

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM R5-2013-XXXX  
FOR  
AERA ENERGY LLC  
FOR  
POST-CLOSURE MAINTENANCE AND CORRECTIVE ACTION  
NORTH SURFACE IMPOUNDMENTS  
NORTH BELRIDGE OIL FIELD, KERN COUNTY

This monitoring and reporting program (MRP) is issued pursuant to California Water Code section 13267 and incorporates requirements for groundwater monitoring and reporting; facility monitoring, maintenance, and reporting; and financial assurances reporting contained in California Code of Regulations, Title 27, section 20005, et seq. (hereafter Title 27), Waste Discharge Requirements (WDRs) Order R5-2013-XXXX, and the *Standard Provisions and Reporting Requirements* (Standard Provisions) dated September 2003. Compliance with this MRP is ordered by the WDRs and Aera Energy LLC (hereafter Discharger) shall not implement any changes to this MRP unless a revised MRP is issued by the Central Valley Regional Water Quality Board (Central Valley Water Board) or the Executive Officer. Failure to comply with this MRP or with the Standard Provisions constitutes noncompliance with the WDRs and with the Water Code, which can result in the imposition of civil monetary liability.

**A. MONITORING**

The Discharger shall comply with the corrective action monitoring program provisions for groundwater in accordance with Provisions E.1 through E.8 of WDRs Order R5-2013-XXXX. All monitoring shall be conducted in accordance with a revised Sampling and Analysis Plan containing quality assurance/quality control standards acceptable to the Executive Officer.

Groundwater monitoring wells established for the corrective action program shall constitute the monitoring points for the groundwater Water Quality Protection Standard. All groundwater monitoring wells shall be sampled and analyzed annually for the monitoring constituents as indicated and listed in Table I.

Method detection limits and practical quantitation limits shall be reported.

The Discharger may use alternative analytical test methods, including new United States Environmental Protection Agency approved methods, provided the methods have method detection limits equal to or lower than the analytical methods specified in this MRP, are with the approval of the Executive Officer, and are incorporated into the revised Sampling and Analysis Plan.

The monitoring program of this MRP includes:

**1. Groundwater**

The Discharger shall operate and maintain a groundwater corrective action monitoring system that complies with the applicable provisions of §20415 and

§20420 of Title 27 in accordance with a Corrective Action Program approved by the Executive Officer.

The groundwater monitoring network shall consist of the following:

<u>Well</u>	<u>Status</u>
14R1	Corrective Action
19M1	Corrective Action
25H1	Corrective Action
25C1	Corrective Action
25N1	Corrective Action
26A1	Corrective Action
276(2)-26	Corrective Action

Groundwater samples shall be collected from the above wells and any additional wells added as part of the approved groundwater monitoring system. Samples shall be collected and analyzed in accordance with the methods specified in Table I. The Discharger shall collect, preserve, and transport groundwater samples in accordance with the approved revised Sampling and Analysis Plan.

The Discharger shall measure groundwater elevations in each well, determine the groundwater flow direction, estimate groundwater flow rate, and report the results annually. Hydrographs of each well shall be submitted annually showing the elevation of groundwater with respect to the elevations of the top and bottom of the screened interval and the elevation of the pump intake.

Appropriate constituents shall be evaluated with regards to the cation/anion balance and the results shall be graphically presented using a Stiff diagram, a Piper graph, or a Schoeller plot.

For each reporting period, the isotopic composition for oxygen and deuterium shall be evaluated. The isotopic results shall be graphically presented along with historical isotopic data.

## **2. Corrective Action**

The Discharger shall operate and maintain a groundwater corrective action monitoring system for the purpose of monitoring the nature and extent of the release and the progress of corrective action.

Corrective Action monitoring data analysis shall include the following:

a. Nature and Extent

- 1) Comparisons of the constituents of concern (COCs), which include total dissolved solids, chloride, and boron.

- 2) Graphical plot of stable oxygen and deuterium isotope results, historical isotope data from the wells and the facility along with the meteoric water line.
- b. Effectiveness of Corrective Action
- 1) Preparation of time series plots for the COCs.
  - 2) Trend analysis for the COCs and stable oxygen and deuterium isotopes.
  - 3) The need for additional corrective action measures and/or monitoring wells.

The results of the above analysis and a narrative discussion, to include an assessment of the effectiveness of monitored natural attenuation as the corrective action measure, shall be in each annual corrective action monitoring report, as specified under reporting Section B.

### 3. Facility Monitoring

a. Cover Integrity Monitoring and Maintenance

The Discharger shall conduct annual cover-integrity monitoring and maintenance in accordance with a Cover Integrity Monitoring and Maintenance Program included in the *Facility Post-Closure Maintenance and Monitoring Plan* approved by the Executive Officer.

b. Cover Soil Moisture

The Discharger shall conduct annual cover soil moisture monitoring at depths of 12 to 18 inches and at about three feet at the same cover soil moisture monitoring location prior to the beginning of the rainy season in accordance with a Cover Moisture Monitoring Program included in the *Facility Post-Closure Maintenance and Monitoring Plan* approved by the Executive Officer.

c. Major Storm Events

The Discharger shall inspect the facility for damage **within 7 days** following a storm yielding one inch or more of precipitation within 24 hours. Necessary repairs shall be completed **within 30 days** of the inspection. Surface areas where ponding or stormwater is observed shall be corrected by backfilling with compacted clean soil to achieve proper slope and drainage. Ponding problems shall be corrected **within 60 days** of the inspection. The Discharger shall submit a report describing the damage and subsequent repairs **within 45 days** of completion of the repairs, including photographs of the problems and the repairs.

## B. REPORTING

The Discharger shall submit the following reports in accordance with the required schedule:

### Reporting Schedule

<u>Report</u>	<u>Due</u>
1. Groundwater Monitoring Report (Section A.1)	<b>Annually</b>
2. Corrective Action Monitoring Report (Section A.2)	<b>Annually</b>
3. Cover Integrity Monitoring and Maintenance Report (Section A.3.a)	<b>Annually</b>
4. Cover Soil Moisture Monitoring Report (Section A.3.b)	<b>Annually</b>
5. Major Storm Event Reporting (Section A.3.c)	<b>As necessary</b>
6. Financial Assurances Review Report (See Provision E.8 of the WDRs)	<b>Annually</b>

### Reporting Requirements

The Discharger shall submit monitoring reports **annually** with the data and information as required in this Monitoring and Reporting Program and as required in WDRs Order R5-2013-XXXX and the Standard Provisions.

Monitoring reports requiring engineering or geologic analysis shall be prepared by a registered professional, as required by the California Business and Professions Code.

#### 1. Monitoring Data

In reporting the monitoring data required by this program, the Discharger shall arrange the data in tabular form so that the date, the constituents, the concentrations, and the units are readily discernable. The data shall be summarized in such a manner so as to illustrate clearly the compliance with waste discharge requirements or the lack thereof. Data shall also be submitted in a digital format acceptable to the Executive Officer. The Discharger shall enter all monitoring data and monitoring reports into the online Geotracker database as required by Division 3 of Title 27.

#### 2. Compliance Evaluation Summary

Each monitoring report shall include a compliance evaluation summary. The summary shall contain for each monitoring point addressed by the report, a description of:

- a. The time of water level measurement;
- b. The type of pump - or other device - used for purging and the elevation of the pump intake relative to the elevation of the screened interval;
- c. The method of purging (the pumping rate; the equipment and methods used to monitor field pH, temperature, and specific electrical conductance (EC) during purging; the calibration of the field equipment; results of the pH, temperature, EC, and turbidity testing; and the method of disposing of the purge water) to remove all portions of the water that was in the well bore while the sample was being taken;
- d. The type of pump or other device used for sampling, if different than the pump or device used for purging;
- e. A map or aerial photograph showing the locations of monitoring wells;
- f. A description and graphical presentation of the gradient and direction of groundwater flow;
- g. Cumulative tabulated monitoring data for all monitoring wells and constituents for groundwater. Concentrations below the laboratory reporting limit shall not be reported as "ND" unless the reporting limit is also given in the table. Otherwise they shall be reported "<" the reporting limit (e.g., <0.10). Units shall be as required in Table I unless specific justification is given to report in other units. Refer to the Standard Provisions Section IX B. Sampling and Analytical Methods for requirements regarding MDLs and PQLs.
- h. Laboratory statements of results of all analyses evaluating compliance with requirements; and,
- i. A statement that the sampling procedure was conducted in accordance with an approved Sampling and Analysis Plan.

### 3. Reporting Schedule

Monitoring reports shall be submitted to the Central Valley Water Board in accordance with the following schedule for the calendar period in which monitoring occurred and observations were made.

<u>Monitoring Frequency</u>	<u>Reporting Frequency</u>	<u>Reporting Periods End</u>	<u>Report Date Due</u>
Annually	Annually	30 September	31 October

## **C. WATER QUALITY PROTECTION STANDARD**

### **1. Water Quality Protection Standard**

The water quality protection standard shall consist of the COCs, the stable isotopes of oxygen and deuterium, and all groundwater monitoring wells.

### **2. Monitoring Constituents**

The monitoring constituents include those constituents in groundwater that are reasonably expected to be from wastewater historically discharged at the facility. The monitoring constituents are listed in Table I. The Discharger shall monitor these constituents annually, or more frequently as required, in accordance with the Corrective Action Program.

### **3. Other Constituents**

Other constituents include those constituents in groundwater that are reasonably expected to be from wastewater historically discharged at the facility. Other constituents are listed in Table I. The Discharger shall monitor these constituents biennially (every other year), or more frequently as required, in accordance with the Corrective Action Program.

### **4. Stable Isotopes**

The Discharger shall monitor groundwater for the stable isotopes of concern listed in Table I, oxygen and deuterium. The levels of the oxygen and deuterium isotopes in groundwater shall be evaluated and compared graphically with the levels previously measured in wastewater previously in the impoundments and in groundwater. The Discharger shall monitor the stable isotopes annually, or more frequently as required, in accordance with the Corrective Action Program.

## **D. OTHER REQUIREMENTS**

### **1. Transmittal Letter**

A transmittal letter explaining the essential points shall accompany each report. At a minimum, the transmittal letter shall identify any violations found since the last report was submitted, and if the violations were corrected. If no violations have **occurred** since the last submittal, this shall be stated in the transmittal letter. The transmittal letter shall also state that a discussion of any violations found since the last report was submitted, and a description of the actions taken or planned for correcting those violations, including any references to previously submitted time schedules, is contained in the accompanying report.

The transmittal letter shall contain a statement by the Discharger, or the Discharger's authorized agent, under penalty of perjury, that to the best of the signer's knowledge the report is true, accurate, and complete.

The Discharger shall implement the above monitoring program on the effective date of this Program.

Ordered by \_\_\_\_\_  
PAMELA C. CREEDON, Executive Officer

\_\_\_\_\_  
Date

**TABLE I**  
**GROUNDWATER MONITORING**

	<b>Units<sup>2</sup></b>	<b>Method<sup>1</sup></b>
<b><u>Field Parameters / Measurement</u></b>		
Groundwater Elevation	Ft. & hundredths, M.S.L.	
Temperature	°C	
Specific Electrical Conductance	µmhos/cm	
pH	pH units	
<b><u>Monitored Constituents</u></b>		
Total Dissolved Solids (TDS)	mg/L	EPA 160.1
Specific Electrical Conductance (EC)	µmhos/cm	EPA 120.1
Chloride	mg/L	EPA 300.0
Boron, dissolved	mg/L	EPA 6010B
<b><u>Other Constituents</u></b>		
<b><i>Standard Minerals</i></b>		
Total Alkalinity, dissolved	mg/L	SM 2320B
Carbonate Alkalinity, dissolved	mg/L	SM 2320B
Bicarbonate Alkalinity, dissolved	mg/L	SM 2320B
Sulfate, dissolved	mg/L	EPA 300.0
Nitrate as Nitrogen, dissolved	mg/L	EPA 300.0
Calcium, dissolved	mg/L	EPA 6010B
Magnesium, dissolved	mg/L	EPA 6010B
Sodium, dissolved	mg/L	EPA 6010B
Potassium, dissolved	mg/L	EPA 6010B
<b><i>Aromatic Hydrocarbons</i></b>		
Benzene	µg/L	EPA 8260B
Toluene	µg/L	EPA 8260B
Ethylbenzene	µg/L	EPA 8260B
Xylenes (m,p-xylenes and o-xylene)	µg/L	EPA 8260B
<b><u>Stable Isotopes</u></b>		
Oxygen	‰	CF-IRMS
Deuterium	‰	CF-IRMS

1 EPA = US Environmental Protection Agency; SM = Standard Method; CF-IRMS = Continuous Flow Isotope Ratio Mass Spectrometry

2 M.S.L.= mean sea level; °C = degrees centigrade; µmhos/cm = micromhos per centimeter; mg/L = milligrams per liter; µg/L = micrograms per liter; ‰ = molecules per thousand, or "per mil"