

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

REVISED MONITORING AND REPORTING PROGRAM R5-2015-0136
FOR
UNIVAR USA INC.
IN-SITU CHEMICAL OXIDATION GROUNDWATER REMEDIATION PROJECT
1152 G STREET, FRESNO
FRESNO COUNTY

This Monitoring and Reporting Program (MRP) describes requirements for monitoring an in-situ groundwater treatment system. This MRP is issued pursuant to Water Code section 13267. The Discharger shall not implement any changes to this MRP unless and until a revised MRP is issued by the Executive Officer. As appropriate, Central Valley Water Board staff shall approve specific sample station locations prior to implementation of sampling activities.

All samples should be representative of the volume and nature of the discharge or matrix of material sampled. The time, date, and location of each grab sample shall be recorded on the sample's chain of custody form.

GROUNDWATER MONITORING

Existing and proposed wells for the site are shown on Attachment A. The groundwater monitoring program for these wells and any wells installed subsequent to the issuance of this MRP shall follow the schedule in Table 1. The volume of injected and/or extracted groundwater, if applicable, shall be provided in quarterly monitoring reports. Sample collection and analysis shall follow standard EPA protocol.

The monitor wells, extraction wells and/or injection wells shall be sampled according to the schedule in Table 1 and the samples analyzed by the methods in Table 2.

Table 1: Sampling Frequency and Constituent Suite

Well Number ¹	Constituent ²	Frequency ³	Monitoring Objective
IW-1 through IW-8, MW-05S, MW-06, MW-11, MW-12, MW-14S, MW-18S, MW-21S, MW-23, VW-1B, VW-2B, VW-3B, VW-4B, VW-5, VW-6, VW-7	Suite A, Suite C	Quarterly	Treatment Zone ⁴
	Suite B	Semi-Annually	
	Suite D	Monthly	
MW-08, MW-17S, MW-17D, MW-19S, MW-19D, MW-22S, OB-08, T01-01	Suite A, Suite C	Quarterly	Transition Zone ⁵
	Suite B	Semi-Annually	
	Suite D	Monthly	
MW-03, MW-07, MW-09, MW-10, MW-15S, MW-15D, MW-15D1, MW-16D	Suite A, Suite C	Quarterly	Compliance Group A ⁶
	Suite B	Semi-Annually	
	Suite D	Monthly	
MW-20S, MW-20D, MW-21D, T01-02, T01-03	Suite A	Semi-Annually	Compliance Group B ⁷

- ¹ Well numbers and locations are shown on Attachment A.
- ² Constituent analytical methods are listed in Table 2.
- ³ Semi-annual sampling occurs 2nd and 4th quarters.
- ⁴ Wells sampled to evaluate in-situ remediation progress inside the treatment zone.
- ⁵ Wells sampled to evaluate migration of pollutants within the transition zone.
- ⁶ Wells adjacent to transition zone
- ⁷ Distal wells

Table 2: Analytical Methods

Suite	Constituent	Method ¹	Maximum Practical Quantitation Limit (µg/L) ²
Suite A	Volatile Organic Compounds	EPA 8260B	0.5
Suite B	Chloride	EPA 300	1,000
	Nitrate	EPA 353.2	1,000
	Sodium	EPA 200.7	1,000
	Potassium	EPA Method 300	1,000
	Total Alkalinity	EPA 310.1	1,000
	Total Dissolved Solids	EPA 160.1	10,000
Suite C	Hexavalent Chromium	EPA 7199	1
	Metals, Total and Dissolved ³	EPA 200.7, 200.8	Various
Suite D	Potassium Permanganate	Colorimetric	

¹ Or an equivalent EPA Method that achieves the maximum Practical Quantitation Limit.

² All concentrations between the Method Detection Limit and the Practical Quantitation Limit shall be reported as an estimated value.

³ Metals include aluminum, arsenic, barium, cadmium, calcium, total chromium, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, sodium, and zinc.

FIELD SAMPLING

In addition to the above sampling and analysis, field sampling and analysis shall be conducted each time a monitor well or extraction well is sampled. The sampling and analysis of field parameters shall be as specified in Table 3.

Table 3: Field Sampling Requirements

Parameters	Units	Type of Sample
Groundwater Elevation	Feet, Mean Sea Level	Measurement
Oxidation-Reduction Potential	Millivolts	Grab
Electrical Conductivity	uhmos/cm	Grab
Dissolved Oxygen	mg/L	Grab
Temperature	Degrees C	Grab
pH	pH Units (to 0.1 units)	Grab

Field test instruments (such as those used to test pH and dissolved oxygen) may be used provided that:

1. The operator is trained in proper use and maintenance of the instruments;
2. The instruments are calibrated prior to each monitoring event;
3. Instruments are serviced and/or calibrated by the manufacturer at the recommended frequency; and
4. Field calibration reports are submitted as described in item (b) of the "Reporting" section of this MRP.

DISCHARGE MONITORING

The Discharger shall monitor daily the discharge of water and amendments that are injected into the groundwater according to the requirements specified in Table 4. Each amendment addition shall be

recorded individually, along with information regarding the time period over which the amendment was injected into the aquifer.

Table 4: Discharge Monitoring Requirements

Parameters	Units	Type of Sample
Injected Volume	gallons per event	Measured
Amendment(s) Added	kilograms per event	Measured

AMENDMENT ANALYSIS

Prior to use, amendments shall be analyzed for the constituents listed in Table 4. The analysis should be done on the pure amendment (if possible) and on a mixture of the amendment and deionized water at the estimated concentration that would be injected during the project.

Table 5: Amendment Analytical Requirements

Constituent	Method ¹	Maximum Practical Quantitation Limit (µg/L) ²
Volatile Organic Compounds	EPA 8260B	0.5
General Minerals ³		
Metals, Total and Dissolved ⁴	EPA 200.7, 200.8	Various
Hexavalent Chromium	EPA 218.6	0.5
pH	meter	NA
Electrical Conductivity	meter	NA

¹ Or an equivalent EPA Method that achieves the maximum Practical Quantitation Limit.

² All concentrations between the Method Detection Limit and the Practical Quantitation Limit shall be reported, and reported as an estimated value.

³ Alkalinity, bicarbonate, sodium, calcium, magnesium, potassium, chloride, sulfate, total hardness, nitrate, nitrite, ammonia, total dissolved solids.

⁴ Metals include arsenic, barium, cadmium, total chromium, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium and silica.

BACKGROUND CONCENTRATION VALUES

The Discharger developed background values for concentrations of general minerals, metals, and electrical conductivity in groundwater calculated from historical data. The background values were presented in a letter submitted by the Discharger's consultant, ERM West, Inc., dated 13 April 2016.

REPORTING

When reporting the data, the Discharger shall arrange the information in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner as to illustrate clearly the compliance with this Order. In addition, the Discharger shall notify the Central Valley Water Board within 48 hours of any unscheduled shutdown of any soil vapor and/or groundwater extraction/injection system. The results of any monitoring done more frequently than required at the locations specified in the Monitoring and Reporting Program shall also be reported to the Central Valley Water Board.

As required by the California Business and Professions Code sections 6735, 7835, and 7835.1, all reports shall be prepared by a registered professional or their subordinate and signed by the registered professional.

The Discharger shall submit quarterly electronic data reports, which conform to the requirements of the California Code of Regulations, Title 23, Division 3, Chapter 30. The quarterly reports shall be submitted electronically over the internet to the Geotracker database system by the 1st day of the second month following the end of each calendar quarter by **1 February, 1 May, 1 August, and 1 November** until such time as the Executive Officer determines that the reports are no longer necessary.

Each quarterly report shall include the following minimum information:

- (a) a description and discussion of the groundwater sampling event and results, including trends in the concentrations of pollutants and groundwater elevations in the wells, how and when samples were collected, and whether the pollutant plume(s) is delineated;
- (b) field logs that contain, at a minimum, water quality parameters measured before, during, and after purging, method of purging, depth of water, volume of water purged, etc.;
- (c) groundwater contour maps for all groundwater zones, if applicable;
- (d) pollutant concentration maps for all groundwater zones, if applicable;
- (e) a table showing well construction details such as well number, groundwater zone being monitored, coordinates (longitude and latitude), reference elevation, screened interval, depth of seal, depth of well;
- (f) a table showing historical lateral and vertical (if applicable) flow directions and gradients;
- (g) cumulative data tables containing the water quality analytical results and depth to groundwater;
- (h) a copy of the laboratory analytical data report, which may be submitted in an electronic format with the report;
- (i) the status of any ongoing remediation, including an estimate of the cumulative mass of pollutant removed from the subsurface, system operating time, the effectiveness of the remediation system, analytical results of sampling, and any field notes pertaining to the operation and maintenance of the system;
- (j) a table showing the dates on which potassium permanganate was injected, and the location and amount of potassium permanganate injected at each location; and
- (k) if applicable, the reasons for and duration of all interruptions in the operation of any remediation system, and actions planned or taken to correct and prevent interruptions.

An Annual Report shall be submitted to the Central Valley Water Board by **1 February (1 November for semi-annual monitoring)** of each year. This report shall contain an evaluation of the effectiveness

and progress of the investigation and remediation, and may be substituted for the fourth quarter monitoring report. The Annual Report shall contain the following minimum information:

- (a) both tabular and graphical summaries of all data obtained during the year;
- (b) groundwater contour maps and pollutant concentration maps containing all data obtained during the previous year;
- (c) a discussion of the long-term trends in the concentrations of the pollutants in the groundwater monitoring wells;
- (d) an analysis of whether the pollutant plume is being effectively treated;
- (e) a description of all remedial activities conducted during the year, graphs showing trends of constituents of concern, an analysis of their effectiveness in removing the pollutants, and plans to improve remediation system effectiveness;
- (f) an identification of any data gaps and potential deficiencies/redundancies in the monitoring system or reporting program; and
- (g) if desired, a proposal and rationale for any revisions to the groundwater sampling plan frequency and/or list of analytes.

A letter transmitting the monitoring reports shall accompany each report. Such a letter shall include a discussion of requirement violations found during the reporting period, and actions taken or planned for correcting noted violations, such as operation or facility modifications. If the Discharger has previously submitted a report describing corrective actions and/or a time schedule for implementing the corrective actions, reference to the previous correspondence will be satisfactory. The transmittal letter shall contain the penalty of perjury statement by the Discharger, or the Discharger's authorized agent, as described in the Standard Provisions General Reporting Requirements Section B.3.

The Discharger shall implement the above monitoring program as of the date of this Order.

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 7 December 2018.

Original signed by
PATRICK PULUPA, Executive Officer