ALBEMARLE®

Albemarle Annual Report 2023

Form 10-K (NYSE:ALB)

Published: February 15th, 2023

Albemarle (ALB) Historical Annual Reports 2002-2022

Year	Report	Size
2022	Albemarle (ALB) 10-K Annual Report - Mar 2nd, 2022	307kb
2022	Albemarle (ALB) 10-K Annual Report - Feb 22nd, 2022	233kb
2021	Albemarle (ALB) 10-K Annual Report - Feb 19th, 2021	232kb
2020	Albemarle (ALB) 10-K Annual Report - Apr 15th, 2020	196kb
2020	Albemarle (ALB) 10-K Annual Report - Feb 26th, 2020	243kb
2019	Albemarle (ALB) 10-K Annual Report - Feb 27th, 2019	268kb
2018	Albemarle (ALB) 10-K Annual Report - Feb 28th, 2018	269kb
2017	Albemarle (ALB) 10-K Annual Report - Feb 28th, 2017	1.5mb
2016	Albemarle (ALB) 10-K Annual Report - Feb 29th, 2016	1.5mb
2015	Albemarle (ALB) 10-K Annual Report - Mar 2nd, 2015	237kb
2014	Albemarle (ALB) 10-K Annual Report - Feb 25th, 2014	241kb
2013	Albemarle (ALB) 10-K Annual Report - Feb 15th, 2013	823kb
2012	Albemarle (ALB) 10-K Annual Report - Feb 22nd, 2012	780kb
2011	Albemarle (ALB) 10-K Annual Report - Feb 25th, 2011	771kb
2010	Albemarle (ALB) 10-K Annual Report - Feb 26th, 2010	739kb
2009	Albemarle (ALB) 10-K Annual Report - Feb 27th, 2009	731kb
2008	Albemarle (ALB) 10-K Annual Report - Feb 29th, 2008	736kb
2007	Albemarle (ALB) 10-K Annual Report - Mar 1st, 2007	642kb
2006	Albemarle (ALB) 10-K Annual Report - Mar 15th, 2006	562kb
2005	Albemarle (ALB) 10-K Annual Report - Mar 14th, 2005	671kb
2004	Albemarle (ALB) 10-K Annual Report - Mar 1st, 2004	554kb
2003	Albemarle (ALB) 10-K Annual Report - May 12th, 2003	475kb
2003	Albemarle (ALB) 10-K Annual Report - Feb 26th, 2003	472kb

2002	Albemarle (ALB) 10-K Annual Report - May 31st, 2002	274kb

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

☒ **Annual Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934**

For the fiscal year ended December 31, 2022

or

☐ **Transition Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934**

For the transition period from __________ to __________

Commission file number 001-12658

ALBEMARLE CORPORATION
(Exact name of registrant as specified in its charter)

Virginia	**54-1692118**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**

4250 Congress Street, Suite 900
Charlotte, North Carolina 28209
(Address of principal executive offices) (Zip Code)

Registrant's telephone number, including area code: (980) - 299-5700

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol	Name of each exchange on which registered
COMMON STOCK, $.01 Par Value	**ALB**	**New York Stock Exchange**

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☒ No ☐

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes ☐ No ☒

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for at least the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes ☒ No ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer	☒	Accelerated filer	☐
Non-accelerated filer	☐	Smaller reporting company	☐
		Emerging growth company	☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C.7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☒

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes ☐ No ☒

The aggregate market value of the voting and non-voting common equity stock held by non-affiliates of the registrant was approximately $ 24.5 billion based on the last reported sale price of common stock on June 30, 2022, the last business day of the registrant's most recently completed second quarter.

Number of shares of common stock outstanding as of February 8, 2023: 117,197,977

Documents Incorporated by Reference

Portions of Albemarle Corporation's definitive Proxy Statement for its 2023 Annual Meeting of Shareholders to be filed with the U.S. Securities and Exchange Commission pursuant to Regulation 14A under the Securities Exchange Act of 1934, as amended, are incorporated by reference into Part III of this Annual Report on Form 10-K.

Index to Form 10-K
Year Ended December 31, 2022

PART I

Item 1. Business.

Albemarle Corporation was incorporated in Virginia in 1993. Our principal executive offices are located at 4250 Congress Street, Suite 900, Charlotte, North Carolina 28209. Unless the context otherwise indicates, the terms “Albemarle,” “we,” “us,” “our” or “the Company” mean Albemarle Corporation and its consolidated subsidiaries.

We are a leading global developer, manufacturer and marketer of highly-engineered specialty chemicals that are designed to meet our customers’ needs across a diverse range of end markets. Our corporate purpose is making the world safe and sustainable by powering the potential of people. The end markets we serve include energy storage, petroleum refining, consumer electronics, construction, automotive, lubricants, pharmaceuticals and crop protection. We believe that our commercial and geographic diversity, technical expertise, access to high-quality resources, innovative capability, flexible, low-cost global manufacturing base, experienced management team and strategic focus on our core base technologies will enable us to maintain leading positions in those areas of the specialty chemicals industry in which we operate.

We and our joint ventures currently operate more than 25 production and research and development (“R&D”) facilities, as well as a number of administrative and sales offices, around the world. As of December 31, 2022, we served approximately 1,900 customers in approximately 70 countries. For information regarding our unconsolidated joint ventures see Note 10, “Investments,” to our consolidated financial statements included in Part II, Item 8 of this report.

Business Segments

During 2022, we managed and reported our operations under three reportable segments: Lithium, Bromine and Catalysts. Each segment has a dedicated team of sales, research and development, process engineering, manufacturing and sourcing, and business strategy personnel and has full accountability for improving execution through greater asset efficiency, market focus, agility and responsiveness. Financial results and discussion about our segments included in this report are organized according to these categories except where noted.

For financial information regarding our reportable segments and geographic area information, see Note 25, “Segment and Geographic Area Information,” to our consolidated financial statements included in Part II, Item 8 of this report.

In August 2022, we announced plans to realign our Lithium and Bromine global business units into a new corporate structure designed to better meet customer needs and foster talent required to deliver in a competitive global environment. In addition, we announced our decision to retain our Catalysts business under a separate, wholly-owned subsidiary. The realignment was completed in the first quarter of 2023, and resulted in the following three reportable segments: (1) Energy Storage; (2) Specialties; and (3) Ketjen (Catalysts). We will begin to report our segments in the new structure in our Quarterly Report on Form 10-Q for the quarter ended March 31, 2023, the period in which the new organizational structure became effective.

Lithium Segment

Our Lithium business develops lithium-based materials for a wide range of industries and end markets. We produce one of the most diverse product portfolios of lithium derivatives in the industry.

We develop and manufacture a broad range of basic lithium compounds, including lithium carbonate, lithium hydroxide, lithium chloride, and value-added lithium specialties and reagents, including butyllithium and lithium aluminum hydride. Lithium is a key component in products and processes used in a variety of applications and industries, which include lithium batteries used in consumer electronics and electric vehicles, high performance greases, thermoplastic elastomers for car tires, rubber soles and plastic bottles, catalysts for chemical reactions, organic synthesis processes in the areas of steroid chemistry and vitamins, various life science applications, as well as intermediates in the pharmaceutical industry, among other applications. We also develop and manufacture cesium products for the chemical and pharmaceutical industries, and zirconium, barium and titanium products for various pyrotechnical applications, including airbag initiators.

In addition to developing and supplying lithium compounds, we provide technical services, including the handling and use of reactive lithium products. We also offer our customers recycling services for lithium-containing by-products resulting from synthesis with organolithium products, lithium metal and other reagents. We plan to continue to focus on the development of new products and applications.

During 2022, net sales to our customer Umicore N.V. and its affiliates represented more than 10% of our consolidated net sales.

Competition

The global lithium market is highly competitive and growing very rapidly. It is characterized by aggressive expansion and entry from existing and new players, including automotive OEMs, junior miners, and large well capitalized diversified miners. Producers are primarily located in the Americas, Asia and Australia. Major competitors in lithium compounds include Sociedad Quimica y Minera de Chile S.A., Sichuan Tianqi Lithium, Jiangxi Ganfeng Lithium, Rio Tinto plc, Pilbara Minerals, Allkem, Tesla, Chengxin Lithium, Ruifu Lithium, Livent Corporation and a large number of additional Chinese companies. Competition in the global lithium market is increasingly based on index-based market pricing and differentiated via product quality, product diversity, reliability of supply and customer service.

Raw Materials and Significant Supply Contracts

We obtain lithium: (a) through solar evaporation of our ponds at the Salar de Atacama, in Chile, and in Silver Peak, Nevada; and (b) by purchasing lithium concentrate from our 49%-owned joint venture, Windfield Holdings Pty. Ltd. ("Windfield"), which directly owns 100% of the equity of Talison Lithium Pty. Ltd., a company incorporated in Australia ("Talison") that owns the Greenbushes mine, and from our 60%-owned unincorporated joint venture, MARBL Lithium Joint Venture ("MARBL") in Western Australia, which owns the Wodgina hard rock lithium mine project (the "Wodgina Project"). Production of spodumene concentrate at the Wodgina site resumed in the second quarter of 2022 after it had been idled in 2019 following the acquisition of our 60% interest in the Wodgina Project and the formation of MARBL. In addition, we hold mineral rights in defined areas of Kings Mountain, North Carolina with available lithium resources and we own undeveloped land with access to a lithium resource in Antofalla, within the Catamarca Province of Argentina. As necessary, we can also obtain lithium from other sources. See Item 2. Properties, for additional disclosures of our lithium mineral properties.

Bromine Segment

Our bromine and bromine-based business includes products used in fire safety solutions and other specialty chemicals applications. Our fire safety technology enables the use of plastics in high performance, high heat applications by enhancing the flame resistant properties of these materials. End market products that benefit from our fire safety technology include plastic enclosures for consumer electronics, printed circuit boards, wire and cable products, electrical connectors, textiles and foam insulation. Our bromine-based business also includes specialty chemicals products such as elemental bromine, alkyl bromides, inorganic bromides, brominated powdered activated carbon and a number of bromine fine chemicals. These specialty products are used in chemical synthesis, oil and gas well drilling and completion fluids, mercury control, water purification, beef and poultry processing and various other industrial applications. Other specialty chemicals that we produce include tertiary amines for surfactants, biocides, and disinfectants and sanitizers. A number of customers of our bromine business operate in cyclical industries, including the consumer electronics and oil field industries. As a result, demand from our customers in such industries is also cyclical.

Competition

Our bromine business serves markets in the Americas, Asia, Europe and the Middle East, each of which is highly competitive. Product performance and quality, price and contract terms are the primary factors in determining which qualified supplier is awarded a contract. Research and development, product and process improvements, specialized customer services, the ability to attract and retain skilled personnel and maintenance of a good safety record have also been important factors to compete effectively in the marketplace. Our most significant competitors are Lanxess AG, Israel Chemicals Ltd, as well as producers in India and China.

Raw Materials and Significant Supply Contracts

The bromine we use is originally sourced from two locations: Arkansas and the Dead Sea. Our bromine production operations in Arkansas are supported by an active brine rights leasing program. In addition, through our 50% interest in Jordan Bromine Company Limited ("JBC"), a consolidated joint venture established in 1999, with operations in Safi, Jordan, we acquire bromine that is originally sourced from the Dead Sea. JBC processes the bromine at its facilities into a variety of end products. See Item 2. Properties, for additional disclosures for our mineral properties.

Catalysts Segment

Our three main product lines in this segment are (i) Clean Fuels Technologies ("CFT"), which is primarily composed of hydroprocessing catalysts ("HPC") together with isomerization and akylation catalysts; (ii) fluidized catalytic cracking ("FCC") catalysts and additives; and (iii) performance catalyst solutions (“PCS”), which is primarily composed of organometallics and curatives.

We offer a wide range of HPC products, which are applied throughout the oil refining industry. Their application enables the upgrading of oil fractions to clean fuels and other usable oil feedstocks and products by removing sulfur, nitrogen and other impurities from the feedstock. In addition, they improve product properties by adding hydrogen and in some cases improve the performance of downstream catalysts and processes. We continuously seek to add more value to refinery operations by offering HPC products that meet our customers’ requirements for profitability and performance in the very demanding refining market.

We provide our customers with customized FCC catalyst systems, which assist in the high yield cracking of refinery petroleum streams into derivative, higher-value products such as transportation fuels and petrochemical feedstocks like propylene. Our FCC additives are used to reduce emissions of sulfur dioxide and nitrogen oxide in FCC units and to increase liquefied petroleum gas olefins yield, such as propylene, and to boost octane in gasoline. Albemarle offers unique refinery catalysts to crack and treat the lightest to the heaviest feedstocks while meeting refinery yield and product needs.

Within our PCS product line, we manufacture organometallic co-catalysts (e.g., aluminum, magnesium and zinc alkyls) used in the manufacture of alpha-olefins (e.g., hexene, octene, decene), polyolefins (e.g., polyethylene and polypropylene) and electronics. Our curatives include a range of curing agents used in polyurethanes, epoxies and other engineered resins.

There were more than 700 refineries world-wide as of December 31, 2022. We expect to continue to see some less profitable, typically smaller, refineries shutting down and, over the long-term, being replaced by larger scale and more complex refineries, with growth concentrated in the Middle East and Asia. Oil refinery utilization increased to near pre-COVID pandemic levels in 2022, recovering from lower rates in 2021 and 2020, as most refineries had cut throughput due to the reduction in demand resulting from global travel restrictions during those years. We estimate that there are currently approximately 600 FCC units being operated globally, each of which requires a constant supply of FCC catalysts. In addition, we estimate that there are approximately 4,000 HPC units being operated globally, each of which typically requires replacement HPC catalysts once every one to four years.

Competition

Our Catalysts segment serves the global market including the Americas, Asia, Europe and the Middle East, each of which is highly competitive. Competition in these markets is driven by a variety of factors. Product performance and quality, price and contract terms, product and process improvements, specialized customer services, the ability to attract and retain skilled personnel, and the maintenance of a good safety record are the primary factors to compete effectively in the catalysts marketplace. In addition, through our research and development programs, we strive to differentiate our business by developing value-added products and products based on proprietary technologies.

Our major competitors in the CFT catalysts market include Shell Catalysts & Technologies, Advanced Refining Technologies and Haldor Topsoe. Our major competitors in the FCC catalysts market include W.R. Grace & Co., BASF Corporation and China Petrochemical Corporation (Sinopec). In the PCS market, our major competitors include Nouryon, Lanxess AG and Arxada.

Raw Materials and Significant Supply Contracts

The major raw materials we use in our Catalysts operations include sodium silicate, sodium aluminate, kaolin, aluminum, ethylene, alpha-olefins, isobutylene, toluene and metals, such as lanthanum, molybdenum, nickel and cobalt, most of which are readily available from numerous independent suppliers and are purchased or provided under contracts at prices we believe are competitive. The cost of raw materials is generally based on market prices, although we may use contracts with price caps or other tools, as appropriate, to mitigate price volatility.

Human Capital

Our main human capital management objectives are to attract, retain and develop the highest quality talent and ensure they feel safe, supported and empowered to do the best work they can do. We believe providing a diverse, equal and inclusive workplace facilitates opportunities for innovation, fosters good decision making practices, and promotes employee engagement and high productivity across our organization.

As of December 31, 2022, we had approximately 7,400 employees, including employees of our consolidated joint ventures, of whom 3,100, or 42%, are employed in the U.S. and the Americas; 2,300, or 31%, are employed in Asia Pacific; 1,500, or 20%, are employed in Europe; and 500, or 7%, are employed in the Middle East or other areas. Approximately 30% of these employees are represented by unions or works councils. We believe that we generally have a good relationship with our employees, and with those unions and works councils.

Health and Safety

The health and safety of our employees is a part of our core values at Albemarle and is integral to how we conduct business. Our employees, contractors, and visitors follow a comprehensive set of written health and safety policies and procedures at both the corporate and local site levels. We routinely audit ourselves against our policies, procedures and standards, using internal and third-party resources. We also include health and safety metrics in our annual incentive plan for all employees to incentivize our commitment to safety. In 2022, we improved our Occupational Safety and Health Act ("OSHA") occupational injury and illness incident rate to 0.14 for our employees and nested contractors, compared to 0.19 in 2021. In addition, we provide all employees and their dependents with access to our Employee Assistance Program which provides free mental and behavioral health resources.

Diversity, Equity and Inclusion

In 2020, we hired a Vice President, Diversity and Inclusion, to accelerate our inclusion and diversity initiatives and deliver meaningful change in our global organization. A primary focus in our recruiting efforts is to drive greater diversity in our workforce, including higher representation in the professional and managerial job categories. We want to ensure that our workplace reflects the communities in which we live and work. Our recruiting policy includes a requirement that we include individuals from gender or racial minority groups among those we interview for openings at the manager level and above.

We seek to provide employees with a desirable workplace that will enable us to attract and retain top talent. We believe employees should be compensated through wages and benefits, based on experience, expertise, performance, and the criticality of their roles in the Company. We also perform an annual review of our pay practices by gender, and in the U.S. by gender and race, to ensure that they are fair and equitable, and not influenced by biased opinions or discrimination. In addition, we have established employee groups, known as Connect groups, to promote an atmosphere of inclusion and encouragement in which every employee's voice can be heard. These Connect groups provide opportunities for employees to share their backgrounds, experiences, and beliefs, and to use them to benefit others through mentoring and volunteering in the local community, among other activities.

Investment in Talent

Investing in talent is a critical process for Albemarle because it allows us to be proactive and anticipate key organizational needs for talent and capabilities. This enables us to efficiently and effectively ensure that we have the right talent pipeline to drive Albemarle's success into the future. We also provide leadership development through performance coaching, comprehensive feedback, plant training including health, safety and environmental topics, and experiential development and mentoring. Our leadership development is a cornerstone to our talent management strategy. We also invest in our people through enhanced training and development opportunities and by seeking to foster a diverse workforce, equitable workplace and an inclusive culture that enables employees to reach their full potential. We also invest in our people through enhanced training and development opportunities and by seeking to foster a diverse workforce, equitable workplace and an inclusive culture that enables employees to reach their full potential.

Our incentive program is designed to provide incentives and rewards for achieving Albemarle's annual goals and objectives. The Executive Compensation Committee of the Board has the overall responsibility of evaluating the performance of the CEO and approving the compensation structure for senior management and other key employees. The Executive Compensation Committee determines performance goals under our incentive program annually to ensure our executive officers execute on short-term financial and strategic initiatives that drive our business strategy and long-term shareholder value.

Sales, Marketing and Distribution

We have an international strategic account program that uses cross-functional teams to serve large global customers. This program emphasizes creative strategies to improve and strengthen strategic customer relationships with emphasis on creating value for customers and promoting post-sale service. Complementing this program are regional Albemarle sales and technical personnel around the world who serve numerous additional customers globally. We also utilize commissioned sales representatives and specialists in specific market areas when necessary or required by law.

Research and Development

We believe that in order to generate revenue growth, maintain our margins and remain competitive, we must continually invest in research and development, product and process improvements and specialized customer services. Our research and development efforts support each of our business segments. The objective of our research and development efforts is to develop innovative chemistries and technologies with applications relevant within targeted key markets through both process and new product development. Through research and development, we continue to seek increased margins by introducing value-added products and proprietary processes and innovative green chemistry technologies. Our green chemistry efforts focus on the development of products in a manner that minimizes waste and the use of raw materials and energy, avoids the use of toxic reagents and solvents and utilizes safe, environmentally friendly manufacturing processes. Green chemistry is encouraged with our researchers through periodic focus group discussions and special rewards and recognition for outstanding new green developments.

Intellectual Property

Our intellectual property, including our patents, licenses and trade names, is an important component of our business. As of December 31, 2022, we owned more than 2,100 active patents and more than 500 pending patent applications in key strategic markets worldwide. We also have acquired rights under patents and inventions of others through licenses, and we license certain patents and inventions to third parties.

Regulation

Our business is subject to a broad array of employee health and safety laws and regulations, including those under the OSHA. We also are subject to similar state laws and regulations as well as local laws and regulations for our non-U.S. operations. We devote significant resources and have developed and implemented comprehensive programs to promote the health and safety of our employees, and we maintain an active health, safety and environmental program. As noted above, we finished 2022 with an OSHA occupational injury and illness incident rate of 0.14 for Albemarle employees and nested contractors, compared to 0.19 in 2021.

Our business and our customers are subject to significant requirements under the European Community Regulation for the Registration, Evaluation, Authorization and Restriction of Chemicals ("REACH"). REACH imposes obligations on European Union manufacturers and importers of chemicals and other products into the European Union to compile and file comprehensive reports, including testing data, on each chemical substance, and perform chemical safety assessments. Additionally, substances of high concern, as defined under REACH, are subject to an authorization process. Authorization may result in restrictions in the use of products by application or even banning the product. REACH regulations impose significant additional responsibilities on chemical producers, importers, downstream users of chemical substances and preparations, and the entire supply chain. Our significant manufacturing presence and sales activities in the European Union require significant compliance costs and may result in increases in the costs of raw materials we purchase and the products we sell. Increases in the costs of our products could result in a decrease in their overall demand; additionally, customers may seek products with lower regulatory compliance requirements, which could also result in a decrease in the demand of certain products subject to the REACH regulations.

The Toxic Substances Control Act ("TSCA"), as amended in June 2016, requires chemicals to be assessed against a risk-based safety standard and calls for the elimination of unreasonable risks identified during risk evaluation. This regulation and other pending initiatives at the U.S. state level, as well as initiatives in Canada, Asia and other regions, will potentially require toxicological testing and risk assessments of a wide variety of chemicals, including chemicals used or produced by us. These assessments may result in heightened concerns about the chemicals involved and additional requirements being placed on the production, handling, labeling or use of the subject chemicals. Such concerns and additional requirements could also increase the cost incurred by our customers to use our chemical products and otherwise limit the use of these products, which could lead to a decrease in demand for these products.

Historically, there has been scrutiny of certain brominated fire safety solutions by regulatory authorities, legislative bodies and environmental interest groups in various countries. We manufacture a broad range of brominated fire safety solution products, which are used in a variety of applications. Concern about the impact of some of our products on human health or the environment may lead to regulation or reaction in our markets independent of regulation.

Environmental Regulation

We are subject to numerous foreign, federal, state and local environmental laws and regulations, including those governing the discharge of pollutants into the air and water, the management and disposal of hazardous substances and wastes and the cleanup of contaminated properties. Ongoing compliance with such laws and regulations is an important consideration for us. Key aspects of our operations are subject to these laws and regulations. In addition, we incur substantial capital and operating costs in our efforts to comply with them.

We use and generate hazardous substances and wastes in our operations and may become subject to claims for personal injury and/or property damage relating to the release of such substances into the environment. In addition, some of our current properties are, or have been, used for industrial purposes, which could contain currently unknown contamination that could expose us to governmental requirements or claims relating to environmental remediation, personal injury and/or property damage. Liabilities associated with the investigation and cleanup of hazardous substances, as well as personal injury, property damages or natural resource damages arising from the release of, or exposure to, such hazardous substances, may be imposed in many situations without regard to violations of laws or regulations or other fault, and may also be imposed jointly and severally (so that a responsible party may be held liable for more than its share of the losses involved, or even the entire loss). Such liabilities also may be imposed on many different entities with a relationship to the hazardous substances at issue, including, for example, entities that formerly owned or operated the property affected by the hazardous substances and entities that arranged for the disposal of the hazardous substances at the affected property, as well as entities that currently own or operate such property. We are subject to such laws, including the federal Comprehensive Environmental Response, Compensation and Liability Act, commonly known as CERCLA or Superfund, in the U.S., and similar foreign and state laws. We may have liability as a potentially responsible party ("PRP") with respect to active off-site locations under CERCLA or state equivalents. We have sought to resolve our liability as a PRP at these sites through indemnification by third parties and settlements, which would provide for payment of our allocable share of remediation costs. Because the cleanup costs are estimates and are subject to revision as more information becomes available about the extent of remediation required, and in some cases we have asserted a defense to any liability, our estimates could change. Moreover, liability under CERCLA and equivalent state statutes may be joint and several, which could require us to pay in excess of our pro rata share of remediation costs. Our understanding of the financial strength of other PRPs has been considered, where appropriate, in estimating our liabilities. Accruals for these matters are included in the environmental reserve. Our management is actively involved in evaluating environmental matters and, based on information currently available to us, we have concluded that our outstanding environmental liabilities for unresolved waste sites currently known to us should not have a material effect on our operations.

See "Safety and Environmental Matters" in Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations for further details.

Climate Change and Natural Resources

The growing concerns about climate change and the related increasingly stringent regulations may provide us with new or expanded business opportunities. We provide solutions to companies pursuing alternative fuel products and technologies (such as renewable fuels), emission control technologies (including mercury emissions), alternative transportation vehicles and energy storage technologies and other similar solutions. As demand for, and legislation mandating or incentivizing the use of, alternative fuel technologies that limit or eliminate greenhouse gas emissions increase, we continue to monitor the market and offer solutions where we have appropriate technology and believe we are well positioned to take advantage of opportunities that may arise from such demand or legislation.

In addition to potential business opportunities, we acknowledge our responsibility to address the impact of our operations on the environment. We are investing in technology and people to reduce energy consumption, greenhouse gas emissions and air emissions of ozone-depleting substances. In 2021, we established greenhouse gas emission targets for each of our businesses, including achieving net zero carbon emissions by 2050, reducing the carbon-intensity of our Bromine and Catalysts businesses by a combined 35% by 2030, and growing our Lithium business in a carbon-intensity neutral manner through 2030.

Water is a critical input to Albemarle's production operations. As water is a scarce resource, we understand the need to responsibly manage our water consumption not only for the preservation of the environment, but for the viability of our local communities. We are investing in new process technologies to reduce our water footprint and expand capacity sustainably in locations with high water risk. Our goal is to reduce our intensity of freshwater usage by 25% by 2030 in areas of high or extremely high-water risk as defined by the World Resources Institute, such as Chile and Jordan.

Our businesses are dependent on the availability and responsible management of natural resources. We manage our natural resources to operate efficiently and preserve the environment for our local communities and the world. Our natural resource management includes mineral resource transparency with local communities, governments, regulators and other key stakeholders, as well as partnering with the Initiative for Responsible Mining Assurance for our lithium production for the assurance of responsible mining. We attempt to maximize the recovery of our extracted minerals and recycle or reuse by-products where possible. In addition, we work with local communities, regulatory agencies and wildlife organizations to preserve and restore land and biodiversity before, during and after all operations commence.

Recent Acquisitions, Joint Ventures and Divestitures

During recent years, we have devoted resources to acquisitions and joint ventures, including the subsequent integration of acquired businesses. These acquisitions and joint ventures have expanded our base business, provided our customers with a wider array of products and presented new alternatives for discovery through additional chemistries. In addition, we have pursued opportunities to divest businesses which do not fit our high priority business growth profile. The following is a summary of our significant acquisitions, joint ventures and divestitures over the last three years.

On October 25, 2022 the Company completed the acquisition of all of the outstanding equity of Guangxi Tianyuan New Energy Materials Co., Ltd. (“Qinzhou”), for approximately $200 million in cash. Qinzhou's operations include a recently constructed lithium processing plant strategically positioned near the Port of Qinzhou in Guangxi, which began commercial production in the first half of 2022. The plant has designed annual conversion capacity of up to 25,000 metric tons of lithium carbonate equivalent (“LCE”) and produces battery-grade lithium carbonate and lithium hydroxide.

On June 1, 2021, we completed the sale of our fine chemistry services (“FCS”) business to W. R. Grace & Co. (“Grace”) for proceeds of approximately $570 million, consisting of $300 million in cash and the issuance to Albemarle of preferred equity of a Grace subsidiary having an aggregate stated value of $270 million. As part of the transaction, Grace acquired our manufacturing facilities located in South Haven, Michigan and Tyrone, Pennsylvania.

In the fourth quarter of 2020, we divested our ownership interest in the Saudi Organometallic Chemicals Company LLC (“SOCC”) joint venture for cash proceeds of $11.0 million. As a result of this divestiture, the Company recorded a gain of $7.2 million in Other income (expenses), net during the year ended December 31, 2020.

These transactions reflect our commitment to investing in future growth of our high priority businesses, maintaining leverage flexibility and returning capital to our shareholders.

Available Information

Our website address is *www.albemarle.com*. We make available free of charge through our website our Annual Report on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended (“Exchange Act”), as well as beneficial ownership reports on Forms 3, 4 and 5 filed pursuant to Section 16 of the Exchange Act, as soon as reasonably practicable after such documents are electronically filed with, or furnished to, the Securities and Exchange Commission (“SEC”). The information on our website is not, and shall not be deemed to be, a part of this report or incorporated into any other filings we make with the SEC. The SEC also maintains a website at *www.sec.gov* that contains reports, proxy statements and other information regarding SEC registrants, including Albemarle.

Our Corporate Governance Guidelines, Code of Conduct and the charters of the Audit and Finance, Health, Safety and Environment, Executive Compensation, and Nominating and Governance Committees of our Board of Directors are also available on our website and are available in print to any shareholder upon request by writing to Investor Relations, 4250 Congress Street, Suite 900, Charlotte, North Carolina 28209, or by calling (980) 299-5700.

Item 1A. Risk Factors.

You should consider carefully the following risks when reading the information, including the financial information, contained in this Annual Report on Form 10-K.

Risks Related to Our Business

Our substantial international operations subject us to risks of doing business in foreign countries, which could adversely affect our business, financial condition and results of operations.

We conduct a substantial portion of our business outside the U.S., with approximately 88% of our sales to foreign countries. We operate and/or sell our products to customers in approximately 70 countries. We currently have many production, research and development and administrative facilities as well as sales offices located outside the U.S., as detailed in Item 2. Properties. Accordingly, our business is subject to risks related to the differing legal, political, social and regulatory requirements and economic conditions of many jurisdictions. Risks inherent in international operations include the following:

- fluctuations in foreign currency exchange rates may affect product demand and may adversely affect the profitability in U.S. dollars of products and services we provide in international markets where payment for our products and services is made in the local currency;

- transportation and other shipping costs may increase, or transportation may be inhibited;
- increased cost or decreased availability of raw materials;
- increased regulations on, or reduced access to, scarce resources, such as freshwater;
- changes in foreign laws and tax rates or U.S. laws and tax rates with respect to foreign income may unexpectedly increase the rate at which our income is taxed, impose new and additional taxes on remittances, repatriation or other payments by subsidiaries, or cause the loss of previously recorded tax benefits;
- foreign countries in which we do business may adopt other restrictions on foreign trade or investment, including currency exchange controls;
- trade sanctions by or against foreign countries in which we do business could result in our losing access to customers and suppliers in those countries;
- unexpected adverse changes in foreign laws or regulatory requirements may occur;
- our agreements with counterparties in foreign countries may be difficult for us to enforce and related receivables may be difficult for us to collect;
- compliance with the variety of foreign laws and regulations may be unduly burdensome;
- compliance with anti-bribery and anti-corruption laws (such as the Foreign Corrupt Practices Act) as well as anti-money-laundering laws may be costly;
- unexpected adverse changes in export duties, quotas and tariffs and difficulties in obtaining export licenses may occur;
- general economic conditions in the countries in which we operate could have an adverse effect on our earnings from operations in those countries;
- our foreign operations may experience staffing difficulties and labor disputes;
- termination or substantial modification of international trade agreements may adversely affect our access to raw materials and to markets for our products outside the U.S.;
- foreign governments may nationalize or expropriate private enterprises;
- increased sovereign risk (such as default by or deterioration in the economies and credit worthiness of local governments) may occur; and
- political or economic repercussions from terrorist activities, including the possibility of hyperinflationary conditions and political instability, may occur in certain countries in which we do business.

In addition, certain of our operations and ongoing capital projects are in regions of the world such as Asia, the Middle East and South America that are of high risk due to significant civil, political and security instability. Unanticipated events, such as geopolitical changes, could result in a write-down of our investment in the affected joint venture or a delay or cause cancellation of those capital projects, which could negatively impact our future growth and profitability. Our success as a global business will depend, in part, upon our ability to succeed in differing legal, regulatory, economic, social and political conditions by developing, implementing and maintaining policies and strategies that are effective in each location where we and our joint ventures do business.

Furthermore, we are subject to rules and regulations related to anti-bribery and antitrust prohibitions of the U.S. and other countries, as well as export controls and economic embargoes, violations of which may carry substantial penalties. For example, export control and economic embargo regulations limit the ability of our subsidiaries to market, sell, distribute or otherwise transfer their products or technology to prohibited countries or persons. Failure to comply with these regulations could subject our subsidiaries to fines, enforcement actions and/or have an adverse effect on our reputation and the value of our common stock.

Because we conduct substantial operations in China, risks associated with regulatory activity and political and social events in China could negatively affect our business and operating results.

In 2022, net sales shipped to China represented 33% of our total net sales. Additionally, we own three production facilities located in China and are in the process of constructing a lithium conversion plant in Meishan, China. In addition to the risks described above under "*Our substantial international operations subject us to risks of doing business in foreign countries, which could adversely affect our business, financial condition and results of operations.*", our operations in China expose us to risks particular to conducting business in that country. For example, over the past several years the U.S. and China have applied tariffs to certain of each other's exports, which have resulted in shifting trade flows and restrictions on certain sales of goods into China. Additionally, geopolitical disputes (including as a result of China-Taiwan and U.S.-Taiwan relations) between the U.S. and China may lead to further restrictions on trade and/or obstacles to conducting business in China. Recently, Australia and China have attempted to improve relations and resolve trade disputes. As we ship a significant portion of our lithium from Australia into China for further processing, tensions or a breakdown in relations between the countries could have a material impact on our operations. Furthermore, the Chinese government has, from time to time, curtailed manufacturing operations, with little or no notice, in industrial regions out of growing concern over air quality and in response to COVID-19 outbreaks. The Chinese government has also instituted energy intensity and energy consumption targets in a number of provinces in its efforts to reduce energy consumption, resulting in energy quotas and shortages in energy supply that can be disruptive to construction and manufacturing operations. These and other risks may have an adverse effect on our sales to Chinese customers and/or result in our not realizing a return on, or losing some, or all, of our strategic investments in China.

Our inability to secure key raw materials, or to pass through increases in costs and expenses for other raw materials and energy, on a timely basis or at all, including due to climate change, could have an adverse effect on the margins of our products and our results of operations.

The long-term profitability of our operations will, in part, depend on our ability to continue to economically obtain resources, including energy and raw materials. For example, our lithium and bromine businesses rely upon our continued ability to produce, or otherwise obtain, lithium and bromine of sufficient quality and in adequate amounts to meet our customers' demand. If we fail to secure and retain the rights to continue to access these key raw materials, we may have to restrict or suspend our operations that rely upon these key resources, which could harm our business, results of operations and financial condition. In addition, in some cases access to these raw materials by us and our competitors is subject to decisions or actions by governmental authorities, which could adversely impact us. Furthermore, other raw material and energy costs account for a significant percentage of our total costs of products sold, even if they can be obtained on commercially reasonable terms. Our raw material and energy costs can be volatile and may increase significantly. Increases are primarily driven by tightening of market conditions and major increases in the pricing of key constituent materials for our products such as crude oil, chlorine and metals (including molybdenum and rare earths which are used in the refinery catalysts business). We generally attempt to pass through changes in the prices of raw materials and energy to our customers, but we may be unable to do so (or may be delayed in doing so). In addition, raising prices we charge to our customers in order to offset increases in the prices we pay for raw materials could cause us to suffer a loss of sales volumes. Our inability to efficiently and effectively pass through price increases, or inventory impacts resulting from price volatility, could adversely affect our margins.

Competition within our industry may place downward pressure on the prices and margins of our products and may adversely affect our businesses and results of operations.

We compete against a number of highly competitive global specialty chemical producers. Competition is based on several key criteria, including product performance and quality, product price, product availability and security of supply, and responsiveness of product development in cooperation with customers and customer service. Some of our competitors are larger than we are and may have greater financial resources. These competitors may also be able to maintain significantly greater operating and financial flexibility. As a result, these competitors may be better able to withstand changes in conditions within our industry. Competitors' pricing decisions could compel us to decrease our prices, which could negatively affect our margins and profitability. Our ability to maintain or increase our profitability is, and will continue to be, dependent upon our ability to offset decreases in the prices and margins of our products by improving production efficiency and volume and other productivity enhancements, shifting to production of higher margin chemical products and improving existing products through innovation and research and development. If we are unable to do so or to otherwise maintain our competitive position, we could lose market share to our competitors.

In addition, Albemarle's brands, product image and trademarks represent the unique product identity of each of our products and are important symbols of the Company's reputation. Accordingly, the performance of our business could be adversely affected by any marketing and promotional materials used by our competitors that make adverse claims, whether with or without merit, against our Company or its products, imply or assert immoral or improper conduct by us, or are otherwise disparaging of our Company or its products. Further, our own actions could hurt such brands, product image and trademarks if our products underperform or we otherwise draw negative publicity.

Our research and development efforts may not succeed in addressing changes in our customers' needs, and our competitors may develop more effective or successful products.

Our industries and the end markets into which we sell our products experience technological change and product improvement. Manufacturers periodically introduce new products or require new technological capacity to develop customized products. Our future growth depends on our ability to gauge the direction of the commercial and technological progress in all key end markets in which we sell our products and upon our ability to fund and successfully develop, manufacture and market products in such changing end markets. As a result, we must commit substantial resources each year to research and development. There is no assurance that we will be able to continue to identify, develop, market and, in certain cases, secure regulatory approval for innovative products in a timely manner or at all, as may be required to replace or enhance existing products, and any such inability could have a material adverse effect on our profit margins and our competitive position.

In addition, our customers use our specialty chemicals for a broad range of applications. Changes in our customers' products or processes may enable our customers to reduce consumption of the specialty chemicals that we produce or make our specialty chemicals unnecessary. Customers may also find alternative materials or processes that do not require our products. Should a customer decide to use a different material due to price, performance or other considerations, we may not be able to supply a product that meets the customer's new requirements. Consequently, it is important that we develop new products to replace the sales of products that mature and decline in use. Our business, results of operations, cash flows and margins could be materially adversely affected if we are unable to manage successfully the maturation of our existing products and the introduction of new products.

Despite our efforts, we may not be successful in developing new products and/or technology, either alone or with third parties, or licensing intellectual property rights from third parties on a commercially competitive basis. Our new products may not be accepted by our customers or may fail to receive regulatory approval. Moreover, new products may have lower margins than the products they replace. Furthermore, ongoing investments in research and development for the future do not yield an immediate beneficial impact on our operating results and therefore could result in higher costs without a proportional increase in revenues.

The development of non-lithium battery technologies could adversely affect us.

The development and adoption of new battery technologies that rely on inputs other than lithium compounds could significantly impact our prospects and future revenues. Current and next generation high energy density batteries for use in electric vehicles rely on lithium compounds as a critical input. Alternative materials and technologies are being researched with the goal of making batteries lighter, more efficient, faster charging and less expensive, and some of these could be less reliant on lithium compounds. We cannot predict which new technologies may ultimately prove to be commercially viable and on what time horizon. Commercialized battery technologies that use no, or significantly less, lithium could materially and adversely impact our prospects and future revenues.

Downturns in our customers' industries, many of which are cyclical, could adversely affect our sales and profitability.

Downturns in the businesses that use our specialty chemicals may adversely affect our sales. Many of our customers are in industries, including the electronics, building and construction, oilfield and automotive industries, which are cyclical in nature, or which are subject to secular market downturns. Historically, cyclical or secular industry downturns have resulted in diminished demand for our products, excess manufacturing capacity and lower average selling prices, and we may experience similar problems in the future. A decline in our customers' industries may have a material adverse effect on our sales and profitability.

Our results are subject to fluctuation because of irregularities in the demand for our HPC catalysts and certain of our agrichemicals.

Our HPC catalysts are used by petroleum refiners in their processing units to reduce the quantity of sulfur and other impurities in petroleum products. The effectiveness of HPC catalysts diminishes with use, requiring the HPC catalysts to be replaced, on average, once every one to four years. The sales of our HPC catalysts, therefore, are largely dependent on the useful life cycle of the HPC catalysts in the processing units and may vary materially by quarter. In addition, the timing and profitability of HPC catalysts sales can have a significant impact on revenue and profit in any one quarter. Sales of our agrichemicals are also subject to fluctuation as demand varies depending on climate and other environmental conditions, which may prevent or reduce farming for extended periods. In addition, crop pricing and the timing of when farms alternate from one crop to another crop in a particular year can also alter sales of agrichemicals.

Regulation, or the threat of regulation, of some of our products could have an adverse effect on our sales and profitability.

We manufacture or market a number of products that are or have been the subject of attention by regulatory authorities and environmental interest groups. For example, over the past decade, there has been increasing scrutiny of certain brominated fire safety solutions by regulatory authorities, legislative bodies and environmental interest groups in various countries. We manufacture a broad range of brominated fire safety solution products, which are used in a variety of applications to protect people, property and the environment from injury and damage caused by fire. Concern about the impact of some of our products on human health or the environment may lead to regulation, or reaction in our markets independent of regulation, that could reduce or eliminate markets for such products.

Agencies in the European Union ("E.U.") continue to evaluate the risks to human health and the environment associated with certain brominated fire safety solutions such as tetrabromobisphenol A and decabromodiphenylethane, both of which we manufacture. Additional government regulations, including limitations or bans on the use of brominated flame retardants, could result in a decline in our net sales of brominated fire safety solutions and have an adverse effect on our sales and profitability. In addition, the threat of additional regulation or concern about the impact of brominated fire safety solutions on human health or the environment could lead to a negative reaction in our markets that could reduce or eliminate our markets for these products, which could have an adverse effect on our sales and profitability.

Our business and our customers are subject to significant requirements under REACH, which imposes obligations on E.U. manufacturers and importers of chemicals and other products into the E.U. to compile and file comprehensive reports, including testing data, on each chemical substance, and perform chemical safety assessments. Additionally, substances of high concern, as defined under REACH, are subject to an authorization process, which may result in restrictions in the use of products by application or even banning the product. REACH regulations impose significant additional burdens on chemical producers, importers, downstream users of chemical substances and preparations, and the entire supply chain. See "Regulation" in Item 1. Business. Our significant manufacturing presence and sales activities in the E.U. require significant compliance costs and may result in increases in the costs of raw materials we purchase and the products we sell. Increases in the costs of our products could result in a decrease in their overall demand; additionally, customers may seek products with lower regulatory compliance requirements, which could also result in a decrease in the demand of certain products subject to the REACH regulations.

The TSCA requires chemicals to be assessed against a risk-based safety standard and calling for the elimination of unreasonable risks identified during risk evaluation. This regulation and other pending initiatives at the U.S. state level, as well as initiatives in Canada, Asia and other regions, could potentially require toxicological testing and risk assessments of a wide variety of chemicals, including chemicals used or produced by us. These assessments may result in heightened concerns about the chemicals involved and additional requirements being placed on the production, handling, labeling or use of the subject chemicals. Such concerns and additional requirements could also increase the cost incurred by our customers to use our chemical products and otherwise limit the use of these products, which could lead to a decrease in demand for these products. Such a decrease in demand could have an adverse impact on our business and results of operations.

We could be subject to damages based on claims brought against us by our customers or lose customers as a result of the failure of our products to meet certain quality specifications.

Our products enable important performance attributes to our customers' products. If a product fails to perform in a manner consistent with quality specifications or has a shorter useful life than guaranteed, a customer of ours could seek the replacement of the product or damages for costs incurred as a result of the product failing to perform as guaranteed. These risks apply to our refinery catalysts in particular because, in certain instances, we sell our refinery catalysts under agreements that contain limited performance and life cycle guarantees. Also, because many of our products are integrated into our customers' products, we may be requested to participate in, or fund in whole or in part the costs of, a product recall conducted by a customer. For example, some of our businesses supply products to customers in the automotive industry. In the event one of these customers conducts a product recall that it believes is related to one of our products, we may be asked to participate in, or fund in whole or in part, such a recall.

Our customers often require our subsidiaries to represent that our products conform to certain product specifications provided by our customers. Any failure to comply with such specifications could result in claims or legal action against us.

A successful claim or series of claims against us could have a material adverse effect on our financial condition and results of operations and could result in our loss of one or more customers.

Our business is subject to hazards common to chemical and natural resource extraction businesses, any of which could injure our employees or other persons, damage our facilities or other properties, interrupt our production and adversely affect our reputation and results of operations.

Our business is subject to hazards common to chemical manufacturing, storage, handling and transportation, as well as natural resource extraction, including explosions, fires, severe weather, natural disasters, mechanical failure, unscheduled downtime, transportation interruptions, remediation, chemical spills, discharges or releases of toxic or hazardous substances or gases and other risks. These hazards can cause personal injury and loss of life to our employees and other persons, severe damage to, or destruction of, property and equipment and environmental contamination. In addition, the occurrence of disruptions, shutdowns or other material operating problems at our facilities due to any of these hazards may diminish our ability to meet our output goals. Accordingly, these hazards and their consequences could adversely affect our reputation and have a material adverse effect on our operations as a whole, including our results of operations and cash flows, both during and after the period of operational difficulties.

Our business could be adversely affected by environmental, health and safety laws and regulations.

The nature of our business, including historical operations at our current and former facilities, exposes us to risks of liability under environmental laws and regulations due to the production, storage, use, transportation and sale of materials that can cause contamination or personal injury if released into the environment. In the jurisdictions in which we operate, we are subject to numerous U.S. and non-U.S. national, federal, state and local environmental, health and safety laws and regulations, including those governing the discharge of pollutants into the air and water, the management and disposal of hazardous substances and wastes and the cleanup of contaminated properties. We currently use, and in the past have used, hazardous substances at many of our facilities, and we have in the past been, and may in the future be, subject to claims relating to exposure to hazardous materials. We also have generated, and continue to generate, hazardous wastes at a number of our facilities. Some of our facilities also have lengthy histories of manufacturing or other activities that may have resulted in site contamination. Liabilities associated with the investigation and cleanup of hazardous substances, as well as personal injury, property damages or natural resource damages arising from the release of, or exposure to, such hazardous substances, may be imposed in many situations without regard to violations of laws or regulations or other fault, and may also be imposed jointly and severally (so that a responsible party may be held liable for more than its share of the losses involved, or even the entire loss). Such liabilities may also be imposed on many different entities, including, for example, current and prior property owners or operators, as well as entities that arranged for the disposal of the hazardous substances. Such liabilities may be material and can be difficult to identify or quantify.

Further, some of the raw materials we handle are subject to government regulation. These regulations affect the manufacturing processes, handling, uses and applications of our products. In addition, our production facilities and a number of our distribution centers require numerous operating permits. Due to the nature of these requirements and changes in our operations, our operations may exceed limits under permits or we may not have the proper permits to conduct our operations. Ongoing compliance with such laws, regulations and permits is an important consideration for us and we incur substantial capital and operating costs in our compliance efforts.

Compliance with environmental laws generally increases the costs of manufacturing, registration/approval requirements, transportation and storage of raw materials and finished products, and storage and disposal of wastes, and could have a material adverse effect on our results of operations. We may incur substantial costs, including fines, damages, criminal or civil sanctions and remediation costs, or experience interruptions in our operations, for violations arising under these laws or permit requirements. Additional information may arise in the future concerning the nature or extent of our liability with respect to identified sites, and additional sites may be identified for which we are alleged to be liable, that could cause us to materially increase our environmental accrual or the upper range of the costs we believe we could reasonably incur for such matters. Furthermore, environmental laws are subject to change and have become increasingly stringent in recent years. We expect this trend to continue and to require materially increased capital expenditures and operating and compliance costs.

We may be subject to indemnity claims and liable for other payments relating to properties or businesses we have divested.

In connection with the sale of certain properties and businesses, we have agreed to indemnify the purchasers of such properties for certain types of matters, such as certain breaches of representations and warranties, taxes and certain environmental matters. With respect to environmental matters, the discovery of contamination arising from properties that we have divested may expose us to indemnity obligations under the sale agreements with the buyers of such properties or cleanup obligations and other damages under applicable environmental laws. We may not have insurance coverage for such indemnity obligations or cash flows to make such indemnity or other payments. Further, we cannot predict the nature of and the amount of any indemnity or other obligations we may have to the applicable purchaser. Such payments may be costly and may adversely affect our financial condition and results of operations. For example, in 2021, we agreed to pay $665 million to settle claims related to a legacy Rockwood Holdings, Inc. ("Rockwood") business sold to a third party prior to our acquisition of Rockwood in 2015.

At several of our properties where hazardous substances are known to exist (including some sites where hazardous substances are being investigated or remediated), we believe we are entitled to contractual indemnification from one or more former owners or operators; however, in the event we make a claim, the indemnifier may disagree with us regarding, or not have the financial capacity to fulfill, its indemnity obligation. If our contractual indemnity is not upheld or effective, our accrual and/or our costs for the investigation and cleanup of hazardous substances could increase materially.

We could be adversely affected by violations of the U.S. Foreign Corrupt Practices Act and similar foreign anti-corruption laws.

The U.S. Foreign Corrupt Practices Act (the "FCPA") and similar foreign anti-corruption laws in other jurisdictions around the world generally prohibit companies and their intermediaries from making improper payments or providing anything of value to non-U.S. government officials for the purpose of obtaining or retaining business or securing an unfair advantage. We operate in some parts of the world that have experienced governmental corruption to some degree, and, in certain circumstances, strict compliance with anti-bribery laws may conflict with local customs and practices. Although we have established formal policies or procedures for prohibiting or monitoring this conduct, we cannot assure you that our employees or other agents will not engage in such conduct for which we might be held responsible. In the event that we believe or have reason to believe that our employees, agents or distributors have or may have violated applicable anti-corruption laws, including the FCPA, we may be required to investigate or have outside counsel investigate the relevant facts and circumstances, which can be expensive and require significant time and attention from senior management. If we are found to be liable for violations of the FCPA or other applicable anti-corruption laws (either due to our own acts or our inadvertence, or due to the acts or inadvertence of others, including employees of our joint ventures), we could suffer from civil and criminal penalties or other sanctions, which could have a material adverse effect on our business and results of operations.

As first reported in 2018, following receipt of information regarding potential improper payments being made by third-party sales representatives of our Refining Solutions business, within our Catalysts segment, we promptly retained outside counsel and forensic accountants to investigate potential violations of the Company's Code of Conduct, the Foreign Corrupt Practices Act, and other potentially applicable laws. Based on this internal investigation, we have voluntarily self-reported potential issues relating to the use of third-party sales representatives in our Refining Solutions business, within our Catalysts segment, to the U.S. Department of Justice ("DOJ"), the SEC, and the Dutch Public Prosecutor ("DPP"), and are cooperating with the DOJ, the SEC, and the DPP in their review of these matters. In connection with our internal investigation, we have implemented, and are continuing to implement, appropriate remedial measures. We have commenced discussions with the SEC, DOJ and DPP about a potential resolution of these matters.

At this time, we are unable to predict the duration, scope, result, or related costs associated with the investigations. We also are unable to predict what action may be taken by the DOJ, the SEC, or the DPP, or what penalties or remedial actions they may ultimately seek. Any determination that our operations or activities are not, or were not, in compliance with existing laws or regulations could result in the imposition of fines, penalties, disgorgement, equitable relief, or other losses. We do not believe, however, that any such fines, penalties, disgorgement, equitable relief, or other losses would have a material adverse effect on our financial condition or liquidity. However, an adverse resolution could have a material adverse effect on our results of operations in a particular period.

We are subject to extensive foreign government regulation that can negatively impact our business.

We are subject to government regulation in non-U.S. jurisdictions in which we conduct our business. The requirements for compliance with these laws and regulations may be unclear or indeterminate and may involve significant costs, including additional capital expenditures or increased operating expenses, or require changes in business practice, in each case that could result in reduced profitability for our business. Our having to comply with these foreign laws or regulations may provide a competitive advantage to competitors who are not subject to comparable restrictions or prevent us from taking advantage of growth opportunities. Determination of noncompliance can result in penalties or sanctions that could also adversely impact our operating results and financial condition.

Our inability to protect our intellectual property rights, or being accused of infringing on intellectual property rights of third parties, could have a material adverse effect on our business, financial condition and results of operations.

Protection of our proprietary processes, methods and compounds and other technology is important to our business. We generally rely on patent, trade secret, trademark and copyright laws of the U.S. and certain other countries in which our products are produced or sold, as well as licenses and nondisclosure and confidentiality agreements, to protect our intellectual property rights. The patent, trade secret, trademark and copyright laws of some countries, or their enforcement, may not protect our intellectual property rights to the same extent as the laws of the U.S. Failure to protect our intellectual property rights may result in the loss of valuable proprietary technologies. Additionally, some of our technologies are not covered by any patent or patent application and, even if a patent application has been filed, it may not result in an issued patent. If patents are issued to us, those patents may not provide meaningful protection against competitors or against competitive technologies. We cannot assure you that our intellectual property rights will not be challenged, invalidated, circumvented or rendered unenforceable.

We also conduct research and development activities with third parties and license certain intellectual property rights from third parties and we plan to continue to do so in the future. We endeavor to license or otherwise obtain intellectual property rights on terms favorable to us. However, we may not be able to license or otherwise obtain intellectual property rights on such terms or at all. Our inability to license or otherwise obtain such intellectual property rights could have a material adverse effect on our ability to create a competitive advantage and create innovative solutions for our customers, which will adversely affect our net sales and our relationships with our customers.

We could face patent infringement claims from our competitors or others alleging that our processes or products infringe on their proprietary technologies. If we are found to be infringing on the proprietary technology of others, we may be liable for damages and we may be required to change our processes, redesign our products partially or completely, pay to use the technology of others, stop using certain technologies or stop producing the infringing product entirely. Even if we ultimately prevail in an infringement suit, the existence of the suit could prompt customers to switch to products that are not the subject of infringement suits. We may not prevail in intellectual property litigation and such litigation may result in significant legal costs or otherwise impede our ability to produce and distribute key products.

We also rely upon unpatented proprietary manufacturing expertise, continuing technological innovation and other trade secrets to develop and maintain our competitive position. While we generally enter into confidentiality agreements with our employees and third parties to protect our intellectual property, we cannot assure you that our confidentiality agreements will not be breached, that they will provide meaningful protection for our trade secrets and proprietary manufacturing expertise or that adequate remedies will be available in the event of an unauthorized use or disclosure of our trade secrets or manufacturing expertise. In addition, our trade secrets and know-how may be improperly obtained by other means, such as a breach of our information technologies security systems or direct theft.

Our inability to acquire or develop additional reserves that are economically viable could have a material adverse effect on our future profitability.

Our lithium reserves will, without more, decline as we continue to extract these raw materials. Accordingly, our future profitability depends upon our ability to acquire additional lithium reserves that are economically viable to replace the reserves we will extract. Exploration and development of lithium resources are highly speculative in nature. Exploration projects involve many risks, require substantial expenditures and may not result in the discovery of sufficient additional resources that can be extracted profitably. Once a site with potential resources is discovered, it may take several years of development until production is possible, during which time the economic viability of production may change. Substantial expenditures are required to establish recoverable proven and probable reserves and to construct extraction and production facilities. As a result, there is no assurance that current or future exploration programs will be successful and there is a risk that depletion of reserves will not be offset by discoveries or acquisitions.

We utilize feasibility studies to estimate the anticipated economic returns of an exploration project. The actual project profitability or economic feasibility may differ from such estimates as a result of factors such as, but not limited to, changes in volumes, grades and characteristics of resources to be mined and processed; changes in labor costs or availability of adequate and skilled labor force; the quality of the data on which engineering assumptions were made; adverse geotechnical conditions; availability, supply and cost of water and power; fluctuations in inflation and currency exchange rates; delays in obtaining environmental or other government permits or approvals or changes in the laws and regulations related to our operations or project development; changes in royalty agreements, laws and/or regulations around royalties and other taxes; and weather or severe climate impacts.

For our existing operations, we utilize geological and metallurgical assumptions, financial projections and price estimates. These estimates are periodically updated to reflect changes in our operations, including modifications to our proven and probable reserves and mineralized material, revisions to environmental obligations, changes in legislation and/or social, political or economic environment, and other significant events associated with natural resource extraction operations. There are numerous uncertainties inherent in estimating quantities and qualities of lithium and costs to extract recoverable reserves, including many factors beyond our control, that could cause results to differ materially from expected financial and operating results or result in future impairment charges. In addition, it cannot be assumed that any part or all of the inferred mineral resources will ever be converted into mineral reserves, as defined by the SEC. See Item 2. Properties, for a discussion and quantification of our current mineral resources and reserves.

There is risk to the growth of lithium markets.

Our lithium business is significantly dependent on the development and adoption of new applications for lithium batteries and the growth in demand for plug-in hybrid electric vehicles and battery electric vehicles. To the extent that such development, adoption and growth do not occur in the volume and/or manner that we contemplate, including for reasons described under the heading “The development of non-lithium battery technologies could adversely affect us,” above, the long-term growth in the markets for lithium products may be adversely affected, which would have a material adverse effect on our business, financial condition and operating results.

Demand and market prices for lithium will greatly affect the value of our investment in our lithium resources and our revenues and profitability generally.

Our ability to successfully develop our lithium resources, including our 60% interest in MARBL's Wodgina mine, and generate a return on investment will be affected by changes in the demand for and market price of lithium-based end products, such as lithium hydroxide. The market price of these products can fluctuate and is affected by numerous factors beyond our control, primarily world supply and demand. Such external economic factors are influenced by changes in international investment patterns, various political developments and macro-economic circumstances. In addition, the price of lithium products is impacted by their purity and performance. We may not be able to effectively mitigate against such fluctuations.

Following the Wodgina acquisition, the Wodgina mine idled production of spodumene until market demand supported bringing the mine back into production. We have resumed spodumene concentrate production at the Wodgina mine, but there are no assurances that we will not idle production at the Wodgina mine or one of our other mines in the future due to lack of market demand or for other reasons.

In addition, we have renegotiated certain of our long-term agreements to include higher pricing that is more reflective of current market conditions. In other cases, we have moved from our previous fixed-price, long-term agreements toward index-referenced and variable-priced contracts. As a result, our Lithium business is more aligned with changes in market and index pricing than it has been in the past. While lithium market indices have increased 70% to 200% since the start of 2022, they may decline in the future, and any such decline could have a material and adverse effect on the revenues and profitability of our Lithium business and on our company generally.

If we are unable to retain key personnel or attract new skilled personnel, it could have an adverse effect on our business.

Our success depends on our ability to attract and retain key personnel including our management team. In light of the specialized and technical nature of our business, our performance is dependent on the continued service of, and on our ability to attract and retain, qualified management, scientific, technical, marketing and support personnel. Competition for such personnel is intense, and we may be unable to continue to attract or retain such personnel. In addition, because of our reliance on our senior management team, the unanticipated departure of any key member of our management team could have an adverse effect on our business. Our future success depends, in part, on our ability to identify and develop or recruit talent to succeed our senior management and other key positions throughout the organization. If we fail to identify and develop or recruit successors, we are at risk of being harmed by the departures of these key employees. Effective succession planning is also important to our long-term success. Failure to ensure effective transfer of knowledge and smooth transitions involving key employees could hinder our strategic planning and execution. In addition, the U.S. and other regions in which we operate are experiencing an acute workforce shortage for skilled workers, which in turn has created a hyper-competitive wage environment that may impact our ability to attract and retain employees.

Some of our employees are unionized, represented by works councils or are employed subject to local laws that are less favorable to employers than the laws of the U.S.

As of December 31, 2022, we had approximately 7,400 employees, including employees of our consolidated joint ventures. Approximately 30% of these employees are represented by unions or works councils. In addition, a large number of our employees are employed in countries in which employment laws provide greater bargaining or other rights to employees than the laws of the U.S. Such employment rights require us to work collaboratively with the legal representatives of those employees to effect any changes to labor arrangements. For example, most of our employees in Europe are represented by works councils that must approve any changes in conditions of employment, including salaries and benefits and staff changes, and may impede efforts to restructure our workforce. Although we believe that we have a good working relationship with our employees, a strike, work stoppage, slowdown or significant dispute with our employees could result in a significant disruption of our operations or higher labor costs.

Our joint ventures may not operate according to their business plans if our partners fail to fulfill their obligations, which may adversely affect our results of operations and may force us to dedicate additional resources to these joint ventures.

We currently participate in a number of joint ventures and may enter into additional joint ventures in the future. The nature of a joint venture requires us to share control with unaffiliated third parties. If our joint venture partners do not fulfill their obligations, the affected joint venture may not be able to operate according to its business plan. In that case, our results of operations may be adversely affected and we may be required to materially change the level of our commitment to the joint venture. Also, differences in views among joint venture participants may result in delayed decisions or failures to agree on major issues. If these differences cause the joint ventures to deviate from their business plans, our results of operations could be adversely affected.

The realignment of our former Lithium, Bromine and Catalysts segments into our Energy Storage, Specialties and Ketjen (Catalysts) segments may not benefit us as we expect or result in an improvement in our operating results.

In August 2022, we announced plans to realign our Lithium and Bromine global business units into a new corporate structure designed to better meet customer needs and foster talent required to deliver in a competitive global environment. In addition, we announced our decision to retain our Catalysts business under a separate, wholly-owned subsidiary. Effective January 1, 2023, we realigned our Lithium and Bromine global business units into new Energy Storage and Specialties segments. Energy Storage focuses on the lithium-ion battery evolution and the transition to clean energy. Specialties combines the former Bromine business with the Lithium specialties business. We also reorganized our former Catalysts business unit into a wholly-owned subsidiary branded as Ketjen. If we do not manage this reorganization and the consequent realignment of responsibilities effectively, or if this new organization does not provide better service and products to our customers, then our overall business could suffer with an adverse impact on our financial condition and results of operations.

We will continue to report our segments in the current structure until our Quarterly Report on Form 10-Q for the quarter ended March 31, 2023, the period in which the new organizational structure became effective.

Risks Related to Our Financial Condition

Our required capital expenditures can be complex, may experience delays or other difficulties, and the costs may exceed our estimates.

Our capital expenditures generally consist of expenditures to maintain and improve existing equipment, facilities and properties, and substantial investments in new or expanded equipment, facilities and properties. Execution of these capital expenditures can be complex, and commencement of production requires start-up, commission and certification of product quality by our customers, which may impact the expected output and timing of sales of product from such facilities. Construction of large chemical operations is subject to numerous risks and uncertainties, including, among others, the ability to complete a project on a timely basis and in accordance with the estimated budget for such projects and our ability to estimate future demand for our products. In addition, our returns on these capital expenditures may not meet our expectations.

Future capital expenditures may be significantly higher, depending on the investment requirements of each of our business lines, and may also vary substantially if we are required to undertake actions to compete with new technologies in our industry. We may not have the capital necessary to undertake these capital investments. If we are unable to do so, we may not be able to effectively compete in some of our markets.

We will need a significant amount of cash to service our indebtedness and our ability to generate cash depends on many factors beyond our control.

Our ability to generate sufficient cash flow from operations or use existing cash balances to make scheduled payments on our debt depends on a range of economic, competitive and business factors, many of which are outside our control. Our business may not generate sufficient cash flow from operations to service our debt obligations. If we are unable to service our debt obligations, we may need to refinance all or a portion of our indebtedness on or before maturity, reduce or delay capital expenditures, sell assets or raise additional equity. We may not be able to refinance any of our indebtedness, sell assets or raise additional equity on commercially reasonable terms or at all, which could cause us to default on our obligations and impair our liquidity. Our inability to generate sufficient cash flow or use existing cash balances to satisfy our debt obligations, or to refinance our obligations on commercially reasonable terms, could have a material adverse effect on our business and financial condition.

Restrictive covenants in our debt instruments may adversely affect our business.

Our senior credit facilities and the indentures governing our senior notes contain select restrictive covenants. These covenants provide constraints on our financial flexibility. The failure to comply with these or other covenants governing other indebtedness, including indebtedness incurred in the future, could result in an event of default, which, if not cured or waived, could have a material adverse effect on our business, financial condition and results of operations, including cross-defaults to other debt facilities. See “Financial Condition and Liquidity—Long-Term Debt” in Item 7. Management’s Discussion and Analysis of Financial Condition and Results of Operations.

Changes in credit ratings issued by nationally recognized statistical rating organizations could adversely affect our cost of financing, the market price of our securities and our debt service obligations.

Credit rating agencies rate our debt securities on factors that include our operating results, actions that we take, their view of the general outlook for our industry and their view of the general outlook for the economy. Actions taken by the rating agencies can include maintaining, upgrading or downgrading the current rating or placing us on a watch list for possible future downgrades. Downgrading the credit rating of our debt securities or placing us on a watch list for possible future downgrades would likely increase our cost of future financing, limit our access to the capital markets and have an adverse effect on the market price of our securities.

Borrowings under a portion of our debt facilities bear interest at floating rates, and are subject to adjustment based on the ratings of our senior unsecured long-term debt. The downgrading of any of our ratings or an increase in any of the benchmark interest rates would result in an increase of the interest expense on our variable rate borrowings.

We are exposed to fluctuations in currency exchange rates, which may adversely affect our operating results and net income.

We conduct our business and incur costs in the local currency of most of the countries in which we operate. Changes in exchange rates between foreign currencies and the U.S. Dollar will affect the recorded levels of our assets, liabilities, net sales, cost of goods sold and operating margins and could result in exchange losses. The primary currencies to which we have exposure are the Chinese Renminbi, Euro, Australian Dollar, Chilean Peso and Japanese Yen. Exchange rates between these currencies and the U.S. Dollar in recent years have fluctuated significantly and may do so in the future. With respect to our potential exposure to foreign currency fluctuations and devaluations, for the year ended December 31, 2022, approximately 29% of our net sales were denominated in currencies other than the U.S. Dollar. Significant changes in these foreign currencies relative to the U.S. Dollar could also have an adverse effect on our ability to meet interest and principal payments on any foreign currency-denominated debt outstanding. In addition to currency translation risks, we incur currency transaction risks whenever one of our operating subsidiaries or joint ventures enters into either a purchase or a sales transaction using a different currency from its functional currency. Our operating results and net income may be affected by any volatility in currency exchange rates and our ability to manage effectively our currency transaction and translation risks.

Inflationary trends in the price of our input costs, such as raw materials, transportation and energy, could adversely affect our business and financial results.

We have experienced, and may continue to experience, volatility and increases in the price of certain raw materials and in transportation and energy costs as a result of global market and supply chain disruptions and the broader inflationary environment. For example, results for our Catalysts segment have been negatively impacted in 2022 as a result of inflationary pressures in freight and input costs, including as a result of the volatility of natural gas pricing in Europe related to the war in Ukraine.

If we are unable to increase the prices to our customers of our products to offset inflationary cost trends, or if we are unable to achieve cost savings to offset such cost increases, we could fail to meet our cost expectations, and our profits and operating results could be adversely affected. Our ability to price our products competitively to timely reflect higher input costs is critical to maintain and grow our sales. Increases in prices of our products to customers or the impact of the broader inflationary environment on our customers and may lead to declines in demand and sales volumes. Further, we may not be able to accurately predict the volume impact of price increases, especially if our competitors are able to more successfully adjust to such input cost volatility. Increasing our prices to our customers could result in long-term sales declines or loss of market share if our customers find alternative suppliers or purchase less of our products, which could have an adverse long-term impact on our results of operations.

Changes in, or the interpretation of, tax legislation or rates throughout the world could materially impact our results.

Our effective tax rate and related tax balance sheet attributes could be impacted by changes in tax legislation throughout the world. Recent changes in the U.S. include the Inflation Reduction Act of 2022 (the “Inflation Reduction Act”), enacted August 16, 2022, which, among other items, imposes a 15% alternative minimum tax on corporations with three-year average annual adjusted financial statement income exceeding $1 billion and introduces or extends a number of tax credits to promote clean energy development. We continue to monitor the effects of the Inflation Reduction Act and other regulatory developments on our financial condition, operating results, and income tax rate. Currently, the majority of our net sales are generated from customers located outside the U.S., and a substantial portion of our assets and employees are located outside of the U.S.

We have not accrued income taxes or foreign withholding taxes on undistributed earnings for most non-U.S. subsidiaries, because those earnings are intended to be indefinitely reinvested in the operations of those subsidiaries. Certain tax proposals with respect to such earnings could substantially increase our tax expense, which would substantially reduce our income and have a material adverse effect on our results of operations and cash flows from operating activities.

Our future effective tax rates could be affected by changes in the mix of earnings in countries with differing statutory tax rates, expirations of tax holidays or rulings, changes in the assessment regarding the realization of the valuation of deferred tax assets, or changes in tax laws and regulations or their interpretation. Recent developments, including the European Commission's investigations on illegal state aid, as well as the Organisation for Economic Co-operation and Development ("OECD") project on Base Erosion and Profit Shifting may result in changes to long-standing tax principles, which could adversely affect our effective tax rates or result in higher cash tax liabilities. The OECD has also proposed the introduction of a global minimum tax rate at 15%. Consultations are ongoing and while we expect increased tax compliance requirements, we are unable to predict the ultimate outcome of this proposal.

We are subject to the regular examination of our income tax returns by various tax authorities. Examinations in material jurisdictions or changes in laws, rules, regulations or interpretations by local taxing authorities could result in impacts to tax years open under statute or to foreign operating structures currently in place. We regularly assess the likelihood of adverse outcomes resulting from these examinations or changes in laws, rules, regulations or interpretations to determine the adequacy of our provision for taxes. It is possible the outcomes from these examinations will have a material adverse effect on our financial condition and operating results.

Future events may impact our deferred tax asset position and U.S. deferred federal income taxes on undistributed earnings of international affiliates that are considered to be indefinitely reinvested.

We evaluate our ability to utilize deferred tax assets and our need for valuation allowances based on available evidence. This process involves significant management judgment about assumptions that are subject to change from period to period based on changes in tax laws or variances between future projected operating performance and actual results. We are required to establish a valuation allowance for deferred tax assets if we determine, based on available evidence at the time the determination is made, that it is more likely than not that some portion or all of the deferred tax assets will not be utilized. In making this determination, we evaluate all positive and negative evidence as of the end of each reporting period. Future adjustments (either increases or decreases) to the deferred tax asset valuation allowance are determined based upon changes in the expected realization of the net deferred tax assets. The utilization of our deferred tax assets ultimately depends on the existence of sufficient taxable income in either the carry-back or carry-forward periods under the applicable tax law. Due to significant estimates used to establish the valuation allowance and the potential for changes in facts and circumstances, it is reasonably possible that we will be required to record adjustments to the valuation allowance in future reporting periods. Changes to the valuation allowance or the amount of deferred tax liabilities could have a materially adverse effect on our business, financial condition and results of operations. Further, should we change our assertion regarding the permanent reinvestment of the undistributed earnings in foreign operations, a deferred tax liability may need to be established.

Our business and financial results may be adversely affected by various legal and regulatory proceedings.

We are involved from time to time in legal and regulatory proceedings, which may be material in the future. The outcome of proceedings, lawsuits and claims may differ from our expectations, leading us to change estimates of liabilities and related insurance receivables.

Legal and regulatory proceedings, whether with or without merit, and associated internal investigations, may be time-consuming and expensive to prosecute, defend or conduct, may divert management's attention and other resources, inhibit our ability to sell our products, result in adverse judgments for damages, injunctive relief, penalties and fines, and otherwise negatively affect our business.

Because a significant portion of our operations is conducted through our subsidiaries and joint ventures, our ability to service our debt may be dependent on our receipt of distributions or other payments from our subsidiaries and joint ventures.

A significant portion of our operations is conducted through our subsidiaries and joint ventures. As a result, our ability to service our debt may be partially dependent on the earnings of our subsidiaries and joint ventures and the payment of those earnings to us in the form of dividends, loans or advances and through repayment of loans or advances from us. Payments to us by our subsidiaries and joint ventures are contingent upon our subsidiaries' or joint ventures' earnings and other business considerations and may be subject to statutory or contractual restrictions. In addition, there may be significant tax and other legal restrictions on the ability of our non-U.S. subsidiaries or joint ventures to remit money to us.

Although our pension plans currently meet minimum funding requirements, events could occur that would require us to make significant contributions to the plans and reduce the cash available for our business.

We have several defined benefit pension plans around the world, including in the U.S., U.K., Germany, Belgium and Japan. We are required to make cash contributions to our pension plans to the extent necessary to comply with minimum funding requirements imposed by the various countries' benefit and tax laws. The amount of any such required contributions will be determined annually based on an actuarial valuation of the plans as performed by the plans' actuaries.

In previous years, we have made voluntary contributions to our U.S. qualified defined benefit pension plans. We anticipate approximately $12 million of required cash contributions during 2023 for our defined benefit pension plans. Additional voluntary pension contributions in and after 2023 may vary depending on factors such as asset returns, interest rates, and legislative changes. The amounts we may elect or be required to contribute to our pension plans in the future may increase significantly. These contributions could be substantial and would reduce the cash available for our business.

Further, an economic downturn or recession or market disruption in the capital and credit markets may adversely impact the value of our pension plan assets, our results of operations, our statement of changes in stockholders' equity and our liquidity. Our funding obligations could change significantly based on the investment performance of the pension plan assets and changes in actuarial assumptions for local statutory funding valuations. Any deterioration of the capital markets or returns available in such markets may negatively impact our pension plan assets and increase our funding obligations for one or more of these plans and negatively impact our liquidity. We cannot predict the impact of this or any further market disruption on our pension funding obligations.

We may not be able to consummate future acquisitions or integrate acquisitions into our business, which could result in unanticipated expenses and losses.

We believe that our customers are increasingly looking for strong, long-term relationships with a few key suppliers that help them improve product performance, reduce costs, and support new product development. To satisfy these growing customer requirements, our competitors have been consolidating within product lines through mergers and acquisitions.

As part of our business growth strategy, we have acquired businesses and entered into joint ventures in the past and intend to pursue acquisitions and joint venture opportunities in the future. Our ability to implement this component of our growth strategy will be limited by our ability to identify appropriate acquisition or joint venture candidates and our financial resources, including available cash and borrowing capacity. The expense incurred in consummating acquisitions or entering into joint ventures, the time it takes to integrate an acquisition or our failure to integrate businesses successfully, could result in unanticipated expenses and losses. Furthermore, we may not be able to realize any of the anticipated benefits from acquisitions or joint ventures.

The process of integrating acquired operations into our existing operations may result in unforeseen operating difficulties and may require significant financial resources that would otherwise be available for the ongoing development or expansion of existing operations. Some of the risks associated with the integration of acquisitions include:

- potential disruption of our ongoing business and distraction of management;
- unforeseen claims and liabilities, including unexpected environmental exposures;
- unforeseen adjustments, charges and write-offs;
- problems enforcing the indemnification obligations of sellers of businesses or joint venture partners for claims and liabilities;
- unexpected losses of customers of, or suppliers to, the acquired business;
- difficulty in conforming the acquired businesses' standards, processes, procedures and controls with our operations;
- in the case of foreign acquisitions, the need to integrate operations across different cultures and languages and to address the particular economic, currency, political and regulatory risks associated with specific countries;
- variability in financial information arising from the implementation of purchase price accounting;
- inability to coordinate new product and process development;
- loss of senior managers and other critical personnel and problems with new labor unions and cultural challenges associated with integrating employees from the acquired company into our organization; and
- challenges arising from the increased scope, geographic diversity and complexity of our operations.

We may continue to expand our business through acquisitions and we may incur additional indebtedness, including indebtedness related to acquisitions.

We have historically expanded our business primarily through acquisitions. A part of our business strategy is to continue to grow through acquisitions that complement our existing technologies and accelerate our growth. Our credit facilities have limited financial maintenance covenants. In addition, the indenture and other agreements governing our senior notes do not limit our ability to incur additional indebtedness in connection with acquisitions or otherwise. As a result, we may incur substantial additional indebtedness in connection with acquisitions.

Any such additional indebtedness and the related debt service obligations (whether or not arising from acquisitions) could have important consequences and risks for us, including:

- reducing flexibility in planning for, or reacting to, changes in our businesses, the competitive environment and the industries in which we operate, and to technological and other changes;
- lowering credit ratings;
- reducing access to capital and increasing borrowing costs generally or for any additional indebtedness to finance future operating and capital expenses and for general corporate purposes;
- to the extent that our debt is subject to floating interest rates, increasing our vulnerability to fluctuations in market interest rates;
- reducing funds available for operations, capital expenditures, share repurchases, dividends and other activities; and
- creating competitive disadvantages relative to other companies with lower debt levels.

If our goodwill, intangible assets or long-lived assets become impaired, we may be required to record a significant charge to earnings.

Under U.S. Generally Accepted Accounting Principles (“GAAP”), we review our intangible assets and long-lived assets for impairment when events or changes in circumstances indicate the carrying value may not be recoverable. Goodwill is tested for impairment on October 31 of each year, or more frequently if required. Factors that may be considered a change in circumstances, indicating that the carrying value of our goodwill, intangible assets or long-lived assets may not be recoverable, include, but are not limited to, a decline in our stock price and market capitalization, reduced future cash flow estimates, and slower growth rates in our industry. We may be required to record a significant charge in our financial statements during the period in which any impairment of our goodwill, intangible assets or long-lived assets is determined, negatively impacting our results of operations and financial condition.

General Risk Factors

Adverse conditions in the economy, and volatility and disruption of financial markets can negatively impact our customers, suppliers and other business partners and therefore have a material adverse effect on our business and results of operations.

A global, regional or localized economic downturn may reduce customer demand or inhibit our ability to produce our products, negatively impacting our operating results. Our business and operating results have been and will continue to be sensitive to the many challenges that can affect national, regional and global economies, including economic downturns (including credit market tightness, which can impact our liquidity as well as that of our customers, suppliers and other business partners), declining consumer and business confidence, fluctuating commodity prices and volatile exchange rates. Our customers may experience deterioration of their businesses, cash flow shortages and difficulty obtaining financing, leading them to delay or cancel plans to purchase products, and they may not be able to fulfill their obligations in a timely fashion. Further, suppliers and other business partners may experience similar conditions, which could impact their ability to fulfill their obligations to us. Also, it could be difficult to find replacements for business partners without incurring significant delays or cost increases. Finally, any such adverse conditions in the economy and financial markets could make it difficult for us to raise debt or equity capital on favorable terms.

Our business and operations could suffer in the event of cybersecurity breaches, information technology system failures, or network disruptions.

Attempts to gain unauthorized access to our information technology systems become more sophisticated over time. These attempts, which might be related to industrial or other espionage, include covertly introducing malware to our computers and networks and impersonating authorized users, among others. We seek to detect and investigate all security incidents and to prevent their recurrence, but in some cases we might be unaware of an incident or its magnitude and effects. The theft, unauthorized use or publication of our intellectual property and/or confidential business information could harm our competitive position, reduce the value of our investment in research and development and other strategic initiatives or otherwise adversely affect our business. To the extent that any cybersecurity breach results in inappropriate disclosure of our customers' or licensees' confidential information, we may incur liability as a result. The devotion of additional resources to the security of our information technology systems in the future could significantly increase the cost of doing business or otherwise adversely impact our financial results.

In addition, risks associated with information technology systems failures or network disruptions, including risks associated with upgrading our systems or in successfully integrating information technology and other systems in connection with the integration of businesses we acquire, could disrupt our operations by impeding our processing of transactions, financial reporting and our ability to protect our customer or company information, which could adversely affect our business and results of operations. Finally, we face increased information technology security and fraud risks due to our increased reliance on working remotely during the COVID-19 pandemic and beyond, which may create additional information security vulnerabilities and/or magnify the impact of any disruption in information technology systems.

The occurrence or threat of extraordinary events, including domestic and international terrorist attacks, may disrupt our operations and decrease demand for our products.

Chemical-related assets may be at greater risk of future terrorist attacks than other possible targets in the U.S. and around the world. As a result, we are subject to existing federal rules and regulations (and may be subject to additional legislation or regulations in the future) that impose site security requirements on chemical manufacturing facilities, which increase our overhead expenses.

We are also subject to federal regulations that have heightened security requirements for the transportation of hazardous chemicals in the U.S. We believe we have met these requirements but additional federal and local regulations that limit the distribution of hazardous materials are being considered. We ship and receive materials that are classified as hazardous. Bans on movement of hazardous materials through cities, like Washington, D.C., could affect the efficiency of our logistical operations. Broader restrictions on hazardous material movements could lead to additional investment to produce hazardous raw materials and change where and what products we manufacture.

The Chemical Facility Anti-Terrorism Standards program ("CFATS Program"), which is administered by the Department of Homeland Security ("DHS"), identifies and regulates chemical facilities to ensure that they have security measures in place to reduce the risks associated with potential terrorist attacks on chemical plants located in the U.S. In December 2014, the Protecting and Securing Chemical Facilities from Terrorist Attacks Act of 2014 ("CFATS Act") was enacted. DHS has enacted new rules under the CFATS Program that imposes comprehensive federal security regulations for high-risk chemical facilities in possession of specified quantities of chemicals of interest. This rule establishes risk-based performance standards for the security of the U.S.'s chemical facilities. It requires covered chemical facilities to prepare Security Vulnerability Assessments, which identify facility security vulnerabilities, and to develop and implement Site Security Plans, which include measures that satisfy the identified risk-based performance standards. We have implemented all necessary changes to comply with the rules under the CFATS Program to date, however, we cannot determine with certainty any future costs associated with any additional security measures that DHS may require.

The occurrence of extraordinary events, including future terrorist attacks and the outbreak or escalation of hostilities, cannot be predicted, and their occurrence can be expected to continue to negatively affect the economy in general, and the markets for our products in particular. The resulting damage from a direct attack on our assets, or assets used by us, could include loss of life and property damage. In addition, available insurance coverage may not be sufficient to cover all of the damage incurred or, if available, may be prohibitively expensive.

The COVID-19 pandemic, and any future pandemic, could have a material adverse effect on our results of operations, financial position, and cash flows.

We continue to closely monitor the impact of the COVID-19 pandemic and its impact on our business. The COVID-19 pandemic has created significant uncertainty, volatility and economic disruption and any future pandemics could have a serious adverse impact on the economy and on our business, results of operations and cash flows. While we have not experienced a material impact as a result of the COVID-19 pandemic to date, the ultimate extent to which the COVID-19 pandemic and any future pandemics impact our business, results of operations, financial position, and cash flows is difficult to predict and dependent upon many factors over which we have no control. These factors include, but are not limited to, the duration and severity of the pandemic, including from the discovery of new strain variants; government restrictions on businesses and individuals; the health and safety of our employees and communities in which we do business; the impact of the pandemic on our customers' businesses and the resulting demand for our products; the impact on our suppliers and supply chain network; the impact on U.S. and global economies and the timing and rate of economic recovery; and potential adverse effects on the financial markets.

The military conflict between Russia and Ukraine, and the global response to it, could impact our results of operations.

The U.S. government and other nations have imposed significant restrictions on most companies' ability to do business in Russia as a result of the military conflict between Russia and Ukraine. It is not possible to predict the broader or longer-term consequences of this conflict, which could include further sanctions, embargoes, regional instability, energy shortages, geopolitical shifts and adverse effects on macroeconomic conditions, security conditions, currency exchange rates and financial markets. Such geo-political instability and uncertainty could have a negative impact on our ability to sell to, ship products to, collect payments from, and support customers in certain regions based on trade restrictions, embargoes and export control law restrictions, and logistics restrictions including closures of air space, and could increase the costs, risks and adverse impacts from these new challenges. For example, results for our Catalysts segment were negatively impacted in 2022 as a result of inflationary pressures in freight and input costs, including the volatility of natural gas pricing in Europe related to the war in Ukraine. We may also be the subject of increased cybersecurity breaches. We currently do not sell our products into Russia nor have assets or any operations in the country, however, a significant escalation or expansion of economic disruption or the conflict's current scope could have a material adverse effect on our results of operations due to its impact in the countries in which we do conduct business.

Natural disasters or other unanticipated catastrophes could impact our results of operations.

The occurrence of natural disasters, such as hurricanes, floods or earthquakes; pandemics, such as COVID-19; or other unanticipated catastrophes at any of the locations in which we or our key partners, suppliers and customers do business, could cause interruptions in our operations. Historically, major hurricanes have caused significant disruption to the operations on the U.S. Gulf Coast for many of our customers and our suppliers of certain raw materials, which had an adverse impact on volume and cost for some of our products. Our operations in Chile could be subject to significant rain events and earthquakes, and our operations in Asia could be subject to weather events such as typhoons. A global or regional pandemic or similar outbreak in a region of our, our customers, or our suppliers could disrupt business. If similar or other weather events, natural disasters, or other catastrophe events occur in the future, they could negatively affect the results of operations at our sites in the affected regions as well as have adverse impacts on the global economy.

Our insurance may not fully cover all potential exposures.

We maintain property, business interruption, casualty, and other insurance, but such insurance may not cover all risks associated with the hazards of our business and is subject to limitations, including deductibles and coverage limits. We may incur losses beyond the limits, or outside the coverage, of our insurance policies, including liabilities for environmental remediation. In addition, from time to time, various types of insurance for companies in the specialty chemical industry have not been available on commercially acceptable terms or, in some cases, have not been available at all. We are potentially at additional risk if one or more of our insurance carriers fail. Additionally, severe disruptions in the domestic and global financial markets could adversely impact the ratings and survival of some insurers. Future downgrades in the ratings of enough insurers could adversely impact both the availability of appropriate insurance coverage and its cost. In the future, we may not be able to obtain coverage at current levels, if at all, and our premiums may increase significantly on coverage that we maintain.

We may be exposed to certain regulatory and financial risks related to climate change.

Growing concerns about climate change may result in the imposition of additional regulations or restrictions to which we may become subject. Climate changes include changes in rainfall and in storm patterns and intensities, water shortages, significantly changing sea levels and increasing atmospheric and water temperatures, among others. For example, there have been concerns regarding the declining water level of the Dead Sea, from which our joint venture, JBC, produces bromine. Climate changes and unprecedented weather events may pose a risk to business operations in vulnerable areas. Storms could cause business interruptions, incur additional restoration costs, and impact product availability and pricing. Disruptions to the global supply chain due to climate related impacts or geopolitical events are possible and exist as external risk factors that we can respond to but not control. These events could limit the supply of key raw materials to us, or could have significant impacts to pricing. We work with numerous independent suppliers to mitigate lack of availability from a single supplier, however in some cases products with limited numbers of suppliers may become difficult to obtain.

A number of governments or governmental bodies have introduced or are contemplating regulatory changes in response to climate change, including regulating greenhouse gas emissions. Potentially, additional U.S. federal regulation will be forthcoming with respect to greenhouse gas emissions (including carbon dioxide) and/or “cap and trade” legislation that could impact our operations. In addition, we have operations in the E.U., Brazil, China, Japan, Jordan, Saudi Arabia, Singapore and the United Arab Emirates, which have implemented, or may implement, measures to achieve objectives under the 2015 Paris Climate Agreement, an international agreement linked to the United Nations Framework Convention on Climate Change (“UNFCC”), which set targets for reducing greenhouse gas emissions. Significant regional or national differences in approaches to environmental laws and regulations could affect us disproportionately compared to our competitors and result in a competitive disadvantage to us.

The outcome of new legislation or regulation in the U.S. and other jurisdictions in which we operate may result in new or additional requirements, additional charges to fund energy efficiency activities, and fees or restrictions on certain activities. We may have heightened credit risk due to our exposure to climate risks. While certain climate change initiatives may result in new business opportunities for us in the area of alternative fuel technologies and emissions control, compliance with these initiatives may also result in additional costs to us, including, among other things, increased production costs, additional taxes, reduced emission allowances or additional restrictions on production or operations. Any adopted future climate change regulations could also negatively impact our ability to compete with companies situated in areas not subject to such limitations. Even without such regulation, increased public awareness and adverse publicity about potential impacts on climate change emanating from us or our industry could harm us. We may not be able to recover the cost of compliance with new or more stringent laws and regulations, which could adversely affect our business and negatively impact our growth. Furthermore, the potential impact of climate change and related regulation, market trends or litigation on the Company is highly uncertain and there can be no assurance that it will not have an adverse effect on our financial condition and results of operations.

Item 1B. Unresolved Staff Comments.

NONE

Item 2. Properties.

We operate globally, with our principal executive offices located in Charlotte, North Carolina and regional shared services offices located in Budapest, Hungary and Dalian, China. Each of these properties are leased. We and our affiliates also operate regional sales and administrative offices in various locations throughout the world, which are generally leased.

We believe that our production facilities, research and development facilities, and sales and administrative offices are generally well maintained, effectively used and are adequate to operate our business. During 2022, the Company’s manufacturing plants operated at approximately 84% capacity, in the aggregate.

Set forth below is information regarding our production facilities operated by us and our affiliates. Additional details regarding our significant mineral properties can be found below the table.

Location	Principal Use	Owned/Leased
Lithium		
Chengdu, China	Production of lithium carbonate and technical and battery-grade lithium hydroxide	Owned
Greenbushes, Australia[(a)]	Production of lithium spodumene minerals and lithium concentrate	Owned[(c)]
Kemerton, Australia	Production of lithium carbonate and technical and battery-grade lithium hydroxide	Owned[(c)]
Kings Mountain, NC	Production of technical and battery-grade lithium hydroxide, lithium salts and battery-grade lithium metal products	Owned
La Negra, Chile	Production of technical and battery-grade lithium carbonate and lithium chloride	Owned
Langelsheim, Germany	Production of butyllithium, lithium chloride, specialty products, lithium hydrides, cesium and special metals	Owned
New Johnsonville, TN	Production of butyllithium and specialty products	Owned
Qinzhou, China	Production of lithium carbonate and technical and battery-grade lithium hydroxide	Owned
Salar de Atacama, Chile[(a)]	Production of lithium brine and potash	Owned[(d)]
Silver Peak, NV[(a)]	Production of lithium brine, technical-grade lithium carbonate and lithium hydroxide	Owned
Taichung, Taiwan	Production of butyllithium	Owned
Wodgina, Australia[(a)]	Production of lithium spodumene minerals and lithium concentrate	Owned and leased[(c)]
Xinyu, China	Production of lithium carbonate and technical and battery-grade lithium hydroxide	Owned
Bromine		
Baton Rouge, LA	Research and product development activities, and production of fire safety solutions	Leased
Magnolia, AR[(a)]	Production of fire safety solutions, bromine, inorganic bromides, agricultural intermediates and tertiary amines	Owned

Location	Principal Use	Owned/Leased
Safi, Jordan[a]	Production of bromine and derivatives and fire safety solutions	Owned and leased[c]
Twinsburg, OH	Production of bromine-activated carbon	Leased
Catalysts		
Amsterdam, the Netherlands	Production of refinery catalysts, research and product development activities	Owned
Bitterfeld, Germany	Refinery catalyst regeneration, rejuvenation, and sulfiding	Owned[c]
La Voulte, France	Refinery catalysts regeneration and treatment, research and development activities	Owned[c]
McAlester, OK	Refinery catalyst regeneration, rejuvenation, pre-reclaim burn off, as well as specialty zeolites and additives marketing activities	Owned[c]
Mobile, AL	Production of tin stabilizers	Owned[c]
Niihama, Japan	Production of refinery catalysts	Leased[c]
Pasadena, TX[b]	Production of aluminum alkyls, orthoalkylated anilines, refinery catalysts and other specialty chemicals; refinery catalysts regeneration services and research and development activities	Owned
Santa Cruz, Brazil	Production of catalysts, research and product development activities	Owned[c]
Takaishi City, Osaka, Japan	Production of aluminum alkyls	Owned[c]

(a) See below for further discussion of these significant mineral extraction facilities.
(b) The Pasadena, Texas location includes three separate manufacturing plants which are owned, primarily utilized by Catalysts, including one plant that is owned by an unconsolidated joint venture.
(c) Owned or leased by joint venture.
(d) Ownership will revert to the Chilean government once we have sold all remaining amounts under our contract with the Chilean government pursuant to which we obtain lithium brine in Chile.

Mineral Properties

Set forth below are details regarding our mineral properties operated by us and our affiliates which have been prepared in accordance with the requirements of subpart 1300 of Regulation S-K, issued by the SEC. As used in this Annual Report on Form 10-K, the terms “mineral resource,” “measured mineral resource,” “indicated mineral resource,” “inferred mineral resource,” “mineral reserve,” “proven mineral reserve” and “probable mineral reserve” are defined and used in accordance with subpart 1300 of Regulation S-K. Under subpart 1300 of Regulation S-K, mineral resources may not be classified as “mineral reserves” unless the determination has been made by a qualified person (“QP”) that the mineral resources can be the basis of an economically viable project.

Except for that portion of mineral resources classified as mineral reserves, mineral resources do not have demonstrated economic value. Inferred mineral resources are estimates based on limited geological evidence and sampling and have a too high of a degree of uncertainty as to their existence to apply relevant technical and economic factors likely to influence the prospects of economic extraction in a manner useful for evaluation of economic viability. Estimates of inferred mineral resources may not be converted to a mineral reserve. It cannot be assumed that all or any part of an inferred mineral resource will ever be upgraded to a higher category. A significant amount of exploration must be completed in order to determine whether an inferred mineral resource may be upgraded to a higher category. Therefore, it cannot be assumed that all or any part of an inferred mineral resource exists, that it can be the basis of an economically viable project, that it will ever be upgraded to a higher category, or that all or any part of the mineral resources will ever be converted into mineral reserves. See risk factor - “Our inability to acquire or develop additional reserves that are economically viable could have a material adverse effect on our future profitability,” in Item 1A. Risk Factors.

Overview

At December 31, 2022, we had the following mineral extraction facilities:

Location	Business Segment	Ownership %	Extraction Type	Stage
Australia				
Greenbushes	Lithium	49%	Hard rock	Production
Wodgina	Lithium	60%	Hard rock	Production[(a)]
Chile				
Salar de Atacama	Lithium	100%	Brine	Production
Jordan				
Safi[(b)]	Bromine	50%	Brine	Production
United States				
Kings Mountain, NC	Lithium	100%	Hard rock	Development
Magnolia, AR[(b)]	Bromine	100%	Brine	Production
Silver Peak, NV[(b)]	Lithium	100%	Brine	Production

(a) Production of spodumene concentrate at the Wodgina mine resumed in the second quarter of 2022 after it had been idled in 2019, following the acquisition of our the 60% interest in the Wodgina Project.
(b) Site includes on-site, or otherwise near-by exclusive, conversion facilities. See individual property disclosure below for further details.

Aggregate annual production from our mineral extraction facilities is shown in the below table. Amounts represent Albemarle’s attributable portion based on ownership percentages noted above and are shown in thousands of metric tonnes of lithium metal and bromine production. Lithium and bromine is extracted as brine or hard rock concentrate at the extraction facilities. These are then further converted into various compounds and products at on-site processing facilities or other conversion facilities owned by Albemarle around the world. In addition, the brine or concentrate can be used by tolling entities for further processing.

	Aggregate Annual Production (metric tonnes in thousands) Year Ended December 31,		
	2022	2021	2020
Lithium (lithium metal)[(a)]			
Australia			
Greenbushes[(b)]	19	13	8
Wodgina[(c)]	3	—	—
Chile			
Salar de Atacama[(d)]	10	8	8
United States			
Silver Peak, NV	2	2	2
Total lithium metal	34	23	18
Bromine			
Jordan			
Safi[(e)(f)]	60	57	56
United States			
Magnolia, AR[(g)]	73	71	74
Total bromine	133	128	130

(a) Lithium production amounts shown as lithium metal. Conversion to LCE is 0.1878 metric tonne of lithium metal to 1 metric tonne of LCE.
(b) Production from Greenbushes represents 49% of production of the Greenbushes mine which is attributable to the Company’s interest in the Talison joint venture.
(c) Production of spodumene concentrate at the Wodgina mine resumed in the second quarter of 2022 after it had been idled in 2019. Production amounts presented from Wodgina represent 60% of production of the Wodgina mine which is attributable to the Company’s interest in the MARBL joint venture.
(d) The Salar de Atacama operation also produces potash (potassium chloride), bichofite, halite and sylvinite as byproducts. However, the Company does not consider production of these byproducts as material to the economics of the operation.
(e) Production from Safi represents the 50% production by the Jordan Bromine Project which is attributable to the Company’s interest in the JBC joint venture.
(f) The Safi operation also produces potassium hydroxide (“KOH”) as a byproduct. However, the Company does not consider production of this byproduct as material to the economics of the operation.
(g) In addition, elemental sulfur and sodium hydrosulfide solution (“NaHS”) are manufactured from the sour gas produced by the Magnolia operation. However, the Company does not consider these products as material to the economics of the operation.

See individual property disclosure below for further details regarding mineral rights, titles, property size, permits and other information for our significant mineral extraction properties. The extracted brine or hard rock is processed at facilities on location (as described below) or processed, or further processed, at other facilities throughout the world.

The following table provides a summary of our mineral resources, exclusive of reserves, at December 31, 2022. The below mineral resource amounts are rounded and shown in thousands of metric tonnes. Where applicable, the amounts represent Albemarle’s attributable portion based on ownership percentages noted. The relevant technical information supporting mineral resources for each material property is included in the “Material Individual Properties” section below, as well as in the technical report summaries filed as Exhibits 96.1 to 96.6 to this report.

	Measured Mineral Resources		Indicated Mineral Resources		Measured and Indicated Mineral Resources		Inferred Mineral Resources	
	Amount (‘000s metric tonnes)	Grade (Li_2O%)	Amount (‘000s metric tonnes)	Grade (Li_2O%)	Amount (‘000s metric tonnes)	Grade (Li_2O%)	Amount (‘000s metric tonnes)	Grade (Li_2O%)
Lithium - Hard Rock:								
Australia								
Greenbushes[(a)]	—	—	21,800	1.53%	21,800	1.53%	28,300	1.15%
Wodgina[(b)]	—	—	12,600	1.36%	12,600	1.36%	98,300	1.12%
United States								
Kings Mountain, NC	—	—	46,816	1.37%	46,816	1.37%	42,869	1.10%
	Amount (‘000s metric tonnes)	Concentration (mg/L)	Amount (‘000s metric tonnes)	Concentration (mg/L)	Amount (‘000s metric tonnes)	Concentration (mg/L)	Amount (‘000s metric tonnes)	Concentration (mg/L)
Lithium - Brine:								
Chile								
Salar de Atacama	471	2,390	363	1,943	834	2,159	237	1,617
United States								
Silver Peak, NV	14	153	36	144	50	146	90	121

(a) Through our Talison joint venture, we own a 49% interest in the Greenbushes mine. We are therefore reporting 49% of Greenbushes’ mineral resources.
(b) Through our MARBL joint venture, we own a 60% interest in the Wodgina project. We are therefore reporting 60% of Wodgina’s mineral resources.

The feedstock for the Safi, Jordan site, owned 50% by Albemarle through its JBC joint venture, is drawn from the Dead Sea, a nonconventional reservoir owned by the nations of Israel and Jordan. As such, there are no specific resources owned by JBC, but Albemarle’s joint venture partner, Arab Potash Company (“APC”) has exclusive rights granted by the Hashemite Kingdom of Jordan to withdraw brine from the Dead Sea and process it to extract minerals. The measured resource of bromide ion attributable to Albemarle’s 50% interest in its JBC joint venture is estimated to be approximately 178.3 million metric tonnes. JBC is extracting approximately 1 percent of the bromine available in Jordan’s share of the Dead Sea. Bromide concentration in the Dead Sea is estimated to average approximately 5,000 parts per million (“ppm”).

There are no mineral resource estimates at the Magnolia, AR bromine extraction site. All bromine mineral accumulations of economic interest and with reasonable prospects for eventual economic extraction within the Magnolia production lease area are either currently on production or subject to an economically viable future development plan and are classified as mineral reserves.

The following table provides a summary of our mineral reserves at December 31, 2022. The below mineral reserve amounts are rounded and shown in thousands of metric tonnes. The amounts represent Albemarle’s attributable portion based on ownership percentages noted above. The relevant technical information supporting mineral reserves for each material property is included in the ”Material Individual Properties” section below, as well as the in the technical report summaries referenced in Exhibits 96.1 to 96.6 to this report.

	Proven Mineral Reserves		Probable Mineral Reserves		Total Mineral Reserves	
	Amount (‘000s metric tonnes)	Grade (Li_2O%)	Amount (‘000s metric tonnes)	Grade (Li_2O%)	Amount (‘000s metric tonnes)	Grade (Li_2O%)
Lithium - Hard Rock [(a)]:						
Australia						
Greenbushes[(b)]	—	—	77,000	1.91%	77,000	1.91%
	Amount (‘000s metric tonnes)	Concentration (mg/L)	Amount (‘000s metric tonnes)	Concentration (mg/L)	Amount (‘000s metric tonnes)	Concentration (mg/L)
Lithium - Brine:						
Chile						
Salar de Atacama	329	2,430	237	2,063	566	2,262
United States						
Silver Peak, NV	13	95	56	95	69	95
Bromine:						
United States						
Magnolia, AR[(c)]	2,419		565		2,984	

(a) The Wodgina mine is at an initial assessment level, and as a result, contains no mineral reserves. Mineral reserve estimates are not applicable for the Kings Mountain site.
(b) Through our Talison joint venture, we own a 49% interest in the Greenbushes mine. We are therefore reporting 49% of Greenbushes’ mineral reserves.
(c) The concentration of bromine at the Magnolia site varies based on the physical location of the field and can range over 6,000 mg/L.

All bromine reserves reported by Albemarle for the JBC project are classified as proven mineral reserves. The mineral reserve estimate for the Safi, Jordan bromine site attributable to Albemarle’s 50% interest in its JBC joint venture is approximately 2.38 million metric tonnes of bromine from the Dead Sea. This estimate is based on the time available under the concession agreement with the Hashemite Kingdom of Jordan and the processing capability of the JBC plant. As only approximately one percent of the available resource is consumed from the Dead Sea, as noted above, the reserve estimate is based on the amount the JBC plant can produce over until the end of 2058, when the APC concession agreement ends. Bromine concentration used to calculate the reserve estimate from the Dead Sea was approximately 8,890 ppm based on historical pumping.

Mineral resource and reserve estimates were prepared by a QP with an effective date provided in the individual technical report summaries referenced in Exhibits 96.1 to 96.6 to this report. Differences between the amounts in the table above and those amounts in the technical report summaries represent estimated depletion from the effective date of the report until December 31, 2022. Our mineral resource and reserve estimates are based on many factors, including the area and volume covered by our mining rights, assumptions regarding our extraction rates based upon an expectation of operating the mines on a long-term basis and the quality of in-place reserves.

Internal Controls

The modeling and analysis of our mineral resources and reserves was developed by our site personnel and reviewed by several levels of internal management, as well as the QP for each site. The development of such resources and reserves estimates, including related assumptions, were prepared by a QP.

When determining resources and reserves, as well as the differences between resources and reserves, management developed specific criteria, each of which must be met to qualify as a resource or reserve, respectively. These criteria, such as demonstration of economic viability, points of reference and grade, are specific and attainable. The QP and management agree on the reasonableness of the criteria for the purposes of estimating resources and reserves. Calculations using these criteria are reviewed and validated by the QP.

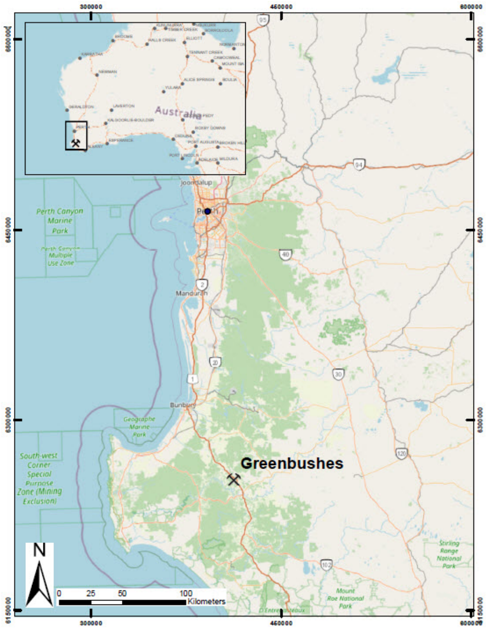
Estimations and assumptions were developed independently for each significant mineral location. All estimates require a combination of historical data and key assumptions and parameters. When possible, resources and data from public information and generally accepted industry sources, such as governmental resource agencies, were used to develop these estimations.

Each site has developed quality control and quality assurance (“QC/QA”) procedures, which were reviewed by the QP, to ensure the process for developing mineral resource and reserve estimates were sufficiently accurate. QC/QA procedures include independent checks (duplicates) on samples by third party laboratories, blind blank/standard insertion into sample streams, duplicate sampling, among others. In addition, the QPs reviewed the consistency of historical production at each site as part of their analysis of the QC/QA procedures. See details of the controls for each site in the technical summary reports filed as Exhibits 96.1 to 96.6 to this report.

We recognize the risks inherent in mineral resource and reserve estimates, such as the geological complexity, the interpretation and extrapolation of field and well data, changes in operating approach, macroeconomic conditions and new data, among others. The capital, operating and economic analysis estimates rely on a range of assumptions and forecasts that are subject to change. In addition, certain estimates are based on mineral rights agreements with local and foreign governments. Any changes to these access rights could impact the estimates of mineral resources and reserves calculated in these reports. Overestimated resources and reserves resulting from these risks could have a material effect on future profitability.

Material Individual Properties

Greenbushes, Australia



The Greenbushes mine is a hard rock, open pit mine (latitude 33° 52´S, longitude 116° 04´ E) located approximately 250km south of Perth, Western Australia, 90km southeast of the port of Bunbury, a major bulk-handling port in the southwest of Western Australia. The lithium mining operation is near the Greenbushes townsite located in the Shire of Bridgetown-Greenbushes. Access to the Greenbushes Mine is via the paved South Western Highway between Bunbury and Bridgetown to Greenbushes Township and via the paved Maranup Ford Road to the Greenbushes Mine.

Lithium production from the Greenbushes Mine has been undertaken continuously for more than 20 years. Modern exploration has been undertaken on the property since the mid-1980s, first by Greenbushes Limited, then by Lithium Australia

Ltd and in turn by Sons of Gwalia prior to the acquisition of Greenbushes by Talison in 2007. Initial exploration focused largely on tantalum, with the emphasis changing to lithium from around 2000. In 2014, Rockwood acquired a 49% ownership interest in Windfield, which owns 100% of Talison, from Sichuan Tianqi Lithium Industries Inc. This 49% ownership in Windfield was assumed by Albemarle in 2015 as part of the acquisition of Rockwood. We purchase lithium concentrate from Windfield, and our investment in the joint venture is reported as an unconsolidated equity investment on our balance sheet.

About 55% of the tenements held by Talison are covered by Western Australia's State Forest, which is under the authority of the Western Australia Department of Biodiversity, Conservation and Attractions. The majority of the remaining land is private land that covers about 40% of the surface rights. The remaining ground comprises crown land, road reserves and other miscellaneous reserves. The tenements cover a total area of approximately 10,000 hectares and include the historic Greenbushes tin, tantalum and current lithium mining areas. See section 3 of the Greenbushes technical report summary, filed as Exhibit 96.1 to this report, for a listing of tenements held by the Greenbushes site. Talison holds the mining rights for all lithium minerals on these tenements. The operating open pit lithium mining and processing plant area covers approximately 2,000 hectares comprising three mining leases. All lithium mining activities, including tailings storage, processing plant operations, open pits and waste rock dumps, are currently carried out within the boundaries of the three mining leases plus two general purpose leases. In order to keep the granted tenements in good standing, Talison is required to maintain permits, make an annual contribution to the statutory Mining Rehabilitation Fund and pay a royalty on concentrate sales for lithium mineral production as prescribed under the Mining Act 1978 in Western Australia. There are no private royalties that apply to the Greenbushes property. Talison reviews and renews all tenements on an annual basis.

The Greenbushes pegmatite deposit consists of a primary pegmatite intrusion (Central Lode) with a smaller, sub-parallel pegmatite to the east (Kapanga). The primary intrusion and its subsidiary dikes and pods are concentrated within shear zones within a metamorphic belt consisting of granofels, ultramafic schists and amphibolites. The pegmatites are crosscut by mafic dolerite dikes. The Central Lode pegmatite is over 3 kilometers long (north by northwest), up to 300 meters wide (normal to dip), strikes north to north-west and dips moderately to steeply west to south-west. The Kapanga deposit sits approximately 300 m to the east of the Central Lode deposit with strike length of 1.8 km, thickness averaging 150 meters and dips between 40º and 60º toward the west. Current drilling has defined the Kapanga deposit to approximately 450 meters depth below surface. The major minerals from the Greenbushes pegmatite are quartz, spodumene, albite and K-feldspar.

The main lithium-bearing minerals are spodumene (containing approximately 8% lithium oxide) and varieties kunzite and hiddenite. Minor to trace lithium minerals include lepidolite mica, amblygonite and lithiophilite. Lithium is readily leached in the weathering environment and thus is virtually non-existent in weathered pegmatite. Exploration drilling at Greenbushes has been ongoing for over 40 years, including drilling in 2020, using reverse circulation and diamond drill holes.

Three lithium mineral processing plants are currently operating on the Greenbushes site, two chemical grade plants and a technical grade plant. Tailings are discharged to the tailings storage facility without the need for any neutralization process. Additional infrastructure on site includes power and water supply facilities, a laboratory, administrative offices, occupational health/safety/training offices, dedicated mines rescue area, stores, storage sheds, workshops and engineering offices. The Greenbushes site also leases production drills, excavators, trucks and various support equipment to extract the ore deposit by open pit methods. Talison's power is delivered by a local distribution system and reticulated and metered within the site. Water is sourced from rainfall and stored in several process dams located on site. We consider the condition of all of our plants, facilities and equipment to be suitable and adequate for the businesses we conduct, and we maintain them regularly. As of December 31, 2022, our 49% ownership interest of the gross asset value of the facilities at the Greenbushes site was approximately $471.7 million. Greenbushes is currently constructing a new chemical grade plant with a target completion in 2025 and is developing plans for a fourth chemical grade plant to be constructed in 2027. Other planned upgrades to the infrastructure include a new mine service area, a new mine access road, expansions of warehouse and laboratories and the expansion of tailings facilities.

Talison ships the chemical-grade lithium concentrate in vessels to our facilities in Meishan and Xinyu, China, and by land transport to our recently completed Kemerton, Australia facility, to process into battery-grade lithium hydroxide. In addition, the output from Talison can be used by tolling entities in China to produce both lithium carbonate and lithium hydroxide.

A summary of the Greenbushes facility's lithium mineral resources, exclusive of reserves, and reserves as of December 31, 2022 are shown in the following tables. SRK Consulting (U.S.) Inc. ("SRK"), a third-party firm comprising mining experts in accordance with Item 1302(b)(1) of Regulation S-K, served as the QP and prepared the estimates of lithium mineral resources and reserves at the Greenbushes facility, with an effective date of December 31, 2022. A copy of the QP's technical report summary with respect to the lithium mineral resource and reserve estimates at the Greenbushes facility, dated February 14, 2023 is filed as Exhibit 96.1 to this report. The amounts represent Albemarle's attributable portion based on a 49% ownership percentage, and are presented as metric tonnes of lithium ore in thousands.

The Greenbushes mineral resources, exclusive of reserves, estimates with depletion from production from the effective date of the report through December 31, 2022 are summarized in the following table:

	Amount (‘000s metric tonnes)	Grade (Li_2O%)
Indicated mineral resources	21,800	1.53%
Inferred mineral resources	28,300	1.15%

- Albemarle’s attributable portion of mineral resources is 49%.
- Mineral resources are reported exclusive of mineral reserves. Mineral resources are not mineral reserves and do not have demonstrated economic viability.
- Resources have been reported as in situ (hard rock within an optimized pit shell).
- Resources have been categorized subject to the opinion of a QP based on the quality of informing data for the estimate, consistency of geological/grade distribution, data quality, and have been validated against long term mine reconciliation.
- Resources which are contained within the mineral reserve pit design may be excluded from reserves due to an Inferred classification.
- All stockpiled resources have been converted to mineral reserves.
- Mineral resources are reported considering a nominal set of assumptions for reporting purposes:
  - The mass yield for resources processed through the chemical grade plants is estimated based on Greenbushes’ mass yield formula, which is Yield%=9.362*(Li_2O %)^1.319, subject to a 97% recovery limitation when the Li_2O grade exceeds 5.5%.
  - Derivation of economic cutoff grade for resources is based on the mine gate pricing of $1,523/metric tonne of 6% Li_2O concentrate. The mine gate price is based on $1,650/metric tonne-conc CIF less $127/metric tonne-conc for government royalty and transportation to China.
  - Costs estimated in Australian Dollars were converted to U.S. dollars based on an exchange rate of AU$1.00:$0.72.
  - The economic cutoff grade calculation is based on $2.79/metric tonne-ore incremental ore mining cost, $23.35/metric tonne-ore processing cost, $3.57/metric tonne-ore G&A cost, and $1.88/metric tonne-ore sustaining capital cost. Incremental ore mining costs are the costs associated with the run-of-mine loader, stockpile rehandling, grade control assays and rockbreaker.
  - The price, cost and mass yield parameters produce a calculated resource economic cutoff grade of 0.319% Li2O. However, due to the internal constraints of the current operations, an elevated resource cutoff grade of 0.7% Li_2O has been applied. SRK notes actual economic cutoff grade is lower, but it is the QP’s opinion to use a 0.7% Li_2O cutoff grade to align with current site practices.
  - An overall 42° (east side) and 46° (west side) pit slope angle, 0% mining dilution, and 100% mining recovery.
  - Resources were reported above the assigned 0.7% Li_2O cutoff grade and are constrained by an optimized 0.95 revenue factor pit shell.
  - No infrastructure movement capital costs have been added to the optimization.
- Mineral resources tonnage and contained metal have been rounded to reflect the accuracy of the estimate, and numbers may not add due to rounding.

The Greenbushes indicated mineral resources of 21.8 million metric tonnes at December 31, 2022 increased by 29% from 16.9 million metric tonnes at December 31, 2021. The Greenbushes inferred mineral resources of 28.3 million metric tonnes at December 31, 2022 increased by 42% from 20.0 million metric tonnes at December 31, 2021. The increase in mineral resources was primarily driven by an update of the resource model including the addition of Kapanga, changes in the economic parameters (specifically the increase in lithium pricing) and updating of the economic pit shell, partially offset by mine depletion and an increase to the cutoff grade used in the resource model.

The Greenbushes mineral reserve estimates with depletion from production from the effective date of the report through December 31, 2022 are summarized in the following table:

	Amount (‘000s metric tonnes)	Grade (Li_2O%)
obable mineral reserves:		
Reserve Pit	75,000	1.91%
Stockpiles	2,000	1.99%

- Albemarle’s attributable portion of mineral resources and reserves is 49%.
- Mineral reserves are reported exclusive of mineral resources.
- Indicated in situ resources have been converted to Probable reserves.
- Measured and Indicated stockpile resources have been converted to Probable mineral reserves.
- Mineral reserves are reported considering a nominal set of assumptions for reporting purposes:
  - Mineral reserves are based on a mine gate price of $1,381/metric tonne of chemical grade concentrate (6% Li_2O).
  - Mineral reserves assume 93% global mining recovery.

- Mineral reserves are diluted at approximately 5% at zero grade for all mineral reserve blocks in addition to internal dilution built into the resource model (2.7% with the assumed selective mining unit of 5 meter x 5 meter x 5 meter).
- The mass yield for reserves processed through the chemical grade plants is estimated based on Greenbushes' mass yield formula, which is Yield%=9.362*(Li_2O %)^1.319, subject to a 97% recovery limitation when the Li_2O grade exceeds 5.5%. The average life of mine mass yield for the chemical grade plants is 22.2%.
- The mass yield for reserves processed through the technical grade plant is estimated based on Greenbushes' mass yield formula, which is Yield%=(31.792* Li_2O %)–80.809. There is approximately 3.2 million metric tonnes of technical grade plant feed at 3.7% Li_2O. The average life of mine mass yield for the technical grade plant is 37.5%.
- Although Greenbushes produces a technical grade product from the current operation, it is assumed that the reserves reported herein will be sold as a chemical grade product. This assumption is necessary because feed for the technical grade plant is currently only defined at the grade control or blasting level. Therefore, it is conservatively assumed that concentrate produced by the technical grade plant will be sold at the chemical grade product price
- Derivation of economic cutoff grade for reserves is based on mine gate pricing of $1,381/metric tonne of 6% Li_2O concentrate. The mine gate price is based on $1,500/metric tonne-conc CIF less $119/metric tonne-conc for government royalty and transportation to China.
- Costs estimated in Australian Dollars were converted to U.S. dollars based on an exchange rate of AU$1.00:$0.72.
- The economic cutoff grade calculation is based on $2.79/metric tonne-ore incremental ore mining cost, $23.35/metric tonne-ore processing cost, $3.57/metric tonne-ore G&A cost, and $1.88/metric tonne-ore sustaining capital cost. Incremental ore mining costs are the costs associated with the run-of-mine loader, stockpile rehandling, grade control assays and rockbreaker.
- The price, cost and mass yield parameters produce a calculated economic cutoff grade of 0.344% Li_2O. However, due to the internal constraints of the current operations, an elevated mineral reserves cutoff grade of 0.7% Li_2O has been applied.
- The cutoff grade of 0.7% Li_2O was applied to reserves that are constrained by the ultimate pit design and are detailed in a yearly mine schedule.
- Stockpile reserves have been previously mined and are reported at a 0.7% Li_2O cutoff grade.

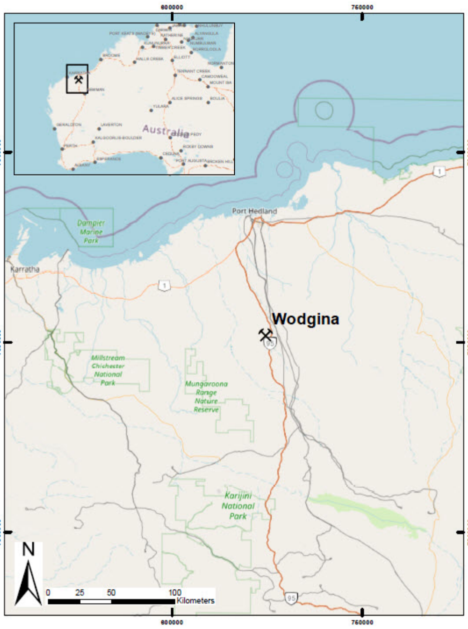
• Waste tonnage within the reserve pit is 701.5 million metric tonnes at a strip ratio of 4.58:1 (waste to ore – not including reserve stockpiles)
• Mineral reserve tonnage, grade and mass yield have been rounded to reflect the accuracy of the estimate, and numbers may not add due to rounding.

The Greenbushes total mineral reserves of 77.0 million metric tonnes at December 31, 2022 increased by 10% from 69.9 million metric tonnes at December 31, 2021. The increase in total mineral reserves was primarily driven by use of a different resource block model, changes in the economic parameters (specifically the increase in lithium pricing) and updating of the economic pit shell, partially offset by mine depletion differing recovery and dilution methodology and a higher strip ratio. The increases in costs were offset by higher revenue.

The LoM sustaining capital cost of $1.88/metric tonne of ore was used only for the purposes of pit optimization and cut-off grade calculation. This sustaining capital cost was based on estimates of LoM annual sustaining capital costs for Greenbushes that were included in the 2023 budget. Subsequent to pit optimization, design and scheduling, a detailed estimate of LoM sustaining capital costs was prepared.

Additional information about key assumptions and parameters relating to the lithium mineral resources and reserves at the Greenbushes facility is discussed in sections 11 and 12, respectively, of the Greenbushes technical report summary.

Wodgina, Australia



The Wodgina property, which includes a hard rock, open pit mine (latitude -21° 11' 25"S, longitude 118° 40' 25"E) is located approximately 110 km south-southeast of Port Hedland, Western Australia between the Turner and Yule Rivers. The area includes multiple prominent greenstone ridges up to 180 m above mean sea level surrounded by granitic plains and lowlands. The property is accessible via National Highway 1 to National highway 95 to the Wodgina camp road. All roads to site are paved. The nearest large regional airport is in Port Hedland which also hosts an international deep-water port facility. In addition, a site dedicated all-weather airstrip is located near to site, capable of landing certain aircrafts.

The Wodgina pegmatite deposits were discovered in 1902. Since then, the pegmatite-hosted deposits have been mined for tin, tantalum, beryl, and lithium by various companies. Mining occurred sporadically until Goldrim Mining formed a new partnership with Pan West Tantalum Pty Ltd., who opened open pit mining at the site in 1989 and progressively expanded during the 1990s. Active mining at the Mt. Cassiterite pit has been started and stopped regularly between 2008 and the present. The mine was placed on care and maintenance in 2008, 2012, and most recently in 2019. In 2016, MRL acquired the mine and upgraded the processing facilities and site infrastructure to 750ktpa spodumene plant producing 6% spodumene concentrate, completed in 2019. On October 31, 2019, we completed the acquisition of a 60% interest in this hard rock lithium mine project and formed an unincorporated joint venture with MRL, named MARBL. We formed MARBL for the exploration, development, mining, processing and production of lithium and other minerals (other than iron ore and tantalum) from the Wodgina Project. Production of spodumene concentrate from the first and second trains at the Wodgina mine was achieved in May and July of this year, respectively, after it had been idled following its acquisition in 2019.

Wodgina holds mining tenements within the Karriyarra native title claim and are subject to the Land Use Agreement dated March 2001 between the Karriyarra People and Gwalia Tantalum Ltd (now Wodgina Lithium, a 100% subsidiary of MRL, our MARBL joint venture partner). See section 3 of the Wodgina technical report summary, filed as Exhibit 96.2 to this report, for a listing of all mining and exploration land tenements, which are in good standing and no known impediments exist. Certain tenements are due for renewal in 2026 and another in 2030. Drilling and exploration activities have been conducted throughout the mining life of the Wodgina property.

The Wodgina mine is a pegmatite lithium deposit with spodumene the dominant mineral. The lithium mineralization occurs as 10 - 30 cm long grey-white spodumene crystals within medium grained pegmatites comprising primarily of quartz, feldspar, spodumene, and muscovite. Typically, the spodumene crystals are oriented orthogonal to the pegmatite contacts.

The facilities at Wodgina consist of a three stage crushing plant, the spodumene concentration plant, administrative offices, an accommodation camp, a power station, gas pipeline, three mature and reliable water bore fields, extension for future tailing storage and a fleet of owned and leased mine production equipment. The gas pipeline feeds the site power station to provide the power to the facilities. Water is obtained from the dedicated water bore fields. We consider the condition of all of our plants, facilities and equipment to be suitable and adequate for the businesses we conduct, and we maintain them regularly. As of December 31, 2022, our 60% ownership interest of the gross asset value of the facilities at our Wodgina site was approximately $255.4 million.

A summary of the Wodgina facility's lithium mineral resources as of December 31, 2022 is shown in the following table. SRK served as the QP and prepared the estimates of lithium mineral resources at the Wodgina facility, with an effective date of September 30, 2020. No reserves have been declared at Wodgina. A copy of the QP's amended technical report summary with respect to the lithium mineral resource estimates at the Wodgina facility, dated December 16, 2022, is referenced in Exhibit 96.2 to this report. The mineral resource economic pit and cutoff grade economic assumptions remain unchanged from December 31, 2021. The September 30, 2020 resource has been depleted for 2022 production and is reported as of December 31, 2022 in the below table. Mineral resources for Wodgina represent 60% interest in the Wodgina Project, which is attributable to the Company's interest in the MARBL joint venture. Amounts are presented as metric tonnes of lithium ore in thousands.

The Wodgina mineral resources, exclusive of reserves, estimates with depletion from production from the effective date of the report through December 31, 2022 are summarized in the following table:

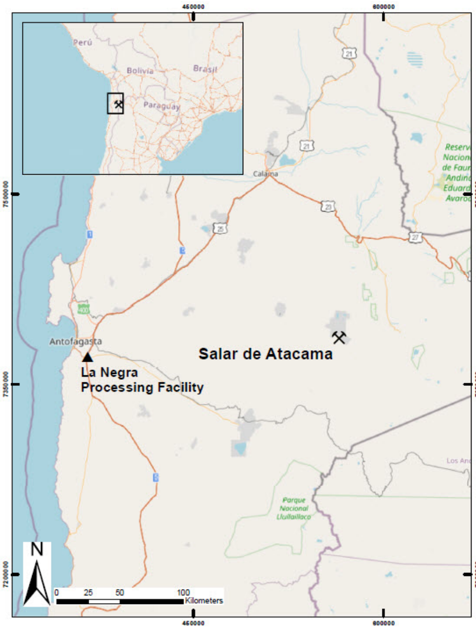
	Amount ('000s metric tonnes)	Grade (Li_2O%)
Indicated mineral resources	12,600	1.36%
Inferred mineral resources	98,300	1.12%

- The summary mineral resources attributable tonnes reflects Albemarle's 60% ownership percentage in the Wodgina project.
- All significant figures are rounded to reflect the relative accuracy of the estimates.
- The mineral resource estimate has been classified in accordance with SEC S-K 1300 guidelines and definitions.
- The Cassiterite Deposit comprises the historically mined Mt. Cassiterite pit and undeveloped North Hill areas.
- Mineral resources are not mineral reserves and do not have demonstrated economic viability. Inferred mineral resources have a high degree of uncertainty as to their economic and technical feasibility. It cannot be assumed that all or any part of an inferred mineral resources can be upgraded to measured or indicated mineral resources.
- Metallurgical recovery of lithium has been estimated on a block basis at a consistent 65% based on documentation from historical plant production.
- To demonstrate reasonable prospects for eventual economic extraction of Mineral Resources, a cut-off grade of 0.5% Li2O based on metal recoverability assumptions, long-term price assumptions of $584 per metric tonne, variable mining costs averaging $3.40/metric tonne, processing costs and G&A costs totaling $23/metric tonne.
- The mineral resources are constrained by an economic pit shell using an overall 43° pit slope angle, 0% mining dilution, and 100% mining recovery.
- There are no known legal, political, environmental, or other risks that could materially affect the potential development of the Mineral Resources based on the level of study completed for this property.

The Wodgina indicated mineral resources of 12.6 million metric tonnes at December 31, 2022 decreased by 6% from 13.4 million metric tonnes at December 31, 2021. The Wodgina inferred mineral resources of 98.3 million metric tonnes at December 31, 2022 decreased by less than 1% from 98.5 million metric tonnes at December 31, 2021. The decrease in mineral resources was driven by mine depletion from the restart of mining activities during 2022.

The Wodgina mine is at an initial assessment level, and as a result, contains no mineral reserves. Additional information about key assumptions and parameters relating to the lithium mineral resources at the Wodgina facility is discussed in section 11 of the Wodgina technical report summary.

Salar de Atacama/La Negra, Chile



The Salar de Atacama is located in the commune of San Pedro de Atacama, with the operations approximately 100 kilometers to the south of this commune, in the extreme east of the Antofagasta Region and close to the border with the republics of Argentina and Bolivia. Access to the property is on the major four-lane paved Panamericana Route 5 north from Antofagasta, Chile approximately 60 km northeast to B-385. On B-385, a two-lane paved highway, the Albemarle Salar de Atacama project (latitude 23°38'31.52"S, longitude 68°19'30.31"W) is approximately 175 km to the east. The site has a small private airport that serves the project. A small paved runway airport is also located near San Pedro de Atacama and a large international airport is located in Antofagasta. The La Negra plant (latitude 23°45'20.31"S, longitude 70°18'36.92"W) has direct access roads and located approximately 20 km by paved four lane highway Route 28 southeast of Antofagasta turning north approximately 3 km on Route 5.

In the early 1960s, water with high concentrations of salts was discovered in the Salar de Atacama Basin. In January 1975, one of our predecessors, Foote Mineral Company, signed a long-term contract with the Chilean government for mineral rights with respect to the Salar de Atacama consisting exclusively of the right to access lithium brine, covering an area of approximately 16,700 hectares. See section 3 of the Salar de Atacama technical report summary, filed as Exhibit 96.3 to this report, for a listing of mining concessions at the Salar de Atacama site. The contract originally permitted the production and sale of up to 200,000 metric tons of lithium metal equivalent (“LME”), a calculated percentage of LCE. In 1981, the first construction of evaporation ponds in the Salar de Atacama began. The following year, the construction of the lithium carbonate plant in La Negra began. In 1990, the facilities at the Salar de Atacama were expanded with a new well system and the capacity of the lithium carbonate plant in the La Negra plant was expanded. In 1998, the lithium chloride plant in La Negra began operating, the same year that Chemetall purchased Foote Mineral Company. Subsequently, in 2004, Chemetall was acquired by Rockwood, and in 2015, Rockwood was acquired by Albemarle. Effective January 1, 2017, the Chilean government and Albemarle entered into an annex to the original agreement through which its duration was modified, extending it until the balance of: (a) the original 200,000 metric tons of LME and an additional 262,132 metric tons of LME granted through this annex have been exploited, processed, and sold, or (b) on January 1, 2044, whichever comes first. In addition, the amended agreement provides for commission payments to the Chilean government based on sales price/metric ton on the amounts sold under the additional quota granted, our support of research and development in Chile of lithium applications and solar energy, and our support of local communities in Northern Chile. Albemarle currently operates its extraction and production facilities in Chile under this mineral rights agreement with the Chilean government.

The Salar de Atacama is a salt flat, the largest in Chile, located in the Atacama Desert in northern Chile, which is the driest place on the planet and thus has an extremely high annual rate of evaporation and extremely low annual rainfall. Our extraction through evaporation process works as follows: snow in the Andes Mountains melts and flows into underground pools of water containing brine, which generally have high concentrations of lithium. We then pump the water containing brine above ground through a series of pumps and wells into a network of large evaporation ponds. Over the course of approximately eighteen months, the desert sun evaporates the water causing other salts to precipitate and leaving behind concentrated lithium brine. If weather conditions are not favorable, the evaporation process may be prolonged. After we obtain the lithium brine from the Salar de Atacama, we process it into lithium carbonate and lithium chloride at our manufacturing facilities in nearby La Negra, Chile.

The filling materials of the Salar de Atacama Basin are dominated by the Vilama Formation and the more recently, in geologic time, by evaporitic and clastic materials that are currently being deposited in the basin. These units house the basin's aquifer system and are composed of evaporitic chemical sediments that include carbonate, gypsum and halite intervals interrupted by volcanic deposits of large sheets of ignimbrite, volcanic ash and smaller classical deposits. Lithium-rich brines are extracted from the halite aquifer that is located within the nucleus of the salt flat. The Salar de Atacama basin contains a continental system of lithium-rich brine. These types of systems have six common (global) characteristics: arid climate; closed basin that contains a salt flat (salt crust), a salt lake, or both; igneous and/or hydrothermal activity; tectonic subsidence; suitable sources of lithium; and sufficient time to concentrate the lithium in the brine.

In the Salar de Atacama basin, lithium-rich brines are found in a halite aquifer. Carbonate and sulfates are found near the edges of the basin. The average, minimum and maximum concentrations of lithium in the Salar de Atacama basin are approximately 1,400, 900 and 7,000 mg/L, respectively. From 2017 through 2019, two drilling campaigns were carried out in order to obtain geological and hydrogeological information at the Albemarle mining concession.

The facilities at the Salar de Atacama consist of extraction wells, evaporation and concentration ponds, leaching plants, a potash plant, a drying plant, salar yield improvement plant, services and general areas, including salt stockpiles, as well as a fleet of owned and leased equipment. In addition, the site includes administrative offices, an operations building and a laboratory. The extracted concentrated lithium brine is sent to the La Negra plant by truck for processing. The Salar de Atacama has its own powerhouse that generates the energy necessary for the entire operation of the facilities. We also have permanent and continuous groundwater exploitation rights for two wells that are for industrial use and to supply the Salar de Atacama facilities. The La Negra facilities consist of a boron removal plant, a calcium and magnesium removal plant, two lithium carbonate conversion plants, a lithium chloride plant, evaporation-sedimentation ponds, an offsite area where the raw materials are housed and the inputs that are used in the process are prepared, a dry area where the various products are prepared, as well as a fleet of owned and leased equipment. La Negra is supplied electricity from a local company and has rights to a well in the Peine community for its water supply. We have completed construction of the third lithium carbonate conversion plant in late 2022. The plant has begun a six-month commissioning, qualification process, and ramp up process. We consider the condition of all of our plants, facilities and equipment to be suitable and adequate for the businesses we conduct, and we maintain them regularly. As of December 31, 2022, the combined gross asset value of our facilities at the Salar de Atacama and in La Negra, Chile (not inclusive of construction in process) was approximately $1,673.5 million.

A summary of the Salar de Atacama facility’s lithium mineral resources, exclusive of reserves, and reserves as of December 31, 2022 are shown in the following tables. SRK served as the QP and prepared the estimates of lithium mineral resources and reserves at the Salar de Atacama facility, with an effective date of August 31, 2022. A copy of the QP’s technical report summary with respect to the lithium mineral resource and reserve estimates at the Salar de Atacama facility, dated February 14, 2023, is filed as Exhibit 96.3 to this report. The amounts represent Albemarle’s attributable portion based on a 100% ownership percentage, and are presented as metric tonnes of lithium metal in thousands.

The Salar de Atacama mineral resource, exclusive of reserves, estimates with depletion from production from the effective date of the report to December 31, 2022 are summarized in the following table:

	Amount ('000s metric tonnes)	Li Concentration (mg/L)
Measured mineral resources	471	2,390
Indicated mineral resources	363	1,943
Measured and Indicated mineral resources	834	2,159
Inferred mineral resources	237	1,617

- Mineral resources are reported exclusive of mineral reserves. Mineral resources are not mineral reserves and do not have demonstrated economic viability.
- Given the dynamic reserve versus the static resource, a direct measurement of resources post-reserve extraction is not practical. Therefore, as a simplification, to calculate mineral resources, exclusive of reserves, the quantity of lithium pumped in the life of mine plan was subtracted from the overall resource without modification to lithium concentration. Measured and indicated resource were deducted proportionate to their contribution to the overall mineral resource.
- Resources are reported on an in situ basis.
- Resources are reported above the elevation of 2,200 meters above sea level. Resources are reported as lithium metal.
- Resources have been categorized subject to the opinion of a QP based on the amount/robustness of informing data for the estimate, consistency of geological/grade distribution, survey information.
- Resources have been calculated using drainable porosity estimated from measured values in Upper Halite and Volcano-sedimentary units, and bibliographical values based on the lithology and QP's experience in similar deposits.
- The estimated economic cutoff grade utilized for resource reporting purposes is 800 mg/l lithium, based on the following assumptions:
  - A technical grade lithium carbonate price of $22,000/metric tonne CIF La Negra. This is a 10% premium to the price utilized for reserve reporting purposes. The 10% premium applied to the resource versus the reserve was selected to generate a resource larger than the reserve, ensuring the resource fully encompassed the reserve while still maintaining reasonable prospect for eventual economic extraction.
  - Recovery factors for the salar operation increase gradually over the span of 4 years, from the current 40% to the proposed salar yield improvement program 65% recovery in 2025. After that point, evaporation pond recovery is relatively constant at 65%. An additional recovery factor of 80% lithium recovery is applied to the La Negra lithium carbonate plant.
  - An average annual brine pumping rate of 414 L/s is assumed to meet drawdown constraint consistent with Albemarle's permit conditions.
  - Operating cost estimates are based on a combination of fixed brine extraction, G&A and plant costs and variable costs associated with raw brine pumping rate or lithium production rate. Average life of mine operating cost is calculated at approximately $4,155/metric tonne CIF Asia.
  - Sustaining capital costs are included in the cut-off grade calculation and post the salar yield improvement program installation, average around $98 million per year.
- Mineral Resources tonnage and contained metal have been rounded to reflect the accuracy of the estimate, and numbers may not add due to rounding.

The Salar de Atacama measured and indicated mineral resources, exclusive of reserves, of 834,000 metric tonnes at December 31, 2022 decreased by 39% from 1.4 million metric tonnes at December 31, 2021. The Salar de Atacama inferred mineral resources, exclusive of reserves, of 237,000 metric tonnes at December 31, 2022 increased by 81% from 131,000 metric tonnes at December 31, 2021. The geology model reinterpretation coupled with results from the sampling campaign reduced the brine volume and lithium contained. Some specific yield factors in the salar decreased, reducing the resource by approximately 10%. Increases in grade were driven by higher grade in some deeper wells. The re-estimation also resulted in the reclassification of some brine from indicated to the inferred. Increases in revenue were offset by cost increase. The mineral resources were also reduced by depletion during the year.

The Salar de Atacama reserve estimates with depletion from production from the effective date of the report through December 31, 2022 are summarized in the following table:

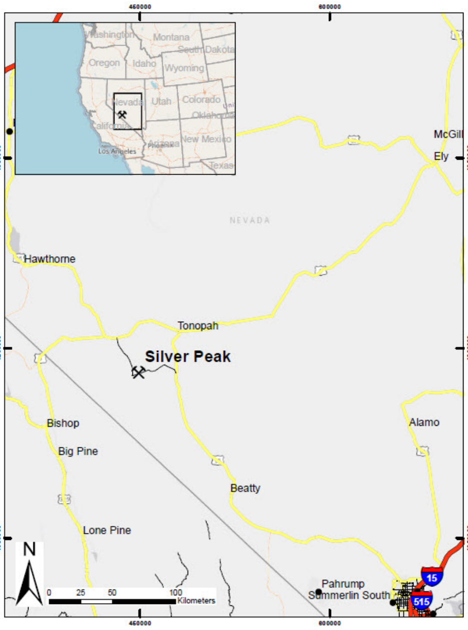
	Amount ('000s metric tonnes)	Concentration (mg/L)
ɔven mineral reserves:		
ı Situ	306	2,407
ı Process	23	2,741
ɔbable mineral reserves:		
ı Situ	237	2,063
tal mineral reserves:		
ı Situ	542	2,244
ı Process	23	2,741

- In process reserves quantify the prior 24 months of pumping data and reflect the raw brine, at the time of pumping. These reserves represent the first 24 months of feed to the lithium process plant in the economic model.
- Proven reserves have been estimated as the lithium mass pumped during Years 2020 through 2030 of the proposed life of mine plan.
- Probable reserves have been estimated as the lithium mass pumped from 2031 until the end of the proposed life of mine plan (2041).
- Reserves are reported as lithium metal
- This mineral reserve estimate was derived based on a production pumping plan truncated in December 31, 2041 (i.e., approximately 20 years). This plan was truncated to reflect the projected depletion of Albemarle's authorized lithium production quota.
- The estimated economic cut-off grade for the Project is 858 mg/l lithium, based on the assumptions discussed below. The truncated production pumping plan remained well above the economic cut-off grade (i.e., the economic cut-off grade did not result in a limiting factor to the estimation of the reserve).
    - A technical grade lithium carbonate price of $20,000/metric tonne CIF Asia.
    - Recovery factors for the salar operation increase gradually over the span of 4 years, from the current 40% to the proposed salar yield improvement program 65% recovery in 2025. After that point, evaporation pond recovery remains relatively constant at 65%, An additional recovery factor of 80% lithium recovery is applied to the La Negra lithium carbonate plant.
    - A fixed average annual brine pumping rate of 414 L/s is assumed to meet consistent with Albemarle's permit conditions.
    - Operating cost estimates are based on a combination of fixed brine extraction, G&A and plant costs and variable costs associated with raw brine pumping rate or lithium production rate. Average life of mine operating cost is calculated at approximately $4,155/metric tonne CIF Asia.
    - Sustaining capital costs are included in the cut-off grade calculation and post the salar yield improvement program installation, average around $98 million per year.
- Mineral reserve tonnage, grade and mass yield have been rounded to reflect the accuracy of the estimate and numbers may not add due to rounding.

The Salar de Atacama total mineral reserves of 566,000 metric tonnes at December 31, 2022 decreased by 13% from 647,000 metric tonnes at December 31, 2021. The decrease in total mineral reserves was driven by depletion during the year. Increases in model assumptions such as lithium pricing were offset by higher costs. These changes in economics did not have a material impact because mining at the Salar de Atacama is done at an elevated cutoff grade. Changes in the resource had minimal impact on the reserve as the production total is limited by quota.

Additional information about key assumptions and parameters relating to the lithium mineral resources and reserves at the Salar de Atacama facility is discussed in sections 11 and 12, respectively, of the Salar de Atacama technical report summary.

Silver Peak, Nevada



The Silver Peak site (latitude 37.751773°N, longitude 117.639027°W) is located in a rural area approximately 30 miles southwest of Tonopah, in Esmeralda County, Nevada. It is located in the Clayton Valley, an arid valley historically covered with dry lake beds (playas). The operation borders the small unincorporated town of Silver Peak, Nevada. Albemarle uses the Silver Peak site for the production of lithium brines, which are used to make lithium carbonate and, to a lesser degree, lithium hydroxide. Access to the site is off of the paved highway SR-265 in the town of Silver Peak, Nevada. The administrative offices are located on the south side of the road. The process facility is on the north side of the road and the brine operations are located approximately three miles east of Silver Peak on Silver Peak Road and occupy both the north and south sides of the road. In addition, access to the site is also possible via gravel/dirt roads from Tonopah, Nevada and Goldfield, Nevada.

Lithium brine extraction in the Clayton Valley began in the mid-1960’s by one of our predecessors, the Foote Mineral Company. Since that time, lithium brine operations have been operated on a continuous basis. In 1998, Chemetall purchased Foote Mineral Company. Subsequently, in 2004, Chemetall was acquired by Rockwood, and in 2015, Rockwood was acquired by Albemarle. Our mineral rights in Silver Peak consist of our right to access lithium brine pursuant to our permitted and certified senior water rights, a settlement agreement with the U.S. government, originally entered into in June 1991, and our patented and unpatented land claims. Pursuant to the 1991 agreement, our water rights and our land claims, we have rights to all lithium that we can remove economically from the Clayton Valley Basin in Nevada. See section 3 of the Silver Peak technical report summary, filed as Exhibit 96.4 to this report, for a listing of patented and unpatented claims at the Silver Peak site. We have been operating at the Silver Peak site since 1966. Our Silver Peak site covers a surface of over 13,500 acres, more than 10,500 acres of which we own through a subsidiary. The remaining acres are owned by the U.S. government from whom we lease the land pursuant to unpatented land claims that are renewed annually. Actual surface disturbance associated with the operations is 7,390 acres, primarily associated with the evaporation ponds. The manufacturing and administrative activities are confined to an area approximately 20 acres in size.

We extract lithium brine from our Silver Peak site through substantially the same evaporation process we use at the Salar de Atacama. We process the lithium brine extracted from our Silver Peak site into lithium carbonate at our plant in Silver Peak. It is hypothesized that the current levels of lithium dissolved in brine originate from relatively recent dissolution of halite by meteoric waters that have penetrated the playa in the last 10,000 years. The halite formed in the playa during the aforementioned climatic periods of low precipitation and that the concentrated lithium was incorporated as liquid inclusions into the halite crystals. There are no current exploration activities on the Silver Peak lithium operation. However, in January 2021, we announced that we will expand capacity in Silver Peak and begin a program to evaluate clays and other available Nevada resources for commercial production of lithium. As previously announced, we are investing in our Silver Peak site with the goal of doubling the current production in Silver Peak by 2025 by making full use of the brine water rights.

The facilities at Silver Peak consist of extraction wells, evaporation and concentration ponds, a lithium carbonate plant, a lithium anhydrous plant, a lithium hydroxide plant, a new liming plant, wellfield and mill maintenance, a shipping and packaging facility and administrative offices, as well as a fleet of owned and leased equipment. Silver Peak is supplied electricity from a local company and we currently have two operating fresh water wells nearby that supply water to the facilities. We consider the condition of all of our plants, facilities and equipment to be suitable and adequate for the businesses we conduct, and we maintain them regularly. As of December 31, 2022, the gross asset value of our facilities at our Silver Peak site was approximately $77.8 million.

A summary of the Silver Peak facility's lithium mineral resources, exclusive of reserves, and reserves as of December 31, 2022 are shown in the following tables. SRK served as the QP and prepared the estimates of lithium mineral resources (exclusive of reserves) and reserves at the Silver Peak facility, with an effective date of September 30, 2022. A copy of the QP's technical report summary with respect to the lithium mineral resource and reserve estimates at the Silver Peak facility, dated February 14, 2023, is filed as Exhibit 96.4 to this report. The amounts represent Albemarle's attributable portion based on a 100% ownership percentage, and are presented as metric tonnes of lithium metal in thousands.

The Silver Peak mineral resources, exclusive of reserves, estimates with depletion from production from the effective date of the report through December 31, 2022 are summarized in the following table:

	Amount (‘000s metric tonnes)	Concentration (mg/L)
Measured mineral resources	14	153
Indicated mineral resources	36	144
Measured and Indicated mineral resources	50	146
Inferred mineral resources	90	121

- Mineral resources are reported exclusive of mineral reserves. Mineral resources are not mineral reserves and do not have demonstrated economic viability.
- Given the dynamic reserve versus the static resource, a direct measurement of resources post-reserve extraction is not practical. Therefore, as a simplification, to calculate mineral resources, exclusive of reserves, the quantity of lithium pumped in the life of mine plan was subtracted from the overall resource without modification to lithium concentration. Measured and indicated resource were deducted proportionate to their contribution to the overall mineral resource.
- Resources are reported on an in-situ basis.
- Resources are reported as lithium metal.
- The resources have been calculated from the block model above 740 meters above sea level.
- Resources have been categorized subject to the opinion of a QP based on the amount/robustness of informing data for the estimate, consistency of geological/grade distribution, survey information.
- Resources have been calculated using drainable porosity estimated from bibliographical values based on the lithology and QP's experience in similar deposits.
- The estimated economic cutoff grade utilized for resource reporting purposes is 50 mg/l lithium, based on the following assumptions:
    - A technical grade lithium carbonate price of $22,000/metric tonne CIF North Carolina. This is a 10% premium to the price utilized for reserve reporting purposes. The 10% premium applied to the resource versus the reserve was selected to generate a resource larger than the reserve, ensuring the resource fully encompassed the reserve while still maintaining reasonable prospect for eventual economic extraction.
    - Recovery factors for the wellfield are = -206.23*(Li wellfield feed)2 +7.1903*(wellfield Li feed)+0.4609. An additional recovery factor of 78% lithium recovery is applied to the lithium carbonate plant.
    - A fixed brine pumping rate of 20,000 acre feet per year, ramped up from current levels over a period of five years.
    - Operating cost estimates are based on a combination of fixed brine extraction, G&A and plant costs and variable costs associated with raw brine pumping rate or lithium production rate. Average life of mine operating costs is calculated at approximately $6,200/metric tonne lithium carbonate CIF North Carolina.

- Sustaining capital costs are included in the cut-off grade calculation and include a fixed component at $7.0 million per year and an additional component tied to the estimated number of wells replaced per year and other planned capital programs.

- Mineral Resources tonnage and contained metal have been rounded to reflect the accuracy of the estimate, and numbers may not add due to rounding.

The Silver Peak measured and indicated mineral resources of 50,200 metric tonnes at December 31, 2022 increased by 43% from 35,100 metric tonnes at December 31, 2021. The Silver Peak inferred mineral resources of 89,500 metric tonnes at December 31, 2022 increased by 43% from 62,800 metric tonnes at December 31, 2021. The increase in mineral resources was driven by updated geologic modeling and increased brine volume at depth. Cost increases offset revenue increase with minimal impact to the overall resource as the overall grade is unchanged. The increase in resource was partially offset by production depletion during the year.

The Silver Peak reserve estimates with depletion from production from the effective date of the report through December 31, 2022 are summarized in the following table:

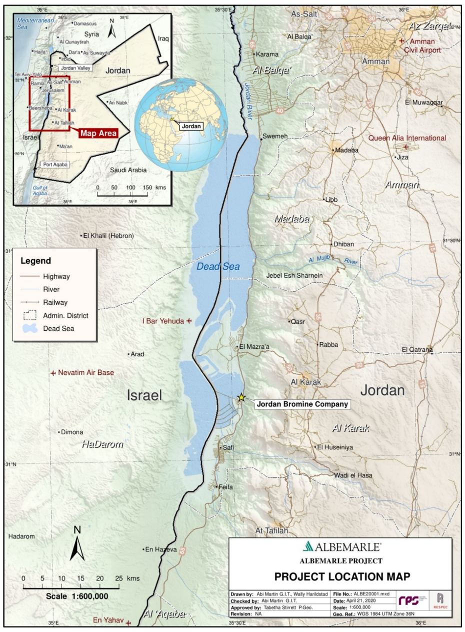
	Amount ('000s metric tonnes)	Concentration (mg/L)
oven mineral reserves:		
ı Situ	12	94
ı Process	1	104
obable mineral reserves:		
ı Situ	56	95
tal mineral reserves:		
ı Situ	68	95
ı Process	1	104

- In process reserves quantify the prior 24 months of pumping data and reflect the raw brine, at the time of pumping. These reserves represent the first 24 months of feed to the lithium process plant in the economic model.
- Proven reserves have been estimated as the lithium mass pumped during the Partial Year 2022 through 2027 of the proposed life of mine plan.
- Probable reserves have been estimated as the lithium mass pumped from 2028 until the end of the proposed life of mine plan (2052).
- Reserves are reported as lithium metal.
- This mineral reserve estimate was derived based on a production pumping plan truncated at the end of year 2052 (i.e., approximately 29.5 years). This plan was truncated to reflect the QP's opinion on uncertainty associated with the production plan as a direct conversion of measured and indicated resource to proven and probable reserve is not possible in the same way as a typical hard-rock mining project.
- The estimated economic cutoff grade for the Silver Peak project is 57 mg/l lithium, based on the assumptions discussed below. The production pumping plan was truncated due to technical uncertainty inherent in long-term production modeling and remained well above the economic cutoff grade (i.e., the economic cutoff grade did not result in a limiting factor to the estimation of the reserve).
  - A technical grade lithium carbonate price of US$20,000/metric tonne CIF North Carolina.
  - Recovery factors for the wellfield are = -206.23*(Li wellfield feed)2 +7.1903*(wellfield Li feed)+0.4609. An additional recovery factor of 78% lithium recovery is applied to the lithium carbonate plant.
  - A fixed brine pumping rate of 20,000 acre feet per year, ramped up from current levels over a period of five years.
  - Operating cost estimates are based on a combination of fixed brine extraction, G&A and plant costs and variable costs associated with raw brine pumping rate or lithium production rate. Average life of mine operating costs is calculated at approximately $6,200/metric tonne lithium carbonate CIF North Carolina.
  - Sustaining capital costs are included in the cut-off grade calculation and include a fixed component at $7.0 million per year and an additional component tied to the estimated number of wells replaced per year and other planned capital programs.
- Mineral reserve tonnage, grade and mass yield have been rounded to reflect the accuracy of the estimate (thousand tonnes), and numbers may not add due to rounding.

The Silver Peak total mineral reserves of 69,100 metric tonnes at December 31, 2022 increased by 12% from 61,700 metric tonnes at December 31, 2021. The increase in total mineral reserves was driven by increase brine grades at depth, partially offset by a decrease in the recovery factor at the processing plant to 78% from 85% based on recent operating history. The Silver Peak reserves were also offset by depletion during the year.

Additional information about key assumptions and parameters relating to the lithium mineral resources and reserves at the Silver Peak facility is discussed in sections 11 and 12, respectively, of the Silver Peak technical report summary.

Safi, Jordan



Our 50% interest in JBC, a consolidated joint venture established in 1999, with operations in Safi, Jordan, acquires bromine that is originally sourced from the Dead Sea. JBC processes the bromine at its facilities into a variety of end products. The JBC operation (latitude 31°8'34.85"N , longitude 35°31'34.68"E) is located in Safi, Jordan, and is located on a 26-ha area on the southeastern edge of the Dead Sea, about 6 kilometers north of the of the APC plant. JBC also has a 2-hectare storage facility within the free-zone industrial area at the Port of Aqaba. The Jordan Valley Highway/Route 65 is the primary method of access for supplies and personnel to JBC. The Port of Aqaba is the main entry point for supplies and equipment for JBC, where imported shipping containers are offloaded from ships and are transported by truck to JBC via the Jordan Valley Highway. Aqaba is approximately 205 km south of JBC via Highway 65. Major international airports can be readily accessed either at Amman or Aqaba. Jordan's railway transport runs north-south through Jordan and is not used to transport JBC employees and product.

In 1958, the Government of the Hashemite Kingdom of Jordan granted APC a concession for exclusive rights to exploit the minerals and salts from the Dead Sea brine until 2058; at that time, APC factories and installations would become the property of the Government. APC was granted its exclusive mineral rights under the Concession Ratification Law No. 16 of 1958. APC produces potash from the brine extracted from the Dead Sea. A concentrated bromide-enriched brine extracted from APC's evaporation ponds is the feed material for the JBC plant. Following the formation of the joint venture, the JBC bromine plant began operations in 2002. Expansion of the facilities to double its bromine production capacity went into operation in 2017.

The climate, geology and location provide a setting that makes the Dead Sea a valuable large-scale natural resource for potash and bromine. Today, the Dead Sea has a surface area of 583 km^2 and a brine volume of 110 km^3. The Dead Sea is the world's saltiest natural lake, containing high concentrations of ions compared to that of regular sea water and an unusually high amount of magnesium and bromine. There is an estimated 900 million tonnes of bromine in the Dead Sea.

Mining methods consist of all activities necessary to extract brine from the Dead Sea and extract Bromine. The low rainfall, low humidity and high temperatures in the Dead Sea area provide ideal conditions for recovering potash from the brine by solar evaporation. JBC obtains its feedbrine from APC's evaporation pond and this supply is intimately linked to the APC operation. As evaporation takes place the specific gravity of the brine increases until its constituent salts progressively crystallize and precipitate out of solution, starting with sodium chloride (common salt) precipitating out to the bottom of the ponds (pre-carnallite ponds). Brine is transferred to other pans in succession where its specific gravity increases further, ultimately precipitating out of the sodium chloride. Carnallite precipitation takes place at the evaporation pond where it is harvested from the brine and pumped as slurry to a process plant (where the potassium chloride is separated from the magnesium chloride). JBC extracts the bromide-rich, "carnallite-free" brine through a pumping station. This brine feeds the bromine and magnesium plants. There is no exploration as typically conducted for the characterization of a mineral deposit.

Infrastructure and facilities to support the operation of the bromine production plant at the Safi site is compact and contained in an approximately 33 ha area. JBC ships product in bulk through a storage terminal in Aqaba. There are above ground storage tanks as well as pumps and piping for loading these products onto ships. JBC main activities at Aqaba are raw material/product storing, importing, and exporting. An evaporation pond collects the waste streams from pipe flushing, housekeeping, and other activities. Fresh water is sources from the Mujib Reservoir, a man-made reservoir. JBC is supplied electricity from the National Electric Power Company of Jordan. We consider the condition of all of our plants, facilities and equipment to be suitable and adequate for the businesses we conduct, and we maintain them regularly. As of December 31, 2022, our 50% ownership interest of the gross asset value of the facilities at the Safi, Jordan site was approximately $222.3 million.

A summary of the Safi facility's bromine mineral resources and reserves as of December 31, 2022 is provided below. RPS Energy Canada Ltd ("RPS"), a third-party firm comprising mining experts in accordance with Item 1302(b)(1) of Regulation S-K, served as the QP and prepared the estimates of bromine mineral resources and reserves at the Safi facility, with an effective date of December 31, 2022. A copy of the QP's amended technical report summary with respect to the bromine mineral resource and reserve estimates at the Safi facility, dated February 15, 2023, is filed as Exhibit 96.5 to this report.

The feedstock is drawn from the Dead Sea, a nonconventional reservoir owned by the nations of Israel and Jordan. As such, there are no specific resources owned by JBC, but Albemarle's joint venture partner, APC, has exclusive rights granted by the Hashemite Kingdom of Jordan to withdraw brine from the Dead Sea and process it to extract minerals. Revenues are based on a forecast bromine price ranging from $3,560 to $6,480 per metric tonne and the operating cost ranges between $341 and $529 per metric tonne . The measured resource of bromide ion attributable to Albemarle's 50% interest in its JBC joint venture is estimated to be approximately 178.3 million metric tonnes. JBC is extracting approximately 1 percent of the bromine available in Jordan's share of the Dead Sea. Bromide concentration in the Dead Sea is estimated to average approximately 5,000 ppm. The cut-off grade of the Albemarle bromine operations has been estimated to be at 1,000 ppm. The bromide ion concentration in the brine extracted which feeds the bromine plants, significantly exceeds the selected cut-off grade.

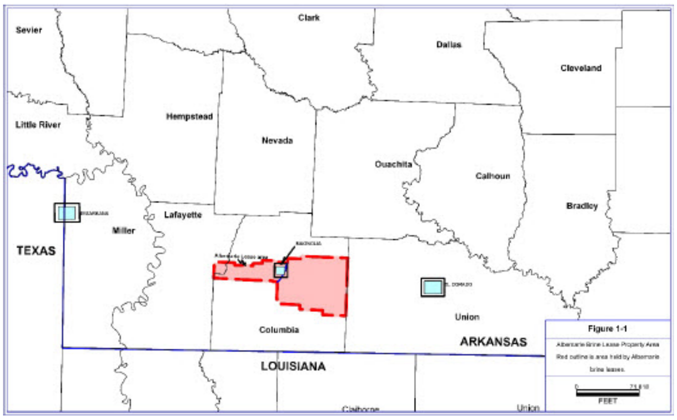
The Safi measured mineral reserves of 178.3 million metric tonnes at December 31, 2022 increased by 1% from 177.5 million metric tonnes at December 31, 2021. The increase in measured mineral resources was driven by evaporation in the Dead Sea, partially offset by the end date of the forecast remained unchanged due to the concession agreement and depletion during 2022.

All bromine reserves reported by Albemarle for the JBC project are classified as proven mineral reserves. The mineral reserve estimate attributable to Albemarle's 50% interest in its JBC joint venture is approximately 2.38 million metric tonnes of bromine from the Dead Sea. This estimate is based on the time available under the concession agreement with the Hashemite Kingdom of Jordan and the processing capability of the JBC plant. As only approximately one percent of the available resource is consumed from the Dead Sea, as noted above, the reserve estimate is based on the amount the JBC plant can produce over until the end of 2058, when the APC concession agreement ends. Revenues are based on a forecast bromine price ranging from $3,560 to $6,480 per metric tonne and the operating cost ranges between $341 and $529 per metric tonne. At the plant process recovery of 80 to 85 percent (bromine from bromide), product bromine is estimated at approximately 120,000 metric tonnes per year. Bromine concentration used to calculate the reserve estimate from the Dead Sea was approximately 8,890 ppm based on historical pumping. The cut-off grade of the Albemarle bromine operations has been estimated to be at 1,000 ppm. The bromide ion concentration in the brine extracted which feeds the bromine plants, significantly exceeds the selected cut-off grade.

The Safi total mineral reserves of 2.38 million metric tonnes at December 31, 2022 decreased by 3% from 2.45 million metric tonnes at December 31, 2021. The decrease in total mineral reserves was driven by depletion during 2022 and the end date of the forecast remained unchanged due to the concession agreement.

Additional information about key assumptions and parameters relating to the bromine mineral resources and reserves at the Safi facility is discussed in sections 11 and 12, respectively, of the Safi technical report summary.

Magnolia, Arkansas



Magnolia is located in the southwest Arkansas, north of the center of Columbia County, approximately 50 miles east of Texarkana and 135 miles south of Little Rock. Our facilities include two separate production plants, the South Plant and the West Plant. The South Plant (latitude 33.1775°N, longitude 93.2161°W) is accessible via U.S. Route 79 and paved local roads. The West Plant (latitude 33.2648°N, longitude 93.3151°W) is accessible by U.S. Route 371 and paved local roads. The decentralized well sites around the brine fields are accessed via paved Arkansas Highway 19, 98, 160 and 344.

In Magnolia, bromine is recovered from underground brine wells and then processed into a variety of end products at the plant on location. Albemarle has more than 50 brine production and injection wells that are currently active on the property. Albemarle's area of bromine operation is comprised of over 9,500 individual leases with local landowners comprising a total area of over 99,500 acres. The leases have been acquired over time as field development extended across the field. Each lease continues for a period of 25 years or longer until after a two year period where brine is not injected or produced from/to a well within two miles of lease land areas, as long as lease rentals are continuing to be paid. See section 3 of the Magnolia technical report summary, filed as Exhibit 96.6 to this report, for a map of leases and burdens on those leases at the Magnolia site.

Bromine extraction began in Magnolia in 1965 as the first brine supply well was drilled, and additional wells were put into production over the next few years. In 1987, a predecessor company took over operations of certain brine supply and injection wells, which Albemarle continues to operate to this day. In 2019, Albemarle completed, and put into production, two new brine production supply wells in Magnolia.

In Magnolia, bromine exists as sodium bromide in the formation waters or brine of the Jurassic age Smackover Formation, a geological formation in Arkansas, in the subsurface at 7,000 to 8,500 feet below sea level. The mineralization occurs within the highly saline Smackover Formation waters or brine where the bromide has an abnormally rich composition. The bromine concentration is more than twice as high as that found in normal evaporated sea water. The bromine mineralization of the brine is distributed throughout the porous intervals of the upper and middle Smackover on the property. The strong permeability and porosity of the Smackover grainstones provide excellent continuity of the bromine mineralization within the brine.

The facilities at Magnolia consist of brine production and injection wells, brine ponds, two bromine processing plants, pipelines between the plants and wells, a laboratory, storage and warehouses, administrative offices, as well as a fleet of owned and leased equipment. Our Magnolia facilities are supplied electricity from a local company and we currently have several operating freshwater wells nearby that supply water to the facilities. In addition, both plants have dedicated rail spurs that provide access to several rail lines to transport product throughout the country. We consider the condition of all of our plants, facilities and equipment to be suitable and adequate for the businesses we conduct, and we maintain them regularly. As of December 31, 2022, the gross asset value of our facilities at our Magnolia site was approximately $833.5 million.

A summary of the Magnolia facility's bromine mineral reserves as of December 31, 2022 is shown in the following table. RPS served as the QP and prepared the estimates of bromine mineral reserves at the Magnolia facility, with an effective date of December 31, 2022. A copy of the QP's technical report summary with respect to the bromine mineral resource and reserve estimates at the Magnolia facility, dated February 15, 2023, is filed as Exhibit 96.6 to this report. The amounts represent Albemarle's attributable portion based on a 100% ownership percentage, and are presented as metric tonnes in thousands.

There are no mineral resource estimates at the Magnolia, AR bromine extraction site. All bromine mineral accumulations of economic interest and with reasonable prospects for eventual economic extraction within the Magnolia production lease area are either currently on production or subject to an economically viable future development plan and are classified as mineral reserves.

	Amount ('000s metric tonnes)
ɔven mineral reserves	2,419
ɔbable mineral reserves	565
tal mineral reserves	2,984

- Reserves are reported as bromine, on an in situ basis.
- The estimated economic cutoff grade utilized for reserve reporting purposes is 1,000 mg/L bromine, with a bromine price ranging from $3,560 to $6,480 per metric tonne and operating costs ranging from $850 to $1,150 per metric tonne.
- Recovery factors for the Magnolia are 75% and 82% for the proven mineral reserves and total mineral reserves, respectively.
- The concentration of bromine at the Magnolia site varies based on the physical location of the field and can range up to over 6,000 mg/L.

The Magnolia total mineral reserves of 3.0 million metric tonnes at December 31, 2022 decreased by 3% from 3.1 million metric tonnes at December 31, 2021. The decrease in total mineral reserves was driven by depletion of the reserve during 2022.

Additional information about key assumptions and parameters relating to the bromine mineral reserves at the Magnolia facility is discussed in section 12 of the Magnolia technical report summary.

Item 3. Legal Proceedings.

We are involved in litigation incidental to our business and are a party to a number of legal actions and claims, various governmental proceedings and private civil lawsuits, including, but not limited to, those related to environmental and hazardous material exposure matters, product liability, and breach of contract. Some of the legal proceedings include claims for compensatory as well as punitive damages. While the final outcome of these matters cannot be predicted with certainty, considering, among other things, the legal defenses available and liabilities that have been recorded along with applicable insurance, it is currently the opinion of management that none of these pending items will have a material adverse effect on our financial condition, results of operations or liquidity.

In addition, the information set forth under Note 17, "Commitments and Contingencies – Litigation" to the Consolidated Financial Statements of this Annual Report on Form 10-K is incorporated herein by reference.

An unexpected adverse resolution of one or more of these items, however, could have a material adverse effect on our financial condition, results of operations or liquidity in that particular period.

Item 4. Mine Safety Disclosures.

NONE

Executive Officers of the Registrant.

The names, ages and biographies of our executive officers, as of February 15, 2023, are set forth below. The term of office of each officer is until the meeting of the Board of Directors following the next annual shareholders' meeting in May 2023.

Name	Age	Position
J. Kent Masters	62	Chairman, President and Chief Executive Officer
Scott A. Tozier	57	Executive Vice President, Chief Financial Officer
Kristin M. Coleman	54	Executive Vice President, General Counsel and Corporate Secretary
Karen G. Narwold	63	Executive Vice President, Chief Administrative Officer
Melissa Anderson	58	Senior Vice President, Chief Human Resources Officer
John C. Barichivich III	55	Vice President, Corporate Controller, Chief Accounting Officer
Raphael Crawford	47	President, Catalysts Global Business Unit
Netha Johnson	52	President, Bromine Global Business Unit
Eric Norris	56	President, Lithium Global Business Unit

J. Kent Masters was elected as Chairman, President and Chief Executive Officer in April 2020. He joined the Albemarle board of directors in 2015 and served as Lead Independent Director from 2018 until April 2020. Prior to joining Albemarle, Mr. Masters served as Operating Partner of Advent International, an international private equity group. Prior to Advent, he served as Chief Executive Officer of Foster Wheeler AG, a global engineering and construction contractor and power equipment supplier, when Foster Wheeler AG was acquired by Amec plc to form Amec Foster Wheeler plc. He is also a former member of the executive board of Linde AG, a global leader in manufacturing and sales of industrial gases, with responsibility for the Americas, Africa, and the South Pacific.

Scott A. Tozier was elected as our Executive Vice President and Chief Financial Officer effective January 2011. Mr. Tozier also served as our Chief Accounting Officer from January 2013 until February 2014. Mr. Tozier has over 25 years of diversified international financial management experience. Following four years of assurance services with the international firm Ernst & Young, LLP, Mr. Tozier joined Honeywell International, Inc., where his 16 year career spanned senior financial positions in the U.S., Australia and Europe. His roles of increasing responsibilities included management of financial planning, analysis and reporting, global credit and treasury services and Chief Financial Officer of Honeywell's Transportation Systems, Turbo Technologies and Building Solutions divisions. Most recently, Mr. Tozier served as Vice President of Finance, Operations and Transformation of Honeywell International, Inc.

Kristin M. Coleman joined us in November of 2022 and currently serves as Executive Vice President, General Counsel and Corporate Secretary. Ms. Coleman has nearly 30 years of legal experience, previously serving as Executive Vice President, General Counsel, and Chief Compliance Officer at US Foods. She also served as Senior Vice President, General Counsel, and Corporate Secretary of Sears Holdings Corporation and as Vice President, General Counsel, and Corporate Secretary for Brunswick Corporation. Before moving in-house, she worked in private practice with Sidley Austin LLP. Ms. Coleman founded the Chicago General Counsel Forum and is a member of the Economic Club of Chicago. She serves as a Board Member Emeritus for the Center for Enriched Living.

Karen G. Narwold joined us in September of 2010 and currently serves as Executive Vice President and Chief Administrative Officer. Ms. Narwold has over 25 years of legal, management and business experience with global industrial and chemical companies. After five years in private practice, she served as Vice President, General Counsel, Human Resources and Secretary of GrafTech International Ltd., a global graphite and carbon manufacturer and former subsidiary of Union Carbide. She then served as Vice President and Strategic Counsel of Barzel Industries, a North American steel processor and distributor. Prior to joining Albemarle, Ms. Narwold served as Special Counsel with Kelley Drye & Warren LLP and with Symmetry Advisors where she worked in the areas of strategic, financial and capital structure planning and restructuring for public and private companies. Ms. Narwold was appointed as a member of the Board of Directors of Ingevity Corporation on February 20, 2019. On October 31, 2022, Ms. Narwold announced that she will retire from the Company, effective April 4, 2023.

Melissa Anderson joined Albemarle as Senior Vice President, Chief Human Resources Officer in January 2021. Prior to joining Albemarle, Ms. Anderson served as Executive Vice President, Administration and Chief Human Resources Officer at Duke Energy, an American electric power holding company based in North Carolina. Previous to that role, she held the role of Senior Vice President, Human Resources, for Domtar Corporation in South Carolina. Her previous experience also includes 17 years with IBM in progressive Human Resources leadership roles. Ms. Anderson serves on the board of Vulcan Materials and as Chair of the Society of Human Resource Management (SHRM), the world's largest HR professional association. She is also a member of the advisory board for the Center for Executive Succession at the University of South Carolina's Darla Moore School of Business.

John C. Barichivich III was elected Vice President, Corporate Controller and Chief Accounting Officer effective November 2019. Mr. Barichivich has worked for the Company since 2007, holding various staff and leadership positions of increasing responsibility. Most recently, Mr. Barichivich served as Chief Financial Officer Vice President Finance, Purchasing, and S&OP Catalysts GBU since February 2019. Between January 2016 and February 2019, Mr. Barichivich acted as Vice President - Finance, Bromine Specialties global business unit, and he previously served as Vice President of Finance, Catalysts global business unit from September 2012 until December 2015. Mr. Barichivich was also the Director of Finance for the Albemarle shared service centers and he started his career with Albemarle as the Operations Controller for the Polymer Solutions business. Prior to Albemarle, Mr. Barichivich held a number of positions, including Director of Finance at the Home Depot, CFO Sensors SBE at PerkinElmer, and Manager of FP&A at General Electric. Mr. Barichivich began his career at Georgia Pacific, where he worked as an internal auditor and was a financial analyst supporting the restructuring of the Distribution Division.

Raphael Crawford was appointed President, Catalysts Global Business Unit in 2018. Mr. Crawford joined Albemarle in 2012 as Vice President of the Performance Catalysts Solutions unit, and the additional responsibility of Managing Director for Rockwood Lithium GmbH after the Rockwood acquisition. In 2015, Mr. Crawford was appointed President of the Bromine Specialties business unit until being named to his current role. Prior to Albemarle, Mr. Crawford served as the Director of Global Marketing and Business Development for Dow Coating Materials, a global business unit of The Dow Chemical Company. He also served as the Global Commercial Director and Global Asset Director for Dow Water and Process Solutions, following the acquisition of Rohm and Haas Company. Previously, Crawford held various strategic marketing and commercial roles at Rohm and Haas. Prior to Rohm and Haas, Mr. Crawford worked at Campbell Soup Company as a Marketing Manager. He began his career at SNET Telecommunications where he served in several capacities including new ventures, finance and marketing. Mr. Crawford is a member of the board of directors of the American Fuel & Petrochemical Manufacturers (AFPM) association, where he had served as chairman of the Petrochemical Members Committee and as a member of the Executive Committee.

Netha Johnson joined Albemarle as President, Bromine Global Business Unit in 2018. Mr. Johnson has more than 20 years of diverse leadership experience, both domestically and internationally, including having worked extensively in Singapore, Malaysia, Taiwan, Japan and Germany. Prior to joining Albemarle, Mr. Johnson served in several progressive leadership roles with 3M Company. Most recently, he served as Vice President and General Manager, Electrical Markets Division, where he was directly responsible for 3M's electrical and renewable energy solutions. Prior to that, he served as 3M's Vice President, Advanced Materials Division. In this role, he was responsible for three distinct businesses comprising the Advanced Material division, which provided world-leading, innovative solutions in fluoropolymer chemicals, advanced ceramics and light-weighting materials. Preceding his business career, Mr. Johnson served as a U.S. Naval Officer. Mr. Johnson has served as a member of the board of directors of Xcel Energy, Inc. since March 2020.

Eric Norris was appointed President, Lithium Global Business Unit in August 2018. Mr. Norris joined Albemarle in January 2018 as Chief Strategy Officer. In this role, he managed the company's strategic planning, M&A, and corporate business development programs as well as its investor relations efforts. Prior to joining Albemarle, Mr. Norris served as President of Health and Nutrition for FMC Corporation. Following FMC's announcement to acquire DuPont Agricultural Chemical assets, he led the divestiture of FMC Health and Nutrition to DuPont. Previously, Mr. Norris served as Vice President and Global Business Director for FMC Health and Nutrition, and Vice President and Global Business Director for FMC Lithium. During his 16-year FMC career, he served in additional leadership roles including Investor Relations, Corporate Development and Director of FMC Healthcare Ventures. Prior to FMC, Mr. Norris founded and led an internet-based firm offering formulation and design tools to the chemical industry. Previously, he served in a variety of roles for Rohm and Haas Company including sales, marketing, strategic planning and investor relations. Norris is a member of the board of directors of Communities in Schools of Charlotte-Mecklenburg and is a member of the board of directors of The Zero Emission Transportation Association (ZETA).

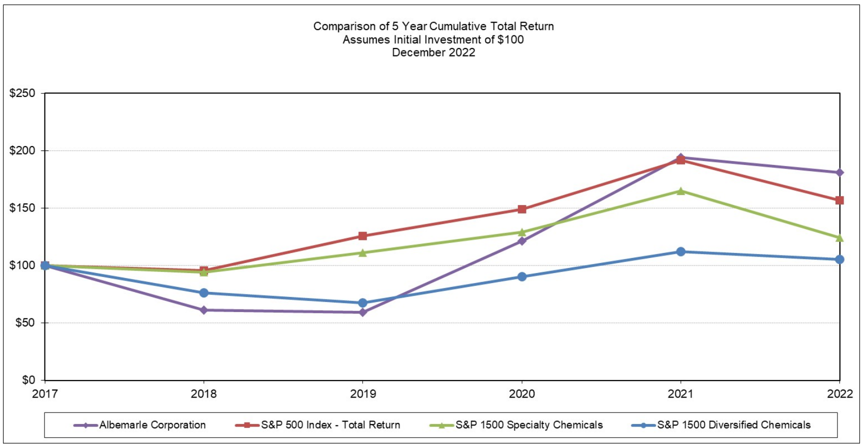
PART II

Item 5. Market for the Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities.

Our common stock trades on the New York Stock Exchange ("NYSE") under the symbol "ALB." There were 117,197,977 shares of common stock held by 2,101 shareholders of record as of February 8, 2023. On each of February 24, 2022, May 3, 2022, July 18, 2022, and October 24, 2022, we declared a dividend of $0.395 per share. In each quarter of 2021, we declared a dividend of $0.39 per share and, in each quarter of 2020, we declared a dividend of $0.385 per share. We expect to continue to declare and pay comparable dividends to our shareholders in the future, however, dividends are declared solely at the discretion of our Board of Directors and there is no guarantee that the Board of Directors will continue to declare dividends in the future.

Stock Performance Graph

The graph below shows the cumulative total shareholder return assuming the investment of $100 in our common stock on December 31, 2017 and the reinvestment of all dividends thereafter. The information contained in the graph below is furnished and therefore not to be considered “filed” with the SEC, and is not incorporated by reference into any document that incorporates this Annual Report on Form 10-K by reference.



Item 6. **[Reserved]**

Item 7. **Management’s Discussion and Analysis of Financial Condition and Results of Operations.**

Forward-looking Statements

Some of the information presented in this Annual Report on Form 10-K, including the documents incorporated by reference herein, may constitute forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. Such forward-looking statements are based on our current expectations, which are in turn based on assumptions that we believe are reasonable based on our current knowledge of our business and operations. We have used words such as “anticipate,” “believe,” “could,” “estimate,” “expect,” “intend,” “may,” “should,” “would,” “will” and variations of such words and similar expressions to identify such forward-looking statements.

These forward-looking statements are not guarantees of future performance and involve certain risks, uncertainties and assumptions, which are difficult to predict and many of which are beyond our control. There can be no assurance that our actual results will not differ materially from the results and expectations expressed or implied in the forward-looking statements. Factors that could cause actual results to differ materially from the outlook expressed or implied in any forward-looking statement include, without limitation, information related to:

- changes in economic and business conditions;
- product development;
- changes in financial and operating performance of our major customers and industries and markets served by us;
- the timing of orders received from customers;
- the gain or loss of significant customers;

- fluctuations in lithium market pricing, which could impact our revenues and profitability particularly due to our increased exposure to index-referenced and variable-priced contracts for battery grade lithium sales;
- inflationary trends in our input costs, such as raw materials, transportation and energy, and their effects on our business and financial results;
- changes with respect to contract renegotiations;
- potential production volume shortfalls;
- competition from other manufacturers;
- changes in the demand for our products or the end-user markets in which our products are sold;
- limitations or prohibitions on the manufacture and sale of our products;
- availability of raw materials;
- increases in the cost of raw materials and energy, and our ability to pass through such increases to our customers;
- technological change and development;
- changes in our markets in general;
- fluctuations in foreign currencies;
- changes in laws and government regulation impacting our operations or our products;
- the occurrence of regulatory actions, proceedings, claims or litigation (including with respect to the U.S. Foreign Corrupt Practices Act and foreign anti-corruption laws);
- the occurrence of cyber-security breaches, terrorist attacks, industrial accidents or natural disasters;
- the effects of climate change, including any regulatory changes to which we might be subject;
- hazards associated with chemicals manufacturing;
- the inability to maintain current levels of insurance, including product or premises liability insurance, or the denial of such coverage;
- political unrest affecting the global economy, including adverse effects from terrorism or hostilities;
- political instability affecting our manufacturing operations or joint ventures;
- changes in accounting standards;
- the inability to achieve results from our global manufacturing cost reduction initiatives as well as our ongoing continuous improvement and rationalization programs;
- changes in the jurisdictional mix of our earnings and changes in tax laws and rates or interpretation;
- changes in monetary policies, inflation or interest rates that may impact our ability to raise capital or increase our cost of funds, impact the performance of our pension fund investments and increase our pension expense and funding obligations;
- volatility and uncertainties in the debt and equity markets;
- technology or intellectual property infringement, including cyber-security breaches, and other innovation risks;
- decisions we may make in the future;
- future acquisition and divestiture transactions, including the ability to successfully execute, operate and integrate acquisitions and divestitures and incurring additional indebtedness;
- expected benefits from proposed transactions;
- timing of active and proposed projects;
- continuing uncertainties as to the duration and impact of the novel coronavirus (“COVID-19”) pandemic and any future pandemic;
- impacts of the military conflict between Russia and Ukraine and the global response to it;
- performance of our partners in joint ventures and other projects;
- changes in credit ratings;
- the inability to realize the benefits of our decision to retain our Catalysts business as a wholly-owned subsidiary and to realign our Lithium and Bromine global business units into a new corporate structure, including Energy Storage and Specialties business units; and
- the other factors detailed from time to time in the reports we file with the SEC.

We assume no obligation to provide revisions to any forward-looking statements should circumstances change, except as otherwise required by securities and other applicable laws. The following discussion should be read together with our consolidated financial statements and related notes included in this Annual Report on Form 10-K.

The following is a discussion and analysis of our results of operations for the years ended December 31, 2022, 2021 and 2020. A discussion of our consolidated financial condition and sources of additional capital is included under a separate heading “Financial Condition and Liquidity.”

Overview

We are a leading global developer, manufacturer and marketer of highly-engineered specialty chemicals that are designed to meet our customers’ needs across a diverse range of end markets. Our corporate purpose is making the world safe and sustainable by powering the potential of people. The end markets we serve include energy storage, petroleum refining, consumer electronics, construction, automotive, lubricants, pharmaceuticals and crop protection. We believe that our commercial and geographic diversity, technical expertise, access to high-quality resources, innovative capability, flexible, low-cost global manufacturing base, experienced management team and strategic focus on our core base technologies will enable us to maintain leading positions in those areas of the specialty chemicals industry in which we operate.

Secular trends favorably impacting demand within the end markets that we serve combined with our diverse product portfolio, broad geographic presence and customer-focused solutions will continue to be key drivers of our future earnings growth. We continue to build upon our existing green solutions portfolio and our ongoing mission to provide innovative, yet commercially viable, clean energy products and services to the marketplace to contribute to our sustainable revenue. For example, our Lithium business contributes to the growth of clean miles driven with electric vehicles and more efficient use of renewable energy through grid storage; Bromine enables the prevention of fires starting in electronic equipment, greater fuel efficiency from rubber tires and the reduction of emissions from coal fired power plants; and the Catalysts business creates efficiency of natural resources through more usable products from a single barrel of oil, enables safer, greener production of alkylates used to produce more environmentally-friendly fuels, and reduced emissions through cleaner transportation fuels. We believe our disciplined cost reduction efforts and ongoing productivity improvements, among other factors, position us well to take advantage of strengthening economic conditions as they occur, while softening the negative impact of the current challenging global economic environment.

2022 Highlights

- In the first quarter of 2022, we increased our quarterly dividend for the 29th consecutive year, to $0.395 per share.
- In January 2022, we signed a joint development agreement with 6K to explore the use of 6K’s patented UniMelt® advanced, sustainable materials production platform to develop novel lithium battery materials through potentially disruptive manufacturing processes.
- In February 2022, we announced that we signed a non-binding letter agreement with our MARBL joint venture partner, MRL, to explore a potential expansion of the MARBL joint venture, in an effort to expand lithium conversion capacity with increased optionality and reduced risk.
- In May 2022, we issued $1.7 billion of senior notes pursuant to an underwritten public offering. The proceeds from this issuance were used to redeem the 4.15% Senior Notes due in 2024 (the “2024 Notes”), repay the balance of commercial paper outstanding and for general corporate purposes.
- Production of spodumene concentrate from the first and second trains at the Wodgina mine managed by our 60%-owned MARBL joint venture was achieved in May and July of this year, respectively.
- We announced plans to build integrated lithium operations in the United States, including the Kings Mountain, North Carolina spodumene mine and a lithium conversion plant in the Southeast.
- We announced the conclusion of our strategic review of the Catalysts business. As a result of the review, we chose to retain the business under a separate, wholly-owned subsidiary of Albemarle that has been renamed Ketjen in 2023. This structure is intended to allow the Catalysts business to respond to unique customer needs and global market dynamics more effectively while also achieving its growth ambitions.
- We announced the realignment of our Lithium and Bromine global business units into a new corporate structure designed to better meet customer needs and foster talent required to deliver in a competitive global environment. The realignment was effective January 1, 2023, and resulted in the following three reportable segments: (1) Energy Storage; (2) Specialties; and (3) Ketjen (Catalysts).
- In October 2022, we announced that we have been awarded a nearly $150 million grant from the U.S. Department of Energy to expand domestic manufacturing of batteries for EVs and the electric grid and for materials and components

currently imported from other countries. The grant funding is intended to support a portion of the anticipated cost to construct a new, commercial-scale U.S.-based lithium concentrator facility at our Kings Mountain, North Carolina, location.

- In October 2022, we completed the acquisition of all of the outstanding equity of Qinzhou, for approximately $200 million in cash. Qinzhou's operations include a recently constructed lithium processing plant strategically positioned near the Port of Qinzhou in Guangxi, which began commercial production in the first half of 2022. The plant has designed annual conversion capacity of up to 25,000 metric tonnes of LCE and is capable of producing battery-grade lithium carbonate and lithium hydroxide.
- In December 2022, we unveiled a groundbreaking product, MercLok™, which captures mercury from soil and mining waste, helping to remove this harmful element from the food chain.
- In December 2022, we announced the acquisition of a location in Charlotte, North Carolina, where we intend to invest at least $180 million to establish the Albemarle Technology Park, a world-class facility designed for novel materials research, advanced process development, and acceleration of next-generation lithium products to market. We anticipate that innovations from the new site will enhance lithium recovery, improve production methods, and introduce new forms of lithium to enable breakthrough levels of battery performance. In addition, we anticipate the creation of at least 200 jobs at the site.
- We achieved net income of $2.7 billion during 2022 compared to $123.7 million for 2021. The increase in 2022 net income was primarily driven by increased lithium prices reflecting tight market conditions and greater volumes sold under index-referenced and variable-based contracts.
- Cash flows from operations in 2022 were $1.9 billion compared to $344.3 million in 2021.

Outlook

The current global business environment presents a diverse set of opportunities and challenges in the markets we serve. In particular, the market for lithium battery and energy storage, particularly for electric vehicles (“EVs”), remains strong, providing the opportunity to continue to develop high quality and innovative products while managing the high cost of expanding capacity. The other markets we serve continue to present various opportunities for value and growth as we have positioned ourselves to manage the impact on our business of changing global conditions, such as slow and uneven global growth, currency exchange volatility, crude oil price fluctuation, a dynamic pricing environment, an ever-changing landscape in electronics, the continuous need for cutting edge catalysts and technology by our refinery customers and increasingly stringent environmental standards. Amidst these dynamics, we believe our business fundamentals are sound and that we are strategically well-positioned as we remain focused on increasing sales volumes, optimizing and improving the value of our portfolio primarily through pricing and product development, managing costs and delivering value to our customers and shareholders. We believe that our businesses remain well-positioned to capitalize on new business opportunities and long-term trends driving growth within our end markets and to respond quickly to changes in economic conditions in these markets.

Beginning in the first quarter of 2023, the chief operating decision maker began evaluating performance, forecasting and making resource allocation decisions based on our previously announced realignment of the Lithium and Bromine global business units. The new corporate structure was designed to better meet customer needs and foster talent required to deliver in a competitive global environment. The realignment resulted in the following three reportable segments: (1) Energy Storage; (2) Specialties; and (3) Ketjen (Catalysts). The below segment outlook is presented in the new segment structure based on how the chief operating decision maker started reviewing the business starting in 2023.

Energy Storage: We expect Energy Storage results to increase year-over-year in 2023, mainly due to increased pricing as well as higher sales volume. The increased market pricing reflects tight market conditions, primarily in battery- and tech-grade carbonate and hydroxide, as well as renegotiations of certain of our long-term agreements. Since the beginning of 2022 market indices have increased 70% to 200%. Some of our renegotiated contracts include higher prices on existing long-term agreements that are more reflective of current market conditions. In other cases, we have moved from previous fixed-price, long-term agreements towards index-referenced and variable-priced contracts. As a result, our Energy Storage business is more aligned with changes in market and index pricing than it has been in the past. While we expect these prices to remain strong throughout the year, a material decline in these market prices would have a negative impact on our outlook. The increased sales volume is primarily expected from new capacity coming on line from La Negra, Chile, Kemerton, Western Australia, and the recently completed acquisition of Qinzhou, which includes a lithium hydroxide conversion plant designed to produce up to 25,000 metric tons of LCE per year. While we ramp up our new capacity, we will continue to utilize tolling arrangements to meet growing customer demand. EV sales are expected to continue to increase over the prior year as the lithium battery market remains strong.

We announced agreements for a strategic investment in China with plans to build a battery grade lithium conversion plant in Meishan initially targeting 50,000 metric tons of LCE per year. Construction of the Meishan facility is currently underway and is expected to be complete by the end of 2024. In addition, production of spodumene concentrate from the first and second trains at the Wodgina mine managed by our 60%-owned MARBL joint venture was achieved in May and July of this year, respectively. In February 2022, we announced that we signed a non-binding letter agreement with our MARBL joint venture partner, MRL, to explore a potential expansion of the MARBL joint venture, in an effort to expand lithium conversion capacity with increased optionality and reduced risk.

On a longer-term basis, we believe that demand for lithium will continue to grow as new lithium applications advance and the use of plug-in hybrid electric vehicles and full battery electric vehicles increases. This demand for lithium is supported by a favorable backdrop of steadily declining lithium-ion battery costs, increasing battery performance, continuing significant investments in the battery and EV supply chain by cathode and battery producers and automotive OEMs and favorable global public policy toward e-mobility/renewable energy usage. Our outlook is also bolstered by long-term supply agreements with key strategic customers, reflecting our standing as a preferred global lithium partner, highlighted by our scale, access to geographically diverse, low-cost resources and long-term track record of reliability of supply and operating execution.

Specialties: We expect both net sales and profitability to increase in 2023 due to strength in demand across our product portfolio that benefits from diverse end markets. One anticipated contributor to growth is the December 2022 launch of MercLok, a groundbreaking new bromine-based product that sequesters elemental and ionic mercury in the environment. Volumes are expected to increase compared to 2022 due to the continued successful execution of growth projects, assuming continued availability of raw materials like chlorine. In addition, Specialties' ongoing cost savings initiatives and higher pricing are expected to offset higher freight and raw material costs such as lithium chloride.

On a longer-term basis, we continue to believe that improving global standards of living, widespread digitization, increasing demand for data management capacity and the potential for increasingly stringent fire safety regulations in developing markets are likely to drive continued demand for fire safety products. We are focused on profitably growing our globally competitive bromine and derivatives production network to serve all major bromine consuming products and markets. The combination of our solid, long-term business fundamentals, strong cost position, product innovations and effective management of raw material costs should enable us to manage our business through end-market challenges and to capitalize on opportunities that are expected with favorable market trends in select end markets.

Ketjen (Catalysts): Total Ketjen results in 2023 are expected to increase year-over-year despite inflationary pressures in freight and input costs, including the volatility of natural gas pricing in Europe related to the war in Ukraine. These higher costs are expected to be offset by higher pricing in refining markets. Volume is expected to grow across each of the Ketjen businesses. The fluidized catalytic cracking ("FCC") market has recovered from the COVID-19 pandemic as a result of increased travel and depletion of global gasoline inventories. Hydroprocessing catalysts ("HPC") demand tends to be lumpier than FCC demand, but is expected to see a prolonged recovery due to refineries pushing out turnarounds. In addition, the Ketjen business is seeking contingent business interruption insurance settlements for lost income from 2019 to 2022 due to multiple incidents with one of its customers. If we prevail with these claims, we could receive these settlements in multiple distributions in 2023, totaling up to an additional $47 million. Our decision to retain this business as a separate, wholly-owned subsidiary is intended to better meet customer needs and foster talent required to deliver in a competitive global environment.

On a longer-term basis, we believe increased global demand for transportation fuels, new refinery start-ups and ongoing adoption of cleaner fuels will be the primary drivers of growth in our Ketjen business. We believe delivering superior end-use performance continues to be the most effective way to create sustainable value in the refinery catalysts industry. We also believe our technologies continue to provide significant performance and financial benefits to refiners challenged to meet tighter regulations around the world, including those managing new contaminants present in North America tight oil, and those in the Middle East and Asia seeking to use heavier feedstock while pushing for higher propylene yields. Longer-term, we believe that the global crude supply will get heavier and more sour, a trend that bodes well for our catalysts portfolio. With superior technology and production capacities, and expected growth in end market demand, we believe that Ketjen remains well-positioned for the future. In performance catalyst solutions ("PCS"), we expect growth on a longer-term basis in our organometallics business due to growing global demand for plastics driven by rising standards of living and infrastructure spending.

Corporate: We continue to focus on cash generation, working capital management and process efficiencies. We expect our global effective tax rate will vary based on the locales in which income is actually earned and remains subject to potential volatility from changing legislation in the United States, such as the Inflation Reduction Act and the CHIPS and Science Act of 2022, and other tax jurisdictions.

Actuarial gains and losses related to our defined benefit pension and OPEB plan obligations are reflected in Corporate as a component of non-operating pension and OPEB plan costs under mark-to-market accounting. Results for the year ended December 31, 2022 include an actuarial gain of $37.0 million ($26.5 million after income taxes), as compared to a loss of $56.9 million ($43.6 million after income taxes) for the year ended December 31, 2021.

We remain committed to evaluating the merits of any opportunities that may arise for acquisitions or other business development activities that will complement our business footprint. Additional information regarding our products, markets and financial performance is provided at our website, *www.albemarle.com*. Our website is not a part of this document nor is it incorporated herein by reference.

Results of Operations

The following data and discussion provides an analysis of certain significant factors affecting our results of operations during the periods included in the accompanying consolidated statements of income.

Discussion of our results of operations for the year ended December 31, 2021 compared to the year ended December 31, 2020 can be found in Part II, Item 7 of our Annual Report on Form 10-K for the year ended December 31, 2021.

Comparison of 2022 to 2021

Selected Financial Data

Net Sales

In thousands	2022	2021	$ Change	% Change
Net sales	$ 7,320,104	$ 3,327,957	$ 3,992,147	120 %

- $3.5 billion of favorable pricing from each of our businesses, primarily in Lithium
- $698.6 million of higher sales volume from each of our businesses, primarily in Lithium
- $75.1 million decrease in net sales following the sale of the FCS business on June 1, 2021
- $177.8 million of unfavorable currency translation resulting from the stronger U.S. Dollar against various currencies

Gross Profit

In thousands	2022	2021	$ Change	% Change
Gross profit	$ 3,074,587	$ 997,971	$ 2,076,616	208 %
Gross profit margin	42.0 %	30.0 %		

- Favorable pricing impacts and higher sales volume in all businesses, primarily in Lithium
- Increased commission expenses in Chile resulting from the higher pricing in Lithium
- Increased utility costs, primarily natural gas in Europe, and freight costs in each of our businesses
- Unfavorable currency exchange impacts resulting from the stronger U.S. Dollar against various currencies

Selling, General and Administrative (“SG&A”) Expenses

In thousands	2022	2021	$ Change	% Change
Selling, general and administrative expenses	$ 524,145	$ 441,482	$ 82,663	19 %
Percentage of Net sales	7.2 %	13.3 %		

- Higher compensation, including incentive-based, expenses across all businesses and Corporate
- Increase in professional fees for various growth and improvement projects
- Partially offset by productivity improvements and a reduction in administrative costs
- 2021 included a $20.0 million charitable contribution, using a portion of the proceeds received from the FCS divestiture, to the Albemarle Foundation, in addition to the normal annual contributions
- 2021 also included $11.5 million of legal fees related to a legacy Rockwood legal matter and $9.8 million of expenses in 2021 primarily related to non-routine labor and compensation related costs that are outside normal compensation arrangements

Research and Development Expenses

In thousands	2022	2021	$ Change	% Change
Research and development expenses	$ 71,981	$ 54,026	$ 17,955	33 %
Percentage of Net sales	1.0 %	1.6 %		

- Increased research and development spending in each of our businesses

Loss (Gain) on Sale of Business/Interest in Properties, Net

In thousands	2022	2021	$ Change	% Change
Loss (gain) on sale of business/interest in properties, net	$ 8,400	$ (295,971)	$ 304,371	

- 2022 expense related to cost overruns for MRL's 40% interest in lithium hydroxide conversion assets being built in Kemerton, Western Australia
- 2021 included a gain of $428.4 million resulting from the sale of the FCS business on June 1, 2021
- A $132.4 million expense related to cost overruns for MRL's 40% interest in lithium hydroxide conversion assets being built in Kemerton in 2021

Interest and Financing Expenses

In thousands	2022	2021	$ Change	% Change
Interest and financing expenses	$ (122,973)	$ (61,476)	$ (61,497)	100 %

- 2022 included a $19.2 million loss on early extinguishment of debt, representing the tender premiums, fees, unamortized discounts, unamortized deferred financing costs and accelerated amortization of the interest rate swap balance from the redemption of debt during the second quarter of 2022
- 2022 also included an expense of $17.5 million related to the correction of out of period errors regarding overstated capitalized interest values in prior periods
- 2021 included a $29.0 million loss on early extinguishment of debt, representing the tender premiums, fees, unamortized discounts and unamortized deferred financing costs from the redemption of debt during the first quarter of 2021
- Increased debt balance during 2022 compared to 2021 following the issuance of $1.7 billion in new senior notes

Other Income (Expenses), Net

In thousands	2022	2021	$ Change	% Change
Other income (expenses), net	$ 86,356	$ (603,340)	$ 689,696	(114)%

- 2021 included $657.4 million of additional expense recorded following the settlement of an arbitration ruling for a prior legal matter. See Note 17, "Commitments and Contingencies," to our consolidated financial statements included in Part II, Item 8 of this report for further details
- $39.4 million of indemnification expenses in 2021 primarily to revise an indemnification estimate for an ongoing tax-related matter of a previously disposed business in Germany
- $21.8 million increase in foreign exchange losses
- $5.3 million increase in income from accretion of discount in preferred equity of Grace subsidiary acquired as a portion of the proceeds of the FCS sale
- $57.0 million of pension and OPEB credits (including mark-to-market actuarial gains of $37.0 million) in 2022 as compared to $78.8 million of pension and OPEB credits (including mark-to-market actuarial gains of $56.9 million) in 2021
    - The mark-to-market actuarial gain in 2022 is primarily attributable to a significant increase in the weighted-average discount rate to 5.46% from 2.86% for our U.S. pension plans and to 4.04% from 1.44% for our foreign pension plans to reflect market conditions as of the December 31, 2022 measurement date. This was partially offset by a lower return on pension plan assets in 2022 than was expected, as a result of overall market and investment portfolio performance. The weighted-average actual return on our U.S. and foreign pension plan assets was (17.94)% versus an expected return of 6.48%.
    - The mark-to-market actuarial loss in 2021 is primarily attributable to a higher return on pension plan assets in 2021 than was expected, as a result of overall market and investment portfolio performance. The weighted-average actual return on our U.S. and foreign pension plan assets was 8.42% versus an expected return of 6.50%. In addition, there was an increase in the weighted-average discount rate to 2.86% from 2.50% for our U.S. pension plans and to 1.44% from 0.86% for our foreign pension plans to reflect market conditions as of the December 31, 2021 measurement date.

Income Tax Expense

In thousands	2022	2021	$ Change	% Change
Income Tax Expense	$ 390,588	$ 29,446	$ 361,142	1,226 %
Effective income tax rate	16.1 %	22.0 %		

- 2022 includes a $91.8 million tax benefit resulting from the release of a valuation allowance in Australia, a $72.6 million benefit resulting from foreign-derived intangible income, partially offset by a $50.6 million current year tax reserve related to an uncertain tax position in Chile
- Change in geographic mix in earnings in 2022
- 2021 included $148.9 million tax benefit resulting from an accrual recorded following an arbitration ruling related to a prior legal matter. See Note 17, “Commitments and Contingencies,” to our consolidated financial statements included in Part II, Item 8 of this report for further details
- $97.5 million one-time tax expense recorded for the gain on the sale of the FCS business in 2021
- $27.9 million discrete tax benefit recorded in 2021 related to the indemnification estimate of an ongoing tax-related matter in Germany
- 2021 included a discrete tax expense due to an out-of-period adjustment for an overstated deferred tax liability recorded during the three-month period ended December 31, 2017

Equity in Net Income of Unconsolidated Investments

In thousands	2022	2021	$ Change	% Change
Equity in net income of unconsolidated investments	$ 772,275	$ 95,770	$ 676,505	706 %

- Increased earnings due to strong pricing and volume increases from the Talison joint venture
- $10.9 million of favorable foreign exchange impacts from the Talison joint venture

Net Income Attributable to Noncontrolling Interests

In thousands	2022	2021	$ Change	% Change
Net income attributable to noncontrolling interests	$ (125,315)	$ (76,270)	$ (49,045)	64 %

- Increase in consolidated income related to our JBC joint venture due to favorable pricing

Net Income Attributable to Albemarle Corporation

In thousands	2022	2021	$ Change	% Change
Net income attributable to Albemarle Corporation	$ 2,689,816	$ 123,672	$ 2,566,144	2,075 %
Percentage of Net Sales	36.7 %	3.7 %		
Basic earnings per share	$ 22.97	$ 1.07	$ 21.90	2,047 %
Diluted earnings per share	$ 22.84	$ 1.06	$ 21.78	2,055 %

- Favorable pricing and increased sales volume in all businesses, particularly in Lithium
- Increased earnings from Talison joint venture
- Productivity improvements and a reduction in administrative costs
- Increased commission expenses in Chile resulting from the higher pricing in Lithium
- $504.5 million, net of income taxes, of additional expense recorded following the settlement of an arbitration ruling for a prior legal matter in 2021
- Gain on sale of FCS business of $330.9 million, net of tax in 2021
- $132.4 million expense related to cost overruns for MRL’s 40% interest in lithium hydroxide conversion assets being built in Kemerton in 2021
- Increased utility, primarily natural gas in Europe, and freight costs in each of our businesses
- Increased SG&A expenses, primarily related to increased compensation expense
- Increased interest and financing expenses due to higher debt balances
- Mark-to-market actuarial gains of $26.5 million, net of income taxes, recorded in 2022 compared to mark-to-market actuarial gains of $43.6 million, net of income taxes, recorded in 2021

Other Comprehensive (Loss) Income, Net of Tax

In thousands	2022	2021	$ Change	% Change
Other comprehensive (loss) income, net of tax	$ (168,295)	$ (66,478)	$ (101,817)	153 %
• Foreign currency translation	$ (171,295)	$ (74,385)	$ (96,910)	130 %
▪ 2022 included unfavorable movements in the Chinese Renminbi of approximately $74 million, the Euro of approximately $64 million, the Japanese Yen of approximately $14 million, the Taiwanese Dollar of approximately $9 million, the South Korean Won of approximately $5 million and the net unfavorable variance in other currencies totaling approximately $6 million				
▪ 2022 included a $0.9 million gain compared to a loss of $5.4 million in 2021, representing adjustments to the fair value of our available-for-sale debt securities				
▪ 2021 included unfavorable movements in the Euro of approximately $62 million, the Japanese Yen of approximately $8 million, the Brazilian Real of approximately $5 million, the South Korean Won of approximately $4 million and the net unfavorable variance in other currencies totaling approximately $5 million, partially offset by favorable movements in the Chinese Renminbi of approximately $10 million				
• Net investment hedge	$ —	$ 5,110	$ (5,110)	(100) %
• Cash flow hedge	$ (4,399)	$ 174	$ (4,573)	*
• Interest rate swap	$ 7,399	$ 2,623	$ 4,776	182 %
▪ Accelerated the amortization of the remaining interest rate swap balance in 2022 as a result of the repayment of the 4.15% senior notes in 2024				

• Percentage calculation is not meaningful

Segment Information Overview. We have identified three reportable segments according to the nature and economic characteristics of our products as well as the manner in which the information is used internally by the Company's chief operating decision maker to evaluate performance and make resource allocation decisions. During 2022, our reportable business segments consisted of: (1) Lithium, (2) Bromine and (3) Catalysts.

Summarized financial information concerning our reportable segments is shown in the following tables. The "All Other" category included only the FCS business that did not fit into any of the Company's core businesses. On June 1, 2021, the Company completed the sale of the FCS business. Amounts in the "All Other" category represent activity in this business until divested on June 1, 2021.

The Corporate category is not considered to be a segment and includes corporate-related items not allocated to the operating segments. Pension and OPEB service cost (which represents the benefits earned by active employees during the period) and amortization of prior service cost or benefit are allocated to the reportable segments, All Other, and Corporate, whereas the remaining components of pension and OPEB benefits cost or credit ("Non-operating pension and OPEB items") are included in Corporate. Segment data includes intersegment transfers of raw materials at cost and allocations for certain corporate costs.

Our chief operating decision maker uses adjusted EBITDA (as defined below) to assess the ongoing performance of the Company's business segments and to allocate resources. We define adjusted EBITDA as earnings before interest and financing expenses, income tax expense, depreciation and amortization, as adjusted on a consistent basis for certain non-operating, non-recurring or unusual items in a balanced manner and on a segment basis. These non-operating, non-recurring or unusual items may include acquisition and integration-related costs, gains or losses on sales of businesses, restructuring charges, facility divestiture charges, certain litigation and arbitration costs and charges, non-operating pension and OPEB items and other significant non-recurring items. In addition, management uses adjusted EBITDA for business planning purposes and as a significant component in the calculation of performance-based compensation for management and other employees. We reported adjusted EBITDA because management believes it provides transparency to investors and enables period-to-period comparability of financial performance. Total adjusted EBITDA is a financial measure that is not required by, or presented in accordance with, the generally accepted accounting principles in the United States ("U.S. GAAP"). Adjusted EBITDA should not be considered as an alternative to Net (loss) income attributable to Albemarle Corporation, the most directly comparable financial measure calculated and reported in accordance with U.S. GAAP, or any other financial measure reported in accordance with U.S. GAAP.

	Year Ended December 31,				Percentage Change
	2022	%	2021	%	2022 vs. 2021
	(In thousands, except percentages)				
Net sales:					
Lithium	$ 5,008,850	68.4 %	$ 1,363,284	41.0 %	267 %
Bromine	1,411,682	19.3 %	1,128,343	33.9 %	25 %
Catalysts	899,572	12.3 %	761,235	22.9 %	18 %
All Other	—	— %	75,095	2.2 %	(100) %
Total net sales	$ 7,320,104	100.0 %	$ 3,327,957	100.0 %	120 %
Adjusted EBITDA:					
Lithium	$ 3,102,662	89.3 %	$ 479,538	55.1 %	547 %
Bromine	456,916	13.1 %	360,682	41.4 %	27 %
Catalysts	28,732	0.8 %	106,941	12.3 %	(73) %
All Other	—	— %	29,858	3.4 %	(100) %
Corporate	(112,453)	(3.2)%	(106,045)	(12.2)%	6 %
Total adjusted EBITDA	$ 3,475,857	100.0 %	$ 870,974	100.0 %	299 %

See below for a reconciliation of adjusted EBITDA, the non-GAAP financial measure, from Net income attributable to Albemarle Corporation, the most directly comparable financial measure calculated and reported in accordance with U.S. GAAP, (in thousands):

	Lithium	Bromine	Catalysts	All Other	Corporate	Consolidated Total
2022						
Net income (loss) attributable to Albemarle Corporation	$ 2,903,076	$ 402,820	$ (27,104)	$ —	$ (588,976)	$ 2,689,816
Depreciation and amortization	189,347	54,096	51,417	—	5,981	300,841
Loss on sale of interest in properties[(a)]	8,400	—	—	—	—	8,400
Acquisition and integration related costs[(b)]	—	—	—	—	16,259	16,259
Interest and financing expenses[(c)]	—	—	—	—	122,973	122,973
Income tax expense	—	—	—	—	390,588	390,588
Non-operating pension and OPEB items	—	—	—	—	(57,032)	(57,032)
Other[(d)]	1,839	—	4,419	—	(2,246)	4,012
Adjusted EBITDA	$ 3,102,662	$ 456,916	$ 28,732	$ —	$ (112,453)	$ 3,475,857
2021						
Net income (loss) attributable to Albemarle Corporation	$ 192,244	$ 309,501	$ 55,353	$ 27,988	$ (461,414)	$ 123,672
Depreciation and amortization	138,772	51,181	51,588	1,870	10,589	254,000
Restructuring and other[(e)]	—	—	—	—	3,027	3,027
Loss (gain) on sale of business/interest in properties, net[(f)]	132,400	—	—	—	(428,371)	(295,971)
Acquisition and integration related costs[(b)]	—	—	—	—	12,670	12,670
Interest and financing expenses[(c)]	—	—	—	—	61,476	61,476
Income tax expense	—	—	—	—	29,446	29,446
Non-operating pension and OPEB items	—	—	—	—	(78,814)	(78,814)
Legal accrual[(g)]	—	—	—	—	657,412	657,412
Albemarle Foundation contribution[(h)]	—	—	—	—	20,000	20,000
Indemnification adjustments[(i)]	—	—	—	—	39,381	39,381
Other[(j)]	16,122	—	—	—	28,553	44,675
Adjusted EBITDA	$ 479,538	$ 360,682	$ 106,941	$ 29,858	$ (106,045)	$ 870,974

(a) Expense recorded as a result of revised estimates of the obligation to construct certain lithium hydroxide conversion assets in Kemerton, Western Australia, due to cost overruns from supply chain, labor and COVID-19 pandemic related issues. The corresponding obligation was recorded in Accrued liabilities to be transferred to Mineral Resources Limited ("MRL"), which maintains a 40% ownership interest in these Kemerton assets.

(b) See Note 2, "Acquisitions," for additional information.

(c) Included in Interest and financing expenses is a loss on early extinguishment of debt of $19.2 million and $29.0 million for the years ended December 31, 2022 and 2021, respectively. See Note 14, "Long-term Debt," for additional information. In addition, Interest and financing expenses for the year ended December 31, 2022 includes the correction of an out of period error of $17.5 million related to the overstatement of capitalized interest in prior periods.

(d) Included amounts for the year ended December 31, 2022 recorded in:
- Cost of goods sold - $2.7 million of expense related to one-time retention payments for certain employees during the Catalysts strategic review and business unit realignment, and $0.5 million related to the settlement of a legal matter resulting from a prior acquisition.
- SG&A - $4.3 million related to facility closure expenses of offices in Germany, $2.8 million of charges for environmental reserves at sites not part of our operations, $2.8 million of shortfall contributions for our multiemployer plan financial improvement plan, $1.9 million of expense primarily related to one-time retention payments for certain employees during the Catalysts strategic review, partially offset by $4.3 million of gains from the sale of legacy properties not part of our operations.
- Other income (expenses), net - $4.3 million net gain related to the fair value adjustment of equity securities in a public company, a $3.0 million gain from the reversal of a liability related to a previous divestiture, a $2.0 million gain relating to the adjustment of an environmental reserve at non-operating businesses we have previously divested and a $0.6 million gain related to a

settlement received from a legal matter in a prior period, partially offset by a $3.2 million loss resulting from the adjustment of indemnification related to previously disposed businesses.

(e) In 2021, we recorded facility closure related to offices in Germany, and severance expenses in Germany and Belgium, in SG&A.

(f) Includes a $428.4 million gain related to the FCS divestiture recorded during the year ended December 31, 2021. In addition, includes a $132.4 million expense related to anticipated cost overruns for MRL's 40% interest in lithium hydroxide conversion assets being built in Kemerton.

(g) Loss recorded in Other income (expenses), net for the year ended December 31, 2021 related to the settlement of an arbitration ruling for a prior legal matter. See Note 17, "Commitments and Contingencies," for further details.

(h) Included in SG&A is a charitable contribution, using a portion of the proceeds received from the FCS divestiture, to the Albemarle Foundation, a non-profit organization that sponsors grants, health and social projects, educational initiatives, disaster relief, matching gift programs, scholarships and other charitable initiatives in locations where the Company's employees live and the Company operates. This contribution is in addition to the normal annual contribution made to the Albemarle Foundation by the Company, and is significant in size and nature in that it is intended to provide more long-term benefits in these communities.

(i) Included in Other income (expenses), net to revise an indemnification estimate for an ongoing tax-related matter of a previously disposed business in Germany. A corresponding discrete tax benefit of $27.9 million was recorded in Income tax expense during the same period, netting to an expected cash obligation of approximately $11.5 million.

(j) Included amounts for the year ended December 31, 2021 recorded in:
- Cost of goods sold - $10.5 million of expense related to a legal matter as part of a prior acquisition in our Lithium business.
- SG&A - $11.5 million of legal fees related to a legacy Rockwood legal matter noted above, $9.8 million of expenses primarily related to non-routine labor and compensation related costs that are outside normal compensation arrangements, a $4.0 million loss resulting from the sale of property, plant and equipment and $3.8 million of charges for environmental reserves at a sites not part of our operations.
- Other income (expenses), net - $4.8 million of net expenses primarily related to asset retirement obligation charges to update of an estimate at a site formerly owned by Albemarle.

Lithium

In thousands	2022	2021	$ Change	% Change
Net sales	$ 5,008,850	$ 1,363,284	$ 3,645,566	267 %

- $3.2 billion of favorable pricing impacts, reflecting tight market conditions, primarily in battery- and tech-grade carbonate and hydroxide, as well as greater volumes sold under index-referenced and variable-priced contracts, and mix
- $549.2 million of higher sales volume, driven by the La Negra III/IV expansion in Chile and increased tolling volume to meet growing customer demand
- $133.1 million of unfavorable currency translation resulting from the stronger U.S. Dollar against various currencies

Adjusted EBITDA	$ 3,102,662	$ 479,538	$ 2,623,124	547 %

- Favorable pricing impacts and higher sales volume
- Higher equity in net income from the Talison joint venture, driven by increased pricing and sales volume
- Savings from designed productivity improvements
- Increased commission expenses in Chile resulting from the higher pricing in Lithium
- Increased SG&A expenses from higher compensation and other administrative costs
- Increased utility and freight costs
- Increased spending for investments to support business growth
- $2.2 million of unfavorable currency translation resulting from a stronger Chilean Peso

Bromine

In thousands	2022	2021	$ Change	% Change
Net sales	$ 1,411,682	$ 1,128,343	$ 283,339	25 %

- $260.6 million of favorable pricing impacts, primarily in the fire safety solutions division
- $49.8 million of higher sales volume related to increased demand across all products
- $26.9 million of unfavorable currency translation resulting from the stronger U.S. Dollar against various currencies

Adjusted EBITDA	$ 456,916	$ 360,682	$ 96,234	27 %

- Favorable pricing impacts and higher sales volume
- Increased freight costs, partially due to trucker strikes in Jordan during the fourth quarter of 2022
- Increased utility costs and raw material prices, primarily due to the higher costs of bisphenol A (BPA)
- Increased SG&A expenses from higher compensation costs
- 2021 included higher production and utility costs of approximately $6 million resulting from the U.S. Gulf Coast winter storm
- $19.9 million of unfavorable currency translation resulting from the stronger U.S. Dollar against various currencies

Catalysts

In thousands	2022	2021	$ Change	% Change
Net sales	$ 899,572	$ 761,235	$ 138,337	18 %

- $99.7 million of higher sales volume, primarily from the timing of clean fuel technologies sales, which has lumpier demand; sales volume was negatively affected by the impacts of a winter freeze in the U.S. during the fourth quarter of 2022
- $56.5 million of favorable pricing impacts, primarily in clean fuel technologies and PCS
- $17.8 million of unfavorable currency translation resulting from the stronger U.S. Dollar against various currencies

Adjusted EBITDA	$ 28,732	$ 106,941	$ (78,209)	(73) %

- Increased utility costs, primarily natural gas in Europe
- Increased raw material and freight costs
- Higher sales volume and favorable pricing impacts; adjusted EBITDA was negatively affected by the impacts of a winter freeze in the U.S. during the fourth quarter of 2022
- 2022 benefited from $7 million of government grants from the Netherlands in response to losses during the COVID-19 pandemic as compared to $19 million of these grants in 2021
- Recorded $10 million gain from contingent business interruption insurance settlements resulting from lost income during 2019 to 2022 due to multiple incidents at one of its customers
- 2021 included higher production and utility costs of approximately $16 million resulting from the U.S. Gulf Coast winter storm
- 2021 included a $3.1 million out-of-period adjustment expense recorded in Cost of goods sold to correct inventory foreign exchange values relating to prior year periods

All Other

In thousands	2022	2021	$ Change	% Change
Net sales	$ —	$ 75,095	$ (75,095)	(100)%

- Decreased volume resulting from the sale of the FCS business in the second quarter of 2021

Adjusted EBITDA	$ —	$ 29,858	$ (29,858)	(100)%

- Decreased volume resulting from the sale of the FCS business in the second quarter of 2021

Corporate

In thousands	2022	2021	$ Change	% Change
Adjusted EBITDA	$ (112,453)	$ (106,045)	$ (6,408)	6 %

- Increase in compensation costs, including incentive-based compensation
- $10.9 million of unfavorable currency exchange impacts, including a $10.9 million increase in foreign currency impacts from our Talison joint venture

Summary of Critical Accounting Policies and Estimates

Estimates, Assumptions and Reclassifications

The preparation of financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of revenues, expenses, assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements. Listed below are the estimates and assumptions that we consider to be critical in the preparation of our financial statements.

Property, Plant and Equipment. We assign the useful lives of our property, plant and equipment based upon our internal engineering estimates which are reviewed periodically. The estimated useful lives of our property, plant and equipment range from two to sixty years and depreciation is recorded on the straight-line method, with the exception of our mineral rights and reserves, which are depleted on a units-of-production method. We evaluate the recovery of our property, plant and equipment by comparing the net carrying value of the asset group to the undiscounted net cash flows expected to be generated from the use and eventual disposition of that asset group when events or changes in circumstances indicate that its carrying amount may not be recoverable. If the carrying amount of the asset group is not recoverable, the fair value of the asset group is measured and if the carrying amount exceeds the fair value, an impairment loss is recognized.

Acquisition Method of Accounting. We recognize the identifiable assets acquired, the liabilities assumed and any noncontrolling interest in the acquiree at their estimated fair values on the date of acquisition for acquired businesses. Determining the fair value of these items requires management's judgment and the utilization of independent valuation specialists and involves the use of significant estimates and assumptions with respect to the timing and amounts of future cash flows and discount rates, among other items. When acquiring mineral reserves, the fair value is estimated using an excess earnings approach, which requires management to estimate future cash flows, net of capital investments in the specific operation. Management's cash flow projections involved the use of significant estimates and assumptions with respect to the expected production of the mine over the estimated time period, sales prices, shipment volumes, and expected profit margins. The present value of the projected net cash flows represents the preliminary fair value assigned to mineral reserves. The discount rate is a significant assumption used in the valuation model. The judgments made in the determination of the estimated fair value assigned to the assets acquired, the liabilities assumed and any noncontrolling interest in the investee, as well as the estimated useful life of each asset and the duration of each liability, can materially impact the financial statements in periods after acquisition, such as through depreciation and amortization expense. For more information on our acquisitions and application of the acquisition method, see Note 2, "Acquisitions," to our consolidated financial statements included in Part II, Item 8 of this report.

Income Taxes. We assume the deductibility of certain costs in our income tax filings, and we estimate the future recovery of deferred tax assets, uncertain tax positions and indefinite investment assertions.

Environmental Remediation Liabilities. We estimate and accrue the costs required to remediate a specific site depending on site-specific facts and circumstances. Cost estimates to remediate each specific site are developed by assessing (i) the scope of our contribution to the environmental matter, (ii) the scope of the anticipated remediation and monitoring plan and (iii) the extent of other parties' share of responsibility.

Actual results could differ materially from the estimates and assumptions that we use in the preparation of our financial statements.

Revenue Recognition

Revenue is measured as the amount of consideration we expect to receive in exchange for transferring goods or providing services, and is recognized when performance obligations are satisfied under the terms of contracts with our customers. A performance obligation is deemed to be satisfied when control of the product or service is transferred to our customer. The transaction price of a contract, or the amount we expect to receive upon satisfaction of all performance obligations, is determined by reference to the contract's terms and includes adjustments, if applicable, for any variable consideration, such as customer rebates, noncash consideration or consideration payable to the customer, although these adjustments are generally not material. Where a contract contains more than one distinct performance obligation, the transaction price is allocated to each performance obligation based on the standalone selling price of each performance obligation, although these situations do not occur frequently and are generally not built into our contracts. Any unsatisfied performance obligations are not material. Standalone selling prices are based on prices we charge to our customers, which in some cases are based on established market prices. Sales and other similar taxes collected from customers on behalf of third parties are excluded from revenue. Our payment terms are generally between 30 to 90 days, however, they vary by market factors, such as customer size, creditworthiness, geography and competitive environment.

All of our revenue is derived from contracts with customers, and almost all of our contracts with customers contain one performance obligation for the transfer of goods where such performance obligation is satisfied at a point in time. Control of a product is deemed to be transferred to the customer upon shipment or delivery. Significant portions of our sales are sold free on board shipping point or on an equivalent basis, while delivery terms of other transactions are based upon specific contractual arrangements. Our standard terms of delivery are generally included in our contracts of sale, order confirmation documents and invoices, while the timing between shipment and delivery generally ranges between 1 and 45 days. Costs for shipping and handling activities, whether performed before or after the customer obtains control of the goods, are accounted for as fulfillment costs.

The Company currently utilizes the following practical expedients, as permitted by Accounting Standards Codification ("ASC") 606, *Revenue from Contracts with Customers*:

- All sales and other pass-through taxes are excluded from contract value;
- In utilizing the modified retrospective transition method, no adjustment was necessary for contracts that did not cross over the reporting year;
- We will not consider the possibility of a contract having a significant financing component (which would effectively attribute a portion of the sales price to interest income) unless, if at contract inception, the expected payment terms (from time of delivery or other relevant criterion) are more than one year;

- If our right to customer payment is directly related to the value of our completed performance, we recognize revenue consistent with the invoicing right; and
- We expense as incurred all costs of obtaining a contract incremental to any costs/compensation attributable to individual product sales/shipments for contracts where the amortization period for such costs would otherwise be one year or less.

Certain products we produce are made to our customer's specifications where such products have no alternative use or would need significant rework costs in order to be sold to another customer. In management's judgment, control of these arrangements is transferred to the customer at a point in time (upon shipment or delivery) and not over the time they are produced. Therefore revenue is recognized upon shipment or delivery of these products.

Costs incurred to obtain contracts with customers are not significant and are expensed immediately as the amortization period would be one year or less. When the Company incurs pre-production or other fulfillment costs in connection with an existing or specific anticipated contract and such costs are recoverable through margin or explicitly reimbursable, such costs are capitalized and amortized to Cost of goods sold on a systematic basis that is consistent with the pattern of transfer to the customer of the goods or services to which the asset relates, which is less than one year. We record bad debt expense in specific situations when we determine the customer is unable to meet its financial obligation.

Goodwill and Other Intangible Assets

We account for goodwill and other intangibles acquired in a business combination in conformity with current accounting guidance which requires goodwill and indefinite-lived intangible assets to not be amortized.

We test goodwill for impairment by comparing the estimated fair value of our reporting units to the related carrying value. Our reporting units are either our operating business segments or one level below our operating business segments for which discrete financial information is available and for which operating results are regularly reviewed by the business management. In applying the goodwill impairment test, we initially perform a qualitative test ("Step 0"), where we first assess qualitative factors to determine whether it is more likely than not that the fair value of the reporting units is less than its carrying value. Qualitative factors may include, but are not limited to, economic conditions, industry and market considerations, cost factors, overall financial performance of the reporting units and other entity and reporting unit specific events. If after assessing these qualitative factors, we determine it is "more-likely-than-not" that the fair value of the reporting unit is less than the carrying value, we perform a quantitative test ("Step 1"). During Step 1, we estimate the fair value based on present value techniques involving future cash flows. Future cash flows for all reporting units include assumptions about revenue growth rates, adjusted EBITDA margins, discount rate as well as other economic or industry-related factors. For the Refining Solutions reporting unit, the revenue growth rates, adjusted EBITDA margins and the discount rate were deemed to be significant assumptions. Significant management judgment is involved in estimating these variables and they include inherent uncertainties since they are forecasting future events. We use a Weighted Average Cost of Capital ("WACC") approach to determine our discount rate for goodwill recoverability testing. Our WACC calculation incorporates industry-weighted average returns on debt and equity from a market perspective. The factors in this calculation are largely external to Albemarle and, therefore, are beyond our control. We perform a sensitivity analysis by using a range of inputs to confirm the reasonableness of these estimates being used in the goodwill impairment analysis. We test our recorded goodwill for impairment in the fourth quarter of each year or upon the occurrence of events or changes in circumstances that would more likely than not reduce the fair value of our reporting units below their carrying amounts. We performed our annual goodwill impairment test as of October 31, 2022 and no evidence of impairment was noted from the analysis. As a result, we concluded there was no impairment as of that date. However, if the adjusted EBITDA or discount rate estimates for the Refining Solutions reporting unit negatively changed by 10%, the Refining Solutions fair value would be below its carrying value.

We assess our indefinite-lived intangible assets, which include trade names and trademarks, for impairment annually and between annual tests if events or changes in circumstances indicate that it is more likely than not that the asset is impaired. The indefinite-lived intangible asset impairment standard allows us to first assess qualitative factors to determine if a quantitative impairment test is necessary. Further testing is only required if we determine, based on the qualitative assessment, that it is more likely than not that the indefinite-lived intangible asset's fair value is less than its carrying amount. If we determine based on the qualitative assessment that it is more likely than not that the asset is impaired, an impairment test is performed by comparing the fair value of the indefinite-lived intangible asset to its carrying amount. During the year ended December 31, 2022, no evidence of impairment was noted from the analysis for our indefinite-lived intangible assets.

Definite-lived intangible assets, such as purchased technology, patents and customer lists, are amortized over their estimated useful lives generally for periods ranging from five to twenty-five years. Except for customer lists and relationships associated with the majority of our Lithium business, which are amortized using the pattern of economic benefit method, definite-lived intangible assets are amortized using the straight-line method. We evaluate the recovery of our definite-lived intangible assets by comparing the net carrying value of the asset group to the undiscounted net cash flows expected to be generated from the use and eventual disposition of that asset group when events or changes in circumstances indicate that its carrying amount may not be recoverable. If the carrying amount of the asset group is not recoverable, the fair value of the asset group is measured and if the carrying amount exceeds the fair value, an impairment loss is recognized. See Note 12, “Goodwill and Other Intangibles,” to our consolidated financial statements included in Part II, Item 8 of this report.

Pension Plans and Other Postretirement Benefits

Under authoritative accounting standards, assumptions are made regarding the valuation of benefit obligations and the performance of plan assets. As required, we recognize a balance sheet asset or liability for each of our pension and OPEB plans equal to the plan’s funded status as of the measurement date. The primary assumptions are as follows:

- Discount Rate—The discount rate is used in calculating the present value of benefits, which is based on projections of benefit payments to be made in the future.
- Expected Return on Plan Assets—We project the future return on plan assets based on prior performance and future expectations for the types of investments held by the plans as well as the expected long-term allocation of plan assets for these investments. These projected returns reduce the net benefit costs recorded currently.
- Rate of Compensation Increase—For salary-related plans, we project employees’ annual pay increases, which are used to project employees’ pension benefits at retirement.
- Mortality Assumptions—Assumptions about life expectancy of plan participants are used in the measurement of related plan obligations.

Actuarial gains and losses are recognized annually in our consolidated statements of income in the fourth quarter and whenever a plan is determined to qualify for a remeasurement during a fiscal year. The remaining components of pension and OPEB plan expense, primarily service cost, interest cost and expected return on assets, are recorded on a monthly basis. The market-related value of assets equals the actual market value as of the date of measurement.

During 2022, we made changes to assumptions related to discount rates and expected rates of return on plan assets. We consider available information that we deem relevant when selecting each of these assumptions.

Our U.S. defined benefit plans for non-represented employees are closed to new participants, with no additional benefits accruing under these plans as participants’ accrued benefits have been frozen. In selecting the discount rates for the U.S. plans, we consider expected benefit payments on a plan-by-plan basis. As a result, the Company uses different discount rates for each plan depending on the demographics of participants and the expected timing of benefit payments. For 2022, the discount rates were calculated using the results from a bond matching technique developed by Milliman, which matched the future estimated annual benefit payments of each respective plan against a portfolio of bonds of high quality to determine the discount rate. We believe our selected discount rates are determined using preferred methodology under authoritative accounting guidance and accurately reflect market conditions as of the December 31, 2022 measurement date.

In selecting the discount rates for the foreign plans, we look at long-term yields on AA-rated corporate bonds when available. Our actuaries have developed yield curves based on the yields of constituent bonds in the various indices as well as on other market indicators such as swap rates, particularly at the longer durations. For the Eurozone, we apply the Aon Hewitt yield curve to projected cash flows from the relevant plans to derive the discount rate. For the U.K., the discount rate is determined by applying the Aon Hewitt yield curve for typical schemes of similar duration to projected cash flows of Albemarle’s U.K. plan. In other countries where there is not a sufficiently deep market of high-quality corporate bonds, we set the discount rate by referencing the yield on government bonds of an appropriate duration.

At December 31, 2022, the weighted-average discount rate for the U.S. and foreign pension plans increased to 5.46% and 4.04%, respectively, from 2.86% and 1.44%, respectively, at December 31, 2021 to reflect market conditions as of the December 31, 2022 measurement date. The discount rate for the OPEB plans at December 31, 2022 and 2021 was 5.45% and 2.85%, respectively.

In estimating the expected return on plan assets, we consider past performance and future expectations for the types of investments held by the plan as well as the expected long-term allocations of plan assets to these investments. For the years 2022 and 2021, the weighted-average expected rate of return on U.S. pension plan assets was 6.89%, and the weighted-average expected rate of return on foreign pension plan assets was 3.85% and 3.98%, respectively. Effective January 1, 2023, the weighted-average expected rate of return on U.S. and foreign pension plan assets is 6.88% and 4.86%, respectively.

In projecting the rate of compensation increase, we consider past experience in light of changes in inflation rates. At December 31, 2022 and 2021, the assumed weighted-average rate of compensation increase was 3.67% and 3.20%, respectively, for our foreign pension plans.

For the purpose of measuring our U.S. pension and OPEB obligations at December 31, 2022 and 2021, we used the Pri-2012 Mortality Tables along with the MP-2021 Mortality Improvement Scale, respectively, published by the SOA.

At December 31, 2022, the assumed rate of increase in the pre-65 and post-65 per capita cost of covered health care benefits for U.S. retirees was zero as the employer-paid premium caps (pre-65 and post-65) were met starting January 1, 2013.

A variance in the assumptions discussed above would have an impact on the projected benefit obligations, the accrued OPEB liabilities, and the annual net periodic pension and OPEB cost. The following table reflects the sensitivities associated with a hypothetical change in certain assumptions, primarily in the U.S. (in thousands):

	(Favorable) Unfavorable			
	1% Increase		1% Decrease	
	Increase (Decrease) in Benefit Obligation	Increase (Decrease) in Benefit Cost	Increase (Decrease) in Benefit Obligation	Increase (Decrease) in Benefit Cost
Actuarial Assumptions				
Discount Rate:				
Pension	$ (60,603)	$ 2,670	$ 71,494	$ (3,2
Other postretirement benefits	$ (2,822)	$ 158	$ 3,293	$ (1
Expected return on plan assets:				
Pension	*	$ (5,066)	*	$ 5,(
Other postretirement benefits	*	$ —	*	$

* Not applicable.

Of the $528.1 million total pension and postretirement assets at December 31, 2022, $68.7 million, or approximately 13%, are measured using the net asset value as a practical expedient. Gains or losses attributable to these assets are recognized in the consolidated balance sheets as either an increase or decrease in plan assets. See Note 15, “Pension Plans and Other Postretirement Benefits,” to our consolidated financial statements included in Part II, Item 8 of this report.

Income Taxes

We use the liability method for determining our income taxes, under which current and deferred tax liabilities and assets are recorded in accordance with enacted tax laws and rates. Under this method, the amounts of deferred tax liabilities and assets at the end of each period are determined using the tax rate expected to be in effect when taxes are actually paid or recovered. Future tax benefits are recognized to the extent that realization of such benefits is more likely than not. In order to record deferred tax assets and liabilities, we are following guidance under ASU 2015-17, which requires deferred tax assets and liabilities to be classified as noncurrent on the balance sheet, along with any related valuation allowance. Tax effects are released from Accumulated Other Comprehensive Income using either the specific identification approach or the portfolio approach based on the nature of the underlying item.

Deferred income taxes are provided for the estimated income tax effect of temporary differences between the financial statement carrying amounts and the tax basis of existing assets and liabilities. Deferred tax assets are also provided for operating losses, capital losses and certain tax credit carryovers. A valuation allowance, reducing deferred tax assets, is established when it is more likely than not that some portion or all of the deferred tax assets will not be realized. The realization of such deferred tax assets is dependent upon the generation of sufficient future taxable income of the appropriate character. Although realization is not assured, we do not establish a valuation allowance when we believe it is more likely than not that a net deferred tax asset will be realized. We elected to not consider the estimated impact of potential future Corporate Alternative Minimum Tax liabilities for purposes of assessing valuation allowances on its deferred tax balances.

We only recognize a tax benefit after concluding that it is more likely than not that the benefit will be sustained upon audit by the respective taxing authority based solely on the technical merits of the associated tax position. Once the recognition threshold is met, we recognize a tax benefit measured as the largest amount of the tax benefit that, in our judgment, is greater than 50% likely to be realized. Interest and penalties related to income tax liabilities are included in Income tax expense on the consolidated statements of income.

We are subject to income taxes in the U.S. and numerous foreign jurisdictions. Due to the statute of limitations, we are no longer subject to U.S. federal income tax audits by the Internal Revenue Service ("IRS") for years prior to 2019. Due to the statute of limitations, we also are no longer subject to U.S. state income tax audits prior to 2017.

With respect to jurisdictions outside the U.S., several audits are in process. We have audits ongoing for the years 2011 through 2022 in Germany, Italy, Belgium, South Africa, China, Canada and Chile, some of which are for entities that have since been divested.

While we believe we have adequately provided for all tax positions, amounts asserted by taxing authorities could be greater than our accrued position. Accordingly, additional provisions on federal and foreign tax-related matters could be recorded in the future as revised estimates are made or the underlying matters are settled or otherwise resolved.

Since the timing of resolutions and/or closure of tax audits are uncertain, it is difficult to predict with certainty the range of reasonably possible significant increases or decreases in the liability related to uncertain tax positions that may occur within the next twelve months. Our current view is that it is reasonably possible that we could record a decrease in the liability related to uncertain tax positions, relating to a number of issues, up to approximately $0.3 million as a result of closure of tax statutes. As a result of the sale of the Chemetall Surface Treatment business in 2016, we agreed to indemnify certain income and non-income tax liabilities, including uncertain tax positions, associated with the entities sold. The associated liability is recorded in Other noncurrent liabilities. See Note 16, "Other Noncurrent Liabilities," and Note 21, "Income Taxes," to our consolidated financial statements included in Part II, Item 8 of this report for further details.

We have designated the undistributed earnings of a portion of our foreign operations as indefinitely reinvested and as a result we do not provide for deferred income taxes on the unremitted earnings of these subsidiaries. Our foreign earnings are computed under U.S. federal tax earnings and profits ("E&P") principles. In general, to the extent our financial reporting book basis over tax basis of a foreign subsidiary exceeds these E&P amounts, deferred taxes have not been provided, as they are essentially permanent in duration. The determination of the amount of such unrecognized deferred tax liability is not practicable. We provide for deferred income taxes on our undistributed earnings of foreign operations that are not deemed to be indefinitely invested. We will continue to evaluate our permanent investment assertion taking into consideration all relevant and current tax laws.

Financial Condition and Liquidity

Overview

The principal uses of cash in our business generally have been capital investments and resource development costs, funding working capital, and service of debt. We also make contributions to our defined benefit pension plans, pay dividends to our shareholders and have the ability to repurchase shares of our common stock. Historically, cash to fund the needs of our business has been principally provided by cash from operations, debt financing and equity issuances.

We are continually focused on working capital efficiency particularly in the areas of accounts receivable, payables and inventory. We anticipate that cash on hand, cash provided by operating activities, proceeds from divestitures and borrowings will be sufficient to pay our operating expenses, satisfy debt service obligations, fund capital expenditures and other investing activities, fund pension contributions and pay dividends for the foreseeable future.

Cash Flow

Our cash and cash equivalents were $1.5 billion at December 31, 2022 as compared to $439.3 million at December 31, 2021. Cash provided by operating activities was $1.9 billion, $344.3 million and $798.9 million during the years ended December 31, 2022, 2021 and 2020, respectively.

The increase in cash provided by operating activities in 2022 versus 2021 was primarily due to significantly higher earnings from the Lithium and Bromine segments and higher dividends received from unconsolidated investments, primarily from the Talison joint venture. This increase was partially offset by an increase in working capital outflow driven by higher inventory and accounts receivable balances from higher lithium pricing and increased sales. The decrease in cash provided by operating activities in 2021 versus 2020 was primarily due to the $332.5 million payment to settle a prior legal matter, lower earnings from the FCS business sold on June 1, 2021, as well as increased inventory balances and accounts receivable due to the timing of payments. This was partially offset by increased sales in our Lithium and Bromine segments.

During 2022, cash on hand, cash provided by operations and the proceeds of $2.0 billion in long-term debt and credit agreements funded $1.3 billion of capital expenditures for plant, machinery and equipment, the repayment of long-term debt and credit agreements of $705.0 million, the net repayment of $391.7 million of commercial paper, the final payment of $332.5 million of a settlement of an arbitration ruling for a prior legal matter and dividends to shareholders of $184.4 million. During 2021, cash on hand, cash provided by operations, net cash proceeds of $289.8 million from the sale of the FCS business, $388.5 million of commercial paper borrowings and the $1.5 billion net proceeds from our underwritten public offering of common stock funded debt principal payments of approximately $1.5 billion, early extinguishment of debt fees of $24.9 million, $332.5 million of a settlement of an arbitration ruling for a prior legal matter, $953.7 million of capital expenditures for plant, machinery and equipment, dividends to shareholders of $177.9 million, and pension and postretirement contributions of $30.3 million. During 2020, cash on hand, cash provided by operations and proceeds from borrowings of $200 million from one of our credit facilities funded $850.0 million of capital expenditures for plant, machinery and equipment, dividends to shareholders of $161.8 million, and pension and postretirement contributions of $16.4 million. In addition, during 2020 we received $11.0 million in proceeds from the sale of our ownership interest in the SOCC joint venture during and paid $22.6 million of agreed upon purchase price adjustments for the Wodgina Project acquisition. In addition, during the years ended December 31, 2022, 2021 and 2020, our consolidated joint venture, JBC, declared dividends of $274.5 million, $274.6 million and $89.9 million, respectively, which resulted in dividends paid to noncontrolling interests of $44.2 million ($53.1 million declared in 2022 was paid in the first quarter of 2023), $96.1 million and $32.1 million, respectively.

On October 25, 2022, the Company completed the acquisition of all of the outstanding equity of Qinzhou, for approximately $200 million in cash, which includes a deferral of approximately $29 million to be paid in installments within a year of the acquisition closing date. Qinzhou's operations include a recently constructed lithium processing plant strategically positioned near the Port of Qinzhou in Guangxi, which began commercial production in the first half of 2022. The plant has designed annual conversion capacity of up to 25,000 metric tonnes of LCE and is capable of producing battery-grade lithium carbonate and lithium hydroxide.

On May 13, 2022, the Company issued a series of notes (collectively, the “2022 Notes”) as follows:

- $650.0 million aggregate principal amount of senior notes, bearing interest at a rate of 4.65% payable semi-annually on June 1 and December 1 of each year, beginning on December 1, 2022. The effective interest rate on these senior notes is approximately 4.84%. These senior notes mature on June 1, 2027.
- $600.0 million aggregate principal amount of senior notes, bearing interest at a rate of 5.05% payable semi-annually on June 1 and December 1 of each year, beginning on December 1, 2022. The effective interest rate on these senior notes is approximately 5.18%. These senior notes mature on June 1, 2032.
- $450.0 million aggregate principal amount of senior notes, bearing interest at a rate of 5.65% payable semi-annually on June 1 and December 1 of each year, beginning on December 1, 2022. The effective interest rate on these senior notes is approximately 5.71%. These senior notes mature on June 1, 2052.

The net proceeds from the issuance of the 2022 Notes were used to repay the balance of the commercial paper notes, the remaining balance of $425.0 million of the 4.15% Senior Notes due 2024 (the “2024 Notes”) and for general corporate purposes. The 2024 Notes were originally due to mature on December 15, 2024 and bore interest at a rate of 4.15%. During the year ended December 31, 2022, the Company recorded a loss on early extinguishment of debt of $19.2 million in Interest and financing expenses, representing the tender premiums, fees, unamortized discounts and unamortized deferred financing costs from the redemption of the 2024 Notes. In addition, the loss on early extinguishment of debt includes the accelerated amortization of the interest rate swap associated with the 2024 Notes from Accumulated other comprehensive income.

On June 1, 2021, we completed the sale of the FCS business to Grace for proceeds of approximately $570 million, consisting of $300 million in cash and the issuance to Albemarle of preferred equity of a Grace subsidiary having an aggregate stated value of $270 million. The preferred equity can be redeemed at Grace’s option under certain conditions and will accrue payment-in-kind dividends at an annual rate of 12% beginning on June 1, 2023, two years after issuance.

On February 8, 2021, we completed an underwritten public offering of 8,496,773 shares of our common stock at a price to the public of $153.00 per share. We also granted to the underwriters an option to purchase up to an additional 1,274,509 shares, which was exercised. The total gross proceeds from this offering were approximately $1.5 billion, before deducting expenses, underwriting discounts and commissions. In the first quarter of 2021, we made the following debt principal payments using the net proceeds from this underwritten public offering:

- €123.8 million of the 1.125% notes due in November 2025
- €393.0 million, the remaining balance, of the 1.875% Senior notes originally due in December 2021
- $128.4 million of the 3.45% senior notes due in November 2029
- $200.0 million, the remaining balance, of the floating rate notes originally due in November 2022

- €183.3 million, the outstanding balance, of the unsecured credit facility originally entered into on August 14, 2019, as amended and restated on December 15, 2020 (the "2019 Credit Facility")
- $325.0 million, the outstanding balance, of the commercial paper notes

Capital expenditures were $1.3 billion, $953.7 million and $850.5 million for the years ended December 31, 2022, 2021 and 2020, respectively, and were incurred mainly for plant, machinery and equipment. We expect our capital expenditures to be between $1.7 billion and $1.9 billion in 2023 primarily for Energy Storage growth and capacity increases, including in Australia, Chile, China and Silver Peak, Nevada, as well as productivity and continuity of operations projects in all segments. Our La Negra, Chile plant has completed the qualification stage and is running as expected. Train I of our Kemerton, Western Australia plant is complete and ramping through the commissioning stage. Train II has achieved mechanical completion and transitioned to the commissioning stage, with commercial sales volume from Train II expected to begin in 2023. In addition, construction of our announced lithium conversion plant in Meishan, China is progressing on schedule, with estimated completion by the end of 2024.

The Company is permitted to repurchase up to a maximum of 15,000,000 shares under a share repurchase program authorized by our Board of Directors. There were no shares of our common stock repurchased during 2022, 2021 or 2020. At December 31, 2022, there were 7,396,263 remaining shares available for repurchase under the Company's authorized share repurchase program.

Net current assets increased to approximately $2.4 billion at December 31, 2022 from $119.3 million at December 31, 2021. The increase is primarily due to increases in cash and cash equivalents from the issuance of the 2022 Notes, as well as increased inventory and accounts receivable balances from higher lithium pricing. Additional changes in the components of net current assets are primarily due to the timing of the sale of goods and other ordinary transactions leading up to the balance sheet dates. The additional changes are not the result of any policy changes by the Company, and do not reflect any change in either the quality of our net current assets or our expectation of success in converting net working capital to cash in the ordinary course of business.

At December 31, 2022 and 2021, our cash and cash equivalents included $1.3 billion and $374.0 million, respectively, held by our foreign subsidiaries. The majority of these foreign cash balances are associated with earnings that we have asserted are indefinitely reinvested and which we plan to use to support our continued growth plans outside the U.S. through funding of capital expenditures, acquisitions, research, operating expenses or other similar cash needs of our foreign operations. From time to time, we repatriate cash associated with earnings from our foreign subsidiaries to the U.S. for normal operating needs through intercompany dividends, but only from subsidiaries whose earnings we have not asserted to be indefinitely reinvested or whose earnings qualify as "previously taxed income" as defined by the Internal Revenue Code. For the years ended December 31, 2022, 2021 and 2020, we repatriated approximately $1.7 million, $0.9 million and $1.8 million of cash, respectively, as part of these foreign earnings cash repatriation activities.

While we continue to closely monitor our cash generation, working capital management and capital spending in light of continuing uncertainties in the global economy, we believe that we will continue to have the financial flexibility and capability to opportunistically fund future growth initiatives. Additionally, we anticipate that future capital spending, including business acquisitions, share repurchases and other cash outlays, should be financed primarily with cash flow provided by operations and cash on hand, with additional cash needed, if any, provided by borrowings. The amount and timing of any additional borrowings will depend on our specific cash requirements.

Long-Term Debt

We currently have the following notes outstanding:

Issue Month/Year	Principal (in millions)	Interest Rate	Interest Payment Dates	Maturity Date
November 2019	€371.7	1.125%	November 25	November 25, 2025
May 2022[(a)]	$650.0	4.65%	June 1 and December 1	June 1, 2027
November 2019	€500.0	1.625%	November 25	November 25, 2028
November 2019[(a)]	$171.6	3.45%	May 15 and November 15	November 15, 2029
May 2022[(a)]	$600.0	5.05%	June 1 and December 1	June 1, 2032
November 2014[(a)]	$350.0	5.45%	June 1 and December 1	December 1, 2044
May 2022[(a)]	$450.0	5.65%	June 1 and December 1	June 1, 2052

(a) Denotes senior notes.

Our senior notes are senior unsecured obligations and rank equally with all our other senior unsecured indebtedness from time to time outstanding. The notes are effectively subordinated to all of our existing or future secured indebtedness and to the existing and future indebtedness of our subsidiaries. As is customary for such long-term debt instruments, each series of notes outstanding has terms that allow us to redeem the notes before maturity, in whole at any time or in part from time to time, at a redemption price equal to the greater of (i) 100% of the principal amount of these notes to be redeemed, or (ii) the sum of the present values of the remaining scheduled payments of principal and interest thereon (exclusive of interest accrued to the date of redemption) discounted to the redemption date on a semi-annual basis using the comparable government rate (as defined in the indentures governing these notes) plus between 25 and 40 basis points, depending on the series of notes, plus, in each case, accrued interest thereon to the date of redemption. Holders may require us to purchase such notes at 101% upon a change of control triggering event, as defined in the indentures. These notes are subject to typical events of default, including bankruptcy and insolvency events, nonpayment and the acceleration of certain subsidiary indebtedness of $40 million or more caused by a nonpayment default.

Our Euro notes issued in 2019 are unsecured and unsubordinated obligations and rank equally in right of payment to all our other unsecured senior obligations. The Euro notes are effectively subordinated to all of our existing or future secured indebtedness and to the existing and future indebtedness of our subsidiaries. As is customary for such long-term debt instruments, each series of notes outstanding has terms that allow us to redeem the notes before their maturity, in whole at any time or in part from time to time, at a redemption price equal to the greater of (i) 100% of the principal amount of the notes to be redeemed and (ii) the sum of the present values of the remaining scheduled payments of principal thereof and interest thereon (exclusive of interest accrued to, but excluding, the date of redemption) discounted to the redemption date on an annual basis using the bond rate (as defined in the indentures governing these notes) plus between 25 and 35 basis points, depending on the series of notes, plus, in each case, accrued and unpaid interest on the principal amount being redeemed to, but excluding, the date of redemption. Holders may require us to purchase such notes at 101% upon a change of control triggering event, as defined in the indentures. These notes are subject to typical events of default, including bankruptcy and insolvency events, nonpayment and the acceleration of certain subsidiary indebtedness exceeding $100 million caused by a nonpayment default.

On October 28, 2022, we amended our revolving, unsecured credit agreement (the “2018 Credit Agreement”), which provides for borrowings of up to $1.5 billion and matures on October 28, 2027. The 2018 Credit Agreement was originally dated as of June 21, 2018, and was previously amended on August 14, 2019, May 11, 2020 and December 10, 2021. Borrowings under the 2018 Credit Agreement bear interest at variable rates based on a benchmark rate depending on the currency in which the loans are denominated, plus an applicable margin which ranges from 0.910% to 1.375%, depending on the Company’s credit rating from Standard & Poor’s Ratings Services LLC (“S&P”), Moody’s Investors Services, Inc. (“Moody’s”) and Fitch Ratings, Inc. (“Fitch”). With respect to loans denominated in U.S. dollars, interest is calculated using the term Secured Overnight Financing Rate (“SOFR”) plus a term SOFR adjustment of 0.10%, plus the applicable margin. The applicable margin on the facility was 1.125% as of December 31, 2022. There were no borrowings outstanding under the 2018 Credit Agreement as of December 31, 2022.

On August 14, 2019, the Company entered into a $1.2 billion unsecured credit facility with several banks and other financial institutions, which was amended and restated on December 15, 2020 and again on December 10, 2021 (the “2019 Credit Facility”). On October 24, 2022, the 2019 Credit Facility was terminated, with the outstanding balance of $250 million repaid using cash on hand.

Borrowings under the 2018 Credit Agreement are conditioned upon satisfaction of certain conditions precedent, including the absence of defaults. The Company is subject to one financial covenant, as well as customary affirmative and negative covenants. The financial covenant requires that the Company’s consolidated net funded debt to consolidated EBITDA ratio (as such terms are defined in the 2018 Credit Agreement) be less than or equal to 3.50:1 for all fiscal quarters, subject to adjustments in accordance with the terms of the 2018 Credit Agreement relating to a consummation of an acquisition where the consideration includes cash proceeds from issuance of funded debt in excess of $500 million. The 2018 Credit Agreement also contains customary default provisions, including defaults for non-payment, breach of representations and warranties, insolvency, non-performance of covenants and cross-defaults to other material indebtedness. The occurrence of an event of default under the 2018 Credit Agreement could result in all loans and other obligations becoming immediately due and payable and the 2018 Credit Agreement being terminated.

On May 29, 2013, we entered into agreements to initiate a commercial paper program on a private placement basis under which we may issue unsecured commercial paper notes (the “Commercial Paper Notes”) from time-to-time up to a maximum aggregate principal amount outstanding at any time of $750.0 million. The proceeds from the issuance of the Commercial Paper Notes are expected to be used for general corporate purposes, including the repayment of other debt of the Company. The 2018

Credit Agreement is available to repay the Commercial Paper Notes, if necessary. Aggregate borrowings outstanding under the 2018 Credit Agreement and the Commercial Paper Notes will not exceed the $1.5 billion current maximum amount available under the 2018 Credit Agreement. The Commercial Paper Notes will be sold at a discount from par, or alternatively, will be sold at par and bear interest at rates that will vary based upon market conditions at the time of issuance. The maturities of the Commercial Paper Notes will vary but may not exceed 397 days from the date of issue. The definitive documents relating to the commercial paper program contain customary representations, warranties, default and indemnification provisions. There were no Commercial Paper Notes outstanding at December 31, 2022.

When constructing new facilities or making major enhancements to existing facilities, we may have the opportunity to enter into incentive agreements with local government agencies in order to reduce certain state and local tax expenditures. Under these agreements, we transfer the related assets to various local government entities and receive bonds. We immediately lease the facilities from the local government entities and have an option to repurchase the facilities for a nominal amount upon tendering the bonds to the local government entities at various predetermined dates. The bonds and the associated obligations for the leases of the facilities offset, and the underlying assets are recorded in property, plant and equipment. We currently have the ability to transfer up to $540 million in assets under these arrangements, however, at December 31, 2022, there are no amounts outstanding under these arrangements.

The non-current portion of our long-term debt amounted to $3.2 billion at December 31, 2022, compared to $2.0 billion at December 31, 2021. In addition, at December 31, 2022, we had the ability to borrow $1.5 billion under our commercial paper program and the 2018 Credit Agreement, and $179.0 million under other existing lines of credit, subject to various financial covenants under the 2018 Credit Agreement. We have the ability and intent to refinance our borrowings under our other existing credit lines with borrowings under the 2018 Credit Agreement, as applicable. Therefore, the amounts outstanding under those credit lines, if any, are classified as long-term debt. We believe that as of December 31, 2022 we were, and currently are, in compliance with all of our debt covenants. For additional information about our long-term debt obligations, see Note 14, “Long-Term Debt,” to our consolidated financial statements included in Part II, Item 8 of this report.

Off-Balance Sheet Arrangements

In the normal course of business with customers, vendors and others, we have entered into off-balance sheet arrangements, including bank guarantees and letters of credit, which totaled approximately $142.3 million at December 31, 2022. None of these off-balance sheet arrangements has, or is likely to have, a material effect on our current or future financial condition, results of operations, liquidity or capital resources.

Liquidity Outlook

We anticipate that cash on hand and cash provided by operating activities, divestitures and borrowings will be sufficient to pay our operating expenses, satisfy debt service obligations, fund any capital expenditures and share repurchases, make acquisitions, make pension contributions and pay dividends for the foreseeable future. Our main focus in the short-term, during the continued uncertainty surrounding the global economy, including caused by the ongoing COVID-19 pandemic and recent inflationary trends, is to continue to maintain financial flexibility by continuing our cost savings initiative, while still protecting our employees and customers, committing to shareholder returns and maintaining an investment grade rating. Over the next three years, in terms of uses of cash, we will continue to invest in growth of the businesses and return value to shareholders. Additionally, we will continue to evaluate the merits of any opportunities that may arise for acquisitions of businesses or assets, which may require additional liquidity.

Our growth investments include the recently completed acquisition all of the outstanding equity of Qinzhou for approximately $200 million in cash. Qinzhou's operations include a recently constructed lithium processing plant that has designed annual conversion capacity of up to 25,000 metric tons of LCE and is capable of producing battery-grade lithium carbonate and lithium hydroxide. In addition, we announced agreements for a strategic investment in China with plans to build a battery grade lithium conversion plant in Meishan initially targeting 50,000 metric tons of LCE per year. Construction of the Meishan facility is currently underway and is expected to be complete by the end of 2024.

In October 2022, we announced we had been awarded a nearly $150 million grant from the U.S. Department of Energy to expand domestic manufacturing of batteries for EVs and the electrical grid and for materials and components currently imported from other countries. The grant funding is intended to support a portion of the anticipated cost to construct a new, commercial-scale U.S.-based lithium concentrator facility at our Kings Mountain, North Carolina, location. We expect the concentrator facility to create hundreds of construction and full-time jobs, and to supply up to 350,000 metric tons per year of spodumene concentrate to our previously announced mega-flex lithium conversion facility.

Overall, with generally strong cash-generative businesses and no significant long-term debt maturities before November 2025, we believe we have, and will be able to maintain a solid liquidity position. Our annual maturities of long-term debt as of December 31, 2022 are as follows (in millions): 2023—$2.1; 2024—$0.0; 2025—$401.3; 2026—$0.0; 2027—$650.0; thereafter—$2,192.4. In addition, we expect to make interest payments on those long-term debt obligations as follows (in millions): 2023—$124.5; 2024—$124.5; 2025—$124.1; 2026—$119.8; 2027—$102.3; thereafter—$1,098.5. For variable-rate debt obligations, projected interest payments are calculated using the December 31, 2022 weighted average interest rate of approximately 0.07%.

In addition, we expect our capital expenditures to be between $1.7 billion and $1.9 billion in 2023, primarily for Energy Storage growth and capacity increases, including in Australia, Chile, China and Silver Peak, Nevada, as well as productivity and continuity of operations projects in all segments. As of December 31, 2022, we have also committed to approximately $350.7 million of payments to third-party vendors in the normal course of business to secure raw materials for our production processes, with approximately $161.2 million to be paid in 2023. In order to secure materials, sometimes for long durations, these contracts mandate a minimum amount of product to be purchased at predetermined rates over a set timeframe.

See Note 18, “Leases,” to our consolidated financial statements included in Part II, Item 8 of this report for our annual expected payments under our operating lease obligations at December 31, 2022.

In 2023, we expect to pay $41.8 million of the $233.5 million balance remaining from the transition tax on foreign earnings as a result of the Tax Cuts and Jobs Act (“TCJA”) signed into law in December 2017. The one-time transition tax imposed by the TCJA is based on our total post-1986 earnings and profits that we previously deferred from U.S. income taxes and is payable over an eight-year period, with the final payment made in 2026.

Contributions to our domestic and foreign qualified and nonqualified pension plans, including our supplemental executive retirement plan, are expected to approximate $15 million in 2023. We may choose to make additional pension contributions in excess of this amount. We made contributions of approximately $13.4 million to our domestic and foreign pension plans (both qualified and nonqualified) during the year ended December 31, 2022.

The liability related to uncertain tax positions, including interest and penalties, recorded in Other noncurrent liabilities totaled $83.7 million and $27.7 million at December 31, 2022 and 2021, respectively. Related assets for corresponding offsetting benefits recorded in Other assets totaled $32.4 million and $32.9 million at December 31, 2022 and 2021, respectively. We cannot estimate the amounts of any cash payments during the next twelve months associated with these liabilities and are unable to estimate the timing of any such cash payments in the future at this time.

Our cash flows from operations may be negatively affected by adverse consequences to our customers and the markets in which we compete as a result of moderating global economic conditions, continuing inflationary trends and reduced capital availability. We have experienced, and may continue to experience, volatility and increases in the price of certain raw materials and in transportation and energy costs as a result of global market and supply chain disruptions and the broader inflationary environment. In addition, the COVID-19 pandemic has not had a material impact on our liquidity to date; however, we cannot predict the overall impact in terms of cash flow generation as that will depend on the length and severity of the outbreak and any future pandemics and its and their impact. As a result, we are planning for various economic scenarios and actively monitoring our balance sheet to maintain the financial flexibility needed.

Although we maintain business relationships with a diverse group of financial institutions as sources of financing, an adverse change in their credit standing could lead them to not honor their contractual credit commitments to us, decline funding under our existing but uncommitted lines of credit with them, not renew their extensions of credit or not provide new financing to us. While the global corporate bond and bank loan markets remain strong, periods of elevated uncertainty related to the COVID-19 pandemic or future pandamic or global economic and/or geopolitical concerns may limit efficient access to such markets for extended periods of time. If such concerns heighten, we may incur increased borrowing costs and reduced credit capacity as our various credit facilities mature. If the U.S. Federal Reserve or similar national reserve banks in other countries decide to continue tightening the monetary supply, we may incur increased borrowing costs (as interest rates increase on our variable rate credit facilities, as our various credit facilities mature or as we refinance any maturing fixed rate debt obligations), although these cost increases would be partially offset by increased income rates on portions of our cash deposits.

On February 6, 2017, Huntsman International LLC (“Huntsman”), a subsidiary of Huntsman Corporation, filed a lawsuit in New York state court against Rockwood Holdings, Inc. (“Rockwood”), Rockwood Specialties, Inc., certain former executives of Rockwood and its subsidiaries, Seifollah Ghasemi, Thomas Riordan, Andrew Ross, and Michael Valente, and Albemarle. The lawsuit arises out of Huntsman’s acquisition of certain Rockwood subsidiaries in connection with a stock purchase agreement (the “SPA”), dated September 17, 2013. Before that transaction closed on October 1, 2014, Albemarle began discussions with Rockwood to purchase all outstanding equity of Rockwood and did so in a transaction that closed on

January 12, 2015. Huntsman’s complaint asserted that certain technology that Rockwood had developed for a production facility in Augusta, Georgia, and which was among the assets that Huntsman acquired pursuant to the SPA, did not work, and that Rockwood and the defendant executives had intentionally misled Huntsman about that technology in connection with the Huntsman-Rockwood transaction. The complaint asserted claims for, among other things, fraud, negligent misrepresentation, and breach of the SPA, and sought certain costs for completing construction of the production facility.

On March 10, 2017, Albemarle moved in New York state court to compel arbitration, which was granted on January 8, 2018 (although Huntsman unsuccessfully appealed that decision). Huntsman’s arbitration demand asserted claims substantially similar to those asserted in its state court complaint, and sought various forms of legal remedies, including cost overruns, compensatory damages, expectation damages, punitive damages, and restitution. After a trial, the arbitration panel issued an award on October 28, 2021, awarding approximately $600 million (including interest) to be paid by Albemarle to Huntsman, in addition to the possibility of attorney’s fees, costs and expenses. Following the arbitration panel decision, Albemarle reached a settlement with Huntsman to pay $665 million in two equal installments, with the first payment made in December 2021. The second and final payment of $332.5 million was made in May 2022. As a result, the consolidated statements of income for the year ended December 31, 2021, includes expense of $657.4 million ($508.5 million net of income tax), inclusive of estimated possible legal fees incurred by Huntsman and other related obligations, to reflect the increase in liabilities for this legal matter.

As first reported in 2018, following receipt of information regarding potential improper payments being made by third-party sales representatives of our Refining Solutions business, within our Catalysts segment, we promptly retained outside counsel and forensic accountants to investigate potential violations of the Company’s Code of Conduct, the Foreign Corrupt Practices Act, and other potentially applicable laws. Based on this internal investigation, we have voluntarily self-reported potential issues relating to the use of third-party sales representatives in our Refining Solutions business, within our Catalysts segment, to the U.S. Department of Justice (“DOJ”), the SEC, and the Dutch Public Prosecutor (“DPP”), and are cooperating with the DOJ, the SEC, and the DPP in their review of these matters. In connection with our internal investigation, we have implemented, and are continuing to implement, appropriate remedial measures. We have commenced discussions with the SEC, DOJ and DPP about a potential resolution of these matters.

At this time, we are unable to predict the duration, scope, result, or related costs associated with the investigations. We also are unable to predict what action may be taken by the DOJ, the SEC, or the DPP, or what penalties or remedial actions they may ultimately seek. Any determination that our operations or activities are not, or were not, in compliance with existing laws or regulations could result in the imposition of fines, penalties, disgorgement, equitable relief, or other losses. We do not believe, however, that any such fines, penalties, disgorgement, equitable relief, or other losses would have a material adverse effect on our financial condition or liquidity. However, an adverse resolution could have a material adverse effect on our results of operations in a particular period.

We had cash and cash equivalents totaling $1.5 billion as of December 31, 2022, of which $1.3 billion is held by our foreign subsidiaries. This cash represents an important source of our liquidity and is invested in bank accounts or money market investments with no limitations on access. The cash held by our foreign subsidiaries is intended for use outside of the U.S. We anticipate that any needs for liquidity within the U.S. in excess of our cash held in the U.S. can be readily satisfied with borrowings under our existing U.S. credit facilities or our commercial paper program.

Guarantor Financial Information

Albemarle Wodgina Pty Ltd Issued Notes

Albemarle Wodgina Pty Ltd (the “Issuer”), a wholly-owned subsidiary of Albemarle Corporation, issued $300.0 million aggregate principal amount of 3.45% Senior Notes due 2029 (the “3.45% Senior Notes”) in November 2019. The 3.45% Senior Notes are fully and unconditionally guaranteed (the “Guarantee”) on a senior unsecured basis by Albemarle Corporation (the “Parent Guarantor”). No direct or indirect subsidiaries of the Parent Guarantor guarantee the 3.45% Senior Notes (such subsidiaries are referred to as the “Non-Guarantors”).

In 2019, we completed the acquisition of a 60% interest in MRL’s Wodgina hard rock lithium mine project (“Wodgina Project”) in Western Australia and formed an unincorporated joint venture with MRL, named MARBL Lithium Joint Venture, for the exploration, development, mining, processing and production of lithium and other minerals (other than iron ore and tantalum) from the Wodgina spodumene mine and for the operation of the Kemerton assets in Western Australia. We participate in the Wodgina Project through our ownership interest in the Issuer.

The Parent Guarantor conducts its U.S. Bromine and Catalysts operations directly, and conducts its other operations (other than operations conducted through the Issuer) through the Non-Guarantors.

The 3.45% Senior Notes are the Issuer's senior unsecured obligations and rank equally in right of payment to the senior indebtedness of the Issuer, effectively subordinated to all of the secured indebtedness of the Issuer, to the extent of the value of the assets securing that indebtedness, and structurally subordinated to all indebtedness and other liabilities of its subsidiaries. The Guarantee is the senior unsecured obligation of the Parent Guarantor and ranks equally in right of payment to the senior indebtedness of the Parent Guarantor, effectively subordinated to the secured debt of the Parent Guarantor to the extent of the value of the assets securing the indebtedness and structurally subordinated to all indebtedness and other liabilities of its subsidiaries.

For cash management purposes, the Parent Guarantor transfers cash among itself, the Issuer and the Non-Guarantors through intercompany financing arrangements, contributions or declaration of dividends between the respective parent and its subsidiaries. The transfer of cash under these activities facilitates the ability of the recipient to make specified third-party payments for principal and interest on the Issuer and/or the Parent Guarantor's outstanding debt, common stock dividends and common stock repurchases. There are no significant restrictions on the ability of the Issuer or the Parent Guarantor to obtain funds from subsidiaries by dividend or loan.

The following tables present summarized financial information for the Parent Guarantor and the Issuer on a combined basis after elimination of (i) intercompany transactions and balances among the Issuer and the Parent Guarantor and (ii) equity in earnings from and investments in any subsidiary that is a Non-Guarantor. Each entity in the combined financial information follows the same accounting policies as described herein.

Summarized Statement of Operations

$ in thousands		**Year ended December 31, 2022**
Net sales[(a)]	$	2,981,170
Gross profit		636,894
Loss before income taxes and equity in net income of unconsolidated investments [(b)]		52,048
Net loss attributable to the Guarantor and the Issuer		119,551

(a) Includes net sales to Non-Guarantors of $2,155.7 million for the year ended December 31, 2022.
(b) Includes intergroup expenses to Non-Guarantors of $134.2 million for the year ended December 31, 2022.

Summarized Balance Sheet

$ in thousands		**At December 31, 2022**
Current assets[(a)]	$	1,274,018
Net property, plant and equipment		3,379,369
Other non-current assets[(b)]		687,603
Current liabilities[(c)]	$	2,103,749
Long-term debt		2,260,397
Other non-current liabilities[(d)]		7,173,636

(a) Includes receivables from Non-Guarantors of $605.3 million at December 31, 2022.
(b) Includes non-curent receivables from Non-Guarantors of $109.3 million at December 31, 2022.
(c) Includes current payables to Non-Guarantors of $1.6 billion at December 31, 2022.
(d) Includes non-current payables to Non-Guarantors of $6.6 billion at December 31, 2022.

The 3.45% Senior Notes are structurally subordinated to the indebtedness and other liabilities of the Non-Guarantors. The Non-Guarantors are separate and distinct legal entities and have no obligation, contingent or otherwise, to pay any amounts due pursuant to the 3.45% Senior Notes or the Indenture under which the 3.45% Senior Notes were issued, or to make any funds available therefor, whether by dividends, loans, distributions or other payments. Any right that the Parent Guarantor has to receive any assets of any of the Non-Guarantors upon the liquidation or reorganization of any Non-Guarantor, and the consequent rights of holders of the 3.45% Senior Notes to realize proceeds from the sale of any of a Non-Guarantor's assets, would be effectively subordinated to the claims of such Non-Guarantor's creditors, including trade creditors and holders of preferred equity interests, if any, of such Non-Guarantor. Accordingly, in the event of a bankruptcy, liquidation or reorganization of any of the Non-Guarantors, the Non-Guarantors will pay the holders of their debts, holders of preferred equity interests, if any, and their trade creditors before they will be able to distribute any of their assets to the Parent Guarantor.

The 3.45% Senior Notes are obligations of the Issuer. The Issuer's cash flow and ability to make payments on the 3.45% Senior Notes could be dependent upon the earnings it derives from the production from MARBL for the Wodgina Project. Absent income received from sales of its share of production from MARBL, the Issuer's ability to service the 3.45% Senior Notes could be dependent upon the earnings of the Parent Guarantor's subsidiaries and other joint ventures and the payment of those earnings to the Issuer in the form of equity, loans or advances and through repayment of loans or advances from the Issuer.

The Issuer's obligations in respect of MARBL are guaranteed by the Parent Guarantor. Further, under MARBL pursuant to a deed of cross security between the Issuer, the joint venture partner and the manager of the project (the "Manager"), each of the Issuer, and the joint venture partner have granted security to each other and the Manager for the obligations each of the Issuer and the joint venture partner have to each other and to the Manager. The claims of the joint venture partner, the Manager and other secured creditors of the Issuer will have priority as to the assets of the Issuer over the claims of holders of the 3.45% Senior Notes.

Albemarle Corporation Issued Notes

In March 2021, Albemarle New Holding GmbH (the "Subsidiary Guarantor"), a wholly-owned subsidiary of Albemarle Corporation, added a full and unconditional guarantee (the "Upstream Guarantee") to all securities of Albemarle Corporation (the "Parent Issuer") issued and outstanding as of such date and, subject to the terms of the applicable amendment or supplement, securities issuable by the Parent Issuer pursuant to the Indenture, dated as of January 20, 2005, as amended and supplemented from time to time (the "Indenture"). No other direct or indirect subsidiaries of the Parent Issuer guarantee these securities (such subsidiaries are referred to as the "Upstream Non-Guarantors"). See Long-term debt section above for a description of the securities issued by the Parent Issuer.

The current securities outstanding under the Indenture are the Parent Issuer's unsecured and unsubordinated obligations and rank equally in right of payment with all other unsecured and unsubordinated indebtedness of the Parent Issuer. All securities currently outstanding under the Indenture are effectively subordinated to the Parent Issuer's existing and future secured indebtedness to the extent of the value of the assets securing that indebtedness. With respect to any series of securities issued under the Indenture that is subject to the Upstream Guarantee (which series of securities does not include the 2022 Notes), the Upstream Guarantee is, and will be, an unsecured and unsubordinated obligation of the Subsidiary Guarantor, ranking pari passu with all other existing and future unsubordinated and unsecured indebtedness of the Subsidiary Guarantor. All securities currently outstanding under the Indenture (other than the 2022 Notes) are effectively subordinated to all existing and future indebtedness and other liabilities of the Parent's Subsidiaries other than the Subsidiary Guarantor. The 2022 Notes are effectively subordinated to all existing and future indebtedness and other liabilities of the Parent's Subsidiaries, including the Subsidiary Guarantor.

For cash management purposes, the Parent Issuer transfers cash among itself, the Subsidiary Guarantor and the Upstream Non-Guarantors through intercompany financing arrangements, contributions or declaration of dividends between the respective parent and its subsidiaries. The transfer of cash under these activities facilitates the ability of the recipient to make specified third-party payments for principal and interest on the Parent Issuer and/or the Subsidiary Guarantor's outstanding debt, common stock dividends and common stock repurchases. There are no significant restrictions on the ability of the Parent Issuer or the Subsidiary Guarantor to obtain funds from subsidiaries by dividend or loan.

The following tables present summarized financial information for the Subsidiary Guarantor and the Parent Issuer on a combined basis after elimination of (i) intercompany transactions and balances among the Parent Issuer and the Subsidiary Guarantor and (ii) equity in earnings from and investments in any subsidiary that is an Upstream Non-Guarantor.

Summarized Statement of Operations

$ in thousands		Year ended December 31, 2022
Net sales[(a)]	$	2,557,914
Gross profit		353,515
Loss before income taxes and equity in net income of unconsolidated investments [(b)]		(121,421)
Net loss attributable to the Subsidiary Guarantor and the Parent Issuer		(77,487)

(a) Includes net sales to Non-Guarantors of $1,752.5 million for the year ended December 31, 2022.
(b) Includes intergroup expenses to Non-Guarantors of $25.4 million for the year ended December 31, 2022.

Summarized Balance Sheet

$ in thousands		At December 31, 2022
Current assets[(a)]	$	1,261,682
Net property, plant and equipment		893,715
Other non-current assets[(b)]		1,783,357
Current liabilities[(c)]	$	1,981,456
Long-term debt		2,955,934
Other non-current liabilities[(d)]		6,393,534

(a) Includes current receivables from Non-Guarantors of $644.0 million at December 31, 2022.
(b) Includes noncurrent receivables from Non-Guarantors of $1.2 billion at December 31, 2022.
(c) Includes current payables to Non-Guarantors of $1.6 billion at December 31, 2022.
(d) Includes non-current payables to Non-Guarantors of $5.8 billion at December 31, 2022.

These securities are structurally subordinated to the indebtedness and other liabilities of the Upstream Non-Guarantors. The Upstream Non-Guarantors are separate and distinct legal entities and have no obligation, contingent or otherwise, to pay any amounts due pursuant to these securities or the Indenture under which these securities were issued, or to make any funds available therefor, whether by dividends, loans, distributions or other payments. Any right that the Subsidiary Guarantor has to receive any assets of any of the Upstream Non-Guarantors upon the liquidation or reorganization of any Upstream Non-Guarantors, and the consequent rights of holders of these securities to realize proceeds from the sale of any of an Upstream Non-Guarantor’s assets, would be effectively subordinated to the claims of such Upstream Non-Guarantor’s creditors, including trade creditors and holders of preferred equity interests, if any, of such Upstream Non-Guarantor. Accordingly, in the event of a bankruptcy, liquidation or reorganization of any of the Upstream Non-Guarantors, the Upstream Non-Guarantors will pay the holders of their debts, holders of preferred equity interests, if any, and their trade creditors before they will be able to distribute any of their assets to the Subsidiary Guarantor.

Safety and Environmental Matters

We are subject to federal, state, local and foreign requirements regulating the handling, manufacture and use of materials (some of which may be classified as hazardous or toxic by one or more regulatory agencies), the discharge of materials into the environment and the protection of the environment. To our knowledge, we are currently complying and expect to continue to comply in all material respects with applicable environmental laws, regulations, statutes and ordinances. Compliance with existing federal, state, local and foreign environmental protection laws is not currently expected to have a material effect on capital expenditures, earnings or our competitive position, but the costs associated with increased legal or regulatory requirements could have an adverse effect on our operating results.

Among other environmental requirements, we are subject to the federal Superfund law, and similar state laws, under which we may be designated as a PRP, and may be liable for a share of the costs associated with cleaning up various hazardous waste sites. Management believes that in cases in which we may have liability as a PRP, our liability for our share of cleanup is de minimis. Further, almost all such sites represent environmental issues that are quite mature and have been investigated, studied and in many cases settled. In de minimis situations, our policy generally is to negotiate a consent decree and to pay any apportioned settlement, enabling us to be effectively relieved of any further liability as a PRP, except for remote contingencies. In other than de minimis PRP matters, our records indicate that unresolved PRP exposures should be immaterial. We accrue and expense our proportionate share of PRP costs. Because management has been actively involved in evaluating environmental matters, we are able to conclude that the outstanding environmental liabilities for unresolved PRP sites should not have a material adverse effect upon our results of operations or financial condition.

Our environmental and safety operating costs charged to expense were $46.3 million, $43.2 million and $44.9 million in 2022, 2021 and 2020, respectively, excluding depreciation of previous capital expenditures, and are expected to be in the same range in the next few years. Costs for remediation have been accrued and payments related to sites are charged against accrued liabilities, which at December 31, 2022 totaled approximately $38.2 million, a decrease of $8.4 million from $46.6 million at December 31, 2021. See Note 17, “Commitments and Contingencies” to our consolidated financial statements included in Part II, Item 8 of this report for a reconciliation of our environmental liabilities for the years ended December 31, 2022, 2021 and 2020.

We believe that any sum we may be required to pay in connection with environmental remediation and asset retirement obligation matters in excess of the amounts recorded should occur over a period of time and should not have a material adverse effect upon our results of operations, financial condition or cash flows on a consolidated annual basis, although any such sum could have a material adverse impact on our results of operations, financial condition or cash flows in a particular quarterly reporting period.

Capital expenditures for pollution-abatement and safety projects, including such costs that are included in other projects, were approximately $75.6 million, $55.4 million and $40.4 million in 2022, 2021 and 2020, respectively. In the future, capital expenditures for these types of projects may increase due to more stringent environmental regulatory requirements and our efforts in reaching sustainability goals. Management’s estimates of the effects of compliance with governmental pollution-abatement and safety regulations are subject to (a) the possibility of changes in the applicable statutes and regulations or in judicial or administrative construction of such statutes and regulations and (b) uncertainty as to whether anticipated solutions to pollution problems will be successful, or whether additional expenditures may prove necessary.

Recently Issued Accounting Pronouncements

See Note 1, “Summary of Significant Accounting Policies” to our consolidated financial statements included in Part II, Item 8 of this report for a discussion of our Recently Issued Accounting Pronouncements.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk.

The primary currencies to which we have foreign currency exchange rate exposure are the Chinese Renminbi, Euro, Australian Dollar, Chilean Peso and Japanese Yen. In response to greater fluctuations in foreign currency exchange rates in recent periods, we have increased the degree of exposure risk management activities to minimize the potential impact on earnings.

We manage our foreign currency exposures by balancing certain assets and liabilities denominated in foreign currencies and through the use, from time to time, of foreign currency forward contracts. The principal objective of such contracts is to minimize the financial impact of changes in foreign currency exchange rates. The counterparties to these contractual agreements are major financial institutions with which we generally have other financial relationships. We are exposed to credit loss in the event of nonperformance by these counterparties. However, we do not anticipate nonperformance by the counterparties. We do not utilize financial instruments for trading or other speculative purposes.

The primary method we use to reduce foreign currency exposure is to identify natural hedges, in which the operating activities denominated in respective currencies across various subsidiaries balance in respect to timing and the underlying exposures. In the event a natural hedge is not available, we may employ a forward contract to reduce exposure, generally expiring within one year. While these contracts are subject to fluctuations in value, such fluctuations are intended to offset the changes in the value of the underlying exposures being hedged. In the fourth quarter of 2019, we entered into a foreign currency forward contract to hedge the cash flow exposure of non-functional currency purchases during the construction of the Kemerton plant in Australia. This contract has been designated as an effective hedging instrument, and beginning the date of designation, gains or losses on the revaluation of this contract to our reporting currency have been and will be recorded in Accumulated other comprehensive loss. All other gains and losses on foreign currency forward contracts not designated as an effective hedging instrument are recognized in Other income (expenses), net, and generally do not have a significant impact on results of operations.

At December 31, 2022, our financial instruments subject to foreign currency exchange risk consisted of foreign currency forward contracts with an aggregate notional value of $2.9 billion and with a fair value representing a net asset position of $2.8 million. The aggregate notional value of foreign currency forward contracts increased in 2022 due to increased balance sheet exposure from higher sales and income in foreign-denominated currencies. Fluctuations in the value of these contracts are intended to offset the changes in the value of the underlying exposures being hedged. We conducted a sensitivity analysis on the fair value of our foreign currency hedge portfolio assuming an instantaneous 10% change in select foreign currency exchange rates from their levels as of December 31, 2022, with all other variables held constant. A 10% appreciation of the U.S. Dollar against foreign currencies that we hedge would result in a decrease of approximately $30.0 million in the fair value of our foreign currency forward contracts. A 10% depreciation of the U.S. Dollar against these foreign currencies would result in an increase of approximately $15.2 million in the fair value of our foreign currency forward contracts. The sensitivity of the fair value of our foreign currency hedge portfolio represents changes in fair values estimated based on market conditions as of December 31, 2022, without reflecting the effects of underlying anticipated transactions. When those anticipated transactions are realized, actual effects of changing foreign currency exchange rates could have a material impact on our earnings and cash flows in future periods.

On December 18, 2014, the carrying value of our 1.875% Euro-denominated senior notes was designated as an effective hedge of our net investment in foreign subsidiaries where the Euro serves as the functional currency, and beginning on the date of designation, gains or losses on the revaluation of these senior notes to our reporting currency have been were recorded in Accumulated other comprehensive loss. In the first quarter of 2021, we repaid the outstanding balance of these senior notes, and as a result, this net investment hedge was discontinued. The balance of foreign exchange revaluation gains and losses associated with this discontinued net investment hedge will remain within accumulated other comprehensive loss until the hedged net investment is sold or liquidated.

We are exposed to changes in interest rates that could impact our results of operations and financial condition. We manage global interest rate and foreign exchange exposure as part of our regular operational and financing strategies. We had variable interest rate borrowings of $14.4 million and $393.7 million outstanding at December 31, 2022 and 2021, respectively. These borrowings represented less than 1% and 16% of total outstanding debt and bore average interest rates of 0.07% and 0.40% at December 31, 2022 and 2021, respectively. A hypothetical 100 basis point increase in the average interest rate applicable to these borrowings would change our annualized interest expense by approximately $0.1 million as of December 31, 2022. We may enter into interest rate swaps, collars or similar instruments with the objective of reducing interest rate volatility relating to our borrowing costs.

Our raw materials are subject to price volatility caused by weather, supply conditions, political and economic variables and other unpredictable factors. Historically, we have not used futures, options or swap contracts to manage the volatility related to the above exposures. However, the refinery catalysts business has used financing arrangements to provide long-term protection against changes in natural gas and metals prices. We seek to limit our exposure by entering into long-term contracts when available, and we seek price increase limitations through contracts. These contracts do not have a significant impact on our results of operations.

Item 8. Financial Statements and Supplementary Data.

MANAGEMENT'S REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING

Our management is responsible for establishing and maintaining adequate internal control over financial reporting as defined in Exchange Act Rule 13a-15(f) and 15d-15(f). Our internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with accounting principles generally accepted in the United States. Our internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of assets; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with accounting principles generally accepted in the United States, and that receipts and expenditures of the Company are being made only in accordance with management's and our directors' authorizations; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of our assets that could have a material effect on the financial statements.

Under the supervision and with the participation of our management, including our principal executive officer and principal financial officer, we conducted an evaluation of the effectiveness of our internal control over financial reporting as of December 31, 2022. In making this assessment, management used the criteria for effective internal control over financial reporting described in the *Internal Control—Integrated Framework 2013* set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Based on the assessment, management concluded that, as of December 31, 2022, our internal control over financial reporting was effective to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles in the United States. The concept of reasonable assurance is based on the recognition that there are inherent limitations in all systems of internal control. Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Our management's assessment of internal control over financial reporting as of December 31, 2022 excludes the Guangxi Tianyuan New Energy Materials Co., Ltd. ("Qinzhou") business because it was acquired in a purchase business combination during 2022. Quinzhou is a wholly-owned subsidiary whose total assets and total revenues represent 1% and 0%, respectively, of the related consolidated financial statement amounts as of and for the year ended December 31, 2022.

The effectiveness of our internal control over financial reporting as of December 31, 2022 has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in their report which is included herein.

/S/ J. KENT MASTERS

J. Kent Masters
Chairman, President and Chief Executive Officer
(principal executive officer)
February 15, 2023

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Shareholders of Albemarle Corporation

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of Albemarle Corporation and its subsidiaries (the “Company”) as of December 31, 2022 and 2021, and the related consolidated statements of income, of comprehensive income, of changes in equity and of cash flows for each of the three years in the period ended December 31, 2022, including the related notes (collectively referred to as the “consolidated financial statements”). We also have audited the Company’s internal control over financial reporting as of December 31, 2022, based on criteria established in *Internal Control—Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2022 and 2021, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2022 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2022, based on criteria established in *Internal Control—Integrated Framework* (2013) issued by the COSO.

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management’s Report on Internal Control over Financial Reporting. Our responsibility is to express opinions on the Company’s consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

As described in Management’s Report on Internal Control over Financial Reporting, management has excluded Guangxi Albemarle Lithium Co., Ltd. from its assessment of internal control over financial reporting as of December 31, 2022 because it was acquired by the Company in a purchase business combination during 2022. We have also excluded Guangxi Albemarle Lithium Co., Ltd. from our audit of internal control over financial reporting. Guangxi Albemarle Lithium Co., Ltd. is a wholly-owned subsidiary whose total assets and total revenues excluded from management’s assessment and our audit of internal control over financial reporting represent 1% and 0%, respectively, of the related consolidated financial statement amounts as of and for the year ended December 31, 2022.

Definition and Limitations of Internal Control over Financial Reporting

A company’s internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company’s internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Critical Audit Matters

The critical audit matter communicated below is a matter arising from the current period audit of the consolidated financial statements that was communicated or required to be communicated to the audit committee and that (i) relates to accounts or disclosures that are material to the consolidated financial statements and (ii) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matter below, providing a separate opinion on the critical audit matter or on the accounts or disclosures to which it relates.

Goodwill Impairment Assessment – Refining Solutions Reporting Unit

As described in Notes 1 and 12 to the consolidated financial statements, the Company's goodwill balance was $1,618 million as of December 31, 2022, and the goodwill associated with the Refining Solutions reporting unit was $166 million. Management conducts an impairment test as of October 31 of each year, or more frequently if events or circumstances indicate that the carrying value of goodwill may be impaired. Potential impairment is identified by comparing the fair value of a reporting unit to its carrying value, including goodwill. Fair value is estimated by management using present value techniques involving future cash flows. Management's cash flow projections for the Refining Solutions reporting unit included significant judgment and assumptions relating to revenue growth rates, adjusted EBITDA margins and the discount rate.

The principal considerations for our determination that performing procedures relating to the goodwill impairment assessment of the Refining Solutions reporting unit is a critical audit matter are (i) the significant judgment by management when developing the fair value measurement of the reporting unit; (ii) a high degree of auditor judgment, subjectivity, and effort in performing procedures and evaluating management's significant assumptions related to revenue growth rates, adjusted EBITDA margins, and the discount rate; and (iii) the audit effort involved the use of professionals with specialized skill and knowledge.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to management's goodwill impairment assessment, including controls over the valuation of the Refining Solutions reporting unit. These procedures also included, among others (i) testing management's process for developing the fair value estimate of the Refining Solutions reporting unit; (ii) evaluating the appropriateness of the discounted cash flow model; (iii) testing the completeness and accuracy of underlying data used in the model; and (iv) evaluating the significant assumptions used by management related to the revenue growth rates, adjusted EBITDA margins, and the discount rate. Evaluating management's assumptions related to the revenue growth rates and adjusted EBITDA margins involved evaluating whether the assumptions used by management were reasonable considering (i) the current and past performance of the reporting unit; (ii) the consistency with external economic and industry data; and (iii) whether these assumptions were consistent with evidence obtained in other areas of the audit. Professionals with specialized skill and knowledge were used to assist in the evaluation of the Company's discounted cash flow model and the discount rate assumption.

/s/ PricewaterhouseCoopers LLP
Charlotte, North Carolina
February 15, 2023

We have served as the Company's auditor since 1994.

(In Thousands, Except Per Share Amounts) **Year Ended December 31**	2022	2021	2020
Net sales	$ 7,320,104	$ 3,327,957	$ 3,128,909
Cost of goods sold	4,245,517	2,329,986	2,134,056
Gross profit	3,074,587	997,971	994,853
Selling, general and administrative expenses	524,145	441,482	429,827
Research and development expenses	71,981	54,026	59,214
Loss (gain) on sale of business/interest in properties, net	8,400	(295,971)	—
Operating profit	2,470,061	798,434	505,812
Interest and financing expenses	(122,973)	(61,476)	(73,116)
Other income (expenses), net	86,356	(603,340)	(59,177)
Income before income taxes and equity in net income of unconsolidated investments	2,433,444	133,618	373,519
Income tax expense	390,588	29,446	54,425
Income before equity in net income of unconsolidated investments	2,042,856	104,172	319,094
Equity in net income of unconsolidated investments (net of tax)	772,275	95,770	127,521
Net income	2,815,131	199,942	446,615
Net income attributable to noncontrolling interests	(125,315)	(76,270)	(70,851)
Net income attributable to Albemarle Corporation	$ 2,689,816	$ 123,672	$ 375,764
Basic earnings per share	$ 22.97	$ 1.07	$ 3.53
Diluted earnings per share	$ 22.84	$ 1.06	$ 3.52
Weighted-average common shares outstanding—basic	117,120	115,841	106,402
Weighted-average common shares outstanding—diluted	117,793	116,536	106,808

See accompanying notes to the consolidated financial statements.

(In Thousands) **Year Ended December 31**	**2022**	**2021**	**2020**
Net income	$ 2,815,131	$ 199,942	$ 446,615
Other comprehensive (loss) income, net of tax:			
Foreign currency translation and other	(171,295)	(74,385)	99,832
Net investment hedge	—	5,110	(34,185)
Cash flow hedge	(4,399)	174	1,602
Interest rate swap	7,399	2,623	2,601
Total other comprehensive (loss) income, net of tax	(168,295)	(66,478)	69,850
Comprehensive income	2,646,836	133,464	516,465
Comprehensive income attributable to noncontrolling interests	(125,232)	(76,110)	(71,098)
Comprehensive income attributable to Albemarle Corporation	$ 2,521,604	$ 57,354	$ 445,367

See accompanying notes to the consolidated financial statements.

(In Thousands) December 31	2022	2021
Assets		
Current assets:		
Cash and cash equivalents	$ 1,499,142	$ 439,272
Trade accounts receivable, less allowance for doubtful accounts (2022—$ 2,534; 2021—$2,559)	1,190,970	556,922
Other accounts receivable	185,819	66,184
Inventories	2,076,031	798,620
Other current assets	234,955	132,683
Total current assets	5,186,917	1,993,681
Property, plant and equipment, at cost	9,354,330	8,074,746
Less accumulated depreciation and amortization	2,391,333	2,165,130
Net property, plant and equipment	6,962,997	5,909,616
Investments	1,150,553	912,008
Other assets	250,558	252,239
Goodwill	1,617,627	1,597,627
Other intangibles, net of amortization	287,870	308,947
Total assets	$ 15,456,522	$ 10,974,118
Liabilities and Equity		
Current liabilities:		
Accounts payable to third parties	$ 1,533,624	$ 600,487
Accounts payable to related parties	518,377	47,499
Accrued expenses	505,894	763,293
Current portion of long-term debt	2,128	389,920
Dividends payable	46,116	45,469
Income taxes payable	134,876	27,667
Total current liabilities	2,741,015	1,874,335
Long-term debt	3,214,972	2,004,319
Postretirement benefits	32,751	43,693
Pension benefits	159,571	229,187
Other noncurrent liabilities	636,596	663,698
Deferred income taxes	480,770	353,279
Commitments and contingencies (Note 17)		
Equity:		
Albemarle Corporation shareholders' equity:		
Common stock, $.01 par value (authorized 150,000 shares), issued and outstanding — 117,168 in 2022 and 117,015 in 2021	1,172	1,170
Additional paid-in capital	2,940,840	2,920,007
Accumulated other comprehensive loss	(560,662)	(392,450)
Retained earnings	5,601,277	3,096,539
Total Albemarle Corporation shareholders' equity	7,982,627	5,625,266
Noncontrolling interests	208,220	180,341
Total equity	8,190,847	5,805,607
Total liabilities and equity	$ 15,456,522	$ 10,974,118

See accompanying notes to the consolidated financial statements.

(In Thousands, Except Share Data)

	Common Stock		Additional Paid-in Capital	Accumulated Other Comprehensive (Loss) Income	Retained Earnings	Total Albemarle Shareholders' Equity	Noncontrolling Interests	Total Equity
	Shares	Amounts						
Balance at January 1, 2020	106,040,215	$ 1,061	$ 1,383,446	$ (395,735)	$ 2,943,478	$ 3,932,250	$ 161,330	$ 4,093,580
Net income					375,764	375,764	70,851	446,615
Other comprehensive income				69,603		69,603	247	69,850
Cash dividends declared, $1.54 per common share					(163,990)	(163,990)	(32,061)	(196,051)
Stock-based compensation			19,306			19,306		19,306
Exercise of stock options	682,068	7	40,430			40,437		40,437
Issuance of common stock, net	185,918	2	(2)			—		—
Shares withheld for withholding taxes associated with common stock issuances	(65,832)	(1)	(5,142)			(5,143)		(5,143)
Balance at December 31, 2020	106,842,369	$ 1,069	$ 1,438,038	$ (326,132)	$ 3,155,252	$ 4,268,227	$ 200,367	$ 4,468,594
Net income					123,672	123,672	76,270	199,942
Other comprehensive loss				(66,318)		(66,318)	(160)	(66,478)
Cash dividends declared, $1.56 per common share					(182,385)	(182,385)	(96,136)	(278,521)
Stock-based compensation			18,818			18,818		18,818
Fees related to public issuance of common stock			(888)			(888)		(888)
Exercise of stock options	302,151	3	18,389			18,392		18,392
Issuance of common stock, net	9,919,755	99	1,453,789			1,453,888		1,453,888
Shares withheld for withholding taxes associated with common stock issuances	(48,942)	(1)	(8,139)			(8,140)		(8,140)
Balance at December 31, 2021	117,015,333	$ 1,170	$ 2,920,007	$ (392,450)	$ 3,096,539	$ 5,625,266	$ 180,341	$ 5,805,607
Net income					2,689,816	2,689,816	125,315	2,815,131
Other comprehensive loss				(168,212)		(168,212)	(83)	(168,295)
Cash dividends declared, $1.58 per common share					(185,078)	(185,078)	(97,353)	(282,431)
Stock-based compensation			31,390			31,390		31,390
Exercise of stock options	32,581	1	2,395			2,396		2,396
Issuance of common stock, net	186,768	2	385			387		387
Shares withheld for withholding taxes associated with common stock issuances	(66,316)	(1)	(13,337)			(13,338)		(13,338)
Balance at December 31, 2022	117,168,366	$ 1,172	$ 2,940,840	$ (560,662)	$ 5,601,277	$ 7,982,627	$ 208,220	$ 8,190,847

See accompanying notes to the consolidated financial statements.

(In Thousands) Year Ended December 31	2022	2021	2020
Cash and cash equivalents at beginning of year	$ 439,272	$ 746,724	$ 613,110
Cash flows from operating activities:			
Net income	2,815,131	199,942	446,615
Adjustments to reconcile net income to cash flows from operating activities:			
Depreciation and amortization	300,841	254,000	231,984
Gain on sale of business/interest in properties, net	8,400	(295,971)	(7,168)
Stock-based compensation and other	30,474	20,120	22,837
Equity in net income of unconsolidated investments (net of tax)	(772,275)	(95,770)	(127,521)
Dividends received from unconsolidated investments and nonmarketable securities	801,239	78,391	88,161
Pension and postretirement (benefit) expense	(52,254)	(74,010)	45,658
Pension and postretirement contributions	(16,112)	(30,253)	(16,434)
Unrealized gain on investments in marketable securities	3,279	(3,818)	(4,635)
Loss on early extinguishment of debt	19,219	28,955	—
Deferred income taxes	93,339	(38,500)	(1,976)
Changes in current assets and liabilities, net of effects of acquisitions and divestitures:			
(Increase) decrease in accounts receivable	(786,121)	(49,295)	100,118
(Increase) decrease in inventories	(1,609,642)	(127,401)	51,978
(Increase) decrease in other current assets	(104,655)	17,411	7,902
Increase (decrease) in accounts payable	1,287,072	143,939	(31,519)
(Decrease) increase in accrued expenses and income taxes payable	(201,356)	127,068	(215,011)
Non-cash transfer of 40% value of construction in progress of Kemerton plant to MRL	122,682	135,928	179,437
Other, net	(31,412)	53,521	28,488
Net cash provided by operating activities	1,907,849	344,257	798,914
Cash flows from investing activities:			
Acquisitions, net of cash acquired	(162,239)	—	(22,572)
Capital expenditures	(1,261,646)	(953,667)	(850,477)
Cash proceeds from divestitures, net	—	289,791	—
Proceeds from sale of joint venture	—	—	11,000
Sales of marketable securities, net	1,942	3,774	903
Investments in equity and other corporate investments	(706)	(6,488)	(2,427)
Net cash used in investing activities	(1,422,649)	(666,590)	(863,573)
Cash flows from financing activities:			
Proceeds from issuance of common stock	—	1,453,888	—
Proceeds from borrowings of other long-term debt	1,964,216	—	452,163
Repayments of long-term debt and credit agreements	(705,000)	(1,173,823)	(250,000)
Other (repayments) borrowings, net	(391,662)	60,991	137,635
Fees related to early extinguishment of debt	(9,767)	(24,877)	—
Dividends paid to shareholders	(184,429)	(177,853)	(161,818)
Dividends paid to noncontrolling interests	(44,208)	(96,136)	(32,061)
Proceeds from exercise of stock options	2,783	18,392	40,437
Withholding taxes paid on stock-based compensation award distributions	(13,338)	(8,140)	(5,143)
Other	(6,708)	(2,230)	(3,952)
Net cash provided by financing activities	611,887	50,212	177,261
Net effect of foreign exchange on cash and cash equivalents	(37,217)	(35,331)	21,012
Increase (decrease) in cash and cash equivalents	1,059,870	(307,452)	133,614
Cash and cash equivalents at end of year	$ 1,499,142	$ 439,272	$ 746,724

See accompanying notes to the consolidated financial statements.

NOTE 1—Summary of Significant Accounting Policies:

Basis of Consolidation

The consolidated financial statements include the accounts and operations of Albemarle Corporation and our wholly owned, majority owned and controlled subsidiaries. Unless the context otherwise indicates, the terms “Albemarle,” “we,” “us,” “our” or “the Company” mean Albemarle Corporation and its consolidated subsidiaries. For entities that we control and are the primary beneficiary, but own less than 100%, we record the minority ownership as noncontrolling interest, except as noted below. We apply the equity method of accounting for investments in which we have an ownership interest from 20% to 50% or where we exercise significant influence over the related investee’s operations. In addition, the consolidated financial statements contained herein include our 60% proportionate share of the results of operations of the MARBL Lithium Joint Venture (“MARBL”), which manages the exploration, development, mining, processing and production of lithium and other minerals from the Wodgina hard rock lithium mine project (“Wodgina Project”). The joint venture is unincorporated with each investor holding an undivided interest in each asset and proportionately liable for each liability; therefore our proportionate share of assets, liabilities, revenue and expenses are included in the appropriate classifications in the consolidated financial statements. All significant intercompany accounts and transactions are eliminated in consolidation.

Interest and financing expenses for the year ended December 31, 2022 includes an expense of $ 17.5 million for the correction of out-of-period errors regarding overstated capitalized interest values in prior periods. For the years ended December 31, 2021, 2020 and 2019, Interest expense was understated by $11.4 million, $5.5 million and $0.6 million, respectively. The Company does not believe these adjustments are material to the consolidated financial statements for any of the prior periods presented or to the year ended December 31, 2022, in which they were corrected.

Estimates, Assumptions and Reclassifications

The preparation of financial statements in conformity with generally accepted accounting principles (“GAAP”) in the United States (“U.S.”) requires management to make estimates and assumptions that affect the reported amounts of revenues, expenses, assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements. Actual results could differ from those estimates.

Revenue Recognition

Revenue is measured as the amount of consideration we expect to receive in exchange for transferring goods or providing services, and is recognized when performance obligations are satisfied under the terms of contracts with our customers. A performance obligation is deemed to be satisfied when control of the product or service is transferred to our customer. The transaction price of a contract, or the amount we expect to receive upon satisfaction of all performance obligations, is determined by reference to the contract’s terms and includes adjustments, if applicable, for any variable consideration, such as customer rebates, noncash consideration or consideration payable to the customer, although these adjustments are generally not material. Where a contract contains more than one distinct performance obligation, the transaction price is allocated to each performance obligation based on the standalone selling price of each performance obligation, although these situations do not occur frequently and are generally not built into our contracts. Any unsatisfied performance obligations are not material. Standalone selling prices are based on prices we charge to our customers, which in some cases are based on established market prices. Sales and other similar taxes collected from customers on behalf of third parties are excluded from revenue. Our payment terms are generally between 30 to 90 days, however, they vary by market factors, such as customer size, creditworthiness, geography and competitive environment.

All of our revenue is derived from contracts with customers, and almost all of our contracts with customers contain one performance obligation for the transfer of goods where such performance obligation is satisfied at a point in time. Control of a product is deemed to be transferred to the customer upon shipment or delivery. Significant portions of our sales are sold free on board shipping point or on an equivalent basis, while delivery terms of other transactions are based upon specific contractual arrangements. Our standard terms of delivery are generally included in our contracts of sale, order confirmation documents and invoices, while the timing between shipment and delivery generally ranges between 1 and 45 days. Costs for shipping and handling activities, whether performed before or after the customer obtains control of the goods, are accounted for as fulfillment costs.

The Company currently utilizes the following practical expedients, as permitted by Accounting Standards Codification (“ASC”) 606, *Revenue from Contracts with Customers*:

- All sales and other pass-through taxes are excluded from contract value;

- In utilizing the modified retrospective transition method, no adjustment was necessary for contracts that did not cross over the reporting year;
- We will not consider the possibility of a contract having a significant financing component (which would effectively attribute a portion of the sales price to interest income) unless, if at contract inception, the expected payment terms (from time of delivery or other relevant criterion) are more than one year;
- If our right to customer payment is directly related to the value of our completed performance, we recognize revenue consistent with the invoicing right; and
- We expense as incurred all costs of obtaining a contract incremental to any costs/compensation attributable to individual product sales/shipments for contracts where the amortization period for such costs would otherwise be one year or less.

Certain products we produce are made to our customer's specifications where such products have limited alternative use or would need significant rework costs in order to be sold to another customer. In management's judgment, control of these arrangements is transferred to the customer at a point in time (upon shipment or delivery) and not over the time they are produced. Therefore revenue is recognized upon shipment or delivery of these products.

Costs incurred to obtain contracts with customers are not significant and are expensed immediately as the amortization period would be one year or less. When the Company incurs pre-production or other fulfillment costs in connection with an existing or specific anticipated contract and such costs are recoverable through margin or explicitly reimbursable, such costs are capitalized and amortized to Cost of goods sold on a systematic basis that is consistent with the pattern of transfer to the customer of the goods or services to which the asset relates, which is less than one year. We record bad debt expense in specific situations when we determine the customer is unable to meet its financial obligation.

Included in Trade accounts receivable at December 31, 2022 and 2021 is approximately $ 1.0 billion and $544.1 million, respectively, arising from contracts with customers. The remaining balance of Trade accounts receivable at December 31, 2022 and 2021 primarily includes value-added taxes collected from customers on behalf of various taxing authorities.

Cash and Cash Equivalents

Cash and cash equivalents include cash and money market investments with insignificant interest rate risks and no limitations on access.

Inventories

Inventories are stated at lower of cost and net realizable value with cost determined primarily on the first-in, first-out basis. Cost is determined on the weighted-average basis for a small portion of our inventories at foreign plants and our stores, supplies and other inventory. A portion of our domestic produced finished goods and raw materials are determined on the last-in, first-out basis. The balance of deferred profits on sales from its equity method investments to the Company are recorded to finished goods.

Property, Plant and Equipment

Property, plant and equipment include costs of assets constructed, purchased or leased under a finance lease, related delivery and installation costs and interest incurred on significant capital projects during their construction periods. Expenditures for renewals and betterments also are capitalized, but expenditures for normal repairs and maintenance are expensed as incurred. Costs associated with yearly planned major maintenance are generally deferred and amortized over 12 months or until the same major maintenance activities must be repeated, whichever is shorter. The cost and accumulated depreciation applicable to assets retired or sold are removed from the respective accounts, and gains or losses thereon are included in income.

We assign the useful lives of our property, plant and equipment based upon our internal engineering estimates which are reviewed periodically. The estimated useful lives of our property, plant and equipment range from two to sixty years and depreciation is recorded on the straight-line method, with the exception of our mineral rights and reserves, which are depleted on a units-of-production method.

We evaluate the recovery of our property, plant and equipment by comparing the net carrying value of the asset group to the undiscounted net cash flows expected to be generated from the use and eventual disposition of that asset group when events or changes in circumstances indicate that its carrying amount may not be recoverable. If the carrying amount of the asset group is not recoverable, the fair value of the asset group is measured and if the carrying amount exceeds the fair value, an impairment loss is recognized.

Leases

We determine if an arrangement is a lease at inception. Right-of-use (“ROU”) assets represent our right to use an underlying asset for the lease term and lease liabilities represent our obligation to make lease payments arising from the lease. Operating lease ROU assets and liabilities are recognized at commencement date based on the present value of lease payments over the lease term. As an implicit rate for most of our leases is not determinable, we use our incremental borrowing rate based on the information available at commencement date in determining the present value of lease payments. The lease payments for the initial measurement of lease ROU assets and lease liabilities include fixed and variable payments based on an index or a rate. Variable lease payments that are not index or rate based are recorded as expenses when incurred. Our variable lease payments typically include real estate taxes, insurance costs and common-area maintenance. The operating lease ROU asset also includes any lease payments made, net of lease incentives. The lease term is the non-cancelable period of the lease, including any options to extend, purchase or terminate the lease when it is reasonably certain that we will exercise that option. We amortize the operating lease ROU assets on a straight-line basis over the period of the lease and the finance lease ROU assets on a straight-line basis over the shorter of their estimated useful lives or the lease terms. Leases with an initial term of 12 months or less are not recorded on the balance sheet, and we recognize lease expense for these leases on a straight-line basis over the lease term.

Additionally, we have made accounting policy elections such as exclusion of short-term leases (leases with a term of 12 months or less and which do not include a purchase option that we are reasonably certain to exercise) from the balance sheet presentation, use of portfolio approach in determination of discount rate and accounting for non-lease components in a contract as part of a single lease component for all asset classes, except specific mining operation equipment.

Resource Development Expenses

We incur costs in resource exploration, evaluation and development during the different phases of our resource development projects. Exploration costs incurred before the declaration of proven and probable resources are generally expensed as incurred. After proven and probable resources are declared, exploration, evaluation and development costs necessary to bring the property to commercial capacity or increase the capacity or useful life are capitalized. Any costs to maintain the production capacity in a property under production are expensed as incurred.

Capitalized resource costs are depleted using the units-of-production method. Our resource development assets are evaluated for impairment when events or changes in circumstances indicate that the carrying amount may not be recoverable.

Investments

Investments are accounted for using the equity method of accounting if the investment gives us the ability to exercise significant influence, but not control, over the investee. Significant influence is generally deemed to exist if we have an ownership interest in the voting stock of the investee between 20% and 50%, although other factors, such as representation on the investee’s board of directors and the impact of commercial arrangements, are considered in determining whether the equity method of accounting is appropriate. Under the equity method of accounting, we record our investments in equity-method investees in the consolidated balance sheets as Investments and our share of investees’ earnings or losses together with other-than-temporary impairments in value as Equity in net income of unconsolidated investments in the consolidated statements of income. We evaluate our equity method investments for impairment whenever events or changes in circumstances indicate that the carrying amounts of such investments may be impaired. If a decline in the value of an equity method investment is determined to be other than temporary, a loss is recorded in earnings in the current period.

Certain mutual fund investments are accounted for as trading equities and are marked-to-market on a periodic basis through the consolidated statements of income. Investments in joint ventures and nonmarketable securities of immaterial entities are estimated based upon the overall performance of the entity where financial results are not available on a timely basis.

Environmental Compliance and Remediation

Environmental compliance costs include the cost of purchasing and/or constructing assets to prevent, limit and/or control pollution or to monitor the environmental status at various locations. These costs are capitalized and depreciated based on estimated useful lives. Environmental compliance costs also include maintenance and operating costs with respect to pollution prevention and control facilities and other administrative costs. Such operating costs are expensed as incurred. Environmental remediation costs of facilities used in current operations are generally immaterial and are expensed as incurred. We accrue for environmental remediation costs and post-remediation costs that relate to existing conditions caused by past operations at facilities or off-plant disposal sites in the accounting period in which responsibility is established and when the related liability is considered probable and estimable. In developing these cost estimates, we evaluate currently available facts regarding each site, with consideration given to existing technology, presently enacted laws and regulations, prior experience in remediation of contaminated sites, the financial capability of other potentially responsible parties and other factors, subject to uncertainties inherent in the estimation process. If the amount and timing of the cash payments for a site are fixed or reliably determinable, the liability is discounted, if the calculated discount is material. Additionally, these estimates are reviewed periodically, with adjustments to the accruals recorded as necessary.

Research and Development Expenses

Our research and development expenses related to present and future products are expensed as incurred. These expenses consist primarily of personnel-related costs and other overheads, as well as outside service and consulting costs incurred for specific programs. Our U.S. facilities in Texas and Louisiana and our global facilities in the Netherlands, Germany, Belgium and Korea form the capability base for our contract research and custom manufacturing businesses. These business areas provide research and scale-up services primarily to innovative life science companies.

Goodwill and Other Intangible Assets

We account for goodwill and other intangibles acquired in a business combination in conformity with current accounting guidance that requires that goodwill and indefinite-lived intangible assets not be amortized.

We test goodwill for impairment by comparing the estimated fair value of our reporting units to the related carrying value. Our reporting units are either our operating business segments or one level below our operating business segments for which discrete financial information is available and for which operating results are regularly reviewed by the business management. In applying the goodwill impairment test, the Company initially performs a qualitative test (“Step 0”), where it first assesses qualitative factors to determine whether it is more likely than not that the fair value of the reporting units is less than its carrying value. Qualitative factors may include, but are not limited to, economic conditions, industry and market considerations, cost factors, overall financial performance of the reporting units and other entity and reporting unit specific events. If after assessing these qualitative factors, the Company determines it is “more-likely-than-not” that the fair value of the reporting unit is less than the carrying value, the Company performs a quantitative test (“Step 1”). During Step 1, the Company estimates the fair value based on present value techniques involving future cash flows. Future cash flows for all reporting units include assumptions about revenue growth rates, adjusted EBITDA margins, discount rate as well as other economic or industry-related factors. For the Refining Solutions reporting unit, the revenue growth rates, adjusted EBITDA margins and the discount rate were deemed to be significant assumptions. Significant management judgment is involved in estimating these variables and they include inherent uncertainties since they are forecasting future events. The Company uses a Weighted Average Cost of Capital (“WACC”) approach to determine our discount rate for goodwill recoverability testing. The WACC calculation incorporates industry-weighted average returns on debt and equity from a market perspective. The factors in this calculation are largely external to the Company and, therefore, are beyond its control. The Company performs a sensitivity analysis by using a range of inputs to confirm the reasonableness of these estimates being used in the goodwill impairment analysis. The Company tests its recorded goodwill for impairment in the fourth quarter of each year or upon the occurrence of events or changes in circumstances that would more likely than not reduce the fair value of its reporting units below their carrying amounts. The Company performed its annual goodwill impairment test as of October 31, 2022 and no evidence of impairment was noted from the analysis. As a result, the Company concluded there was no impairment as of that date. However, if the adjusted EBITDA or discount rate estimates for the Refining Solutions reporting unit negatively changed by 10%, the Refining Solutions fair value would be below its carrying value.

The Company assesses its indefinite-lived intangible assets, which include trade names and trademarks, for impairment annually and between annual tests if events or changes in circumstances indicate that it is more likely than not that the asset is impaired. The indefinite-lived intangible asset impairment standard allows the Company to first assess qualitative factors to determine if a quantitative impairment test is necessary. Further testing is only required if we determine, based on the qualitative assessment, that it is more likely than not that the indefinite-lived intangible asset’s fair value is less than its carrying amount. If we determine based on the qualitative assessment that it is more likely than not that the asset is impaired, an impairment test is performed by comparing the fair value of the indefinite-lived intangible asset to its carrying amount. During the year ended December 31, 2022, no evidence of impairment was noted from the analysis for the Company’s indefinite-lived intangible assets.

Definite-lived intangible assets, such as purchased technology, patents and customer lists, are amortized over their estimated useful lives generally for periods ranging from five to twenty-five years. Except for customer lists and relationships associated with the majority of our Lithium business, which are amortized using the pattern of economic benefit method, definite-lived intangible assets are amortized using the straight-line method. We evaluate the recovery of our definite-lived intangible assets by comparing the net carrying value of the asset group to the undiscounted net cash flows expected to be generated from the use and eventual disposition of that asset group when events or changes in circumstances indicate that its carrying amount may not be recoverable. If the carrying amount of the asset group is not recoverable, the fair value of the asset group is measured and if the carrying amount exceeds the fair value, an impairment loss is recognized. See Note 12, "Goodwill and Other Intangibles."

Pension Plans and Other Postretirement Benefits

Under authoritative accounting standards, assumptions are made regarding the valuation of benefit obligations and the performance of plan assets. As required, we recognize a balance sheet asset or liability for each of our pension and other postretirement benefit ("OPEB") plans equal to the plan's funded status as of the measurement date. The primary assumptions are as follows:

- Discount Rate—The discount rate is used in calculating the present value of benefits, which is based on projections of benefit payments to be made in the future.
- Expected Return on Plan Assets—We project the future return on plan assets based on prior performance and future expectations for the types of investments held by the plans, as well as the expected long-term allocation of plan assets for these investments. These projected returns reduce the net benefit costs recorded currently.
- Rate of Compensation Increase—For salary-related plans, we project employees' annual pay increases, which are used to project employees' pension benefits at retirement.
- Mortality Assumptions—Assumptions about life expectancy of plan participants are used in the measurement of related plan obligations.

Actuarial gains and losses are recognized annually in our consolidated statements of income in the fourth quarter and whenever a plan is determined to qualify for a remeasurement during a fiscal year. The remaining components of pension and OPEB plan expense, primarily service cost, interest cost and expected return on assets, are recorded on a monthly basis. The market-related value of assets equals the actual market value as of the date of measurement.

During 2022, we made changes to assumptions related to discount rates and expected rates of return on plan assets. We consider available information that we deem relevant when selecting each of these assumptions.

In selecting the discount rates for the U.S. plans, we consider expected benefit payments on a plan-by-plan basis. As a result, the Company uses different discount rates for each plan depending on the demographics of participants and the expected timing of benefit payments. For 2022, the discount rates were calculated using the results from a bond matching technique developed by Milliman, which matched the future estimated annual benefit payments of each respective plan against a portfolio of bonds of high quality to determine the discount rate. We believe our selected discount rates are determined using preferred methodology under authoritative accounting guidance and accurately reflect market conditions as of the December 31, 2022 measurement date.

In selecting the discount rates for the foreign plans, we look at long-term yields on AA-rated corporate bonds when available. Our actuaries have developed yield curves based on the yields on the constituent bonds in the various indices as well as on other market indicators such as swap rates, particularly at the longer durations. For the Eurozone, we apply the Aon Hewitt yield curve to projected cash flows from the relevant plans to derive the discount rate. For the United Kingdom ("U.K."), the discount rate is determined by applying the Aon Hewitt yield curve for typical schemes of similar duration to projected cash flows of Albemarle's U.K. plan. In other countries where there is not a sufficiently deep market of high-quality corporate bonds, we set the discount rate by referencing the yield on government bonds of an appropriate duration.

In estimating the expected return on plan assets, we consider past performance and future expectations for the types of investments held by the plan as well as the expected long-term allocation of plan assets to these investments. In projecting the rate of compensation increase, we consider past experience in light of movements in inflation rates.

For the purpose of measuring our U.S. pension and OPEB obligations at December 31, 2022 and 2021, we used the Pri-2012 Mortality Tables along with the MP-2021 Mortality Improvement Scale, respectively, published by the SOA.

Stock-based Compensation Expense

The fair value of restricted stock awards, restricted stock unit awards and performance unit awards with a service condition are determined based on the number of shares or units granted and the quoted price of our common stock on the date of grant, and the fair value of stock options is determined using the Black-Scholes valuation model. The fair value of performance unit awards with a service condition and a market condition are estimated on the date of grant using a Monte Carlo simulation model. The fair value of these awards is determined after giving effect to estimated forfeitures. Such value is recognized as expense over the service period, which is generally the vesting period of the equity grant. To the extent restricted stock awards, restricted stock unit awards, performance unit awards and stock options are forfeited prior to vesting in excess of the estimated forfeiture rate, the corresponding previously recognized expense is reversed as an offset to operating expenses.

Income Taxes

We use the liability method for determining our income taxes, under which current and deferred tax liabilities and assets are recorded in accordance with enacted tax laws and rates. Under this method, the amounts of deferred tax liabilities and assets at the end of each period are determined using the tax rate expected to be in effect when taxes are actually paid or recovered. Future tax benefits are recognized to the extent that realization of such benefits is more likely than not. The Company's deferred tax assets and liabilities are classified as noncurrent on the balance sheet, along with any related valuation allowance. Tax effects are released from Accumulated Other Comprehensive Income using either the specific identification approach or the portfolio approach based on the nature of the underlying item.

Deferred income taxes are provided for the estimated income tax effect of temporary differences between the financial statement carrying amounts and the tax basis of existing assets and liabilities. Deferred tax assets are also provided for operating losses, capital losses and certain tax credit carryovers. A valuation allowance, reducing deferred tax assets, is established when it is more likely than not that some portion or all of the deferred tax assets will not be realized. The realization of such deferred tax assets is dependent upon the generation of sufficient future taxable income of the appropriate character. Although realization is not assured, we do not establish a valuation allowance when we believe it is more likely than not that a net deferred tax asset will be realized. The Company elected to not consider the estimated impact of potential future Corporate Alternative Minimum Tax liabilities for purposes of assessing valuation allowances on its deferred tax balances.

We only recognize a tax benefit after concluding that it is more likely than not that the benefit will be sustained upon audit by the respective taxing authority based solely on the technical merits of the associated tax position. Once the recognition threshold is met, we recognize a tax benefit measured as the largest amount of the tax benefit that, in our judgment, is greater than 50% likely to be realized. Under current accounting guidance for uncertain tax positions, interest and penalties related to income tax liabilities are included in Income tax expense on the consolidated statements of income.

We have designated the undistributed earnings of a portion of our foreign operations as indefinitely reinvested and as a result we do not provide for deferred income taxes on the unremitted earnings of these subsidiaries. Our foreign earnings are computed under U.S. federal tax earnings and profits, or E&P, principles. In general, to the extent our financial reporting book basis over tax basis of a foreign subsidiary exceeds these E&P amounts, deferred taxes have not been provided as they are essentially permanent in duration. The determination of the amount of such unrecognized deferred tax liability is not practicable. We provide for deferred income taxes on our undistributed earnings of foreign operations that are not deemed to be indefinitely invested. We will continue to evaluate our permanent investment assertion taking into consideration all relevant and current tax laws.

Accumulated Other Comprehensive Loss

Accumulated other comprehensive loss comprises principally foreign currency translation adjustments, gains or losses on foreign currency cash flow hedges designated as effective hedging instruments, amounts related to the revaluation of our euro-denominated senior notes which were designated as a hedge of our net investment in foreign operations in 2014, a realized loss on a forward starting interest rate swap entered into in 2014 which was designated as a cash flow hedge, and deferred income taxes related to the aforementioned items.

Foreign Currency Translation

The assets and liabilities of all foreign subsidiaries were prepared in their respective functional currencies and translated into U.S. Dollars based on the current exchange rate in effect at the balance sheet dates, while income and expenses were translated at average exchange rates for the periods presented. Translation adjustments are reflected as a separate component of equity.

Foreign exchange transaction and revaluation (losses) gains were ($ 21.8) million, $0.1 million and ($ 28.8) million for the years ended December 31, 2022, 2021 and 2020, respectively, and are included in Other income (expenses), net, in our consolidated statements of income, with the unrealized portion included in Other, net, in our consolidated statements of cash flows.

Derivative Financial Instruments

We manage our foreign currency exposures by balancing certain assets and liabilities denominated in foreign currencies and through the use of foreign currency forward contracts from time to time, which generally expire within one year. The principal objective of such contracts is to minimize the financial impact of changes in foreign currency exchange rates. While these contracts are subject to fluctuations in value, such fluctuations are generally expected to be offset by changes in the value of the underlying foreign currency exposures being hedged. Gains or losses under foreign currency forward contracts that have been designated as an effective hedging instrument under ASC 815, *Derivatives and Hedging* will be recorded in Accumulated other comprehensive loss beginning on the date of designation. All other gains and losses on foreign currency forward contracts not designated as an effective hedging instrument are recognized currently in Other income (expenses), net, and generally do not have a significant impact on results of operations.

We may also enter into interest rate swaps, collars or similar instruments from time to time, with the objective of reducing interest rate volatility relating to our borrowing costs.

The counterparties to these contractual agreements are major financial institutions with which we generally have other financial relationships. We are exposed to credit loss in the event of nonperformance by these counterparties. However, we do not anticipate nonperformance by the counterparties. We do not utilize financial instruments for trading or other speculative purposes. In the fourth quarter of 2019, we entered into a foreign currency forward contract to hedge the cash flow exposure of non-functional currency purchases during the construction of the Kemerton plant in Australia and designated it as an effective hedging instrument under ASC 815, *Derivatives and Hedging*. All other foreign currency forward contracts outstanding at December 31, 2022 and 2021 have not been designated as hedging instruments under ASC 815, *Derivatives and Hedging*.

Recently Issued Accounting Pronouncements

In March 2020, the Financial Accounting Standards Board (“FASB”) issued accounting guidance that provides optional expedients and exceptions for applying U.S. GAAP to contracts, hedging relationships and other transactions affected by reference rate reform if certain criteria are met. The guidance applies only to contracts, hedging relationships and other transactions that reference LIBOR or another reference rate expected to be discontinued because of reference rate reform. In January 2021, the FASB issued additional accounting guidance which clarifies that certain optional expedients and exceptions apply to derivatives that are affected by the discounting transition. The guidance under both FASB issuances was originally effective March 12, 2020 through December 31, 2022. However, in December 2022, the FASB issued an update to defer the sunset date of this guidance to December 31, 2024. The Company currently does not expect this guidance to have a significant impact on its consolidated financial statements.

In October 2021, the FASB issued guidance on how to recognize and measure acquired contract assets and liabilities from revenue contracts in a business combination, which requires the acquirer to recognize and measure contract assets and contract liabilities acquired in a business combination in accordance with ASC 606, *Revenue from Contracts with Customers* as if it had originated the contracts. This guidance is effective for financial statements issued for annual periods beginning after December 15, 2022, including interim periods within those annual periods. The Company currently does not expect this guidance to have a significant impact on its consolidated financial statements.

In November 2021, the FASB issued accounting guidance that requires disclosures about government assistance in the notes to the financial statements. This guidance will require the disclosure of: (1) the types of government assistance received; (2) the accounting for such assistance; and (3) the effect of the assistance on a business entity’s financial statements. This guidance is effective for financial statements issued for annual periods beginning after December 15, 2021. The Company has adopted this guidance and provided the required disclosures in this Annual Report on Form 10-K.

In March 2022, the FASB issued accounting guidance that expands the Company’s abilities to hedge the benchmark interest rate risk of portfolios of financial assets or beneficial interests in a fair value hedge. This guidance expands the use of the portfolio layer method to allow multiple hedges of a single closed portfolio of assets using spot starting, forward starting, and amortizing-notional swaps. This also permits both prepayable and non prepayable financial assets to be included in the closed portfolio of assets hedged in a portfolio layer hedge. In addition, this guidance requires that basis adjustments not be allocated to individual assets for active portfolio layer method hedges, but rather be maintained on the closed portfolio of assets as a whole. This guidance is effective for financial statements issued for annual periods beginning after December 15, 2022, including interim periods within those annual periods. The Company currently does not expect this guidance to have a significant impact on its consolidated financial statements.

NOTE 2—Acquisitions:

Guangxi Tianyuan New Energy Materials Acquisition

On October 25, 2022, the Company completed the acquisition of all of the outstanding equity of Guangxi Tianyuan New Energy Materials Co., Ltd. ("Qinzhou"), for approximately $ 200 million in cash, which includes a deferral of approximately $29 million to be paid in installments within a year of the acquisition closing date. Qinzhou's operations include a recently constructed lithium processing plant strategically positioned near the Port of Qinzhou in Guangxi, which began commercial production in the first half of 2022. The plant has designed annual conversion capacity of up to 25,000 metric tonnes of LCE and is capable of producing battery-grade lithium carbonate and lithium hydroxide.

Qinzhou did not provide material Net sales or Net income attributable to Albemarle Corporation from October 25, 2022 through December 31, 2022. Pro forma financial information of the combined entities for periods prior to the acquisition is not presented due to the immaterial impact of the Net Sales and Net Income of Qinzhou on our consolidated statements of income.

The aggregate purchase price noted above was allocated to the major categories of assets and liabilities acquired based upon their estimated fair values at the acquisition closing date, which were based, in part, upon third-party appraisals for certain assets. The fair value of the assets and liabilities was primarily related to Property, plant and equipment of $106.6 million, Other intangibles of $16.3 million, net current liabilities of $5.5 million, and long-term liabilities of $ 7.1 million. The excess of the purchase price over the preliminary estimated fair value of the net assets acquired was approximately $76.1 million and was recorded as Goodwill.

The allocation of the purchase price to the assets acquired and liabilities assumed, including the residual amount allocated to Goodwill, is based upon preliminary information and is subject to change within the measurement-period (up to one year from the acquisition date) as additional information concerning final asset and liability valuations is obtained. The primary area of the preliminary purchase price allocation that is not yet finalized relates to the fair value of the net working capital and Goodwill. The fair value of the assets acquired and liabilities assumed was based on management's estimates and assumptions, as well as other information compiled by management, including valuations that utilize customary valuation procedures and techniques. The discount rate is a significant assumption used in the valuation model. If the actual results differ from the estimates and judgments used in these fair values, the amounts recorded in the consolidated financial statements could be subject to possible impairment.

Goodwill arising from the acquisition consists largely of anticipated synergies and economies of scale from the combined companies and overall strategic importance of the acquired businesses to Albemarle. The goodwill attributable to the acquisition will not be amortizable or deductible for tax purposes.

Wodgina Acquisition

In 2019, we completed the acquisition of a 60% interest in Mineral Resources Limited's ("MRL") Wodgina Project for a total purchase price of approximately $ 1.3 billion. The purchase price was comprised of $820 million in cash and the transfer of 40% interest in certain lithium hydroxide conversion assets being built by Albemarle in Kemerton, Western Australia, originally valued at $480 million. During the years ended December 31, 2022 and 2021, the Company revised its estimate of the obligation to construct these lithium hydroxide conversion assets due to anticipated cost overruns from supply chain, labor and COVID-19 pandemic related issues. Consequently, expenses of $8.4 million and $132.4 million were included in Loss (gain) on sale of business/interest in properties, net, within operating income for the years ended December 31, 2022 and 2021, respectively, with a corresponding obligation recorded in Accrued liabilities.

In addition, during the year ended December 31, 2020, we paid $ 22.6 million of agreed upon purchase price adjustments for this acquisition. The stamp duty levied on the assets purchased of $61.5 million, originally recorded as an expense based on an estimated calculation during the year ended December 31, 2019, was paid during the year ended December 31, 2020 and is included in Change in working capital on the consolidated statement of cash flows.

Acquisition and integration related costs

Acquisition and integration related costs for the years ended December 31, 2022, 2021 and 2020 of $ 16.3 million, $12.7 million and $17.3 million were included primarily in Selling, general and administrative expenses, respectively, on our consolidated statements of income. These include costs for the Qinzhou acquisitions noted above, as well as various other completed or potential acquisitions and divestitures.

NOTE 3—Divestitures:

On June 1, 2021, the Company completed the sale of its fine chemistry services ("FCS") business to W. R. Grace & Co. ("Grace") for proceeds of approximately $ 570 million, consisting of $300 million in cash and the issuance to Albemarle of preferred equity of a Grace subsidiary having an aggregate stated value of $ 270 million. The preferred equity can be redeemed at Grace's option under certain conditions and will accrue payment-in-kind ("PIK") dividends at an annual rate of 12% beginning two years after issuance.

As part of the transaction, Grace acquired our manufacturing facilities located in South Haven, Michigan and Tyrone, Pennsylvania. The sale of the FCS business reflects the Company's commitment to investing in its core, growth-oriented business segments. During the year ended December 31, 2021 we recorded a gain of $428.4 million ($330.9 million after taxes) related to the sale of this business.

We determined that this business met the assets held for sale criteria in accordance with ASC 360, *Property, Plant and Equipment* during the first quarter of 2021. The results of operations of the business classified as held for sale are included in the consolidated statements of income through June 1, 2021. This business did not qualify for discontinued operations treatment because the Company's management does not consider the sale as representing a strategic shift that had or will have a major effect on the Company's operations and financial results.

NOTE 4—Supplemental Cash Flow Information:

Supplemental information related to the consolidated statements of cash flows is as follows (in thousands):

	Year Ended December 31,		
	2022	2021	2020
Cash paid during the year for:			
Income taxes (net of refunds of $ 11,564, $32,677 and $25,991 in 2022, 2021 and 2020, respectively)[(a)]	$ 248,143	$ 130,840	$ 52,103
Interest (net of capitalization)	$ 92,095	$ 27,734	$ 66,379
Supplemental non-cash disclosures related to investing activities:			
Capital expenditures included in Accounts payable	$ 296,294	$ 165,677	$ 139,120
Promissory note issued for capital expenditures [(b)]	$ 10,876	$ —	$ —
Non-cash proceeds from divestitures[(c)]	$ —	$ 244,530	$ —

(a) Cash paid for income tax during the year ended December 31, 2021 includes a $45.0 million payment in the U.S. primarily resulting from the proceeds on the sale of the FCS business.
(b) During the first quarter of 2022, the Company issued a promissory note with a present value of $10.9 million for land purchased in Kings Mountain, North Carolina. The promissory note is payable in equal annual installments from the years 2027 to 2048.
(c) Fair value of preferred equity of a Grace subsidiary received as part of proceeds for the sale of our FCS business. See Note 3, "Divestitures," for further details.

As part of the purchase price paid for the acquisition of a 60% interest in MRL's Wodgina Project, the Company transferred $ 122.7 million, $135.9 million and $ 179.4 million of its construction in progress of the designated Kemerton assets during the years ended December 31, 2022, 2021 and 2020, respectively, representing MRL's 40% interest in the assets. Since the acquisition, the Company has transferred the full $480 million of construction in progress to MRL, as defined in the purchase agreement. During the years ended December 31, 2022 and 2021, the Company recorded expenses of $8.4 million and $132.4 million, respectively, related to anticipated cost overruns of the designated Kemerton assets. See Note 2, "Acquisitions," for further details. The cash outflow for these assets was recorded in Capital expenditures within Cash flows from investing activities on the condensed consolidated statements of cash flows. The non-cash transfer of these assets is recorded in Non-cash transfer of 40% value of construction in progress of the Kemerton plant to MRL within Cash flows from operating activities on the consolidated statements of cash flows.

Other, net within Cash flows from operating activities on the consolidated statements of cash flows for the years ended December 31, 2022, 2021 and 2020 included $ 41.8 million, $28.7 million and $30.4 million, respectively, representing the reclassification of the current portion of the one-time transition tax resulting from the enactment of the Tax Cuts and Jobs Act ("TCJA") in 2017, from Other noncurrent liabilities to Income taxes payable within current liabilities. For additional information, see Note 21, "Income Taxes." In addition, included in Other, net for the years ended December 31, 2022, 2021 and

2020 is $21.8 million, ($0.1) million and $28.8 million, respectively, related to (gains) losses on fluctuations in foreign currency exchange rates.

NOTE 5—Earnings Per Share:

Basic and diluted earnings per share are calculated as follows (in thousands, except per share amounts):

	Year Ended December 31,		
	2022	2021	2020
Basic earnings per share			
Numerator:			
Net income attributable to Albemarle Corporation	$ 2,689,816	$ 123,672	$ 375,764
Denominator:			
Weighted-average common shares for basic earnings per share	117,120	115,841	106,402
Basic earnings per share	$ 22.97	$ 1.07	$ 3.53
Diluted earnings per share			
Numerator:			
Net income attributable to Albemarle Corporation	$ 2,689,816	$ 123,672	$ 375,764
Denominator:			
Weighted-average common shares for basic earnings per share	117,120	115,841	106,402
Incremental shares under stock compensation plans	673	695	406
Weighted-average common shares for diluted earnings per share	117,793	116,536	106,808
Diluted earnings per share	$ 22.84	$ 1.06	$ 3.52

Included in the calculation of basic earnings per share are unvested restricted stock awards that contain nonforfeitable rights to dividends. At December 31, 2022, there were 5,117 unvested shares of restricted stock awards outstanding.

We have the authority to issue 15 million shares of preferred stock in one or more classes or series. As of December 31, 2022, no shares of preferred stock have been issued.

On February 8, 2021, we completed an underwritten public offering of 8,496,773 shares of our common stock, par value $ 0.01 per share, at a price to the public of $ 153.00 per share. The Company also granted to the Underwriters an option to purchase up to an additional 1,274,509 shares for a period of 30 days, which was exercised. The total gross proceeds from this offering were approximately $1.5 billion, before deducting expenses, underwriting discounts and commissions.

In November 2016, our Board of Directors authorized an increase in the number of shares the Company is permitted to repurchase under our share repurchase program, pursuant to which the Company is now permitted to repurchase up to a maximum of 15 million shares, including those previously authorized but not yet repurchased.

There were no shares of the Company’s common stock repurchased during the year ended December 31, 2022, 2021 or 2020. As of December 31, 2022, there were 7,396,263 remaining shares available for repurchase under the Company’s authorized share repurchase program.

NOTE 6—Other Accounts Receivable:

Other accounts receivable consist of the following at December 31, 2022 and 2021 (in thousands):

	December 31,	
	2022	2021
Value added tax/consumption tax	$ 141,856	$ 35,758
Other	43,963	30,426
Total	$ 185,819	$ 66,184

NOTE 7—Inventories:

The following table provides a breakdown of inventories at December 31, 2022 and 2021 (in thousands):

	December 31,	
	2022	2021
Finished goods	$ 1,679,473	$ 459,536
Raw materials and work in process [(a)]	296,998	259,221
Stores, supplies and other	99,560	79,863
Total	$ 2,076,031	$ 798,620

(a) Included $133.2 million and $149.4 million at December 31, 2022 and 2021, respectively, of work in process in our Lithium segment.

Approximately 3% and 6% of our inventories are valued using the last-in, first-out ("LIFO") method at December 31, 2022 and 2021, respectively. The portion of our domestic inventories stated on the LIFO basis amounted to $52.9 million and $51.2 million at December 31, 2022 and 2021, respectively, which are below replacement cost by approximately $ 57.9 million and $45.3 million, respectively.

Effective in 2022 the Company began recording the balance of deferred profits on sales from its equity method investments to the Company to Inventories, specifically finished goods. Historically this balance was recorded in Investments in the consolidated balance sheets. As a result, the historical balances have been reclassified to reflect the current period presentation. This change in presentation was made to better align the location of these deferred profits with their respective inventory balances until they are sold to a third party. Deferred profits from equity method investments totaled $332.3 million and $14.3 million at December 31, 2022 and 2021, respectively, with the increase primarily driven by increased pricing and volume of sales from the Talison joint venture. There was no impact to the statements of income, comprehensive (loss) income, changes in equity or cash flows for any period as a result of this change in presentation. In addition, the Company does not believe this change in presentation is material to the consolidated financial statements for any prior period.

NOTE 8—Other Current Assets:

Other current assets consist of the following at December 31, 2022 and 2021 (in thousands):

	December 31,	
	2022	2021
Income tax receivables	$ 71,795	$ 76,952
Prepaid taxes	97,682	12,573
Other prepaid expenses	58,754	37,360
Other	6,724	5,798
Total	$ 234,955	$ 132,683

NOTE 9—Property, Plant and Equipment:

Property, plant and equipment, at cost, consist of the following at December 31, 2022 and 2021 (in thousands):

	Useful Lives (Years)	December 31,	
		2022	2021
Land	—	$ 172,464	$ 117,703
Land improvements	10 – 30	201,284	112,374
Buildings and improvements	10 – 50	492,509	383,879
Machinery and equipment [(a)]	2 – 45	4,446,315	3,619,712
Mineral rights and reserves	7 – 60	1,795,668	1,783,691
Construction in progress	—	2,246,090	2,057,387
Total		$ 9,354,330	$ 8,074,746

(a) Consists primarily of (1) short-lived production equipment components, office and building equipment and other equipment with estimated lives ranging 2 – 7 years, (2) production process equipment (intermediate components) with estimated lives ranging 8 – 19 years, (3) production process equipment (major unit components) with estimated lives ranging 20 – 29 years, and (4) production process equipment (infrastructure and other) with estimated lives ranging 30 – 45 years.

The cost of property, plant and equipment is depreciated generally by the straight-line method. Depletion of mineral rights is based on the units-of-production method. Depreciation expense, including depletion, amounted to $273.0 million, $225.6 million and $203.6 million during the years ended December 31, 2022, 2021 and 2020, respectively. Interest capitalized on significant capital projects in 2022, 2021 and 2020 was $31.1 million, $50.0 million and $30.4 million, respectively.

In October 2022, the Company announced it has been awarded a nearly $150 million grant from the U.S. Department of Energy to expand domestic manufacturing of batteries for EVs and the electric grid and for materials and components currently imported from other countries. The grant funding is intended to support a portion of the anticipated cost to construct a new, commercial-scale U.S.-based lithium concentrator facility at our Kings Mountain, North Carolina location. The grant will be received over the life of the construction period for the new facility (projected as 2023 to 2026) as reimbursement for capital expenditures. As funds are received the Company will reduce the cost of the assets by the amount of the grant, and income will be recognized by the lower depreciation expense over the useful life of the assets.

NOTE 10—Investments:

Investments include our share of unconsolidated joint ventures, nonmarketable securities and marketable equity securities. The following table details our investment balances at December 31, 2022 and 2021 (in thousands):

	December 31, 2022	December 31, 2021
Joint ventures	$ 832,119	$ 607,644
Available for sale debt securities	260,139	246,517
Nonmarketable securities	18,760	20,660
Marketable equity securities	39,535	37,187
Total	$ 1,150,553	$ 912,008

Our ownership positions in significant unconsolidated investments are shown below:

	December 31, 2022	December 31, 2021	December 31, 2020
* Windfield Holdings Pty. Ltd. - a joint venture with Sichuan Tianqi Lithium Industries, Inc., that mines lithium ore and produces lithium concentrate	49 %	49 %	49 %
* Nippon Aluminum Alkyls - a joint venture with Mitsui Chemicals, Inc. that produces aluminum alkyls	50 %	50 %	50 %
* Nippon Ketjen Company Limited - a joint venture with Sumitomo Metal Mining Company Limited that produces refinery catalysts	50 %	50 %	50 %
* Eurecat S.A. - a joint venture with Axens Group for refinery catalysts regeneration services	50 %	50 %	50 %
* Fábrica Carioca de Catalisadores S.A. - a joint venture with Petrobras Quimica S.A. - PETROQUISA that produces catalysts and includes catalysts research and product development activities	50 %	50 %	50 %

Our investment in the significant unconsolidated joint ventures above amounted to $ 813.9 million and $575.3 million as of December 31, 2022 and 2021, respectively, and the amount included in Equity in net income of unconsolidated investments (net of tax) in the consolidated statements of income totaled $771.6 million, $94.9 million and $126.0 million for the years ended December 31, 2022, 2021 and 2020, respectively. Undistributed earnings attributable to our significant unconsolidated investments represented approximately $242.7 million and $271.9 million of our consolidated retained earnings at December 31, 2022 and 2021, respectively. All of the unconsolidated joint ventures in which we have investments are private companies and accordingly do not have a quoted market price available.

The following summary lists the assets, liabilities and results of operations for our significant unconsolidated joint ventures presented herein (in thousands):

	December 31,	
	2022	2021
Summary of Balance Sheet Information:		
Current assets	$ 1,927,791	$ 485,730
Noncurrent assets	1,659,692	1,590,958
Total assets	$ 3,587,483	$ 2,076,688
Current liabilities	$ 770,211	$ 209,621
Noncurrent liabilities	1,175,773	739,599
Total liabilities	$ 1,945,984	$ 949,220

	Year Ended December 31,		
	2022	2021	2020
Summary of Statements of Income Information:			
Net sales	$ 4,290,223	$ 827,848	$ 597,082
Gross profit	$ 3,765,304	$ 443,129	$ 266,026
Income before income taxes	$ 3,301,875	$ 269,788	$ 225,436
Net income	$ 2,314,094	$ 187,084	$ 157,628

We have evaluated each of the unconsolidated investments pursuant to current accounting guidance and none qualify for consolidation. Dividends received from our significant unconsolidated investments were $800.9 million, $78.4 million and $87.4 million in 2022, 2021 and 2020, respectively.

At December 31, 2022 and 2021, the carrying amount of our investments in unconsolidated joint ventures differed from the amount of underlying equity in net assets by approximately $5.6 million and $30.4 million, respectively. These amounts represent the differences between the value of certain assets of the joint ventures and our related valuation on a U.S. GAAP basis.

The Company holds a 49% equity interest in Windfield Holdings Pty. Ltd. (“Windfield”), which we acquired in the Rockwood acquisition. With regards to the Company’s ownership in Windfield, the parties share risks and benefits disproportionate to their voting interests. As a result, the Company considers Windfield to be a variable interest entity (“VIE”). However, the Company does not consolidate Windfield as it is not the primary beneficiary. The carrying amount of our 49% equity interest in Windfield, which is our most significant VIE, was $694.5 million and $462.3 million at December 31, 2022 and 2021, respectively. The Company’s aggregate net investment in all other entities which it considers to be VIEs for which the Company is not the primary beneficiary was $6.7 million and $8.0 million at December 31, 2022 and 2021, respectively. Our unconsolidated VIEs are reported in Investments in the consolidated balance sheets. The Company does not guarantee debt for, or have other financial support obligations to, these entities, and its maximum exposure to loss in connection with its continuing involvement with these entities is limited to the carrying value of the investments.

Effective in 2022 the Company began recording the balance of deferred profits on sales from its equity method investments to the Company to Inventories, specifically finished goods. Historically this balance was recorded in Investments in the consolidated balance sheets. As a result, the historical balances have been reclassified to reflect the current period presentation. This change in presentation was made to better align the location of these deferred profits with their respective inventory balances until they are sold to a third party. Deferred profits from equity method investments totaled $332.3 million and $14.3 million at December 31, 2022 and 2021, respectively, with the increase primarily driven by increased pricing and volume of sales from the Talison joint venture. There was no impact to the statements of income, comprehensive income, changes in equity or cash flows for any period as a result of this change in presentation. In addition, the Company does not believe this change in presentation is material to the consolidated financial statements for any prior period.

In the fourth quarter of 2020, the Company divested its ownership interest in the Saudi Organometallic Chemicals Company LLC (“SOCC”) joint venture for cash proceeds of $11.0 million. As a result of this divestiture, the Company recorded a gain of $7.2 million in Other income (expenses), net during the year ended December 31, 2020.

The Company holds a 50% equity interest in Jordan Bromine Company Limited ("JBC"), reported in the Bromine segment. The Company consolidates this venture as it is considered the primary beneficiary due to its operational and financial control.

The Company holds a 60% interest in MRL's Wodgina Project and formed an unincorporated joint venture with MRL. The joint venture is unincorporated with each investor holding an undivided interest in each asset and proportionately liable for each liability; therefore our proportionate share of assets, liabilities, revenue and expenses are included in the appropriate classifications in the consolidated financial statements.

On June 1, 2021, the Company completed the sale of its FCS business to Grace for proceeds of approximately $ 570 million, consisting of $300 million in cash and the issuance to Albemarle of preferred equity of a Grace subsidiary having an aggregate stated value of $270 million. The preferred equity can be redeemed at Grace's option under certain conditions and will accrue PIK dividends at an annual rate of 12% beginning June 1, 2023, two years after issuance. The fair value of this preferred equity was $ 260.1 million and $246.5 million at December 31, 2022 and 2021, respectively.

We maintain a Benefit Protection Trust (the "Trust") that was created to provide a source of funds to assist in meeting the obligations of our Executive Deferred Compensation Plan ("EDCP"), subject to the claims of our creditors in the event of our insolvency. Assets of the Trust, in conjunction with our EDCP, are accounted for as trading securities in accordance with authoritative accounting guidance. The assets of the Trust consist primarily of mutual fund investments and are marked-to-market on a monthly basis through the consolidated statements of income. At December 31, 2022 and 2021, these marketable securities amounted to $27.3 million and $32.5 million, respectively.

NOTE 11—Other Assets:

Other assets consist of the following at December 31, 2022 and 2021 (in thousands):

	December 31,	
	2022	2021
Deferred income taxes [a]	$ 46,434	$ 18,797
Assets related to unrecognized tax benefits [a]	32,421	32,868
Operating leases [b]	128,173	154,741
Other	43,530	45,833
Total	$ 250,558	$ 252,239

(a) See Note 1, "Summary of Significant Accounting Policies" and Note 21, "Income Taxes."
(b) See Note 18, "Leases."

NOTE 12—Goodwill and Other Intangibles:

The following table summarizes the changes in goodwill by reportable segment for the years ended December 31, 2022 and 2021 (in thousands):

	Lithium	Bromine	Catalysts [c]	All Other	Total
Balance at December 31, 2020	$ 1,441,781	$ 20,319	$ 196,834	$ 6,586	$ 1,665,520
Divestitures [a]	—	—	—	(6,586)	(6,586)
Foreign currency translation adjustments and other	(47,599)	—	(13,708)	—	(61,307)
Balance at December 31, 2021	1,394,182	20,319	183,126	—	1,597,627
Acquisitions [b]	76,105	—	—	—	76,105
Foreign currency translation adjustments and other	(46,012)	—	(10,093)	—	(56,105)
Balance at December 31, 2022	$ 1,424,275	$ 20,319	$ 173,033	$ —	$ 1,617,627

(a) Represents goodwill of the FCS business. See Note 3, "Divestitures," for additional information.
(b) Represents preliminary purchase price adjustments for the Qinzhou acquisition. See Note 2, "Acquisitions," for additional information.
(c) Balance at December 31, 2022 and 2021 consists of goodwill related to Refining Solutions (composed of our clean fuels technologies ("CFT") and fluidized catalytic cracking ("FCC") catalysts and additives businesses) of $166.2 million and $176.0 million, respectively, and performance catalyst solutions ("PCS") of $6.8 million and $7.1 million, respectively.

Other intangibles consist of the following at December 31, 2022 and 2021 (in thousands):

	Customer Lists and Relationships	Trade Names and Trademarks[c]	Patents and Technology	Other	Total
Gross Asset Value					
Balance at December 31, 2020	$ 448,748	$ 18,710	$ 58,096	$ 39,864	$ 565,418
Divestitures[a]	—	—	—	(1,473)	(1,473)
Foreign currency translation adjustments and other	(20,369)	(827)	(783)	(1,686)	(23,665)
Balance at December 31, 2021	428,379	17,883	57,313	36,705	540,280
Acquisitions[b]	6,000	—	8,300	2,030	16,330
Retirements	—	(4,253)	(16,206)	(5,844)	(26,303)
Foreign currency translation adjustments and other	(21,709)	(469)	(3,008)	2,295	(22,891)
Balance at December 31, 2022	$ 412,670	$ 13,161	$ 46,399	$ 35,186	$ 507,416
Accumulated Amortization					
Balance at December 31, 2020	$ (147,286)	$ (8,176)	$ (39,500)	$ (21,351)	$ (216,313)
Amortization	(22,982)	—	(1,461)	(891)	(25,334)
Divestitures[a]	—	—	—	1,457	1,457
Foreign currency translation adjustments and other	6,985	193	1,165	514	8,857
Balance at December 31, 2021	(163,283)	(7,983)	(39,796)	(20,271)	(231,333)
Amortization	(22,144)	—	(1,649)	(914)	(24,707)
Retirements	—	4,253	16,206	5,844	26,303
Foreign currency translation adjustments and other	7,800	143	1,449	799	10,191
Balance at December 31, 2022	$ (177,627)	$ (3,587)	$ (23,790)	$ (14,542)	$ (219,546)
Net Book Value at December 31, 2021	$ 265,096	$ 9,900	$ 17,517	$ 16,434	$ 308,947
Net Book Value at December 31, 2022	$ 235,043	$ 9,574	$ 22,609	$ 20,644	$ 287,870

(a) Represents other intangibles of the FCS business. See Note 3, "Divestitures," for additional information.
(b) Represents preliminary purchase price adjustments for the Qinzhou acquisition. See Note 2, "Acquisitions," for additional information.
(c) Net Book Value includes only indefinite-lived intangible assets.

Useful lives range from 13 – 25 years for customer lists and relationships; 8 – 20 years for patents and technology; and primarily 5 – 25 years for other.

Amortization of other intangibles amounted to $ 24.7 million, $25.3 million and $24.9 million for the years ended December 31, 2022, 2021 and 2020, respectively. Included in amortization for the years ended December 31, 2022, 2021 and 2020 is $17.2 million, $19.3 million and $19.1 million, respectively, of amortization using the pattern of economic benefit method.

Total estimated amortization expense of other intangibles for the next five fiscal years is as follows (in thousands):

	Estimated Amortization Expense
2023	$ 29,163
2024	$ 24,230
2025	$ 23,693
2026	$ 23,172
2027	$ 22,671

NOTE 13—Accrued Expenses:

Accrued expenses consist of the following at December 31, 2022 and 2021 (in thousands):

	December 31,	
	2022	2021
Employee benefits, payroll and related taxes	$ 145,885	$ 100,718
Dividend payable to noncontrolling interest	53,168	—
Settlement of prior legal matter [(a)]	—	332,500
Wodgina Project acquisition consideration obligation [(b)]	18,380	132,400
Other[(c)]	288,461	197,675
Total	$ 505,894	$ 763,293

(a) Balance paid in 2022 for the settlement of an arbitration ruling for a prior legal matter. See Note 17, "Commitments and Contingencies," for further details.
(b) Represents the 40% interest in the Kemerton assets, which are under construction, expected to be transferred to MRL in the next twelve months as part of the consideration paid for the Wodgina Project acquisition. See Note 2, "Acquisitions," for further details.
(c) Other accrued expenses represent balances such as operating lease liabilities, environmental reserves, asset retirement obligations, pension obligations, interest, utilities, other taxes, among other liabilities, expected to be paid within the next 12 months. No individual component exceeds 5% of total current liabilities.

NOTE 14—Long-Term Debt:

Long-term debt consisted of the following at December 31, 2022 and 2021 (in thousands):

	December 31,	
	2022	2021
1.125% notes due 2025	$ 401,265	$ 426,571
1.625% notes due 2028	532,000	565,550
3.45% Senior notes due 2029	171,612	171,612
4.15% Senior notes due 2024	—	425,000
4.65% Senior notes due 2027	650,000	—
5.05% Senior notes due 2032	600,000	—
5.45% Senior notes due 2044	350,000	350,000
5.65% Senior notes due 2052	450,000	—
Commercial paper notes	—	388,500
Variable-rate foreign bank loans	2,997	5,226
Finance lease obligations	76,537	75,431
Other	11,378	—
Unamortized discount and debt issuance costs	(28,689)	(13,651)
Total long-term debt	3,217,100	2,394,239
Less amounts due within one year	2,128	389,920
Long-term debt, less current portion	$ 3,214,972	$ 2,004,319

Aggregate annual maturities of long-term debt as of December 31, 2022 are as follows (in millions): 2023—$ 2.1; 2024—$0.0; 2025—$401.3; 2026—$0.0; 2027—$650.0; thereafter—$2,192.4.

2022 Notes

On May 13, 2022, the Company issued a series of notes (collectively, the "2022 Notes") as follows:

- $650.0 million aggregate principal amount of senior notes, bearing interest at a rate of 4.65% payable semi-annually on June 1 and December 1 of each year, beginning on December 1, 2022. The effective interest rate on these senior notes is approximately 4.84%. These senior notes mature on June 1, 2027.
- $600.0 million aggregate principal amount of senior notes, bearing interest at a rate of 5.05% payable semi-annually on June 1 and December 1 of each year, beginning on December 1, 2022. The effective interest rate on these senior notes is approximately 5.18%. These senior notes mature on June 1, 2032.

- $450.0 million aggregate principal amount of senior notes, bearing interest at a rate of 5.65% payable semi-annually on June 1 and December 1 of each year, beginning on December 1, 2022. The effective interest rate on these senior notes is approximately 5.71%. These senior notes mature on June 1, 2052.

The net proceeds from the issuance of the 2022 Notes were used to repay the balance of the commercial paper notes, the remaining balance of $425.0 million of the 4.15% Senior Notes due 2024 (the "2024 Notes") and for general corporate purposes. The 2024 Notes were originally due to mature on December 15, 2024 and bore interest at a rate of 4.15%. During the year ended December 31, 2022, the Company recorded a loss on early extinguishment of debt of $19.2 million in Interest and financing expenses, representing the tender premiums, fees, unamortized discounts and unamortized deferred financing costs from the redemption of the 2024 Notes. In addition, the loss on early extinguishment of debt includes the accelerated amortization of the interest rate swap associated with the 2024 Notes from Accumulated other comprehensive income.

2019 Notes

On November 25, 2019, the Company issued a series of notes (collectively, the "2019 Notes") as follows:

- $200.0 million aggregate principal amount of notes, bearing interest at a floating rate, which were fully repaid in the first quarter of 2021, as noted below.
- €500.0 million aggregate principal amount of notes, bearing interest at a rate of 1.125% payable annually on November 25 of each year, beginning in 2020. The effective interest rate on these notes is approximately 1.30%. These notes mature on November 25, 2025. These notes were partially repaid in the first quarter of 2021, as noted below.
- €500.0 million aggregate principal amount of notes, bearing interest at a rate of 1.625% payable annually on November 25 of each year, beginning in 2020. The effective interest rate on these notes is approximately 1.74%. These notes mature on November 25, 2028.
- $300.0 million aggregate principal amount of senior notes, bearing interest at a rate of 3.45% payable semi-annually on May 15 and November 15 of each year, beginning in 2020. The effective interest rate on these senior notes is approximately 3.58%. These senior notes mature on November 15, 2029. These notes were partially repaid in the first quarter of 2021, as noted below.

The net proceeds from the issuance of the 2019 Notes were used to repay the $ 1.0 billion balance of the 2019 Credit Facility (see below for further details), a large portion of approximately $370 million of commercial paper notes, the remaining balance of $ 175.2 million of the senior notes issued on December 10, 2010 ("2010 Senior Notes"), and for general corporate purposes. The 2010 Senior Notes were originally due to mature on December 15, 2020 and bore interest at a rate of 4.50%. During the year ended December 31, 2019, we recorded a loss on early extinguishment of debt of $4.8 million in Interest and financing expenses, representing the tender premiums, fees, unamortized discounts and unamortized deferred financing costs from the redemption of the 2010 Senior Notes.

2014 Senior Notes

We currently have $350.0 million aggregate principal amount of senior notes outstanding, which were issued on November 24, 2014, bearing interest at a rate of 5.45% payable semi-annually on June 1 and December 1 of each year, beginning June 1, 2015. The effective interest rate on these senior notes is approximately 5.50%. These senior notes mature on December 1, 2044.

In the first quarter of 2021, the Company made certain debt principal payments using proceeds from the February 2021 underwritten public offering of common stock. As a result, included in Interest and financing expenses for the year ended December 31, 2021 is a loss on early extinguishment of debt of $29.0 million representing the tender premiums, fees, unamortized discounts and unamortized deferred financing costs from the redemption of this debt.

On January 22, 2014, we entered into a pay fixed, receive variable rate forward starting interest rate swap, with a notional amount of $ 325.0 million, with J.P. Morgan Chase Bank, N.A., to be effective October 15, 2014. Our risk management objective and strategy for undertaking this hedge was to eliminate the variability in the interest rate and partial credit spread on the 20 future semi-annual coupon payments that were to be paid in connection with the 2024 Notes. On October 15, 2014, the swap was settled, resulting in a payment to the counterparty of $33.4 million. This amount was recorded in Accumulated other comprehensive loss and was to be amortized to interest expense over the life of the 2024 Notes. As noted above, the 2024 Notes were repaid in the second quarter of 2022, and as a result, the unamortized balance of this interest rate swap was reclassified to interest expense during the same period as part of the early extinguishment of debt..

Prior to repayment in the first quarter of 2021, the carrying value of the 1.875% Euro-denominated senior notes was designated as an effective hedge of our net investment in certain foreign subsidiaries where the Euro serves as the functional currency, and gains or losses on the revaluation of these senior notes to our reporting currency were recorded in accumulated other comprehensive loss. Upon repayment of these notes, this net investment hedge was discontinued. The balance of foreign exchange revaluation gains and losses associated with this discontinued net investment hedge will remain within accumulated other comprehensive loss until the hedged net investment is sold or liquidated. Prior to the net investment hedge being discontinued, gains (losses) of $5.1 million and ($34.2) million (net of income taxes), during the years ended December 31, 2021 and 2020, respectively, were recorded in Accumulated other comprehensive loss.

Credit Agreements

On October 28, 2022, we amended our revolving, unsecured credit agreement (the “2018 Credit Agreement”), which provides for borrowings of up to $ 1.5 billion and matures on October 28, 2027. This credit agreement was originally dated as of June 21, 2018, and was previously amended on August 14, 2019, May 11, 2020 and December 10, 2021. Borrowings under the 2018 Credit Agreement bear interest at variable rates based on a benchmark rate depending on the currency in which the loans are denominated, plus an applicable margin which ranges from 0.910% to 1.375%, depending on the Company’s credit rating from Standard & Poor’s Ratings Services LLC (“S&P”), Moody’s Investors Services, Inc. (“Moody’s”) and Fitch Ratings, Inc. (“Fitch”). With respect to loans denominated in U.S. dollars, interest is calculated using the term Secured Overnight Financing Rate (“SOFR”) plus a term SOFR adjustment of 0.10%, plus the applicable margin. The applicable margin on the facility was 1.125% as of December 31, 2022. There were no borrowings outstanding under the 2018 Credit Agreement as of December 31, 2022.

On August 14, 2019, the Company entered into a $1.2 billion unsecured credit facility with several banks and other financial institutions, which was amended and restated on December 15, 2020 and again on December 10, 2021 (the “2019 Credit Facility”). On October 24, 2022, the 2019 Credit Facility was terminated, with the outstanding balance of $250 million repaid using cash on hand.

Borrowings under the 2018 Credit Agreement are conditioned upon satisfaction of certain conditions precedent, including the absence of defaults. The Company is subject to one financial covenant, as well as customary affirmative and negative covenants. The financial covenant requires that the Company’s consolidated net funded debt to consolidated EBITDA ratio (as such terms are defined in the 2018 Credit Agreement) be less than or equal to 3.50:1 for all fiscal quarters, subject to adjustments in accordance with the terms of the 2018 Credit Agreement relating to a consummation of an acquisition where the consideration includes cash proceeds from issuance of funded debt in excess of $500 million. The 2018 Credit Agreement also contains customary default provisions, including defaults for non-payment, breach of representations and warranties, insolvency, non-performance of covenants and cross-defaults to other material indebtedness. The occurrence of an event of default under the 2018 Credit Agreement could result in all loans and other obligations becoming immediately due and payable and the 2018 Credit Agreement being terminated.

Commercial Paper Notes

On May 29, 2013, we entered into agreements to initiate a commercial paper program on a private placement basis under which we may issue unsecured commercial paper notes (the “Commercial Paper Notes”) from time-to-time up to a maximum aggregate principal amount outstanding at any time of $750.0 million. The proceeds from the issuance of the Commercial Paper Notes are expected to be used for general corporate purposes, including the repayment of other debt of the Company. The 2018 Credit Agreement is available to repay the Commercial Paper Notes, if necessary. Aggregate borrowings outstanding under the 2018 Credit Agreement and the Commercial Paper Notes will not exceed the $1.5 billion current maximum amount available under the 2018 Credit Agreement. The Commercial Paper Notes will be sold at a discount from par, or alternatively, will be sold at par and bear interest at rates that will vary based upon market conditions at the time of issuance. The maturities of the Commercial Paper Notes will vary but may not exceed 397 days from the date of issue. The definitive documents relating to the commercial paper program contain customary representations, warranties, default and indemnification provisions. There were no Commercial Paper Notes outstanding at December 31, 2022.

Other

We have additional uncommitted credit lines with various U.S. and foreign financial institutions that provide for borrowings of up to approximately $ 274.3 million at December 31, 2022. Outstanding borrowings under these agreements were $3.0 million and $5.2 million at December 31, 2022 and 2021, respectively. The average interest rate on borrowings under these agreements during 2022, 2021 and 2020 was approximately 0.36%.

At December 31, 2022 and 2021, we had the ability and intent to refinance our borrowings under our other existing credit lines with borrowings under the 2018 Credit Agreement. Therefore, the amounts outstanding under those credit lines, if any, are classified as long-term debt at December 31, 2022 and 2021. At December 31, 2022, we had the ability to borrow $ 1.5 billion under our commercial paper program and the Credit Agreements.

We believe that as of December 31, 2022, we were, and currently are, in compliance with all of our debt covenants.

NOTE 15—Pension Plans and Other Postretirement Benefits:

We maintain various noncontributory defined benefit pension plans covering certain employees, primarily in the U.S., the U.K., Germany and Japan. We also have a contributory defined benefit plan covering certain Belgian employees. The benefits for these plans are based primarily on compensation and/or years of service. Our U.S. and U.K. defined benefit plans for non-represented employees are closed to new participants, with no additional benefits accruing under these plans as participants' accrued benefits have been frozen. The funding policy for each plan complies with the requirements of relevant governmental laws and regulations. The pension information for all periods presented includes amounts related to salaried and hourly plans.

The following provides a reconciliation of benefit obligations, plan assets and funded status, as well as a summary of significant assumptions, for our defined benefit pension plans (in thousands):

	Year Ended December 31, 2022		Year Ended December 31, 2021	
	U.S. Pension Plans	Foreign Pension Plans	U.S. Pension Plans	Foreign Pension Pla
Change in benefit obligations:				
Benefit obligation at January 1	$ 680,696	$ 255,234	$ 740,951	$ 290,3
Service cost	904	3,700	869	3,6
Interest cost	18,827	3,363	18,005	2,4
Actuarial gain	(144,288)	(49,380)	(24,576)	(14,7
Benefits paid	(41,168)	(11,049)	(54,553)	(10,4
Employee contributions	—	64	—	
Foreign exchange gain	—	(18,562)	—	(14,0
Settlements/curtailments	—	(1,028)	—	(1,9
Other	—	(1,781)	—	[illegible]
Benefit obligation at December 31	$ 514,971	$ 180,561	$ 680,696	$ 255,2
Change in plan assets:				
Fair value of plan assets at January 1	$ 605,991	$ 94,256	$ 594,228	$ 89,2
Actual return on plan assets	(95,925)	(29,694)	50,256	7,3
Employer contributions	930	12,451	16,060	11,5
Benefits paid	(41,168)	(11,049)	(54,553)	(10,4
Employee contributions	—	64	—	
Foreign exchange gain	—	(9,004)	—	(1,4
Settlements/curtailments	—	(1,028)	—	(1,9
Other	—	2,233	—	[illegible]
Fair value of plan assets at December 31	$ 469,828	$ 58,229	$ 605,991	$ 94,2
Funded status at December 31	$ (45,143)	$ (122,332)	$ (74,705)	$ (160,9

	December 31, 2022		December 31, 2021	
	U.S. Pension Plans	Foreign Pension Plans	U.S. Pension Plans	Foreign Pension Plans
Amounts recognized in consolidated balance sheets:				
Current liabilities (accrued expenses)	$ (947)	$ (6,957)	$ (525)	$ (5,972)
Noncurrent liabilities (pension benefits)	(44,196)	(115,375)	(74,180)	(155,006)
Net pension liability	$ (45,143)	$ (122,332)	$ (74,705)	$ (160,978)
Amounts recognized in accumulated other comprehensive (loss) income:				
Prior service benefit	$ —	$ (615)	$ —	$ (773)
Net amount recognized	$ —	$ (615)	$ —	$ (773)
Weighted-average assumptions used to determine benefit obligations at December 31:				
Discount rate	5.46 %	4.04 %	2.86 %	1.44 %
Rate of compensation increase	— %	3.67 %	— %	3.20 %

The accumulated benefit obligation for all defined benefit pension plans was $ 688.0 million and $928.8 million at December 31, 2022 and 2021, respectively.

Postretirement medical benefits and life insurance is provided for certain groups of U.S. retired employees. Medical and life insurance benefit costs have been funded principally on a pay-as-you-go basis. Although the availability of medical coverage after retirement varies for different groups of employees, the majority of employees who retire before becoming eligible for Medicare can continue group coverage by paying a portion of the cost of a monthly premium designed to cover the claims incurred by retired employees subject to a cap on payments allowed. The availability of group coverage for Medicare-eligible retirees also varies by employee group with coverage designed either to supplement or coordinate with Medicare. Retirees generally pay a portion of the cost of the coverage. Plan assets for retiree life insurance are held under an insurance contract and are reserved for retiree life insurance benefits. In 2005, the postretirement medical benefit available to U.S. employees was changed to provide that employees who are under age 50 as of December 31, 2005 would no longer be eligible for a company-paid retiree medical premium subsidy. Employees who are of age 50 and above as of December 31, 2005 and who retire after January 1, 2006 will have their retiree medical premium subsidy capped. Effective January 1, 2008, our medical insurance for certain groups of U.S. retired employees is now insured through a medical carrier.

The following provides a reconciliation of benefit obligations, plan assets and funded status, as well as a summary of significant assumptions, for our postretirement benefit plans (in thousands):

	Year Ended December 31,	
	2022	2021
	Other Postretirement Benefits	Other Postretirement Benefits
Change in benefit obligations:		
Benefit obligation at January 1	$ 47,493	$ 51,343
Service cost	85	123
Interest cost	1,307	1,238
Actuarial (gain) loss	(10,164)	(2,568)
Benefits paid	(2,731)	(2,643)
Benefit obligation at December 31	$ 35,990	$ 47,493
Change in plan assets:		
Fair value of plan assets at January 1	$ —	$ —
Employer contributions	2,731	2,643
Benefits paid	(2,731)	(2,643)
Fair value of plan assets at December 31	$ —	$ —
Funded status at December 31	$ (35,990)	$ (47,493)

	December 31,	
	2022	2021
	Other Postretirement Benefits	Other Postretirement Benefits
Amounts recognized in consolidated balance sheets:		
Current liabilities (accrued expenses)	$ (3,239)	$ (3,800)
Noncurrent liabilities (postretirement benefits)	(32,751)	(43,693)
Net postretirement liability	$ (35,990)	$ (47,493)
Weighted-average assumptions used to determine benefit obligations at December 31:		
Discount rate	5.45 %	2.85 %
Rate of compensation increase	— %	3.50 %

The components of pension benefits cost (credit) are as follows (in thousands):

	Year Ended December 31, 2022		Year Ended December 31, 2021		Year Ended December 31, 2020	
	U.S. Pension Plans	Foreign Pension Plans	U.S. Pension Plans	Foreign Pension Plans	U.S. Pension Plans	Foreign Pension Plans
Service cost	$ 904	$ 3,700	$ 869	$ 3,697	$ 849	$ 4,000
Interest cost	18,827	3,363	18,005	2,427	23,402	3,357
Expected return on assets	(40,288)	(3,252)	(39,972)	(3,593)	(36,957)	(3,274)
Actuarial (gain) loss	(8,008)	(18,818)	(34,857)	(19,494)	40,653	14,189
Amortization of prior service benefit	—	89	—	115	—	36
Total net pension benefits (credit) cost	$ (28,565)	$ (14,918)	$ (55,955)	$ (16,848)	$ 27,947	$ 18,308
Weighted-average assumption percentages:						
Discount rate	2.86 %	1.44 %	2.50 %	0.86 %	3.56 %	1.33 %
Expected return on plan assets	6.89 %	3.85 %	6.88 %	3.98 %	6.88 %	4.07 %
Rate of compensation increase	— %	3.12 %	— %	3.26 %	— %	3.72 %

Effective January 1, 2023, the weighted-average expected rate of return on plan assets for the U.S. and foreign defined benefit pension plans is 6.88% and 4.86%, respectively.

The components of postretirement benefits cost (credit) are as follows (in thousands):

	Year Ended December 31,		
	2022	2021	2020
	Other Postretirement Benefits	Other Postretirement Benefits	Other Postretirement Benefits
Service cost	$ 85	$ 123	$ 105
Interest cost	1,307	1,238	1,871
Actuarial gain	(10,163)	(2,568)	(2,573)
Total net postretirement benefits credit	$ (8,771)	$ (1,207)	$ (597)
Weighted-average assumption percentages:			
Discount rate	2.85 %	2.49 %	3.53 %
Rate of compensation increase	3.50 %	3.50 %	3.50 %

All components of net benefit cost (credit), other than service cost, are included in Other income (expenses), net on the consolidated statements of income.

The mark-to-market actuarial gain in 2022 is primarily attributable to a significant increase in the weighted-average discount rate to 5.46% from 2.86% for our U.S. pension plans and to 4.04% from 1.44% for our foreign pension plans to reflect market conditions as of the December 31, 2022 measurement date. This was partially offset by a lower return on pension plan assets in 2022 than was expected, as a result of overall market and investment portfolio performance. The weighted-average actual return on our U.S. and foreign pension plan assets was (17.94)% versus an expected return of 6.48%.

The mark-to-market actuarial gain in 2021 is primarily attributable to a higher return on pension plan assets in 2021 than was expected, as a result of overall market and investment portfolio performance. The weighted-average actual return on our U.S. and foreign pension plan assets was 8.42% versus an expected return of 6.50%. In addition, there was an increase in the weighted average discount rate to 2.86% from 2.50% for our U.S. pension plans and to 1.44% from 0.86% for our foreign pension plans to reflect market conditions as of the December 31, 2021 measurement date.

The mark-to-market actuarial loss in 2020 is primarily attributable to a decrease in the weighted-average discount rate to 2.50% from 3.56% for our U.S. pension plans and to 0.86% from 1.33% for our foreign pension plans to reflect market conditions as of the December 31, 2020 measurement date. This was partially offset by a higher return on pension plan assets in 2020 than was expected, as a result of overall market and investment portfolio performance. The weighted-average actual return on our U.S. and foreign pension plan assets was 13.15% versus an expected return of 6.52%.

Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date (exit price). The inputs used to measure fair value are classified into the following hierarchy:

Level 1 Unadjusted quoted prices in active markets for identical assets or liabilities

Level 2 Unadjusted quoted prices in active markets for similar assets or liabilities, or unadjusted quoted prices for identical or similar assets or liabilities in markets that are not active, or inputs other than quoted prices that are observable for the asset or liability

Level 3 Unobservable inputs for the asset or liability

We endeavor to utilize the best available information in measuring fair value. Financial assets and liabilities are classified in their entirety based on the lowest level of input that is significant to the fair value measurement. Investments for which market quotations are readily available are valued at the closing price on the last business day of the year. Listed securities for which no sale was reported on such date are valued at the mean between the last reported bid and asked price. Securities traded in the over-the-counter market are valued at the closing price on the last business day of the year or at bid price. The net asset value of shares or units is based on the quoted market value of the underlying assets. The market value of corporate bonds is based on institutional trading lots and is most often reflective of bid price. Government securities are valued at the mean between bid and ask prices. Holdings in private equity securities are typically valued using the net asset valuations provided by the underlying private investment companies.

The following tables set forth the assets of our pension and postretirement plans that were accounted for at fair value on a recurring basis as of December 31, 2022 and 2021 (in thousands):

	December 31, 2022	Quoted Prices in Active Markets for Identical Items (Level 1)	Quoted Prices in Active Markets for Similar Items (Level 2)	Unobservable Inputs (Level 3)
Pension Assets:				
Domestic Equity[a]	$ 98,080	$ 97,984	$ 96	$ —
International Equity[b]	88,002	79,815	8,187	—
Fixed Income[c]	269,352	235,184	34,168	—
Absolute Return Measured at Net Asset Value[d]	68,725	—	—	—
Cash	3,898	3,898	—	—
Total Pension Assets	$ 528,057	$ 416,881	$ 42,451	$ —

	December 31, 2021	Quoted Prices in Active Markets for Identical Items (Level 1)	Quoted Prices in Active Markets for Similar Items (Level 2)	Unobservable Inputs (Level 3)
Pension Assets:				
Domestic Equity[a]	$ 129,946	$ 129,139	$ 807	$ —
International Equity[b]	128,353	103,554	24,799	—
Fixed Income[c]	345,635	290,177	55,458	—
Absolute Return Measured at Net Asset Value[d]	96,313	—	—	—
Total Pension Assets	$ 700,247	$ 522,870	$ 81,064	$ —

(a) Consists primarily of U.S. stock funds that track or are actively managed and measured against the S&P 500 index.
(b) Consists primarily of international equity funds which invest in common stocks and other securities whose value is based on an international equity index or an underlying equity security or basket of equity securities.
(c) Consists primarily of debt obligations issued by governments, corporations, municipalities and other borrowers. Also includes insurance policies.
(d) Consists primarily of funds with holdings in private investment companies. See additional information about the Absolute Return investments below. Holdings in private investment companies are measured at fair value using the net asset value per share as a practical expedient and have not been categorized in the fair value hierarchy. The fair value amounts of $68.7 million and $96.3 million as of December 31, 2022 and 2021, respectively, are included in this table to permit reconciliation to the reconciliation of plan assets table above.

The Company’s pension plan assets in the U.S. and U.K. represent approximately 96% of the total pension plan assets. The investment objective of these pension plan assets is to achieve solid returns while preserving capital to meet current plan cash flow requirements. Assets should participate in rising markets, with defensive action in declining markets expected to an even greater degree. Depending on market conditions, the broad asset class targets may range up or down by approximately 10%. These asset classes include but are not limited to hedge fund of funds, bonds and other fixed income vehicles, high yield fixed income securities, equities and distressed debt. At December 31, 2022 and 2021, equity securities held by our pension and OPEB plans did not include direct ownership of Albemarle common stock.

The weighted-average target allocations as of the measurement date are as follows:

	Target Allocation
Equity securities	41 %
Fixed income	49 %
Absolute return	10 %

Our Absolute Return investments consist primarily of our investments in hedge fund of funds. These are holdings in private investment companies with fair values that are based on significant unobservable inputs including assumptions where there is little, if any, market activity for the investment. Investment managers or fund managers associated with these investments provide valuations of the investments on a monthly basis utilizing the net asset valuation approach for determining fair values. These valuations are reviewed by the Company for reasonableness based on applicable sector, benchmark and company performance to validate the appropriateness of the net asset values as a fair value measurement. Where available, audited financial statements are obtained and reviewed for the investments as support for the manager’s investment valuation. In general, the investment objective of these funds is high risk-adjusted returns with an emphasis on preservation of capital. The investment strategies of each of the funds vary; however, the objective of our Absolute Return investments is complementary to the overall investment objective of our U.S. pension plan assets.

We made contributions to our defined benefit pension and OPEB plans of $ 16.1 million, $30.3 million and $16.4 million during the years ended December 31, 2022, 2021 and 2020, respectively. We expect contributions to our domestic nonqualified and foreign qualified and nonqualified pension plans to approximate $14.6 million in 2023. Also, we expect to pay approximately $3.2 million in premiums to our U.S. postretirement benefit plan in 2023. However, we may choose to make additional voluntary pension contributions in excess of these amounts.

The current forecast of benefit payments, which reflects expected future service, amounts to (in millions):

	U.S. Pension Plans	Foreign Pension Plans	Other Postretirement Benefits
2023	$ 43.2	$ 14.5	$ 3.2
2024	$ 43.5	$ 12.5	$ 3.2
2025	$ 43.6	$ 12.9	$ 3.1
2026	$ 43.3	$ 12.0	$ 3.1
2027	$ 42.8	$ 12.6	$ 3.0
2026-2030	$ 201.4	$ 68.3	$ 14.0

We have a supplemental executive retirement plan (“SERP”), which provides unfunded supplemental retirement benefits to certain management or highly compensated employees. The SERP provides for incremental pension benefits to offset the limitations imposed on qualified plan benefits by federal income tax regulations. (Credits) costs relating to our SERP were ($1.2) million, ($0.2) million and $3.8 million for the years ended December 31, 2022, 2021 and 2020, respectively. The projected benefit obligation for the SERP recognized in the consolidated balance sheets at December 31, 2022 and 2021 was $6.5 million and $8.7 million, respectively. The benefit expenses and obligations of this SERP are included in the tables above. Benefits of $ 0.9 million are expected to be paid to SERP retirees in 2023. On October 1, 2012, our Board of Directors approved amendments to the SERP, such that effective December 31, 2014, no additional benefits shall accrue under this plan and participants’ accrued benefits shall be frozen as of that date to reflect the same changes as were made under the U.S. qualified defined benefit plan.

At December 31, 2022, the assumed rate of increase in the pre-65 and post-65 per capita cost of covered health care benefits for U.S. retirees was zero as the employer-paid premium caps (pre-65 and post-65) were met starting January 1, 2013.

Defined Contribution Plans

On March 31, 2004, a new defined contribution pension plan benefit was adopted under the qualified defined contribution plan for U.S. non-represented employees hired after March 31, 2004. On October 1, 2012 our Board of Directors approved certain plan amendments, such that effective January 1, 2013, the defined contribution pension plan benefit is expanded to include non-represented employees hired prior to March 31, 2004, and revised the contribution for all participants to be based on 5% of eligible employee compensation. The employer portion of contributions to our U.S. defined contribution pension plan amounted to $12.1 million, $16.7 million, and $6.9 million in 2022, 2021 and 2020, respectively. Contributions in 2021 included amounts deferred from 2020 as a result of the Company's plan to maintain financial flexibility during the COVID-19 pandemic.

Certain of our employees participate in our defined contribution 401(k) employee savings plan, which is generally available to all U.S. full-time salaried and non-union hourly employees and to employees who are covered by a collective bargaining agreement that provides for such participation. This U.S. defined contribution plan is funded with contributions made by the participants and us. Our contributions to the 401(k) plan amounted to $12.7 million, $17.4 million and $7.5 million in 2022, 2021 and 2020, respectively. Contributions in 2021 included amounts deferred from 2020 as a result of the Company's plan to maintain financial flexibility during the COVID-19 pandemic.

Multiemployer Plan

Prior to 2022, certain current and former employees participated in a multiemployer plan in Germany, the Pensionskasse Dynamit Nobel Versicherungsverein auf Gegenseitigkeit, Troisdorf ("DN Pensionskasse") that provided monthly payments in the case of disability, death or retirement. On January 1, 2022, the Company terminated its membership with the DN Pensionskasse and as a result did not make any contributions during the year.

In prior years, the majority of the Company's contributions to the DN Pensionskasse were tied to employees' contributions, which are generally calculated as a percentage of base compensation, up to a certain statutory ceiling. Our normal contributions to this plan were $1.5 million in both the years ended December 31, 2021 and 2020, respectively.

Effective July 1, 2016, the DN Pensionskasse was subject to a financial improvement plan which expired on December 31, 2022, with the final contribution in the second quarter of 2023. This financial improvement plan called for increased capital reserves to avoid future underfunding risk. During the years ended December 31, 2022, 2021 and 2020, the Company made contributions for its employees covered under this plan of $2.8 million, $1.3 million and $3.1 million, respectively, recorded in Selling, general and administrative expenses, as a result of this financial improvement plan. The value of the additional funding required under the financial improvement plan each year is determined upon the completion of the annual financial statements and are payable in the second quarter of the following year. A portion of the additional funding necessary for the year will be based on an estimate prepared on September 30 of each year and payable in the fourth quarter of that same year.

NOTE 16—Other Noncurrent Liabilities:

Other noncurrent liabilities consist of the following at December 31, 2022 and 2021 (in thousands):

	December 31, 2022	December 31, 2021
Transition tax on foreign earnings[(a)]	$ 191,708	$ 234,180
Operating leases[(b)]	99,269	126,997
Liabilities related to uncertain tax positions[(c)]	83,670	27,719
Executive deferred compensation plan obligation	27,270	32,491
Environmental liabilities[(d)]	31,272	37,540
Asset retirement obligations[(d)]	79,522	76,196
Tax indemnification liability[(e)]	66,137	66,799
Other[(f)]	57,748	61,776
Total	$ 636,596	$ 663,698

(a) Noncurrent portion of one-time transition tax on foreign earnings. See Note 21, "Income Taxes," for additional information.
(b) See Note 18, "Leases."
(c) See Note 21, "Income Taxes."
(d) See Note 17, "Commitments and Contingencies."

(e) Indemnification of certain income and non-income tax liabilities primarily associated with the Chemetall Surface Treatment entities sold in 2017.
(f) No individual component exceeds 5% of total liabilities.

NOTE 17—Commitments and Contingencies:

In the ordinary course of business, we have commitments in connection with various activities. We believe that amounts recorded are adequate for known items which might become due in the current year. The most significant commitments are as follows:

Environmental

We had the following activity in our recorded environmental liabilities for the years ended December 31, 2022, 2021 and 2020 (in thousands):

	Year Ended December 31,		
	2022	2021	2020
Balance, beginning of year	$ 46,617	$ 45,771	$ 42,592
Expenditures	(10,378)	(2,752)	(3,290)
Accretion of discount	1,031	960	925
Additions, liability releases and changes in estimates, net	673	4,063	3,815
Foreign currency translation adjustments and other	302	(1,425)	1,729
Balance, end of year	38,245	46,617	45,771
Less amounts reported in Accrued expenses	6,973	9,077	9,473
Amounts reported in Other noncurrent liabilities	$ 31,272	$ 37,540	$ 36,298

Environmental remediation liabilities included discounted liabilities of $30.1 million and $39.7 million at December 31, 2022 and 2021, respectively, discounted at rates with a weighted-average of 3.4% and 3.5%, respectively, with the undiscounted amount totaling $57.5 million and $70.0 million at December 31, 2022 and 2021, respectively. For certain locations where the Company is operating groundwater monitoring and/or remediation systems, prior owners or insurers have assumed all or most of the responsibility.

The amounts recorded represent our future remediation and other anticipated environmental liabilities. These liabilities typically arise during the normal course of our operational and environmental management activities or at the time of acquisition of the site, and are based on internal analysis as well as input from outside consultants. As evaluations proceed at each relevant site, changes in risk assessment practices, remediation techniques and regulatory requirements can occur, therefore such liability estimates may be adjusted accordingly. The timing and duration of remediation activities at these sites will be determined when evaluations are completed. Although it is difficult to quantify the potential financial impact of these remediation liabilities, management estimates (based on the latest available information) that there is a reasonable possibility that future environmental remediation costs associated with our past operations could represent an additional $9 million before income taxes, in excess of amounts already recorded.

We believe that any sum we may be required to pay in connection with environmental remediation matters in excess of the amounts recorded would likely occur over a period of time and would likely not have a material adverse effect upon our results of operations, financial condition or cash flows on a consolidated annual basis although any such sum could have a material adverse impact on our results of operations, financial condition or cash flows in a particular quarterly reporting period.

Asset Retirement Obligations

The following is a reconciliation of our beginning and ending asset retirement obligation balances for 2022 and 2021 (in thousands):

	Year Ended December 31,	
	2022	2021
Balance, beginning of year	$ 79,213	$ 75,872
Additions and changes in estimates [(a)]	2,919	4,832
Accretion of discount	1,996	2,098
Liabilities settled	(4,266)	(3,605)
Foreign currency translation adjustments and other	239	16
Balance, end of year	$ 80,101	$ 79,213
Less amounts reported in Accrued expenses	579	3,017
Amounts reported in Other noncurrent liabilities	$ 79,522	$ 76,196

(a) Additions in 2022 primarily related to updated estimates of asset retirement obligations in Australia. 2021 additions primarily related to the update of an estimate at a site formerly owned by Albemarle.

Asset retirement obligations primarily relate to post-closure reclamation of brine wells and sites involved in the surface mining and manufacturing of lithium. We are not aware of any conditional asset retirement obligations that would require recognition in our consolidated financial statements.

Litigation

We are involved from time to time in legal proceedings of types regarded as common in our business, including administrative or judicial proceedings seeking remediation under environmental laws, such as the federal Comprehensive Environmental Response, Compensation and Liability Act, commonly known as CERCLA or Superfund, products liability, breach of contract liability and premises liability litigation. Where appropriate, we may establish financial reserves for such proceedings. We also maintain insurance to mitigate certain of such risks. Costs for legal services are generally expensed as incurred.

On February 6, 2017, Huntsman International LLC (“Huntsman”), a subsidiary of Huntsman Corporation, filed a lawsuit in New York state court against Rockwood Holdings, Inc. (“Rockwood”), Rockwood Specialties, Inc., certain former executives of Rockwood and its subsidiaries, Seifollah Ghasemi, Thomas Riordan, Andrew Ross, and Michael Valente, and Albemarle. The lawsuit arises out of Huntsman’s acquisition of certain Rockwood subsidiaries in connection with a stock purchase agreement (the “SPA”), dated September 17, 2013. Before that transaction closed on October 1, 2014, Albemarle began discussions with Rockwood to purchase all outstanding equity of Rockwood and did so in a transaction that closed on January 12, 2015. Huntsman’s complaint asserted that certain technology that Rockwood had developed for a production facility in Augusta, Georgia, and which was among the assets that Huntsman acquired pursuant to the SPA, did not work, and that Rockwood and the defendant executives had intentionally misled Huntsman about that technology in connection with the Huntsman-Rockwood transaction. The complaint asserted claims for, among other things, fraud, negligent misrepresentation, and breach of the SPA, and sought certain costs for completing construction of the production facility.

On March 10, 2017, Albemarle moved in New York state court to compel arbitration, which was granted on January 8, 2018 (although Huntsman unsuccessfully appealed that decision). Huntsman’s arbitration demand asserted claims substantially similar to those asserted in its state court complaint, and sought various forms of legal remedies, including cost overruns, compensatory damages, expectation damages, punitive damages, and restitution. After a trial, the arbitration panel issued an award on October 28, 2021, awarding approximately $600 million (including interest) to be paid by Albemarle to Huntsman, in addition to the possibility of attorney’s fees, costs and expenses. Following the arbitration panel decision, Albemarle reached a settlement with Huntsman to pay $665 million in two equal installments, with the first payment made in December 2021. The second and final payment of $ 332.5 million was made in May 2022. As a result, the consolidated statements of income for the year ended December 31, 2021, includes expense of $657.4 million ($508.5 million net of income tax), inclusive of estimated possible legal fees incurred by Huntsman and other related obligations, to reflect the increase in liabilities for this legal matter.

As first reported in 2018, following receipt of information regarding potential improper payments being made by third-party sales representatives of our Refining Solutions business, within our Catalysts segment, we promptly retained outside counsel and forensic accountants to investigate potential violations of the Company’s Code of Conduct, the Foreign Corrupt

Practices Act, and other potentially applicable laws. Based on this internal investigation, we have voluntarily self-reported potential issues relating to the use of third-party sales representatives in our Refining Solutions business, within our Catalysts segment, to the U.S. Department of Justice (“DOJ”), the SEC, and the Dutch Public Prosecutor (“DPP”), and are cooperating with the DOJ, the SEC, and the DPP in their review of these matters. In connection with our internal investigation, we have implemented, and are continuing to implement, appropriate remedial measures. We have commenced discussions with the SEC, DOJ and DPP about a potential resolution of these matters.

At this time, we are unable to predict the duration, scope, result, or related costs associated with the investigations. We also are unable to predict what action may be taken by the DOJ, the SEC, or the DPP, or what penalties or remedial actions they may ultimately seek. Any determination that our operations or activities are not, or were not, in compliance with existing laws or regulations could result in the imposition of fines, penalties, disgorgement, equitable relief, or other losses. We do not believe, however, that any such fines, penalties, disgorgement, equitable relief, or other losses would have a material adverse effect on our financial condition or liquidity. However, an adverse resolution could have a material adverse effect on our results of operations in a particular period.

Indemnities

We are indemnified by third parties in connection with certain matters related to acquired and divested businesses. Although we believe that the financial condition of those parties who may have indemnification obligations to the Company is generally sound, in the event the Company seeks indemnity under any of these agreements or through other means, there can be no assurance that any party who may have obligations to indemnify us will adhere to their obligations and we may have to resort to legal action to enforce our rights under the indemnities.

The Company may be subject to indemnity claims relating to properties or businesses it divested, including properties or businesses of acquired businesses that were divested prior to the completion of the acquisition. In the opinion of management, and based upon information currently available, the ultimate resolution of any indemnification obligations owed to the Company or by the Company is not expected to have a material effect on the Company’s financial condition, results of operations or cash flows. The Company had approximately $66.1 million and $66.8 million at December 31, 2022 and 2021, respectively, recorded in Other noncurrent liabilities primarily related to the indemnification of certain income and non-income tax liabilities associated with the Chemetall Surface Treatment entities sold in 2017. During the year ended December 31, 2021, the Company recorded $39.4 million to revise this indemnification estimate for an ongoing tax-related matter in Germany. A corresponding discrete tax benefit of $27.9 million was recorded in Income tax expense during the same period, netting to an expected cash obligation of approximately $11.5 million.

Other

The Company has standby letters of credit and guarantees with various financial institutions. The following table summarizes our letters of credit and guarantee agreements (in thousands):

	2023	2024	2025	2026	2027	Thereafter
Letters of credit and other guarantees	$ 127,235	$ 10,366	$ 1,770	$ 1,931	$ 344	$ 684

The outstanding letters of credit are primarily related to insurance claim payment guarantees. The majority of the Company’s other guarantees have terms of one year and mainly consist of performance and environmental guarantees, as well as guarantees to customs and port authorities. The guarantees arose during the ordinary course of business.

We do not have recorded reserves for the letters of credit and guarantees as of December 31, 2022. We are unable to estimate the maximum amount of the potential future liability under guarantees and letters of credit. However, we accrue for any potential loss for which we believe a future payment is probable and a range of loss can be reasonably estimated. We believe our liability under such obligations is immaterial.

We currently, and are from time to time, subject to transactional audits in various taxing jurisdictions and to customs audits globally. We do not expect the financial impact of any of these audits to have a material adverse effect on the Company’s results of operations, financial condition or cash flows.

NOTE 18—Leases:

We lease certain office space, buildings, transportation and equipment in various countries. The initial lease terms generally range from 1 to 30 years for real estate leases, and from 2 to 15 years for non-real estate leases. Leases with an initial term of 12 months or less are not recorded on the balance sheet, and we recognize lease expense for these leases on a straight-line basis over the lease term.

Many leases include options to terminate or renew, with renewal terms that can extend the lease term from 1 to 50 years or more. The exercise of lease renewal options is at our sole discretion. Certain leases also include options to purchase the leased property. The depreciable life of assets and leasehold improvements are limited by the expected lease term, unless there is a transfer of title or purchase option reasonably certain of exercise. Our lease agreements do not contain any material residual value guarantees or material restrictive covenants.

The following table provides details of our lease contracts for the years ended December 31, 2022, 2021 and 2020 (in thousands):

	Year Ended December 31,		
	2022	**2021**	**2020**
Operating lease cost	$ 43,809	$ 42,338	$ 33,904
Finance lease cost:			
Amortization of right of use assets	3,377	614	585
Interest on lease liabilities	3,504	3,010	2,681
Total finance lease cost	6,881	3,624	3,266
Short-term lease cost	13,985	11,084	11,663
Variable lease cost	8,064	8,002	8,691
Total lease cost	$ 72,739	$ 65,048	$ 57,524

Supplemental cash flow information related to our lease contracts for the years ended December 31, 2022, 2021 and 2020 is as follows (in thousands):

	Year Ended December 31,		
	2022	**2021**	**2020**
Cash paid for amounts included in the measurement of lease liabilities:			
Operating cash flows from operating leases	$ 36,629	$ 33,030	$ 36,245
Operating cash flows from finance leases	3,389	1,776	1,568
Financing cash flows from finance leases	1,432	687	663
Right-of-use assets obtained in exchange for lease obligations:			
Operating leases	15,913	56,814	29,581
Finance leases	3,976	17,096	—

Supplemental balance sheet information related to our lease contracts, including the location on balance sheet, at December 31, 2022 and 2021 is as follows (in thousands, except as noted):

	December 31,	
	2022	2021
Operating leases:		
Other assets	$ 128,173	$ 154,741
Accrued expenses	35,515	31,603
Other noncurrent liabilities	99,269	126,997
Total operating lease liabilities	134,784	158,600
Finance leases:		
Net property, plant and equipment	81,356	75,302
Current portion of long-term debt [(a)]	4,995	3,768
Long-term debt	74,409	74,011
Total finance lease liabilities	79,404	77,779
Weighted average remaining lease term (in years):		
Operating leases	13.3	12.9
Finance leases	22.8	24.5
Weighted average discount rate (%):		
Operating leases	3.60 %	3.44 %
Finance leases	4.41 %	4.47 %

(a) Balance includes accrued interest of finance lease.

Maturities of lease liabilities as of December 31, 2022 were as follows (in thousands):

	Operating Leases	Finance Leases
2023	$ 38,529	$ 6,979
2024	24,565	9,328
2025	13,518	6,088
2026	10,551	5,450
2027	8,866	5,450
Thereafter	112,836	91,801
Total lease payments	208,865	125,096
Less imputed interest	74,081	45,692
Total	$ 134,784	$ 79,404

NOTE 19—Stock-based Compensation Expense:

Incentive Plans

We have various share-based compensation plans that authorize the granting of (i) qualified and non-qualified stock options to purchase shares of our common stock, (ii) restricted stock and restricted stock units, (iii) performance unit awards and (iv) stock appreciation rights (“SARs”) to employees and non-employee directors, at our option. Stock options granted to employees generally vest over three years and have a term of ten years. Restricted stock and restricted stock unit awards vest in periods ranging from one to five years from the date of grant. Performance unit awards are earned at a level ranging from 0% to 200% contingent upon the achievement of specific performance criteria over periods ranging from one to three years. Distribution of earned units occurs generally 50% upon completion of the applicable measurement period with the remaining 50% distributed one year thereafter.

In May 2017, the Company adopted the Albemarle Corporation 2017 Incentive Plan (the "Incentive Plan"), which replaced the Albemarle Corporation 2008 Incentive Plan. The maximum number of shares available for issuance to participants under the Incentive Plan is 4,500,000 shares. The adoption of the Incentive Plan did not affect awards already granted under the Albemarle Corporation 2008 Incentive Plan. Under the Albemarle Corporation 2013 Stock Compensation and Deferral Election Plan for Non-Employee Directors (the "Non-Employee Directors Plan"), a maximum aggregate number of 500,000 shares of our common stock is authorized for issuance to the Company's non-employee directors; any shares remaining available for issuance under the prior plans were canceled. The aggregate fair market value of shares that may be issued to a director during any compensation year (as defined in the agreement, generally July 1 to June 30) shall not exceed $150,000. At December 31, 2022, there were 3,334,570 shares available for grant under the Incentive Plan and 328,572 shares available for grant under the Non-Employee Directors Plan.

Total stock-based compensation expense associated with our incentive plans for the years ended December 31, 2022, 2021 and 2020 amounted to $ 31.4 million, $18.8 million and $19.3 million, respectively, and is included in Cost of goods sold and Selling, general and administrative expenses in the consolidated statements of income. Total related recognized tax benefits for the years ended December 31, 2022, 2021 and 2020 amounted to $4.0 million, $2.3 million and $2.4 million, respectively.

The following table summarizes information about the Company's fixed-price stock options as of and for the year ended December 31, 2022:

	Shares	Weighted-Average Exercise Price	Weighted-Average Remaining Contractual Term (Years)	Aggregate Intrinsic Value (in thousands)
Outstanding at December 31, 2021	360,169	$ 98.19	6.6	$ 48,833
Granted	57,348	191.95		
Exercised	(32,581)	73.54		
Outstanding at December 31, 2022	384,936	$ 114.24	6.3	$ 39,501
Exercisable at December 31, 2022	194,393	$ 89.29	4.6	$ 24,798

We granted 57,348, 62,479 and 76,221 stock options during 2022, 2021 and 2020, respectively. There were no significant modifications made to any share-based grants during these periods.

The fair value of each option granted during the years ended December 31, 2022, 2021 and 2020 was estimated on the date of grant using the Black-Scholes option-pricing model with the following weighted-average assumptions:

	Year Ended December 31,		
	2022	2021	2020
Dividend yield	1.32 %	1.43 %	1.69 %
Volatility	36.21 %	36.19 %	32.65 %
Average expected life (years)	6	6	6
Risk-free interest rate	1.97 %	1.44 %	1.13 %
Fair value of options granted	$ 63.00	$ 49.42	$ 22.14

Dividend yield is the average of historical yields and those estimated over the average expected life. The stock volatility is based on historical volatilities of our common stock. The average expected life represents the weighted average period of time that options granted are expected to be outstanding giving consideration to vesting schedules and our historical exercise patterns. The risk-free interest rate is based on the U.S. Treasury strip rate with stripped coupon interest for the period equal to the contractual term of the share option grant in effect at the time of grant.

The intrinsic value of options exercised during the years ended December 31, 2022, 2021 and 2020 was $ 6.9 million, $37.2 million and $31.3 million, respectively. The intrinsic value of a stock option is the amount by which the market value of the underlying stock exceeds the exercise price of the option.

Total compensation cost not yet recognized for nonvested stock options outstanding as of December 31, 2022 is approximately $ 3.8 million and is expected to be recognized over a remaining weighted-average period of 1.8 years. Cash proceeds from stock options exercised and tax benefits related to stock options exercised were $ 2.8 million and $1.6 million for the year ended December 31, 2022, respectively. The Company issues new shares of common stock upon exercise of stock options and vesting of restricted common stock awards.

The following table summarizes activity in performance unit awards as of and for the year ended December 31, 2022:

	Shares	Weighted-Average Grant Date Fair Value Per Share
Nonvested, beginning of period	224,903	$ 121.39
Granted	64,106	204.60
Vested	(60,639)	118.91
Forfeited	(3,822)	137.12
Nonvested, end of period	224,548	140.44

The weighted average grant date fair value of performance unit awards granted in 2022, 2021 and 2020 was $ 13.1 million, $10.0 million and $8.7 million, respectively. For all periods presented, half of the performance unit awards granted were based on the targeted return on invested capital ("ROIC Award"), while the other half were granted based on targeted market conditions ("TSR Award"). The fair value of each TSR Award was estimated on the date of grant using the Monte Carlo simulation model as these equity awards are tied to a service and market condition. The calculation used the following weighted-average assumptions:

	Year Ended December 31,		
	2022	2021	2020
Volatility	51.51 %	47.13 %	33.66 %
Risk-free interest rate	1.72 %	0.27 %	0.85 %

The weighted average fair value of performance unit awards that vested during 2022, 2021 and 2020 was $ 11.9 million, $5.8 million and $3.0 million, respectively, based on the closing prices of our common stock on the dates of vesting. Total compensation cost not yet recognized for nonvested performance unit awards outstanding as of December 31, 2022 is approximately $20.0 million, calculated based on current expectation of specific performance criteria, and is expected to be recognized over a remaining weighted-average period of approximately 1.2 years. Each performance unit represents one share of common stock.

The following table summarizes activity in non-performance based restricted stock and restricted stock unit awards as of and for the year ended December 31, 2022:

	Shares	Weighted-Average Grant Date Fair Value Per Share
Nonvested, beginning of period	309,254	$ 92.52
Granted	74,887	205.45
Vested	(75,643)	90.26
Forfeited	(7,545)	140.13
Nonvested, end of period	300,953	120.09

The weighted average grant date fair value of restricted stock and restricted stock unit awards granted in 2022, 2021 and 2020 was $ 15.4 million, $10.6 million and $13.3 million, respectively. The weighted average fair value of restricted stock and restricted stock unit awards that vested in 2022, 2021 and 2020 was $17.8 million, $11.0 million and $9.0 million, respectively, based on the closing prices of our common stock on the dates of vesting. Total compensation cost not yet recognized for nonvested, non-performance based restricted stock and restricted stock units as of December 31, 2022 is approximately $17.5 million and is expected to be recognized over a remaining weighted-average period of 2.0 years. The fair value of the non-performance based restricted stock and restricted stock units was estimated on the date of grant adjusted for a dividend factor, if necessary.

NOTE 20—Accumulated Other Comprehensive (Loss) Income:

The components and activity in Accumulated other comprehensive (loss) income (net of deferred income taxes) consisted of the following during the years ended December 31, 2022, 2021 and 2020 (in thousands):

	Foreign Currency Translation and Other	Net Investment Hedge[(a)]	Cash Flow Hedge[(b)]	Interest Rate Swap[(c)]	Total
Balance at December 31, 2019	$ (468,737)	$ 80,778	$ 4,847	$ (12,623)	$ (395,735)
Other comprehensive income (loss) before reclassifications	99,809	(34,185)	1,602	—	67,226
Amounts reclassified from accumulated other comprehensive loss	23	—	—	2,601	2,624
Other comprehensive income (loss), net of tax	99,832	(34,185)	1,602	2,601	69,850
Other comprehensive income attributable to noncontrolling interests	(247)	—	—	—	(247)
Balance at December 31, 2020	$ (369,152)	$ 46,593	$ 6,449	$ (10,022)	$ (326,132)
Other comprehensive (loss) income income before reclassifications	(74,478)	5,110	174	—	(69,194)
Amounts reclassified from accumulated other comprehensive loss	93	—	—	2,623	2,716
Other comprehensive (loss) income, net of tax	(74,385)	5,110	174	2,623	(66,478)
Amounts reclassified within accumulated other comprehensive income	51,703	(51,703)	—	—	—
Other comprehensive loss attributable to noncontrolling interests	160	—	—	—	160
Balance at December 31, 2021	$ (391,674)	$ —	$ 6,623	$ (7,399)	$ (392,450)
Other comprehensive (loss) income before reclassifications	(171,367)	—	(4,399)	—	(175,766)
Amounts reclassified from accumulated other comprehensive loss	72	—	—	7,399	7,471
Other comprehensive (loss) income, net of tax	(171,295)	—	(4,399)	7,399	(168,295)
Other comprehensive loss attributable to noncontrolling interests	83	—	—	—	83
Balance at December 31, 2022	$ (562,886)	$ —	$ 2,224	$ —	$ (560,662)

(a) During the first quarter of 2021 the net investment hedge was discontinued following the repayment of the 1.875% Euro-denominated senior notes. The balance of foreign exchange revaluation gains and losses associated with this discontinued net investment hedge have been reclassified to Foreign currency translation and other, and will remain within accumulated other comprehensive loss until the hedged net investment is sold or liquidated.

(b) We entered into a foreign currency forward contract in the fourth quarter of 2019, which was designated and accounted for as a cash flow hedge under ASC 815, *Derivatives and Hedging*. See Note 22, “Fair Value of Financial Instruments,” for additional information.

(c) The pre-tax portion of amounts reclassified from accumulated other comprehensive loss is included in interest expense. The balance of this interest rate swap was being amortized to Interest and financing expenses over the life of the 4.15% senior notes originally due in 2024. As discussed in Note 14, “Long-term Debt,” the Company repaid these notes in the second quarter of 2022, and as a result, reclassified the remaining balance of this interest rate swap to interest expense during the same period as part of the early extinguishment of debt.

The amount of income tax benefit (expense) allocated to each component of Other comprehensive income (loss) for the years ended December 31, 2022, 2021 and 2020 is provided in the following tables (in thousands):

	Foreign Currency Translation and Other	Net Investment Hedge	Cash Flow Hedge	Interest Rate Swap
2022				
Other comprehensive (loss) income, before tax	$ (168,953)	$ —	$ (4,399)	$ 9,739
Income tax benefit (expense)	(2,342)	—	—	(2,340)
Other comprehensive (loss) income, net of tax	$ (171,295)	$ —	$ (4,399)	$ 7,399
2021				
Other comprehensive income (loss), before tax	$ (76,544)	$ 6,552	$ 174	$ 3,336
Income tax benefit (expense)	2,159	(1,442)	—	(713)
Other comprehensive income (loss), net of tax	$ (74,385)	$ 5,110	$ 174	$ 2,623
2020				
Other comprehensive (loss) income, before tax	$ 99,710	$ (43,826)	$ 1,602	$ 3,336
Income tax expense	122	9,641	—	(735)
Other comprehensive (loss) income, net of tax	$ 99,832	$ (34,185)	$ 1,602	$ 2,601

NOTE 21—Income Taxes:

Income before income taxes and equity in net income of unconsolidated investments, and current and deferred income tax expense (benefit) are composed of the following (in thousands):

	Year Ended December 31,		
	2022	2021	2020
Income before income taxes and equity in net income of unconsolidated investments:			
Domestic	$ 952,799	$ (186,077)	$ 41,346
Foreign	1,480,645	319,695	332,173
Total	$ 2,433,444	$ 133,618	$ 373,519
Current income tax expense (benefit):			
Federal	$ 33,230	$ 11,722	$ (140)
State	4,965	694	(193)
Foreign	259,054	55,530	56,734
Total	$ 297,249	$ 67,946	$ 56,401
Deferred income tax (benefit) expense:			
Federal	$ 84,054	$ (38,413)	$ 4,564
State	(3,511)	(5,544)	(2,893)
Foreign	12,796	5,457	(3,647)
Total	$ 93,339	$ (38,500)	$ (1,976)
Total income tax expense	$ 390,588	$ 29,446	$ 54,425

The reconciliation of the U.S. federal statutory rate to the effective income tax rate is as follows:

	% of Income Before Income Taxes					
	2022		2021		2020	
Federal statutory rate	21.0	%	21.0	%	21.0	%
State taxes, net of federal tax benefit	—		(3.5)		0.3	
Change in valuation allowance[a]	(3.9)		33.7		1.9	
Impact of foreign earnings, net[b][c]	(0.1)		(40.5)		(8.4)	
Global intangible low tax inclusion	0.3		12.3		1.9	
Foreign-derived intangible income	(3.0)		—		—	
Section 162(m) limitation	0.3		4.5		0.5	
Subpart F income	0.2		4.8		1.3	
Stock-based compensation	(0.3)		(7.2)		(1.0)	
Depletion	(0.2)		(2.9)		(0.9)	
U.S. federal return to provision	(0.4)		(1.7)		(0.9)	
Revaluation of unrecognized tax benefits/reserve requirements	2.3		3.0		(0.4)	
Other items, net	(0.1)		(1.5)		(0.7)	
Effective income tax rate	16.1	%	22.0	%	14.6	%

(a) The years ended December 31, 2022 and 2021 include benefits of $91.8 million and $6.0 million, respectively, due to the release of a foreign valuation allowance due to changes in expected profitability.
(b) The year ended December 31, 2021 includes a discrete tax benefit of $27.9 million related to the revision of an indemnification estimate for an ongoing tax-related matter in Germany.
(c) Our statutory rate is decreased by our share of the income of JBC, a Free Zones company under the laws of the Hashemite Kingdom of Jordan. The applicable provisions of the Jordanian law, and applicable regulations thereunder, do not have a termination provision and the exemption is indefinite. As a Free Zones company, JBC is not subject to income taxes on the profits of products exported from Jordan, and currently, substantially all of the profits are from exports. This resulted in a rate benefit of 3.2%, 34.6%, and 11.9% for 2022, 2021, and 2020, respectively.

Deferred income tax assets and liabilities recorded on the consolidated balance sheets as of December 31, 2022 and 2021 consist of the following (in thousands):

	December 31,			
	2022		2021	
Deferred tax assets:				
Accrued employee benefits	$	20,060	$	18,374
Operating loss carryovers		1,157,841		1,295,925
Pensions		26,229		48,720
Tax credit carryovers		3,750		2,448
Other[a]		122,333		212,882
Gross deferred tax assets		1,330,213		1,578,349
Valuation allowance		(1,087,505)		(1,276,305)
Deferred tax assets		242,708		302,044
Deferred tax liabilities:				
Depreciation		(446,942)		(411,336)
Intangibles		(84,690)		(83,182)
Other		(145,412)		(142,008)
Deferred tax liabilities		(677,044)		(636,526)
Net deferred tax liabilities	$	(434,336)	$	(334,482)
Classification in the consolidated balance sheets:				
Noncurrent deferred tax assets	$	46,434	$	18,797
Noncurrent deferred tax liabilities		(480,770)		(353,279)
Net deferred tax liabilities	$	(434,336)	$	(334,482)

(a) Decrease in other primarily related to a reduction in the deferred tax assets for the payment of the settlement of an arbitration ruling for a prior legal matter.

Changes in the balance of our deferred tax asset valuation allowance are as follows (in thousands):

	Year Ended December 31,		
	2022	2021	2020
Balance at January 1	$ (1,276,305)	$ (1,326,204)	$ (1,148,268)
Additions	(5,810)	(61,470)	(182,325)
Deductions	194,610	111,369	4,389
Balance at December 31	$ (1,087,505)	$ (1,276,305)	$ (1,326,204)

At December 31, 2022, we had approximately $ 2.7 million of domestic credits available to offset future payments of income taxes, expiring in varying amounts between 2023 and 2027. We have established valuation allowances for $0.2 million of those domestic credits since we believe that it is more likely than not that the related deferred tax assets will not be realized. We believe that sufficient taxable income will be generated during the carryover period in order to utilize the other remaining credit carryovers.

At December 31, 2022, we have on a pre-tax basis, domestic state net operating losses of $ 345.9 million, expiring between 2022 and 2041, which have pre-tax valuation allowances of $ 15.3 million established. In addition, we have on a pre-tax basis $4.55 billion of foreign net operating losses, which have pre-tax valuation allowances for $ 4.34 billion established. $2.63 billion of these foreign net operating losses expire in 2035 and $1.68 billion have an indefinite life. We have established valuation allowances for these deferred tax assets since we believe that it is more likely than not that the related deferred tax assets will not be realized. For the same reason, we established pre-tax valuation allowances of $226.4 million and $30.4 million for other state and foreign deferred tax assets, respectively, unrelated to net operating losses. The realization of the deferred tax assets is dependent on the generation of sufficient taxable income in the appropriate tax jurisdictions. Although realization is not assured, we believe it is more likely than not that the remaining deferred tax assets will be realized. However, the amount considered realizable could be reduced if estimates of future taxable income change.

As of December 31, 2022, we have not recorded taxes on approximately $ 8.3 billion of cumulative undistributed earnings of our non-U.S. subsidiaries and joint ventures. The TCJA imposed a mandatory transition tax on accumulated foreign earnings and generally eliminated U.S. taxes on foreign subsidiary distribution with the exception of foreign withholding taxes and other foreign local tax. We generally do not provide for taxes related to our undistributed earnings because such earnings either would not be taxable when remitted or they are considered to be indefinitely reinvested. If in the foreseeable future, we can no longer demonstrate that these earnings are indefinitely reinvested, a deferred tax liability will be recognized. A determination of the amount of the unrecognized deferred tax liability related to these undistributed earnings is not practicable due to the complexity and variety of assumptions necessary based on the manner in which the undistributed earnings would be repatriated.

Liabilities related to uncertain tax positions were $83.7 million and $27.7 million at December 31, 2022 and 2021, respectively, inclusive of interest and penalties of $ 11.5 million and $7.0 million at December 31, 2022 and 2021, respectively, and are reported in Other noncurrent liabilities as provided in Note 16, “Other Noncurrent Liabilities.” These liabilities at December 31, 2022 and 2021 were reduced by $32.4 million and $32.9 million, respectively, for offsetting benefits from the corresponding effects of potential transfer pricing adjustments, state income taxes and rate arbitrage related to foreign structure. These offsetting benefits are recorded in Other assets as provided in Note 11, “Other Assets.” The resulting net liability of $39.8 million as of December 31, 2022 would favorably affect earnings if recognized and released, while the net asset of $12.2 million at December 31, 2021 would unfavorably affect earnings if recognized and released.

The liabilities related to uncertain tax positions, exclusive of interest, were $ 72.2 million and $20.7 million at December 31, 2022 and 2021, respectively. The following is a reconciliation of our total gross liability related to uncertain tax positions for 2022, 2021 and 2020 (in thousands):

	Year Ended December 31,		
	2022	2021	2020
Balance at January 1	$ 20,717	$ 11,639	$ 17,548
Additions for tax positions related to prior years	1,673	75	5,646
Reductions for tax positions related to prior years	—	(6)	(174)
Additions for tax positions related to current year	50,531	10,911	315
Lapses in statutes of limitations/settlements	(995)	(1,931)	(12,128)
Foreign currency translation adjustment	236	29	432
Balance at December 31	$ 72,162	$ 20,717	$ 11,639

We are subject to income taxes in the U.S. and numerous foreign jurisdictions. Due to the statute of limitations, we are no longer subject to U.S. federal income tax audits by the Internal Revenue Service ("IRS") for years prior to 2019. Due to the statute of limitations, we also are no longer subject to U.S. state income tax audits prior to 2017.

With respect to jurisdictions outside the U.S., several audits are in process. We have audits ongoing for the years 2011 through 2022 related to Germany, Italy, Belgium, China, Canada, South Africa and Chile, some of which are for entities that have since been divested.

While we believe we have adequately provided for all tax positions, amounts asserted by taxing authorities could be greater than our accrued position. Accordingly, additional provisions on federal and foreign tax-related matters could be recorded in the future as revised estimates are made or the underlying matters are settled or otherwise resolved.

Since the timing of resolutions and/or closure of tax audits is uncertain, it is difficult to predict with certainty the range of reasonably possible significant increases or decreases in the liability related to uncertain tax positions that may occur within the next twelve months. Our current view is that it is reasonably possible that we could record an increase in the liability related to uncertain tax positions, relating to a number of issues, up to approximately $0.3 million as a result of closure of tax statutes.

NOTE 22—Fair Value of Financial Instruments:

In assessing the fair value of financial instruments, we use methods and assumptions that are based on market conditions and other risk factors existing at the time of assessment. Fair value information for our financial instruments is as follows:

Long-Term Debt—the fair values of our notes are estimated using Level 1 inputs and account for the difference between the recorded amount and fair value of our long-term debt. The carrying value of our remaining long-term debt reported in the accompanying consolidated balance sheets approximates fair value as substantially all of such debt bears interest based on prevailing variable market rates currently available in the countries in which we have borrowings.

	December 31,			
	2022		2021	
	Recorded Amount	Fair Value	Recorded Amount	Fair Value
	(In thousands)			
Long-term debt	$ 3,239,853	$ 2,993,027	$ 2,405,021	$ 2,593,590

Foreign Currency Forward Contracts—during the fourth quarter of 2019, we entered into a foreign currency forward contract to hedge the cash flow exposure of non-functional currency purchases during the construction of the Kemerton plant in Australia. This derivative financial instrument is used to manage risk and is not used for trading or other speculative purposes. This foreign currency forward contract has been designated as a hedging instrument under ASC 815, *Derivatives and Hedging*. At December 31, 2022 and 2021, we had outstanding designated foreign currency forward contracts with notional values totaling the equivalent of $64.5 million and $36.5 million, respectively.

We also enter into foreign currency forward contracts in connection with our risk management strategies that have not been designated as hedging instruments under ASC 815, *Derivatives and Hedging*, in an attempt to minimize the financial impact of changes in foreign currency exchange rates. These derivative financial instruments are used to manage risk and are not used for trading or other speculative purposes. The fair values of our non-designated foreign currency forward contracts are estimated based on current settlement values. At December 31, 2022 and 2021, we had outstanding non-designated foreign currency forward contracts with notional values totaling $2.8 billion and $618.1 million,respectively, hedging our exposure to various currencies including the Chinese Renminbi, Euro, Australian Dollar, Chilean Peso and Japanese Yen.

The following table summarizes the fair value of our foreign currency forward contracts included in the consolidated balance sheets at December 31, 2022 and 2021 (in thousands):

	December 31,			
	2022		2021	
	Assets	Liabilities	Assets	Liabilities
Designated as hedging instruments				
Other current assets	$ —	$ —	$ 237	$ —
Accrued expenses	—	3,159	—	57
Total designated as hedging instruments	—	3,159	237	57
Not designated as hedging instruments				
Other current assets	6,016	—	2,901	—
Accrued expenses	—	85	—	248
Total not designated as hedging instruments	6,016	85	2,901	248
Total	$ 6,016	$ 3,244	$ 3,138	$ 305

The following table summarizes the net gains (losses) recognized for our foreign currency forward contracts during the years ended December 31, 2022, 2021 and 2020 (in thousands):

	Year Ended December 31,		
	2022	2021	2020
Designated as hedging instruments:			
(Losses) gains recognized in Other comprehensive income (loss)	$ (4,398)	$ 174	$ 1,602
Not designated as hedging instruments:			
(Losses) gains recognized in Other income (expenses), net [(a)]	$ (41,088)	$ 1,068	$ (7,665)

(a) Fluctuations in the value of our foreign currency forward contracts not designated as hedging instruments are generally expected to be offset by changes in the value of the underlying exposures being hedged, which are also reported in Other income (expenses), net.

In addition, for the years ended December 31, 2022, 2021 and 2020, we recorded net cash settlements of $ 44.4 million, $2.4 million and $19.4 million, respectively, primarily within Changes in current assets and liabilities, in our consolidated statements of cash flows.

Unrealized gains and losses related to the cash flow hedges will be reclassified to earnings over the life of the related assets when settled and the related assets are placed into service.

The counterparties to our foreign currency forward contracts are major financial institutions with which we generally have other financial relationships. We are exposed to credit loss in the event of nonperformance by these counterparties. However, we do not anticipate nonperformance by the counterparties.

NOTE 23—Fair Value Measurement:

Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date (exit price). The inputs used to measure fair value are classified into the following hierarchy:

Level 1	Unadjusted quoted prices in active markets for identical assets or liabilities
Level 2	Unadjusted quoted prices in active markets for similar assets or liabilities, or unadjusted quoted prices for identical or similar assets or liabilities in markets that are not active, or inputs other than quoted prices that are observable for the asset or liability
Level 3	Unobservable inputs for the asset or liability

We endeavor to utilize the best available information in measuring fair value. Financial assets and liabilities are classified in their entirety based on the lowest level of input that is significant to the fair value measurement. The following tables set forth our financial assets and liabilities that were accounted for at fair value on a recurring basis as of December 31, 2022 and 2021 (in thousands):

	December 31, 2022	Quoted Prices in Active Markets for Identical Items (Level 1)	Quoted Prices in Active Markets for Similar Items (Level 2)	Unobservable Inputs (Level 3)
Assets:				
Available for sale debt securities [(a)]	$ 260,139	$ —	$ —	$ 260,139
Investments under executive deferred compensation plan [(b)]	$ 27,270	$ 27,270	$ —	$ —
Public equity securities [(c)]	$ 5,890	$ 5,890	$ —	$ —
Private equity securities measured at net asset value [(d)(e)]	$ 6,375	$ —	$ —	$ —
Foreign currency forward contracts [(f)]	$ 6,016	$ —	$ 6,016	$ —
Liabilities:				
Obligations under executive deferred compensation plan [(b)]	$ 27,270	$ 27,270	$ —	$ —
Foreign currency forward contracts [(f)]	$ 3,244	$ —	$ 3,244	$ —

	December 31, 2021	Quoted Prices in Active Markets for Identical Items (Level 1)	Quoted Prices in Active Markets for Similar Items (Level 2)	Unobservable Inputs (Level 3)
Assets:				
Available for sale debt securities [(a)]	$ 246,517	$ —	$ —	$ 246,517
Investments under executive deferred compensation plan [(b)]	$ 32,491	$ 32,491	$ —	$ —
Private equity securities measured at net asset value [(d)(e)]	$ 4,696	$ —	$ —	$ —
Foreign currency forward contracts [(f)]	$ 3,138	$ —	$ 3,138	$ —
Liabilities:				
Obligations under executive deferred compensation plan [(b)]	$ 32,491	$ 32,491	$ —	$ —
Foreign currency forward contracts [(f)]	$ 305	$ —	$ 305	$ —

(a) Preferred equity of a Grace subsidiary acquired as a portion of the proceeds of the FCS sale on June 1, 2021. See Note 2, “Divestitures,” for further details on the material terms and conditions. A third-party estimate of the fair value was prepared using expected future cash flows over the period up to when the asset is likely to be redeemed, applying a discount rate that appropriately captures a market participant's view of the risk associated with the investment. These are considered to be Level 3 inputs.

(b) We maintain an EDCP that was adopted in 2001 and subsequently amended. The purpose of the EDCP is to provide current tax planning opportunities as well as supplemental funds upon the retirement or death of certain of our employees. The EDCP is intended to aid in attracting and retaining employees of exceptional ability by providing them with these benefits. We also maintain a Benefit Protection Trust (the “Trust”) that was created to provide a source of funds to assist in meeting the obligations of the EDCP, subject to the claims of our creditors in the event of our insolvency. Assets of the Trust are consolidated in accordance with authoritative guidance. The assets of the Trust consist primarily of mutual fund investments (which are accounted for as trading securities and are marked-to-market on a monthly basis through the consolidated statements of income) and cash and cash equivalents. As such, these assets and obligations are classified within Level 1.

(c) Holdings in equity securities of public companies reported in Investments in the consolidated balance sheets. The fair value is measured using publicly available share prices of the investments, with any changes reported in Other income (expense), net, in our consolidated statements of income.
(d) Primarily consists of private equity securities reported in Investments in the consolidated balance sheets. The changes in fair value are reported in Other income (expense), net, in our consolidated statements of income.
(e) Holdings in certain private equity securities are measured at fair value using the net asset value per share (or its equivalent) practical expedient and have not been categorized in the fair value hierarchy.
(f) As a result of our global operating and financing activities, we are exposed to market risks from changes in foreign currency exchange rates which may adversely affect our operating results and financial position. When deemed appropriate, we minimize our risks from foreign currency exchange rate fluctuations through the use of foreign currency forward contracts. The foreign currency forward contracts are valued using broker quotations or market transactions in either the listed or over-the-counter markets. As such, these derivative instruments are classified within Level 2. See Note 22, "Fair Value of Financial Instruments," for further details about our foreign currency forward contracts.

The following tables set forth the reconciliation of the beginning and ending balance for the Level 3 recurring fair value measurements (in thousands):

	Available for Sale Debt Securities	
	Year Ended December 31,	
	2022	2021
Beginning balance	$ 246,517	$ —
Additions	—	244,530
Accretion of discount	12,735	7,429
Change in fair value	887	(5,442)
Ending balance	$ 260,139	$ 246,517

NOTE 24—Related Party Transactions:

Our consolidated statements of income include sales to and purchases from unconsolidated affiliates in the ordinary course of business as follows (in thousands):

	Year Ended December 31,		
	2022	2021	2020
Sales to unconsolidated affiliates	$ 51,906	$ 19,441	$ 22,589
Purchases from unconsolidated affiliates[(a)]	$ 1,920,476	$ 213,077	$ 168,072

(a) Increases in purchases from unconsolidated affiliates primarily relate to increased pricing and volume of spodumene purchased from the Company's Windfield joint venture.

Our consolidated balance sheets include accounts receivable due from and payable to unconsolidated affiliates in the ordinary course of business as follows (in thousands):

	December 31,	
	2022	2021
Receivables from related parties	$ 21,495	$ 2,139
Payables to related parties[(a)]	$ 518,377	$ 47,499

(a) Increases in payables to unconsolidated affiliates primarily relate to increased purchases of spodumene purchased from the Company's joint venture under normal payment terms.

NOTE 25—Segment and Geographic Area Information:

During 2022, the Company's three reportable segments included: (1) Lithium; (2) Bromine; and (3) Catalysts. Each segment had a dedicated team of sales, research and development, process engineering, manufacturing and sourcing, and business strategy personnel and had full accountability for improving execution through greater asset and market focus, agility and responsiveness. This business structure aligned with the markets and customers we serve through each of the segments. This structure also facilitated the continued standardization of business processes across the organization, and was consistent with the manner in which information is presently used internally by the Company's chief operating decision maker to evaluate performance and make resource allocation decisions.

Summarized financial information concerning our reportable segments is shown in the following tables. The "All Other" category included only the FCS business that did not fit into any of the Company's core businesses. On June 1, 2021, the Company completed the sale of the FCS business. See Note 3, "Divestitures," for additional information. Amounts in the "All Other" category represent activity in this business until divested on June 1, 2021.

The Corporate category is not considered to be a segment and includes corporate-related items not allocated to the operating segments. Pension and other post-employment benefit ("OPEB") service cost (which represents the benefits earned by active employees during the period) and amortization of prior service cost or benefit are allocated to the reportable segments, All Other, and Corporate, whereas the remaining components of pension and OPEB benefits cost or credit ("Non-operating pension and OPEB items") are included in Corporate. Segment data includes inter-segment transfers of raw materials at cost and allocations for certain corporate costs.

The Company's chief operating decision maker uses adjusted EBITDA (as defined below) to assess the ongoing performance of the Company's business segments and to allocate resources. The Company defines adjusted EBITDA as earnings before interest and financing expenses, income tax expenses, depreciation and amortization, as adjusted on a consistent basis for certain non-operating, non-recurring or unusual items in a balanced manner and on a segment basis. These non-operating, non-recurring or unusual items may include acquisition and integration related costs, gains or losses on sales of businesses, restructuring charges, facility divestiture charges, certain litigation and arbitration costs and charges, non-operating pension and OPEB items and other significant non-recurring items. In addition, management uses adjusted EBITDA for business and enterprise planning purposes and as a significant component in the calculation of performance-based compensation for management and other employees. The Company has reported adjusted EBITDA because management believes it provides transparency to investors and enables period-to-period comparability of financial performance. Adjusted EBITDA is a financial measure that is not required by, or presented in accordance with, U.S. GAAP. Adjusted EBITDA should not be considered as an alternative to Net income (loss) attributable to Albemarle Corporation, the most directly comparable financial measure calculated and reported in accordance with U.S. GAAP, or any other financial measure reported in accordance with U.S. GAAP.

	Year Ended December 31,		
	2022	2021	2020
		(In thousands)	
Net sales:			
Lithium	$ 5,008,850	$ 1,363,284	$ 1,144,778
Bromine	1,411,682	1,128,343	964,962
Catalysts	899,572	761,235	797,914
All Other	—	75,095	221,255
Total net sales	$ 7,320,104	$ 3,327,957	$ 3,128,909
Adjusted EBITDA:			
Lithium	$ 3,102,662	$ 479,538	$ 393,093
Bromine	456,916	360,682	323,605
Catalysts	28,732	106,941	130,134
All Other	—	29,858	84,821
Corporate	(112,453)	(106,045)	(112,915)
Total adjusted EBITDA	$ 3,475,857	$ 870,974	$ 818,738

See below for a reconciliation of adjusted EBITDA, the non-GAAP financial measure, from Net income attributable to Albemarle Corporation, the most directly comparable financial measure calculated and reported in accordance with U.S. GAAP (in thousands):

	Lithium	Bromine	Catalysts	All Other	Corporate	Consolidated Total
2022						
Net income (loss) attributable to Albemarle Corporation	$ 2,903,076	$ 402,820	$ (27,104)	$ —	$ (588,976)	$ 2,689,816
Depreciation and amortization	189,347	54,096	51,417	—	5,981	300,841
Loss on sale of interest in properties[a]	8,400	—	—	—	—	8,400
Acquisition and integration related costs[b]	—	—	—	—	16,259	16,259
Interest and financing expenses[c]	—	—	—	—	122,973	122,973
Income tax expense	—	—	—	—	390,588	390,588
Non-operating pension and OPEB items	—	—	—	—	(57,032)	(57,032)
Other[d]	1,839	—	4,419	—	(2,246)	4,012
Adjusted EBITDA	$ 3,102,662	$ 456,916	$ 28,732	$ —	$ (112,453)	$ 3,475,857
2021						
Net income (loss) attributable to Albemarle Corporation	$ 192,244	$ 309,501	$ 55,353	$ 27,988	$ (461,414)	$ 123,672
Depreciation and amortization	138,772	51,181	51,588	1,870	10,589	254,000
Restructuring and other[e]	—	—	—	—	3,027	3,027
Loss (gain) on sale of business/interest in properties, net[f]	132,400	—	—	—	(428,371)	(295,971)
Acquisition and integration related costs[b]	—	—	—	—	12,670	12,670
Interest and financing expenses[c]	—	—	—	—	61,476	61,476
Income tax expense	—	—	—	—	29,446	29,446
Non-operating pension and OPEB items	—	—	—	—	(78,814)	(78,814)
Legal accrual[g]	—	—	—	—	657,412	657,412
Albemarle Foundation contribution[h]	—	—	—	—	20,000	20,000
Indemnification adjustments[i]	—	—	—	—	39,381	39,381
Other[j]	16,122	—	—	—	28,553	44,675
Adjusted EBITDA	$ 479,538	$ 360,682	$ 106,941	$ 29,858	$ (106,045)	$ 870,974
2020						
Net income (loss) attributable to Albemarle Corporation	$ 277,711	$ 274,495	$ 80,149	$ 76,323	$ (332,914)	$ 375,764
Depreciation and amortization	112,854	50,310	49,985	8,498	10,337	231,984
Restructuring and other[e]	—	—	—	—	19,597	19,597
Acquisition and integration related costs[b]	—	—	—	—	17,263	17,263
Interest and financing expenses	—	—	—	—	73,116	73,116
Income tax expense	—	—	—	—	54,425	54,425
Non-operating pension and OPEB items	—	—	—	—	40,668	40,668
Other[k]	2,528	(1,200)	—	—	4,593	5,921
Adjusted EBITDA	$ 393,093	$ 323,605	$ 130,134	$ 84,821	$ (112,915)	$ 818,738

(a) Expense recorded as a result of revised estimates of the obligation to construct certain lithium hydroxide conversion assets in Kemerton, Western Australia, due to cost overruns from supply chain, labor and COVID-19 pandemic related issues. The corresponding obligation was recorded in Accrued liabilities to be transferred to Mineral Resources Limited ("MRL"), which maintains a 40% ownership interest in these Kemerton assets.
(b) See Note 2, "Acquisitions," for additional information.
(c) Included in Interest and financing expenses is a loss on early extinguishment of debt of $19.2 million and $29.0 million for the years ended December 31, 2022 and 2021, respectively. See Note 14, "Long-term Debt," for additional information. In addition, Interest and financing expenses for the year ended December 31, 2022 includes the correction of an out of period error of $17.5 million related to the overstatement of capitalized interest in prior periods. See Note 1, "Summary of Significant Accounting Policies," for further details.
(d) Included amounts for the year ended December 31, 2022 recorded in:

- Cost of goods sold - $2.7 million of expense related to one-time retention payments for certain employees during the Catalysts strategic review and business unit realignment, and $6.5 million related to the settlement of a legal matter resulting from a prior acquisition.
- SG&A - $4.3 million primarily related to facility closure expenses of offices in Germany, $2.8 million of charges for environmental reserves at sites not part of our operations, $2.8 million of shortfall contributions for our multiemployer plan financial improvement plan, $1.9 million of expense related to one-time retention payments for certain employees during the Catalysts strategic review, partially offset by $4.3 million of gains from the sale of legacy properties not part of our operations.
- Other income (expenses), net - $4.3 million net gain related to the fair value adjustment of equity securities in a public company, a $3.0 million gain from the reversal of a liability related to a previous divestiture, a $2.0 million gain relating to the adjustment of an environmental reserve at non-operating businesses we previously divested and a $9.6 million gain related to a settlement received from a legal matter in a prior period, partially offset by a $3.2 million loss resulting from the adjustment of indemnification related to previously disposed businesses.

(e) In 2021, we recorded facility closure related to offices in Germany, and severance expenses in Germany and Belgium, in SG&A. During the year ended December 31, 2020, we recorded severance expenses as part of business reorganization plans, impacting each of our businesses and Corporate, primarily in the U.S., Belgium, Germany and with our Jordanian joint venture partner. We recorded expenses of $0.7 million in Cost of goods sold, $19.2 million in SG&A and a $0.3 million gain in Net income attributable to noncontrolling interests for the portion of severance expense allocated to our Jordanian joint venture partner.

(f) Includes a $428.4 million gain related to the FCS divestiture recorded during the year ended December 31, 2021. See Note 3, “Divestitures,” for additional information on this gain. In addition, includes a $132.4 million expense related to anticipated cost overruns for MRL’s 40% interest in lithium hydroxide conversion assets being built in Kemerton. See Note 2, “Acquisitions,” for additional information.

(g) Loss recorded in Other income (expenses), net for the year ended December 31, 2021 related to the settlement of an arbitration ruling for a prior legal matter. See Note 17, “Commitments and Contingencies,” for further details.

(h) Included in SG&A is a charitable contribution, using a portion of the proceeds received from the FCS divestiture, to the Albemarle Foundation, a non-profit organization that sponsors grants, health and social projects, educational initiatives, disaster relief, matching gift programs, scholarships and other charitable initiatives in locations where the Company’s employees live and the Company operates. This contribution is in addition to the normal annual contribution made to the Albemarle Foundation by the Company, and is significant in size and nature in that it is intended to provide more long-term benefits in these communities.

(i) Included in Other income (expenses), net to revise an indemnification estimate for an ongoing tax-related matter of a previously disposed business in Germany. A corresponding discrete tax benefit of $27.9 million was recorded in Income tax expense during the same period, netting to an expected cash obligation of approximately $1.5 million.

(j) Included amounts for the year ended December 31, 2021 recorded in:

- Cost of goods sold - $10.5 million of expense related to a legal matter as part of a prior acquisition in our Lithium business.
- SG&A - $11.5 million of legal fees related to a legacy Rockwood legal matter noted above, $9.8 million of expenses primarily related to non-routine labor and compensation related costs that are outside normal compensation arrangements, a $4.0 million loss resulting from the sale of property, plant and equipment and $3.8 million of charges for environmental reserves at a sites not part of our operations.
- Other income (expenses), net - $4.8 million of net expenses primarily related to asset retirement obligation charges to update of an estimate at a site formerly owned by Albemarle.

(k) Included amounts for the year ended December 31, 2020 recorded in:

- Cost of goods sold - $1.3 million of expense related to a legal matter as part of a prior acquisition in our Lithium business.
- SG&A - $3.1 million of shortfall contributions for our multiemployer plan financial improvement plan and $3.8 million of a net expense primarily relating to the increase of environmental reserves at non-operating businesses we have previously divested.
- Other income (expenses), net - $7.2 million gain related to the sale of our ownership percentage in the SOCC joint venture, $3.6 million of a net gain primarily relating to the sale of intangible assets in our Bromine business and property in Germany not used as part of our operations and a $2.5 million net gain resulting from the settlement of legal matters related to a business sold or a site in the process of being sold, partially offset by $9.6 million of losses resulting from the adjustment of indemnifications related to previously disposed businesses and $1.2 million of expenses related to other costs outside of our regular operations.

	December 31,		
	2022	2021	2020
		(In thousands)	
Identifiable assets:			
Lithium[a]	$ 10,795,997	$ 7,676,259	$ 7,134,229
Bromine	1,072,535	939,808	867,648
Catalysts	1,214,482	1,149,592	1,066,089
All Other	—	—	136,659
Corporate	2,373,508	1,208,459	1,246,321
Total identifiable assets	$ 15,456,522	$ 10,974,118	$ 10,450,946

(a) Increase in Lithium identifiable assets each year primarily due to capital expenditures for growth and capacity increases, and the impact of increased lithium pricing on working capital balances.

	Year Ended December 31,		
	2022	2021	2020
		(In thousands)	
Depreciation and amortization:			
Lithium	$ 189,347	$ 138,772	$ 112,854
Bromine	54,096	51,181	50,310
Catalysts	51,417	51,588	49,985
All Other	—	1,870	8,498
Corporate	5,981	10,589	10,337
Total depreciation and amortization	$ 300,841	$ 254,000	$ 231,984
Capital expenditures:			
Lithium	$ 1,010,661	$ 813,128	$ 720,563
Bromine	153,407	70,711	57,486
Catalysts	66,319	49,312	44,448
All Other	—	2,339	6,792
Corporate	31,259	18,177	21,188
Total capital expenditures	$ 1,261,646	$ 953,667	$ 850,477

	Year Ended December 31,		
	2022	2021	2020
		(In thousands)	
Net Sales[(a)]:			
United States	$ 888,612	$ 730,738	$ 743,834
Foreign[(b)]	6,431,492	2,597,219	2,385,075
Total	$ 7,320,104	$ 3,327,957	$ 3,128,909

(a) Net sales are attributed to countries based upon shipments to final destination.
(b) In 2022, net sales to China, South Korea and Japan represented33%, 22% and 15%, respectively, of total net sales. In 2021, net sales to China, Japan and South Korea represented18%, 14% and 11%, respectively, of total net sales. In 2020, net sales to South Korea, China and Japan represented 14%, 14%, and 13%, respectively, of total net sales.

During 2022, the only customer that represented more than 10% of the Company's consolidated net sales was Umicore N.V. and its affiliates.

	As of December 31,		
	2022	2021	2020
		(In thousands)	
Long-Lived Assets[(a)]:			
United States	$ 1,371,347	$ 1,040,252	$ 1,007,793
Australia	3,253,069	2,736,590	2,362,377
Chile	2,057,270	1,923,821	1,814,658
China	438,090	139,537	122,749
Jordan	267,612	262,392	256,640
Netherlands	167,264	177,405	181,206
Germany	77,845	80,956	90,174
France	52,894	49,740	45,505
Brazil	31,855	29,474	24,393
Other foreign countries	77,747	62,667	66,273
Total	$ 7,794,993	$ 6,502,834	$ 5,971,768

(a) Long-lived assets are comprised of the Company's Property, plant and equipment and joint ventures included in Investments.

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure.

NONE

Item 9A. Controls and Procedures.

Evaluation of Disclosure Controls and Procedures

Under the supervision and with the participation of our management, including our principal executive officer and principal financial officer, we conducted an evaluation of the effectiveness of the design and operation of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended, or the Exchange Act), as of the end of the period covered by this report. Based on this evaluation, our principal executive officer and principal financial officer concluded that, as of the end of the period covered by this report, our disclosure controls and procedures are effective to ensure that information required to be disclosed by us in the reports that we file or submit under the Exchange Act, is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms, and that such information is accumulated and communicated to our management, including our principal executive officer and principal financial officer, as appropriate, to allow timely decisions regarding required disclosure.

Management's report on internal control over financial reporting and the independent registered public accounting firm's report are included in Item 8 under the captions entitled "Management's Report on Internal Control over Financial Reporting" and "Report of Independent Registered Public Accounting Firm" and are incorporated herein by reference.

Prior Year Remediation

On January 26, 2023, we filed an amended Annual Report on Form 10-K/A for the year ended December 31, 2021 (the "Form 10-K/A") to amend certain disclosures within the Mineral Properties section of Part I, Item 2. Properties, and file amended versions of the material individual mineral property technical report summaries responding to Item 601(b)(96) and subpart 1300 of Regulation S-K (the "Mining Disclosures"). In connection with the preparation and filing of this the Form 10-K/A, our principal executive officer and principal financial officer re-evaluated the effectiveness of the design and operation of our disclosure controls and procedures. Based on this re-evaluation and solely as a result of the updated Mining Disclosures included in this Form 10-K/A, our principal executive officer and principal financial officer concluded that, as of the end of the period covered by the Form 10-K/A, our disclosure controls and procedures were not effective.

During the re-evaluation, our principal executive officer and principal financial officer concluded that, while the design of our disclosure controls and procedures is appropriate, there was a deficiency in their operation solely in connection with certain of the new disclosures required by the Mining Disclosures that we were required to provide for the first time in the Annual Report on Form 10-K for the year ended December 31, 2021. Following the initial preparation of the Mining Disclosures and in connection with the re-evaluation of the design and operation of our disclosure controls and procedures described above, we implemented additional operational procedures with respect to the Mining Disclosures included in this Annual Report on Form 10-K for the year ended December 31, 2022 and that will be applied to the preparation of the Mining Disclosures for future reports that we file or submit to the SEC under the Exchange Act, including:

- additional reviews of rule-based disclosure checklists for the Mining Disclosures;
- more frequent communication, including discussion of the Mining Disclosure rules specifically, with qualified persons in connection with their preparation of the technical report summaries for each of our mineral properties to ensure effective processes and procedures were applied in preparing and reviewing the Mining Disclosures; and
- review of best practices for Mining Disclosures based on SEC comment letters and SEC filings of industry peers in connection with their preparation.

In light of the additional operation procedures discussed above, our principal executive officer and principal financial officer concluded that, as of the end of the period covered by this report, our disclosure controls and procedures were effective and the deficiencies in the operation of the disclosure controls and procedures related to the Mining Disclosures as of the end of the period covered by the Form 10-K/A were remediated. Even with the implementation of the additional operational procedures discussed above, our management recognizes that any controls and procedures, no matter how well designed and operated, can only provide reasonable, and not absolute, assurance of achieving their objectives and our management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures.

Changes in Internal Control over Financial Reporting

No changes in our internal control over financial reporting (as such term is defined in Exchange Act Rule 13a-15(f)) occurred during the fiscal quarter ended December 31, 2022 that materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information.

NONE

Item 9C. Disclosure Regarding Foreign Jurisdictions That Prevent Inspections.

NONE

PART III

Item 10. Directors, Executive Officers and Corporate Governance.

The information required by this Item 10 will be contained in the Proxy Statement and is incorporated herein by reference. In addition, the information in “Executive Officers of the Registrant” appearing after Item 4 in Part I of this Annual Report, is incorporated herein by reference.

Code of Conduct

We have adopted a code of conduct and ethics for directors, officers and employees, known as the Albemarle Code of Conduct. The Albemarle Code of Conduct is available on our website, *www.albemarle.com*. Shareholders may also request a free copy of the Albemarle Code of Conduct from: Albemarle Corporation, Attention: Investor Relations, 4250 Congress Street, Suite 900, Charlotte, North Carolina 28209. We will disclose any amendments to, or waivers from, a provision of our Code of Conduct that applies to the principal executive officer, principal financial officer, principal accounting officer or controller, or persons performing similar functions that relates to any element of the Code of Conduct as defined in Item 406 of Regulation S-K by posting such information on our website.

New York Stock Exchange Certifications

Because our common stock is listed on the New York Stock Exchange (“NYSE”), our Chief Executive Officer is required to make, and he has made, an annual certification to the NYSE stating that he was not aware of any violation by us of the corporate governance listing standards of the NYSE. Our Chief Executive Officer made his annual certification to that effect to the NYSE as of May 4, 2022. In addition, we have filed, as exhibits to this Annual Report on Form 10-K, the certifications of our principal executive officer and principal financial officer required under Sections 906 and 302 of the Sarbanes-Oxley Act of 2002 to be filed with the Securities and Exchange Commission regarding the quality of our public disclosure.

Additional information will be contained in the Proxy Statement and is incorporated herein by reference.

Item 11. Executive Compensation.

The information required by this Item 11 will be contained in the Proxy Statement and is incorporated herein by reference.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters.

The information required by this Item 12 will be contained in the Proxy Statement and is incorporated herein by reference.

Item 13. Certain Relationships and Related Transactions, and Director Independence.

The information required by this Item 13 will be contained in the Proxy Statement and is incorporated herein by reference.

Item 14. Principal Accountant Fees and Services.

The information required by this Item 14 will be contained in the Proxy Statement and is incorporated herein by reference.

PART IV

Item 15. Exhibits and Financial Statement Schedules.

(a)(1) The following consolidated financial and informational statements of the registrant are included in Part II Item 8 on pages 80 to 131:

Management's Report on Internal Control Over Financial Reporting

Report of Independent Registered Public Accounting Firm (PCAOB ID 238)

Consolidated Balance Sheets as of December 31, 2022 and 2021

Consolidated Statements of Income, Comprehensive Income, Changes in Equity and Cash Flows for the years ended December 31, 2022, 2021 and 2020

Notes to the Consolidated Financial Statements

(a)(2) No financial statement schedules are provided in accordance with Item 15(a)(2) as the information is either not applicable, not required or has been furnished in the Consolidated Financial Statements or Notes thereto.

(a)(3) Exhibits

The following documents are filed as exhibits to this Annual Report on Form 10-K pursuant to Item 601 of Regulation S-K:

2.1 Agreement and Plan of Merger, dated as of July 15, Agreement and Plan of Merger, dated as of July 15, 2014, among Albemarle Corporation, Albemarle Holdings Corporation and Rockwood Holdings, Inc. [filed as Exhibit 2.1 to the Company's Current Report on Form 8-K (No. 1-12658) filed on July 18, 2014, and incorporated herein by reference].

2.2 Share Purchase Agreement, dated as of June 17, 2016, between Albemarle Corporation and BASF SE [filed as Exhibit 2.1 to the Company's Quarterly Report on Form 10-Q for the quarter ended June 30, 2016 (No. 1-12658), filed on August 5, 2016, and incorporated herein by reference].

2.3 First Amendment to the Share Purchase Agreement, dated December 7, 2016, between Albemarle Corporation and BASF SE [filed as Exhibit 2.3 to the Company's Annual Report on Form 10-K for the year ended December 31, 2016 (No. 1-12658), and incorporated herein by reference].

2.4 Second Amendment to the Share Purchase Agreement, dated December 14, 2016, between Albemarle Corporation and BASF SE [filed as Exhibit 2.4 to the Company's Annual Report on Form 10-K for the year ended December 31, 2016 (No. 1-12658), and incorporated herein by reference].

3.1 Amended and Restated Articles of Incorporation of Albemarle Corporation [filed as Exhibit 3.1 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on August 7, 2018, and incorporated herein by reference].

3.2 Amended and Restated Bylaws, effective July 23, 2019, of Albemarle Corporation [filed as Exhibit 3.1 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on August 7, 2019, and incorporated herein by reference].

4.1 Indenture, dated as of January 20, 2005, between Albemarle Corporation and The Bank of New York, as trustee [filed as Exhibit 4.1 to the Company's Current Report on Form 8-K (No. 1-12658) filed on January 20, 2005, and incorporated herein by reference].

4.2	Third Supplemental Indenture, dated as of November 24, 2014, among Albemarle Corporation, Albemarle Holdings Corporation (now Rockwood Holdings, Inc.) and Albemarle Holdings II Corporation (now Rockwood Specialties Group, Inc.) and U.S. Bank National Association, as trustee [filed as Exhibit 4.1 to the Company's Current Report on Form 8-K (No. 1-12658) filed on November 24, 2014, and incorporated herein by reference].
4.3	Fourth Supplemental Indenture, dated as of January 29, 2015, among Albemarle Corporation, Rockwood Holdings, Inc. (as successor by merger to Albemarle Holdings Corporation), Rockwood Specialties Group, Inc. (as successor by merger to Albemarle Holdings II Corporation), The Bank of New York Mellon Trust Company, N.A., a national banking association, as successor to The Bank of New York, as resigning trustee, and U.S. Bank National Association, as successor trustee [filed as Exhibit 4.1 to the Company's Current Report on Form 8-K (No. 1-12658) filed on January 29, 2015, and incorporated herein by reference].
4.4	Form of Global Security for the 5.450% Senior Notes due 2044 [filed as Exhibit 4.4 to the Company's Current Report on Form 8-K (No. 1-12658) filed on November 24, 2014, and incorporated herein by reference].
4.5	Form of 3.450% Note due 2029 [filed as Exhibit 4.3 to the Company's Current Report on Form 8-K (No. 1-12658) filed on November 25, 2019, and incorporated herein by reference].
4.6	Form of 1.125% Note due 2025 [filed as Exhibit 4.4 to the Company's Current Report on Form 8-K (No. 1-12658) filed on November 25, 2019, and incorporated herein by reference].
4.7	Form of 1.625% Note due 2028 [filed as Exhibit 4.5 to the Company's Current Report on Form 8-K (No. 1-12658) filed on November 25, 2019, and incorporated herein by reference].
4.8	Form of 4.650% Senior Notes due 2027 [filed as Exhibit 4.2 to the Company's Current Report on Form 8-K (No. 1-12658) filed on May 13, 2022, and incorporated herein by reference].
4.9	Form of 5.050% Senior Notes due 2032 [filed as Exhibit 4.3 to the Company's Current Report on Form 8-K (No. 1-12658) filed on May 13, 2022, and incorporated herein by reference].
4.10	Form of 5.650% Senior Notes due 2052 [filed as Exhibit 4.4 to the Company's Current Report on Form 8-K (No. 1-12658) filed on May 13, 2022, and incorporated herein by reference].
4.11	Description of Securities [filed on the Company's Current Report on Form 8-K (No. 1-12658) filed February 15, 2023, and incorporated herein by reference].
#10.1	2013 Stock Compensation and Deferral Election Plan for Non-Employee Directors of Albemarle Corporation [filed as Annex A to the Company's definitive Proxy Statement on Schedule 14A (No. 1-12658) filed on March 28, 2013, and incorporated herein by reference].
#10.2	First Amendment to the Albemarle Corporation Stock Comp ensation and Deferral Election Plan [filed as Exhibit 10.1 to the Company 's Quarterly Report on Form 10-Q for the quarter ended June 30, 2016 (No. 1-12658), and incorporated herein by reference].
#10.3	Form of Notice of Option Grant under the Albemarle Corporation 2008 Incentive Plan [filed as Exhibit 10.1 to the Company's Current Report on Form 8-K (No. 1-12658) filed on March 2, 2016, and incorporated herein by reference].
#10.4	Form Notice of Restricted Stock Unit Award under the Albemarle Corporation 2008 Incentive Plan [filed as Exhibit 10.4 to the Company's Current Report on Form 8-K (No. 1-12658) filed on December 9, 2016, and incorporated herein by reference].
#10.5	Form of Notice of TSR Performance Unit Award under the Albemarle Corporation 2008 Incentive Plan [filed as Exhibit 10.5 to the Company's Current Report on Form 8-K (No. 1-12658) filed on December 9, 2016, and incorporated herein by reference].

#10.6	Form of Notice of TSR Performance Unit Award under the Albemarle Corporation 2017 Incentive Plan [filed as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on May 9, 2018, and incorporated herein by reference].
#10.7	Form of Notice of Option Grant under the Albemarle Corporation 2017 Incentive Plan [filed as Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on May 9, 2018, and incorporated herein by reference].
#10.8	Form of Notice of Restricted Stock Unit Award under the Albemarle Corporation 2017 Incentive Plan [filed as Exhibit 10.3 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on May 9, 2018, and incorporated herein by reference].
#10.9	Form of Notice of ROIC Performance Unit Award under the Albemarle Corporation 2017 Incentive Plan [filed as Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on May 8, 2019, and incorporated herein by reference].
#10.10	Notice of 3-Year Cliff Vest Restricted Stock Unit Award under the Albemarle Corporation 2017 Incentive Plan [filed as Exhibit 10.5 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on May 8, 2019, and incorporated herein by reference].
#10.11	Form of Notice of NEO Special Retention Restricted Stock Unit Award under the Albemarle Corporation 2017 Incentive Plan [filed as Exhibit 10.1 to the Company's Current Report on Form 8-K (No. 1-12658) filed on February 27, 2020, and incorporated herein by reference].
#10.12	Form of Notice of Special Restricted Stock Unit Award under the Albemarle Corporation 2017 Incentive Plan [filed as Exhibit 10.6 to the Company's Current Report on Form 8-K (No. 1-12658) filed on February 27, 2020, and incorporated herein by reference].
#10.13	Amended and Restated Albemarle Corporation Supplemental Executive Retirement Plan, effective as of January 1, 2005 [filed as Exhibit 10.13 to the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2014 (No. 1-12658), and incorporated herein by reference].
#10.14	First Amendment to the Albemarle Corporation Supplemental Executive Retirement Plan, dated December 1, 2010 [filed as Exhibit 10.14 to the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2014 (No. 1-12658), and incorporated herein by reference].
#10.15	Second Amendment to the Albemarle Corporation Supplemental Executive Retirement Plan, dated December 18, 2011 [filed as Exhibit 10.15 to the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2014 (No. 1-12658), and incorporated herein by reference].
#10.16	Third Amendment to the Albemarle Corporation Supplemental Executive Retirement Plan, dated December 2, 2013 [filed as Exhibit 10.16 to the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2014 (No. 1-12658), and incorporated herein by reference].
#10.17	Form of Severance Compensation Agreement (Pension-Eligible Employees) [filed as Exhibit 10.19 to the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2015 (No. 1-12658), and incorporated herein by reference].
#10.18	Form of Severance Compensation Agreement (Non-Pension-Eligible Employees) [filed as Exhibit 10.20 to the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2015 (No. 1-12658), and incorporated herein by reference].
#10.19	Form of Amendment to Severance Compensation Agreement [filed as Exhibit 10.21 to the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2015 (No. 1-12658), and incorporated herein by reference].
#10.20	Second Amendment to Severance Compensation Agreement between Luther C. Kissam, IV and Albemarle Corporation [filed as Exhibit 10.1 to the Company's Current Report on Form 8-K (No. 1-12658) filed on December 9, 2016, and incorporated herein by reference].

#10.21	Form of Second Amendment to Severance Compensation Agreement between each of Karen Narwold and Scott Tozier, and Albemarle Corporation [filed as Exhibit 10.2 to the Company's Current Report on Form 8-K (No. 1-12658) filed on December 9, 2016, and incorporated herein by reference].
#10.22	Albemarle Corporation Severance Pay Plan, as revised effective as of December 13, 2006 [filed as Exhibit 10.6 to the Company's Current Report on Form 8-K (No. 1-12658) filed on December 18, 2006, and incorporated herein by reference].
#10.23	Amended and Restated Albemarle Corporation Benefits Protection Trust, effective as of December 13, 2006 [filed as Exhibit 10.9 to the Company's Current Report on Form 8-K (No. 1-12658) filed on December 18, 2006, and incorporated herein by reference].
#10.24	Albemarle Corporation Employee Relocation Policy [filed as Exhibit 10.33 to the Company's Quarterly Report on Form 10-Q for the quarter ended June 30, 2008 (No. 1-12658), and incorporated herein by reference].
#10.25	Albemarle Corporation 2008 Incentive Plan, as amended and restated as of April 20, 2010 [filed as Exhibit 10.1 to the Company's Registration Statement on Form S-8 (No. 333-166828) filed on May 14, 2010, and incorporated herein by reference].
#10.26	Amended and Restated Albemarle Corporation Executive Deferred Compensation Plan, effective as of January 1, 2013 [filed as Exhibit 10.23 to the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2014 (No. 1-12658), and incorporated herein by reference].
#10.27	First Amendment to the Albemarle Corporation Executive Deferred Compensation Plan, dated as of November 14, 2014 [filed as Exhibit 10.24 to the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2014 (No. 1-12658), and incorporated herein by reference].
#10.28	Second Amendment to the Albemarle Corporation Executive Deferred Compensation Plan, dated as of February 12, 2015 [filed as Exhibit 10.28 to the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2015 (No. 1-12658), and incorporated herein by reference].
#10.29	Third Amendment to the Albemarle Corporation Executive Deferred Compensation Plan, dated as of July 31, 2015 [filed as Exhibit 10.29 to the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2015 (No. 1-12658), and incorporated herein by reference].
#10.30	Fourth Amendment to the Albemarle Corporation Executive Deferred Compensation Plan, dated as of December 17, 2015 [filed as Exhibit 10.30 to the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2015 (No. 1-12658), and incorporated herein by reference].
#10.31	Fifth Amendment to the Albemarle Corporation Executive Deferred Compensation Plan, dated as of March 31, 2017 [filed as Exhibit 10.38 to the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2017 (No. 1-12658), and incorporated herein by reference].
#10.32	Sixth Amendment to the Albemarle Corporation Executive Deferred Compensation Plan, dated as of July 5, 2017 [filed as Exhibit 10.39 to the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2017 (No. 1-12658), and incorporated herein by reference].
#10.33	Seventh Amendment to the Albemarle Corporation Executive Deferred Compensation Plan, dated as of November 9, 2017 [filed as Exhibit 10.40 to the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2017 (No. 1-12658), and incorporated herein by reference].
#10.34	Albemarle Corporation 2017 Incentive Plan, adopted May 12, 2017 [filed as Appendix A to the Company's Definitive Proxy Statement filed on March 30, 2017, and incorporated herein by reference].
#10.35	Albemarle Corporation Compensation Recoupment and Forfeiture Policy effective July 10, 2017 [filed as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q for the quarter ended June 30, 2017 (No. 1-12658), and incorporated herein by reference].

#10.36	Form of letter agreement dated February 26, 2018 between the Company and each of Luther C. Kissam, IV, Karen Narwold, Scott Tozier and Donald J. LaBauve, Jr. [filed as Exhibit 10.43 to the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2017 (No. 1-12658), and incorporated herein by reference].
10.37	Credit Agreement, dated as of June 21, 2018, among Albemarle Corporation, Albemarle Global Finance Company SCA and Albemarle Europe SPRL, as borrowers, certain of the Company's subsidiaries that from time to time become parties thereto, the several banks and other financial institutions as may from time to time become parties thereto, and Bank of America, N.A., as Administrative Agent and Swing Line Lender [filed as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on August 7, 2018, and incorporated herein by reference].
10.38	Asset Sale and Share Subscription Agreement, dated December 14, 2018, by and among Albemarle Corporation, Albemarle Wodgina Pty Ltd, a wholly-owned subsidiary of Albemarle Corporation, Mineral Resources Limited and Wodgina Lithium Pty Ltd, a wholly-owned subsidiary of Mineral Resources Limited [filed as Exhibit 10.41 to the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2018 (No. 1-12658), and incorporated herein by reference].
10.39	Form of Wodgina Joint Venture Agreement by and among Wodgina Lithium Pty Ltd, Albemarle Wodgina Pty Ltd and Wodgina Lithium Operations Pty Ltd [filed as Exhibit 10.42 to the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2018 (No. 1-12658), and incorporated herein by reference].
10.40	Form of Letter Agreement, dated June 13, 2019, among Wodgina Lithium Pty Ltd, Albemarle Wodgina Pty Ltd, Mineral Resources Limited and the Company [filed as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on August 7, 2019, and incorporated herein by reference].
10.41	Form of Amendment Deed to Asset Sale and Share Subscription Agreement, dated August 1, 2019, among Wodgina Lithium Pty Ltd, Albemarle Wodgina Pty Ltd, Mineral Resources Limited and the Company [filed as Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on August 7, 2019, and incorporated herein by reference].
10.42	Form of MRL Kemerton Asset Sale Agreement among Wodgina Lithium Pty Ltd, Albemarle Wodgina Pty Ltd, Mineral Resources Limited, Albemarle Lithium Pty Ltd and the Company [filed as Exhibit 10.3 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on August 7, 2019, and incorporated herein by reference].
10.43	Form of break fee letter, dated August 1, 2019, between the Company and Mineral Resources Limited [filed as Exhibit 10.4 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on August 7, 2019, and incorporated herein by reference].
10.44	Syndicated Facility Agreement, dated as of August 14, 2019, among Albemarle Corporation, Albemarle Finance Company B.V., Albemarle New Holding GmbH, Albemarle Wodgina Pty Ltd, the Lenders Party Thereto and JPMorgan Chase Bank, N.A., as Administrative Agent [filed as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on November 6, 2019, and incorporated herein by reference].
10.45	First Amendment to Credit Agreement, dated as of August 14, 2019, among Albemarle Corporation, Albemarle Europe SRL, the Lenders party thereto, and Bank of America, N.A., as Administrative Agent for the Lenders [filed as Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on November 6, 2019, and incorporated herein by reference].
10.46	MARBL Joint Venture Agreement, dated August 1, 2019, among Wodgina Lithium Pty Ltd, Albemarle Wodgina Pty Ltd, and MARBL Lithium Operations [filed as Exhibit 10.3 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on November 6, 2019, and incorporated herein by reference].
10.47	Amendment Deed to Asset Sale and Share Subscription Agreement and MRL Kemerton ASA, dated August 1, 2019, among Wodgina Lithium Pty Ltd, Albemarle Wodgina Pty Ltd, Mineral Resources Limited, Albemarle Corporation, and Albemarle Lithium Pty Ltd [filed as Exhibit 10.4 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on November 6, 2019, and incorporated herein by reference].

10.48	Second Amendment to Credit Agreement, dated as of May 11, 2020, among Albemarle Corporation, Albemarle Europe SRL, the Lenders party thereto, and Bank of America, N.A., as Administrative Agent for the Lenders [filed as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on May 11, 2020, and incorporated herein by reference].
10.49	First Amendment to Syndicated Facility Agreement, dated as of May 11, 2020, among Albemarle Corporation, Albemarle Finance Company B.V., Albemarle New Holding GmbH, Albemarle Wodgina Pty Ltd, the Lenders Party Thereto and JPMorgan Chase Bank, N.A., as Administrative Agent [filed as Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on May 11, 2020, and incorporated herein by reference].
#10.50	Executive Employment Agreement with J. Kent Masters, dated April 20, 2020 [filed as Exhibit 10.3 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on May 11, 2020, and incorporated herein by reference].
#10.51	Change in Control Agreement with J. Kent Masters, dated April 20, 2020 [filed as Exhibit 10.4 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on May 11, 2020, and incorporated herein by reference].
#10.52	Notice of Restricted Stock Unit Award to J. Kent Masters, dated May 8, 2020 [filed as Exhibit 10.5 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on May 11, 2020, and incorporated herein by reference].
#10.53	Second Amendment to the Albemarle Corporation 2013 Stock Compensation and Deferral Election Plan for Non-Employee Directors [filed as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on August 5, 2020, and incorporated herein by reference].
#10.54	Third Amendment to the Albemarle Corporation 2013 Stock Compensation and Deferral Election Plan for Non-Employee Directors [filed as Exhibit 10.56 to the Company's Annual Report on From 10-K (No. 1-12658) filed on February 19, 2021 and incorporated herein by reference].
10.55	Second Amendment to Syndicated Facility Agreement, dated as of December 15, 2020, among Albemarle Corporation, Albemarle Finance Company B.V., Albemarle New Holding GmbH, Albemarle Wodgina Pty Ltd, the Lenders Party Thereto and JPMorgan Chase Bank, N.A., as Administrative Agent [filed as Exhibit 10.57 to the Company's Annual Report on From 10-K (No. 1-12658) filed on February 19, 2021 and incorporated herein by reference].
10.56	Sale, Purchase and Contribution Agreement, dated February 25, 2021 among Albemarle Corporation, W. R. Grace & Co.-Conn and Fine Chemical Manufacturing Services LLC [filed as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on May 5, 2021, and incorporated herein by reference].
#10.57	Fourth Amendment to the Albemarle Corporation 2013 Stock Compensation and Deferral Election Plan for Non-Employee Directors [filed as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on August 4, 2021, and incorporated herein by reference].
#10.58	Letter Agreement with Raphael Crawford, dated November 3, 2021 [filed as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on November 4, 2021, and incorporated herein by reference].
10.59	Third Amendment to Credit Agreement, dated as of December 10, 2021, among Albemarle Corporation, Albemarle Europe SRL, the Lenders party thereto, and Bank of America, N.A., as Administrative Agent for the Lenders [filed as Exhibit 10.61 to the Company 's Annual Report on Form 10-K (No. 1-12658) filed on February 18, 2022 and incorporated herein by reference].
10.60	Second Amendment and Restatement Agreement, dated as of December 10, 2021, among Albemarle Corporation, the Lenders Party hereto, and JPMorgan Chase Bank, N.A., as Administrative Agent[filed as Exhibit 10.62 to the Company's Annual Report on Form 10-K (No. 1-12658) filed on February 18, 2022 and incorporated herein by reference].

#10.61	Form of Restricted Stock Unit Award Agreement [filed as Exhibit 10.1 to the Company's Current Report on Form 8-K (No. 1-12658) filed on February 28, 2022, and incorporated herein by reference].
#10.62	Form of Adjusted ROIC Performance Unit Award Agreement [filed as Exhibit 10.2 to the Company's Current Report on Form 8-K (No. 1-12658) filed on February 28, 2022, and incorporated herein by reference].
#10.63	Form of TSR Performance Unit Award Agreement [filed as Exhibit 10.3 to the Company's Current Report on Form 8-K (No. 1-12658) filed on February 28, 2022, and incorporated herein by reference].
#10.64	Form of Stock Option Grant Agreement [filed as Exhibit 10.4 to the Company's Current Report on Form 8-K (No. 1-12658) filed on February 28, 2022, and incorporated herein by reference].
#10.65	Form of Special Restricted Stock Unit Award Agreement [filed as Exhibit 10.5 to the Company's Current Report on Form 8-K (No. 1-12658) filed on February 28, 2022, and incorporated herein by reference].
10.66	Amended and Restated Credit Agreement, dated as of October 28, 2022, among Albemarle Corporation, certain other subsidiaries of the Company, the Lenders Party thereto, and Bank of America, N.A., as Administrative Agent for the Lenders [filed as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on November 2, 2022, and incorporated herein by reference].
#10.67	Form Notice of Special Retention Restricted Stock Unit Award under the Albemarle Corporation 2017 Incentive Plan [filed as Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q (No. 1-12658) filed on November 2, 2022, and incorporated herein by reference].
10.68	Form of Employee Non-Solicitation, Non-Compete and Confidentiality Agreement [filed as Exhibit 10.1 to the Company's Current Report on Form 8-K (No. 1-12658) filed on March 9, 2022 and incorporated herein by reference].
*21.1	Subsidiaries of the Company.
*23.1	Consent of PricewaterhouseCoopers LLP.
23.2	Consent of SRK Consulting (U.S), Inc. regarding lithium reserves and resources [filed as Exhibit 23.1 to the Company's Current Report on Form 8-K (No. 1-12658) filed on February 15, 2023 and incorporated herein by reference].
23.3	Consent of Fastmarkets Group Limited regarding market studies for lithium reserves and resources [filed as Exhibit 23.2 to the Company's Current Report on Form 8-K (No. 1-12658) filed on February 15, 2023 and incorporated herein by reference].
23.4	Consent of RPS Energy Canada Ltd regarding bromine reserves and resources [filed as Exhibit 23.3 to the Company's Current Report on Form 8-K (No. 1-12658) filed on February 15, 2023 and incorporated herein by reference].
23.5	Consent of RESPEC regarding bromine reserves and resources [filed as Exhibit 23.4 to the Company's Current Report on Form 8-K (No. 1-12658) filed on February 15, 2023 and incorporated herein by reference].
*31.1	Certification of Chief Executive Officer pursuant to Rule 13a-15(e) and 15d-15(e) of the Securities Exchange Act of 1934, as amended.
*31.2	Certification of Chief Financial Officer pursuant to Rule 13a-15(e) and 15d-15(e) of the Securities Exchange Act of 1934, as amended.
*32.1	Certification of Chief Executive Officer pursuant to 18 U.S.C. 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
*32.2	Certification of Chief Financial Officer pursuant to 18 U.S.C. 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.

96.1	SEC Technical Report Summary, Pre-Feasibility Study, Greenbushes Mine, Western Australia, prepared by SRK Consulting (U.S), Inc., dated February 14, 2023 [filed as Exhibit 96.1 to the Company's Current Report on Form 8-K (No. 1-12658) filed on February 15, 2023 and incorporated herein by reference].
96.2	SEC Technical Report Summary, Initial Assessment, Wodgina, Western Australia, prepared by SRK Consulting (U.S), Inc., dated December 16, 2022 [filed as Exhibit 96.2 to the Company's Annual Report on Form 10-K/A (No. 1-12658) filed on January 26, 2023, and incorporated herein by reference].
96.3	SEC Technical Report Summary, Pre-Feasibility Study, Salar de Atacama Region II, Chile, prepared by SRK Consulting (U.S), Inc., dated February 14, 2023 [filed as Exhibit 96.2 to the Company's Current Report on Form 8-K (No. 1-12658) filed on February 15, 2023 and incorporated herein by reference].
96.4	SEC Technical Report Summary Pre-Feasibility Study, Silver Peak Lithium Operation, Nevada, USA, prepared by SRK Consulting (U.S), Inc., dated February 14, 2023 [filed as Exhibit 96.3 to the Company's Current Report on Form 8-K (No. 1-12658) filed on February 15, 2023 and incorporated herein by reference].
96.5	SEC Technical Report Summary for Jordan Bromine Operation, prepared by RPS Energy Canada Ltd and RESPEC Consulting Inc., dated February 15, 2023 [filed as Exhibit 96.4 to the Company's Current Report on Form 8-K (No. 1-12658) filed on February 15, 2023 and incorporated herein by reference].
96.6	SEC Technical Report Summary for Magnolia Field Bromine Reserves, prepared by RPS Energy Canada Ltd, dated February 15, 2023 [filed as Exhibit 96.5 to the Company's Current Report on Form 8-K (No. 1-12658) filed on February 15, 2023 and incorporated herein by reference].
*101	Interactive Data Files (Annual Report on Form 10-K, for the fiscal year ended December 31, 2022, furnished in XBRL (eXtensible Business Reporting Language)). Attached as Exhibit 101 to this report are the following documents formatted in XBRL: (i) the Consolidated Statements of Income for the fiscal years ended December 31, 2022, 2021 and 2020, (ii) the Consolidated Statements of Comprehensive Income for the fiscal years ended December 31, 2022, 2021 and 2020, (iii) the Consolidated Balance Sheets at December 31, 2022 and 2021, (iv) the Consolidated Statements of Changes in Equity for the fiscal years ended December 31, 2022, 2021 and 2020, (v) the Consolidated Statements of Cash Flows for the fiscal years ended December 31, 2022, 2021 and 2020 and (vi) the Notes to Consolidated Financial Statements.
*104	Cover Page Interactive Data File (formatted as inline XBRL and contained in Exhibit 101).

Management contract or compensatory plan or arrangement.
* Included with this filing.

(c) In accordance with Regulation S-X Rule 3-09, the audited financial statements of Windfield Holdings Pty. Ltd. ("Windfield") for the year ended December 31, 2022, Windfield's fiscal year end, will be filed by amendment to this Annual Report on Form 10-K on or before June 30, 2023.

Item 16. Form 10-K Summary.

NONE

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

ALBEMARLE CORPORATION
(Registrant)

By: /S/ J. KENT MASTERS
(J. Kent Masters)
Chairman, President and Chief Executive Officer

Dated: February 15, 2023

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities indicated as of February 15, 2023.

Signature	Title
/S/ J. KENT MASTERS **(J. Kent Masters)**	Chairman, President and Chief Executive Officer (principal executive officer)
/S/ SCOTT A. TOZIER **(Scott A. Tozier)**	Executive Vice President, Chief Financial Officer (principal financial officer)
/S/ JOHN C. BARICHIVICH III **(John C. Barichivich III)**	Vice President, Corporate Controller and Chief Accounting Officer (principal accounting officer)
/S/ M. LAUREN BRLAS **(M. Lauren Brlas)**	Director
/S/ RALF H. CRAMER **(Ralf H. Cramer)**	Director
/S/ GLENDA J. MINOR **(Glenda J. Minor)**	Director
/S/ JAMES J. O'BRIEN **(James J. O'Brien)**	Director
/S/ DIARMUID B. O'CONNELL **(Diarmuid B. O'Connell)**	Director
/S/ DEAN L. SEAVERS **(Dean L. Seavers)**	Director
/S/ GERALD A. STEINER **(Gerald A. Steiner)**	Director
/S/ HOLLY A. VAN DEURSEN **(Holly A. Van Deursen)**	Director
/S/ ALEJANDRO D. WOLFF **(Alejandro D. Wolff)**	Director