CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2015-0012-082

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 the Equilon Enterprises, LLC dba Shell Oil Products US (Equilon or Discharger) cleanup project at 4301 Marconi Avenue in Sacramento, Sacramento County (Site). 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 1, there are multiple monitoring wells associated with the Site, and 7 of these are associated with this remediation pilot study. One additional monitoring well included in this pilot study is associated with a neighboring site. Currently, Equilon submits semi-annual status updates voluntarily, including groundwater monitoring analytical data. To the extent practicable and in addition to the activities presented herein, Equilon should continue to monitor and report Site conditions consistent with the scope and frequency of reports preceding this MRP. Continuing established monitoring protocol ensures consistent data collection more easily comparable to historical data. If duplicative sampling is ordered between this MRP and Equilon's established voluntary monitoring, a single sample will suffice for both reporting objectives. Duplication of monitoring efforts is not intended. The groundwater monitoring program for these 8 remediation wells and any remediation monitoring wells installed subsequent to the issuance of this MRP shall be sampled according to the schedule in Table 1 and the samples shall be analyzed by the methods in Table 2. Sample collection and analysis shall follow standard EPA protocol.

Table 1. Remediation Monitoring Schedule[1]

Monitoring Area	Monitoring Point	Monitoring Frequency
Treatment Zone[2]	MW-2	Quarterly[6]
Treatment Zone[2]	INJ-3	Quarterly[6]
Transition Zone[3]	MW-1	Quarterly[6]
Transition Zone[3]	GS-3	Quarterly[6]
Transition Zone[3]	MW-3	Quarterly[6]
Compliance Zone[4]	MW-8	Quarterly[6]
Baseline[5]	MW-4	Quarterly[6]
Baseline[5]	MW-5	Quarterly[6]

[1] Within 3 months prior to the initial injection, all wells shall be analyzed for their respective analytes.
[2] Wells sampled to evaluate in-situ bioremediation progress inside the treatment zone.
[3] Wells sampled to evaluate migration of pollutants within the treatment zone.
[4] Wells used to determine compliance with water groundwater limitations.
[5] Wells used to develop treatment zone baseline concentrations.
[6] Monitored quarterly for four consecutive quarters, then monitored semi-annually thereafter.

Table 2: Analytical Methods

Constituent	Method[1]	Maximum Practical Quantitation Limit (ug/L)[2]
Dissolved Cations (K, Fe, Mn)	EPA 200.7	100
Nitrate, Sulfate, Chloride	EPA 300.0	100
Dissolved Gases (CH4, ethene)	RSK 175	100
Total Dissolved Solids	EPA 160.1	10,000
Alkalinity	EPA 310.1	2,000
Volatile Organic Compounds	EPA 8260 B	0.5-20

[1] Or an equivalent EPA or Standards Method that achieves the maximum Practical Quantitation Limit.
[2] For constituents not detected. 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 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	Practical Quantitation Limit	Analytical Method
Groundwater Elevation	Feet, Mean Sea Level	0.01 feet	Measurement
Oxidation-Reduction Potential	Millivolts	20 millivolts	Field Meter
Electrical Conductivity	uhmos/cm	50 µS/cm^2	Field Meter
Dissolved Oxygen	mg/L	0.2 mg/L	Field Meter
pH	pH Units (to 0.1 units)	0.2 units	Field Meter
Temperature	^{o}F/^{o}C	0.1 ^{o}F/^{o}C	Field Meter

All wells that are purged shall be purged until pH, temperature, conductivity and dissolved oxygen are within approximately 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
Biocide Added (if used)	pounds per day	Measured

AMENDMENT ANALYSIS

Central Valley Water Board staff has received the laboratory analysis of WilClear and KB-1 from the manufacturers JRW Bioremediation and SiREM, respectively.

ESTABLISHMENT OF BACKGROUND CONCENTRATION VALUES

Background concentrations of constituents such as dissolved iron, dissolved manganese, potassium, chloride, and total dissolved solids in groundwater will be developed from four quarters of monitoring in upgradient wells MW-4 and MW-5 and continuing monitoring.

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 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), 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.

An Annual Report shall be submitted to the Central Valley Water Board by **1 November** 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 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: Digitally signed by John J. Baum Date: 2023.10.02 10:57:24 -07'00'

For PATRICK E. PULUPA, Executive Officer

October 2,2023

(Date)

Figure 1. Remediation Monitoring Well Locations