follows:

23(1) If the Secretary has reasonable grounds for believing, in relation to an export licence, that: ...

(b) if the licence is held by a body corporate, the holder of the licence has ceased to be:(i) a body corporate of integrity; or

(ii) competent to hold the licence; or

(iii) a body corporate of sound financial standing; or ...

(d) a person who participates in the management or control of the meat or live-stock export business of the holder of the licence has ceased to be a person of integrity; or ...

(g) the holder of the licence has contravened a condition of the licence;the Secretary may give a written notice under this section to the holder of the licence. ...Section 23(1)(b)

163. We agree with both parties ’ submissions that the words “integrity” and “competence” (derived from “competent”) should be given their natural and ordinary meaning, noting relevant dictionary definitions. This is consistent with the consideration of “integrity” in other decisions of this Tribunal (see Mottaghi and Migration Agents Registration Authority [2007] AATA 60; (2007) 98 ALD 424, 436 and Salomonn and Migration Agents Registration Authority [2013] AATA 146).

164. The Macquarie Dictionary Online (at entry 1) defines “integrity” as “soundness of moral principle and character; uprightness; honesty”. It further defines “competence” (at entries 1 and 4) as “the quality of being competent; adequacy; due qualification or capacity” and “the quality or position of being legally competent; legal capacity or qualification (which presupposes the meeting of certain minimum requirements of age, soundness of mind, citizenship, or the like)”.

165. The Oxford English Dictionary Online defines “integrity” (at entry 3b) as “soundness of moral principle; the character of uncorrupted virtue, esp. in relation to truth and fair dealing; uprightness, honesty, sincerity”. It defines “competence” (at entries 4a and 4b) as “sufficiency of qualification; capacity to deal adequately with a subject” and “the quality or position of being legally competent; legal capacity or admissibility”.

166. The concepts of “integrity” and “competence” must be considered in the statutory context in which those words appear. For the purpose of s 23, the question of whether a body corporate is one of integrity is to be determined by reference to whether the corporation and those associated with it will conduct the business of exporting live-stock with integrity. With respect to competence, the question is whether the corporation has the qualifications and capability to satisfy us that their business will be conducted properly and with integrity.

167. The issue before the Tribunal with respect to s 23(1)(b) is whether Emanuel has ceased to be, in the sense of no longer being, a body corporate of integrity. This interpretation is supported contextually by the operation of s 12(1)(b)(i) which requires the Secretary to have been satisfied that Emanuel was a body corporate of integrity when it granted the export licence to Emanuel. It follows that Emanuel was a body corporate of integrity at the time that its export licence was granted. The Tribunal needs to consider the question of integrity as at the date of making its decision. The question for the Tribunal is therefore whether it is satisfied that Emanuel is no longer a body corporate of integrity. To answer this question the Tribunal would consider any conduct of Emanuel, since its licence was issued, that goes to its integrity and then decide whether Emanuel is a body corporate of integrity as at the date of making its decision. In other words, the Tribunal will consider both historical and current factors in determining the integrity of Emanuel for the purpose of exercising any of the powers under s 24(1). This may involve consideration of the concept of corporate rehabilitation if Emanuel has, at some time since its licence was granted, shown a lack of integrity, for example, but has since taken steps towards establishing itself as a body corporate of integrity. Closely linked to this concept of corporate rehabilitation is whether Emanuel has taken steps to improve itself by removing Mr Graham Daws from involvement in Emanuel.

168. In determining what is the correct or preferable decision, the Tribunal must be satisfied of any of the specified matters in s 23(1), including s 23(1)(b), which states that “if the licence is held by a body corporate”, the holder of the licence has ceased to be a body corporate of integrity. The use of the present tense “is” does not require that s 23(1)(b) will only apply if a licence is currently held by Emanuel. That would lead to the absurd result that, despite being available to the Secretary as a ground upon which to cancel or suspend a licence, s 23(1)(b) could not be relied upon by the Tribunal upon review because the licence is no longer held by the body corporate. No party contended for that construction, but both parties contended that some weight in terms of interpretation should be given to the use of the present tense in s 23(1)(d). We disagree for the reasons that follow.

Section 23(1)(d)

169. Section 23(1)(d) provides that the Secretary may issue a show cause notice if “a person who participates in the management or control of the meat or live-stock export business of the holder of the licence has ceased to be a person of integrity”. The use of the present tense in the phrase “who participates” does not limit the application of s 23(1)(d) to a person currently (namely at the time of this decision) participating in the management or control of the export business. That would lead to a similar and equally absurd result as for s 23(1)(b), because if the licence was cancelled or suspended by the Secretary, then the business would no longer be operating and therefore no person would be participating in it. Section 23(1)(d) refers to the conduct of “a person who participates in” the business but there is no temporal requirement with respect to that conduct. The phrase “who participates” is in the present simple tense. The present simple tense can refer to the present or the past (when it refers to the past it is called the “historical present”). If the legislator wished to make it clear that this provision referred to the present only, the present continuous tense - “a person who is participating” - could have been used. Further, the fact that a “person who participates” could be replaced with the noun “a participant” adds additional weight to the finding that the verb “participates” was not intended to indicate a particular point in time.

170. We find that the phrase “who participates” describes the person participating in the management or control of the business at any time.

171. Having identified the person by reference to their participation, the matter for consideration is whether that person ceased to be a person of integrity. Whilst not directly on point, we note the High Court decision of Mikasa (NSW) v Festival Stores [1972] HCA 69; (1972) 127 CLR 617 at 661, where a past participle was construed as being “neutral in temporal meaning”. We consider that “participates” is also neutral in temporal meaning. We reject the contention that the person must participate at the time of the decision.

172. We note that, pursuant to s 12(1)(c), the Secretary must have been satisfied that a person who participates or would participate in the management or control of the business (such as Mr Graham Daws as managing director) was a person of integrity when it granted Emanuel ’ s Licence. The issue for the Tribunal under s 23(1)(d) is whether that person has ceased to be, in the sense of no longer being, a person of integrity. The Tribunal needs to consider this question as at the date of making its decision.

173. The question for the Tribunal is whether it is satisfied that Mr Graham Daws is no longer a person of integrity. To answer this question the Tribunal would consider any conduct of Mr Graham Daws whilst participating in the control or management of the business of Emanuel that goes to his integrity and then decide whether Mr Graham Daws ceased being a person of integrity. In other words, the Tribunal will consider both historical and current factors when determining the question of the integrity of Mr Graham Daws for the purpose of exercising any of the powers under s 24(1). This may involve placing less weight on the historical conduct of Mr Graham Daws in the context of s 23(1)(d) if it were the case that he had effectively removed himself from the control or management of the business of Emanuel. Conversely, if his participation continued beyond his resignation as managing director, then greater weight would be placed upon his historical conduct and the Tribunal would take into account his ongoing involvement for the purposes of both ss 23(1)(b) and 23(1)(d). In some cases, there would be the prospect of the person in s 23(1)(d) showing that they had rehabilitated themselves, but that does not apply to Mr Graham Daws who chose to simply resign and has not attempted to show any personal rehabilitation.

174. Further, the Applicants contend that satisfaction of the elements in s 23(1)(d) is defined by s 8(1) which, it is contended, provides an exhaustive description of those persons who fall within the meaning of a person who participates in the management or control of the live-stock export business. Section 8(1) contains a deeming provision by use of the phrase “is taken to be”.

175. In Muller v Dalgety & Company Ltd [1909] HCA 67; (1909) 9 CLR 693 at 696 Griffith CJ observed that the word “deemed” may be used to indicate that a definition is exhaustive or as extending the sense which might otherwise have been given to that definition. This would apply equally to where the phrase “is taken to be” is used instead of “deemed”. His Honour added:

The word ‘deemed ’ may be used in either sense, but it is more commonly used for the purpose of creating what James L.J and Lord Cairns L.C called a ‘statutory fiction ’ ... that is, for the purpose of extending the meaning of some term to a subject matter which it does not properly designate. When used in that sense it becomes very important to consider the purpose for which the statutory fiction is introduced.176. In Tay v Minister for Immigration and Citizenship [2010] FCAFC 23; (2010) 183 FCR 163 (Tay) the Full Court of the Federal Court considered the meaning of the phrase “is taken to” in a legislative provision in the Migration Act 1958 (Cth):

24. ... Section 494C makes very detailed provision for determining when a document is taken (deemed) to have been received from the Minister. Those provisions must be construed in a statutory context of similarly detailed provisions concerning the methods by which the Minister may give documents to a person when this is a requirement (s 494B) and when it is not required (s 494A) and the identification of the authorised recipient of documents (s 494D). These provisions all evidence concern that there should be certainty in the transfer of documents from the Minister both as to the method and as to the time of delivery.177. The Applicants relied on the Tay decision. They referred to the statutory context in which ss 23(1)(d) and 8(1) appear in support of the contention that the drafter of the legislation was seeking to achieve certainty in identifying a person who participates in the management or control of a live-stock export business. We consider that the detailed provisions in s 8(1) as to participation and the important role of the deeming provision within the AMLI Act more generally indicate that s 8(1) is exhaustive. Section 8(1) expressly sets out matters that might or might not fall within the scope of the phrase “participates in the management or control of the ... business” and thereby provides the certainty necessary for the effective operation of the AMLI Act.

178. It follows that the test for determining if Mr Graham Daws is a person who participated in the management or control of Emanuel ’ s live-stock export business for the purposes of s 23(1)(d) is whether he had authority to direct the operations, or an important or substantial part of the operations, of Emanuel ’ s live-stock export business; or whether he had authority to direct a person in the exercise of that authority. This test is broadly consistent with the test applied in Commissioner for Corporate Affairs (Vic) v Bracht [1989] VicRp 72; [1989] VR 821 at 830 – 831, which required “real and direct” participation in “activities which involve policy and decision-making, related to the business affairs of a corporation, affecting the corporation as a whole or a substantial part of that corporation”.

179. Having provided this context, we now turn to the specific issues for consideration.

ISSUE 1: WHETHER EMANUEL HAS CEASED TO BE A BODY CORPORATE OF INTEGRITY—s 23(1)(b)(i)—a consideration of the historical events

180. The Tribunal has power to cancel or suspend a licence or to issue a reprimand to the holder of a licence under s 24(1) of the AMLI Act if satisfied, relevantly, of any of the matters in s 23(1). One of the matters in s 23(1) is that the holder of the licence has ceased to be a body corporate of integrity (23(1)(b)(i)). If the Tribunal is satisfied of this matter then it may cancel, suspend or reprimand the licence holder.

181. The principal historical event that goes towards integrity is the doubling of the PAT values by Mr Graham Daws in 2014, which we will now consider.

182. Mr Nicholas Daws gave evidence in his statement dated 16 May 2019 that for each consignment, the exporter is required by the ASEL to submit an agreed HSRA to the Department. The HSRA for the purposes of standard 4.12 of ASEL is calculated using a software package called “HotStuff” version 4. One of the inputs to the HotStuff program is a “vessel file”, which includes ***data*** concerning the PAT for the areas of the ship in which live-stock are to be kept during transport. PAT (namely, the Pen Air Turnover) is the ratio of the air ventilation flow to the pen area in the ventilated section of the Vessel.

183. In June 2014, Mr Graham Daws asked Mr Nicholas Daws to find out what information was needed to create a HotStuff vessel file for the Vessel. On 24 June 2014, Mr Nicholas Daws contacted Dr Conrad Stacey by email asking what information and ***data*** was needed for the HotStuff program so that an HSRA could be produced. The email was written on Emanuel letterhead and asked for information/***data*** “ so that we can produce an HSRA output ” (emphasis added). Dr Stacey responded with the information needed in order to create a vessel file for the Vessel. Mr Nicholas Daws cut and pasted the information and passed it on to Mr Graham Daws by email on 24 June 2014. From that point onwards, Mr Nicholas Daws did not have any further involvement in seeking or providing the information required by Dr Stacey to create a vessel file.

184. Although Mr Graham Daws did not give evidence, we can draw a reasonable inference about what happened from relevant email correspondence. On 24 June 2014, Mr Graham Daws sent an email to a representative of the owners of the Vessel, Mr George Assaf, and said:

George, this ***data*** is from Conrad Stacey and is required to work out the PATs, however it would be preferable to have Bjoern [sic] work them out for each deck to be confident the correct loading capacity is all ok when the Hot Stuff is worked out ... we cannot leave it to the last minute in case something is wrong in calculations. Can you please ask for the PATs from Bjoern [sic] urgently.185. The following day, Mr George Assaf provided by email information from the designer and installer of ventilation on the vessel. Mr Bjorn Clausen was then asked for help to calculate the PAT values for each deck. On 26 June 2014, Mr Clausen responded with a schedule of PAT values for each deck of the Vessel.

186. Mr Graham Daws responded immediately, stating, with reference to the PAT values, “these are very low and will kill the carrying capacity”.

187. Mr Graham Daws then sent a further email to Mr Clausen asking him to:

please add the deckwise exhausts to the Air volume M3 deckwise so we can see how this works out. I cannot give Conrad any ***data*** until I know the answer is going to be acceptable.188. Mr Clausen responded, stating:

If you apply the principle that all fans are on supply the PAT figures I gave you last night should be multiplied by a factor 2.0 in all decks... Technically it will not be possible to defend the use of multiplying with factor 2.0 for two reasons: There is no way so much air will be able to escape the decks / holds and the exhaust fans cannot be reversed. You could use another argument which is also not holding water: That the supply is for half the pens and exhaust is for the other half of the pens and that this allows for the two figures to be added (factor 2.0), but better not use any arguments at all.189. Mr Graham Daws responded:

Thanks Bjorn, We all agree Hot Stuff is a hoax and AQIS stupid but Conrad can defend himself well and the science behind it has been verified but something is wrong with the formula that makes it useless.190. We can infer from Mr Graham Daws ’ emails that, despite receiving advice from Mr Clausen that it would not be possible to defend the doubling of the PAT values, he decided that the PAT calculation formula was wrong and that he was going to disregard it. The next day, on 27 June 2014, Mr Graham Daws doubled the PAT values and sent them to Dr Stacey. Mr Graham Daws does not appear to have explained to Dr Stacey that he was being provided with PAT values calculated on a false assumption. Dr Stacey stated in his statutory declaration dated 14 August 2018 that he did not receive any of the information that he had requested from Mr Nicholas Daws on 24 June 2014 and nor did he receive any contact from Mr Graham Daws or anyone else from or on behalf of Emanuel asking him to calculate the PAT values. It is apparent from Mr Graham Daws ’ email of 24 June 2014 to Mr George Assaf that he had decided not to use Dr Stacey to calculate the PAT values but had instead used Mr Clausen.

191. On 1 July 2014, Dr Stacey provided Mr Graham Daws with the HotStuff vessel file for the Vessel. Mr Graham Daws then sent an email to Mr Mike Stanton on Emanuel letterhead reporting that:

We now have the hot stuff and looks as though the PATS are sufficient not to worry about de-stocking for summer months ...192. The conduct of Mr Graham Daws in doubling the PAT values in June 2014 has had a lasting effect. Those incorrect values formed the basis of nine HSRA plans submitted by Emanuel in connection with applications for an export permit for subsequent voyages, including Voyage 25 in August 2017. Emanuel took no steps to correct the PAT values during this period. Mr Ben Stanton, the export services manager for Emanuel, was responsible for providing HSRA plans for these subsequent voyages.

193. It is apparent from the emails discussed above, that to calculate PAT values, Emanuel needed information specific to the Vessel. There were three ***variables*** in the equation for the calculation of a PAT value, namely the volume of deck space, the areas of pens on the vessel and the number of “ air changes ” per hour. To obtain this information, Emanuel reached out to both the owner of the Vessel (through Mr Assaf) and the designer of the Vessel (through Mr Clausen). It was a relatively simple task to take the information provided by Mr Assaf on 25 June 2014 and feed it into the PAT equation for the purpose of calculating a PAT value for each deck on the vessel. This is what Mr Clausen did in his email on 26 June 2014. Mr Graham Daws expressed concern that the PAT values calculated by Mr Clausen were “ very low and will kill the carrying capacity ”. He put forward a false assumption, namely, to include both supply and exhaust fans which would increase the third ***variable*** relating to “air changes”. He asked Mr Clausen what difference that would make. Mr Clausen said it would result in the PAT values being multiplied by a “factor of 2.0”. In other words, it would double the PAT values, but Mr Clausen provided two reasons why such an action was indefensible. His email of 26 June 2014 is clear in this regard. This was advice from the person employed by the designer of the Vessel based on information from the designer and installer of the ventilation system on the Vessel. Mr Graham Daws had very appropriately sought their advice but having received it in writing, chose to ignore it because it would impact negatively on the carrying capacity of the Vessel.

194. The incorrect PAT values were used by Dr Stacey (through no fault of his own) to provide electronic files that enabled Emanuel to create the HSRA. Emanuel submitted nine HSRAs with incorrect PAT values to the Department with applications to obtain export permits for voyages of the Vessel in June 2017 (Voyage 24), July 2017 (Voyage 25) and August 2017 (Voyage 26).

195. It was not until April 2018 that Dr Stacey was provided with all the relevant information that was in Emanuel ’ s possession. He used that information to calculate PAT values and realised that Mr Graham Daws had previously provided him with incorrect PAT values. Dr Stacey then used the correct PAT values to calculate an HSRA which involved calculating ***data*** for each of the 17 lines of live-stock (referred to as stocking entries) on the Vessel. Dr Stacey stated in his statutory declaration:

29. The column entitled ‘5% Mortality Risk Less Than ’ shows the probability of 5% mortality for each stocking entry. The figures in that column range from 0.36% for one line on Deck B to 7.08% for the 52 kg wethers on Deck 4. Eight stocking entries exceed the industry-nominated acceptable mortality risk of 2% chance of 5% mortality. If one stocking entry exceeds the acceptable risk, then the HSRA will not meet ASEL and I understand that the export permit would be refused. On the basis of this HSRA, I understand that the export permit for this consignment would not have been approved had the correct PATs been used.196. Dr Stacey calculated the number of live-stock that would have been loaded on the Vessel if the correct PAT values had been used. He said in his statutory declaration that:

32. in order for all lines to meet the acceptable mortality risk, only 60,816 livestock should have been in the loading plan for the vessel. This means that 4,234 animals in excess of the acceptable loading were in the loading plan.197. Mr Graham Daws was aware of the relationship between PAT values and loading capacity because he had said in his 1 July 2014 email that the false PAT values “ are sufficient not to worry about de-stocking for summer months ”. One can infer from this wording, and from the reference to the PAT values calculated by Mr Clausen being “very low and will kill the carrying capacity”, that Mr Graham Daws was worried that Emanuel would have to de-stock (that is, reduce the number of live-stock) on the Vessel during the northern hemisphere summer months and that he deliberately doubled the PAT values so as to avoid that outcome. Mr Nicholas Daws said that there is no commercial benefit to Emanuel in over-stocking an export vessel, but clearly there was some benefit to Emanuel, given the statement of Mr Graham Daws in his 1 July 2014 email.

198. Dr Stacey said in his report dated 27 August 2019 that the relevance of HSRAs for voyages during northern hemisphere summer lies in preventing those voyages which would have a high chance of heat stress (mortality) in one or more lines of live-stock. All the experts agreed that over-stating the PAT values is a serious issue which would significantly increase the risk to animals.

199. The doubling of the PAT values and the resultant increase in live-stock on board led to an increased risk of harm and death for the animals on board the Vessel. Mr Graham Daws had over 45 years of experience in the export of live-stock to the Middle East. He played a central role in that trade, advising government bodies and serving in numerous industry leadership roles, including as a founding member and later chair of the Australian Livestock Exporters ’ Association. Mr Graham Daws must have been aware of the increased risk to the welfare of the animals, but he decided to ignore the expert advice he had received and instead proceeded to overload the vessel. It is fair to say that this increased risk eventuated when the 2,400 sheep died on the vessel, representing a mortality rate of 3.76% exceeding the reportable mortality of 2% under ASEL.

200. The parties made lengthy and detailed submissions regarding the issue of attribution of the conduct of Mr Graham Daws to Emanuel. The Applicants argued for a more restrictive interpretation of attribution, in accordance with common law principles of corporate responsibility, agency, and the attribution of the conduct of individuals to corporations that are used in civil penalty and criminal prosecutions. However, in the context of administrative decision-making, we accept the Secretary ’ s submission that the correct approach is that described in Australian Broadcasting Tribunal v Bond [1990] HCA 33; (1990) 170 CLR 321 (ABT v Bond). The context in ABT v Bond is similar to the current circumstances in that it concerned whether a company was a “fit and proper person” to hold a broadcasting licence due to the conduct of Mr Bond who was able to control the licensee companies due to his shareholdings and ability to control the board. In their joint judgment, Toohey and Gaudron JJ provided the following guidance regarding the attribution of an individual ’ s conduct to a company. Their Honours stated, at 382 – 383:

When the question is whether, having regard to its character or reputation, a company is fit and proper, the answer may be given by reference to the conduct, character or reputation of the persons by and through whom it acts or who are otherwise relevantly associated with it. The identity of the persons relevant to the character and reputation of a company will necessarily vary according to the circumstances of the company under consideration. At one extreme, if a person regularly exercises control in all important matters affecting the company ’ s activities, then, ordinarily, the question will be sufficiently answered by reference to that person. At the other extreme, if no person is in a position of control or if one person, although in a position to exercise control, regularly delegates that control to others, then it will ordinarily be necessary to have regard to the persons who manage the company ’ s affairs and activities. The question whether it is sufficient to have regard to one person or necessary to have regard to others when determining whether a company is fit and proper is one that depends on the circumstances of the company and not on any legal requirement imported by the expression ‘fit and proper ’ . It follows that, in appropriate circumstances, the question of the fitness and propriety of a company to hold a commercial licence under the Broadcasting Act may be determined by reference to the conduct, character or reputation of a single person associated with it.201. In a separate judgment, Mason CJ stated, at 349 – 350:

The degree of an individual ’ s capacity for control may not be so great as to warrant an inference that his character should be identified automatically with that of the licensee; in that event it would be necessary to look to the character and performance of the directors and the management. In another case, where the capacity of the individual for control of the licensee is great, the inference may be justified without examining the character and performance of the directors and the management of the licensee. Especially is this so when it is established that the person having the capacity to control participates in the decision-making processes of a licensee and procures the making of reprehensible decisions which are designed to enhance and protect his own interests.202. The Secretary also referred us to the following passage from the United States case of Merrimack College v KPMG LLP 480 Mass 614 (2018), 628 (Merrimack), which was cited by the Inquiry Under Section 143 of the Casino Control Act 1992 (NSW) Report dated 1 February 2021, volume 1 (Casino Report), page 337:

Where the plaintiff is an organization that can only act through its employees, its moral responsibility is measured by the conduct of those who lead the organization. Thus, where the plaintiff is a corporation ... we look to the conduct of senior management – that is, the officers primarily responsible for managing the corporation, the directors, and the controlling shareholders, if any.We agree that this passage is consistent with ABT v Bond and accurately summarises the relevance of the conduct of senior management of a corporation.

203. The doubling of the PAT values, despite clear advice to the contrary, showed a distinct lack of integrity on the part of Mr Graham Daws. We find that, in doing so, Mr Graham Daws was acting in his capacity as managing director of Emanuel. Emanuel was obliged to provide the HSRA and did so through its managing director, Mr Graham Daws. He was the person who led, managed and controlled the organisation. The degree of control he exercised as managing director was so great as to warrant the inference that his character should be attributed to Emanuel (ABT v Bond; Merrimack). Consequently, we find that the conduct of Mr Graham Daws in doubling the PAT values is to be attributed to Emanuel. We find that, by extension, Emanuel engaged in conduct that showed a distinct lack of integrity. Emanuel, as the holder of an export licence, ceased to be a body corporate of integrity because of its conduct in doubling the PAT values and thereby increasing the risk of harm to animals and misleading the Secretary to issue an export permit.

204. Each of the nine HSRAs contained false and misleading information which had its genesis with the doubling of the PAT values in June 2014. This means that each of those subsequent voyages were overloaded. Mr Graham Daws knew that he incorrectly doubled the PAT values and therefore must have known that it would have the effect of continuing to mislead the Department each time an HSRA was submitted for a subsequent voyage. Further, he must have known of the increased risk of harm to the live-stock during these voyages. It follows that Emanuel ’ s lack of integrity continued throughout the period that it submitted these misleading HSRAs, namely up until and including 2017.

205. Emanuel has made no challenge to the Secretary ’ s finding in her decision of 21 August 2018 that Mr Graham Daws did not act in good faith. Emanuel accepted that Mr Graham Daws submitted the PAT ***data*** to Dr Stacey with disregard for Emanuel ’ s obligations under the regulatory framework. Further, Emanuel accepted that the HSRAs contained inaccurate PAT figures, which had the propensity or the risk that it would, or could, mislead the Secretary into issuing an export permit.

206. The Secretary in her show cause notice dated 22 June 2018 expressly referred to the conduct of Emanuel in submitting nine HSRA plans with incorrect PAT values to the Secretary. The Secretary relied on this ongoing conduct as one of the reasons for concluding that there were reasonable grounds for believing that Emanuel:

(a) “knew or ought to have known that the PAT scores provided to Stacey Agnew and the Secretary for the purposes of obtaining export permits were incorrect”; and(b) “has ceased to be: (a) a body corporate of integrity; and (b) competent to hold the licence”.207. The Applicants submitted that Mr Graham Daws ’ conduct is not attributable to Emanuel and that he was acting for ILE, the company that was the charterer of the Vessel. We reject that submission for the following reasons.

208. The regulatory framework provides that it is an obligation of Emanuel as an exporter of live-stock to submit the HSRA in accordance with the 2012 EA Notice. The stated purpose of that notice was to advise exporters of the requirement for submission of the HSRA to the Department. The 2012 EA Notice provided that under the ASEL, exporters must load live-stock on sea vessels in accordance with an agreed heat stress model and that the assessment of heat stress risk for live export voyages from Australia is performed by a software program called “HotStuff”. The 2012 EA Notice included instructions with which exporters were required to comply for every consignment of live-stock by sea from

1 May 2012, where an HSRA was required. These instructions included how the HotStuff vessel ***data*** file was to be provided.

209. Mr Nicholas Daws accepted in his witness statement dated 16 May 2019 that Emanuel, as “the exporter”, had a duty under the regulatory framework to submit an HSRA to the Secretary. He admitted that he was involved in that process. At the time, he was a fulltime employee of Emanuel. He wrote his emails on Emanuel letterhead. He was not employed by ILE and was not engaged in any conduct on behalf of ILE.

210. Mr Graham Daws, as we have said, was managing director of Emanuel in 2014 and was a director of ILE but, according to Mr Nicholas Daws, “was not involved in the operations of ILE”. Mr Graham Daws wrote his emails on Emanuel letterhead. When he stated in his 1 July 2014 email that “ We now have the hot stuff ”, he was clearly speaking on behalf of Emanuel and as its managing director. As we have seen from the emails referred to above, Mr Graham Daws was closely involved in the process of preparing the HSRA for submission in support of an export permit. The fact that he was managing director of Emanuel at the time, that he wrote on Emanuel letterhead, and that it was Emanuel ’ s obligation to submit the HSRA (which it subsequently did) are all very strong indicators that he was acting in his capacity as managing director of Emanuel.

211. The work carried out by Mr Nicholas Daws and Mr Graham Daws in obtaining, preparing and providing information for the HSRA was work of Emanuel, not ILE, done in preparation for the export of live-stock on the Vessel. The fact that Mr Nicholas Daws was not aware at the time that his father had doubled the PAT values does not mean that Mr Graham Daws ’ conduct should not be attributed to Emanuel.

212. We find that the historical events of the doubling of the PAT values establishes that Emanuel ceased to be a body corporate of integrity, that Mr Graham Daws was acting on behalf of Emanuel and that his conduct can be attributed to Emanuel. This finding of itself does not result in satisfaction of s 23(1)(b)(i) because the Tribunal must consider whether the grounds for that finding still exist as at the date of its decision. In other words, we need to consider whether Emanuel has taken any effective steps to rehabilitate itself so as to resume its status as a body corporate of integrity. We will consider that issue separately below.

ISSUE 2: WHETHER ANY PERSON WHO PARTICIPATES IN MANAGEMENT OR CONTROL OF THE LIVE-STOCK EXPORT BUSINESS OF EMANUEL HAS CEASED TO BE A PERSON OF INTEGRITY—s 23(1)(d)

213. There is no dispute that Mr Graham Daws was, when he was the managing director of Emanuel, a person who participated in the management or control of Emanuel. As we have found above, his conduct (which can be attributed to Emanuel) demonstrated a lack of integrity.

214. Mr Graham Daws resigned as managing director of Emanuel on 29 June 2018. However, there is an issue about whether he continues to nevertheless participate in the management and control of Emanuel. This issue is directly relevant to s 23(1)(d) but is also relevant to the question of Emanuel ’ s current integrity under s 23(1)(b)(i).

215. It is important to put this issue in context to determine the weight that should be given to findings on this issue. The issue arises because Emanuel relies on Mr Graham Daws ’ resignation as managing director as evidence of its rehabilitation and current integrity. In response, the Secretary seeks to downgrade any positive effect of his resignation on Emanuel ’ s integrity by establishing on the facts his ongoing involvement. The Secretary submitted that we should apply the principles in the following passage from the Casino Report, page 338:

It is accepted that a company ’ s suitability may ebb and flow with changes to the composition of the company ’ s Board and Management, and others who influence its affairs, over time. If a company ’ s character and integrity has been compromised by the actions of its existing controllers, then it may be possible for a company to ‘remove a stain from the corporate image by removing the persons responsible for the misdeeds ’ . However, this would only be possible if the company could ‘isolate the wrong done and the wrongdoers from the remaining corporate personnel ’ . It would be necessary to ensure that ‘the corporation has purged itself of the offending individuals and they are no longer in a position to dominate, manage or meaningfully influence the business operations of the corporation. ’

(Footnotes omitted.)216. We agree with the principles in this passage. However, we also consider that whilst the extent of the involvement of Mr Graham Daws is an important issue, it is not necessarily determinative of Emanuel ’ s integrity. It is only one factor to be considered amongst many.

217. The Applicants contend that Mr Graham Daws was the only person from Emanuel who was involved in the provision of the incorrect PAT values and that, soon after the licence suspension, he resigned as a director and secretary of Emanuel and has not participated since in the management and control of Emanuel. The Applicants also contend that Mr Graham Daws ’ conduct is historic and is not indicative of the current integrity and competency of Emanuel because of the steps taken to remove him from his involvement in Emanuel.

218. In support of the submission that Mr Graham Daws participates in the management and control of Emanuel, the Secretary referred to Mr Graham Daws ’ 49.85% shareholding in Emanuel and his interests in other family companies. The Secretary submitted that these interests give Mr Graham Daws the ability to directly (and indirectly) control voting rights. However, there is no evidence that Mr Graham Daws has used his shareholdings to exert any control or influence over Emanuel. We reject the Secretary ’ s submission in this regard. Indeed, the evidence shows that from the time of his appointment as managing director, Mr Nicholas Daws was the directing mind and will of the Applicants.

219. The Secretary submitted, based on a minute of a meeting held on 8 January 2020, that Mr Graham Daws had opposed the appointment of independent directors to protect his interest in Emanuel, thus exerting his control on the strategic direction of the company. Mr Nicholas Daws was cross-examined about this meeting. He gave evidence that he told Mr Graham Daws that he proposed appointing independent directors and that Mr Graham Daws had not raised any concern. The only evidence relied upon by the Secretary to the contrary is the minutes of the meeting, which does not name Mr Graham Daws and does not refer to any opposition having been expressed by anyone with respect to the appointment of independent directors. Further, Dr Ludeman, who was the author of the minutes and present with Mr Nicholas Daws at the meeting, explained the reference to “shareholders needs and concerns about multiple family interests” as being a reference to concerns expressed by Mr Nicholas Daws (transcript/633). She rejected the proposition that Mr Nicholas Daws told her that Mr Graham Daws did not want independent directors appointed. We found Mr Nicholas Daws and Dr Ludeman to be honest and credible witnesses. We accept their evidence and reject the Secretary ’ s submission in this regard. We discuss the issue of the appointment of independent directors further below under Issue 5 with respect to changes Emanuel has made to its governance and compliance processes.

220. Mr Nicholas Daws gave evidence about the extent of Mr Graham Daws ’ ongoing involvement, in his statement dated 29 January 2021:

128. I am aware that Graham likes to keep himself informed about Emanuel ’ s affairs. He has a general interest in knowing about the supply of livestock to Emanuel ’ s customers, the livestock prices, and the numbers of animals supplied, the costs involved and the shipping schedules.

129. I have no difficulty with Emanuel ’ s staff keeping Graham informed on these matters or asking him for advice. He has a wealth of industry knowledge and a significant financial interest in the success of Emanuel.

221. Mr Nicholas Daws stated further:

189. I am aware that Ben speaks with Graham about Emanuel ’ s business. I am also aware that Ben asks Graham for advice and other information on issues relating to his role and the livestock industry.

222. These concessions made by Mr Nicholas Daws about Mr Graham Daws ’ ongoing involvement mean that it is unnecessary to set out the numerous examples where Emanuel ’ s staff have conferred with Mr Graham Daws about Emanuel business and seek his advice.

223. However, Mr Graham Daws ’ involvement went beyond conferring with and advising staff, because he continued to be involved with external parties in relation to the business of Emanuel. He maintains an office within Emanuel ’ s place of business. Up until October 2020, he sent emails on Emanuel letterhead to external parties and his email address included a reference to Emanuel. He had dealings with actual and potential clients and service providers of Emanuel.

224. Mr Graham Daws continues to drive two vehicles owned by Emanuel. He receives income from the management services agreement, but no longer performs any duties under it.

225. Mr Edwards gave evidence in his statement about Mr Graham Daws ’ involvement in seeking to re-open Saudi Arabian trade through his membership of an industry body known as ALEC (the Australian Livestock Exporters Council):

170. ALEC along with other Industry bodies have been trying to re-open that trade for a number of years. I know that Graham has an interest in that topic. Also, as a result of his many contacts in the Industry and elsewhere, he is able to provide assistance and advice to ALEC and me about how we may re-open that trade.

226. There were many emails between Mr Edwards and Mr Graham Daws in relation to efforts to re-open that trade and in relation to other matters of interest for both Emanuel and the live-stock industry as a whole. They were both long-standing members of ALEC. We find that the efforts of Mr Graham Daws were directed to benefitting the industry as a whole, but in so doing would have benefitted Emanuel as the largest exporter in the industry. Mr Edwards was cross-examined about his ongoing communications with Mr Graham Daws and said (transcript/453):

Nicholas had advised me early in the developments around the cancellation of the Emanuel ’ s licence, that I should not be sending emails to Graham Daws, and what transpired was an oversight, but an oversight purely around, as I have explained, keeping Graham informed of industry issues and developments, and the larger aspects of the trade.227. Mr Graham Daws also became involved with the business of Emanuel when a shipment of sheep was delayed due to crew members contracting COVID-19 in June 2020. Those sheep needed to be sold into the domestic market instead of exported. Mr Graham Daws fielded calls from potential purchasers to assist with the crisis.

228. After resigning as managing director, Mr Graham Daws continued to communicate with Mr Osama Boodai, the CEO of Emanuel ’ s largest live-stock export client, KLTT (transcript/207). They had a long-standing relationship. Mr Nicholas Daws copied in his father to his email communications with KLTT regarding a contract extension in 2019. Mr Nicholas Daws was cross-examined about this and said (transcript/310):

... it was more out of respect from their long history. They now don ’ t have him in the emails.229. Mr Nicholas Daws denied that Mr Graham Daws was present at a meeting held in Australia with Mr Boodai in November 2019 (transcript/312). Mr Stanton ’ s evidence was that Mr Graham Daws was present at the meeting with KLTT but simply performed the formal introductions and then handed over to his son, Mr Nicholas Daws.

230. With respect to an earlier meeting with KLTT in November 2018, the evidence was that Mr Graham Daws presented the financial information up to 30 June 2018 (the date he resigned) and then Mr Nicholas Daws presented the outlook for going forward (transcript/318 – 319).

231. Under cross-examination Mr Nicholas Daws accepted that his father continued to be given information about KLTT and routinely spoke on the telephone with Mr Boodai regarding Emanuel ’ s business.

232. We make the following findings with respect to Mr Graham Daws ’ involvement in Emanuel.

(a) He resigned as managing director and director of Emanuel on 29 June 2018. He is not an employee of Emanuel.

(b) He does not provide consultancy services to Emanuel, but he continues to receive monthly payments paid under the management services agreement.

(c) As a long-standing participant in the live-stock export industry, Mr Graham Daws maintained that interest and involvement after his resignation from Emanuel. This meant that he would often discuss industry issues and the business of Emanuel with Emanuel employees and management. For a period after his resignation, he continued to use Emanuel letterhead and an Emanuel email address, but he no longer does so.

(d) There is some evidence of his dealing with clients of Emanuel after his resignation, but he was not given authority or responsibility for negotiating any contract or transaction for and on behalf of Emanuel. There was no evidence of any concluded transaction of Emanuel with respect to live-stock exports brought about by the conduct of Mr Graham Daws. For example, although Mr Graham Daws continued after his resignation to have discussions with Mr Boodai from KLTT, a major client of Emanuel based in Kuwait, it was Mr Nicholas Daws who negotiated contract extensions and provided financial information to KLTT for the period after 30 June 2018.

(e) It was not uncommon for Mr Graham Daws to speak about the business of Emanuel with its management and to provide advice, but the evidence does not establish that he made any decisions on behalf of Emanuel or that he was able to direct how the management of Emanuel would be conducted. There is some evidence that Mr Graham Daws assisted the business of Emanuel by drawing upon his connections in the industry and his long-standing relationships with some clients.233. We conclude that Mr Graham Daws had some ongoing participation in the affairs of Emanuel after he resigned his position as managing director, particularly up to the period ending in about October 2020. It is fair to say that Mr Graham Daws did not take all the steps that were available to him to disassociate himself from Emanuel and its operations after his resignation. However, his participation did not involve him binding Emanuel in any dealings with third parties nor did it involve him directing or exerting a controlling influence over the management or operations of Emanuel. Further, the evidence does not establish that he had authority to direct an important or substantial part of the operations of Emanuel ’ s business, or in the words of the Casino Report, “to dominate, manage or meaningfully influence the business operations of the corporation”. That authority had passed to Mr Nicholas Daws as the new managing director. Consequently, Mr Graham Daws, for the period after his resignation, does not come within the deeming provision of s 8(1) of the AMLI Act, as a person who is taken to participate in the management or control of Emanuel. We find that upon Mr Graham Daws ’ resignation, he no longer participated in the management or control of Emanuel ’ s export business. His effective resignation was a positive step towards the rehabilitation of Emanuel as a body corporate of integrity for the purposes of s 23(1)(b)(i).

234. With respect to s 23(1)(d), Mr Graham Daws ’ effective resignation means that we place less weight on his earlier participation because he is no longer a person who participates in the management or control of Emanuel ’ s export business.

ISSUE 3: WHETHER EMANUEL HAS CONTRAVENED A CONDITION OF EMANUEL ’ S LICENCE—s 23(1)(g)

235. As noted above, compliance with the ASEL was a condition of Emanuel ’ s Licence. In a schedule filed with the Tribunal on 18 November 2020, the Secretary alleges nine breaches of the ASEL by Emanuel during Voyages 24, 25 and 26, constituting a contravention of a condition of Emanuel ’ s Licence. One alleged breach concerning wool length, which was initially in dispute, was not pressed by the Secretary at the hearing and so we have not made a finding on it. The remaining alleged breaches of the ASEL will now be discussed.

The submission of HSRA plans to the Department based on incorrect PAT values

236. The first breach, which the Secretary alleges is of high severity, is the submission of HSRA plans to the Department based on incorrect PAT values. The Secretary alleges that this is a breach of Standard 4.12 of the ASEL which requires, amongst other things, that stocking densities must be in accordance with an agreed HSRA, which the 2012 EA Notice states to be HotStuff version 4.

237. The Applicants, on the other hand, submitted that ASEL Standard 4.12 is not concerned with the submission of PAT ***data***, and that it should be read together with the 2012 EA Notice. They submitted that, when read together, ASEL Standard 4.12 and the Notice “stipulate an objective requirement that stocking densities and pen-group weight-range tolerances for species of livestock on a vessel must be such that HotStuff version 4 calculates less than a 2% risk of 5% mortality”. The Applicants further submitted that this risk was not actualised for Voyages 24, 25 and 26 because the actual stocking densities of sheep did not result in a greater than 2% chance of a 5% mortality. Specifically, although the mortality rate for Voyage 25 was 3.76%, which exceeded the reportable mortality rate of 2% under the ASEL, it did not exceed 5%.

238. The Applicants did, however, acknowledge Mr Nicholas Daws ’ admission during cross-examination that the incorrect calculation of PAT values caused Voyage 25 to be overstocked with sheep. This admission was made during the following exchange (transcript/229):

COUNSEL: You agree that the effect of the incorrect calculation of the PAT values in relation to voyage 25, the MV Awassi Express caused that ship to be overstocked with sheep?

MR NICHOLAS DAWS: Yes.

COUNSEL: Do you agree with me that this was a very serious issue that the ship would have more sheep on it than would be permitted to load by the Department?

MR NICHOLAS DAWS: Yes.239. In our view, whether the risk was realised is not material. One does not have to wait for the mortality rate to exceed 5% for the ASEL to be breached. We note that the first point of the “Guiding Principles” in s 5 of the Australian Position Statement on the Export of Livestock (attached to the ASEL) states that, “The health and welfare of animals is a primary consideration at all stages of the livestock export chain”.

240. As we have noted above, all the experts agreed that over-stating the PAT values is a serious issue which significantly increased the risk to animals. We noted the evidence of Dr Stacey above that the doubling of the PAT values resulted in the overstocking of live-stock on board by 4,234 animals. Our conclusion was that doubling the PAT values resulted in an increased risk of harm and death for the animals on board.

241. We find that submitting HSRA plans to the Department that were based on incorrect PAT values was a breach of a condition of Emanuel ’ s Licence. Standard 4.12 of the ASEL requires stocking densities to be within “an agreed stress risk assessment”. We find that the 2012 EA Notice clearly states that there is an obligation for the exporter to provide correct PAT values to the Department. It specifically states that “exporters are required to” use HotStuff version 4 (unless a variation had been approved), which is to be submitted to the Department with the exporter ’ s NOI and CRMP. The provision of correct PAT values is an integral part of the process leading to the grant of an export permit. The exporter cannot export live-stock without this permit (s 1A.01(i) of the Animals Order). Section 1A.30(2) of the Animals Order provides that, in deciding whether to grant an export permit to an exporter, the Secretary may take into account whether the exporter has complied with any conditions to which its licence was subject and any requirements under the AMLI Act relating to the export of live-stock.

242. The accuracy of the PAT values is, as we have mentioned, integral in this process, and the integrity of the exporter in providing correct ***data*** is critical. If the Department was aware that the PAT values had been doubled, it is likely that it would not have granted the export permit due to the potential for the health and welfare of animals to be compromised.

243. We therefore find that Emanuel ’ s submission to the Department of HSRA plans based on incorrect PAT values breached Standard 4.12 of the ASEL and that it was a serious breach.

Pregnant ewes prepared for export to the Middle East by sea between May and October

244. Standard 3.9(a) of the ASEL provides that the operator of a registered premises must not prepare pregnant ewes for export to the Middle East by sea during the period from May to October. The Applicants have accepted that a small number of lambs were born during Voyages 25 and 26, specifically eleven on Voyage 25 and six on Voyage 26. The parties ’ agreed that there is no evidence that Emanuel knowingly prepared pregnant ewes for export. We accept the evidence of Dr Madin that the low number of lambs born in proportion to the number of ewes loaded, suggested that errors in scanning may have been responsible. We therefore accept that there was a breach, but that it was of low severity.

245. Emanuel has now taken steps to prevent future breaches. Specifically, Mr Ben Stanton ’ s evidence was that Emanuel now requires pregnancy testing of all Dorper ewe lambs regardless of weight, which exceeds the requirements of the ASEL.

Sheep had long horns that were not tipped back to one full curl or less

246. Standard 1.7 of the ASEL requires that live-stock must not be prepared for export if they meet the rejection criteria. This rejection criteria includes having “Untipped sharp horns”, and specifically for sheep, “long horns greater than one curl, except in approved NOI and CRMP”. Standard 1.16(d) provides that “Horned sheep or rams must only be sourced for export as slaughter and feeder animals if the horns ... are one full curl or less, or are tipped back to one full curl or less”. The Secretary referred to video evidence of sheep with untipped horns on Voyages 24 and 25. The Applicants accept that there is some video evidence of sheep with untipped horns on Voyages 24 and 25. We therefore find that there was a breach of these Standards.

247. The parties agree that these breaches were of “low severity”. We agree with this characterisation of the breach and note the opinion of Dr Madin that the number of sheep with untipped horns was apparently a small proportion of the total number of horned sheep. Dr Madin further opined that there was no evidence of harm being caused to any sheep and that, “Given the combination of tip sharpness, length and extension away from the head of the horns, it seems that the untipped horns identified in the video presented a low risk of damage to other sheep”. We therefore agree that these breaches are of low severity.

Allegations concerning onboard management of the health, welfare and physical needs of live-stock during Voyage 25

248. The Secretary also alleged that Emanuel breached several ASEL Standards concerning onboard management of the health, welfare and physical needs of live-stock on Voyage 25 (Standards 5.1, 5.6 and 5.7).

249. The Applicants, however, submitted that other persons were responsible for these breaches. Specifically, the Applicants submitted that once the live-stock are loaded onboard the vessel, there is a transfer of responsibility from the exporter to the ship ’ s master, accredited veterinarian and/or stockperson. In making this submission, the Applicants referred to Standard 4.16, which states that “As the livestock for export are loaded on board the vessel at the port of export, responsibility for the livestock transfers to the master of the vessel ... ”.

250. The Applicants referred to ss 5.3(2), 5.3(3) and 5.3(4) of the ASEL, which provide an overview of onboard management by the Master, accredited veterinarian, and accredited stock persons:

(2) Once loading begins at the point of embarkation, the master of the vessel assumes overall responsibility for the management and care of the livestock during transport on the vessel. This responsibility continues until the point of disembarkation ...

(3) Where an accredited veterinarian is required to accompany the consignment, that person is responsible for monitoring and regular reporting of consignment conditions on board during and after the voyage.

(4) Accredited stock persons accompanying the consignment are responsible for providing appropriate care and management of the livestock on board during the voyage.251. The Applicants further referred to s 5.4(2) of the ASEL, which provides, in part, that, “At disembarkation, the master of the vessel transfers responsibility for the animals to the importer in the importing country ... ”.

252. Additionally, the Applicants referred to Standard 5.1 of the ASEL, which they submitted reflects a passing of responsibility from the exporter to the accredited stock person and accredited veterinarian. It provides:

The onboard management of livestock for export by sea must ensure that the health, welfare and physical needs of livestock are met during the voyage:(a) An accredited stock person must accompany each consignment of livestock and must remain with the consignment until the vessel has completed discharging at the final port of discharge.

(b) An accredited veterinarian must accompany each consignment of livestock where required by the relevant Australian Government agency and must remain with the consignment until the vessel has completed discharging at the final port of discharge.

(c) Accredited stock persons and/or veterinarian must work with the vessel ’ s master and crew to maintain the health and welfare of the livestock onboard.253. The Applicants submissions are effectively that the exporter abdicates responsibility for compliance with the ASEL during the voyage. We reject that submission because it is the exporter who holds the export licence, and it is the exporter who bears the ultimate responsibility of compliance with applicable laws and the regulatory regime. Specifically, s 17(5)(a) of the AMLI Act, reproduced in the “legislative framework” section above, provides that an export licence is subject to the condition that the holder of the licence must comply with orders made, and directions given under s 17. As we also stated in the above section, s 3(1) of the Standards Order provides that the holder of a live-stock export licence must not export live-stock except in accordance with the ASEL, with the applicable version being version 2.3, dated 27 April 2011.

254. Further, s 6 of the Australian Position Statement on the Export of Livestock sets out the responsibilities of key participants of the live export industry. Section 6.1 outlines that the ultimate responsibility rests with the exporter throughout the export process. It provides:

The exporter must comply with the Australian animal health and welfare system, including all Australian Government and state, territory or local government laws that apply to the health and welfare of livestock in a particular jurisdiction. The exporter is also responsible for ensuring that importing country requirements are met and that verification systems are established to meet audit scrutiny throughout the livestock export chain. Where the exporter subcontracts to service providers, the exporter is responsible for instructing the service provider to comply with the Standards and importing country requirements, and to ensure that all of the above requirements are met.

In particular, the exporter must source suitable livestock that meets consignment specifications, such as species, class, condition, animal health and welfare status and number of livestock. The exporter must also ensure sufficient livestock services are maintained throughout the voyage and on-board care and management of the livestock is adequate to maintain animal health and welfare. To achieve this, the Standards prescribe that the exporter must engage an accredited stock person and, when required, an accredited veterinarian (see also Sections 6.4 and 6.5).

(Emphasis added.)255. Thus, whilst the exporter holds the export licence, in order to facilitate the export of a consignment of live-stock, the exporter needs to employ or subcontract with persons to assist. These persons include the ship ’ s master, the accredited veterinarian and accredited stock persons. Although these persons have certain responsibilities imposed upon them by the ASEL, this does not mean there is an abdication of responsibility to these persons by the exporter to ensure compliance with the ASEL and other laws. The exporter holds the export licence and bears ultimate responsibility, notwithstanding any further responsibility placed upon persons engaged to facilitate the export of a consignment. An exporter, by necessity, needs to delegate some responsibilities to others during the voyage but does not abdicate those responsibilities.

256. We therefore reject the Applicants ’ submission that, if there were any breaches of the ASEL (specifically Standards 5.1, 5.6 and 5.7) during Voyage 25, the persons responsible for those breaches were the ship ’ s master, accredited veterinarian, and accredited stock person, and not Emanuel.

257. We now turn to the specific breaches.

258. Firstly, the Secretary alleges that onboard management failed to ensure the health, welfare and physical needs of live-stock during Voyage 25, in breach of sub-paragraphs of Standard 5.1, which commences with, “The onboard management of livestock for export by sea must ensure that the health, welfare and physical needs of livestock are met during the voyage”. Specifically, the Secretary referred to video footage showing moribund sheep being left alive amongst decomposing carcasses on Voyage 25 ’ s return to Australia after it had completed discharge at the final port. The Secretary did, however, submit that although the Tribunal should find that this breach occurred, it was of low severity and there is now a procedure in place to address the issue. Emanuel conceded that, on Voyage 25, the veterinarian and stock person ’ s final check did not occur because they departed the Vessel before discharge was completed. In its response dated 31 July 2018, Emanuel further accepted that if the video footage was correct, this was an “unacceptable outcome”. It suggested that the breach was “due to human error in failing to identify such sheep via routine inspections following discharge”, and that Emanuel had implemented a procedure in its voyage instructions to ensure that all live sheep depart the Vessel on discharge.

259. Secondly, the Secretary also alleged breaches of ASEL Standards 5.6(b) and 5.6(f) which provide:

Livestock and livestock services on the vessel must be regularly inspected (day and night) to ensure that the health and welfare of the livestock are maintained while the livestock are on the vessel: ...(b) Livestock must be systematically inspected to assess their health and welfare. ...

(f) Washing down of decks and disposal of faeces and litter must be carried out with regard to the health and welfare of livestock.260. The alleged breach of Standard 5.6(b) concerned sick and injured animals on Voyage 25 not being treated or removed to hospital pens. However, this Standard relates to the inspection of live-stock, and instead, the applicable Standard appears to us to be

Standard 5.7 This Standard provides:

Any livestock identified as being sick or injured must:(a) be given prompt treatment;

(b) be transferred to the hospital pen, if required; and

(c) if necessary, be euthanased humanely and without delay ...261. In a letter to the Secretary dated 15 May 2018, Mr Nicholas Daws referred to mitigating circumstances including the extreme heat event and the “sheer number” of sick animals in a short time frame, which overwhelmed the crew, accredited veterinarian and stock person, who did everything they reasonably could to maximise welfare outcomes. Mr Nicholas Daws further stated in his letter:

On a day and night basis animals were being attended to. However, the sheer number of cases in a short timeframe that were being rescued and treated or destroyed put understandable strain on the ability of the crew to keep up.262. We note the witness statement of the stockman, Mr Adi Tiawarman, dated 23 June 2016, that some sheep that were not sick were moved into the hospital pens to lower the stocking density. We also note the efforts described by the chief officer of the Vessel, Mr Muhammad Gulzar, regarding the extreme weather event which occurred during Voyage 25 from 15 to 17 August 2017. This included, for example, day and night monitoring of the animals, increasing the frequency of watering including by re-deploying hands to undertake continuous watering, allowing some sheep into the walkway, and expediting the discharge of animals. Considering the volume of animals affected, we are satisfied that sick and injured live-stock were not able to be given prompt treatment, or to be removed to the hospital pens. Also, given the measures that were undertaken to reduce the density of animals on board, which included the use of hospital pens, we find that sick or injured animals were not necessarily transferred to the hospital pens. We also note that in Mr Nicholas Daws ’ letter of 15 May 2018, he stated that, “The Vessel deploys one captive bolt gun out on deck, which is usually controlled by the AAV [the Accredited Veterinarian on board the Vessel] so there will inevitably be some delay given the nature and scale of the crisis between the AAV being advised of the need to destroy an animal and the action being taken”. We therefore find that Standard 5.7 was breached. However, due to the mitigating circumstances, including the extreme weather event, and the accredited veterinarian and stock person doing all that they could to minimise adverse animal welfare outcomes for a large volume of affected animals, we agree with the Secretary ’ s submission that the breach should be regarded as being of low severity.

263. The alleged breach of Standard 5.6(f) of the ASEL concerned pen conditions, specifically decks not being washed down and faeces and litter not being disposed of. This included “sticky pens”, being a build-up of manure, which has become soft or boggy underfoot due to a build-up in moisture, as well as coat contamination. Emanuel accepts that this occurred in some parts of the Vessel and explained the circumstances leading to the boggy pad, which was contributed to by the extreme heat event. Emanuel further explained that washing down the decks in those circumstances could result in further heat stress, which would be detrimental to animal welfare. We note that the Secretary accepted that the sticky pens were, in large part, caused by the severe weather, which was outside Emanuel ’ s control. We note that in his report dated 9 July 2019, Dr Madin refers to the wording of Standard 5.6(f), specifically, that a decision to wash down decks is made “with regard to the health and welfare of livestock”. We agree with Dr Madin ’ s conclusion that, “This would vindicate a decision not to wash if it was felt that the washing process would be detrimental to the health and welfare of the livestock to a greater degree than the benefits of washing”. Dr Madin also stated that he was “not aware whether convective heat loss would increase or decrease in animals with coat contamination”. We agree with the opinion of Dr Madin and consequently find that Standard 5.6(f) of the ASEL was not breached in these circumstances, where to wash down decks could have resulted in further adverse animal welfare outcomes.

264. In Emanuel ’ s Amended SFIC dated 3 February 2021, Emanuel accepted that Standards 5.1(a) and 5.1(b) of the ASEL were breached because the accredited veterinarian and accredited stockperson departed the Vessel before final discharge of Voyage 25. Specifically, the date of final discharge according to the end of voyage report was 24 August 2017. However, the stock person, Mr Tiawarman, ceased working at approximately 2.00 pm on 22 August 2017 and his flight itinerary shows a departure time from Dubai on 22 August 2017.

265. In a written statement to the Assistant Secretary of the Department, the accredited veterinarian, Dr David Scharp, confirmed that he “left the vessel before all of the animals were discharged”. We accept that these early departures were not at the direction of Emanual, nor did Emanuel have any knowledge of them. We also accept that these early departures were contrary to the specific voyage instructions which Mr Ben Stanton gave to the accredited veterinarian and stock person, which stated that they “must remain with the consignment until the Vessel has completed discharging at the final port of discharge”. We note the statement in Emanuel ’ s Amended SFIC dated 3 February 2021 that “the Applicant accepts that it is responsible for upholding the conditions of the Licence for the duration of any voyage”. We agree with the statement and find that Emanuel breached Standards 5.1(a) and 5.1(b) of the ASEL. However, we accept that Emanuel has taken steps to ensure that this breach does not recur. Specifically, Emanuel has amended its voyage instructions to require the accredited veterinarian to confirm in the end of voyage report the completion of discharge and time of departure of the accredited veterinarian and stock person from the vessel. Further, Emanuel will then provide a signed declaration to the Department confirming its receipt of this confirmation. We therefore agree with the Secretary ’ s characterisation of this breach as being of low severity.

Findings on Issue 3

266. In summary, we have found that Emanuel did breach a condition of its Licence by breaching the following Standards in the ASEL: Standards 4.12, 3.9(a), 1.7, 1.16(d), 5.1(a), 5.1(b) and 5.7 We are satisfied pursuant to s 24(1)(b)(i) of the matter mentioned in s 23(1)(g), namely that Emanuel contravened a condition of its licence.

267. We have found that the breach of Standard 4.12, being the submission of HSRA plans to the Department based on incorrect PAT values, is serious. However, we found the remaining breaches to include mitigating circumstances and to be of low severity. With respect to these remaining breaches, we also found that Emanuel now has procedures in place to reduce the risk of similar breaches occurring in the future. We did not find that Standard 5.6(f) was breached.

ISSUE 4: WHETHER EMANUEL HAS CEASED TO BE COMPETENT TO HOLD EMANUEL ’ S LICENCE—s 23(1)(b)(ii)

268. There is some overlap between the facts that are relevant to this issue of competence under s 23(1)(b)(ii) and the other issues before us including whether Emanuel ceased to be a body corporate of integrity and whether Emanuel contravened a condition of Emanuel ’ s Licence.

269. We have already found that Mr Graham Daws doubled the PAT values and that he knew or ought to have known that the PAT values he provided to the Department for the purposes of obtaining export permits were incorrect.

270. We found that in doing so, he was acting in his capacity as managing director of Emanuel and that his conduct should be attributed to Emanuel. We further found that this conduct demonstrated that Mr Graham Daws, who was the managing director of Emanuel at the time he provided the information, a person who participates in the management or control of a live-stock export business, was not a person of integrity. Our findings concerning this conduct of Mr Graham Daws on behalf of Emanuel also support our being reasonably satisfied that Emanuel ceased to be competent to hold Emanuel ’ s Licence.

271. This conclusion is further supported by the lack of systems in place at the time to ensure that the correct information was provided to the Department, including any steps to confirm the accuracy of the information or to check errors. For example, Mr Ben Stanton gave evidence to the Tribunal about the limited ability to check HSRAs in Emanuel ’ s offices because no one at Emanuel had the software or the computer system to run HotStuff (transcript/401 – 403).

272. In the preceding section we found that Emanuel contravened a condition of Emanuel ’ s Licence by breaching various Standards of the ASEL. We found that most of the breaches were of low severity and were, relevantly, mitigated by the severe weather event. Accordingly, we find that those breaches alone are not a sufficient basis upon which to conclude that Emanuel was not competent to hold an export licence. However, we also found that there was a breach of Standard 4.12 of the ASEL by the submission of HSRA plans to the Department based on incorrect PAT values, which we regarded as being serious. In our view, the severity of this breach adds further weight to our conclusion that Emanuel ceased to be competent to hold an export licence.

273. Although Emanuel ceased to be competent and ceased to be a body corporate of integrity between 2014 and 2017 when it submitted HSRA plans to the Department based on incorrect PAT values, we must determine whether this remains so as at the time of our decision. Thus, in the following section, we consider whether, at the time of our decision, Emanuel is sufficiently rehabilitated so as to be a body corporate of integrity and competent to hold an export licence. This will inform our decision regarding the appropriate regulatory action that should be taken regarding Emanuel ’ s Licence and EMS ’ s Licence.

ISSUE 5: WHETHER EMANUEL HAS TAKEN SUFFICIENT STEPS TO ADDRESS THE INTEGRITY AND COMPETENCE CONCERNS

274. We have found that Emanuel, through its conduct in 2014, showed a lack of integrity which continued with the submission of each HSRA until 2017. By doubling the PAT values and by allowing that false information to be included as part of the HSRAs submitted to the Department, Emanuel ceased to be a body corporate of integrity. The question that then arises is whether there is any evidence of rehabilitation such that Emanuel can now be considered a body corporate of integrity despite its previous conduct. Emanuel submitted that it has taken steps which it says establishes that it has reformed its practices, such that it is now competent and a body corporate of integrity which should be entitled to hold an export licence. We have found that these issues of current integrity and competency of Emanuel are properly before the Tribunal as being relevant to the statutory questions which must be answered. We note that the Secretary ’ s SFIC dated 21 February 2019 addressed the issue as to whether changes to management and governance of Emanuel were sufficient to address integrity and competency issues. The Applicants then provided evidence on the topic by way of written statements from Dr Ludeman and Mr Nicholas Daws. Prior to the hearing, the Secretary particularised the allegations relating to integrity and competence issues in the Further Amended Supplementary SFIC dated 19 February 2021.

275. It may be thought that there is a practical difficulty for Emanuel to establish its integrity because its licence to export was cancelled on 21 August 2018, now over three years ago. However, Emanuel has continued to trade in the live-stock industry since this time by operating the Peel Feedlot and preparing live-stock for export by RETWA. Despite not acting as a licensed exporter, we are able to consider this ongoing conduct for the purpose of determining Emanuel ’ s current integrity. It is not merely Emanuel ’ s conduct as a licensed exporter (which concluded upon cancellation of the licence) that is relevant to integrity. We can also rely on the evidence as to changed practices which is relevant to the question of integrity to hold an export licence in the future.

276. Before we turn to the reforms made by Emanuel and the issues raised by the Secretary concerning the Peel Feedlot, we will make three observations that are relevant to rehabilitation and specifically to competence and integrity. These observations concern Emanuel ’ s initial response to the allegations regarding Mr Graham Daws in the Second Show Cause Notice; the resignation of Mr Graham Daws; and our observations regarding the current management team.

General observations regarding rehabilitation

Emanuel ’ s initial response to the allegations regarding Mr Graham Daws

277. On 6 July 2018, Emanuel responded to the Second Show Cause Notice by denying the allegations relating to integrity and competence. More particularly, Emanuel said that Mr Graham Daws acted in good faith and provided what he understood to be the correct PAT values for the Vessel. There was no expression of remorse, rather an explanation that Mr Graham Daws had relied on others to form an honest and reasonable belief that the PAT values from Mr Clausen could be doubled. Quite clearly, the views expressed by Emanuel in response to the Second Show Cause Notice cannot be accepted. However, Emanuel has now changed its position, conceding in their written closing submissions:

48. ... that the PAT scores used to generate the HSRAs supporting the NOIs for the relevant 9 voyages of the MV Awassi Express were incorrect ... that Graham Daws ought to have known when submitting the PAT score ***data*** for the MV Awassi Express to Dr Conrad Stacey in 2014 that the ***data*** he provided to Dr Stacey was not calculated the way Dr Stacey would have calculated it and its submission therefore was capable of leading to error.278. Emanuel ’ s initial response showed a concerning lack of remorse and responsibility. However, in our view, their change of position indicates an acceptance of the gravity of the conduct by Mr Graham Daws and, consequently, Emanuel.

The resignation of Mr Graham Daws

279. Mr Graham Daws resigned as managing director of Emanuel as part of the company ’ s attempt to rehabilitate itself and to establish its current integrity. We have already considered the resignation as managing director of Mr Graham Daws and any ongoing involvement he may have in Emanuel. The Secretary raised concerns with respect to Mr Graham Daws not being a person of integrity and yet continuing to be involved in the business of Emanuel. However, as we have found above, the evidence does not support a finding that Mr Graham Daws is in any position to control Emanuel or to direct how the management of Emanuel is to be conducted. We found above that after Mr Graham Daws ’ resignation, he no longer participated in the management or control of Emanuel ’ s export business. Mr Nicholas Daws took over as managing director and became the directing mind and will of Emanuel. Mr Graham Daws ’ continued presence in the business is therefore not significant.

The current management team of the Applicants

280. We do not have any concerns that the current management team are not persons of competence and integrity. Mr Nicholas Daws, the current managing director, and Dr Ludeman, the corporate governance and compliance officer, were credible witnesses who we found to be frank and honest. We formed a similar view with respect to Mr Ben Stanton and Mr Edwards.

281. Mr Nicholas Daws was not aware that his father, Mr Graham Daws, had doubled the PAT values in 2014. On 24 June 2014, Mr Nicholas Daws emailed his father setting out the information needed by Dr Stacey to create the vessel file, but he had no further involvement until he received the vessel file from Dr Stacey on 1 July 2014. Upon receiving the vessel file, Mr Nicholas Daws created an HSRA for the Vessel ’ s maiden voyage to the Middle East (Voyage 2). The HSRA for later voyages were prepared by Mr Alastair Solomon of RETWA on Emanuel ’ s behalf because Emanuel did not have the necessary HotStuff software on its computers. There was no reason to revisit the vessel ***data*** file for these later voyages because the Vessel had not undergone any material changes since 2014. That does not absolve Mr Graham Daws because he alone was aware of the incorrect doubling of the PAT values.

282. It was not until April 2018 that Mr Nicholas Daws became aware of the incorrect PAT values. It was Mr Mike Stanton who at that time reviewed them and informed Mr Nicholas Daws that “they are half what was provided to Conrad in 2014” ’ (Mr Nicholas Daws ’ witness statement dated 16 May 2019).

283. Mr Ben Stanton was not involved with the provision of the incorrect PAT values to Dr Stacey in 2014. He said (and we accept) that he had no reason to doubt the accuracy of the PAT values. He only became aware they were incorrect at around the time that the 60 Minutes program aired in April 2018.

284. The finding of a lack of integrity of Mr Graham Daws for his conduct in doubling the PAT values in 2014 should not be visited upon Mr Nicholas Daws or any of the current management of Emanuel or EMS. Mr Graham Daws acted alone in providing the incorrect PAT values to Dr Stacey and it was not discovered by any of the current management team until April 2018.

285. We also observe that the Applicants, through their management team were open and transparent, by fully cooperating and disclosing information to the Tribunal, including significant volumes of email correspondence involving Mr Graham Daws.

286. We will now consider the issues relevant to rehabilitation described in the first two paragraphs of this section. Firstly, we will consider whether there has been any other conduct on the part of Emanuel suggesting a continuing lack of integrity or competence. This will involve a consideration of allegations made by the Secretary concerning Emanuel ’ s operation of the Peel Feedlot. Secondly, we will consider the related issue of the adequacy of the changes made by Emanuel to its governance and compliance processes in order to address the issues of integrity and competence.

Whether there has been any other conduct suggesting a continuing lack of integrity or competence

287. As has already been mentioned, Emanuel is the registered operator of the Peel Feedlot. Animals are delivered to the Peel Feedlot prior to being transported to the port for export. The Secretary argues that recent conduct on the part of Emanuel as the registered operator of the Peel Feedlot indicates a continuing lack of integrity or competence.

288. Based on an inspection of the Peel Feedlot undertaken on behalf of the Secretary on 17 October 2020, the Secretary alleges that Emanuel breached standards of the ASEL, did not comply with its operations manual for the Peel Feedlot and did not comply with an approved arrangement that Emanuel had in place under s 1A.05 of the Animals Order. The Secretary submitted in its Further Amended Supplementary SFIC that this demonstrates that the Applicants ’ improved compliance systems are inadequate and that they are not competent to hold an export licence.

289. The parties disagree about the condition of the animals inspected on 17 October 2020 and about the interpretation of relevant regulatory provisions including the ASEL. For example, there was disagreement regarding when and whether animals should be removed from the herd and the process of identifying which animals should be rejected.

290. Before we address the issues arising from the 17 October 2020 inspection, we will outline the regulatory provisions referred to above in the “Legislative framework” section in further detail.

Overview of regulatory provisions

Approved arrangements

291. Firstly, with respect to the approved arrangements, we agree with the Applicants ’ submission that the approved arrangements ceased to have effect when Emanuel ’ s Licence was cancelled. Section 1A.01 of the Animals Order states that the export of live-stock is prohibited unless certain listed conditions are complied with. These include that “the exporter holds a live-stock export licence under the AMLI Act” (s 1A.01(a) of the Animals Order) and “an approved arrangement for the exporter is in effect in relation to the live-stock” (s 1A.01(g) of the Animals Order). Section 1A.02 of the Animals Order states that the application for the approved arrangement is made by “An exporter who wants to export live-stock”. Also, for the avoidance of any doubt, s 1A.18(2) of the Animals Order states that, “An approval of an arrangement ceases to have effect if the person who applied for approval of the arrangement ceases to be an exporter”. It was RETWA who was the exporter of the consignment in question, being consignment LNC 11853, and not Emanuel or EMS. Whilst we accept the Applicants ’ submission that the approved arrangements do not apply to Emanual because it was not the exporter, we can place some weight on any conduct that may otherwise be a breach because it would be relevant to ongoing integrity.

Standard 3 of the ASEL

292. Standard 3 of the ASEL concerns the management of live-stock in registered premises. Condition 8 of the Notice of Registration for the Peel Feedlot states that the operator (Emanuel) must comply with Standard 3. Sections 3.1 and 3.2 of the ASEL relevantly state the following “guiding principle” and “required outcomes”:

3.1 Guiding principle

Livestock are assembled at registered premises, where the husbandry and management practices ensure that the livestock are adequately prepared for the export voyage.

3.2 Required outcomes(1) Facilities at registered premises are appropriate for the type and species of livestock to be held.

(2) The health and welfare needs of the livestock are appropriately catered for in a secure environment.

(3) Livestock leaving the premises are fit for the export voyage and meet importing country requirements.

(4) Livestock rejected for export are managed humanely.

293. Standard 3.1 of the ASEL provides:

The operator of registered premises must employ sufficient appropriately trained staff for the effective day-to-day operation of the premises and management of the livestock.294. Standard 3.16 of the ASEL provides:

Daily monitoring of health, welfare and mortality must include the following:(a) All livestock must be inspected daily by a competent stock person

(b) All sick or injured livestock must be given immediate treatment, and veterinary advice must be sought if the cause of a sickness or injury is not obvious, or if action taken to prevent or treat the problem is ineffective

(c) Investigation by a registered veterinarian must be conducted if mortalities in any one paddock or shed exceed 0.1% or 3 deaths, whichever is the greater, on any one day for cattle and buffalo, or 0.25% or 3 deaths, whichever is the greater, on any one day for any other species of livestock. Dead livestock must be ***collected*** and disposed of on a daily basis. Animals must not be able to access the area for disposal of carcases

(d) Records of each consignment must be kept for at least 2 years after the date of export.295. Standard 3.17 states what should happen when live-stock are identified as being distressed, injured or unsuitable for export:

Any livestock identified at unloading as being distressed, injured or otherwise unsuitable for export must be marked by a permanent method and isolated from the rest of the consignment. A record must be kept that details identity, the method of treatment or euthanasia and disposal of all rejected animals. Criteria for rejection are outlined in Appendix 3.1 296. The rejection criteria for sheep are included in Table A3.1.2 of Appendix 3.1 of the ASEL. They are numerous, but include lameness, blindness, scabby mouth and pink eye.

Operations Manual

297. As mentioned above in the “legislative framework” section, for an application to operate a registered feedlot to be approved there must be an operations manual. The relevant manual is the Registered Premises Operations Manual for Peel Feedlot (Manual). A new version of the Manual was submitted to the Department for approval in August 2020 to coincide with the commencement of ASEL version 3 in November 2020 and a copy of that manual has now been provided to the Tribunal.

298. The Manual contains a “Rejected Stock Procedure”, which is consistent with the ASEL. It provides that stock with certain health conditions including pink eye, scabby mouth, limpy, cripples, downers as well as other listed ailments and injuries, are to be removed from the consignment. It further provides that stock that have been rejected (and not held as a re-look) are to be “isolated from other consignment stock”, “identified and recorded” and “diseased or injured animals must be treated appropriately and/or removed from the Feedlot as soon as possible”.

299. The Manual also sets out a “Daily Inspection Procedure”. It provides that:

Resident Manager to arrange to:1. Check livestock daily for general health and injury. ...

6. Ensure stock only handled when necessary, with care to reduce stress.

7. Ensure stock handled in accordance with ASEL VERSION 2.3

8. Monitor for sickness and injury.

9. Isolate sick or injured animals as soon as possible in a separate area for immediate treatment.

10. Identify problem through consultation with a vet if cause or treatment of problem is not obvious or effective. ...

14. Humanely destroy any sick animal. ...

20. Immediately inform EMANUEL (who will inform a Government Veterinary Officer) if mortalities exceed 0.25% on any day in any paddock or shed. Also arrange Vet to perform post-mortem examination of stock. ...

24. Report as per the Reporting Procedure. ...

26. Animal waste is removed using a bobcat from under the shed and loaded into a tip truck.

300. Relevantly, condition 5 of the Notice of Registration for the Peel Feedlot states that “the Operator must ensure that the overall health of the consignment is assessed each day with animal mortality, disease occurrences and states of any animals being treated, reworded on a day to day basis... ”.

Export Advisory Notice 2016 – 16 Management and Removal of Rejects

301. The Secretary has published an Export Advisory Notice 2016 – 16 Management and Removal of Rejects, dated 10 June 2016 (2016 EA Notice). The purpose of the 2016 EA Notice is stated as being: “To provide advice to livestock exporters, Australian Government Accredited Veterinarians (AAVs), registered premises operators and departmental officers on managing livestock rejects”. The 2016 EA Notice further states: “It is the responsibility of livestock exporters to have effective systems in place to ensure consignments of export livestock are compliant with both the relevant importing country requirements and the Australian Standards for the Export of Livestock (ASEL)”.

302. The section titled, “Removal of rejects prior to inspection” provides:

Before a consignment is presented for inspection by the department ’ s authorised officer, an exporter:must have had the consignment inspected by an AAV.must have removed all livestock ineligible for export on the grounds of blood or fecal test results. These livestock present a high risk to maintaining market access as well as to the welfare of all animals in the consignment and must not be exported.should have removed livestock which do not meet ASEL or importing country requirements (for reasons other than test results). The department acknowledges there can be circumstances where removing these livestock from a consignment prior to inspection may not result in the best animal welfare outcome. In these cases the exporters must provide the authorised officer with a written plan for managing rejected livestock at the time of inspection. The plan must clearly identify the rejected animals, their location, reason for rejection and when they will be removed from the consignment. The inclusion of tag numbers to identify animals where possible is encouraged. There is no template for the plan, an example is attached for reference.303. The section titled, “Rejected Livestock” provides in part, that:

Animals identified by the authorised officer at inspection as ineligible for export must be removed from the consignment before it is loaded onto trucks. These livestock cannot be exported as part of that consignment and cannot be reassessed by an AAV and included back into that consignment at a later stage.

Ineligible livestock can be included in future consignments if, at the time of the future consignment, they meet importing country requirements, ASEL and are fit to travel.

It is up to each exporter to implement an effective identification system for rejected livestock which is suitable for their business. Exporters should keep records of actions taken to remove any rejected livestock from the consignment.

Exporters should ensure that any animals rejected from the consignment have been removed from final tag lists provided to the Department. This will prevent possible delays to export permits and health certificates being issued.

This EAN does not prevent AAVs or exporters from removing any additional animal/s from a consignment if, following an inspection by the department ’ s authorised officer, they are not considered as fit for export.Fremantle Model

304. In the Applicants ’ Amended Closing Submissions, the Applicants submitted that, in addition to complying with the ASEL, the Manual and the 2016 EA Notice, they also complied with the “Fremantle Model” (also called the “Fremantle System”). In his report dated 3 February 2021, Dr Madin stated that:

2.2.3 ...the so-called ‘Fremantle model ’ gave greater confidence that more animals were being rejected before loading onto the vessel. In my opinion it also gives greater confidence that the animals which are being exported were in good health and have been subject to less unnecessary stress.305. The following description of the Fremantle System (from a 2008 report prepared by the Department) was cited in a September 2012 report by Dr Nigel Perkins and Dr Madin, titled “Review of sheep pre-embarkation inspection procedures”, at 4.2.1:

On arrival at the registered premise, sheep are drafted into lines according to sex and weight. Unfit sheep are drafted off and rejected. On the day prior to loadout (transport to the port), flock inspections are carried out independently by both an AQIS vet and an accredited vet. The intent of the flock inspection is to assess the health of the flock as a whole, rather than to identify problems with individual sheep. If problems – most notably scouring, pink eye or scabby mouth – are identified amongst a significant number in the flock, the vets may request that the pens be redrafted to remove the unfit sheep, or reject a pen in its entirety. Ear-tag numbers and location of injured or sick individuals are noted but no action is taken at this point

The accredited vet inspection involved walking in a random pattern through a shed of 10 – 12 pens housing approximately 6000 sheep. Not all pens were entered during this process.

Inspection of sheep in the paddocks involved driving through the yards and inspecting the flock through binoculars.

The inspection by the AQIS vet involved walking slowly through the sheds and paddocks to more closely observe the flock ’ s general health.

At loadout the sheep were moved into a system of holding pens before being loaded onto the truck. There were no facilities for drafting off unfit sheep during the loadout process. Sheep exited a funnelling pen single file and ran up the loading ramp onto the trucks.

On arrival at the port, sheep were unloaded via a ramp and onto an elevated race. The race led to a drafting gate and pen. An inspector was positioned along each race to view the sheep as they exited the truck and passed by individually at shoulder height. Inspectors noted unfit sheep as they passed and alerted the drafter, who drafted the rejects off. The raised platform inspection system afforded a good view of the legs and underbelly which are not clearly visible during ground level inspections.

(Footnotes omitted.)The 17 October 2020 inspection

306. On 17 October 2020, the Departmental Veterinarian, Dr Dowd, undertook a pre-export inspection of a consignment of sheep, LNC 11853, at the Peel Feedlot. The consignment was being exported to Kuwait by RETWA on the vessel Al Messilah. The proposed date of export was 19 October 2020. She was accompanied by Dr Macpherson, the accredited veterinarian engaged by RETWA.

307. After her inspection, Dr Dowd produced an inspection record in which she expressed concerns about what was, in her opinion, a significant number of animals that had lameness and ocular issues, and which required immediate treatment or euthanasia.

308. Dr Dowd ’ s report summarised her “feedlot concerns” as follows:

Sheds are required to be attended to by RP stockmen daily. Stockman had already done morning rounds at the RP prior to inspection. AAV also advised that he has been checking the animals daily and was surprised at how quickly the ocular issues had worsened, with the animals not presenting with blindness yesterday. Severity and numbers of impacted animals raise concerns as to the level of daily inspection by RP stockmen and AAV. Consignment presented to VO contained significant number of animals requiring immediate euthanasia or treatment.309. Dr Dowd ’ s report also stated the following “maintenance concerns at feedlot”:

Of the three sheds inspected, multiple pens had significant faecal build up underneath sheds rising up through slatted mesh floor creating mounds of compacted faeces above ground level of mesh slatted floors. The sheds are elevated to a significant raised heights off the ground and the faecal piles appear very similar to those visualised in March/ April before the May northern summer export break – we were advised that these would be cleared out for the October period.310. On 23 October 2020 at 2.00 pm, Dr Dowd sent Dr Macpherson an email, to which Mr Mike Gordon at RETWA was copied. The email stated:

Hi Rob

Further to my inspection at Peel feedlot on Saturday 17/10, you were going to redraft pens as well as recheck the rest of the sheds for lameness and ocular issues. Can you please advise which pens were redrafted, your reject numbers and your inspection findings of the other sheds.311. It appears that Dr Dowd did not receive a response, because she sent a follow up email to Dr Ludeman on 26 October 2020 at 3.19 pm, which stated:

Hi Holly

Can you please follow this up and advise on the outcome of the reinspection and redrafting?312. Dr Ludeman sent an email to Dr Macpherson on 26 October 2020 at 4.01 pm. It stated, in part:

Hi Rob

I was just speaking on the phone with Karen Dowd (RVO) regarding Peel Feedlot manual being reviewed in the coming days to have approval for 1st of November to be operating under ASEL 3.0

Karen mentioned during her sample inspection she was unhappy with the pen she was presented and inspected and she was going to progress to a full inspection based on 4 of 20 pens having:Multiple animals needing immediate euthanasiaMultiple animals 20-30 4/5 lame/crippleMultiple animals 20-30 with sever [sic] pinkeye or blindKaren indicated she had asked you to report back on further inspections and what drafting had occurred. ...313. Dr Macpherson responded to Dr Ludeman on 26 October 2020 at 5.38 pm. His email stated, in part:

Please also note regarding Karen ’ s claims:

1. Only 1 animal required euthanasia and I did it immediately after inspection

2. Karen asked to see the worst pens and was shown the pens that were going to be subsequently redrafted and was told such.

3. Karen was told that there was a normal flush of pinkeye around this time – always to be expected. As we know the vast majority will be over it in a week or 2 without treatment including many of the blind ones.

4. Lame animals do not need euthanasia unless they are obviously badly infected, have a broken or paralysed leg or losing condition. Just because they are limping is not a necessity to euthanase.

5. I did report back to Karen as the feedlot were redrafting any way as she had been told but feel it was a long stretch of her authority to require a report on numbers.

6. Her level of veterinary knowledge continues to underwhelm!314. Dr Dowd gave evidence about her inspection of the Peel Feedlot in her affidavit dated 22 December 2020. Her evidence was that in Shed 1, South Pen 4 and South Pen 3, there were “a number of animals with significant eye issues”. She stated:

42. I identified a significant number of animals (20 +) in each pen that displayed significant ocular symptoms including marked blepharitis, blepharospasm, ocular discharge, conjunctivitis and corneal opacity. I identified multiple animals with bilateral blindness (4-5 in each pen) requiring immediate treatment or euthanasia. ...

43. I said to Dr Macpherson words to the effect of ‘I am concerned with the numbers in these pens with advanced ocular symptoms and also the number of other animals displaying ocular symptoms of varying severity. These are not displaying mild symptoms and need to be removed from South Pens 4 and 3. ’ I was of the understanding that this process to remove animals would likely require the pens to be drafted, to separate the healthy animals within the consignment from those that needed to be removed. The reason for this is because removing individual animals from a pen housing 600 sheep, without infrastructure to support this being done in a low stress way, was problematic in this Registered Premise. I identified the requirement to remove the animals because of the significant numbers of animals displaying symptoms which were non-compliant with the ASEL rejection criteria, which were not considered ‘mild ’ , and also because many ocular diseases with symptoms consistent with what I observed are infectious and are likely to spread further through the pen and shed. I recall Dr Macpherson saying to me words to the effect of, ‘I am surprised they are this bad. This has happened quickly because they went this bad yesterday ’ .

44. I then inspected Shed 1 south pen 1, where I identified an animal with severe lameness requiring immediate euthanasia. This animal had what appeared to be a fractured hock joint (ankle) with dried blood around the joint. I advised Dr Macpherson that this animal required immediate attention (being veterinary medical treatment or euthanasia).315. Dr Dowd stated that she inspected Shed 3 North Pen 1, which Dr Macpherson had identified in his reject management plan as requiring redrafting due to a high level of lameness. She stated:

46. ... In this pen I identified a number of animals (more than 20) which had severe lameness, being unable to weight bear on one of their limbs. I said to Dr Macpherson, ‘These need to be removed from the consignment and those which are severely lame will require immediate attention ’ . By this I meant veterinary medical treatment or euthanasia. ...

48. Any animal with a lameness, particularly one causing pain, requires veterinary attention. The decision to euthanise an animal due to lameness is made on the basis of (i) the value of the animal, (ii) if treatment is available and/or feasible, (iii) the cost of treatment and (iv) the likelihood of treatment being successful for recovery or long term management. Realistically for production animals such as sheep for live export, and animal exhibiting a grade four or five out of five lameness is likely to be euthanised.

49. On this scale, I rated the animals that I observed in North Pen 1 of Shed 3 as being either four out of five lame and five out of five lame. Many animals that I observed where at the tail end of the mob, because they were unable to move within or keep up with the mob movements due to the severity of their lameness. I said to Dr Macpherson words to the effect of, ‘There are a number of animals here with serious non-weightbearing lameness. You need to remove these animals from the consignment and treat them. ’ By ‘treat them ’ I meant provide the animals with veterinary care, being medication or euthanise the animals. Dr Macpherson responded with words to the effect of ‘I will get onto this as soon as we finish this inspection. This has happened quickly because they weren ’ t like this yesterday ’ .316. Dr Dowd stated that she then inspected North Pen 2 in Shed 3, in which she “identified two animals with severe lameness requiring immediate treatment or euthanasia”. Dr Dowd stated that she “advised Dr Macpherson that these animals required immediate attention (being veterinary medical treatment or euthanasia)”.

317. Dr Dowd stated that after inspecting North Pen 3 in Shed 3, the animals “presented like normal consignments”. She then inspected South Pen 4 in Shed 3 and “observed two more animals that were severely lame (four out of five on the symptomatic scale) and multiple animals (10 +) with ocular disease symptoms of varying severity”. Dr Dowd stated that she “also identified two animals with bilateral blindness that required immediate veterinary attention (being veterinary medical treatment or euthanasia)”.

318. Dr Dowd observed a “similar situation” in South Pen 2 in Shed 3, including “multiple animals (5) with ocular disease symptoms of varying severity and one animal with bilateral blindness that required immediate veterinary attention (being veterinary medical treatment or euthanasia)”.

319. Further, Dr Dowd stated that she then inspected Shed 7 and South Pens 1 to 4, which contained reject animals and observed that “generally the animals remaining in the reject pens looked to be in better condition than some of the animals in the sheds [she] had inspected”. She stated that she next inspected North Pen 4 of Shed 7 and “observed a number of animals which were severely non-weightbearing lame (four out of five and five out of five on the symptomatic scale)”. Her affidavit indicates that there was some confusion as to whether the animals in North Pen 4 were rejects that should be included on the reject management plan. This was because Dr Macpherson was unsure if they were part of the consignment, although he agreed to follow up.

320. Dr Dowd stated that she inspected North Pen 2 in Shed 7 and that she “identified multiple animals (8) exhibiting lameness but of a lesser severity than the other pens, being two out of five and three out of five lame on symptomatic scale”.

321. Dr Dowd then stated that she inspected North Pen in Shed 7 and that:

61. ... I again observed a number of animals (more than 20) with severe ocular symptoms, including at least 8 animals which were bilaterally blind. I advised Dr Macpherson that he needed to identify and remove these animals and provide them with immediate veterinary attention (being veterinary medical treatment or euthanasia). As we were nearing the exit of this North Pen 1, there were multiple bilaterally blind sheep that were standing near the exit - I recall at least 5 animals. We were required to move them out of the way in order to get past as these animals had no ability to orient themselves due to their blindness. I took video footage of these animals.322. Dr Dowd ’ s evidence was that, after the inspection, she spoke with Dr Macpherson in the Feedlot office. Her evidence in this regard was that:

63. ... I advised him of which pens and sheds I had identified issues with and that they required immediate veterinary attention and he took these down in his notes. I advised him that he was required to remove the animals from the identified pens and provide veterinary attention to the reject animals and those with severe symptoms.323. Dr Dowd then stated that, “Dr Macpherson advised that he would go immediately and start addressing the issues” and that “the stockman will be back later this afternoon so we can do it then”.

324. Dr Dowd ’ s overall impression of the inspection was:

69. I have attended Peel Feedlot approximately 10-12 times in the last 12 months. The presentation of the animals in consignment LNC 11853 as [sic] the worst I had seen at the Peel Feedlot during the last 12 months with respect to the severity of symptoms and numbers of animals affected. I was particularly concerned about the number of animals that were displaying severe presentations of ASEL rejection criteria and were still contained within the pens presented to me as being included in the consignment (that is, they had not been removed from the pens or been provided veterinary attention). ...325. In her affidavit, Dr Dowd said that she was so concerned by what she had observed that she telephoned her manager and “detailed what [she] had observed and [her] concerns regarding the serious animal welfare issues [she] had observed”. She further stated that she “advised Dr Wells that [she] had serious concerns regarding the animal welfare of the animals [she] had been presented for this consignment”.

326. Dr Dowd ’ s perceptions and recollections of the 17 October 2020 inspection were substantially different from those of Dr Macpherson. We now turn to his evidence.

327. By way of an overview, Dr Macpherson gave evidence about the process of sheep being quarantined and the process of treating and removing rejected sheep (for example with sheep with pink eye, scabby mouth, and lameness) in accordance with the ASEL. Dr Macpherson also gave evidence about the process of record keeping, preparation of the reject management plan and the process of ensuring that only healthy sheep were loaded onto the vessel for export, as well as the 17 October 2020 inspection.

328. The evidence of Dr Macpherson indicated that he did not think that there were any significant issues that arose during the inspection on 17 October 2020 and that, at the time of the inspection, there was substantial agreement between himself and Dr Dowd as they inspected the sheds. Essentially, his evidence was that nothing arose during the inspection that would give him cause for any concern.

329. After the 17 October 2020 inspection, there was disagreement between Dr Dowd and Dr Macpherson about whether animals required immediate treatment and euthanising and about who had first identified sick or injured sheep (transcript/523 – 530). Dr Macpherson was clear in his evidence that many of the concerns in Dr Dowd ’ s inspection report and affidavit were not raised with him. He stated in his witness statement dated 29 January 2021:

135. I accompanied Dr Dowd on her inspection of the sheds at the Peel Feedlot. During and after the inspection Dr Dowd did not communicate to me that she had any serious or significant animal welfare concerns.330. Specifically, Dr Macpherson ’ s evidence was that, during the inspection, both he and Dr Dowd were concerned about the number of sheep showing symptoms of pink eye and that they both agreed that the pens should be redrafted. It was Dr Macpherson ’ s opinion that the severity of the symptoms was moderate. He confirmed his statement that he was surprised at how quickly the ocular issues had worsened from the previous day. Dr Macpherson disagreed that Dr Dowd said during the inspection that the sheep needed re-drafting because they needed immediate treatment or euthanasia (transcript/523 – 525).

331. Dr Macpherson agreed that both he and Dr Dowd observed an animal with a severe infection in its hock joint which he euthanised later that day (transcript/525). This was mostly consistent with Dr Dowd ’ s evidence, although Dr Dowd stated that she had observed this animal and had directed that it be treated or euthanised. However, Dr Macpherson ’ s recollection was that this was the only animal identified during the inspection as requiring euthanasia.

332. Dr Macpherson disagreed that Dr Dowd pointed out a significant number of lame animals (approximately 20) in another pen, stating that he “was the one that pointed them out to her”. Dr Macpherson disagreed that Dr Dowd said the animals needed to be removed and needed immediate attention because he told her those animals were going to be drafted. He stated, “to clarify I told her I would euthanise that individual animal in pen one immediately but we would get onto drafting as soon as possible” (transcript/526 – 527).

333. Dr Macpherson had different views to Dr Dowd as to when animals needed treatment (transcript/569), whether lame or injured sheep should be removed to different pens (transcript/536 – 552), and whether ASEL breaches occurred by not removing sheep (transcript/561).

334. In his witness statement, Dr Macpherson gave the following evidence regarding the complexities of removing sick or injured sheep from the flock:

27. ... whether or not it is appropriate and necessary to remove rejects before load out depends on an assessment of the condition and the impact on the mob and the risk of transmission of infectious diseases (such as pink eye or scabby mouth) to the rest of the sheep in the pen.

28. Identification of a sick or injured animal for which ‘immediate treatment ’ needs to be given, as required by S3.16 in ASEL 2.3 (now ‘prompt and humane handling, care, treatment, euthanasia and/or disposal ’ in S1.1.6 of ASEL 3.0), is a matter of clinical assessment and judgment.

29. Sheep with the conditions pink eye and scabby mouth must be and are rejected from a consignment. However, there is no clinical or welfare reason for individual sheep with these conditions to be immediately treated or isolated from the mob. In the vast majority of cases, pinkeye and scabby mouth will resolve within 2 to 3 weeks without any treatment. Even if sheep with pinkeye is temporarily blinded, so long as the individual is eating and drinking satisfactorily it is not necessary to treat the animal or remove it from the pen.335. Dr Macpherson further explained in his witness statement how seriously ill sheep are identified:

32. Individual sheep that are suffering and require euthanasia or treatment are easily identified. The conditions that usually require euthanasia are lameness resulting from fractures or other serious injury, a severe infection, loss of condition, not eating, or inability to stand up. The conditions that usually require immediate treatment are those that have serious health impacts for the individual or the mob, such as severe scouring or signs of salmonellosis, fly strike, signs of severe systemic disease, or signs of severe lameness, including fractures or severe infections.

33. The signs that the stockmen use to identify seriously ill and suffering animals are clear. Seriously unwell sheep become moribund and lie down without rising when approached. Lame sheep generally stay at the back of the flock when moved and their movement makes their problem obvious. Blind sheep tend to stay at the back or just wander around. If these sheep require treatment or euthanasia it is usually easy to get them out of the pen without disturbing the mob because these sheep are usually much less active and move slowly, and are therefore easier to catch.336. Dr Macpherson said in his witness statement that it is sometimes not in the best interests of animal welfare to separate an animal from the mob:

36. Every time a line of sheep is moved or drafted there is a risk of injury to the sheep or the potential to initiate or spread disease. Drafting causes stress to the sheep, which adversely affects the animals ’ immune systems. This increases the risk of diseases such as pink eye and scabby mouth. It also increases the risk of transmission of pinkeye and scabby mouth because the sheep are forced together during drafting. Dust created by the drafting can also spread pinkeye. Physical injuries are caused by the sheep jostling each other or trying to jump a fence or gate.

37. If, as determined by an inspection, the number of rejects in a pen is more than about 0.5% to 1% of the total, I will usually recommend that the line be drafted to remove the rejects. This is because, in my view, once the number of ‘rejects ’ exceeds this level, the benefit from containing the spread of conditions such as pink eye and scabby mouth will generally outweigh the risk of injury or further contagion from a redraft. Here we are talking about preventing other sheep from getting pinkeye or scabby mouth.

38. Additionally, if the stockmen observe sheep with pinkeye or scabby mouth in a pen is more than about 0.5% to 1% they report it to the Peel Feedlot Manager, Jim Tillett. Jim Tillett notifies me or Michael Kerr (the importer ’ s QA inspector) or both of us and we discuss and decide how to deal with the problem. Generally, Michael Kerr makes more of these judgments and anyone else. He is present at the Peel Feedlot from receival right up until the last truck leaves the feedlot for the wharf.

39. Otherwise, best practice in the management of sheep is to leave them alone.337. Dr Macpherson said in his witness statement:

180. After the inspection, Dr Dowd and I went back to the Feedlot office. I told her I would euthanise the lame animal in Shed 1 (which I did immediately after the inspection). If there was an actual need to euthanise more animals I would have done it at that time but I had not identified any other animals that required immediate euthanasia.

181. Jim Tillet [the Peel Feedlot Manager] was in the Feedlot office. He and I discussed in Dr Dowd ’ s presence the increase in the numbers of ASEL rejects in Sheds 1, 3 and 7 compared to what I had observed the previous day. We decided then that, whether or not the vessel was to be loaded the next day, we would draft out the rejects in the affected pens in those sheds.

182. We also decided that the Feedlot staff and I would inspect all the other sheds and, if necessary, we would draft out any rejects in pens in other sheds. Dr Dowd asked me to give her the numbers of rejects after the draft. ...

190. Whilst I acknowledge there were significant numbers of animals in individual pens that had ASEL reject criteria, I dispute that there were significant numbers that required euthanasia or immediate treatment. ...

196. In my opinion there were no significant or serious animal welfare concerns that day, even in the hospital pens. There was nothing being done at the Peel Feedlot that, in my opinion, was likely to cause harm to animals or adversely affect animal welfare. I did not observe anything during the RVO inspection that in my opinion could possibly trigger the provisions of the Animal Welfare Act.

197. In fact, the general condition of the whole consignment was very good.

198. Certain disease processes will occur on a rolling basis, but I saw nothing serious. There were animals that might eventually require euthanasia but they were not candidates for euthanasia at the time of Dr Dowd ’ s inspection.

199. As I mentioned earlier in this statement, even blindness will resolve in time. Animals may be blind, but when you are inspecting them you are looking at the condition of the animals. So long as they are drinking, eating and in good condition they are better off staying in the pens, even if they are blind.

200. It takes sheep a couple of days to get used to their new group once they come off the trucks and are drafted into lines. If a sheep becomes blind, it still has comfort because it is in its group. The blindness then resolves and the animal is still in its group.

201. Sheep can develop lameness during quarantining. If the weather is wet the sheep have soft hooves and walking on the grating in the sheds can cause soreness. This mainly affects heavy sheep, which is why they are quarantined in the paddocks. If there is a hole in the flooring a sheep may fall and injure its leg. There is a lot of stress on the wire mesh near the feeders and the grating can develop holes, even though the sheds are checked daily. Sheep can also develop foot abscesses, or get a foot caught in a gate or fence, or shearing cuts can become infected. Just because a sheep is lame does not mean the animal has to be euthanised. I do not euthanise a lame sheep unless the condition is very serious, such as gross infection, fracture, paralysis or joint infection.338. There are significant conflicts with respect to the factual and opinion evidence of Dr Macpherson and Dr Dowd. We note that the purpose of considering the conduct of Emanuel at the Peel Feedlot is because it is a factor relevant to a determination as to integrity and competence. We do not have the benefit of a show cause notice and the usual subsequent procedure. If there was uncontroverted evidence of breaches of the ASEL or poor animal welfare practices at the Peel Feedlot, then a finding to that effect would be relevant to that determination as to integrity and competence. We conclude that the evidence falls short of such a finding. We have a general preference for the evidence of Dr Macpherson over Dr Dowd and find that the evidence does not establish that animals needed immediate treatment or euthanising at the time of the 17 October 2020 inspection. Dr Macpherson has over 25 years ’ experience in the live export industry. He has worked fulltime as an accredited veterinarian for the past 18 years, preparing goats, sheep and cattle for export.

339. Dr Dowd ’ s experience is not as extensive as that of Dr Macpherson. From 1996 to 2006, she undertook a mixed veterinary practice treating live-stock as well as farming and companion animals. In 2006, Dr Dowd joined the Department as the Perth district veterinarian officer, but also continued a part-time mixed veterinary practice as a mobile veterinarian until 2012. This veterinary practice included work with sheep, horses, pigs, alpacas, and goats. She worked in a policy role between 2009 and 2011 and from 2011 to 2019 worked in aquatic biosecurity for the Department. Dr Dowd has not practiced as an Australian accredited veterinarian, has not been employed as a veterinarian for a live sheep export vessel, and has not provided services regarding sheep and live-stock on a large scale (transcript/748 – 750).

340. Dr Madin ’ s evidence supports our finding that Dr Macpherson ’ s evidence should be preferred. We note Dr Madin ’ s extensive experience in the Australian live-stock industry since graduating in 1994. He has worked with sheep throughout his career and has been involved in pre-export inspections since the 1990s. Between 1998 and approximately 2006 he worked as a government veterinary officer, conducting pre-export, loading and post-loading inspections of live-stock for export. In this role Dr Madin was responsible for signing export certification and health statements. Since 1999 he has conducted research into the live export trade.

341. Dr Madin was cross-examined in some detail about appropriate treatment for sheep with lameness and pink eye, when to separate sick sheep, and the difficulties in doing so. His evidence was generally consistent with the evidence of Dr Macpherson. For example, Dr Madin noted that there can be animal welfare issues resulting from trying to separate an animal from the flock (transcript/699):

... it would be or could be the case that in trying to isolate one animal from a pen of five or six-hundred or however many in that pen, I can ’ t tell, that in trying to separate that animal off it would cause perhaps more risk of other animals jumping out of the way, increased risk of trauma. Were it possible to gently and quietly lead that animal out, yes, absolutely. Were it necessary to move all those animals through the draft and race system to separate it and take it off then I would be weighing up the benefit of the individual animal against the risk to the whole group.342. Dr Madin ’ s evidence regarding the treatment of pink eye was also consistent with Dr Macpherson ’ s. For example, Dr Madin stated that (transcript/705, 708):

in sheep there ’ s generally little or no benefit from treatment and you may find that instituting a course of treatment over the course of a week or more might reduce the duration of the condition by a day or two at best. ...

it can last for one to two weeks, I would say that would be the most extreme cases, and that most would have recovered within that time.343. Also, in his report dated 3 February 2021, Dr Madin explained that he had been asked to conduct:

3. ... a comprehensive assessment of the livestock holding and assembly systems and processes employed at the Peel Feedlot, reject management practices and provide my opinion on adequacy or otherwise of those systems to ensure that the livestock are adequately prepared for the export voyage.344. Dr Madin attended the Peel Feedlot on several occasions between 11 December 2020 and the end of December 2020 (transcript/694). He opined that after observing all these stages for consignment LNC 11965:

3. ... I am of the opinion that the Peel Feedlot is a well-run operation, with high levels of staff training and effective procedures to ensure a high standard of animal health and welfare is maintained during the livestock export preparation process. From my observations and enquiry, I am of the opinion that the operations of the feedlot are compliant with the ASEL standards outlined above, subject to the limitations discussed below.These ASEL Standards cited by Dr Madin included ss 3.4(1), 3.4(2) and Standards 3.13(b), 3.16 and 3.17

345. The only instance of non-compliance observed by Dr Madin was with ASEL s 3.4(1), which provides that “only fit livestock ... can be accepted into the registered premises”. Dr Madin stated that during his inspection, he observed that one lame animal was unloaded, as was one animal with severe pink eye. However, Dr Madin opined that compliance with this section is “unlikely to be possible, and may contravene the guiding principle of animal welfare”. This is because an animal ’ s fitness cannot be ascertained until it is unloaded, and once unloaded it cannot be re-loaded due to biosecurity considerations. Further, attempting to reload the animal could cause “extreme stress and risk of injury to all livestock on the truck”.

346. Later in his report Dr Madin stated, “I have seen nothing in the photos, video or inspection records that were presented to me that would suggest inappropriate management of these conditions in the feedlot or would change the views expressed above”. Under cross-examination, Dr Madin confirmed that these related to prior voyages, and not just LNC 11965.

Manure build-up

347. Dr Dowd also referred to an issue with a manure build-up in one of the sheds at the Peel Feedlot. A manure build-up was initially identified during a Departmental audit undertaken on 20 December 2019. The audit “observations and comments” stated, “piles of manure under the pens need to be kept to a level that is not allowing the manure to compact in the wire of the flooring”. However, this was marked as an “observation” and the overall finding of the audit was “the registered premise was found to be operating in accordance of the requirements for a registered premise”.

348. Dr Dowd stated in her affidavit that “in multiple pens in multiple sheds, the faecal pile which is usually below the slatted mesh floor was piling up on the inside of the shed ’ s slatted wire mesh floor”. She stated that she recalled having a conversation with Mr Mike Curnick (who was the live-stock manager of Emanuel from August 2009 to July 2020) in April or May 2020 during one of her inspections where she raised this issue, and yet the pile did not appear to her to have been cleared out.

349. In his witness statement, Dr Macpherson stated:

270. A build-up of manure in the pens does not mean that there is an animal welfare issue. There is still ventilation through the walls and under the mesh floors and I have not identified any additional lameness in the pens where there has been a build-up of manure.350. Under cross-examination, Dr Macpherson agreed that the best option is for sheep to be separated from the manure because, if the manure became wet, there was an increased risk of disease, however that this was a “one-off situation” (transcript/572 – 575).

351. In his report dated 3 February 2021, Dr Madin stated that, at the time of his visits in December 2020:

8.1.1 ... While there was faecal material built to the level of the floor of a few pens at the time of my visits, it was only in a limited area. Where this manure was above mesh level, it was firm and dry (and presumably free draining), and the sheep appeared quite comfortable standing on the manure.352. Dr Madin also gave evidence with respect to the issue of the manure build-up at the hearing. Dr Madin ’ s evidence was that he was not of the opinion that an animal lying on a dry manure pad was more at risk than an animal lying on a steel mesh floor. His evidence was that if manure became wet, it would need to be managed to reduce the risk of salmonella outcomes, although this was unlikely because the sheds had roofs and the manure was in the middle of the sheds (transcript/725 – 726). Overall, Dr Madin ’ s evidence was consistent with the finding in the report of the Departmental audit dated 20 December 2019 that the manure build-up was an “observation” rather than a non-compliance.

Findings regarding other conduct suggesting a continuing lack of integrity or competence

353. In conclusion, we are not satisfied that there has been more recent conduct by Emanuel with respect to the Peel Feedlot which suggests a continuing lack of integrity or competence. The evidence does not establish that Emanuel is not compliant with Standard 3 of the ASEL, and with the Manual. We note that Emanuel follows the Fremantle Model, which is considered by experts such as Dr Madin to be best practice in the industry, as well as the 2016 EA Notice.

354. The evidence does not establish that the animals in the Peel Feedlot were not inspected daily. Indeed, in his report dated 3 February 2021, Dr Madin found that “all mobs were inspected daily by stock persons”.

355. As we have stated above, we prefer the evidence of Dr Macpherson and Dr Madin to the evidence of Dr Dowd with respect to the 17 October 2020 inspection. We are not of the opinion that Dr Ludeman only finding out about the result of the 17 October 2020 inspection from Dr Dowd on 26 October 2020 was a breach of any compliance procedures in the Manual. This was because Dr Macpherson correctly believed that there were no serious issues identified with the consignment, and that any ASEL rejects would be drafted out before loading, as he agreed with Dr Dowd. However, Dr Macpherson ’ s surprise at how quickly the ocular issues had worsened from the previous day may indicate that the compliance system was not working as effectively as it should have been, and that Dr Ludeman should have been informed earlier than she was.

356. We accept the opinion of Dr Madin, who determined at his inspections in December 2020, that the Peel Feedlot is a well-run operation that is compliant with the ASEL standards. The only non-compliance with ASEL s 3.4(1) identified by Dr Madin during his visit in December 2020 was a result of it being practically impossible to comply with that section. That is because live-stock could not be loaded again after being unloaded due to biosecurity and animal welfare concerns.

357. Further, although the manure build-up does appear contrary to item 26 of the Daily Inspection Procedure in the Manual, it is a very minor breach. Indeed, it was initially recorded in the 20 December 2019 audit inspection as an “observation”. Additionally, the expert evidence of Dr Madin, which we accept, was that there were no adverse animal welfare outcomes from the manure build-up.

Changes made by Emanuel to its governance and compliance processes to address issues of integrity and competence

358. As we noted above, the Applicants submitted that they have implemented changes to their governance systems and their procedures to ensure legislative compliance. The Secretary, on the other hand, submitted that these systems are inadequate and that we should not be satisfied that the Applicants are competent to hold an export licence.

359. The first step taken by Emanuel to review its regulatory compliance system was to appoint Dr Ludeman as corporate governance and compliance officer of Diverse Management Group Pty Ltd, of which Emanuel and EMS are subsidiary companies, in December 2018. Dr Ludeman gave evidence that she reviewed and updated the companies ’ compliance systems when she commenced her employment and formalised a new framework to measure compliance with the ASEL and to measure animal welfare. She implemented procedures of internal audits, management review meetings, operations meetings, and corrective action reports required under the approved arrangement. Dr Ludeman delivered an audit report in October 2019 that made recommendations for improving Emanuel ’ s compliance systems. Since then, Emanuel has taken steps to implement those recommendations. Dr Ludeman gave evidence that Emanuel and EMS adopted corporate governance policies on 10 March 2020, which included an animal welfare policy and an independent Advisory Council Charter. Dr Ludeman was cross-examined extensively as to the operation and effectiveness of the new compliance framework, particularly with respect to the Peel Feedlot. Our impression of Dr Ludeman was that she was highly competent, well versed in regulatory and compliance issues and that she had undertaken a thorough and extensive review and implementation of improvements in the compliance mechanisms of the group of companies to which the Applicants belong.

Frequency of meetings and incident reporting

360. Notwithstanding the extensive improvements in the compliance mechanisms, it appeared to us from Dr Ludeman ’ s evidence that, at times, the new compliance framework was not working as effectively as it could. For example, monthly management operations meetings did not always occur, but according to Dr Ludeman, there were “a lot of unofficial meetings” (transcript/621) and monthly meetings were not operationally realistic. Dr Ludeman agreed that between March 2020 to October 2020 there were no regular meetings to discuss open corrective action requests (transcript/622) but said that there were regular discussions about corrective actions and incidents (transcript/622 – 623). She disagreed that the failure to hold regular management meetings was because of a lack of commitment to the process of holding those meetings (transcript/627). She also disagreed that the operations and governance manual was being made less prescriptive to reduce meetings and internal reporting requirements (transcript/623).

361. A further example that the compliance system was not working as effectively as it should have been, was that Dr Ludeman only became aware of the high prevalence of eye problems and lameness at the Peel Feedlot (that were noted by Dr Macpherson and Dr Dowd during their inspection on 17 October 2020) during a telephone conversation with Dr Dowd about an unrelated matter on 26 October 2020 (transcript/655 – 656). As we noted above in our findings regarding the 17 October 2020 inspection, we are not of the opinion that Dr Ludeman only finding out about the result of the 17 October 2020 inspection from Dr Dowd on 26 October 2020 was a breach of any compliance procedures in the operations and governance manual, however it suggests that the compliance system was not working as effectively as it should have been.

362. We note that in October 2019, Dr Ludeman identified in her internal audit that there had been inadequate recording of management meetings. Dr Ludeman was cross-examined about the lack of formal meetings, despite the stated intention to hold them. Her evidence was that the management team was small, being made up of three or four people all in the office together, and that while formalised minuting of meetings may not have taken place, there were regular conversations and discussions (transcript/615). She said that “unofficial” meetings were held at which they discussed incident reporting and corrective action reporting. She accepted that from a compliance perspective, the meetings were not adequate because the planned monthly meetings from March 2020 did not take place. We do, however, note the minutes of a management meeting dated 11 March 2020, which recorded that meetings over the last 12 months had been “valuable” but that “meeting dates between operational activities can be difficult and monthly has not been practical”.

363. The Secretary also referred to only one corrective action report being prepared between

1 February 2020 and 28 October 2020, and no incident reports concerning the Peel Feedlot between 22 May 2020 and 26 October 2020 (transcript/136). We are, however, satisfied from Dr Ludeman ’ s evidence that she was adequately monitoring corrective action reports and discussing them at informal management meetings. Several corrective action reports were left open on the register to ensure they were reviewed and updated when the new ASEL version 3 commenced (transcript/615). We accept Dr Ludeman ’ s evidence that there were no incident reports between May and September 2020 due to the moratorium on the export of live-stock to the Middle East, which meant that large numbers of animals were not arriving in the Peel Feedlot until September through to October 2020. We accept her evidence that when animals were received into the Feedlot at this time, there were daily reports that would trigger any incidents that needed to be discussed (transcript/670 – 671). We are not satisfied that there was any failure in reporting and in addressing incidents as they arose.

364. We find that the failure to hold formal management meetings, identified as being non-compliant in Dr Ludeman ’ s audit report of 20 June 2018, has not been adequately addressed. However, we accept that, because of the regular informal discussions and monitoring by Dr Ludeman, the failure to hold and document formal meetings did not compromise the health and welfare of live-stock. Accordingly, we give this factor minimal weight when considering whether the Applicants are competent to hold an export licence. We also note that although formal meetings were not held as frequently as Mr Nicholas Daws and Dr Ludeman had intended in October 2019, that does not support a finding that the Applicants do not have adequate governance and compliance systems in place and that they are not competent to hold an export licence.

Independent Directors vs Advisory Council

365. Mr Nicholas Daws had initially contemplated the appointment of two independent directors to the Emanuel board. This was communicated to the Secretary in a letter dated 9 August 2018 from the Applicants ’ legal representatives.

366. However, as Mr Nicholas Daws explained in his witness statement dated 16 March 2020, he changed his mind about the appointment of the two independent directors, and instead decided that an alternative structure of an independent Advisory Council would best serve Emanuel ’ s interests. In his statement dated 16 March 2020, Mr Nicholas Daws explained:

8. I have carefully considered and reviewed my plan to appoint one to two independent directors to the board of Emanuel.

9. Given the current size and nature of Emanuel ’ s activities, I have, in consultation with Dr Holly Ludeman (Holly), considered alternative structures to best serve Emanuel ’ s interests.

10. Following completion of the Australian Institute of Company Directors (AICD) course by Holly, we further discussed the role of independent directors and whether Emanuel could achieve its objectives through the appointment of an Independent Advisory Council (Advisory Council) instead of expanding the board of directors at this stage of the company ’ s development.

11. As Emanuel is effectively transitioning from a family business which has good financial positioning and internal skills, I considered that the best interests of the company could be served for the time being by appointing an Advisory Council to provide effective independent advice to, and oversight of, the Group[\*] and to support me in my role as Managing Director in regards to governance, risk and strategy and animal welfare.

12. The Advisory Council is to comprise members with a mix of expertise in corporate governance, risk, and animal welfare agribusiness and/or livestock production. Identified by me as necessary to support the Group. This is the skill set identified by me as necessary to support the Group ’ s objectives.

[\*] the ‘Group ’ is the group of companies controlled by Mr Nicholas Daws under Diverse Management Group Pty Ltd including Emanuel and EMS – see statement of Mr Nicholas Daws dated 16 March 2020 at [4]]367. Mr Nicholas Daws gave similar evidence during cross-examination (transcript/254). He also confirmed that prior to his discussion with Dr Ludeman after she completed the AICD course, he thought that the only option available was to appoint independent directors (transcript/253 and 255).

368. The evidence of Mr Nicholas Daws is consistent with Dr Ludeman ’ s evidence. In her statement dated 13 March 2020, Dr Ludeman gave the following evidence:

20. Following my completion of the Australian Institute of Company Directors (AICD) course in January 2020, I reviewed possible alternate structures in light of internal concerns and Emanuel ’ s size and activities and its business and management requirements. I had discussions with Nicholas Daws and recommended that an Independent Advisory Council (Advisory Council) be established as an alternative to the appointment of independent directors.

21. The purpose of the Advisory Council is to provide independent advice to the Group relating to livestock agribusiness operational activities. Specifically, the Advisory Council is to:(a) provide the Board with non-binding informed guidance on the Groups strategic direction and activities; and

(b) support the Group ’ s working groups and/or committees with specific subject matter expertise.369. In cross-examination, counsel for the Respondent took Mr Nicholas Daws and Dr Ludeman to management meeting minutes dated 8 January 2020. The following minute appeared under the agenda item, “Director and board structure options – Legal advice”:

Discussion Points:- Seek legal advice on how best to set up board to meet shareholders needs and concerns about multiple family interests while still ensuring independent input and oversight to strengthen compliance and company position.370. Both Mr Nicholas Daws (transcript/255 – 256) and Dr Ludeman (transcript/632 – 633) denied the proposition that it was Mr Graham Daws who had expressed concerns about the appointment of independent directors. In fact, Dr Ludeman stated several times during cross-examination that she believed that she was referring to Mr Nicholas Daws ’ concerns and that she was not aware of any concerns expressed by Mr Graham Daws. She understood Mr Nicholas Daws as being concerned about appointing people he could trust because he had observed other dysfunctional boards, and as being concerned about balancing independent advice with the interests of what was originally a family business whilst maintaining the success of the business (transcript/632 – 633).

371. The Secretary submitted that there was inconsistency between the evidence of Mr Nicholas Daws and Dr Ludeman regarding why the proposal to appoint independent directors was abandoned. However, as is evident from the above discussion, we find there is no inconsistency in their evidence. The Secretary further submitted in written closing submissions that we should draw the following inference:

339. ... The reasonable inference, given the conflict and in the absence of evidence from Graham Daws, is that the proposal to appoint independent directors was not favoured by Graham Daws as he feared it would dilute his control and influence over the management and operational activities of Emanuel Exports and that the resulting decision not to pursue this change in governance was a direct result of Graham Daws ’ views.372. Such an inference is, in our view, not supported by the evidence. We find Mr Nicholas Daws and Dr Ludeman to be credible and honest witnesses. We accept the evidence of Mr Nicholas Daws and Dr Ludeman that the option of an independent Advisory Board was considered and decided after Dr Ludeman attended the AICD course and not in response to any concerns of Mr Graham Daws regarding the appointment of independent directors. We accept that any concerns were those of Mr Nicholas Daws. We therefore refuse to draw the requested inference.

373. Dr Ludeman developed the independent Advisory Council Charter. In her statement dated 13 March 2020, Dr Ludeman summarised the role of the Advisory Council as follows:

22. The Advisory Council is to consist of between three and five members and will comprise the following skill sets:(a) regulatory and/or corporate governance expertise;

(b) animal ethics and/or animal welfare expertise; and

(c) agribusiness and or livestock production.

23. The Advisory Council is required to meet at least 4 times a year and additional meetings may be requested to address a specific issue or to assist a working group. Importantly, out of session recommendations may be requested by the Managing Director, Company Secretary or Compliance Officer in response to an internal or regulatory incident.

24. To progress this alternative structure, I developed the Independent Advisory Council Charter ...

25. The responsibilities of the Advisory Council are set out in Section 4 of the Advisory Council Charter at Annexure ‘HL6 ’ . These responsibilities largely centre on best practice governance, risk management and regulatory compliance.374. The Advisory Council Charter was adopted on 10 March 2020 when it was approved by Mr Nicholas Daws. It provides for the appointment of a minimum of three independent members (and no more than five) including one member with regulatory and corporate governance experience and one member with animal welfare expertise. As was referred to in Dr Ludeman ’ s evidence above, the purpose of the Advisory Council includes to “provide the Board of Directors with non-binding, but informed guidance on the Group ’ s strategic direction and activities”. The Charter further provides that “the Advisory Council will meet at least four times per year”.

375. The Advisory Council became operational from the date of the appointment of its first member and chair on 31 August 2020. Two other members were appointed to the Advisory Council on 24 November 2020 and 22 January 2021. The Advisory Council first met on 3 December 2020. The Secretary raised concerns about the time that it took to establish any independent oversight, given that Mr Nicholas Daws, through his legal representatives, had initially contemplated the appointment of the two independent directors in August 2018. The Secretary submitted that the steps taken to appoint members to the Advisory Council were “too little, too late to demonstrate a meaningful change to Emanuel Exports ’ governance and competency”.

376. The reasons for the delay in the appointment of independent directors in 2019 are not entirely clear to us. However, we note the resolution in the management meeting minutes of 8 January 2020 that legal advice was being sought about the issue of appointing the two additional directors, which may have resulted in some delays. We agree with Mr Nicholas Daws ’ answer during cross-examination that, “you don ’ t rush governance, it takes time” (transcript/260). We are not of the view that there was an unreasonable delay in establishing the Advisory Council from the time the Charter was adopted on 10 March 2020 until the Advisory Council became operational on 31 August 2020. We also note that in late March 2020, the COVID-19 pandemic resulted in disruptions, including lockdowns in Western Australia in April 2020. The pandemic also impacted on Emanuel when there was an outbreak of COVID-19 on the Al Kuwait vessel, which was due to depart in May 2020. Due to that outbreak Emanuel had to apply for an exemption from the Northern Summer Order to undertake the voyage in June. We accept Dr Ludeman ’ s evidence that this COVID-19 outbreak caused “a significant disruption in business and led to the exemption application and exemption voyage” (transcript/615).

377. The Secretary submitted that we should draw an inference that the Advisory Council is “far weaker (and essentially ineffective) compared to the initial proposal of independent directors”. The Secretary refers to concessions in the evidence of Mr Nicholas Daws and Dr Ludeman during cross-examination that an Advisory Council is a form of oversight that is “not as strong” as the appointment of independent directors. We think this submission is somewhat unfair to the Applicants. This is firstly because, as was correctly submitted by the Applicants, the Applicants were under no obligation under the regulatory regime to appoint independent directors or to establish an Advisory Council. Secondly, there is no evidence to suggest that Mr Nicholas Daws is anything but competent to direct the management of the operations of the Applicants. We therefore are not concerned that the Advisory Council ’ s advice is “non-binding” in circumstances where Mr Nicholas Daws is entirely competent. We also note that the members who have been appointed to the Advisory Council, particularly Dr Terry Enright and Dr Andrew Way, are eminently qualified for their roles and have extensive industry experience. In her witness statement dated 29 January 2021, Dr Ludeman described the Advisory Council members and their expertise:

311. Three appointments have been made to Emanuel ’ s Advisory Council.

312. Terry Enright was engaged as the Chairman of the Advisory Council on 31 August 2020. He has agribusiness expertise and is a former livestock and grain producer. He was chairman of the Grains Research and Development Corporation (GRDC) and chairman of the Australian Livestock Export Corporation (Livecorp), both national research corporations. In 2008 he was awarded an Honorary Doctorate of Science in ***Agriculture*** by the University of Western Australia.

313. Mr Enright is experienced in live export markets particularly Asia and the Middle East and worked in Kuwait during Eid in 2013-2015 assisting management of Australian sheep in that supply chain. He participated in International ***Agricultural*** Research projects through his role with the Crawford Fund and was a member of the team to review the Australian Centre for ***Agricultural*** Research (ACIAR) for the Australian Government. He maintains a number of industry related positions. ...

315. Andrew Way was appointed as a member of the Advisory Council on 24 November 2020. He holds a Bachelor of Veterinary Science from the University of Melbourne, obtained in 2002 and completed a Master of Applied Epidemiology in human health from the Australian National University in 2010. He is an accredited veterinarian under the Accreditation Program for Australian Veterinarians and also holds accreditation as an AQIS Accredited Export Veterinarian. Andrew has worked in small business, corporate ***agriculture***, State and Commonwealth government roles.

316. Emma Walczak, recommended by the Chair, was appointed to the Advisory Council on 22 January 2021. She is a lawyer specialising in contracts.378. We find that the establishment of the Advisory Council demonstrates that Emanuel takes seriously its animal welfare and corporate governance obligations. It supports our finding that the Applicants have rehabilitated and are now bodies corporate of integrity.

379. In conclusion, we find that that the Applicants have taken appropriate steps to address the issues of competence and integrity.

ISSUE 6: THE EXERCISE OF DISCRETION BY THE TRIBUNAL

380. Our findings with respect to Emanuel ’ s breaches of its licence and lack of competency and integrity enliven the discretion to cancel or suspend the licence or to impose a reprimand. Emanuel ’ s conduct, through its previous managing director, showed bad faith and a serious lack of integrity. Emanuel was aware that providing false PAT values endangered the welfare of the live-stock. Emanuel preferred its own interests over animal welfare interests and proceeded to provide false information to Dr Stacey and to the Department so that more live-stock could be loaded on to the Vessel. The experts agreed that over-stating the PAT values was a serious issue which significantly increased the risk of harm to live-stock. This increase in the risk of harm eventuated when 2,400 live-stock died on Voyage 25 to the Middle East in 2017.

381. Emanuel did not challenge the finding that Mr Graham Daws did not act in good faith and accepted that the PAT values were provided in disregard of Emanuel ’ s obligations under the regulatory framework. We have found that Emanuel breached conditions of its licence by failing to comply with the regulatory regime that applies to live-stock exporters. After the Second Show Cause Notice was issued, Mr Graham Daws resigned as managing director and Emanuel has since embarked upon a project of self-improvement, which addresses its lack of integrity and competence. Emanuel has taken further steps towards rehabilitation since the reviewable decisions were made in August and September 2018. An important step in that regard was the appointment of Dr Ludeman as a corporate governance and compliance officer in December 2018. Dr Ludeman identified a lack of formality at Emanuel, with respect to compliance systems, corrective action processes, management reports, meetings and records, as requiring attention. It is fair to say that this lack of formality has not been adequately addressed but there have been improvements in terms of the substance of these areas of deficiency. Importantly, a three-member Advisory Council has been appointed to provide advice to Emanuel in accordance with a written Charter. The third and final member was appointed in January 2021. An animal welfare policy has been developed along with other corporate governance policies and operations systems. We have heard evidence from the management team at Emanuel and we are satisfied that Emanuel has implemented the policies and systems necessary to redeem itself and satisfy us that it is a body corporate of integrity and competence.

382. We consider that the correct or preferable decision is not cancellation of the licences but rather a suspension until seven calendar days after the making of this decision. We note that the effect of our decision is that the licences of Emanuel and EMS will have been suspended for over three years. Accordingly, we are satisfied that the correct or preferable decision is to set aside the decisions under review and replace them with decisions to suspend the export licences.

ISSUE 7: EMS ’ S LICENCE

383. EMS is a wholly owned subsidiary of Emanuel and is therefore an “associate” of Emanuel, as contemplated by s 25A of the AMLI Act. Suspension of EMS ’ s Licence was appropriate due to its close association with Emanuel.

384. We found above that Emanuel has sufficiently rehabilitated itself so as to be a body corporate of integrity and competent to hold an export licence. We found that a period of suspension of Emanuel ’ s Licence was the appropriate exercise of discretion. It is therefore appropriate that there should be a corresponding period of suspension of EMS ’ s Licence (commencing from the date EMS ’ s Licence was initially suspended) because of the degree of association between Emanuel and EMS. It is appropriate that the suspension should end on the same day that Emanuel ’ s Licence suspension ends.

DECISION

385. The First Reviewable Decision (application 2018/5307) of the First Assistant Secretary dated 21 August 2018, to cancel Emanuel ’ s Licence, is set aside. The Tribunal substitutes a new decision that Emanuel ’ s Licence is suspended from 22 June 2018 to 3 December 2021, being seven calendar days from the date of this decision.

386. The Second Reviewable Decision (application 2018/5541) of the First Assistant Secretary dated 5 September 2018, to cancel EMS ’ s Licence, is set aside. The Tribunal substitutes a new decision that EMS ’ s Licence is suspended from 11 July 2018 to 3 December 2021, being seven calendar days from the date of this decision.

I certify that the preceding three hundred and eighty-six (386) paragraphs are a true copy of the reasons for the decision herein of Deputy President Britten-Jones and Senior Member Dr M Evans-Bonner.....[Sgd]...................................................................

Associate

Dated: 26 November 2021

**Load-Date:** December 4, 2021

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