



Central Valley Regional Water Quality Control Board

22 April 2019

Geir Utne Berg, CEO
CMO, Inc.
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Bakersfield, CA 93706

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NOTICE OF APPLICABILITY (NOA), CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD, ORDER NUMBER R5-2017-0035, WASTE DISCHARGE REQUIREMENTS FOR OIL FIELD DISCHARGES TO LAND, GENERAL ORDER NUMBER TWO, CMO, INC., MITCHEL LEASE, CHICO MARTINEZ OIL FIELD, KERN COUNTY

CMO, Inc. (CMO) operates the Mitchel Lease (Lease) in the Chico Martinez Oil Field. Three unlined surface impoundments (ponds) are used for the disposal of oil field produced wastewater (discharge). The ponds are in the southeast corner of the southwest corner of Section 35, T28S, R20E, MDB&M. Pond #1 is 110 feet (ft.) by 95 ft., by 16 ft. deep. Pond #2 is 95 ft. by 45 ft., by 9 ft. deep. Pond #3 is 190 ft. by 140 ft., by 16 ft. deep.

On 11 February 2016, Central Valley Regional Water Quality Control Board (Central Valley Water Board) staff issued Cleanup and Abatement Order R5-2016-0705 (CAO) to CMO. In response to the CAO, CMO submitted a document prepared by Geosyntec Consultants (Geosyntec Consultants), dated 1 June 2016, and titled "*Hydrogeological Site Characterization Work Plan ...*" (Work Plan). The Work Plan included a proposal for the installation of three groundwater monitoring wells. A Central Valley Water Board staff letter dated 10 August 2018 conditionally approved the Work Plan and requested either that a Notice of Intent (NOI) for coverage of discharges into the ponds under a General Order be submitted or that a closure plan for the ponds be provided.

In response, CMO representatives submitted: 1) a letter from Geosyntec Consultants dated 28 September 2018 and titled, "*Notice of Intent to Obtain coverage under General Order R5-2017-035 for Oil Field Discharges to Land and Schedule for Work Plan Implementation, Chico Martinez Oil Field, Kern County*"; 2) a document, dated 12 October 2018, and titled "*Technical Report for General Order R5-2017-0035, Chico Martinez Oil Field, Kern County, California, GeoTracer Site Global ID: L10004438026*" (NOI Technical Report); 3) a letter dated 11 October 2018 that included a completed Form 200, titled "*Application/Report of Waste Discharge...*" and dated 28 September 2018, and an application fee; and , 4) a letter and technical report, both dated 11 January 2019 and titled "*Addendum to Technical Report for General Order R5-2017-0035...*" (NOI Addendum).

Central Valley Water Board staff have reviewed the above noted letters, the NOI Technical Report, and the NOI Addendum. Central Valley Water Board staff comments associated with the review of CMO letters and documents are included in the enclosed memorandum.

This letter serves as formal notice that General Order Two is applicable to the Lease. General Order Number **R5-2017-0035-009** is hereby assigned to all produced wastewater discharges into the ponds. CMO should become familiar with all of the requirements, time schedules, prohibitions, and provisions of General Order Two; and, Monitoring and Reporting Program R5-2017-0035 (MRP).

The MRP for General Order Two requires the submittal of a Monitoring Well Installation and Sampling Plan (MWISP). The Work Plan dated 1 June 2016 and conditionally approved in the Central Valley Water Board staff letter dated 10 August 2018 satisfies the requirements within the MRP for General Order Two to submit a MWISP. CMO will need to implement the scope of work described in the 1 June 2016 Work Plan in order to satisfy the groundwater investigation requirements of the CAO and the groundwater monitoring requirements of General Order Two.

As stated in Water Code section 13263, all discharges of waste into waters of the state are privileges, not rights. General Order Two does not create a vested right for CMO to continue the discharges of waste to the pond. Failure to prevent conditions that create or threaten to create pollution or nuisance or cause degradation will be sufficient reason to modify, revoke, or enforce the provisions of General Order Two, as well as prohibit further discharge.

In 2006, the Central Valley Water Board, the State Water Resources Control Board (State Water Board), and regional stakeholders began a joint effort to address salinity and nitrate problems in the region and adopt long-term solutions that will lead to enhanced water quality and economic sustainability. Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS) is a collaborative basin planning effort aimed at developing and implementing a comprehensive salinity and nitrate management program. The CV-SALTS effort might effect changes to the Water Quality Control Plan for the Tulare Lake Basin (Basin Plan) that would necessitate the re-opening of General Order Two.

FACILITY SPECIFIC REQUIREMENTS

1. CMO shall maintain exclusive control of the discharge and shall comply with all of the requirements and timelines of General Order Two and the MRP.
2. The required annual fee specified in the annual billing from the State Water Board shall be paid until coverage under General Order Two is officially terminated. CMO must notify the Central Valley Water Board in writing to request termination.
3. Under Discharge Specifications, Item B.1., General Order Two states: *“The discharge flow shall not exceed actual maximum monthly average produced wastewater flow to the pond between 26 November 2004 and 26 November 2014. The discharge flow also shall not exceed the maximum design flow of the Facility’s limiting unit as described by the technical data in the NOI.”* In addition, General Order Two, Discharge Specification B.10 requires that the operating freeboard in any pond shall never be less than two feet.

The maximum average monthly effluent flow to the ponds between 26 November 2004 and 26 November 2014 was identified in the NOI Addendum as 110,319 barrels (bbls) or

4,633,398 gallons (gal). CMO shall not exceed this maximum monthly discharge volume. This allowable monthly discharge volume cannot be used as a justification for overtopping the ponds or for maintaining less than the required minimum two feet of freeboard within the ponds.

4. CMO shall not discharge produced wastewater outside of the ponds except for a permitted dust control use. If CMO intends to apply for use of produced wastewater for dust control, a proposed management plan as described in Provision E.5 of General Order Two must be submitted at least **90 days** prior to the anticipated discharges.
5. **By 22 July 2019**, CMO shall, pursuant to Provision E.3 of General Order Two, submit written certification that acceptable flow meters have been installed at a location or locations to ensure the accurate measurement of all discharge flows. The certification shall be accompanied by: (1) a description of the flow metering devices installed, (2) a diagram showing their locations, and (3) evidence demonstrating that the devices were properly calibrated. An engineered alternative may be used if approved in writing by the Central Valley Water Board's Executive Officer.
6. CMO shall operate and maintain all ponds sufficiently to protect the integrity of containment and berms and prevent overtopping and/or structural failure. Discharges not authorized by the General Order and not described in the NOI Technical Report should be reported to the Central Valley Water Board Fresno office. Discharge of wastes other than those described in the NOI Technical Report is prohibited. If the method of waste disposal changes, CMO must submit a Report of Waste Discharge (Form 200).
7. General Order Two, Prohibition A.5 states "The discharge of produced wastewater from wells containing well stimulation treatment fluids is prohibited except as provided by Provision E.7." The NOI Addendum stated that "*CMO has performed well stimulation treatment as defined under CCR title 14, section 1761(a) in the past. Within 3 months after receipt of an NOA from the Water Board, CMO will submit a work plan to conduct studies necessary to demonstrate that the discharges of produced wastewater from stimulated wells do not contain well stimulation fluids in concentrations that could adversely affect beneficial uses of waters.*"

CMO shall comply with the compliance schedule in General Order Two, Provision E.7. and, **by 22 July 2019**, submit either: 1) a work plan to conduct studies necessary to demonstrate that the discharges of produced wastewater from wells that have been stimulated do not contain well stimulation treatment fluids in concentrations that could adversely affect beneficial uses of waters; or, 2) a work plan for an alternate disposal method for wastewater discharges from wells with a history of, or are planned to receive a "well stimulation treatment."

8. General Order Two Discharge Specifications, Item B.15., requires that the Discharger monitor the accumulation of solids within the ponds and as necessary remove them to maintain adequate treatment storage and capacity. General Order Two's Section D.,

titled "Solids Disposal Specifications" includes handling and storage requirements for solids removed. General Order Two Provision Item E.6., states that dischargers reusing solids for road mix, as described in Solids Disposal Specifications, shall submit a solids management plan for approval by the Executive Officer within 60 days of receipt of the NOA and at least 180 days prior to any solids reuse.

The NOI does not contain information regarding stormwater runoff from the Lease or if the Lease has, or is exempt from having, a National Pollutant Discharge Elimination System (NPDES) Permit for stormwater discharges. Order Number 2014-0057-DWQ (NPDES General Permit CAS000001) specifies waste discharge requirements for discharges of storm water associated with industrial activities. When submitting the solids management plan described above, CMO needs to evaluate if the Lease needs or is exempt from needing a NPDES permit for stormwater discharges.

The MRP requires extensive monitoring requirements. Failure to comply with the requirements in General Order Two and the MRP could result in an enforcement action as authorized by provisions of the California Water Code. A copy of General Order Two and the MRP is included with the enclosures to this notice. A copy can also be found online at: https://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/general_orders/r/5-2017-0035.pdf.

The MRP includes monitoring and reporting of chemicals and additives. CMO should become familiar with those requirements. The Central Valley Water Board will review the MRP periodically and revise requirements when necessary. The MRP can be modified if CMO 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, CMO may request the 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.

CMO must comply with the Central Valley Water Board's Standard Provisions and Reporting Requirements for Waste Discharge Requirements, dated 1 March 1991 (Standard Provisions). A copy of the Standard Provisions is included with the enclosures to this notice. A copy can also be found online at: https://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/std_provisions/wdr-mar1991.pdf.

Any person aggrieved by this action of the Central Valley Water Board may petition the State Water Board to review this action in accordance with Water Code section 13320 and CCR, title 23, division 3, chapter 6, section 2050 and those that follow. The State Water Board must receive the petition by 5:00 p.m., 30 days after the date of this Notice of Applicability, except that if the thirtieth day following the date falls on a Saturday, Sunday, or state holiday, the petition must be received by the State Water Board by 5:00 p.m. on the next business day.

SUBMISSIONS

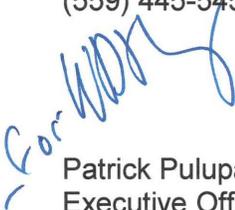
CMO shall submit electronic copies of all work plans, reports, analytical results, and groundwater elevation data over the internet to the State Water Board Geographic Environmental Information Management System database (GeoTracker) at http://www.waterboards.ca.gov/ust/electronic_submittal/index.shtml.

A frequently asked question document for GeoTracker can be found at http://www.waterboards.ca.gov/ust/electronic_submittal/docs/faq.pdf.

Electronic submittals shall comply with GeoTracker standards and procedures, as specified on the State Water Board's web site. Uploads to GeoTracker shall be completed on or prior to the due date. The Geotracker site Global I.D. number that is associated with this NOA is L10004438026.

In addition, documents that are less than 50 MB shall be sent via electronic mail to: centralvalleyfresno@waterboards.ca.gov. Documents that are 50 MB or larger shall be transferred to a disk and mailed to the Central Valley Water Board office at 1685 E Street, Fresno, CA 93706.

If you have any questions regarding this matter, please contact Zachary Jarvie of this office at (559) 445-5455 or at zachary.jarvie@waterboards.ca.gov.


Patrick Pulupa
Executive Officer

Enclosures: 24 April 2019 Memorandum
1 March 1991 Standard Provisions
General Order Two

cc: Cameron Campbell, District Deputy, Division of Oil Gas and Geothermal Resources,
Bakersfield (NOA and Memorandum only, Via Email)
Lisa Van Tassell, Senior Principle, Geosyntec Consultants, Inc., Oakland
Lea Kane, Senior Geologist, Geosyntec Consultants, Inc., Oakland
(NOA and Memorandum only, Via Email)
Andrew Grinberg, National Campaigns Special Projects Manager, Clean Water Action
(NOA and Memorandum only, Via Email)
Bill Allayaud, California Director of Government Affairs, Environmental Working Group
(NOA and Memorandum only, Via Email)

Central Valley Regional Water Quality Control Board

TO: Clay Rodgers
Assistant Executive Officer

W. Dale Harvey
Supervising Engineer
RCE No. 55628

FROM: Michael L. Pfister *M.L.P.*
Senior Engineering Geologist
PG No. 5946

Zachary J. Jarvie *M.L.P. for Z.J.J.*
Engineering Geologist
PG No. 9662

DATE: 22 April 2019

SUBJECT: NOTICE OF APPLICABILITY (NOA), CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD, ORDER NUMBER R5-2017-0035, WASTE DISCHARGE REQUIREMENTS FOR OIL FIELD DISCHARGES TO LAND, GENERAL ORDER NUMBER TWO, CMO, INC., MITCHEL LEASE, CHICO MARTINEZ OIL FIELD, KERN COUNTY

CMO, Inc. (CMO) operates the Mitchel Lease (Lease) in the Chico Martinez Oil Field. Three unlined surface impoundments (ponds) are used for the disposal of oil field produced wastewater (discharge). The ponds are in the southeast corner of the southwest corner of Section 35, T28S, R20E, MDB&M. This memorandum provides a summary and evaluation of the information provided for coverage of the ponds under Order Number R5-2017-0035, Waste Discharge Requirements General Order For Oil Field Discharges to Land, General Order Number Two (General Order Two).

BACKGROUND INFORMATION

General Order Two regulates oil field wastewater discharges that exceed the maximum oil field discharge limits for electrical conductivity, chloride, and boron contained in the "Water Quality Control Plan for the Tulare Lake Basin, Third Edition, Revised May 2018" (Basin Plan).

SUBMITTED INFORMATION AND RECENT REGULATORY HISTORY

On 21 January 2014 the Central Valley Regional Water Quality Control Board (Central Valley Water Board) received a complaint regarding disposal of produced wastewater on the Lease and adjacent property.

On 11 February 2014 Central Valley Water Board staff inspected the Lease. As a result of this inspection, Central Valley Water Board staff issued to CMO a Notice of Violation (NOV) dated 28 February 2014. The NOV stated that wastewater discharge to land and to the ponds was in violation of Section 13260 of the California Water Code for failing to submit a Report of Waste Discharge. Central Valley Water Board staff also issued to CMO a *“California Water Code Directive Pursuant to Section 13267,”* dated 2 April 2014 (April 2014 13267 Order). On 13 May 2014 Central Valley Water Board staff received from CMO a document dated 10 May 2014 and titled *“Section 13267 Response, Chico Martinez Oil Field, Kern County...”* (May 2014 13267 Report).

On 18 December 2014, Central Valley Water Board staff inspected the ponds. As a result of the inspection Central Valley Water Board staff issued to CMO an NOV dated 4 March 2015. The NOV stated that wastewater discharge to the ponds was in violation of Section 13260 of the California Water Code for failing to submit a Report of Waste Discharge.

On 21 April 2015, Central Valley Water Board staff issued *“California Water Code Directive Pursuant to Section 13267”* (April 2015 13267 Order), which required that CMO *“collect representative samples of wastewater within each of the ponds.”* In response, a report dated 12 June 2015, and titled *“CMO, Inc, Response To RWQCB Section 13267 Order...”* was prepared and submitted by EnviroTech Consultants, Inc. (EnviroTech), and contained analytical results from samples collected on 7 May 2015. CMO issued an addendum to the report, dated 21 July 2015 (July 2015 13267 Report).

On 18 December 2015 Central Valley Water Board staff issued to CMO another *“California Water Code Directive Pursuant to Section 13267”* (December 2015 13267 Order). The December 2015 13267 Order required that CMO submit a technical report containing specific information associated with its ponds and wastewater handling at the Mitchel and Bacon Leases. In response, CMO submitted to the Central Valley Water Board a report dated 18 December 2015, and titled *“Technical Report, Response To 13267 Order, CMO Inc.,...”* (December 2015 13267 Report).

On 11 February 2016, Central Valley Water Board staff issued Cleanup and Abatement Order R5-2016-0705 (CAO) to CMO. In response to the CAO, CMO submitted a document prepared by Geosyntec Consultants (Geosyntec Consultants), dated 1 June 2016, and titled *“Hydrogeological Site Characterization Work Plan ...”* (Work Plan). The Work Plan proposed the installation of three groundwater monitoring wells. A Central Valley Water Board staff letter dated 10 August 2018 provided conditional approval of the Work Plan. The 10 August 2018 letter also indicated that by 30 September 2018 CMO needed to submit to the Central Valley Water Board an updated schedule for the monitoring well installation and either: 1) a Notice of Intent (NOI) for coverage under one of the General Orders adopted by the Central Valley Water Board on 6 April 2017, or 2) a work plan and time schedule for closing the ponds.

On 2 October 2018, CMO representatives uploaded to Geotracker a letter from Geosyntec Consultants dated 28 September 2018 and titled, *“Notice of Intent to Obtain coverage under General Order R5-2017-035 for Oil Field Discharges to Land and Schedule for Work Plan Implementation, Chico Martinez Oil Field, Kern County.”* The 28 September 2018 letter states

that “*CMO anticipates implementing the remaining scope of work outlined in the Work Plan during the Summer/Fall of 2019. This includes drilling and installation of three groundwater monitoring wells to first encountered groundwater.*”

On 12 October 2018 CMO submitted via email a document, dated 12 October 2018, and titled “*Technical Report for General Order R5-2017-0035, Chico Martinez Oil Field, Kern County, California, GeoTracer Site Global ID: L10004438026*” (NOI Technical Report). The NOI Technical Report was prepared by Geosyntec Consultants, and proposed coverage for the produced wastewater discharges into the three ponds on the Mitchel Lease under General Order Two. A completed Form 200 “*Application/Report of Waste Discharge...*” dated 28 September 2018, and an application fee were received by Central Valley Water Board staff on 15 October 2018 and were conveyed with a letter from Geosyntec Consultants dated 11 October 2018.

The NOI Technical Report identified a discharge of solid waste to land. It states that since 2014 approximately 650 bbls of oily sludge (sand and oil) generated from tank cleaning operations and 200,000 pounds of SulfaTreat™ (comprised of silica/quartz) have been stored in a 22,500 square foot containment area. This containment area is located on the Bacon lease and is approximately 2,800 feet north of Pond #3.

A Central Valley Water Board staff letter dated 5 November 2018 was sent to CMO. The 5 November 2018 letter indicated that the NOI Technical Report was deficient and identified specific information that CMO needed to provide in an addendum in order for CMO to obtain coverage for its ponds under General Order Two. A request was included in the Central Valley Water Board staff letter dated 5 November 2018 for submitting a sampling plan for the solid waste being stored in the 22,500 square foot containment area described above. In response to the 5 November 2018 letter from Central Valley Water Board staff, CMO submitted a 11 January 2019 Solid Waste Sampling Plan, which is currently under review by Central Valley Water Board staff.

On 14 January 2018 CMO representatives also uploaded a letter and technical report, both dated 11 January 2019 and titled “*Addendum to Technical Report for General Order R5-2017-0035...*” (NOI Addendum). Central Valley Water Board staff have reviewed this document.

POND CHARACTERISTICS

Dimensions and coordinates for the ponds are listed in **Table 1** below. The pond dimensions in Table 1 are from the NOI Addendum, which updated the pond dimensions previously reported in the NOI Technical Report. The NOI Technical Report previously reported that Ponds #1 and #3 were 22 feet (ft.) deep and that Pond #3 was 11.5 ft. deep.

Table 1 Pond Information for the Mitchel Lease.

Pond I.D.(s)	Dimensions (ft.)			Volume at 2 ft. of freeboard	Approximate center of pond coordinates
	Length	Width	Depth	Barrels (bbls)	Latitude, Longitude
Pond #1	100	95	16	23,700	35.441738, -119.789680
Pond #2	95	45	9	5,300	35.441840, -119.789430
Pond #3	190	140	16	66,300	35.442160, -119.789059

The NOI Technical Report states that *“As part of its operations, CMO generates and processes produced wastewater, most of which is either recycled into its oil recovery operations or is discharged to three unlined surface impoundments.”*

DISCHARGE CHARACTERISTICS

The NOI Technical Report describes two “process streams” by which produced wastewater is discharged to the ponds.

The NOI Technical Report identified a *“Process Stream #1”* and states that *“under normal operations, when steam injection is used as part of oil production, produced water from the Clarifier Tank gets processed through an on-site permanent Produced Water Softening System (PWSS), which recycles a majority of the produced water for steam injection.”*

The NOI Technical Report states that *“When the PWSS is operational, produced water in the Clarifier Tank is routed to the gas flotation device (GFD), which is an oil-water separator vessel that operates on the principal of gas (atmospheric air) flotation.”* From the GFD the water *“...flows to the Raw Water Tank and then through a walnut shell filter. The filtered water then flows to the Filter Water Tank,”* and *“The majority of the filtered water is sent through a media filter and then to a water softening plant. Water processed through the softener is sent to the Soft Water Tank where it is stored until it is converted to steam in the steam generators and injected into oil formation through the steam injection wells.”*

The NOI Technical Report states that, *“at times the rate of produced water exceeds the capacity of the PWSS and a small amount of produced water over flows from the Clarifier Tank directly into the Ponds.”* The NOI Technical Report also indicates that produced water from the *“Filter Water Tank”* is used to *“flush”* the water softener prior to its being recharged and that this *“flush”* water is discharged to the ponds, as described below.

The NOI Technical Report states that *“the softener softens the filtered water by replacing calcium and magnesium ions with sodium ions. When the softener media is spent (i.e., no sodium ions remain in the reactive media), the softener filter is flushed with water from the Filter Water Tank, then recharged with brine water. Brine water is produced on-site in the Brine Water Tank, which mixes commercially purchased sodium chloride (salt) with water from the Filter Water Tank. The softener media is recharged on a frequency ranging from once every three to seven days. After flushing the softener media, the flush water is discharged to the Ponds.”*

The NOI Technical Report identified a “Process Stream #2” and states that, “periodically, CMO operates on a reduced production capacity, using only pumping (no steam) to extract water and oil. Under reduced production capacity, the produced water in the Clarifier Tank is discharged directly to the Ponds.”

Flow Volumes

Under Discharge Specifications, Item B.1., General Order Two states: “The discharge flow shall not exceed actual maximum monthly average produced wastewater flow to pond between 26 November 2004 and 26 November 2014. The discharge flow also shall not exceed the maximum design flow of the Facility’s limiting unit as described by the technical data in the NOI.”

The NOI Addendum states that, “... data regarding the volume of water discharged to the ponds has not been accurately collected during the period between November 2004 and September 2011 and the operational conditions changed in December 2013, when Pond 3 was added, and again in July 2014, when the process water softening system was put into service.”

The NOI Addendum estimates, based on data presented in the December 2015 13267 Report, that “... the total maximum average volume of produced water generated between September 2011 and November 2013 was 110,319 barrels (4,633,398 gallons), all of which was discharged to the then existing Ponds 1 and 2. Between December 2013 and June 2014, when all three ponds were in service and prior to the softening system being active, the total maximum monthly average volume of produced water was 100,887 barrels (4,237,254 gallons), all of which was discharged to all three ponds. Between July 2014 and November 2014, when all three ponds and the water softening system were in service, the maximum monthly average volume of produced water was 91,089 barrels (3,825,738 gallons).”

Based on the information above, General Order Two allows for a maximum monthly discharge of 110,319 barrels (bbls) or 4,633,398 gallons (gal) in total to all three ponds.

However, General Order Two, Discharge Specification B.10 requires that the operating freeboard in any pond shall never be less than two feet, and the above maximum allowable monthly discharge of 110,319 bbls cannot be used a justification for violating this requirement of the General Order. Produced wastewater must not be allowed to over top and flow outside of the ponds. General Order Two prohibits produced wastewater discharges outside of the ponds.

The NOI Addendum provides a Water Balance and Capacity Analysis that indicates what monthly volumes of produced wastewater can be discharged to the ponds while still maintaining the required minimum two feet of freeboard. The NOI Addendum states that, “The capacity analysis is based on a water balance approach and takes into consideration Pond construction details, historical percolation and evaporation rates, monthly discharge volume measurements collected during 2018, estimated infiltration rates for the ponds, and monthly rehabilitation schedule. Table 2, below, summarizes the maximum discharge rates that the Water Balance

Capacity Analysis, provided in the NOI addendum, states, “... could occur each month and would maintain a freeboard of at least 2 ft in the three ponds at the CMO Facility.”

Table 2 Maximum Monthly Discharge Rates based on Water Balance Capacity Analysis using an infiltration rate of 0.2017 inches/hour (0.403 feet/day)

Month	gal per day	bbls per day	gal per month	bbls per month
January	121,592	2,895	3,769,361	89,747
February	122,481	2,916	3,429,482	81,654
March	123,882	2,950	3,840,350	91,437
April	125,456	2,987	3,763,685	89,612
May	127,230	3,029	3,944,130	93,908
June	128,916	3,069	3,867,465	92,083
July	129,683	3,088	4,020,177	95,719
August	128,912	3,069	3,996,282	95,150
September	126,910	3,022	3,807,290	90,650
October	124,726	2,970	3,866,513	92,060
November	122,631	2,920	3,678,917	87,593
December	121,598	2,895	3,769,536	89,751

In Table 2 above the highest estimated disposal rate for the ponds is 95,719 bbls of produced water in July, and the lowest estimated disposal rate is 81,654 bbls of produced water in February. CMO should use the monthly discharge volumes listed in Table 2, above, as a guide to prevent it from overtopping the ponds or violating the General Order requirement of maintaining a minimum of two feet of freeboard within each pond at all times.

Well Stimulation Treatment Fluids

General Order Two, Prohibition A.5 states, “The discharge of produced wastewater from wells containing well stimulation treatment fluids is prohibited except as provided by Provision E.7.”

The NOI Addendum states that, “CMO has performed well stimulation treatment as defined under CCR title 14, section 1761(a) in the past. Within 3 months after receipt of an NOA from the Water Board, CMO will submit a work plan to conduct studies necessary to demonstrate that the discharges of produced wastewater from stimulated wells do not contain well stimulation fluids in concentrations that could adversely affect beneficial uses of waters.”

Waste Constituents

The appendices for the NOI Technical Report contains a copy of a document dated 3 August 2018, and titled “2018 First Semiannual Monitoring Report Chico Martinez Oil Field...” **Table 3**, below contains a summary of some of the sampling results reported by CMO in the 31 January 2019 “2018 Fourth Quarter Monitoring and Annual Summary Report Chico Martinez Oil Field...” (4Q 2018 monitoring Report) which was uploaded by CMO staff to GeoTracker Site L10004438026, as part of its monitoring required by the 11 February 2016 CAO. Units of

measurement are milligrams per liter (mg/L), micrograms per liter (µg/L), and picocuries per liter (pCi/L). The samples source identified as PW-01 were collected from a sampling port between the Clarifier Tank to the ponds, and samples source identified as PW-02 were collected from a sampling port between the Water Softener and the ponds. Data presented in the 4Q 2018 monitoring report indicates that polynuclear aromatic hydrocarbons have not been detected.

Table 3 Selected produced wastewater analytical data from the Mitchel Lease.

Sample Point Source	PW-02	PW-01	PW-01	PW-01	
Sample Date	19 Nov 2018	19 Nov 2018	26 Mar 2018	14 Aug 2017	
Concentration					Units
Constituents of Salinity					
Total Dissolved Solids (TDS)	3,680	6,360	7,840	8,720	mg/L
Chloride	1,700	3,100	4,000	4,000	mg/L
Boron	27.7	49.6	43.5	53.2	mg/L
Total Petroleum Hydrocarbons (TPH)					
TPH U.S. EPA Method 418.1	4.26	5.77	16	9.2	mg/L
Volatile Organic Compounds (VOCs)					
Acetone	350	290	<100	<100	µg/L
Benzene	<1.0	1.7 J	<2.5	<2.5	µg/L
Ethylbenzene	3.3	9.7 J	<5.0	<5.0	µg/L
2-Hexanone	<10	10 J	<50	<50	µg/L
2-Butanone	160	200	<50	<50	µg/L
1,2,4-Trimethylbenzene	18	50 J	31	18	µg/L
1,3,5-Trimethylbenzene	4.2	12 J	7.9	<5.0	µg/L
n-Propylbenzene	2.8	9.1 J	5.0	<5.0	µg/L
tert-butylalcohol (TBA)	58	110 J	70	66	µg/L
Toluene	4.0	11 J	<5.0	<5.0	µg/L
Xylenes, Total	17	45 J	27	16.7	µg/L
Radioactivity					
Gross Alpha Particle	4.66 J ± 2.20	1.69 J ± 0.833	2.85 ± 2.00	15.2 ± 21.6	pCi/L
Radium-226	0.929 ± 0.263	1.26 ± 0.305	2.04 ± 0.383	1.73 ± 0.388	pCi/L
Radium-228	0.000 ± 0.667	0.128 ± 0.793	0.000 ± 0.499	1.33 ± 0.585	pCi/L
Uranium	0.005	<0.002	<0.0002	<0.001	mg/L

With regards to hazardous waste, the NOI Technical Report states that *“hazardous waste is not generated at the facility.”*

With regards to chemicals or additives used in oil exploration and production, the NOI Technical Report identifies both chemicals and additives used during production of oil, as well as chemicals and additives used as part of *“Process Stream #1”* described above.

The NOI Technical Report states that chemicals or additives used during oil production include:

- Demulsifier (DMO 7050). Approximately 5 gallons per day are added at the headers where they are injected (pumped) into the lines, to separate heavy solid oil and water;

- Water Clarifier (RBW 517). Approximately 5 gallons per day are added at the headers where they are injected (pumped) into the lines, to increase water and oil separation; and
- Corrosion Inhibitor (BPC 68185). Approximately 1 quart is injected at the boilers and into the supply line every two weeks, to prevent water to corrode carbon steel pipes.

The NOI Technical Report states that chemicals or additives used in “Process Stream #1” include:

- Wetting Agent (WAW3003). Approximately 1.25 gallons per day are added to rinse the pre-filters and the walnut filter;
- Oxygen Scavenger (OXW5200) Approximately 7 quarts per day are injected in the supply line to the softeners, to prevent rusting, scaling, or damaging the tubes to the generator; and,
- Dispersant (SCW7842). Approximately 1 quart per day is injected to the line heading to the generators, to prevent scaling build-up in the generator.

Material safety Data sheets for the above listed chemicals or additives have not been provided. However, this will be required as part of the Monitoring and Reporting Program (MRP) for General Order Two. CMO will need to analyze all samples required by the MRP for all chemicals or additives used in the oil and produced wastewater production processes. This includes effluent and groundwater samples.

Dust Control

Provision E.5 of General Order Two states: *“Dischargers wishing to use produced wastewater at the Facility for dust control or in construction activities shall provide a proposed management plan for such activities.”* The Provision also states: *“The management plan must be submitted to the Executive Officer at least **90 days** prior to the anticipated discharges. Discharges shall not occur without Executive Officer written approval of the management plan.”*

At this time CMO has not proposed and is not permitted to use produced wastewater for dust control. If CMO intends to apply for use for produced wastewater for dust control it must comply with the requirements of Provision E.5 of General Order Two and submit a management plan that includes information required by the provision.

Solid Waste

General Order Two Discharge Specifications, Item B.15., requires that the Discharger monitor the accumulation of solids within the ponds and as necessary remove them to maintain adequate treatment storage and capacity. General Order Two’s Item D., titled *“Solids Disposal Specifications,”* includes handling and storage requirements for solids removed. General Order Two Provision Item E.6., states that dischargers reusing solids for road mix, as described in Solids Disposal Specifications, shall submit a solids management plan for approval by the

Executive Officer within 60 days of receipt of the NOA and at least 180 days prior to any solids reuse.

Storm Water

The NOI does not contain information regarding stormwater runoff from the Lease or if the Lease has, or is exempt from having, a National Pollutant Discharge Elimination System (NPDES) Permit. Order Number 2014 0057-DWQ (NPDES General Permit CAS000001) specifies waste discharge requirements for discharges of storm water associated with industrial activities. When submitting the solids management plan described above, CMO needs to evaluate if the Lease needs an NPDES permit for stormwater discharges.

UNSATURATED SOIL AND GROUNDWATER CHARACTERISTICS

The 1 June 2016 Work Plan reports that the Chico Martinez Oil Field is “*separated structurally*” from the San Joaquin Valley by the Belridge anticline. The stratigraphy below the facility is described as being Quaternary Alluvium, underlain by Tulare Formation sediments, underlain by shallow marine San Joaquin Formation sediments, which is underlain by the shallow marine Etchegoin Formation sediments. Oil Production is from the Etchegoin Formation.

The 1 June 2016 Work Plan also states that “*The Lower Tulare Formation is separated from the upper Tulare and Quaternary alluvium by a diatomaceous mudstone with low permeability that contains hydrocarbons as does the lower Tulare sands (EnviroTech, 2015a). The mudstone layer within the Tulare Formation is identified as equivalent to the Corcoran Clay. The Corcoran Clay is a laterally extensive lacustrine clay in the western and central portions of the Central Valley, which distinguishes the underlying Tulare Formation from the overlying Quaternary sediments, is an important confining aquitard in the Central Valley.*”

The 1 June 2016 Work Plan states that “*...first regional groundwater underlying the CMO leases occurs within the base of the Tulare Formation.*” The Work Plan also states that “*Groundwater was encountered at a depth of approximately 400 feet below ground surface (approximately 500 feet above mean sea level) at two exploratory wells installed in 2011 at the Facility to evaluate the feasibility of process water production.*” The first well is identified as WW-1 (or “*Well 1*”) and is approximately three quarters of a mile northwest of the ponds. The second well is WW-2 (or “*Well 2*”) and is approximately three quarters of a mile northeast of the ponds. In April 2014 the depth to groundwater in WW-2 was measured as 385 ft. bgs, and WW-1, which had a total depth of 330 ft., was dry.

The 1 June 2016 Work Plan states that “*Based on a review of boring logs, geophysical logs, and historical water level measurements, the first encountered groundwater in Well 2 appears to be under semi-confined conditions.*” The Work Plan also states that “*...groundwater quality appears to be impacted with naturally occurring petroleum hydrocarbons (crude oil) and contains high total dissolved solids,...*” and that the sample from “*Well 2 in August 2014*” had a TDS concentration of 3,420 mg/L.

The 1 June 2016 Work Plan indicates that the expected groundwater flow direction is to the northeast. This is based on the topographic relief of the lease property, and a groundwater monitoring report for a facility approximately two miles northeast of the Mitchel Lease.

The 1 June 2016 Work Plan states that *“Neutron-density geophysical logs for some of the oil production wells in the Facility show intervals of “fluid-filled” sediments at depths of 100 to 250 ft. Interpretive geologic cross-sections based on geophysical logs show the ‘first fluid filled’ sands offset by shallow faulting.”* The Work Plan also references the technical report dated 10 May 2014 and states that *“EnviroTech (2014) reports that the “fluid-filled” intervals based on neutron-density logs may not be water-bearing saturated zones. They may be fine-grained unsaturated sediments with relatively high residual water content.”*

GROUNDWATER MONITORING

The MRP for General Order Two requires that “If an appropriate groundwater monitoring system is not in place...” then the discharger must submit a *“submit a Monitoring Well Installation and Sampling Plan (MWISP) for review and approval by the Executive Officer.”*

CMO has already submitted a plan to install three groundwater monitoring wells in its 1 June 2016 Work Plan, which has been reviewed by Central Valley Water Board staff and which was conditionally approved by the Central Valley Water Board staff letter dated 10 August 2018. The 28 September 2018 letter from CMO indicates that the three groundwater monitoring wells proposed in the 1 June 2016 Work Plan will be drilled and installed with screen intervals in first encountered groundwater during the Summer/Fall of 2019.

Because CMO has an approved plan for installing monitoring wells, it does not need to submit a separate MWISP for General Order Two. However, CMO must complete the installation of the groundwater monitoring wells as proposed in the 1 June 2016 Work Plan and begin monitoring groundwater in accordance with the requirements of the MRP for General Order Two.

SUMMARY

Based on information submitted with the NOI and Addendum, coverage under General Order Two appears appropriate for the ponds on the Mitchel Lease.

Based on these conditions, as per Title 23, California Code of Regulations, section 2200, the discharge shall be given a TTWQ (threat to water quality) and CPLX (complexity rating) of 3C. CMO is responsible for annual fees associated with this rating unless conditions or regulatory policies change.