



Central Valley Regional Water Quality Control Board

1 March 2023

Cesar C. Leon
Regulatory & Environmental Specialist 2
Berry Petroleum Corporation
11117 River Run Boulevard
Bakersfield, California 93311

CERTIFIED MAIL
7022 2410 0000 2157 7381

NOTICE OF APPLICABILITY (NOA), CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD, ORDER R5-2017-0036, WASTE DISCHARGE REQUIREMENTS GENERAL ORDER FOR OIL FIELD DISCHARGES TO LAND, GENERAL ORDER NUMBER THREE, BERRY PETROLEUM CORPORATION, SANTA FE, STANFORD, AND THETA 30 LEASES, CARNEROS CREEK OIL FIELD, KERN COUNTY

Berry Petroleum Corporation (Berry or Discharger) operates the Santa Fe, Stanford, and Theta 30 Leases in the Carneros Creek Oil Field, west of Highway 33 (Facility). The Leases contain a total of eight surface impoundments (ponds) used for the disposal of oil field produced wastewater (discharge). The Santa Fe and Theta 30 Leases are in Section 30, T28S, R20E, MDB&M. The Santa Fe Lease has three active ponds and one pond not currently in use, and the Theta 30 Lease has three active ponds. The Stanford Lease has one active pond in the northwest corner of Section 29, T28S, R20E, MDB&M.

Central Valley Regional Water Quality Control Board (Central Valley Water Board) staff received a letter dated 10 March 2022 from Berry that included a Notice of Intent (NOI) prepared by BSK Associates, dated 1 March 2022, and titled "*Notice of Intent for Coverage Under General Order R5-2017-0036 No. 3 Technical Report*" requesting coverage under Order Number R5-2017-0036, Waste Discharge Requirements General Order for Oil Field Discharges to Land, General Order Number Three (General Order Three). The NOI included three completed State Form 200s, "*Application/Report of Waste Discharge*." On 22 December 2022, Berry conveyed additional information in an email titled "*RE: Notice of Intent Review, Carneros Creek Oil Field, Santa Fe, Stanford, and Theta Leases*" (22 December 2022 Email) in response to Central Valley Water Board staff questions regarding the NOI.

General Order Three requires the submittal of an application fee. Central Valley Water Board staff do not have a record of receipt of the application fee. This application fee is overdue.

MARK BRADFORD, CHAIR | PATRICK PULUPA, ESQ., EXECUTIVE OFFICER

1685 E Street, Fresno, CA 93706 | www.waterboards.ca.gov/centralvalley

The enclosed memorandum contains Central Valley Water Board staff's review of the information provided in the NOI and 22 December 2022 Email.

This letter serves as formal notice that General Order Three is applicable to the ponds. General Order Number **R5-2017-0036-025** is hereby assigned to all produced wastewater discharges to the ponds. Berry should become familiar with all of the requirements, time schedules, prohibitions, and provisions of General Order Three, and Monitoring and Reporting Program R5-2017-0036 (MRP).

This NOA does not provide regulatory coverage to the "area of interest" on the Santa Fe Lease cited in a Central Valley Water Board 1 April 2015 Notice of Violation, or the inactive nearby ponds on the Anderson and SFE1 Leases in the Carneros Creek Oil Field. A request for submittal of pond closure plans will be addressed under separate cover.

This letter also serves as formal notice that Cleanup and Abatement Order Number R5-2015-0718 (CAO), issued on 14 August 2015, is hereby rescinded. The CAO erroneously referred to the pond on the Stanford Lease as being on the "Standard Lease." The CAO referred to the ponds on the Theta 30 Lease as being on the "Theta Lease."

As stated in Water Code section 13263, all discharges of waste into waters of the state are privileges, not rights. General Order Three does not create a vested right for Berry to continue the discharges of waste to the ponds. Failure to comply with the terms and conditions of General Order Three or to prevent conditions that create or threaten to create pollution or nuisance or cause degradation of groundwater, will be sufficient reason to modify, revoke, or enforce the provisions of General Order Three, 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 Basin Plan that would necessitate the re-opening of General Order Three.

FACILITY SPECIFIC REQUIREMENTS

1. Berry shall maintain exclusive control of the discharge and shall comply with all of the requirements and timelines of General Order Three and the MRP.
2. The required annual fee specified in the annual billing from the State Water Board shall be paid until coverage for the Facility under General Order Three is

officially terminated. Berry must notify the Central Valley Water Board in writing to request termination.

3. Under Discharge Specifications, Item B.2, General Order Three 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.”*

The allowable maximum monthly discharge into the ponds shall not exceed 953 barrels for the Santa Fe Lease (Pond No. 1, Pond No. 2, Pond No. 3, and Pond No. 4), 197 barrels for the Stanford Lease pond, and 2,221 barrels for the Theta 30 Lease (Pond No. 1, Pond No. 2, and Pond No. 3) (one barrel is equivalent to approximately 42 gallons). These maximum monthly flow rates are based on information provided in the 22 December 2022 Email. Any increase in monthly discharge beyond these limits constitutes a facility expansion requiring an evaluation under the California Environmental Quality Act (CEQA). Additionally, the discharge to the ponds shall not exceed their design capacity with two feet of freeboard.

4. **By 1 May 2023 (within 60 days)**, Berry shall submit a water balance capacity analysis demonstrating that the as-built hydraulic capacity of the facility is consistent with the flow limits while considering a total annual precipitation using a return period of 100 years, distributed monthly in accordance with historical rainfall patterns. The water balance analysis needs to consider the following: 1) a required minimum of two feet of freeboard in each pond at all times, 2) historical pan evaporation rates, and 3) projected long term percolations rates.
5. **By 30 May 2023 (within 90 days)**, Berry shall, pursuant to Provision E.3 of General Order Three, 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. **By 1 May 2023 (within 60 days)**, Berry shall, pursuant to Provision E.4 of General Order Three, submit either:
 - a. The results of a hydrogeological investigation demonstrating that there is no groundwater beneath the Facility discharge areas and that produced wastewater and constituents associated with other approved wastes

discharged at the Facility will not migrate into areas where there is groundwater with designated beneficial uses. Upon the written concurrence of the investigation results by the Executive Officer, this provision shall be considered satisfied,

or

- b. If there is first encountered groundwater underlying the Facility or the Executive Officer does not concur with the results of the investigation in Provision E.4.a, above, the Discharger shall demonstrate that the natural background groundwater quality for the Facility meets the Sources of Drinking Water Policy exception criteria and/or parallel exception criteria outlined in this General Order (Findings 22 through 24) and thus the current Basin Plan groundwater beneficial uses are eligible for de-designation in accordance with the compliance schedule provided in Tasks 1 through 10 of Provision E.4.b.

The NOI states that *“Based on the research of nearby facilities, it is not unreasonable to assume that the groundwater below this Site is also in poor quality that it does not reasonably expect to support beneficial uses.”* Berry needs to provide additional information to support this.

7. Berry shall not discharge produced wastewater outside of the ponds except for a permitted dust control use. If Berry intends to apply for use of produced wastewater for dust control, a proposed management plan as described in Provision E.6 of General Order Three must be submitted at least **90 days** prior to the anticipated discharges.
8. The NOI states that *“Solid waste is generally not produced at the facilities. In the event solid waste is generated at one of the three facilities from production related activities, such as tank or pond maintenance, it will be containerized and characterized for disposal. Non-hazardous wastes may be disposed on-site, for instance as road or berm construction material, if disposal does not pose a threat to water quality.”* If Berry intends to reuse solids for road mix on the Leases, a solids management plan as described in Provision E.7 of General Order Three must be submitted at least **180 days** prior to any solids reuse. The Central Valley Water Board’s Executive Officer must approve the solids management plan.
9. **By 1 May 2023 (within 60 days)**, Berry shall inform the Central Valley Water Board, in writing, as to whether the ponds accept produced wastewater discharge from any wells that have undergone a “well stimulation treatment,” as defined by California Code of Regulations (CCR), title 14, section 1761 (including hydraulic fracturing, acid fracturing, and acid matrix stimulation).

If it is determined that the ponds do accept produced wastewater from wells that have undergone a “well stimulation treatment,” then Berry shall comply with the compliance schedule in Provision E.8 of General Order Three, and, **by 1 June 2023 (three months from date of NOA)**, 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.”

10. Berry 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 should be reported to the Central Valley Water Board Fresno office. Discharge of wastes other than those described in the NOI is prohibited. If the method of waste disposal changes, Berry must submit a complete Report of Waste Discharge (Form 200).
11. The NOI states that *“Samples were not collected from the effluent of the Santa Fe Lease due to low volume of water being produced at this time.”* As soon as the discharge resumes, Berry shall sample the produced wastewater and provide a characterization of the discharge using the constituent list provided in Table I of the MRP.
12. Order No. 2014-0057-DWQ (NPDES General Permit CAS000001) specifies requirements for discharges of stormwater associated with industrial activities. **By 1 May 2023 (within 60 days)**, Berry shall provide information regarding stormwater on the Leases.

The MRP requires extensive monitoring requirements. Failure to comply with the requirements in General Order Three and the MRP could result in an enforcement action as authorized by provisions of the California Water Code. [A copy of General Order Three 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/r5-2017-0036.pdf).

The MRP includes requirements for the monitoring and reporting of chemicals and additives. Berry 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 Berry 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, Berry 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.

Berry 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

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. Berry 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). When applicable, Berry shall submit analytical data of the discharge in both PDF and EDF (electronic data files) formats to GeoTracker. Electronic submittals shall comply with GeoTracker standards and procedures. Uploads to GeoTracker shall be completed on or prior to the due date. The GeoTracker site Global ID numbers that are associated with this NOA are: **T10000006769** for the Santa Fe Lease Ponds; **T10000006770** for the Stanford Lease Pond; and **L10009422184** for the Theta 30 Lease Ponds.

Please review the attached memorandum for more information. If you have any questions regarding this matter, please contact Mary Church of this office at (559) 445-5577 or at mary.church@waterboards.ca.gov.

Original Signed by Clay L. Rodgers for:
Patrick Pulupa
Executive Officer

Enclosures and ccs Next Page:

Berry Petroleum Corporation - 7 -
Notice of Applicability for General Order Three
Santa Fe, Stanford, and Theta 30 Leases
Carneros Creek Oil Field, Kern County

1 March 2023

Enclosures: 1 March 2023 Memorandum
General Order Three
Standard Provisions

cc: Chris Jones, Acting District Deputy, Central District, California Geologic Energy
Management Division, Bakersfield (NOA and Memorandum only, Via email)
Phil Acosta, HSE Manager, Berry Petroleum Corporation, Bakersfield (NOA and
Memorandum only, Via email)
Jon Armstrong, Regulatory and Environmental Engineer, Berry Petroleum
Corporation, Bakersfield (NOA and Memorandum only, Via email)



Central Valley Regional Water Quality Control Board

TO: Clay Rodgers
Assistant Executive Officer

Alex Olsen
Supervising Engineering Geologist

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

Mary C. Church
Water Resource Control Engineer



DATE: 1 March 2023

SUBJECT: NOTICE OF APPLICABILITY (NOA), CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD, ORDER R5-2017-0036, WASTE DISCHARGE REQUIREMENTS GENERAL ORDER FOR OIL FIELD DISCHARGES TO LAND, GENERAL ORDER NUMBER THREE, BERRY PETROLEUM CORPORATION, SANTA FE, STANFORD, AND THETA 30 LEASES, CARNEROS CREEK OIL FIELD, KERN COUNTY

Berry Petroleum Corporation (Berry or Discharger) operates the Santa Fe, Stanford, and Theta 30 Leases in the Carneros Creek Oil Field, west of Highway 33 (Facility). The Leases contain a total of eight surface impoundments (ponds) used for the disposal of oil field produced wastewater (discharge). The Santa Fe and Theta 30 Leases are in Section 30, T28S, R20E, MDB&M. The Santa Fe Lease has three active ponds and one pond not currently in use, and the Theta 30 Lease has three active ponds. The Stanford Lease has one active pond in the northwest corner of Section 29, T28S, R20E, MDB&M.

Central Valley Regional Water Quality Control Board (Central Valley Water Board) staff received a letter dated 10 March 2022 from Berry that included a Notice of Intent (NOI) prepared by BSK Associates, dated 1 March 2022, and titled “*Notice of Intent for Coverage Under General Order R5-2017-0036 No. 3 Technical Report*” requesting coverage under Order Number R5-2017-0036, Waste Discharge Requirements General Order for Oil Field Discharges to Land, General Order Number Three (General Order Three). The NOI included three completed State Form 200s, “*Application/Report of*

MARK BRADFORD, CHAIR | PATRICK PULUPA, ESQ., EXECUTIVE OFFICER

Waste Discharge.” Additionally, on 22 December 2022, Berry conveyed additional information in an email titled “*RE: Notice of Intent Review, Carneros Creek Oil Field, Santa Fe, Stanford, and Theta Leases*” (22 December 2022 Email) in response to Central Valley Water Board staff questions regarding the NOI. As of the date of this NOA, the Central Valley Water Board does not have a record of receipt of the application fee, which is required by General Order Three. This application fee is overdue.

This memorandum provides a summary of the information provided for ponds in the NOI and 22 December 2022 Email.

BACKGROUND INFORMATION

General Order Three regulates oil field produced wastewater discharges where first encountered groundwater does not support beneficial uses as identified in the “*Water Quality Control Plan for the Tulare Lake Basin, Third Edition, Revised May 2018*” (Basin Plan), or where there is no first encountered groundwater.

Regulatory History

On 22 January 2015, Central Valley Water Board staff conducted inspections of ponds identified by the California Division of Oil, Gas, and Geothermal Resources (DOGGR), as being on the Santa Fe, the Stanford, and the Theta 30 Leases in the Carneros Creek Oil Field. As a result of the inspections, Central Valley Water Board staff issued to Pyramid Oil Company (Pyramid), a former Operator, three separate inspection letters, each dated 1 April 2015. The contents of each of the three letters are as follows:

1. The first letter was a Notice of Violation (NOV) and inspection report for the unregulated produced wastewater discharge into four unlined ponds on the Santa Fe Lease without Waste Discharge Requirements (WDRs). These ponds are identified as Pond No. 1, Pond No. 2, Pond No. 3, and Pond No. 4. The NOV noted that at the time of inspection all four ponds were active. Pond No. 1 was fenced and netted and contained oil and sludge. Pond No. 2 contained wastewater with black/brown scum. Pond No. 3 contained wastewater with brown scum. Pond No. 4 was overgrown with sage brush and contained wastewater, which was being actively discharged through a pipe connecting to Pond No. 3. Pond Nos. 2, 3, and 4 were located within the Santa Fe Lease’s perimeter and did not have fencing or netting. The NOV also identified an “area of interest” to the west of Pond No. 2 which may have previously been used for the discharge of wastewater.
2. The second letter was a NOV and inspection report for the unregulated produced wastewater discharge into one unlined pond without WDRs and erroneously referred to as being on the “Standard Lease.” The lease that the pond is on is the

Stanford Lease. The NOV noted that the pond was active at the time of inspection and contained brown wastewater that did not appear oily. The pond was fenced and netted with a circular steel chamber located at the north end, within the fencing and netting.

3. The third letter was a NOV and inspection report for the unregulated produced wastewater discharge into three unlined ponds on the Theta Lease, also known as the Theta 30 Lease, without WDRs. These ponds are identified as Pond No. 1, Pond No. 2, and Pond No. 3. The NOV noted that at the time of inspection all three ponds were active. Pond No. 1 was fenced and netted and contained black wastewater with adequate freeboard. Pond No. 2 contained brown wastewater with a layer of scum and had approximately 1.5 to 2 feet freeboard. Pond No. 3 contained a small amount of wastewater and had adequate freeboard. Pond No. 2 and Pond No. 3 were located within the lease's perimeter and did not have fencing or netting.

On 1 April 2015, Central Valley Water Board staff issued Pyramid *“California Water Code Directive Pursuant to Section 13267”* (13267 Order) for ponds located in the Carneros Creek, Edison, Lost Hills, McDonald Anticline, Midway-Sunset, and Mountain View Oil Fields. The 13267 Order included the Stanford and Theta Leases and required that Pyramid *“collect representative samples of wastewater within each of the ponds”* and submit a technical report by 15 June 2015.

On 14 August 2015, the Central Valley Water Board issued Pyramid *“Cleanup and Abatement Order No. R5-2015-0718, Pyramid Oil Company, Santa Fe Lease, Standard Lease and Theta Lease, Carneros Creek Oil Field, Kern County”* (CAO) for the eight produced wastewater ponds located in the Carneros Creek Oil Field. The CAO required the following: *“By 16 October 2015, the Discharger shall prepare and submit to the Central Valley Water Board a Work Plan with a time schedule proposed by the Discharger and approved by the Assistant Executive Officer. The schedule shall provide the ability to determine whether the discharge can comply with applicable laws, policies, and regulations that would allow the issuance of waste discharge requirements by 31 October 2016. If issuance of waste discharge requirements is not obtained by 31 December 2016, the discharge shall cease.”*

In response to the CAO, Pyramid submitted, on 19 October 2015, a document dated 16 October 2015 and titled *“Pyramid Oil Company, Work Plan, Cleanup and Abatement Order R5-2015-0718, Santa Fe Lease, Standard Lease and Theta Lease, Carneros Creek Oilfield, Kern County, California”* (Work Plan). The Work Plan proposed a time schedule for various tasks including: completion of a hydrogeologic site investigation; development of a Sampling and Analysis Plan; collection and analysis of soil and groundwater samples; and submittal of a Report of Waste Discharge (ROWD). The Work Plan also proposed the following tasks if Pyramid determined there had been a release of waste constituents to groundwater: installation of appropriate monitoring

wells; characterization of the nature and extent of the contamination; and preparation and submittal of a groundwater remediation program.

On 9 November 2015, Central Valley Water Board staff issued Pyramid a NOV titled *“Notice of Violation – Failure to Submit Technical Report, Pyramid Oil Company”* for failure to respond to the 13267 Order by 15 June 2015.

In response to the 13267 Order, Pyramid submitted, on 14 December 2015, two documents titled *“Technical Report, California Water Code Directive Pursuant to Section 13267, Regarding Produced Water Discharge, Pyramid Oil Company, Stanford Lease”* and *“Technical Report, California Water Code Directive Pursuant to Section 13267, Regarding Produced Water Discharge, Pyramid Oil Company, Theta 30 Lease.”*

In a letter dated 22 November 2016, Central Valley Water Board staff extended the 31 December 2016 CAO deadline to obtain WDRs to a date no later than four months following the adoption of the General Orders for Oil Field Wastewater Discharges. The General Orders were adopted on 6 April 2017. On 3 May 2017, Central Valley Water Board staff conveyed a subsequent letter requesting that Pyramid submit a NOI under one of the three General Orders by 8 May 2017 and obtain WDRs, or cease discharge by 7 August 2017.

On 19 May 2017, Pyramid submitted a letter dated 15 May 2017 and titled *“Re: Notification of Coverage Under Oil Field General Orders & Application Deadlines”* with six NOIs requesting coverage under General Order Three for ponds on the Anderson, Santa Fe, SFE1, Stanford, and Theta 30 Leases in the Carneros Creek Oil Field, and on the Theta 12 Lease in the Lost Hills Oil Field (Pyramid NOIs). The Pyramid NOIs included: six completed State Form 200s, one combined check for the application fees for both oil fields, and various technical reports prepared by GeoPlus Consulting Services.

Central Valley Water Board staff provided comments on the Pyramid NOIs in a letter dated 19 June 2017. Staff indicated the Pyramid NOIs were deficient and provided a summary of the technical information needed based on the requirements of General Order Attachment B. EnviroTech Consultants, Inc., (EnviroTech) on behalf of Pyramid, submitted two subsequent responses to the Central Valley Water Board staff comments in letters dated 24 October 2018 and 14 March 2019, respectively.

On 11 September 2019, Berry conveyed an email titled *“Pyramid Acquisition, Ponds-Form 200 (Change in Ownership/Operator)”* which contained completed State Form 200s for seven leases which Berry had acquired from Pyramid. Included in the acquisition were the Santa Fe, Stanford, and Theta 30 Leases in the Carneros Creek Oil Field.

Berry conveyed to Central Valley Water Board staff a letter dated 10 March 2022 and titled “*RE: Berry Corp. Notice of Intent for Coverage Under General Order R5-2017-0036 No. 3*” with a NOI requesting coverage under General Order Three for ponds on the Santa Fe, Stanford, and Theta 30 Leases in the Carneros Creek Oil Field.

Central Valley Water Board staff completed a cursory review of the NOI included with the letter dated 10 March 2022 and conveyed an email dated 21 December 2022 requesting information on the maximum monthly average effluent flow that occurred between 26 November 2004 and 26 November 2014 for each of the eight ponds in the NOI. Berry conveyed a response on 22 December 2022 providing the requested effluent flows for each of the three Leases.

POND CHARACTERISTICS

The ponds and their dimensions, as reported in the NOI, are listed in **Table 1**. Pond coordinates and numbers are consistent with the NOVs, and inspection reports issued on 1 April 2015 for each of the three Leases.

Table 1 Pond coordinates and approximate dimensions.

Lease Name	Pond No.	Latitude	Longitude	Pond Dimensions		
				Length (ft)	Width (ft)	Depth (ft)
Santa Fe	Pond No. 1	35.46011	-119.85062	20	10	12
Santa Fe	Pond No. 2	35.46028	-119.85047	40	30	12
Santa Fe	Pond No. 3	35.46053	-119.85055	130	36	12
Santa Fe	Pond No. 4	35.46072	-119.85053	130	33	12
Stanford	--	35.46567	-119.84924	20	10	12
Theta 30	Pond No. 1	35.46844	-119.85852	70	30	12
Theta 30	Pond No. 2	35.46850	-119.85838	70	30	12
Theta 30	Pond No. 3	35.46862	-119.85818	70	50	12

DISCHARGE CHARACTERISTICS

Flow Volumes

Under Discharge Specifications, Item B.2, General Order Three 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 22 December 2022 Email states, “Average monthly water production between 26 November 2004 and 26 November 2014 was collected from CalGEM. Effluent volumes are based on the assumption that all water produced was transported to the ponds.” The maximum monthly average effluent flow volumes, as reported in the 22 December 2022 Email, are listed in **Table 2**. Unit of measure is barrel (bbl).

Table 2 Maximum monthly average effluent flow volumes.

Lease	Maximum Monthly Flow (bbl)
Santa Fe	953
Stanford	197
Theta 30	2,221

Available Google Earth images between 2004 and 2014 indicate that all eight ponds on the Leases were active during this time.

Under General Order Three, Berry may not exceed the monthly maximum discharge volumes listed above for each facility. In addition, General Order Three specifies the operating freeboard should never be less than two feet.

Water Balance and Pond Capacity Analysis

Berry has not submitted an adequate water balance and capacity analysis for total onsite water storage capacity at each of the Leases. The information described in General Order Three, Attachment B, Items A.7.a through A.7.g and Item B.4, is needed to confirm the pond holding capacities are sufficient for containing the reported maximum monthly average produced wastewater flow. When submitting the water balance capacity analysis, all tables need to be provided in a spreadsheet format (such as Microsoft Excel). Additionally, a narrative explanation of all assumptions, variables, and calculations needs to be provided.

The water balance provided in the NOI cites an “...average monthly mean precipitation of 0.04 inches.” According to data published by the National Oceanic and Atmospheric Administration (NOAA) for Buttonwillow, California, the monthly mean precipitation values for January, March, and December are 1.44 inches, 1.54 inches, and 1.37 inches, respectively. These values are nearly two orders of magnitude greater than the monthly mean precipitation utilized for the water balance. Berry needs to provide a capacity analysis demonstrating that the as-built hydraulic capacity is consistent with the flow limits based on total annual precipitation using a return period of 100 years, distributed monthly in accordance with historical rainfall patterns.

Flow Monitoring

Provision E.3 of General Order Three requires acceptable flow meters to be installed to ensure the accurate measurement of all discharge flows. The Provision also states that *“An engineering alternative may be used if approved in writing by the Executive Officer.”*

The NOI states, *“...sample locations will be continuously monitored for flow by a meter, to be installed after adoption of General Order No. 3...”* Sample locations are identified as the Theta 30 Tank, Santa Fe Tank, and Stanford Tank.

Storm Water Management

Order Number 2014-0057-DWQ (NPDES General Permit CAS000001) specifies waste discharge requirements for discharges of storm water associated with industrial activities. General Order Three states that *“...storm water at Facilities may be captured and contained on-site or comingled with produced wastewater before being discharged to ponds or production containment areas (i.e., secondary containment) in accordance with this General Order. This General Order prohibits the discharge of wastes from leaving the pond area, secondary containment area, or entering waters of the United States.”*

The NOI does not include any information on storm water. Berry needs to provide evidence that the Facility is exempt from or has applied for coverage under the Industrial Storm Water General Permit.

Dust Control

Provision E.6 of General Order Three 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.”*

The NOI does not state whether Berry has any plans to use produced wastewater for dust control. If Berry decides to use produced water as dust control or in construction activities on the Leases, then Berry needs to provide a proposed management plan for such activities, as described in Provision E.6 of General Order Three.

Solid Waste

General Order Three allows for the reuse of solids impacted by the discharge under certain conditions. Under Solids Disposal Specifications, Item D.3, General Order Three states, *“Solids from the Facility shall be managed in accordance with a solids management plan approved by the Executive Officer in accordance with Provision E.7. Handling and*

application practices shall be designed to ensure that oil field wastes do not migrate once placed.”

The NOI states, *“Solid waste is generally not produced at the facilities. In the event solid waste is generated at one of the three facilities from production related activities, such as tank or pond maintenance, it will be containerized and characterized for disposal. Non-hazardous wastes may be disposed on-site, for instance as road or berm construction material, if disposal does not pose a threat to water quality.”*

Regarding hazardous waste, the NOI states, *“Hazardous wastes...will be properly disposed at a Facility permitted to accept waste. Solid wastes disposed off-site will be transported to an appropriately permitted facility.”*

If Berry decides to reuse solids on the Leases, then Berry needs to provide a proposed management plan for such activities, as described in Provision E.7 of General Order Three.

Well Stimulation Treatment Fluids

Prohibition A.5 of General Order Three states, *“The discharge of produced wastewater from wells containing well stimulation treatment fluids is prohibited except as provided by Provision E.8.”*

The NOI does not indicate whether the produced wastewater discharged to the ponds is from wells that have received a well stimulation treatment as defined by California Code of Regulations (CCR), title 14, section 1761 (including hydraulic fracturing, acid fracturing, and acid matrix stimulation). However, a letter submitted by EnviroTech, on behalf of Pyramid, dated 24 October 2018, in response to Central Valley Water Board staff comments on the Pyramid NOIs, indicates that five wells on the Santa Fe Lease have been stimulated. The stimulated wells are listed in **Table 3**.

Table 3 Santa Fe Lease stimulated wells identified by EnviroTech in 24 October 2018 letter.

Well Name	Perforations	Zone	Stimulation Method	Fluid
Santa Fe 2	3515-3545	Phac	Perforated	gel
Santa Fe 12	2930-2950	POR	Perforated	gel
Santa Fe 15	3208-3228	POR	Perforated	oil
Santa Fe 18	2924-2934, 2980-2990	POR	Perforated	oil
Santa Fe 17	2530, 2537	Carneros/Media	Hydra-Jet	oil

Berry needs to identify if any of the stimulated wells on the Santa Fe Lease listed above contribute to the discharge to the ponds. Berry also needs to identify if any wells on the Stanford or Theta 30 Leases have been stimulated as per CCR, title 14, section 1761. If

the ponds accept wastewater from wells that have undergone a well stimulation treatment, Berry must comply with the requirements and compliance schedule in Provision E.8 of General Order Three.

Waste Constituents

The NOI contains analytical results from produced wastewater samples collected seven times between March 2020 and December 2021 at six different sampling locations on the Stanford and Theta 30 Leases. Selected analytical results for the Leases are summarized in **Table 4** and **Table 5**. Units of measurement are milligrams per liter (mg/L), micrograms per liter ($\mu\text{g/L}$), and picocuries per liter (pCi/L).

Table 4 Selected produced wastewater analytical data from the Stanford Lease.

Sample Source	Stanford Tank	Stanford Tank	Stanford Pond	Stanford Pond	
Sample Date	9/16/2021	12/13/2021	9/16/2021	12/13/2021	
Concentration					Units
Constituents of Salinity					
Total Dissolved Solids (TDS)	9,200	3,800	3,400	4,600	mg/L
Chloride	4,600	890	380	1,500	mg/L
Dissolved Boron	47	12	4.4	14	mg/L
Total Petroleum Hydrocarbons (TPH)					
Oil & Grease	160	580	1,900	330	mg/L
TPH	52	170	640	110	mg/L
Volatile Organic Compounds (VOCs) and Polycyclic Aromatic Hydrocarbons (PAHs)					
Benzene	J 7.8	<50	<10	12	µg/L
Naphthalene *	<10 / 2.4	<50 / 5.8	<10 / <3.1	<10 / J 1.2	µg/L
Anthracene	<0.10	<3.0	23	<2.0	µg/L
Benzo[a]anthracene	0.26	4.6	84	3.2	µg/L
Benzo[b]fluoranthene	<0.10	<3.0	11	<2.0	µg/L
Benzo[k]fluoranthene	<0.10	<3.0	5.3	<2.0	µg/L
Benzo[a]pyrene	0.15	<3.0	<3.1	<2.0	µg/L
Benzo[g,h,i]perylene	<0.10	<3.0	<3.1	<2.0	µg/L
Chrysene	0.051	<3.0	49	<2.0	µg/L
Radioactivity					
Gross Alpha	-4.67	3.62	11.1	5.93	pCi/L
Radium-226	18.8	3.53	13.7	3.30	pCi/L
Radium-228	37.3	3.19	9.43	1.47	pCi/L

* Naphthalene was detected at different concentrations using U.S. EPA Method 8260B (VOC) and U.S. EPA Method 8270-SIM (PAH). Both concentrations are included in that respective order.

J Trace values are results between the method detection limit and the reporting limit and are only qualitative (estimates).

Table 5 Selected produced wastewater analytical data from the Theta 30 Lease.

Sample Source	Theta Tank	Theta Tank	Theta Pond No. 3	Theta Pond No. 3	
Sample Date	9/16/2021	12/13/2021	9/16/2021	12/13/2021	
Concentration					Units
Constituents of Salinity					
Total Dissolved Solids (TDS)	3,200	3,400	3,800	4,200	mg/L
Chloride	230	150	280	400	mg/L
Dissolved Boron	3.7	2.9	4.3	5.2	mg/L
Total Petroleum Hydrocarbons (TPH)					
Oil & Grease	98	98	130	170	mg/L
TPH	34	34	48	52	mg/L
Volatile Organic Compounds (VOCs) and Polycyclic Aromatic Hydrocarbons (PAHs)					
Benzene	J 5.2	J 5.0	<10	<10	µg/L
Naphthalene *	<10 / 2	<10 / <0.10	<10 / 0.72	<10 / 0.20	µg/L
Anthracene	1.1	<0.10	2.9	<0.10	µg/L
Benzo[a]anthracene	1.1	<0.10	3.9	<0.10	µg/L
Benzo[b]fluoranthene	J 0.16	<0.10	0.78	<0.10	µg/L
Benzo[k]fluoranthene	0.2	<0.10	0.27	<0.10	µg/L
Benzo[a]pyrene	0.33	<0.10	<0.21	<0.10	µg/L
Benzo[g,h,i]perylene	J 0.12	<0.10	<0.21	<0.10	µg/L
Chrysene	1.6	0.32	2.8	<0.10	µg/L
Radioactivity					
Gross Alpha	0.283	12.3	-17.8	24.9	pCi/L
Radium-226	29.9	9.93	22.7	9.88	pCi/L
Radium-228	12.4	7.13	-0.388	1.00	pCi/L

* Naphthalene was detected at different concentrations using U.S. EPA Method 8260B (VOC) and U.S. EPA Method 8270-SIM (PAH). Both concentrations are included in that respective order.

J Trace values are results between the method detection limit and the reporting limit and are only qualitative (estimates).

The NOI indicates, “Based on the analytical results, effluent from the Leases contain concentrations of metals, total petroleum hydrocarbons, VOCs and PAHs. Effluent concentrations also exceed the maximum oil field discharge salinity limits for EC, chloride, and boron contained in the Basin Plan.”

The NOI also states, *“Samples were not collected from the effluent of the Santa Fe Lease due to low volume of water being produced at this time.”* Produced wastewater from the Santa Fe Lease needs to be sampled and analyzed for the required constituents listed in Table I of Monitoring and Reporting Program R5-2017-0036 once discharge resumes.

HYDROLOGY AND LAND USE

Climate data submitted in the NOI was gathered from stations located in Kettleman City and Buttonwillow. The data shows that the region has an average annual precipitation of 6.64 inches. The NOI indicates that the minimum monthly average pan evaporation is 1.74 inches.

The nearest surface water is the Carneros Creek, which is located to the east of the three Leases. The NOI states, *“Surface drainage is northeast, toward Carneros Creek and Santos Creek in the Antelope Plain Hydrologic Area, part of the South Valley Floor Hydrologic Unit, of the Tulare Lake Basin.”*

The NOI states that the Leases are located approximately 13 miles southwest of Lost Hills. The NOI also indicates, *“Land northeast of the Leases are being used for agricultural production. The nearest irrigated crops are approximately six and half miles northeast of the Stanford Lease.”*

HYDROGEOLOGIC CONDITIONS

The NOI indicates that a groundwater well survey did not identify any domestic or irrigation wells within 1 mile of the Leases.

The NOI states, *“According to the United States Department of Agriculture Natural Resources Conservation Service Web Soil Survey...five soil types are identified across the Site: Panoche Clay Loam, Kimberlina Sandy Loam, Kimberlina gravelly sandy loam, and Milham Sandy Loam... All identified soil types are well drained and classify as alluvium derived from igneous and sedimentary rock with a moderately high to high capacity to transmit water.”*

The NOI indicates that a boring was drilled on the Santa Fe Lease to a depth of 40 feet below ground surface (bgs). No groundwater was encountered. The soil was visually classified, and *“...soil types encountered in the boring consisted of mostly sandy silt for the upper 30 feet bgs, well-graded gravelly sand from 30 to 35 feet bgs and clay with sand from 35 to 40 feet bgs.”* Laboratory analysis of a soil sample taken between 35 to 40 feet bgs indicates the soil is a *“...high plasticity clay which has a low permeability.”*

The NOI cites a document dated 1 June 2016 and titled *“Hydrogeological Site Characterization Work Plan,”* completed by Geosyntec Consultants, on behalf of CMO Inc., pertaining to three unlined ponds located on the Mitchel Lease in the Chico-

Martinez Oil Field, approximately 3.7 miles southeast of the Berry Leases. The NOI states that groundwater at this site was encountered at approximately 400 feet bgs in 2011, and 385 feet bgs in 2014. The NOI also indicates that, *“Groundwater quality was determined to be impacted with naturally occurring petroleum hydrocarbons (crude oil) and containing high TDS. Groundwater samples collected from one of the wells at the GeoTracker listing contained TDS concentrations of 3,420 mg/L (GeoSyntec, 2016).”*

The NOI also cites Central Valley Water Board Order R5-2014-0019 pertaining to the North Belridge Solid Waste Disposal Site, which is an industrial solid waste landfill operated by Aera Energy LLC and located in the North Belridge Oil Field, approximately 5.4 miles northeast of the Berry Leases. The NOI states that *“...the first fluid encountered beneath the site was oil and tar at approximately 250 feet bgs...”*

The NOI concludes that:

Based on the research of nearby facilities, it is not unreasonable to assume that the groundwater below this Site is also in poor quality that it does not reasonably expect to support beneficial uses. Two facilities, one located 5.4 miles to the northeast of the Site, and one located 6.4 miles to the southeast of the Site, either reported first encountered groundwater that does not exist (facility northeast of Site) or that groundwater does not reasonably expect to support beneficial uses (facility southeast of the Site). Therefore, “best efforts” approach is considered to apply at this Site.

Central Valley Water Board staff have reviewed hydrogeologic information submitted by an oil producer in the McDonald Anticline Field on the Mitchel Lease, located approximately 1.2 miles northeast of the Berry Leases, for whom a NOA for coverage under General Order Three has been issued. The NOA and the associated GeoTracker Site ID number are listed below:

R5-2017-0036-018, issued on 1 October 2020 to Fourstar Resources, LLC for the Mitchel and Theta Leases. GeoTracker Site ID: L10001224631

The Fourstar Resources, LLC’s NOA Memorandum for General Order Three, R5-2017-0036-018 indicates that *“The region is covered in Quaternary Alluvium and Tulare Formation sediments, which combined are approximately 500 feet thick. These deposits consist of lenticular bodies of silt, sand, and gravel. The Tulare Formation lies directly upon tilted, oil-bearing Miocene marine formations...”* The Memorandum further states, *“According to the NOI, the Miocene groundwater in the sedimentary deposits underlying the McDonald Anticline Oil Field is exempt by the United States Environmental Protection Agency (USEPA) from the protections of the federal Safe Drinking Water Act.”*

Central Valley Water Board staff have also reviewed hydrogeologic information submitted by another oil producer in the McDonald Anticline Oil Field on the Layman A Lease, located approximately 1.4 miles north of the Berry Leases. The associated GeoTracker Site ID number is listed below:

California Resources Production Corporation, Layman A Lease. GeoTracker Site ID: L10004365367

A document dated 16 November 2017, prepared by Stantec Consulting Corporation (Stantec), on behalf of California Resources Production Corporation, and titled "*Work Plan for Characterization and Closure, McDonald Anticline Oil Field, Layman A Lease Concrete-Lined Impoundments and Conveyance Ditch*" indicates that "... groundwater depths ranged from about 450 feet to 500 feet below ground surface (bgs) in the Tulare Formation." This information was obtained from Stantec's review of available electric log data from oil wells near the Layman A Lease.

PROVISION 4 OF GENERAL ORDER THREE

Provision E.4 of General Order Three requires that Berry either: 1) demonstrate, within 60 days of issuance of the NOA, that "...*there is no groundwater beneath the Facility discharge areas and that produced wastewater and constituents associated with other approved wastes discharged at the Facility will not migrate into areas that there is groundwater with designated beneficial uses,*" or 2) "...*demonstrate that the natural background groundwater quality for the Facility meets the Sources of Drinking Water Policy exception criteria and/or parallel exception criteria ...*" and enter into a 5-year time schedule to develop an amendment to the Basin Plan that removes the beneficial uses of underlying groundwater.

Based on the characteristics of the regional geology and underlying groundwater discussed above, it appears that coverage of the ponds under General Order Three is appropriate. However, further information regarding the depth and quality of first encountered fluids beneath the ponds is needed to assess how Provision E.4 of General Order Three is to be applied.

Berry needs to conduct a hydrogeologic investigation and show that there is "*no groundwater*" beneath the ponds. The results of the hydrogeologic investigation need to be submitted within 60 days of the issuance of the NOA. In order to make a demonstration that there is no groundwater beneath the site, Berry needs to show that first encountered fluids beneath the ponds are oil or hydrocarbon bearing. Alternatively, Berry needs comply with the timeline outlined in Provision E.4.b of General Order Three and obtain a Basin Plan amendment to de-designate the beneficial uses of underlying groundwater. As indicated above, there are other pond operators, including in the nearby McDonald Anticline Oil Field, who have been granted coverage under General Order Three, and that must also obtain a Basin Plan amendment. Berry may work with

other ponds operators and obtain a Basin Plan amendment for a regional area that includes each operators' respective ponds.

SUMMARY

General Order Three applies to operators of existing oil and gas production facilities where the first encountered groundwater is of poor quality or where there is no first encountered groundwater.

Available information indicates that coverage under General Order Three is appropriate for the eight ponds located on the Santa Fe, Stanford, and Theta 30 Leases. However, more information regarding first encountered fluids beneath the site is needed. If first encountered fluids are oil or hydrocarbon bearing, then General Order Three Provision E.4.a will apply. Otherwise, Berry needs to show that the current Basin Plan groundwater beneficial uses are eligible for de-designation and apply for a Basin Plan amendment as described in General Order Three Provision E.4.b.

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. Berry is responsible for annual fees associated with this rating unless conditions or regulatory policies change.