

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM R5-2022-0074
FOR
CITY OF MADERA
MADERA WASTEWATER TREATMENT FACILITY
MADERA COUNTY

This Monitoring and Reporting Program (MRP), which is separately issued pursuant to California Water Code section 13267 subdivision (b)(1), establishes monitoring and reporting requirements related to the waste discharges regulated under Waste Discharge Requirements Order R5-2022-0074 (WDRs Order). Each of the Findings set forth in the WDRs Order, including those pertaining to the need for submission of reports, are hereby incorporated as part of this MRP.

The City of Madera (hereafter City or Discharger) owns and/or operates the Madera Wastewater Treatment Facility (Facility or WWTF) subject to WDRs Order R5-2022-0074. The Discharger shall not implement any changes to this MRP unless and until the Central Valley Regional Water Quality Control Board (Central Valley Water Board) adopts, or the Executive Officer issues, a revised MRP.

A glossary of terms used in this MRP is included on the last page.

This MRP may be separately revised by the Executive Officer, in accordance with their delegated authority under Water Code section 13223.

I. GENERAL MONITORING REQUIREMENTS

A. FLOW MONITORING

Hydraulic flow rates shall be measured at the monitoring points specified in this MRP. All flow monitoring systems shall be appropriate for the conveyance system (i.e., open channel flow or pressure pipeline) and liquid type. The measurements shall be based on flow meter readings. The method of measurement must be specified. Unless otherwise specified, each flow meter shall be equipped with a flow totalizer to allow reporting of cumulative volume as well as instantaneous flow rate. Flow meters shall be calibrated at the frequency recommended by the manufacturer; typically, at least once per year and records of calibration shall be maintained for review upon request.

B. MONITORING AND SAMPLING LOCATIONS

Samples and measurements shall be obtained at the monitoring points specified in this MRP. Central Valley Water Board staff shall approve any proposed changes to sampling locations prior to implementation of the change.

The Discharger shall monitor the following locations to demonstrate compliance with the requirements of this MRP:

Table 1. Monitoring Locations

Monitoring Location	Monitoring Location Description
INF-001	Location where a representative sample of the influent entering the Facility can be collected prior to any additives, treatment processes, or WWTF return flow.
EFF-001	Location where a representative sample of the secondary-treated effluent can be taken prior to application to the evaporation/percolation ponds.
Ponds 1N, 1S, 2N, 2S, 3N, 3S, 4N, 4S, 5N, 5S, 6N, 6S, 7S, 8S, 9S	Evaporation/percolation ponds.
PWS-001	Public water supply for the City of Madera.
MW-01 to MW-09	Existing groundwater monitoring wells and any future monitoring wells added to the WWTF's groundwater monitoring network.
BIO-001	Sludge/Biosolids monitoring

C. SAMPLING AND SAMPLE ANALYSIS

All samples shall be representative of the volume and nature of the discharge or matrix of material sampled. Except as specified otherwise in this MRP, grab samples will be considered representative of water, wastewater, soil, solids/sludges and groundwater. The time, date, and location of each sample shall be recorded on the sample chain of custody form.

Field test instruments (such as those used to measure pH, temperature, electrical conductivity, dissolved oxygen, wind speed, and precipitation) may be used provided that:

1. The operator is trained in proper use and maintenance of the instruments;
2. The instruments are field calibrated at the frequency recommended by the manufacturer;
3. The instruments are serviced and/or calibrated by the manufacturer at the recommended frequency; and
4. Field calibration reports are submitted as described in the "Reporting" section of this MRP.

Laboratory analytical procedures shall comply with the methods and holding times specified in the following (as applicable to the medium to be analyzed):

- *Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater* (EPA);

- *Test Methods for Evaluating Solid Waste* (EPA);
- *Methods for Chemical Analysis of Water and Wastes* (EPA);
- *Methods for Determination of Inorganic Substances in Environmental Samples* (EPA);
- *Standard Methods for the Examination of Water and Wastewater* (APHA/AWWA/WEF); and
- *Soil, Plant and Water Reference Methods for the Western Region* (WREP 125).

Approved editions shall be those that are approved for use by the United States Environmental Protection Agency (EPA) or the State Water Resources Control Board (State Water Board), Division of Drinking Water’s Laboratory Accreditation Program (ELAP). The Discharger may propose alternative methods for approval by the Executive Officer. Where technically feasible, laboratory reporting limits shall be lower than the applicable water quality objectives for the constituents to be analyzed.

II. SPECIFIC MONITORING REQUIREMENTS

A. INFLUENT MONITORING (INF-001)

The Discharger shall monitor the influent to the Facility at Monitoring Location INF-001 as described in Table 1. At a minimum, the influent shall be monitored as specified in Table 2 below:

Table 2. Influent Monitoring (INF-001)

Constituent/Parameter	Units	Sample Type	Frequency
Flow	mgd	Metered	Continuous
pH	pH Units	Grab	1/Week
EC	µmhos/cm	24-hr Composite	1/Week
BOD ₅	mg/L	24-hr Composite	1/Week (see 1 below)
TSS	mg/L	24-hr Composite	1/Week (see 1 below)
Nitrate (as N)	mg/L	24-hr Composite	1/Month
Nitrite (as N)	mg/L	24-hr Composite	1/Month
TKN (as N)	mg/L	24-hr Composite	1/Month
Total Nitrogen	mg/L	Calculation or 24-hr Composite	1/Month

1. Influent and effluent samples to be collected on the same day.

B. EFFLUENT MONITORING (EFF-001)

The Discharger shall monitor the effluent at Monitoring Location EFF-001 as described in Table 1. At a minimum, the effluent shall be monitored as specified in Table 3 below:

Table 3. Effluent Monitoring

Constituent/Parameter	Units	Sample Type	Frequency
pH	s.u.	Grab	1/Week
EC	µmhos/cm	24-Hr Composite	1/Week
BOD ₅	mg/L	24-Hr Composite	1/Week (see 1 below)
TSS	mg/L	24-Hr Composite	1/Week (see 1 below)
TDS	mg/L	24-Hr Composite	2/Month
Nitrate (as N)	mg/L	24-Hr Composite	2/Month
Nitrite (as N)	mg/L	24-Hr Composite	2/Month
TKN (as N)	mg/L	24-Hr Composite	2/Month
Total Nitrogen	mg/L	Calculation or Grab	1/Week
Metals	mg/L	24-Hr Composite	1/Quarter
General Minerals	mg/L	24-Hr Composite	1/Quarter

1. Influent and effluent samples to be collected on the same day.

C. POND MONITORING (POND 1N TO POND 9S)

The Discharger shall monitor the evaporation/percolation ponds (i.e., Pond 1N through Pond 9S) when wastewater is present. Water quality samples (e.g., DO, pH, and EC) shall be collected opposite the pond inlet at a depth of one foot and freeboard shall be measured to the nearest 0.1 foot vertically from the surface of the water to the lowest elevation of the berm. At a minimum, the ponds shall be monitored as specified in Table 4 below:

Table 4. Pond Monitoring (Ponds 1N to 9S)

Constituent/Parameter	Units	Sample Type	Frequency
DO	mg/L	Grab	1/Week (see 1 and 2 below)
pH	std. units	Grab	1/Week (see 1 and 2 below)
EC	µmhos/cm	Grab	1/Week
Freeboard	Nearest 0.10 Feet	Grab	1/Week
Odors	---	Observation	1/Week
Solids Depth	Feet	Grab	Once every 3 years (see 3 below)

1. Samples for DO and pH shall be collected between 8:00 am and 10:00 a.m. when there is more than one foot of water in the pond. If there is insufficient water in the pond

no sample shall be collected, and the Discharger shall report that in the appropriate monitoring report.

2. If offensive odors are detected by or brought to the attention of the Discharger, the Discharger shall monitor the potential source pond(s) at least daily for DO and pH until the odor issue has been resolved and the DO in the pond is greater than 1.0 mg/L.
3. Thickness of settled solids accumulated at the bottom of the ponds shall be monitored at a minimum at least once every three years.

In addition, the Discharger shall inspect the condition of the ponds on a weekly basis and record their observations in a bound logbook. Notations shall include condition of the berms, color of the water in the pond (e.g., dark green, brown, gray, etc.) presence of odors or nuisance conditions, whether grease, dead algae, scum, or debris are accumulating in the pond, and presence of burrowing animals. A summary of these entries shall be included in the subsequent monitoring report.

D. PUBLIC WATER SUPPLY MONITORING (PWS-001)

The Discharger shall monitor the public water supply for the City at PWS-001. If the supply is from more than one source the sample shall be a flow weighted average of all sources. At a minimum, the public water supply shall be monitored as specified in **Table 5** below. In addition, the Discharger shall submit a copy of the City’s most recent Consumer Confidence Report for each 4th quarter monitoring report.

Table 5. Source Water Monitoring

Parameter	Units	Sample Type	Frequency
EC	µmhos/cm	Grab	1/Quarter

E. GROUNDWATER MONITORING (MW-01 TO MW-09 AND ANY FUTURE WELLS ADDED)

After measuring water levels and prior to collecting samples, each monitoring well shall be adequately purged to remove water that has been standing within the well screen and casing that may not be chemically representative of formation water. Purging shall continue until pH, EC, and turbidity have stabilized. Depending on the hydraulic conductivity of the geologic setting, the volume removed during purging is typically from 3 to 5 casing volumes.

The Discharger shall monitor the current wells in its monitoring well network (MW-01 through MW-09) and any subsequent additional wells as follows:

Table 6. Groundwater Monitoring

Constituent/Parameter	Units	Sample Type	Frequency
Depth to Groundwater	0.01 Feet	Measurement	1/Quarter
Groundwater Elevation (see 1 below)	Feet	Calculation	1/Quarter
Groundwater Gradient	Feet/Foot	Calculation	1/Quarter
pH	pH Units	Grab	1/Quarter
EC	µmhos/cm	Grab	1/Quarter
TDS	mg/L	Grab	1/Quarter
Nitrate (as N)	mg/L	Grab	1/Quarter
Arsenic	mg/L	Grab	1/Quarter
Total Coliform Organisms	MPN/100 mL	Grab	1/Quarter
Total Organic Carbon	mg/L	Grab	1/Quarter
General Minerals (see 2 below)	mg/L	Grab	2/Year

1. Groundwater elevation shall be calculated based on depth-to-water measurements from a surveyed measuring point.
2. For constituents with Secondary MCLs listed in Title 22 Table 64449-A (e.g., aluminum, copper, iron, manganese, silver, zinc, color and turbidity), samples shall be filtered with a 1.5-micron filter prior to preservation, digestion, and analysis. For all other constituents, samples shall be filtered with a 0.45-micron filter prior to preservation, digestion, and analysis

In addition, the Discharger shall maintain its groundwater monitoring well network. If a monitoring well(s) is dry for more than four consecutive sampling events or is damaged, the Discharger shall submit a workplan and proposed time schedule to replace the monitoring well(s). The monitoring wells(s) shall be replaced following Executive Officer approval of the workplan. Once installed, all new monitoring wells shall be added to the existing groundwater monitoring well network.

F. SLUDGE/BIOSOLIDS MONITORING (BIO-001)

A composite sample of dewatered sludge/biosolids shall be collected at Monitoring Location BIO-001 in accordance with US EPA's *POTW Sludge Sampling and Analysis Guidance Document* (August 1989) and tested for the metals listed in Title 22 whenever sludge/biosolids is removed from the WWTF for disposal. Sampling records shall be retained for a minimum of five years. A log shall be kept of sludge qualities generated and handling, application, and disposal activities. The frequency of entries is discretionary; however, the log should be complete enough to serve as a basis for part of the Fourth Quarter Annual Monitoring Report.

III. REPORTING REQUIREMENTS

All monitoring reports should be converted to a searchable Portable Document Format (PDF) and submitted electronically. Documents that are less than 50MB should be emailed to: centralvalleyfresno@waterboards.ca.gov. Documents that are 50 MB or larger should be transferred to a CD, DVD, or flash drive and mailed to the following address:

Central Valley Regional Water Quality Control Board
Region 5 – Fresno Office
1685 “E” St.
Fresno, California 93706

To ensure that your submittal is routed to the appropriate staff person, the following information should be included in the body of the email or transmittal sheet:

Program: Non-15,
Facility: Madera Wastewater Treatment Facility
Order: MRP R5-2022-0074
County: Madera
Place ID: 273123

A transmittal letter shall accompany each monitoring report. The letter shall include a discussion of all violations of this MRP during the reporting period and actions taken or planned for correcting each violation. If the Discharger has previously submitted a report describing corrective actions taken and/or a time schedule for implementing the corrective actions, reference to the previous correspondence will be satisfactory. The transmittal letter shall contain a statement by the Discharger or the Discharger’s authorized agent certifying under penalty of perjury that the report is true, accurate and complete to the best of the signer’s knowledge. The transmittal letter shall contain the following penalty of perjury statement and shall be signed by the Discharger or the Discharger’s authorized agent:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

In reporting monitoring data, the Discharger shall arrange the data in tabular form so that the date, sample type (e.g., effluent, groundwater, etc.), and reported analytical result for each sample are readily discernible. The data shall be summarized in such a manner to clearly illustrate compliance with waste discharge requirements and spatial or temporal trends, as applicable. The results of any monitoring done more frequently than required at the locations specified in the Monitoring and Reporting Program shall be reported in the next scheduled monitoring report.

Laboratory analysis reports shall be included in the monitoring reports. In addition, all laboratory reports must be retained for a minimum of three years in accordance with Standard Provision C.3. of the SPRRs. For a Discharger conducting any of its own analyses, reports must also be signed and certified by the chief of the laboratory.

In addition to the requirements of Standard Provision C.3, monitoring information shall include the method detection limit (MDL) and the reporting limit (RL) or practical quantitation limit (PQL). If the regulatory limit for a given constituent is less than the RL (or PQL), then any analytical results for that constituent that are below the RL (or PQL) but above the MDL shall be reported and flagged as estimated.

All monitoring reports that involve planning, investigation, evaluation or design, or other work requiring interpretation and proper application of engineering or geologic sciences, shall be prepared by or under the direction of persons registered to practice in California pursuant to California Business and Professions Code sections 6735, 7835, and 7835.1.

A. QUARTERLY MONITORING REPORTS

Quarterly Monitoring Reports shall be prepared and submitted to the Central Valley Water Board by the **1st day of the second month after the quarter** (i.e., the 1st Quarter (January – March) quarterly report is due 1st May). Each Quarterly Monitoring Report shall include the following:

1. Results of **Influent Monitoring** as specified in Section II.A, including:
 - a. Calculation of the maximum daily and monthly average flow for each month of the quarter.
 - b. Calculation of the monthly average EC value for each month of the quarter.
 - c. Calculation of the monthly average BOD and TSS concentrations for each month of the quarter
2. Results of **Effluent Monitoring** as specified in Section II.B.
 - a. Calculation of the monthly average EC, TDS, and total nitrogen value of the effluent for each month of the quarter.
 - i. The quarterly report shall include the calculation of the 12-month rolling average TDS and total nitrogen of the discharge for each month of the quarter using the TDS/total nitrogen value for that month averaged with the TDS/total nitrogen values for the previous 11 months (results must include supporting calculations).
 - b. Calculation of the monthly average effluent BOD and TSS concentrations for each month of the quarter, and calculation of the percent removal of the BOD and TSS compared to the influent or each month of the quarter.

3. Results of **Pond Monitoring** as specified in Section II.C.
4. Results of the **Public Water Supply Monitoring** as specified in Section II.D. If multiple sources are used, the Discharger shall calculate the flow-weighted average of each constituent monitored. Results must include supporting calculations.
5. Results of **Groundwater Monitoring** specified in Section II.E.
 - a. A narrative description of all preparatory, monitoring, sampling, and sample handling for groundwater monitoring.
 - b. A field log for each well documenting depth to groundwater; sample preparation (e.g., filtering); and sample preservation. For each sampling event, the Discharger may provide a table summarizing this information for all groundwater monitoring wells sampled in lieu of providing a field log for each well. The field logs should be made available on request of the Central Valley Water Board.
 - c. Calculation of groundwater elevation at each monitoring well, and determination of groundwater flow direction and gradient on the date of the measurement.
 - d. For each monitoring well, a table showing groundwater depth, elevation, and constituent concentrations for at least the five previous years, up through the current quarter.
 - e. Summary data tables of analytical results collected during the quarter and the current water table elevations.
 - f. A scaled map showing relevant structures and features of the Facility, the locations of monitoring wells, surface waters, and groundwater elevation contours referenced to an appropriate datum (e.g., National Geodetic Vertical Datum).
6. A comparison of monitoring data with the Flow Limitation and Effluent Limitations and Discharge Specifications specified in the WDRs Order. Include an explanation for any violations.
7. Copies of all laboratory analytical reports.
8. A copy of calibration log page(s) verifying calibration of all hand-held monitoring instruments used during the quarter.

B. FOURTH QUARTER MONITORING REPORT

In addition to the above information, the fourth quarter monitoring report, due **1st February of each year** shall include the following:

1. Names, title, and contact information for persons to contact regarding the Facility for emergency and routine situations.

2. The names, certificate grades, and general responsibilities of all persons in charge of wastewater treatment and disposal.
3. An evaluation of the Facility's annual average effluent TDS (monitored at EFF-001) to the Salinity Action Level of 500 mg/L. If the facility's discharge exceeds the Salinity Action Level, the Discharger shall submit a Salinity Action Level Report by 1 March of the year following the exceedance of the Salinity Action Level as described in the WDRs Order.
4. An evaluation of the Facility's compliance with the annual total nitrogen effluent limitation (monitored at EFF-001).
5. Statement certifying when the flow meter and other monitoring instruments and devices were last calibrated, include identification of who performed the calibrations (SPRRs C.4).
6. The results of an annual evaluation conducted pursuant to Standard Provisions E.4 and a figure depicting monthly average discharge flow for the previous five calendar years.
7. A summary and discussion of the compliance record for the reporting period. If violations have occurred, the report shall also discuss the corrective actions taken and planned to bring the discharge into full compliance with this Order.
8. Copy of the Public Water System's most recent Consumer Confidence Report.
9. Tabulated summary of all monitoring data collected over the year.
10. An evaluation of the City's major industrial dischargers, including permitted flows and loading limits as well as any water quality monitoring data collected.
11. A statement whether the current operation and maintenance manual, sampling plan, and contingency plan, reflect the WWTF as currently constructed and operated, and the dates when these documents were last reviewed for adequacy.
12. A discussion of compliance with the WDRs Order and corrective actions taken, as well as any planned or proposed actions needed to bring the discharge into compliance with the WDRs.
13. An evaluation of the Facility's performance, including discussion of capacity issues, infiltration and inflow rates, nuisance conditions, and forecast of flows anticipated in the following year (SPRRs E.4).
14. Annual production of total sludge/biosolids in dry tons or cubic yards (if applicable).
15. A description of the sludge/biosolids disposal methods, including the following information related to the disposal methods used. If more than one method is used, including the percentage disposed of by each method.

- a) For landfill disposal, include: the name and location of the landfill, and the Order number of WDRs that regulate it.
- b) For land application, include: the location of the site, and the Order number of any WDRs that regulate it.
- c) For incineration, include: the name and locations of the site where incineration occurs, the Order number of WDRs that regulate the site, the disposal method of ash, and the name and location of the facility receiving as (if applicable).
- d) For composting, include: the location of the site, and the Order number of any WDRs that regulate it.

C. PRETREATMENT REPORTING

The Discharger shall submit quarterly, and annual pretreatment reports as required by Standard Provision E.7 of the SPRRs.

D. VOLUMETRIC REPORTING

Per [State Water Resources Control Board's Water Quality Control Policy](https://www.waterboards.ca.gov/water_issues/programs/recycled_water/) (https://www.waterboards.ca.gov/water_issues/programs/recycled_water/) amended in December 2018, dischargers of treated wastewater and recycled water are required to report annually monthly volumes of influent, wastewater produced, and effluent, including treatment level and discharge type. The Discharger shall submit an annual report to the State Water Board by April 30 of each calendar year furnished with the information detailed below. The Discharger must submit this annual report containing monthly data in electronic format via the State Water Board's Internet [Geotracker system](https://geotracker.waterboards.ca.gov/) (<https://geotracker.waterboards.ca.gov/>). Required data shall be submitted to the Geotracker database under a site-specific global identification number. Any data will be made publicly accessible as machine readable datasets. The Discharger must report all applicable items listed below:

1. **Influent.** Monthly volume of influent wastewater collected and treated by the wastewater treatment facility.
2. **Production.** Monthly volume of wastewater treated, specifying level of treatment.
3. **Discharge.** Monthly volume of treated wastewater discharged to one of the following, specifying level of treatment:
 - i. Inland surface waters, specifying volume required to maintain minimum instream flow.
 - ii. Enclosed bays, estuaries and coastal lagoons, and ocean waters.

- iii. Natural systems, such as wetlands, wildlife habitats, and duck clubs, where augmentation or restoration has occurred, and that are not part of a wastewater treatment plant or water recycling treatment plant.
- iv. Underground injection wells, such as those classified by U.S. EPA's Underground Injection Control Program, excluding groundwater recharge via subsurface application intended to reduce seawater intrusion into a coastal aquifer with a seawater interface.
- v. Land, where beneficial uses is not taking place, including evaporation or percolation ponds, overland flow, or spray irrigation disposal, excluding pasture or fields with harvested crops.

If, in the opinion of the Executive Officer, the Discharger fails to comply with the provisions of this Order, the Executive Officer may refer this matter to the Attorney General for judicial enforcement, may issue a complaint for administrative civil liability, or may take other enforcement actions. Failure to comply with this Order may result in the assessment of Administrative Civil Liability of up to \$10,000 per violation, per day, depending on the violation, pursuant to the Water Code, including sections 13268, 13350 and 13385. The Central Valley Water Board reserves its right to take any enforcement actions authorized by law.

Any person aggrieved by this action of the Central Valley Water Board may petition the State Water Resources Control Board to review the action in accordance with California Water Code section 13320 and California Code of Regulations, title 23, sections 2050 and following. The State Water Resources Control Board must receive the petition by 5:00 p.m., 30 days after the date of this MRP, except that if the thirtieth day following the date of this Order falls on a Saturday, Sunday, or state holiday, the petition must be received by the State Water Resources Control Board by 5:00 p.m. on the next business day. [Copies of the law and regulations applicable to filing petitions](#) may be found on the internet (http://www.waterboards.ca.gov/public_notices/petitions/water_quality) or will be provided on request.

The Discharger shall implement the above monitoring program **starting 1 January 2023**.

I, PATRICK PULUPA, Executive Officer, do hereby certify the forgoing is a full, true and correct copy of the Monitoring and Reporting Program issued by the California Regional Water Quality Control Board, Central Valley Region, on 9 December 2022.

PATRICK PULUPA, Executive Office

IV. GLOSSARY

amsl	Above mean sea level
BOD ₅	Five-day biochemical oxygen demand
CaCO ₃	Calcium carbonate
DO	Dissolved oxygen
EC	Electrical conductivity at 25° C
FDS	Fixed dissolved solids
TDS	Total dissolved solids
TKN	Total Kjeldahl nitrogen
TSS	Total suspended solids
Continuous	The specified parameter shall be measured by a meter continuously.
24-hr Composite	Influent samples shall be a flow-proportioned composite consisting of at least eight aliquots over a 24-hour period. Effluent samples shall be a time-proportioned composite consisting of at least eight aliquots over a 24-hour period.
Daily	Once per day.
1/Week	Once per week.
2/Week	Twice per week on non-consecutive days.
1/Month	Once per month.
2/Month	Twice per month in non-consecutive weeks.
1/Quarter	Once per quarter.
2/Year	Once every six calendar months (i.e., two times per year) in non-consecutive quarters unless otherwise specified.
1/Year	Once per year.
mg/L	Milligrams per liter
mg/kg	Milligrams per kilogram
mL/L	Milliliters [of solids] per liter
µg/L	Micrograms per liter
µmhos/cm	Micromhos per centimeter
gpd	Gallons per day
Metals	Metals analysis shall include, at a minimum: aluminum, arsenic, barium, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, silver, and zinc.
mgd	Million gallons per day
MPN/100 mL	Most probable number [of organisms] per 100 milliliters
General Minerals	Analysis shall include: alkalinity (as CaCO ₃), bicarbonate (as CaCO ₃), boron, calcium, carbonate (as CaCO ₃), chloride, iron, magnesium,

manganese, nitrate as N, phosphate, potassium, sodium, sulfate, total dissolved solids, and verification that the analysis is complete (i.e., cation/anion balance).