CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2015-0012-083
FOR
IN-SITU GROUNDWATER REMEDIATION
AND DISCHARGE OF TREATED GROUNDWATER TO LAND

This Monitoring and Reporting Program (MRP) describes requirements for monitoring a groundwater remediation system for Former Wickes Forest Industries Site. This MRP is issued pursuant to Water Code Section 13267. DTSC 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 46 monitoring wells associated with this Site, including 3 wells that were installed and originally used as extraction wells. There are also four domestic irrigation wells shown on Figure 2; three of these are sampled as part of the ongoing monitoring done by DTSC. Figure 3 shows the proposed five injection point locations, approximately 6 to 16 feet north-northwest of monitoring well E-6B. 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. Sample collection and analysis shall follow standard EPA protocol.

The monitoring wells shall be sampled for hexavalent chromium, Cr(VI), total chromium, dissolved arsenic, dissolved iron, dissolved manganese, and total dissolved solids (TDS) according to the schedule in Table 1 (which is continued on the next page). The samples shall be analyzed by the methods in Table 2. Maximum Contaminant Levels (MCLs) from Section 3.2.2 of the Central Valley Water Board's *Water Quality Control Plan for the Sacramento River Basin and The San Joaquin River Basin* (Basin Plan) are included for reference in Table 2. Any additional sampling done shall be reported in the regular groundwater monitoring reports.

Table 1 Monitoring Well Sampling

Well Number	Constituent	Frequency	Monitoring Objective
E-6A, E-6B	Cr(VI) Chromium, total Arsenic, dissolved Iron, dissolved Manganese, dissolved	Quarterly	Evaluation of in-situ remediation progress inside the **Treatment Zone**.

Well Number	Constituent	Frequency	Monitoring Objective
E-5, E-23, E-28, E-30A, E-34	Cr(VI) Chromium, total Arsenic, dissolved Iron, dissolved Manganese, dissolved TDS	Quarterly	Evaluation of pollutant migration from the treatment zone through the **Transition Zone**.
E-7, E-59	Cr(VI) Chromium, total Arsenic, dissolved Iron, dissolved Manganese, dissolved TDS EC	Quarterly	Evaluation of background concentrations.
E-20, E31, E-32	Cr(VI) Arsenic, dissolved Iron, dissolved Manganese, dissolved TDS EC	Quarterly	**Compliance** with groundwater limitations.

Table 2 Analytical Methods

Constituent	Method (note 1)	Practical Quantitation Limit (PQL) (note 2)	Maximum Contaminant Level (MCL)
Hexavalent Chromium	EPA 7199	0.3 µg/L	10 µg/L
Total Chromium	EPA 200.7, 200.8	5 µg/L	50 µg/L
Arsenic, dissolved	EPA 200.7, 200.8	1.0 µg/L	10 µg/L
Manganese, dissolved	EPA 200.7	40 µg/L	50 µg/L
Iron, dissolved	EPA 200, 6020 or SM3000	100 µg/L	300 µg/L
Total Dissolved Solids	EPA 160.1	500 µg/L	500 µg/L
Electrical Conductivity	-	50 µS/cm	900 µS/cm

Table 2 notes:

1. Analytical method substitutions may be made with Central Valley Water Board staff concurrence, provided the method achieves the Practical Quantitation Limit (PQL).
2. All concentrations between the laboratory Method Detection Limit (MDL) and the PQL shall be reported as an estimated value.

If Compliance Zone well concentrations of metals, total dissolved solids, or electrical conductivity are detected at more than 20% greater than their respective baseline concentrations, or if there is any increase in concentration where Compliance Zone wells baseline levels are equal to their respective MCLs, DTSC shall immediately implement its contingency plan to resample and verify the trigger exceedance. If the trigger exceedance is verified, after notifying Central Valley Water Board staff DTSC shall submit one or more contingency measures for Central Valley Water Board staff approval to revert the groundwater conditions to the baseline conditions as proposed in the Corrective Action Work Plan, and as deemed necessary by Central Valley Water Board staff. Once approved, DTSC shall immediately implement the contingency plan.

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, where PQL indicates Practical Quantitation Limit.

Table 3 Field Sampling Requirements

Parameters	PQL	Units	Analytical Method
Depth to groundwater	0.01	feet (ft)	Measurement
Oxidation-Reduction Potential (ORP)	10	millivolts (mV)	Field Meter
Electrical Conductivity (EC)	50	microSiemens per centimeter (µS/cm)	Field Meter
Dissolved Oxygen (DO)	0.2	milligrams per liter (mg/L)	Field Meter
pH	0.1	standard units	Field Meter
Temperature	0.1	°F	Field Meter
Volume purged	0.1	gallons (gal)	Measurement

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

DTSC 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 (gpd)	Totalizing meter
Injection rate	gallons per minute (gpm)	Meter or calculation
Injection duration	hours (h)	Measured
Amendment(s) added	pounds per day (lb/d)	Measured

AMENDMENT ANALYSIS

Prior to use, amendments shall be analyzed for the constituents listed in Table 5 using the listed method or an equivalent EPA Method that achieves the maximum Practical Quantitation Limit. The analysis should be done on a mixture of the amendment and deionized water at the estimated concentration that would be injected during the pilot project. All concentrations between the Method Detection Limit and the PQL shall be reported as an estimated value. NA indicates not applicable.

Table 5 Amendment Analytical Requirements

Constituent	**Method** (note 1)	**Maximum PQL (µg/L)**
Volatile Organic Compounds (VOCs)	EPA 8020 or 8260B	0.5
General Minerals (note 2)	Various	NA
Metals, Total and Dissolved (note 3)	EPA 200.7, 200.8	Various
Semi-Volatile Organic Compounds	EPA 8270	5.0
Total Dissolved Solids (TDS)	EPA 160.1	10,000
pH	meter	NA
Electrical Conductivity (EC)	meter	NA

Table 5 notes:

1. Analytical method substitutions may be made with Central Valley Water Board staff concurrence, provided the method achieves the maximum PQL.
2. General minerals include alkalinity, bicarbonate, potassium, chloride, sulfate, total hardness, nitrate, nitrite, ammonia.
3. Metals include barium cadmium, calcium, total chromium, copper, lead, magnesium, manganese, mercury, molybdenum, nickel, and silica.

ESTABLISHMENT OF BACKGROUND CONCENTRATION VALUES

DTSC shall develop background values for concentrations of Cr(VI), total chromium, dissolved arsenic, dissolved iron, dissolved manganese, total dissolved solids (TDS) and electrical conductivity (EC) in groundwater following the procedures found in California Code of Regulations, Title 27, Section 20415(e)(10). DTSC shall complete a pre-injection monitoring event to establish background and baseline concentrations prior to implementation of the remediation event.

REPORTING

When reporting the data, DTSC 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 clearly illustrate compliance with this Order. The results of any monitoring done more frequently than required at the locations specified in this 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.

Quarterly Reports

DTSC 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 and EDF data 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;

(d) pollutant concentration maps for all groundwater zones;

(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; and

(i) an analysis of whether the pollutant plume is being effectively treated.

Annual Reports

An Annual Report shall be submitted to the Central Valley Water Board by **1 February** of each year. This report shall contain an evaluation of the effectiveness and progress of the investigation and remediation. The Annual Report may be substituted for the **fourth quarter** monitoring report as long as it contains all of the information required for that report plus that required for the Annual 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, 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 DTSC 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 DTSC or DTSC's authorized agent, as described in the Standard Provisions and Reporting Requirements for Waste Discharge Requirements, 1 March 1991 edition, Section B.3. The Standard Provisions are available on the Central Valley Water Board's Adopted Orders website (https://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/std_provisions/wdr-mar1991.pdf).

This monitoring and reporting program is effective upon signature of the Executive Officer.

Original Digitally Signed by: John J. Baum
Ordered by: *Date: 2024.07.29 09:53:05 -07'00'*
for PATRICK PULUPA, Executive Officer