CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM R5-2025-0806
FOR
OPA PISTACHIOS, LLC
OPA PISTACHIO PROCESSING FACILITY
FRESNO COUNTY

This Monitoring and Reporting Program (MRP) is issued pursuant to California Water Code section 13267 subdivision (b)(1). On 3 May 2024, OPA Pistachios, LLC (hereafter Discharger) submitted a Report of Waste Discharge (RWD) to discharge up to 311.4 million gallons of pistachio hulling wastewater annually for irrigation of crops on approximately 3,700 acres of farmland owned by the Discharger. The discharge will be from a new pistachio processing facility (Facility) at 40004 W. Panoche Road near Mendota in Fresno County. This MRP is being issued in anticipation of preparing waste discharge requirements for the Facility. The Discharger shall not implement any changes to this MRP unless or until the Central Valley Regional Water Quality Control Board (Central Valley Water Board) adopts, or the Executive Officer issues a revised MRP.

Section 13267, subsection (b)(1) of the California Water Code states:

> *"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 report 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."*

Section 13268 of the California Water Code states, in part:

> *"(a)(1) Any person failing or refusing to furnish technical or monitoring program reports as required by subdivision (b) of Section 13267, or failing or refusing to furnish a statement of compliance as required by subdivision (b) of Section 13399.2, or falsifying and information provided therein, is guilty of a misdemeanor and may be liable civilly in accordance with subdivision (b).*
>
> *(b)(1) Civil liability may be administratively imposed by a regional board in accordance with Article 2.5 (commencing with section 13323) of Chapter 5 for a violation of subdivision (a) in an amount which shall not exceed one thousand dollars ($1,000) for each day in which the violation occurs."*

Pursuant to Water Code Section 13267, the Discharger shall implement this MRP and shall submit the monitoring reports described herein.

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

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 may be based on flow meter readings or pump run time estimate. 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 waste stream can be obtained prior to discharge to the lined settling ponds.
EFF-001	Location where a representative sample of the effluent can be obtained prior to being applied to the land application areas but after leaving the lined settling ponds and blending with supplemental irrigation water.
PND-001 and PND-002	Lined settling pond monitoring
SW-001	Source water monitoring
IRG	Irrigation system monitoring
LAA	Land application area (LAA) monitoring
Solids	Solids 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 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 currently 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.

If monitoring consistently shows no significant variation in a constituent concentration or parameter after at least 12 months of monitoring, the Discharger may request this MRP be revised to reduce monitoring frequency. The proposal must include adequate technical justification for reduction in monitoring frequency. This monitoring program shall remain in effect unless and until a revised MRP is issued.

II. SPECIFIC MONITORING REQUIREMENTS

A. INFLUENT MONITORING (INF-001)

During the pistachio processing season, samples of the wastewater discharged to the lined settling ponds shall be collected immediately after screening but before it enters the ponds. Samples shall be representative of the volume and nature of the discharge. Time of collection of a grab sample shall be recorded. At a minimum, influent monitoring shall include the following:

Table 2. Influent Monitoring (INF-001)

Constituent/Parameter	Units	Sample Type	Frequency
Flow	mgd	Meter (see 1 below)	Continuous
pH	pH Units	Grab	1/Week
EC	µmhos/cm	Grab	1/Week
BOD_5	mg/L	24-hr Composite	2/Year (see 2 below)
TDS	mg/L	24-hr Composite	2/Year (see 2 below)
FDS	mg/L	24-hr Composite	2/Year (see 2 below)

1. Flow measurements may be metered or estimated based on potable water supply meter reading or other approved method. The method of measurement including data used in calculations shall be specified.
2. Samples shall be collected twice per year during the processing season. Once following startup of hulling operations and once during the peak of the processing season.

B. EFFLUENT MONITORING (EFF-001)

Effluent samples of the blended wastewater and supplemental irrigation water shall be collected prior to being applied to the land application areas (LAAs). Effluent samples shall be collected during the processing season and at any time wastewater is discharged from the lined settling ponds. At a minimum, effluent monitoring shall include the following:

Table 3. Effluent Monitoring (EFF-001)

Constituent/Parameter	Units	Sample Type	Frequency
Flow	mgd	Meter (see 1 below)	Continuous
pH	pH Units	Grab	1/Week
EC	µmhos/cm	Grab	1/Week
BOD_5	mg/L	Grab	1/Week

Constituent/Parameter	Units	Sample Type	Frequency
FDS	mg/L	Grab	1/Week
Potassium	mg/L	Grab	1/Week
Nitrate as N	mg/L	Grab	1/Week
Nitrite as N	mg/L	Grab	1/Week
TKN	mg/L	Grab	1/Week
Total Nitrogen	mg/L	Grab	1/Week
General Minerals (see 2 below)	mg/L	Grab	2/Year (see 3 below)

1. Flow measurements shall be of the blended wastewater and supplemental irrigation water sent to the LAA. Flow measurements may be metered or estimated based on potable water supply meter readings or other approved method. The method of measurement including data used in calculations shall be specified.
2. General minerals analysis, at a minimum, shall include: alkalinity (as $CaCO_3$), bicarbonate (as $CaCO_3$), boron, calcium, carbonate (as $CaCO_3$), chloride, iron, magnesium, manganese, nitrate (as N), potassium, sodium, sulfate, and total dissolved solids.
3. Samples shall be collected twice per year during the processing season, once following startup of hulling operations and once during the peak of the processing season.

C. POND MONITORING (PND-001 AND PND-002)

The Discharger shall monitor the two lined settling ponds (PND-001 and PND-002) when wastewater is present. Freeboard shall be measured to the nearest 0.5 foot vertically from the surface of the water to the lowest elevation of the berm. Samples for dissolved oxygen and pH shall be collected at a depth of one foot below the surface of the water opposite the inlet. At a minimum, the ponds shall be monitored as specified in Table 4 below:

Table 4. Pond Monitoring (PND-001 and PND-002)

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)
Freeboard	Nearest 0.5 Foot	Observation	1/Week
Odors	--	Observation	1/Week
Liner Condition	--	Observation	2/Year (see 3 and 4 below)
Solids Depth	inches	Grab	1/Year (see 5 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 at least daily (excluding weekends and holidays) for DO and pH until the odor issue has been resolved.
3. Prior to the start of the processing season before wastewater is discharged to the ponds, and immediately following the processing season after all wastewater has been removed.
4. The Discharger shall conduct a liner integrity analysis at least once every five years or following any major liner repairs. The integrity analysis shall include an electrical leak location survey or similar assessment (i.e., water balance, etc.) on each pond to ensure the integrity of the pond liners. The initial integrity analysis shall be performed prior to the 2025 processing season and every five years thereafter.
5. Measurement of accumulated solids left in the bottom of the pond after the processing season. If all solids are removed the report shall so state.

D. SOURCE WATER MONITORING (SW-001)

The source water for Facility operations shall be monitored. Samples shall be representative of the source water supplied to the Facility after any treatment (i.e., filter, water softener, disinfection, etc.). If the source water is from more than one source, the results shall be presented as a flow-weighted average of all sources. At a minimum, source water monitoring shall include the following:

Table 5. Source Water Monitoring (SW-001)

Constituent/Parameter	Units	Sample Type	Frequency
EC	µmhos/cm	Grab	1/Year (see 1 below)
FDS	mg/L	Grab	1/Year (see 1 below)
General Minerals (see 2 below)	mg/L	Grab	1/Year (see 1 below)

1. Samples shall be collected once per year in September during the processing season.
2. General Minerals analysis, at a minimum, shall include: alkalinity (as $CaCO_3$), bicarbonate (as $CaCO_3$), boron, calcium, carbonate (as $CaCO_3$), chloride, iron, magnesium, manganese, nitrate (as N), potassium, sodium, sulfate, total dissolved solids and a cation/anion balance.

E. IRRIGATION SYSTEM MONITORING (IRG)

The Discharger shall monitor the irrigation water at the Facility. Samples of the irrigation water shall be representative of the supplemental irrigation water blended with the wastewater prior to land application. If the supplemental irrigation water is from more than one source, samples from all sources will be provided. Irrigation system monitoring shall include at least the following:

Table 6. Irrigation System Monitoring (IRG)

Constituent/Parameter	Units	Sample Type	Frequency
EC	µmhos/cm	Grab	1/Year (see 1 below)
FDS	mg/L	Grab	1/Year (see 1 below)
Nitrate (as N)	mg/L	Grab	1/Year (see 1 below)

1. Samples shall be collected once per year in September during the processing season. Note, if the irrigation water is the same as the source water for the Facility operations (i.e., SW-001) only one sample is required.

In addition, prior to the start of the pistachio processing season, the Discharger shall conduct an annual inspection of its irrigation system. The inspection shall note all irrigation lines and connections to fields that will be used for application of wastewater. In addition, the Discharger shall note any locations where the irrigation system will cross or connect to other irrigation lines, open irrigation canals and/or ditches and check that there are no open connections between any conveyance used to carry wastewater and any surface waters (i.e., canals, ditches, etc.) or irrigation lines used to carry irrigation water to fields not part of the LAA. The results of the inspection as well as a map documenting the various irrigation lines and fields used for transportation or storage of wastewater shall be included in the Annual Report.

F. LAND APPLICATION AREA MONITORING (LAA)

The Discharger shall inspect the LAA at least once daily prior to and during wastewater irrigation events. Evidence of erosion, field saturation, runoff, or the presence of nuisance conditions (i.e., flies, ponding, etc.) shall be noted in the Facility's logbook and included as part of the annual monitoring report. In addition, the Discharger shall perform the following routine monitoring and loading calculations for each discrete irrigation area within the LAA each day when wastewater is applied. The data shall be collected and presented in graphical (map) and/or tabular format and shall include the following:

Table 5. Land Application Area Monitoring

Constituent/Parameter	Units	Sample Type	Frequency
Fields Irrigated	acres	n/a	Daily
Wastewater flow (see 1 below)	mgd	Metered	Daily
Supplemental irrigation (see 1 below)	mgd	Metered	Daily
Precipitation	inches	Rain gage (see 2 below)	Daily
Total Hydraulic Loading (see 3 below)	inches/ac/month	Calculated	1/Month
BOD Loading			
Instantaneous	lbs/acre-day	Calculated	Daily
Cycle average (see 4 below)	lbs/acre-day	Calculated	1/Cycle
Nitrogen Loading (see 5 below)			
From wastewater	lbs/acre	Calculated	1/Year
From fertilizer	lbs/acre	Calculated	1/Year
Salt and Potassium Loading (see 5 below)			
From wastewater	lbs/acre	Calculated	1/Year
From fertilizer	lbs/acre	Calculated	1/Year

1. Flow measurements may be metered or estimated based on potable water supply meter readings or other approved method. The method of measurement including data used in calculations shall be specified.
2. National Weather Service or CIMIS data from the nearest weather station is acceptable.
3. Total Hydraulic loading shall include wastewater, precipitation, and supplemental irrigation water applied to each discreet LAA during the processing season or at any time wastewater is added to the irrigation system.
4. A cycle average is calculated by taking the pounds of BOD added to the LAA in a given irrigation period divided by the sum of the total days between the start of an irrigation cycle and the start of the next irrigation cycle after the rest period (i.e., next time wastewater and/or irrigation water is applied), see section III of the MRP for the calculation.
5. Nitrogen, salt (as FDS), and potassium loading shall be calculated as specified in section III of this MRP. Loading shall be calculated using the average constituent concentrations of the blended wastewater and supplemental irrigation water collected at EFF-001.

G. SOLIDS MONITORING (SOLIDS)

The Discharger shall maintain detailed records for disposal and/or recycling of residual solids removed during the hulling operations. The record should include information on quantity, storage, method of disposal (i.e., livestock feed, soil amendment, composting, etc.) and receipts (if applicable). For solids applied to the land application areas, a map shall be provided identifying specific locations as well as any sample results used to calculate agronomic loading rates. A summary of the information shall be included in the Annual 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:	OPA Pistachio Processing Facility
Order:	MRP R5-2025-0806
County:	Fresno
Place ID:	894769

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.

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. All laboratory reports must also be retained for a minimum of three years. For a discharger conducting any of its own analyses, reports must also be signed and certified by the chief of the laboratory.

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. ANNUAL MONITORING REPORTS

Annual Monitoring Reports shall be prepared and submitted to the Central Valley Water Board by **1st February each year**. The Annual Monitoring Report shall include the following:

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

2. Calibration records for all flow meters used to demonstrate compliance with the flow limits proposed in the RWD.

3. Results of **Influent Monitoring** as specified in Section II.A, including:

    a. Calculation of the maximum daily flow, average daily flow, and cumulative annual flow for the processing season.

4. Results of **Effluent Monitoring** as specified in Section II.B, including:

    a. Calculation of the maximum daily flow, average daily flow, and cumulative annual flow for the discharge of process wastewater from the lined settling ponds.

    b. Seasonal average FDS of the discharge of blended wastewater and irrigation water from samples collected at EFF-001.

5. Results of **Pond Monitoring** as specified in Section II.C.

6. Results of **Source Water Monitoring** as specified in Section II.D. If the source water supply is from more than one source, the Discharger shall calculate the flow-weighted average concentration for each constituent monitored (include supporting calculations).

7. Results of **Irrigation System Monitoring** as specified in Section II.E. If the irrigation supply is from more than one source. The Discharger shall calculate the flow-weighted average concentration for each constituent monitored (include supporting calculations). In addition, the Irrigation System Monitoring shall include:

   a. Summary of the annual inspection conducted prior to the processing season, and

   b. A map showing the location and identification of the various LAA (i.e., fields) as well as the irrigation lines used to carry and transport wastewater to the various irrigation areas.

8. Results of **Land Application Area Monitoring** for the processing season as specified in Section II.F., including:

   a. Summary of the inspection activities conducted by the Discharger.

   b. Calculate the cycle average BOD loading rate for the LAA.

      The mass of BOD_5 applied to each discrete irrigation area within the LAA on a cycle average basis shall be calculated using the following formula:

$$M = \frac{8.345(CV)}{AT}$$

Where:
- M = Mass of BOD_5 applied to an LAA in lbs/ac/day
- C = Concentration of BOD_5 in mg/L based on the average effluent concentration for the week monitored at EFF-001.
- V = Total volume of wastewater and supplemental irrigation water applied to discrete LAA fields during the irrigation cycle, in millions of gallons.
- A = Area of the LAA irrigated in acres.
- T = Irrigation cycle length in days (from the first day wastewater is applied to the start of the next irrigation cycle [prior to subsequent application of wastewater and/or supplemental irrigation water])
- 8.345 = Unit conversion factor.

c. Calculate the total mass loading for total nitrogen, salts (FDS), and potassium for each field within the LAA.

   The mass of total nitrogen, FDS, and potassium applied to each LAA field for the year shall be calculated using the following formula and compared to published crop demand for the crops actually grown:

$$M = \sum_{i=1}^{12} \frac{(8.345(C_i V_i) + M_x)}{A}$$

Where:
- M = Mass of total nitrogen, FDS, or potassium applied to the LAA in lbs/ac/yr
- C_i = Flow-weighted average concentration of total nitrogen, FDS, and potassium for the month *i* in mg/L of wastewater and irrigation water applied to each discreet irrigation area.
- V_i = Volume of wastewater and irrigation water applied to each discreet LAA during the calendar month *i* in million gallons
- A = Area of the LAA (i.e., field) irrigated in acres
- i = Number of the month (e.g., January = 1, February = 2, etc.)
- M_x = Nitrogen, FDS, and potassium mass from other sources (e.g., fertilizer and compost) in pounds
- 8.345 = Unit conversion factor

9. Copies of all laboratory analytical reports.

10. A discussion of annual chemical usage at the Facility (e.g., chemical name, purpose, and quantity used).

11. A summary of the handling and disposal of solids removed during the hulling operations within the calendar year as specified in Section II.G.

12. A summary of any changes in processing that might affect waste characterization and/or discharge flow rates.

A letter transmitting the monitoring reports shall accompany each report. The letter shall report violations found during the reporting period, and actions taken or planned to correct the violations and prevent future violations. 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."*

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 $1,000 per violation, per day, depending on the violation, pursuant to the Water Code sections 13268. 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 begin implementation of the above monitoring program starting as of the date of this MRP.

Ordered by: *Original signed by Alex S. Mushegan*
For PATRICK PULUPA, Executive Officer

4/4/2025
(Date)

GLOSSARY

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
Continuous	The specified parameter shall be measured by a meter continuously.
24-hr Composite	Samples shall be flow- or time-proportioned composite consisting of at least eight aliquots over a 24-hour period.
1/Day	Once per day.
1/Week	Once per week.
1/Month	Once per month.
1/Quarter	Once per quarter (Jan.-Mar.; Apr.-Jun.; Jul.-Sep.; and Oct.-Dec.).
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
µg/L	Micrograms per liter
µmhos/cm	Micromhos per centimeter
gpd	Gallons per day
mgd	Million gallons per day
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), potassium, sodium, sulfate, total dissolved solids, and verification that the analysis is complete (i.e., cation/anion balance).