

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM R5-2018-0808  
FOR  
VALLEY WATER MANAGEMENT COMPANY  
MCKITTRICK 1 & 1-3 FACILITY  
KERN COUNTY

This Monitoring and Reporting Program (MRP) is required pursuant to Water Code section 13267. This MRP is for the discharge to land of produced wastewater (wastewater) from the Cymric, McKittrick, and South Belridge Oil Fields at the McKittrick 1 & 1-3 unlined disposal pond systems. The systems are interconnected, regulated as one facility, and are collectively referred to as the McKittrick 1 & 1-3 Facility or Facility. Valley Water Management Company (hereafter Discharger or Valley Water) owns and operates the Facility.

The Discharger shall not implement any changes to this MRP unless and until the Central Valley Regional Water Quality Control Board (Central Valley Water Board) adopts, or the Executive Officer issues, a revised MRP. Changes to sample location(s) shall be established with concurrence of Central Valley Water Board staff, and a description of the revised stations shall be submitted for approval by the Executive Officer.

This MRP includes monitoring, record-keeping, reporting, and further hydrogeological investigation requirements. Monitoring requirements include monitoring of groundwater, discharges of produced wastewater, solid wastes, chemicals associated with petroleum exploration, and the application of recycled materials (wastewater and solids); to determine if the Discharger is complying with Waste Discharge Requirements Resolution No. 69-199.

### **BACKGROUND**

Oil field produced wastewater has been discharged to the Facility since the late 1950s.

The Facility consists of two side-by-side, interconnected pond systems used for the disposal of produced wastewater via evaporation and percolation. The McKittrick 1 pond system occupies the west side of the Facility and is slightly higher in elevation than the McKittrick 1-3 pond system that occupies the east side of the Facility. At the McKittrick 1 pond system, incoming wastewater is discharged into six netted oil/water cleaning ponds, eight pass-through ponds, and 14 evaporation/percolation ponds. Pipelines that discharge into the cleaning ponds are owned and operated by California Resources Corporation (CRC) and Sentinel Peak Resources California LLC (SPR). At the McKittrick 1-3 pond system, incoming wastewater is discharged into three netted oil/water cleaning ponds, 23 pass-through ponds, and 29 evaporation/percolation ponds. A pipeline that discharges into the McKittrick 1-3 cleaning ponds is owned and operated by SPR.

The two pond systems are partially interconnected. Wastewater can gravity flow from the first two McKittrick 1 evaporation/percolation ponds to 11 evaporation/percolation ponds in the McKittrick 1-3 system. For both pond systems, wastewater usually flows through their respective evaporation/ percolation ponds in parallel. However, the pass-through ponds adjacent to the larger evaporation/ percolation ponds can control the flow into the evaporation/percolation ponds. Therefore, each evaporation/percolation pond in each pond system can be operated independently or jointly in series.

MONITORING AND REPORTING PROGRAM ORDER R5-2018-0808  
 VALLEY WATER MANAGEMENT COMPANY  
 MCKITTRICK 1 & 1-3 FACILITY  
 KERN COUNTY

Pond information follows:

Facility	Pond	Pond dimensions LxWxLxW or LxW in feet (depths were not provided)	Pass through pond LxW in feet	Contains visible oil	Active	2 <sup>nd</sup> Semi-annual 2017 discharge
McKittrick 1 (west side)	CP-1	147x70	-	Yes	Yes	58,000 barrels/day
	CP-2	85x69	-			
	CP-3	109x69	-			
	CP-4	128x68	-			
	CP-5	101x63	-			
	CP-6	100x60	-			
	P-1	1540x117x1598x94	-	No	Yes	
	P-2	1608x123x1625x118	-			
	P-3	1575x88x1593x90	88x52			
	P-4	1600x86x1671x89	86x52			
	P-5	1625x100x1647x82	100x52			
	P-6	1649x87x1673x96	87x52			
	P-7	1669x89x1689x92	89x52			
	P-8	1357x93x1375x91	93x52			
P-9	1380x83x1401x91	83x52				
P-10	1399x83x1419x91	83x52				
P-11	1496x87x1509x89	-				
P-12	240x96	-				
P-13	63x61	-				
P-14	72x61	-				
McKittrick 1-3 (east side)	CP-1	93x74	-	Yes	Yes	
	CP-2	99x77	-			
	CP-3	97x76	-			
	P-1	1574x175x1706x102	-	No	Yes	
	P-2	1615x80x1636x88	276x92x251x96			
	P-3	1854x83x1872x96	96x48			
	P-4	1872x86x1877x90	90x48			
	P-5	1878x79x1871x92	92x48			
	P-6	1874x81x1873x91	91x48			
	P-7	1866x86x1873x92	92x48			
	P-8	1870x80x1875x89	89x48			
	P-9	1863x82x1867x89	89x48			
	P-10	1857x87x1864x91	91x48			
	P-11	1862x84x1864x92	92x48			
	P-12	1860x80x1869x89	89x48			
	P-13	1859x86x1862x90	89x48			
	P-14	1853x84x1843x101	101x48			
	P-15	1836x80x1845x85	95x48			
	P-16	1830x82x1830x94	94x48			
	P-17	1828x82x1829x92	92x48			
	P-18	1826x79x1827x91	91x48			
	P-19	1829x86x1828x92	91x48			
	P-20	1824x81x1815x91	91x48			
	P-21	1623x83x1590x96	96x48			
	P-22	1587x96x1555x91	91x48			
	P-23	1535x87x1502x91	91x48			
	P-24	1483x91x1453x86	86x48			
	P-25	1477x85x1435x93	-			
	P-26	119x118	-			
P-27	225x119	-				
P-28	156x84	-				
P-29	204x84	-				

The Facility has an existing groundwater monitoring network comprised of five shallow monitoring wells and one deep monitoring well.

The following shows the Facility groundwater monitoring network well information:

Well ID	Installed	Ground elevation (ft-amsl)	Top of casing (ft-amsl)	Total Depth (ft-bgs)	Screen Interval (ft-bgs)	Screen Interval (ft-amsl)
CYM-17N1	Nov 2002	451.5	452.9	240	105-165	347-287
CYM-19H1	Nov 2002	469.2	471.2	245	115-155	354-314
CYM-21D1	Nov 2002	427.1	429.1	300	274-294	153-133
CYM-17K1	Aug 2006	427.9	430.9	210	150-200	278-228
CYM-17M1	Sep 2006	446.5	449.5	197	155-185	292-262
CYM-17Q1	Aug 2006	437.6	440.6	208	160-200	278-238

Valley Water owns the Facility and is responsible for the discharge from the McKittrick 1 & 1-3 Facility ponds. The monitoring requirements contained in the MRP are necessary to fully characterize the discharge and the lateral and vertical extent of the groundwater plume emanating from the Facility and inform an effective strategy to protect water quality. The related costs are reasonable considering the magnitude of potential impacts to water quality.

## MONITORING

All samples shall be representative of the volume and nature of the discharge or matrix of material sampled. All analyses shall be performed in accordance with **Standard Provisions and Reporting Requirements for Waste Discharge Requirements**, dated 1 March 1991 (Standard Provisions).

Field test instruments (such as a pH meter) may be used provided that the operator is trained in the proper use of the instrument and each instrument is serviced and/or calibrated at the recommended frequency by the manufacturer or in accordance with manufacturer instructions.

Analytical procedures shall comply with the methods and holding times specified in the following: *Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater* (EPA); *Test Methods for Evaluating Solid Waste* (EPA); *Methods for Chemical Analysis of Water and Wastes* (EPA); *Methods for Determination of Inorganic Substances in Environmental Samples* (EPA); *Standard Methods for the Examination of Water and Wastewater* (APHA/AWWA/WEF); and *Soil, Plant and Water Reference Methods for the Western Region* (WREP 125). Approved editions shall be those that are approved for use by the United States Environmental Protection Agency or the State Water Board's Environmental Laboratory Accreditation Program. The Discharger may propose alternative methods for approval by the Executive Officer.

A complete list of substances that are tested for and reported on by the testing laboratory shall be provided to the Central Valley Water Board. All peaks must be reported. In addition, both the method detection limit (MDL) and the practical quantification limit (PQL) shall be reported. Detection limits shall be equal to or more precise than USEPA methodologies. Analysis with an

MDL greater than the most stringent drinking water standard that results in non-detection needs to be reanalyzed with the MDL set lower than the drinking water standard, if possible, or at the lowest level achievable by the laboratory. If the regulatory limit for a given constituent is less than the reporting limit (RL) or practical quantification limit (PQL), then any analytical results for that constituent below the RL (or PQL), but above the method detection limit (MDL), shall be reported and flagged as estimated. In addition, both the MDL and the PQL shall be reported. All quality assurance/quality control (QA/QC) samples must be run on the same dates as when samples were actually analyzed. Proper chain of custody procedures must be followed and a copy of the completed chain of custody form shall be submitted with the report. All analyses must be performed by an Environmental Laboratory Accreditation Program (ELAP) certified laboratory.

The MRP can be modified if the Discharger provides sufficient data to support the proposed changes. If monitoring consistently shows no significant variation in magnitude of a constituent concentration or parameter after a statistically significant number of sampling events, the Discharger may request this MRP be revised by the Executive Officer to reduce monitoring frequency or minimize the list of constituents. The proposal must include adequate technical justification for reduction in monitoring frequency.

Monitoring requirements include the periodic visual inspection of the facility to ensure continued compliance with the Order. The MRP also requires submittal of information regarding the use of all chemicals used during well drilling, installation, operation, and maintenance activities associated with each well generating waste materials (liquids and solids) that are discharged to land and regulated under this Order.

This MRP requires the Discharger to keep and maintain records for five years from the date the monitoring activities occurred and to prepare and submit reports containing the results of monitoring specified below. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge, or when requested by the Central Valley Water Board.

### **PRODUCED WASTEWATER MONITORING**

Produced wastewater (also referred to as effluent) samples shall be representative of the volume and nature of the discharges. The Discharger shall maintain all sampling and analytical results: date, exact place, and time of sampling; dates analyses were performed; analyst's name; analytical techniques used; and results of all analyses.

The Discharger shall label all pipelines discharging production wastewater into the Facility. Identifying labels shall be located within five feet of the pipeline and shall include at least the following: Operator, source Oil Field, and corresponding generating leases and facilities.

If the discharge is intermittent rather than continuous, then on the first day of each such intermittent discharge, the Discharger shall monitor and record data for all of the constituents listed below, after which the frequencies of analysis given in the schedule shall apply for the duration of each such intermittent discharge.

### DISCHARGE 001

The Discharger shall monitor the volume and quality of produced wastewater discharged to the disposal ponds from all sources. Produced wastewater samples shall be collected downstream from the treatment system and prior to discharge to land (roads, ponds, etc.) (Discharge 001). Produced wastewater monitoring for Discharge 001 shall be collected from the sample points described below and from all additional discharge points not included below and shall include at least the following:

Discharge ID	Facility	Sample point location
001a	McKittrick 1	Pipeline 1 discharge from Sentinel Peak Resources California LLC
001b		Pipeline 2 discharge from California Resources Corporation
001c		Pipeline 3 discharge from California Resources Corporation
001d	McKittrick 1-3	Pipeline 1 discharge from Sentinel Peak Resources California LLC
001x <sup>1</sup>	Name	Description

<sup>1</sup> Discharger shall label, add, monitor, and sample all existing discharge points not described in the table above which have the potential to discharge to the Facility's disposal ponds.

Constituent/Parameter	Units	Sample Type	Frequency
Flow	MGD	Metered <sup>1</sup>	Continuous
Table I – Effluent Monitoring	Varies	Grab	Varies

<sup>1</sup> Flow may be measured with an appropriate engineered alternative if approved in writing by the Central Valley Regional Board Executive Officer.

### DISCHARGE 002

Disposal pond produced wastewater samples shall be collected in the pond at the distal end of the system (Discharge 002), or if ponds are operated in parallel, in the pond that has contained produced wastewater for the longest period of time (i.e., longest retention time and the greatest evaporation and concentration of salts) (Discharge 002). Produced wastewater monitoring for Discharge 002 shall include at least the following:

Discharge ID	Facility	Sample point location
002a	McKittrick 1	Wastewater from the pond with the longest residence time
002b	McKittrick 1-3	Wastewater from the pond with the longest residence time

Constituent/Parameter	Units	Sample Type	Frequency
Table I – Effluent monitoring	Varies	Grab	Varies

### CHEMICAL AND ADDITIVE MONITORING

To adequately characterize discharges into, and ultimately from, the Facility, the Discharger is responsible for reporting all chemicals and additives, including those that may have entered the produced wastewater stream prior to being discharged to each pond system at the Facility. The Discharger shall obtain from oil field operators that discharge to the Facility and shall provide to the Central Valley Water Board the following for all chemicals and additives<sup>1</sup> used during each year at all leases and facilities that discharge produced wastewater to land:

<b>Requirement</b>	<b>Frequency</b>
A list of all chemicals and additives used.	Annually
The volume of each liquid chemical and additive used in gallons.	Annually
The mass of each solid chemical and additive used in grams or kilograms. (if dissolved into a solution, provide resulting solution concentration or ratio).	Annually
A list of the leases and facilities where the chemicals and additives are being used.	Annually
Safety Data Sheets (SDSs) or Material Safety Data Sheets (MSDSs) for each chemical and/or additive used during the year	Annually

<sup>1</sup> Chemicals that are a part of trade secrets shall be kept confidential at the Central Valley Water Board. Documents containing trade secrets shall be properly marked on the cover, by the Discharger, prior to submitting the document to the Central Valley Water Board. Individuals that present proper credentials, or that have received permission by the Discharger, shall be granted access to view the files at the office.

Monitoring and reporting of chemical additives may be reduced to annual reports at the discretion of the Assistant Executive Officer.

### SOLID WASTE MONITORING

The Discharger shall monitor the generation and use of solid wastes, including sludges generated at the Facility from activities, such as tank, pipe, or pond maintenance. Solid waste volumes, disposal methods, disposal facilities, and analytical results from waste characterization shall be reported in the subsequent semi-annual and annual monitoring reports.

Solid waste generated at the Facility from production related activities, such as tank or pond maintenance, shall be characterized for disposal. In accordance with an approved Solid Waste Management Plan, non-hazardous solid wastes may be disposed on-site, as road or berm construction material, for instance, if such disposal does not pose a threat to water quality.

Hazardous waste (as defined in California Code of Regulations, title 22, section 66261.1) and designated wastes (as defined in Wat. Code, § 13173) shall be properly disposed at a Facility permitted to accept the waste.

Solid wastes disposed off-site shall be transported to an appropriately permitted facility.

The disposal of solid waste on-site requires the submittal of a Solid Waste Management Plan for review and approval by the Central Valley Water Board Executive Officer. At a minimum, the Solid Waste Management Plan shall include the following:

1. Sampling frequencies,
2. Average volume of solid waste generated annually,
3. Solid wastes criteria for on-site disposal (e.g., non-hazardous and not within 100 feet of surface waterways),
4. Disposal method(s) and procedures,
5. Disposal location(s), and
6. Reporting requirements.

Prior to the disposal of solid wastes on-site, the Solid Waste Management Plan must be approved, in writing, by the Central Valley Water Board Executive Officer. Modifications to the Solid Waste Management Plan need to be submitted in an addendum report that requires written approval by the Central Valley Water Board Executive Officer prior to implementation. On-site solid waste monitoring shall consist of the reporting requirements specified in the approved Solid Waste Management Plan.

The Discharger shall provide the volumes and locations of all solid wastes disposed on-site and include in the semi-annual reports a demonstration that the applications comply with an approved solid waste management plan.

### **FACILITY MONITORING**

Permanent markers in ponds shall be in place with calibrations indicating the pond water level at design capacity and available operational freeboard (two feet minimum required). The freeboard shall be monitored on all ponds to the nearest tenth of a foot **monthly** and results included in the **semi-annual** report.

Annually, prior to the anticipated rainy season, but **no later than 30 September**, the Discharger shall conduct an inspection of the facility. The inspection shall assess repair and maintenance needed for: drainage control systems; slope failure; groundwater monitoring wells, oil booms, pond netting, or any change in site conditions that could impair the integrity of the waste management unit or precipitation and drainage control structures; and shall assess preparedness for winter conditions including, but not limited to, erosion and sedimentation control. The Discharger shall take photos of any problem areas before and after repairs. Any necessary construction, maintenance, or repairs shall be **completed by 31 October**. Annual facility inspection reporting shall be **submitted by 30 November**.

The Discharger shall inspect all precipitation diversion and drainage facilities for damage **within 7 days** following major storm events (e.g., a storm that causes continual runoff for at least one hour) capable of causing flooding, damage, or significant erosion. The Discharger shall take photos of any problem areas before and after repairs. Necessary repairs shall be commenced **within 30 days** of the inspection. Notification and reporting requirements for major storm events

shall be conducted as required in Reporting Requirements of this MRP and shall be reported in the semi-annual monitoring report following the major storm event.

The Discharger shall monitor and record on-site rainfall data using an automated rainfall gauge or an acceptable alternative. Data shall be used in establishing the severity of storm events and wet seasons for comparison with design parameters used for waste management unit design and conveyance and drainage design. Daily data and on-site observation shall be used for establishing the need for inspection and repairs after major storm events. Rainfall data shall be reported in the semi-annual monitoring reports, as required by this MRP.

### GROUNDWATER WELL SURVEY

**Within 60 days** of the signature date of this MRP, the Discharger shall conduct a well survey to identify all water supply wells within two and one half (2 ½) miles of the ponds that receive produced wastewater or other authorized discharges. **Within 90 days** of the signature date of this MRP, the Discharger shall sample the identified domestic water supply wells within one mile of the ponds that receive produced wastewater or other authorized discharges and analyze the samples for the waste constituents listed in Table II of this MRP. Groundwater well survey results and analytical results shall be reported in the semi-annual report following the groundwater sample collection date. If access to private property is requested and denied, evidence of that denial is required.

### GROUNDWATER MONITORING

The Discharger shall operate and maintain a groundwater monitoring system approved by the Executive Officer that may include groundwater wells available around and downgradient of the Facility and within a reasonable distance from the produced wastewater disposal ponds. At a minimum, the monitoring system needs to include three groundwater wells, with at least two wells located downgradient from the ponds' location that monitor first-encountered groundwater to identify any release at the earliest possible time.

After measuring water levels and prior to collecting samples, each monitoring well shall be adequately purged to remove water that has been standing within the well screen and casing that may not be chemically representative of formation water. Depending on the hydraulic conductivity of the geologic setting, the volume removed during purging is typically from 3 to 5 volumes of the standing water within the well casing and screen, or additionally the filter pack pore volume.

The Discharger shall monitor groundwater wells for the following:

Constituent/Parameter	Units	Sample Type	Frequency
Depth to groundwater	Feet <sup>1</sup>	Measured	<b>Quarterly</b>
Groundwater elevation	Feet <sup>1</sup>	Calculated	<b>Quarterly</b>
Table II – Groundwater Monitoring	Varies	Grab	<b>Varies</b>

<sup>1</sup> Recorded to one hundredth of a foot



**Within 30 days** of notification that permission to locate or sample a well(s) is not granted or is revoked, the Discharger shall submit for review and approval by Central Valley Water staff a report that either: (1) demonstrates that a reduction in the number of monitoring well(s) will not impair the ability to clearly and accurately assess potential groundwater impacts, or (2) proposes the installation of a new monitoring well(s) to offset the well(s) that is no longer able to be sampled.

### **GROUNDWATER MONITORING WELL NETWORK INSTALLATION**

The existing groundwater monitoring system has not fully delineated the lateral and vertical extent of the produced wastewater plume. A Monitoring Well Installation and Sampling Plan (MWISP) shall be submitted **within 60 days** of the signature date of this MRP. The MWISP shall provide for the installation of an appropriate number of upgradient/up-structure dip groundwater monitoring wells to identify background water quality and an appropriate number of downgradient/down-structure wells to delineate the plume of produced wastewater emanating from the Facility ponds.

At a minimum, the MWISP must contain all of the information listed below.

1. General Information:
  - a. Topographic map showing any existing nearby (about 2.5 mile) domestic, irrigation, and municipal supply wells and monitoring wells known to the Discharger, utilities, surface water bodies, drainage courses and their tributaries/destinations, and other major physical and man-made features, as appropriate.
  - b. Site plan showing proposed well locations, other existing wells, unused and/or abandoned wells, major physical site structures, any waste handling facilities, irrigated cropland and pasture, and on-site surface water features.
  - c. Rationale for the number of proposed monitoring wells, their locations and depths, and identification of anticipated depth to groundwater.
  - d. If, proposing to use existing groundwater wells as part of the MWISP, include well screen intervals in relation to groundwater levels, current well use, and rationale for well selection.
  - e. Local permitting information (as required for drilling, well seals, boring/well abandonment).
  - f. Drilling details, including methods and types of equipment for drilling and logging activities. Equipment decontamination procedures (as appropriate) should be described.
  - g. Health and Safety Plan.
2. Proposed Drilling Details:
  - a. Drilling techniques.
  - b. Well logging method.
  - c. Proposed Monitoring Well Design - all proposed well construction information must be displayed on a construction diagram or schematic to accurately identify the following:
  - d. Well depth.

- e. Borehole depth and diameter.
  - f. Well construction materials.
  - g. Casing material and diameter – include conductor casing, if appropriate.
  - h. Location and length of perforation interval, size of perforations, and rationale.
  - i. Location and thickness of filter pack, type and size of filter pack material, and rationale.
  - j. Location and thickness of bentonite seal.
  - k. Location, thickness, and type of annular seal.
  - l. Surface seal depth and material.
  - m. Type of well cap(s).
  - n. Type of well surface completion.
  - o. Well protection devices (such as below-grade water tight-vaults, locking steel monument, bollards, etc.).
3. Proposed Monitoring Well Development:
- a. Schedule for development (not less than 48 hours or more than 10 days after well completion).
  - b. Method of development.
  - c. Method of determining when development is complete.
  - d. Parameters to be monitored during development.
  - e. Method for storage and disposal of development water.
4. Proposed Surveying:
- a. How horizontal and vertical position of each monitoring well will be determined.
  - b. The accuracy of horizontal and vertical measurements to be obtained.
  - c. The California licensed professional (licensed land surveyor or civil engineer) to perform the survey.
5. Proposed Groundwater Monitoring:
- a. Schedule (at least 48 hours after well development).
  - b. Depth to groundwater measuring equipment (e.g., electric sounder or chalked tape capable of  $\pm 0.01$ -foot measurements).
  - c. Well purging method, equipment, and amount of purge water.
  - d. Sample collection (e.g., bottles and preservation methods), handling procedures, and holding times.
  - e. Quality assurance/quality control (QA/QC) procedures (as appropriate).
  - f. Analytical procedures.
  - g. Equipment decontamination procedures (as appropriate).
6. Proposed Schedule:
- a. Fieldwork.
  - b. Laboratory analyses.
  - c. Report submittal.

## MONITORING WELL INSTALLATION COMPLETION REPORT

Within **90 days** of installation of a groundwater monitoring well(s), a Monitoring Well Installation Completion Report (MWICR) shall be submitted. At a minimum, the MWICR shall summarize the field activities as described below.

1. General Information:
  - a. Brief overview of field activities including well installation summary (such as number, depths), and description and resolution of difficulties encountered during field program.
  - b. Topographic map showing any existing nearby domestic, irrigation, and municipal supply wells and monitoring wells, utilities, surface water bodies, drainage courses and their tributaries/destinations, and other major physical and man-made features.
  - c. Site plan showing monitoring well locations, other existing wells, unused and/or abandoned wells, major physical site structures, any waste handling facilities, and on-site surface water features.
  - d. Period of field activities and milestone events (e.g., distinguish between dates of well installation, development, and sampling).
  
2. Monitoring Well Construction:
  - a. Number and depths of monitoring wells installed.
  - b. Monitoring well identification (i.e., numbers).
  - c. Date(s) of drilling and well installation.
  - d. Description of monitoring well locations including field-implemented changes (from proposed locations) due to physical obstacles or safety hazards.
  - e. Description of drilling and construction, including equipment, methods, and difficulties encountered (such as hole collapse, lost circulation, need for fishing).
  - f. Name of drilling company, driller, and logger (site geologist to be identified).
  - g. As-builts for each monitoring well with the following details:
    - i. Well identification.
    - ii. Total borehole and well depth.
    - iii. Date of installation.
    - iv. Boring diameter.
    - v. Casing material and diameter (include conductor casing, if appropriate).
    - vi. Location and thickness of slotted casing, perforation size.
    - vii. Location, thickness, type, and size of filter pack.
    - viii. Location and thickness of bentonite seal.
    - ix. Location, thickness, and type of annular seal.
    - x. Depth of surface seal.
    - xi. Type of well cap.
    - xii. Type of surface completion.
    - xiii. Depth to water (note any rises in water level from initial measurement) and date of measurement.
    - xiv. Well protection device (such as below-grade water tight vaults, stovepipe, bollards, etc.).

- h. All depth to groundwater measurements during field program.
  - i. Field notes from drilling and installation activities (e.g., all subcontractor dailies, as appropriate).
  - j. Construction summary table of pertinent information such as date of installation, well depth, casing diameter, screen interval, bentonite seal interval, and well elevation.
  - k. Detailed geologic log of subsurface materials encountered.
  - l. Complete geophysical logs and corresponding interpretations.
3. Monitoring Well Development:
- a. Date(s) and time of development.
  - b. Name of developer.
  - c. Method of development.
  - d. Methods used to identify completion of development.
  - e. Development log: volume of water purged and measurements of temperature, pH and electrical conductivity during and after development.
  - f. Disposition of development water.
  - g. Field notes (such a bailing to dryness, recovery time, number of development cycles).
4. Monitoring Well Survey:
- a. Identify coordinate system or reference points used.
  - b. Description of measuring points (i.e. ground surface, top of casing, etc.).
  - c. Horizontal and vertical coordinates of well casing with cap removed.
  - d. Name, license number, and signature of California licensed professional who conducted survey.
  - e. Surveyor's field notes.
  - f. Tabulated survey data.

### REPORTING REQUIREMENTS

All Quarterly monitoring results shall be combined and reported in **Semi-Annual Monitoring Reports**, which are due as follows:

First-Semiannual Monitoring Report:	<b>1 August</b>
First Quarter results (January - March)	
Second Quarter results (April – June)	
Second-Semiannual Monitoring Report:	<b>1 February</b>
Third Quarter results (July – September)	
Fourth Quarter results (October – December)	
Facility Inspection Report (Completed by 30 October):	<b>30 November</b>

**A transmittal letter shall accompany each monitoring report.** The transmittal letter shall discuss any exceedances of applicable effluent or groundwater limitations or other instances of non-compliance that occurred during the reporting period and all corrective actions taken or planned, such as operation or facility modifications. If the Discharger has previously submitted a report describing corrective actions or a time schedule for implementing the corrective actions, reference to the previous correspondence is satisfactory. **Reports shall be submitted whether or not there is a discharge.**

The Discharger shall **submit electronic copies** of all work plans, reports, analytical results, and groundwater elevation data via electronic mail to [CentralValleyFresno@waterboards.ca.gov](mailto:CentralValleyFresno@waterboards.ca.gov) and over the Internet to the State Water Board Geographic Environmental Information Management System database (GeoTracker) at [http://www.waterboards.ca.gov/ust/electronic\\_submittal/index.shtml](http://www.waterboards.ca.gov/ust/electronic_submittal/index.shtml)

A frequently asked question document for GeoTracker can be found at: [http://www.waterboards.ca.gov/ust/electronic\\_submittal/docs/faq.pdf](http://www.waterboards.ca.gov/ust/electronic_submittal/docs/faq.pdf)

Electronic submittals to GeoTracker shall comply with GeoTracker standards and procedures, as specified on the State Water Board's web site. All submittals including uploads to GeoTracker shall be completed on or prior to the due date.

In addition, a hardcopy of each document shall be submitted to:

California Regional Water Quality Control Board  
Central Valley Region  
1685 E Street, Suite 200  
Fresno, CA 93706  
Attn: Ronald E. Holcomb

GeoTracker Site Global ID: **L10007494132**  
CIWQS Place ID: **209130** for **BELGIAN ANTICLINE, MCKITTRICK 1 & 1-3 FACILITY**

The following information is to be included on all monitoring reports, as well as report transmittal letters:

Valley Water Management Company  
Belgian Anticline, McKittrick 1 & 1-3  
Waste Discharge Requirements 69-19901  
Monitoring and Reporting Program R5-2018-0808  
GeoTracker Site Global ID: L10007494132  
CIWQS Place ID: 209130

In reporting monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible for all historical and current data. The data shall be summarized in such a manner that illustrates clearly, whether the Discharger complies with waste discharge requirements.

If the Discharger monitors any constituent at the locations designated herein more frequently than is required by this Order, the results of such monitoring shall be included in the calculation and reporting of the values required in the semi-annual monitoring reports. Such increased frequency shall be indicated on the semi-annual monitoring reports.

All monitoring reports shall comply with the signatory requirements in Standard Provision B.3. All monitoring reports that involve planning, investigation, evaluation, or design, or other work requiring interpretation and proper application of engineering or geologic sciences, shall be

prepared by or under the direction of persons registered to practice in California pursuant to California Business and Professions Code sections 6735, 7835, and 7835.1.

**A. All Semi-Annual Monitoring Reports shall include the following:**

**Produced Wastewater reporting:**

1. Tabular summary of current and historical results of effluent discharges as specified on page 5.
2. For each month of the quarter, calculation of monthly effluent flow and the historical monthly effluent flow for the last 12-months. Historical annual effluent flow data in tabular summary.
3. For each quarter, include a current and historical table of **sampling data** for each wastewater sample point. In addition, each quarter, include a data table for current and historical wastewater sample data for all electrical conductivity (EC), total dissolved solids (TDS), boron, dissolved sodium, potassium, dissolved calcium, dissolved magnesium, chloride, alkalinity as CaCO<sub>3</sub>, dissolved sulfate, isotopes for oxygen (<sup>18</sup>O), and deuterium (Hydrogen 2, <sup>2</sup>H, or D) concentrations.

**Facility reporting:**

1. Monthly freeboard results as specified on MRP page 7.
2. The results of Facility inspections conducted during each quarter as specified on MRP page 7 and 8.
3. Rainfall data as specified on MRP page 8.

**Chemical and Additive reporting:**

1. Tabular summary of current and historical data required as specified on MRP page 6.
2. Safety Data Sheets for all chemicals and additives that are identified in semi-annual monitoring reports for that respective calendar year.
3. Tabular summary of current and historical annual volume and mass for all chemicals and additives.
4. Summary that identifies if any chemicals and additives were detected in produced wastewater discharge to the Facility ponds or groundwater.

**Solid Waste reporting:**

1. The results of solid Waste monitoring specified on MRP pages 6 and 7, including the nature, volume, and weight in dry tons of solid waste produced during each quarter.
2. Tabular summary of current and historical analytical results characterizing the solid waste, and particularly, whether the waste is hazardous as defined in California Code of Regulations, title 22, section 66261.
3. The method of disposal and disposal locations of the solid wastes.
4. If wastes are hauled to a disposal facility, evidence that the disposal facility is properly permitted.

**Groundwater reporting:**

1. The results of groundwater monitoring specified on page 8.

2. For each monitoring well, a table showing constituent concentrations for current and historical concentrations. In addition, for each quarter, include a data table for current and historical groundwater sample data for all electrical conductivity (EC), total dissolved solids (TDS), boron, dissolved sodium, potassium, dissolved calcium, dissolved magnesium, chloride, alkalinity as CaCO<sub>3</sub>, dissolved sulfate, isotopes for oxygen (<sup>18</sup>O), and deuterium (Hydrogen 2, <sup>2</sup>H, or D) concentrations.
3. A groundwater contour map based on groundwater elevations for each quarter. The map shall show the gradient and direction of groundwater flow under/around the facility and/or effluent disposal area(s). The map shall also include the locations of monitoring wells and wastewater storage and discharge areas.
4. Provide a current isoconcentration map of groundwater data for EC, chloride, and boron concentrations.

**Laboratory Reports:**

1. Laboratory reports submitted in compliance with this MRP shall be accompanied by an **Excel file** that includes the analytical data found in the laboratory report. Excel files need to be generated by the laboratory, or compiled by the Discharger. At a minimum, the Excel file shall include the constituent name, sample location, sample name, sample date, analysis date, analytical method, result, unit, MDL, RL, and dilution factor. Excel files shall either be mailed to the Central Valley Water Board Office in an electronic storage device, or sent via electronic mail to [CentralValleyFresno@waterboards.ca.gov](mailto:CentralValleyFresno@waterboards.ca.gov). Either method of delivery needs to include, at a minimum, a copy of the transmittal letter.

- B. Second-Semiannual Monitoring Reports**, in addition to the above, by **1 February** of each year, the Discharger shall submit a written report to the Executive Officer containing the following:

**Facility information:**

1. The names and general responsibilities of all persons employed to operate the produced wastewater treatment systems.
2. The names and telephone numbers of persons to contact regarding the Facility for emergency and routine situations.
3. A statement certifying when the flow meters and other monitoring instruments and devices were last calibrated, including identification of who performed the calibration (Standard Provision C.4).
4. A summary of all spills/releases, if any, that occurred during the year at the production facility, tasks undertaken in response to the spills, and the results of the tasks undertaken.
5. A summary of the chemical and additive data collected under the Chemical and Additive Monitoring section, the required Material Safety Data Sheets (MDSs) / Safety Data Sheets (SDSs) sheets, and a discussion of whether any of the chemicals or additives were found in effluent discharges.
6. A flow chart (i.e. diagram that clearly illustrates all processes that produced wastewater undergoes within the Facility up to discharge to the ponds) and map of the following:
  - Facility within the oil field,

- Facility/Lease boundaries
- Facility produced wastewater distribution network with all discharge points to the ponds or land.
- Wastewater flow direction within the Facility's ponds.

**Requesting Administrative Review by the State Water Board.** Any person aggrieved by an action of the Central Valley Water Board that is subject to review as set forth in Water Code section 13320(a), may petition the State Water Board to review the action. Any petition must be made in accordance with Water Code section 13320 and California Code of Regulations, title 23, section 2050 and following. The State Water Board must receive the petition within thirty (30) days of the date the action was taken, except that if the thirtieth day following the date the action was taken falls on a Saturday, Sunday, or state holiday, then the State Water Board must receive the petition by 5:00 p.m. on the next business day. Copies of the laws and regulations applicable to filing petitions may be found on the internet at

[http://www.waterboards.ca.gov/public\\_notices/petitions/water\\_quality/index.shtml](http://www.waterboards.ca.gov/public_notices/petitions/water_quality/index.shtml)  
or will be provided upon request.

**Modifications.** Any modification to this Monitoring and Reporting Program shall be in writing and approved by the Executive Officer, including any extensions. Any written extension request by the Discharger shall include justification for the delay.

This monitoring and reporting program shall be effective on the signature date below.

Ordered by:   
PATRICK PULUPA, Incoming Executive Officer for  
PAMELA C. CREEDON, Executive Officer

April 9, 2018  
(Date)



**Table I – Effluent Monitoring**

<b>Parameters</b>	<b>Units</b>	<b>Monitoring Frequency</b>	<b>US EPA or other Method<sup>9</sup></b>	<b>Reporting Frequency</b>
<b>Field Parameters</b>				
Temperature	°F <sup>1</sup>	Quarterly	Meter	Quarterly
Electrical Conductivity	µmhos/cm <sup>2</sup>	Quarterly	Meter	Quarterly
pH	pH units	Quarterly	Meter	Quarterly
<b>Monitoring Parameters</b>				
Total Dissolved Solids (TDS)	mg/L <sup>3</sup>	Quarterly	160.1	Quarterly
Total Suspended Solids (TSS)	mg/L	Quarterly	160.2	Quarterly
Total Organic Carbon (TOC)	mg/L	Quarterly	415.3	Quarterly
Electrical Conductivity	µmhos/cm	Quarterly	2510B	Quarterly
Boron, dissolved	mg/L	Quarterly	6010B	Quarterly
<b>Standard Minerals</b>				
Alkalinity as CaCO <sub>3</sub>	mg/L	Quarterly	310.1	Quarterly
Bicarbonate Alkalinity as CaCO <sub>3</sub>	mg/L	Quarterly	310.1	Quarterly
Carbonate Alkalinity as CaCO <sub>3</sub>	mg/L	Quarterly	310.1	Quarterly
Hydroxide Alkalinity as CaCO <sub>3</sub>	mg/L	Quarterly	310.1	Quarterly
Sulfate, dissolved	mg/L	Quarterly	300.0	Quarterly
Total Kjeldahl Nitrogen	mg/L	Quarterly	351.3	Quarterly
Nitrate as NO <sub>3</sub>	mg/L	Quarterly	353.2	Quarterly
Nitrite as NO <sub>2</sub>	mg/L	Quarterly	300.0	Quarterly
Ammonia NH <sub>3</sub>	mg/L	Quarterly	350.1	Quarterly
Ammonium NH <sub>4</sub>	mg/L	Quarterly	350.2	Quarterly
Nitrate-N, dissolved	mg/L	Quarterly	300.0	Quarterly
Calcium, dissolved	mg/L	Quarterly	6010B	Quarterly
Magnesium, dissolved	mg/L	Quarterly	6010B	Quarterly
Sodium, dissolved	mg/L	Quarterly	6010B	Quarterly
Potassium	mg/L	Quarterly	6010B	Quarterly
Chloride	mg/L	Quarterly	300.0	Quarterly
<b>PAHs<sup>4</sup></b>	µg/L <sup>5</sup>	Quarterly	8270	Quarterly
<b><u>Total Petroleum Hydrocarbons (TPH)</u></b>	µg/L	Quarterly	418.1	Quarterly

**Table I – Effluent Monitoring**

<b>Parameters</b>	<b>Units</b>	<b>Monitoring Frequency</b>	<b>US EPA or other Method<sup>9</sup></b>	<b>Reporting Frequency</b>
<b><u>Volatile Organic Compounds</u></b>				
Full Scan	µg/L	Quarterly	8260B	Quarterly
<b><u>Oil and Grease</u></b>				
	mg/L	Quarterly	1664A	Quarterly
<b><u>Stable Isotopes</u></b>				
Oxygen ( <sup>18</sup> O)	pCi/L <sup>6</sup>	Quarterly	900.0	Annually
Deuterium (Hydrogen 2, <sup>2</sup> H, or D)	pCi/L	Quarterly	900.0	Annually
<b><u>Radionuclides</u></b>				
Radium-226	pCi/L	Quarterly	SM <sup>7</sup> 7500-Ra	Quarterly
Radium-228	pCi/L	Quarterly	SM 7500-Ra	Quarterly
Gross Alpha particle (excluding radon and uranium)	pCi/L	Quarterly	SM 7110	Quarterly
<b><u>Other Constituents</u></b>				
Lithium	mg/L	Quarterly	200.7	Quarterly
Strontium	mg/L	Quarterly	200.7	Quarterly
Iron	mg/L	Quarterly	200.8	Quarterly
Manganese	mg/L	Quarterly	200.8	Quarterly
Antimony	mg/L	Quarterly	200.8	Quarterly
Arsenic	mg/L	Quarterly	200.8	Quarterly
Barium	mg/L	Quarterly	200.8	Quarterly
Beryllium	mg/L	Quarterly	200.8	Quarterly
Cadmium	mg/L	Quarterly	200.8	Quarterly
Chromium (total)	mg/L	Quarterly	200.8	Quarterly
Chromium (hexavalent)	mg/L	Quarterly	7196A	Quarterly
Cobalt	mg/L	Quarterly	200.8	Quarterly
Copper	mg/L	Quarterly	200.8	Quarterly
Lead	mg/L	Quarterly	200.8	Quarterly
Mercury	mg/L	Quarterly	7470A	Quarterly
Molybdenum	mg/L	Quarterly	200.8	Quarterly
Nickel	mg/L	Quarterly	200.8	Quarterly
Selenium	mg/L	Quarterly	200.8	Quarterly
Silver	mg/L	Quarterly	200.8	Quarterly

**Table I – Effluent Monitoring**

<b>Parameters</b>	<b>Units</b>	<b>Monitoring Frequency</b>	<b>US EPA or other Method<sup>9</sup></b>	<b>Reporting Frequency</b>
Thallium	mg/L	Quarterly	200.8	Quarterly
Vanadium	mg/L	Quarterly	200.8	Quarterly
Zinc	mg/L	Quarterly	200.8	Quarterly
<b>Oil Production and Process Chemicals and Additives<sup>8</sup></b>	µg/L	Quarterly	As Appropriate <sup>9</sup>	Annually

<sup>1</sup> Degrees Fahrenheit

<sup>2</sup> Micromhos per centimeter

<sup>3</sup> Milligrams per liter

<sup>4</sup> Polycyclic aromatic hydrocarbons

<sup>5</sup> Micrograms per liter

<sup>6</sup> Picocuries per liter

<sup>7</sup> Standard Methods

<sup>8</sup> The Discharger shall provide analytical results for all chemicals and additives used in the exploration, production, and/or processing of all oil and the treatment of produced wastewater discharged to land (e.g., ponds, roads, etc.) as described under the Chemical and Additive Monitoring section of the MRP for which there are ELAP approved analyses. For those constituents for which there are not ELAP approved analytical methods, the Discharger shall submit a technical report describing how it intends to address this issue.

<sup>9</sup> Alternative analytical methods may be proposed by the Discharger, but are subject to the approval of the Assistant Executive Officer

**Table II – Groundwater Monitoring**

<b>Parameters</b>	<b>Units</b>	<b>Monitoring Frequency</b>	<b>US EPA or other Method</b>	<b>Reporting Frequency</b>
<b>Groundwater Elevation</b>	feet & hundredths, MSL <sup>1</sup>	Quarterly		Quarterly
<b>Field Parameters</b>				
Temperature	°F <sup>2</sup>	Quarterly	Meter	Quarterly
Electrical Conductivity	µmhos/cm <sup>3</sup>	Quarterly	Meter	Quarterly
pH	pH units	Quarterly	Meter	Quarterly
<b>Monitoring Parameters</b>				
Total Dissolved Solids (TDS)	mg/L <sup>4</sup>	Quarterly	160.1	Quarterly
Electrical Conductivity	µmhos/cm	Quarterly	2510B	Quarterly
Total Organic Carbon (TOC)	mg/L	Quarterly	415.3	Quarterly
Boron, dissolved	mg/L	Quarterly	6010B	Quarterly
<b>Standard Minerals</b>				
Alkalinity as CaCO <sub>3</sub>	mg/L	Quarterly	310.1	Quarterly
Bicarbonate Alkalinity as CaCO <sub>3</sub>	mg/L	Quarterly	310.1	Quarterly
Carbonate Alkalinity as CaCO <sub>3</sub>	mg/L	Quarterly	310.1	Quarterly
Hydroxide Alkalinity as CaCO <sub>3</sub>	mg/L	Quarterly	310.1	Quarterly
Sulfate, dissolved	mg/L	Quarterly	300.0	Quarterly
Total Kjeldahl Nitrogen	mg/L	Quarterly	351.3	Quarterly
Nitrate as NO <sub>3</sub>	mg/L	Quarterly	353.2	Quarterly
Nitrite as NO <sub>2</sub>	mg/L	Quarterly	300.0	Quarterly
Ammonia NH <sub>3</sub>	mg/L	Quarterly	350.1	Quarterly
Ammonium NH <sub>4</sub>	mg/L	Quarterly	350.2	Quarterly
Nitrate-N, dissolved	mg/L	Quarterly	300.0	Quarterly
Calcium, dissolved	mg/L	Quarterly	6010B	Quarterly
Magnesium, dissolved	mg/L	Quarterly	6010B	Quarterly
Sodium, dissolved	mg/L	Quarterly	6010B	Quarterly
Potassium	mg/L	Quarterly	6010B	Quarterly
Chloride	mg/L	Quarterly	300.0	Quarterly
<b>PAHs<sup>5</sup></b>	µg/L <sup>6</sup>	Quarterly	8270	Quarterly

**Table II – Groundwater Monitoring**

<b>Parameters</b>	<b>Units</b>	<b>Monitoring Frequency</b>	<b>US EPA or other Method</b>	<b>Reporting Frequency</b>
<b>Total Petroleum Hydrocarbons (TPH)</b>	µg/L	Quarterly	418.1	Quarterly
<b>Volatile Organic Compounds</b>				
Full Scan	µg/L	Quarterly	8260B	Quarterly
<b>Oil and Grease</b>	mg/L	Quarterly	1664A	Quarterly
<b>Stable Isotopes</b>				
Oxygen ( <sup>18</sup> O)	pCi/L <sup>7</sup>	Quarterly	900.0	Quarterly
Deuterium (Hydrogen 2, <sup>2</sup> H, or D)	pCi/L	Quarterly	900.0	Quarterly
<b>Radionuclides</b>				
Radium-226	pCi/L	Quarterly	SM <sup>8</sup> 7500-Ra	Quarterly
Radium-228	pCi/L	Quarterly	SM 7500-Ra	Quarterly
Gross Alpha particle (excluding radon and uranium)	pCi/L	Quarterly	SM 7110	Quarterly
<b>Other Constituents</b>				
Lithium	mg/L	Quarterly	200.7	Quarterly
Strontium	mg/L	Quarterly	200.7	Quarterly
Iron	mg/L	Quarterly	200.8	Quarterly
Manganese	mg/L	Quarterly	200.8	Quarterly
Antimony	mg/L	Quarterly	200.8	Quarterly
Arsenic	mg/L	Quarterly	200.8	Quarterly
Barium	mg/L	Quarterly	200.8	Quarterly
Beryllium	mg/L	Quarterly	200.8	Quarterly
Cadmium	mg/L	Quarterly	200.8	Quarterly
Chromium (total)	mg/L	Quarterly	200.8	Quarterly
Chromium (hexavalent)	mg/L	Quarterly	7196A	Quarterly
Cobalt	mg/L	Quarterly	200.8	Quarterly
Copper	mg/L	Quarterly	200.8	Quarterly
Lead	mg/L	Quarterly	200.8	Quarterly
Mercury	mg/L	Quarterly	7470A	Quarterly
Molybdenum	mg/L	Quarterly	200.8	Quarterly

**Table II – Groundwater Monitoring**

<b>Parameters</b>	<b>Units</b>	<b>Monitoring Frequency</b>	<b>US EPA or other Method</b>	<b>Reporting Frequency</b>
Nickel	mg/L	Quarterly	200.8	Quarterly
Selenium	mg/L	Quarterly	200.8	Quarterly
Silver	mg/L	Quarterly	200.8	Quarterly
Thallium	mg/L	Quarterly	200.8	Quarterly
Vanadium	mg/L	Quarterly	200.8	Quarterly
Zinc	mg/L	Quarterly	200.8	Quarterly
<b>Oil Production and Process Chemicals and Additives<sup>9</sup></b>	µg/L	Quarterly	As Appropriate <sup>10</sup>	Annually

<sup>1</sup> Mean Sea Level

<sup>2</sup> Degrees Fahrenheit

<sup>3</sup> Micromhos per centimeter

<sup>4</sup> Milligrams per liter

<sup>5</sup> Polycyclic aromatic hydrocarbons

<sup>6</sup> Micrograms per liter

<sup>7</sup> Picocuries per liter

<sup>8</sup> Standard Methods

<sup>9</sup> The Discharger shall provide analytical results for all chemicals and additives used in the exploration, production, and/or processing of all oil and the treatment of produced wastewater discharged to land (e.g., ponds, roads, etc.) as described under the Chemical and Additive Monitoring section of the MRP for which there are ELAP approved analyses. For those constituents for which there are not ELAP approved analytical methods, the Discharger shall submit a technical report describing how it intends to address this issue.

<sup>10</sup> Appropriate analytical methods may be proposed by the Discharger but are subject to the approval of the Executive Officer