

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2015-0012-XXXX
FOR
IN-SITU GROUNDWATER REMEDIATION
AND DISCHARGE OF TREATED GROUNDWATER TO LAND

This Monitoring and Reporting Program (MRP) describes requirements for monitoring groundwater remediation for the Tay Van Car Wash, Redding, Shasta County, California (**Figure 1**). 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, California Regional Water Quality Control Board, Central Valley Region (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 chain of custody form.

GROUNDWATER MONITORING

As shown on **Figure 2**, there are nine monitoring wells and four injection wells associated with the remedial action. The groundwater monitoring program for these wells and any treatment system wells installed subsequent to the issuance of this MRP shall follow the schedule below. Monitoring wells with free phase petroleum product or visible sheen shall be monitored, at a minimum, for product thickness and depth to water. The volume of extracted groundwater, if applicable, shall also be provided in monitoring reports. Sample collection and analysis shall follow standard EPA protocol.

The monitoring wells shall be sampled according to the schedule in **Table 1** and the samples analyzed by the methods in **Table 2**, as follows:

Table 1: Sampling Frequency and Constituent Suite			
Well Number¹	Constituent²	Frequency³	Monitoring Objective
MW-7D	Sodium Sulfate Total/dissolved arsenic Total/dissolved chromium Dissolved hexavalent chromium Total dissolved solids (TDS) Field parameters Total petroleum	1 pre application, 1 two weeks after the first injection, 1 one month after second injection, and 1 three months after second	Background ⁴

Table 1: Sampling Frequency and Constituent Suite			
Well Number¹	Constituent²	Frequency³	Monitoring Objective
	hydrocarbons as gasoline (TPHG) Benzene, toluene, ethyl- benzene, xylenes (BTEX) Methyl tert butyl ether (MTBE) Tert butyl alcohol (TBA)	injection (post remediation monitoring)	
MW-5, MW-6, MW-13D	Sodium Sulfate Total/dissolved arsenic Total/dissolved chromium Dissolved hexavalent chromium TDS Field Parameters TPHG BTEX MTBE TBA	1 pre application, 1 two weeks after the first injection, 1 one month after second injection, and 1 three months after second injection (post remediation monitoring)	Compliance ⁵
MW-1, MW-2 MW-3, MW-4, MW-9D	Sodium Sulfate Total/dissolved arsenic Total/dissolved chromium Dissolved hexavalent chromium TDS Field Parameters TPHG BTEX MTBE TBA	1 pre application, 1 two weeks after the first injection, 1 one month after second injection, and 1 three months after second injection (post remediation monitoring)	Treatment Zone ^{6,7}

1. Well numbers and locations as shown on Figure 1.
2. Constituent analytical methods are listed in Table 2.
3. i.e., weekly, monthly, quarterly, semi-annually, annually, other. Semi-annual sampling occurs 1st and 3rd quarters, annual sampling occurs in the 1st quarter, biennial sampling occurs every two years in the 1st quarter, with the first sample during year two.
4. Wells used to develop background concentrations.
5. Wells used to determine compliance with water groundwater limitations.

6. Wells sampled to evaluate in-situ remediation progress inside the treatment zone.
7. Wells sampled to evaluate migration of pollutants within the treatment zone.

Table 2: Analytical Methods		
Constituent	Method1	Maximum Practical Quantitation Limit (micrograms per liter)²
Sodium	EPA 200.7 Rev 4.4	1,000
Sulfate	EPA 300.0	1,000
Total arsenic and chromium	EPA 200.8	0.50
Dissolved arsenic and chromium	EPA 200.8	0.50
Dissolved hexavalent chromium	Std. Meth. 20th Ed. 3500-Cr	5.0
Total dissolved solids (TDS)	Std. Meth. 20 th Ed. 2540C	6,000
Total petroleum hydrocarbons as gasoline (TPHG)	EPA 8260B	50

Table 2: Analytical Methods		
Constituent	Method1	Maximum Practical Quantitation Limit (micrograms per liter)²
Benzene, toluene, ethylbenzene, xylenes (BTEX)	EPA 8260B	0.5, 2.0, 2.0, 1.0
Methyl tert butyl ether (MTBE) Tert butyl alcohol (TBA)	EPA 8260B	2.0

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.

FIELD SAMPLING

In addition to the above sampling and laboratory analyses, field sampling and analysis shall be conducted each time a monitoring 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	Practical Quantitation Limit	Analytical Method
Groundwater Elevation	Feet, Mean Sea Level	0.01 feet	Measurement
Free Product	Feet	0.1 feet	Measurement

Oxidation-Reduction Potential	Millivolts	10 millivolts	Field Meter
Electrical Conductivity	Microsiemens per square centimeter	50 $\mu\text{S}/\text{cm}^2$	Field Meter
Dissolved Oxygen	Milligrams per liter	0.2 mg/L	Field Meter
pH	pH Units (to 0.1 units)	0.1 units	Field Meter
Temperature	Degrees Fahrenheit or Celsius	0.1 °F/°C	Field Meter

All wells that are purged shall be purged until pH, temperature, conductivity and dissolved oxygen are within 10% of the previous value.

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.

IN-SITU 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 day	Meter
Amendment(s) Added	pounds per day	Measured

AMENDMENT ANALYSIS

Prior to use, amendments shall be analyzed for the constituents listed in **Table 5**. The analysis should be done on a mixture of the amendment and deionized water at the estimated concentrations that would be injected during the project.

Table 5: Analytical Methods		
Constituent	Method¹	Maximum Practical

		Quantitation Limit (micrograms per liter)²
Sodium	EPA 200.7 Rev 4.4	1,000
Sulfate	EPA 300.0	1,000
TDS	Std. Meth. 20 th Ed. 2540C	6,000
Electrical Conductivity	Meter	NA
pH	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 as an estimated value.

ESTABLISHMENT OF BACKGROUND CONCENTRATION VALUES

The Discharger shall develop background values for concentrations of constituents (below) in groundwater following the procedures found in California Code of Regulations, title 27, section 20415(e)(10).

- Sodium
- Sulfate
- Total arsenic
- Dissolved arsenic
- Total chromium
- Dissolved chromium
- Dissolved hexavalent chromium
- Field parameters
- Total petroleum hydrocarbons as gasoline (TPHG)
- Benzene, toluene, ethylbenzene, xylenes (BTEX)
- Methyl tert butyl ether (MTBE)
- Tert butyl alcohol (TBA)

MW-7D is the background well for this project. Groundwater samples were collected from MW-7D on 29 June 2020. Background concentrations of the parameters listed above were submitted in the 9 October 2020 First Half 2020 Groundwater Monitoring Report.

CONTINGENCY PLAN

Each PersulfOx® application is expected to result in oxidant longevity of 3 to 4 weeks. The proposed PersulfOx® applications could potentially increase sodium, sulfate, mobilize metals in groundwater, and cause pH changes in the treatment area.

Due to the location of the Project site and distance to sensitive receptors, the possibility that these constituents will migrate to a sensitive receptor is unlikely. If sodium, sulfate, hexavalent chromium, and/or pH are detected or measured at concentrations 20% or greater than their respective baseline concentrations, the contingency plan will be implemented as described below.

Baseline concentrations will be determined prior to the applications by collecting groundwater samples, as described above. Baseline limit concentrations will be established by taking the highest concentration (either historical or through baseline monitoring) for each constituent at each location and multiplying that value by a factor of 1.2.

If there is an exceedance, the Discharger shall collect a confirmation sample within 10 days of receipt of the laboratory analytical results. If the exceedance is confirmed in the confirmation sample, the Discharger shall notify Central Valley Water Board staff in writing within 10 days of receipt of the confirmation sample laboratory analytical result.

If an exceedance is confirmed, the Discharger shall submit a corrective action work plan to the Central Valley Water Board within 30 days of submittal of the confirmation notification to Central Valley Water Board staff. The work plan will include one or more of the following:

- Increase monitoring frequency.
- Expand the monitoring network.
- Install hydraulic control measures in the treatment zone.

All contingency measures to which the Central Valley Water Board has agreed will be implemented fully within six months of the confirmation of the exceedance.

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. 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 Civil Engineer or Geologist or their subordinate and signed by the registered professional.

The Discharger shall submit semi-annual electronic data reports, which conform to the requirements of the California Code of Regulations, Title 23, Division 3, Chapter 30. The semi-annual reports shall be submitted electronically over the internet to the Geotracker database system by the 15th day of the month following the end of each reporting and sampling period (reports due by **15 January and 15 July**) until such time as the Executive Officer determines that the reports are no longer necessary.

Each semi-annual 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), ground surface elevation, reference elevation, elevation of screen, elevation of bentonite, elevation of filter pack, and elevation of well bottom;
- (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;
- (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, and any field notes pertaining to the operation and maintenance of the system; and
- (j) 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.

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 on the first day of the month following adoption of this Order.

Ordered by:
PATRICK PULUPA, Executive Officer
XX MONTH 2021