
Los Angeles Regional Water Quality Control Board

September 24, 2020

Mr. Rob Whitaker, General Manager
Water Replenishment District of Southern California
4040 Paramount Boulevard
Lakewood, CA 90712

**RECYCLED WATER POLICY CONSTITUENTS OF EMERGING CONCERN
MONITORING AND REPORTING UPDATE - WASTE DISCHARGE REQUIREMENTS
(WDRs) AND WATER RECLAMATION REQUIREMENTS (WRRs) MONITORING AND
REPORTING PROGRAM (MRP) FOR THE GROUNDWATER RELIABILITY
IMPROVEMENT PROJECT (GRIP) ADVANCED WATER TREATMENT FACILITY
(AWTF) SPREADING AND INJECTION PROJECT – WATER REPLENISHMENT
DISTRICT OF SOUTHERN CALIFORNIA (ORDER NO. R4-2018-0129, CI-10318, FILE
NO. 17-008)**

Dear Mr. Whitaker:

The California Regional Water Quality Control Board, Los Angeles Region (hereinafter Regional Water Board) makes the following findings and issues this letter pursuant to California Water Code (CWC) sections 13267 and 13383, to revise the Monitoring and Reporting Program (MRP) of Order No. R4-2018-0129 to require the Water Replenishment District of Southern California (WRD or Project Sponsor) to develop a Quality Assurance Project Plan (QAPP) for constituents of emerging concern (CECs) monitoring and monitor, report and evaluate CEC Monitoring Parameters using a three-phased monitoring approach for production and use of recycled water for groundwater recharge at the Groundwater Reliability Improvement Project – Advanced Water Treatment Facility (GRIP-AWTF).

Background

- A. The County Sanitation Districts of Los Angeles County (LACSD) owns and operates the East and West San Jose Creek Water Reclamation Plants (SJC WRPs), which are tertiary wastewater treatment plants with design capacities of 62.5 million gallons per day (mgd) and 37.5 mgd, respectively. The SJC WRPs either discharge the tertiary treated effluent under National Pollutant Discharge Elimination System (NPDES) Permit No. R4-2015-0070, recycle the effluent under Water Reclamation Requirements (WRRs) contained in Order No. 87-50 and Order No. 91-100, or divert the effluent to the GRIP-AWTF for advanced treatment.
- B. WRD owns and operates the GRIP-AWTF, a publicly owned treatment works (POTW), which has a treatment capacity of 14.8 mgd and typically operates to produce up to 9 mgd of advanced treated recycled water.

IRMA MUÑOZ, CHAIR | RENEE PURDY, EXECUTIVE OFFICER

- C. The Regional Water Board issued Waste Discharge Requirements (WDRs) and WRRs, Order No. R4-2018-0129 on September 13, 2018. All the findings in the original order supporting issuance of requirements pursuant to Water Code sections 13267 and 13383 are applicable here and incorporated herein by reference. Order No. R4-2018-0129 regulates the use of advanced treated recycled water from GRIP-AWTF, which is either injected directly into the ground or mixed with tertiary-treated recycled effluent from the SJC WRPs for surface spreading at the Montebello Forebay Spreading Grounds (MFSGs). The GRIP-AWTF is also permitted to discharge to the San Gabriel River under an NPDES permit, Order No. R4-2017-0187.
- D. The Policy for Water Quality Control for Recycled Water (Recycled Water Policy) was adopted by the State Water Resources Control Board (State Water Board) on February 03, 2009 to streamline permitting for recycled water projects.
- E. On January 22, 2013 the Recycled Water Policy was amended with the adoption of Resolution No. 2013-0003 to specify monitoring requirements for CECs in recycled water used for groundwater recharge projects based on recommendations from the 2010 Science Advisory Panel on CECs in recycled water.
- F. On December 06, 2016 the State Water Board adopted Resolution No. 2016-0061, which directed staff to reconvene a Science Advisory Panel on CECs in recycled water and to propose an amendment to the Recycled Water Policy considering revised goals and mandates for statewide use of recycled water, clarification of recycled water monitoring and reporting requirements, recommendations for the development of representative, basin-wide groundwater monitoring networks, and an evaluation of the frequency of priority pollutant monitoring in recycled water. Resolution No. 2016-0061 also directed staff to consider a time schedule for regional water boards to review recycled water orders and permits, and to evaluate the nexus between the Recycled Water Policy and the Sustainable Groundwater Management Act (SGMA), groundwater recharge regulations, and reservoir water augmentation regulations.
- G. On December 11, 2018 the State Water Board adopted Resolution No. 2018-0057 to amend the Recycled Water Policy to address the provisions described in Resolution No. 2016-0061. The amended Recycled Water Policy (hereafter, Amendment) took effect on April 08, 2019 upon approval by the Office of Administrative Law. Resolution No. 2018-0057 directs the State Water Board Executive Director to issue orders pursuant to California Water Code section 13267 and Water Code section 13383 to implement the monitoring requirements of the Amendment, which shall supersede existing reporting requirements for recycled water to the extent of any conflict or duplication, wherever possible. The State Water Board has since determined that the monitoring requirements of the Amendment should be implemented by the Regional Boards on a permit-by-permit basis.
- H. The purpose of these revisions to the MRP of Order No. R4-2018-0129 is to make the monitoring and reporting requirements consistent with the requirements in the Recycled Water Policy Sections 10 and 11.1 and Attachment A as amended on

December 11, 2018. These revisions incorporate the following new requirements into the Monitoring and Reporting Program:

1. Development of a QAPP for CEC monitoring,
2. Monitoring, reporting, and evaluating health-based CECs, performance indicator CECs, surrogates, and bioanalytical screening tools (collectively referred to as the CEC Monitoring Parameters), considering recommendations by the CEC Science Advisory Panel.
3. Three-phased monitoring approach to determine the most appropriate CECs to monitor for the GRIP-AWTF.

I. California Water Code section 13267, subdivision b(1) states, in part:

“In conducting an investigation specified in subdivision (a), the regional board may require that any person who has discharged, discharges, or is suspected of having discharged or, discharging, or who proposes to discharge waste within its region, or any citizen or domiciliary, or political agency or entity of this state who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste outside of its region that could affect the quality of waters within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires. The burden, including costs, of these reports shall bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports. In requiring those reports, the regional board shall provide the person with a written explanation with regard to the need for the reports, and shall identify the evidence that supports requiring that person to provide the reports.”

The burden of complying with these requirements, including costs, has already been evaluated by the State Water Board in adopting Resolution 2018-0057, which requires the monitoring described herein. The benefits to be obtained from the required monitoring are described in Resolution 2018-0057, in particular sections 10.1.1 through 10.1.3.

Subdivision (d) states, in part:

“The state board or a regional board may require any person, including a person subject to a waste discharge requirement under CWC section 13263, who is discharging, or proposes to discharge, wastes or fluid into an injection well, to furnish the state board or regional board with a complete report on the condition and operation of the facility or injection well, or any other information that may be reasonably required to determine whether the injection well could affect the quality of waters of the state.”

J. Water Code section 13383 is also referenced in the Recycled Water Policy, and allows the regional water boards to establish monitoring requirements for any person who introduces pollutants into a publicly owned treatment works or

any person who owns or operates a publicly owned treatment works. Since the GRIP-AWTF is a POTW, which treats municipal wastewater for beneficial reuse, the Regional Water Board has established monitoring requirements for this facility.

- K. The Regional Water Board finds that the presence of CECs in recycled water used for groundwater recharge could affect the quality of waters of the state. The revisions to the Monitoring and Reporting Program for Order No. R4-2018-0129 pursuant to this letter will ensure the use of recycled water will not adversely impact human health or the environment.

Revisions to MRP

Pursuant to Water Code sections 13267, subdivisions (b)(1) and (d), and 13383, the MRP of Order No. R4-2018-0129, adopted by the California Regional Water Quality Control Board, Los Angeles Region on September 13, 2018, is hereby revised as follows:

- A. Update Table E-1 "Monitoring Station Locations" to include these additional monitoring station locations:

Monitoring Location Name	Monitoring Description Location
PreRO-001	This sampling point is on the pipe header prior to the Reverse Osmosis (RO) trains.
PreAOP-001	This sampling point is on the pipe header between the RO permeate and the Advanced Oxidation Process

- B. Delete Section I.U under "General Monitoring and Reporting Requirements" on page E-7.

- C. Replace Sections III.C.5, III.C.6, and III.C.7 under "Recycled Water Monitoring," including Tables E-13, E-14, and E-15, on pages E-19 through E-22 with the following requirements:

1. Constituents of Emerging Concern (CECs) Monitoring

- a. The following CEC monitoring requirements and Attachment H are consistent with the Recycled Water Policy, Resolution 2018-0057, adopted by the State Water Board on December 11, 2018 and the State Water Board, Division of Drinking Water's (DDW's) recommendations. These revisions include the incorporation of Attachment H "CEC Phased Monitoring Requirements".
- b. Monitoring Locations for Groundwater Recharge - Surface Application
 - i. Monitoring for bioanalytical screening tools, health-based CECs, performance indicator CECs, and surrogates shall be conducted: 1) following advanced treatment prior to mixing with tertiary effluent and application to the surface

- spreading area (EFF-001), and 2) at monitoring well locations within the distance groundwater travels downgradient from the application site in 30 days. The proposed groundwater monitoring wells for this purpose will also be required per the revisions to the MRP for Order No. 91-100 for the Rio Hondo and San Gabriel River Spreading Grounds (File No. 71-67). Duplication of data is not required between the two MRPs (Refer to V.A.4 of Order No. R4-2018-0129).
- ii. Monitoring for NDMA and sucralose shall be conducted prior to RO treatment (PreRO-001) and prior to treatment by AOP (PreAOP-001) in addition to EFF-001 and monitoring wells to monitor RO and AOP system performance.
- c. Monitoring Locations for Groundwater Recharge – Subsurface Application
- i. Monitoring for bioanalytical screening tools and health-based CECs shall be conducted on the advanced treated recycled water produced at the GRIP-AWTF prior to conveyance to the injection wells (EFF-002), where advanced-treated water is released into the aquifer.
 - ii. Monitoring for performance indicator CECs and surrogates shall be conducted prior to treatment by reverse osmosis (PreRO-001) and following treatment prior to conveyance to the injection wells (EFF-002), where advanced-treated water is released into the aquifer. If the Project Sponsor demonstrates the RO unit does not substantially remove a performance CEC or surrogate, the Project Sponsor may request to monitor that CEC prior to treatment by AOP (PreAOP-001) instead of prior to RO treatment (PreRO-001).
 - iii. Monitoring for NDMA and sucralose shall also be conducted prior to treatment by AOP (PreAOP-001).
- d. The Project Sponsor shall revise and maintain a Quality Assurance Project Plan (QAPP) for monitoring CECs to ensure the project data are of known, consistent, and documented quality and that the monitoring is consistent with the Recycled Water Policy. The QAPP shall be developed using the Guidance for Quality Assurance Project Plans, EPA QA/G-5 (EPA/240/R-2/009, 2002) and the template issued by the State Water Board. The QAPP shall be submitted to the Regional Water Board within 90 days of the incorporation of these requirements into the MRP, and approved by the Regional Water Board or State Water Board's Division of Water Quality (DWQ) prior to beginning any sampling or analysis. The QAPP shall be updated and resubmitted to the Regional Water Board for approval when significant changes are made that would affect the overall data quality and use (e.g. using a new analytical chemistry laboratory) or at least annually if any changes are made.
- e. The Project Sponsor shall submit the quality assurance data specified in the QAPP, including percent recoveries and acceptable recovery ranges for each analyte, to the Regional Water Board with each data set.
- f. Laboratories shall use analytical methods that have been validated and approved for the analytes in the applicable matrix and can achieve the reporting

limits in Tables E-13, E-14, and E-15c. This includes methods that have been approved by USEPA, the Standards Methods Committee, the American Society for Testing and Materials International, or other methods that have been validated and approved by the regional water boards or State Water Board for the analytes in the applicable matrix. The QAPP shall include minimum method validation requirements developed by the Regional Water Board in consultation with the State Water Board if proposing to (1) use a method that has not been validated and approved, (2) use a validated and approved method that has been modified, or (3) use a method for an application that is outside the intended use of the method (e.g., different matrix, new analyte).

- g. A laboratory providing analyses of CECs and bioanalytical screening must hold a valid certificate of accreditation from the State of California Environmental Laboratory Accreditation Program (ELAP) for the analytical test methods or analytes selected, if such methods or analytes are accredited by ELAP at the time that monitoring is required to begin. If ELAP accreditation for analytical test methods or an analyte becomes available after monitoring is initiated, then the laboratory providing analysis of CECs shall be accredited by ELAP for those methods or analytes within one year of such accreditation becoming available. If ELAP accreditation is unavailable for a method or an analyte, the recycled water producer shall use a laboratory that has been accredited for a similar analytical method, instrumentation, or analyte until ELAP accreditation becomes available, unless otherwise approved by the Regional Water Board or approved by the State Water Board for bioanalytical screening tools.
- h. The Project Sponsor shall also submit to the Regional Water Board within 90 days of the incorporation of this requirement into the MRP of Order No. R4-2018-0129, a letter report proposing monitoring wells, and their geographic locations, that satisfy the requirement to be within the distance groundwater travels downgradient from the application site in 30 days. This letter report shall also include the proposed surrogates for surface spreading monitoring. Regional Water Board approval is required before implementing the proposed monitoring wells and surrogates.
- i. The Project Sponsor shall conduct a three-phased monitoring approach for the CEC monitoring parameters in Tables E-13, E-14, and E-15a through E-15c, which includes an initial assessment monitoring phase, followed by a baseline monitoring phase, and then a standard operation monitoring phase. The Project Sponsor shall conduct these phases in accordance with Attachment H.

Table E-13. CECs to be Monitored at Groundwater Wells within the Distance Groundwater Travels Downgradient from the Application Site in 30 Days

Constituent	Relevance/ Indicator Type	Sample Type	Reporting Limit (µg/L)
1,4-dioxane	Health	grab	0.1

Constituent	Relevance/ Indicator Type	Sample Type	Reporting Limit (µg/L)
N-Nitrosodimethylamine (NDMA)	Health	grab	0.002
N-Nitrosomorpholine (NMOR)	Health	grab	0.002
Perfluorooctane sulfonate (PFOS)	Health	grab	0.0065
Perfluorooctanoic acid (PFOA)	Health	grab	0.007
Gemfibrozil	Performance	grab	0.01
Iohexol	Performance	grab	0.05
Sucralose	Performance	grab	0.1
Sulfamethoxazole	Performance	grab	0.01

Table E-14. CECs to be Monitored (Surface and Subsurface Application)

Constituent	Relevance/ Indicator Type	Sample Type	Reporting Limit (µg/L)	Prior to RO (PreRO -001)	Post RO/Pre AOP (PreAOP -001)	Prior to Surface Application (EFF-001) ^a	Prior to Subsurface Application (EFF-002)
1,4-dioxane	Health	grab	0.1	---	---	X	X
NDMA	Health and Performance	grab	0.002	X	X	X	X
NMOR	Health	grab	0.002	---	---	X	X
PFOS	Health	grab	0.0065	---	---	X	X
PFOA	Health	grab	0.007	---	---	X	X
Gemfibrozil	Performance	grab	0.01	---	---	X	---
Iohexol	Performance	grab	0.05	---	---	X	---
Sucralose	Performance	grab	0.1	X	X	X	X
Sulfamethox- azole	Performance	grab	0.01	X	---	X	X

Footnotes for Table E-14

- a. EFF-001 and EFF-002 shall be monitored during the initial assessment phase for surface application and subsurface application, respectively, as described in Section I of Attachment H. After the data from the initial assessment phase is evaluated and if the data supports eliminating EFF-001 for surface application, the Project Sponsor may submit a request, for Executive Officer approval, to monitor CECs and surrogates at one effluent monitoring location (EFF-002) for surface and subsurface application.

End of Footnotes for Table E-14**Table E-15a. Potential Surrogates for Surface Application**

Constituent	Units	Sample Type	Prior to Surface Application (EFF-001) ^a	Approved Monitoring Wells
Ammonia	mg/L	Grab	X	X
Dissolved Organic Carbon (DOC) or Total Organic Carbon (TOC)	mg/L	Online/ 24-hour composite/ Grab	X	X
Nitrate	mg/L	Grab	X	X
Total fluorescence	Relative Fluorescence Units (RFU)	Grab	X	X
Ultraviolet (UV) Light Absorbance	%	Grab	X	X

Footnotes for Table E-15a

- a. EFF-001 shall be monitored during the initial assessment phase for surface application as described in Section I of Attachment H. After the data from the initial assessment phase for surface and subsurface application is evaluated and if the data supports eliminating EFF-001 for surface application, the Project Sponsor may submit a request, for Executive Officer approval, to monitor CECs and surrogates at one effluent monitoring location (EFF-002) for surface and subsurface application.

End of Footnotes for Table E-15a

Table E-15b. Potential Surrogates for Subsurface Application

Constituent	Units	Sample Type	Prior to RO Treatment (PreRO-001)	Prior to Subsurface Application (EFF-002)
Electrical Conductivity	µS	Online (For continuous monitoring, report monthly minimum, maximum, and daily average values)	X	X
DOC or TOC	mg/L	Online/ 24-hour Composite/ Grab	X	X
Ultraviolet (UV) Light Absorbance	%	Online (For continuous monitoring, report monthly minimum, maximum, and daily average values) or Grab	X	X

Table E-15c. Bioanalytical Screening Tools for Surface and Subsurface Application

Endpoint Activity	Example Relevant CECs	Reporting Limit (ng/L)	Adverse Effect	Sample Type	Following Treatment Prior to Spreading (EFF-001 ^a)	Approved Monitoring Wells	Following Treatment Prior to Subsurface Application (EFF-002 ^a)
Estrogen Receptor α (ER-α)	Estradiol, bisphenol A, nonylphenol	0.5	Feminization, impaired reproduction, cancer	Grab	X	X	X
Aryl Hydrocarbon receptor (AhR)	Dioxin-like chemicals, polycyclic aromatic hydrocarbons, pesticides	0.5	Cancer, impaired reproduction	Grab	X	X	X

Footnotes for Table E-15c

- a. EFF-001 and EFF-002 shall be monitored during the initial assessment phase for surface and subsurface application, respectively, as described in Section I of Attachment H. After the data from the initial assessment phase for surface and subsurface application is evaluated and if the data supports eliminating EFF-001 for surface application, the Project Sponsor may submit a request for Executive Officer

approval, to monitor CECs and surrogates at one effluent monitoring location (EFF-002) for surface and subsurface application.

End Footnotes for Table E-15c

- D. The following additional language shall be included to Section IV.H.2 on page E-28:
- m. Summary of monitoring results, calculations, and analyses for health-based CECs, performance indicator CECs, surrogates, and bioanalytical screening tools.
- E. The following requirements shall be added to Section IV.I.3 on page E-28 through E-30:
- r. The removal percentages for performance indicator CECs and surrogates.
 - s. Results of the MEC/MTL ratio calculations and any actions taken.
 - t. Results of the BEQ/MTL ratio calculations and any actions taken (when necessary).
- F. The following requirements shall be added to Section IV. on page E-32:
- N. CEC Phased Monitoring Reports

After the completion of each CEC monitoring phase, the Project Sponsor shall submit a final report including a summary of all monitoring data collected, calculations performed, an assessment of the data, and the recommended monitoring frequency for the following phase. Since the phases for bioanalytical screening tools differ in length from the phases for health-based and performance indicator CECs, and surrogates, two separate CEC monitoring reports shall be submitted for each phase, one for surrogates, health-based and performance indicator CECs, and another for bioanalytical screening tools. The final report for each phase shall be submitted to the Regional Water Board within 90 days of receiving the results of the final sample collected for that phase.

If you have any questions, please contact Steven Webb via email at steven.webb@waterboards.ca.gov or Jeong-Hee Lim via email at jeong-hee.lim@waterboards.ca.gov.

Sincerely,

Renee Purdy
Executive Officer

Enclosure: Attachment H: Constituents of Emerging Concern (CECs) Phased Monitoring Requirements

cc: Tricia Lee, Laura McLellan, Andrew Hamilton, State Water Resources
Control Board, Division of Water Quality
Saeed Hafeznezami, Faraz Asad, Randy Barnard, Brian Bernados,
State Water Resources Control Board, Division of Drinking Water
Ann Heil, County Sanitation Districts of Los Angeles County
Ted Johnson, Water Replenishment District of Southern California
Uzi Daniel, West Basin Municipal Water District

ATTACHMENT H – Constituents of Emerging Concern (CECs) Phased Monitoring Requirements

The Project Sponsor shall conduct a three-phased monitoring approach for the CEC monitoring parameters. This approach includes an initial assessment monitoring phase, a baseline monitoring phase, and a standard operation monitoring phase. The purpose of phased monitoring is to allow the Los Angeles Regional Water Quality Control Board (Regional Water Board) to review monitoring results for the CEC monitoring required in the Monitoring and Reporting Program (MRP) at each phase and to refine the specific monitoring requirements based on the monitoring results and findings of the previous phase. Each CEC monitoring phase is described in detail below.

The Project Sponsor may submit existing CEC monitoring data for the health-based CECs and performance indicator CECs, surrogates for CECs, and bioanalytical screening tools from the Facility permitted under the MRP to satisfy the requirements of the initial assessment or baseline monitoring phase. If the Regional Water Board determines the existing CEC monitoring data meets the intent of the initial assessment phase, the Regional Water Board may allow the Project Sponsor to initiate the baseline monitoring phase. If the Regional Water Board determines the existing CEC monitoring data meets the intent of the baseline monitoring phase, the Regional Water Board may allow the Project Sponsor to initiate the standard operation monitoring phase.

For CECs that overlap with chemicals with Notification Levels (1,4-Dioxane, Perfluorooctanoic acid (PFOA), Perfluorooctane sulfonate (PFOS), and N-nitrosodimethylamine (NDMA)) or surrogates that overlap with Primary MCLs (Nitrate), monitoring may not be reduced to less than quarterly at both recycled water monitoring locations (EFF-001 or EFF-002) or at monitoring wells regardless of monitoring phase without State Water Resources Control Board, Division of Drinking Water (DDW) approval.

Advanced treated water is currently being used for surface application only and the need for future subsurface application via the injection wells has not been determined for the Groundwater Reliability Improvement Project Advanced Water Treatment Facility (GRIP-AWTF). Supplemental recharge wells may be used under this permit to keep the plant operational when water cannot be sent to the Montebello Forebay Spreading Grounds (MFSG). Phased monitoring for subsurface application will commence once final product water is injected into the aquifer.

If the facility is not operational for part of a monitoring period, the Project Sponsor must collect samples for twelve months for monthly samples, four quarters for quarterly samples, twice per year for semiannual samples, and once per year for annual samples to satisfy a 1-year monitoring requirement.

I. INITIAL ASSESSMENT MONITORING PHASE

The monitoring requirements for the initial assessment phase applies to this facility because this project uses the recycled water for indirect potable reuse using surface spreading and direct groundwater injection.

The purpose of the initial assessment phase is to: (1) identify the occurrence of health-based CECs, performance indicator CECs, and surrogates in recycled water for groundwater recharge; (2) determine treatment effectiveness; (3) define the project-specific performance indicator CECs and surrogates to monitor during the baseline monitoring phase; (4) specify the expected removal percentages for performance indicator CECs and surrogates; and (5) gather bioactivity data for ER- α and AhR bioanalytical screening tools to determine the range of responses for the bioassays for standardized water quality monitoring.

The Project Sponsor shall monitor for the constituents in Tables E-13, E-14, and E-15a through E-15c of the MRP consistent with the initial assessment phase requirements. Following completion of the initial assessment monitoring phase, the Project Sponsor shall submit the data to the Regional Water Board for evaluation and determination of the appropriate monitoring requirements for the baseline monitoring phase.

A. Monitoring for Health-Based CECs, Performance Indicator CECs, and Surrogates

1. The Project Sponsor shall conduct an initial assessment monitoring phase consistent with Tables 1 and 2 of this attachment for one year for each of the health-based CECs and performance indicator CECs listed in Tables E-13 and E-14 of the MRP and project-specific surrogates identified in Tables E-15a and E-15b of the MRP or other surrogates proposed by the Project Sponsor that are indicative of CEC removal through individual unit processes.
2. The Project Sponsor shall evaluate data from performance indicator CECs and surrogates and prepare an updated Table 3 of this attachment with actual removal percentages for the Facility and submit to the Regional Water Board with the initial assessment monitoring data.
3. Following each sampling event, the Project Sponsor shall evaluate monitoring results for health-based CECs using the direction in section IV.B. of this attachment and implement appropriate response actions. The Project Sponsor shall also evaluate monitoring results for surrogates and evaluate the suitability of the surrogates.

B. Monitoring for Bioanalytical Screening Tools

1. The Project Sponsor shall conduct an initial assessment monitoring phase consistent with Tables 1 and 2 of this attachment for three years for each of the bioanalytical screening tools listed in Table E-15c of the MRP. The monitoring frequency may be increased from the quarterly frequency indicated in Table 1 by

the Regional Water Board if the analysis conducted as part of section IV of this attachment indicates that more frequent monitoring is a required response action.

2. Following each sampling event, the Project Sponsor shall evaluate monitoring results for bioanalytical screening tools. The Project Sponsor may elect to follow the response actions for bioanalytical screening tools using the direction in section IV.C. of this attachment, but implementation of the response actions during the initial assessment monitoring phase is not required.

Table 1. Monitoring Phase Requirements: Surface Application

Constituent	Initial Assessment Monitoring Frequency	Baseline Monitoring Frequency	Standard Operation Monitoring Frequency	Monitoring Locations	Notes
Health-Based CECs: Refer to Table E-14	Quarterly	Semiannually	Semiannually or Annually	Prior to surface application (EFF-001) and at the approved monitoring wells	Notes a and b
Performance Indicator CECs: Refer to Table E-14	Quarterly	Semiannually	Semiannually or Annually	Prior to surface application (EFF-001) and at the approved monitoring wells	Notes a and b
Surrogates: Refer to Tables E-15a and b.	Weekly, (Reduced monitoring frequency after 3 months if approved)	Based on Findings of the Initial Assessment Phase	Based on Findings of the Baseline Monitoring Phase	Prior to surface application (EFF-001) and at the approved monitoring wells.	Notes a, b, and c
Bioanalytical Screening Tools: Refer to Table E-15c	Quarterly	Quarterly	Semiannually or Annually	Prior to surface application (EFF-001) and at the approved monitoring wells	Notes a and b

Footnotes for Table 1

- a. More frequent monitoring may be required per section IV.B and IV.C of this attachment. Notification level monitoring and sucralose monitoring is monthly for the first year (Title 22 of the California Code of Regulations (22 CCR) § 60320.201) then quarterly (22 CCR § 60320.120).
- b. Reduction in frequency is contingent upon approval by DDW, State Water Resources Control Board, Division of Water Quality (DWQ), and Regional Water Board.
- c. Nitrate monitoring is at least quarterly in monitoring wells per 22 CCR § 60320.126 and § 60320.226.

End of Footnotes for Table 1

Table 2. Monitoring Phase Requirements: Subsurface Application

Constituent	Initial Assessment Monitoring Frequency	Baseline Monitoring Frequency	Standard Operation Monitoring Frequency	Monitoring Location	Notes
Health-Based CECs: Refer to Table E-14	Quarterly	Semiannually	Semiannually or Annually	Following treatment prior to subsurface application. (EFF-002)	Notes a, b, and c
Performance Indicator CECs: Refer to Table E-14	Quarterly and Monthly for NDMA	Semiannually and Quarterly for NDMA	Semiannually or Annually, and Quarterly for NDMA	1. Prior to RO treatment (PreRO-001) 2. Following treatment prior to subsurface application. (EFF-002) 3. Following RO/prior to AOP treatment (PreAOP-001)	Notes a, b, d, and e
Surrogates: Refer to Tables E-15a and E-15b.	Continuous for online analyzers and weekly for DOC or TOC	Continuous for online analyzers and based on findings of the initial assessment phase for DOC or TOC	Continuous for online analyzers and based on findings of the baseline monitoring phase for DOC or TOC	1. Prior to RO treatment (PreRO-001) 2. Following treatment prior to subsurface application. (EFF-002) 3. Following RO/prior to AOP treatment (PreAOP-001)	Notes a, b, d, and e
Bioanalytical Screening Tools: Refer to Table E-15c	Quarterly	Quarterly	Semiannually or Annually	Following treatment prior to subsurface application. (EFF-002)	Notes a and b

Footnotes for Table 1

- a. More frequent monitoring may be required per section IV.B and IV.C of this attachment. Notification level monitoring and sucralose monitoring is monthly for the first year (Title 22 of the California Code of Regulations (22 CCR) § 60320.201) then quarterly (22 CCR § 60320.120).
- b. Reduction in frequency is contingent upon approval by DDW, DWQ, and Regional Water Board.
- c. Monthly sampling during the Initial Assessment Monitoring Phase is required for CECs with Notification Levels. All other health-based CECs shall be monitored quarterly.
- d. If the Project Sponsor can demonstrate that the RO unit will not substantially remove a CEC, the Project Sponsor may request to monitor for that CEC prior to the AOP, instead of prior to the RO unit.
- e. Only NDMA and sucralose is required to be monitored at the PreAOP-001 monitoring location unless the Project Sponsors attain approval from the Regional Water Board to monitor additional pollutants at PreAOP-001.

End of Footnotes for Table 1

II. BASELINE MONITORING PHASE

The Project Sponsor shall initiate the baseline monitoring phase upon completion of the initial assessment phase or upon receiving approval from the Regional Water Board to proceed with this phase given the existing data for the Facility meet the intent of the initial assessment phase.

The purpose of the baseline monitoring phase is to: (1) gather occurrence data for health-based CECs; (2) evaluate performance indicator CECs and surrogates and determine treatment effectiveness; (3) gather bioactivity data for ER- α and AhR bioanalytical screening tools and pilot test the framework for response actions; and (4) assess the list of health-based CECs, performance indicator CECs, surrogates, and bioanalytical screening tools and identify an appropriate list of constituents to monitor the removal of CECs and treatment system performance in the standard operation monitoring phase of the Facility.

A. Monitoring for Health-Based CECs, Performance Indicator CECs, and Surrogates

1. The Project Sponsor shall conduct a baseline monitoring phase consistent with Tables 1 and 2 of this attachment for three years for each of the health-based CECs in Tables E-13 and E-14 of the MRP, and performance-based CECs and surrogates identified by the Regional Water Board.
2. Performance indicator CECs and surrogates that exhibited reduction by unit processes and/or provided an indication of operational performance shall be selected for monitoring in the baseline monitoring phase. Surrogates not reduced through a unit process are not good indicators of the unit's intended performance. For example, soil aquifer treatment may not effectively lower electrical conductivity. Therefore, electrical conductivity may not be a good surrogate for soil aquifer treatment.
3. If a performance indicator CEC listed in Tables E-13 and E-14 of the MRP is not a good indicator of CEC removal, the Project Sponsor shall propose an alternative performance indicator CEC to monitor that is representative of the constituent group. This performance indicator CEC shall be subject to approval by the Regional Water Board.
4. The Project Sponsor shall evaluate data from performance indicator CECs and surrogates and prepare an updated Table 3 with the actual removal percentages for the Facility and submit to the Regional Water Board with the baseline monitoring data.
5. Following each sampling event, the Project Sponsor shall evaluate monitoring results for health-based CECs using the direction in section IV.B. of this attachment and implement appropriate response actions.

B. Monitoring for Bioanalytical Screening Tools

1. The Project Sponsor shall conduct a baseline monitoring phase consistent with Tables 1 and 2 of this attachment for one year for each of the bioanalytical screening tools listed in Table E-15c of the MRP.
2. Following each sampling event, the Project Sponsor shall evaluate monitoring results for bioanalytical screening tools using the direction in section IV.C. of this attachment and implement appropriate response actions.

III. STANDARD OPERATION MONITORING PHASE

The Project Sponsor shall initiate the standard operation monitoring phase upon completion of the baseline monitoring phase or upon receiving approval from the Regional Water Board to proceed with this phase given the existing data for the Facility.

The purpose of the standard operation monitoring phase is to monitor CECs under standard operating conditions at the Facility. In this phase, the Regional Water Board in consultation with the State Water Board will identify a list of health-based CECs, performance-based CECs, surrogates, and bioanalytical screening tools to monitor based on the Facility's data from the first two monitoring phases.

A. Monitoring for Health-Based CECs, Performance Indicator CECs, and Surrogates

1. For the standard operation monitoring phase, the Project Sponsor shall conduct the monitoring requirements in Tables 1 and 2 of this attachment while the facility is operating.
2. The Project Sponsor may request removal of a health-based CEC from the required CEC monitoring list if the monitoring results meet the conditions of the minimum threshold level presented in Section IV.B of this attachment and it is not otherwise required to be sampled (e.g., constituents with notification levels, MCLs, or as specified by DDW).
3. Performance indicator CECs and surrogates that exhibited reduction by a unit process and/or provided an indication of operational performance shall be selected for monitoring of standard operations. If a performance indicator CEC is not a good indicator, the Project Sponsor shall propose an alternative performance indicator CEC representative of the constituent group to monitor. This performance indicator CEC shall be subject to approval by the Regional Water Board.
4. With the exception of pollutants with notification levels, monitoring for health-based CECs and performance indicator CECs shall be conducted semi-annually unless the project demonstrates consistency in treatment effectiveness removal of CECs, treatment operational performance, and appropriate recycled water quality. These projects may be monitored for health-based CECs and performance indicator CECs on an annual basis.

5. Following each sampling event, the Project Sponsor shall evaluate monitoring results for health-based CECs using the direction in section IV.B. of this attachment and implement appropriate response actions.
6. If evaluation of monitoring results indicates a concern, such as finding a health-based CEC above the thresholds described in Table 4 of this attachment or a decline in removal of a performance indicator CEC from the performance levels established during the initial and baseline monitoring phases, the Regional Water Board may require more frequent monitoring to further evaluate the effectiveness of the treatment process. Additional actions may also be warranted, which may include, but are not limited to, resampling to confirm a result, additional monitoring, implementation of a source identification program, toxicological studies, engineering removal studies, and/or modification of facility operation.

B. Monitoring for Bioanalytical Screening Tools

1. The Regional Water Board may remove a bioanalytical screening tool from the required monitoring list if monitoring results meet the conditions of the minimum threshold level presented in Table 6 of this attachment.
2. Following each sampling event where bioassay monitoring is required, the Project Sponsor shall evaluate monitoring results for bioanalytical screening tools using the direction in section IV.C. of this attachment and implement appropriate response actions.
3. Semiannual monitoring for bioanalytical screening tools shall be conducted, unless the project demonstrates consistency in treatment effectiveness in removal of CECs, treatment operational performance, and appropriate recycled water quality. These projects may be monitored for CECs and with bioanalytical screening tools on an annual basis. Monitoring frequencies for CECs and surrogates for standard operation monitoring are specified in Tables 1 and 2 of this attachment.

IV. EVALUATION OF CECS, SURROGATES, AND BIOANALYTICAL SCREENING TOOL MONITORING RESULTS

This section describes the approaches for evaluating treatment process performance and health-based CEC and bioanalytical screening tool monitoring results. Monitoring results for performance indicator CECs and surrogates shall be used to evaluate the operational performance of a treatment process and the effectiveness of a treatment process in removing CECs. For evaluation of health-based CEC and bioanalytical screening tool monitoring results, a multi-tiered approach of thresholds and corresponding response actions is specified in sections IV.B. and IV.C. of this attachment, respectively. The evaluation of monitoring results shall be included in monitoring reports submitted to the Regional Water Board.

Evaluation of CECs and surrogates is a separate requirement from compliance with Title 22 requirements for recycled water (1,4-Dioxane, PFOA, PFOS, NDMA) and for monitoring wells (Nitrate). Section I.M. though I.P. of the MRP includes the procedure for determining compliance with Title 22 requirements.

If a pollutant is not detected in a sample, one half the detection limit shall be used to evaluate the CEC results.

A. Evaluation of Performance Indicator CEC and Surrogate Results

1. The effectiveness of a treatment process to remove CECs shall be evaluated by determining the removal percentages for performance indicator CECs and surrogates. The removal percentage is the difference in the concentration of a compound in recycled water prior to (EFF-001) and after a treatment process (e.g., soil aquifer treatment (groundwater wells) or RO followed by AOPs (EFF-002)), divided by the concentration prior to the treatment process and multiplied by 100.

$$\text{Removal Percentage} = ([X_{\text{in}} - X_{\text{out}}]/X_{\text{in}}) (100)$$

X_{in} - Concentration in recycled water prior to a treatment process

X_{out} - Concentration in recycled water after a treatment process

During the initial assessment, the recycled water producer shall monitor performance to determine removal percentages for performance indicator CECs and surrogates. The removal percentages shall be confirmed during the baseline monitoring phase. The established removal percentages for each project shall be used to evaluate treatment effectiveness and operational performance.

2. For groundwater recharge by surface application, the removal percentage shall be determined by comparing the quality of recycled water applied to a surface spreading area (EFF-001) to the quality of groundwater at monitoring wells.
3. For groundwater recharge using subsurface application, the removal percentage shall be determined by comparing the CEC monitoring parameters before treatment by RO/AOP (PreRO-001) and after treatment prior to release into the aquifer (EFF-002).
4. The removal percentages for surrogates shall be determined based on the daily averages for continuously monitored surrogates and weekly values for TOC (Refer to Tables E-15a and E-15b of the MRP).
5. The removal percentages shall also be calculated for sucralose between RO feed and RO permeate, and between RO permeate and AOP effluent for NDMA based on monthly monitoring in the first year and quarterly monitoring subsequently per 22 CCR § 60320.201. These removal percentages are for determining the efficiency of the RO system and are not evaluated using the procedure in section IV.B.

B. Evaluation of Health-based CEC Results

The Project Sponsor shall evaluate the health-based CEC monitoring results. To determine the appropriate response actions, the Project Sponsor shall compare measured environmental concentrations (MECs) to their respective monitoring trigger levels (MTLs) listed in Table 3 of this attachment to determine MEC/MTL ratios. The Project Sponsor shall compare the calculated MEC/MTL ratios to the thresholds specified in Table 4 and implement the response actions corresponding to the threshold.

For surface application, the removal percentage shall be determined by comparing the quality of the recycled water applied to a surface spreading area to the quality of groundwater at monitoring wells. The removal percentage shall be adjusted to account for differences in concentrations due to dilution from potable water applied to the application site, stormwater applied to the application site, tertiary-treated effluent applied to the application site, and native groundwater (maximum background concentrations already present in and around the MFSG). The removal percentage shall also be adjusted to account for CECs in these waters. The Project Sponsor shall include the supporting information in the CEC Phased Monitoring Reports to justify the calculated removal percentage.

For subsurface application, the Project Sponsor shall evaluate the health-based CEC results for the recycled water following treatment prior to release into the aquifer.

Table 3. Monitoring Trigger Levels and Removal Percentages

Constituent/ Parameter	Relevance/ Indicator Type/ Surrogate	Monitoring Trigger Level (µg/L)	Removal Percentages
1,4-dioxane	Health	1	---
NDMA	Health & Performance	0.010	To be determined
N-nitrosomorpholine (NMOR)	Health	0.012	---
PFOS	Health	0.013	---
PFOA	Health	0.014	---
Gemfibrozil	Performance	---	To be determined
Iohexol	Performance	---	To be determined
Sucralose	Performance	---	To be determined
Sulfamethoxazole	Performance	---	To be determined
Ammonia	Surrogate	---	To be determined
Nitrate	Surrogate	---	To be determined
Electrical Conductivity	Surrogate	---	To be determined
DOC or TOC	Surrogate	---	To be determined
Total Fluorescence	Surrogate	---	To be determined
UV Absorbance	Surrogate	---	To be determined

Table 4. MEC/MTL Thresholds and Response Actions for Health-Based CECs

MEC/MTL Threshold	Response Action
If greater than 75 percent of the MEC/MTL ratio results for a CEC are less than or equal to 0.1 during the baseline monitoring phase and/or subsequent monitoring	A) After completion of the baseline monitoring phase, consider requesting removal of the CEC from the monitoring program from the Executive Officer of the Regional Water Board.
If MEC/MTL ratio is greater than 0.1 and less than or equal to 1	B) Continue to monitor.
If MEC/MTL ratio is greater than 1 and less than or equal to 10	C) Check the data. Continue to monitor.
If MEC/MTL ratio is greater than 10 and less than or equal to 100	D) Check the data, resample within 72 hours of notification of the result and analyze to confirm CEC result. Continue to monitor.
If MEC/MTL ratio is greater than 100	E) Check the data, resample within 72 hours of notification of the result and analyze to confirm CEC result. Continue to monitor. Contact the Regional Water Board, DWQ, and DDW to discuss additional actions. (Additional actions may include, but are not limited to, additional monitoring, toxicological studies, engineering removal studies, modification of facility operation, implementation of a source identification program, and monitoring at additional locations.)

C. Evaluation of Bioanalytical Screening Tool Results

The Project Sponsor shall evaluate bioanalytical assay monitoring results. During the baseline monitoring phase and standard operation monitoring phase, the Project Sponsor shall determine the appropriate response actions. The Project Sponsor shall compare bioanalytical equivalent concentrations (BEQs) to their respective MTLs listed in Table 5 of this attachment to determine BEQ/MTL ratios. The Project Sponsor shall compare the calculated BEQ/MTL ratios to the thresholds presented in Table 6 of this attachment and implement the response actions corresponding to the threshold.

For groundwater recharge – surface application, the Project Sponsor shall evaluate the bioanalytical screening results for samples collected from the groundwater monitoring wells.

For groundwater recharge - subsurface application, the Project Sponsor shall evaluate the bioanalytical screening results for the recycled water following treatment prior to release to the aquifer.

Table 5. Required Equivalency Agonists and Monitoring Trigger Levels for Bioanalytical Screening Tools

Constituent/ Parameter	Equivalency Agonist	Monitoring Trigger Level (MTL) (ng/L)
Estrogen Receptor- α	17-beta-estradiol	3.5
Aryl Hydrocarbon receptor (AhR)	2,3,7,8- tetrachlorodibenzo-p- dioxin (TCDD)	0.5

Table 6. BEQ/MTL Thresholds and Response Actions for Bioanalytical Screening Tools

BEQ/MTL Threshold	Response Action
If BEQ/MTL ratio is consistently less than or equal to 0.15 for ER- α or 1.0 for AhR	A) After completion of the baseline monitoring phase, consider decreasing monitoring frequency or requesting removal of the endpoint from the monitoring program.
If BEQ/MTL ratio is greater than 0.15 and less than or equal to 10 for ER- α or greater than 1.0 and less than or equal to 10 for AhR	B) Continue to monitor.
If BEQ/MTL ratio is greater than 10 and less than or equal to 1000	C) Check the data, resample within 72 hours of notification of the result and analyze to confirm bioassay result. Continue to monitor. Contact the Regional Water Board, DWQ, and DDW to discuss additional actions, which may include, but are not limited to, targeted analytical chemistry monitoring, increased frequency of bioassay monitoring, and implementation of a source identification program.
If BEQ/MTL ratio is greater than 1000	D) Check the data, resample within 72 hours of notification of the result and analyze to confirm bioassay result. Continue to monitor. Contact the Regional Water Board, DWQ, and DDW to discuss additional actions, which may

BEQ/MTL Threshold	Response Action
	include, but are not limited to, targeted and/or non-targeted analytical chemistry monitoring, increased frequency of bioassay monitoring, toxicological studies, engineering removal studies, modification of facility operation, implementation of a source identification program, and monitoring at additional locations.