



Central Valley Regional Water Quality Control Board

4 December 2018

Megan Silva
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CERTIFIED MAIL
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NOTICE OF APPLICABILITY (NOA), CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD, ORDER NUMBER R5-2017-0036, WASTE DISCHARGE REQUIREMENTS FOR OIL FIELD DISCHARGES TO LAND, GENERAL ORDER NUMBER THREE, AERA ENERGY LLC, LOCKWOOD DEHYDRATION PLANT, MIDWAY-SUNSET OIL FIELD, KERN COUNTY

Aera Energy LLC (Aera) operates the Lockwood Dehydration Plant, on the southwest side of Midoil Road, approximately 2.5 miles west of the town of Taft. A single geomembrane lined surface impoundment (pond) that is used for temporarily holding produced wastewater (discharge) is present on the Lockwood Lease (Lease). The pond, referred to by Aera as the “*Lockwood Dehydration Plant, Emergency Overflow Basin*” (Lockwood EOB) is in the west half of the southeast corner of Section 16 of T32S, R23E, MDB&M.

On 7 March 2018, Aera representatives submitted a technical report, dated 5 March 2018 and titled “*Technical Report For General Order Number Three, Lockwood Dehydration Plant, Midway-Sunset Oil Field, Kern County, California*” (Report). The Report was submitted as an update to a previous 8 May 2017 Notice of Intent (NOI) submitted by Aera for coverage of ponds in the Midway-Sunset Oil Field under General Orders for oil field produced wastewater discharges to land adopted by the Central Valley Regional Water Quality Control Board (Central Valley Water Board) on 6 April 2017. The Report requests coverage for the pond under Order Number R5-2017-0036, Waste Discharge Requirements General Order for Oil Field Discharges to Land, General Order Number Three (General Order Three).

Available information, including figures and cross-sections provided by Aera, indicates that the pond is constructed in alluvium. The Report states that the pond is “...*trapezoidal in shape with a length of approximately 120 feet and a width varying from 71 feet at one end to 41 feet at the other end, for an average width of 66 feet,*” and 10 ft. deep. The Report states that the pond is lined with a “...*30-mil 8130 XR-5 reinforced geomembrane.*” The Report indicates the pond is used to contain produced wastewater when an “*upset*” occurs in the produced wastewater treatment and disposal system.

This letter serves as formal notice that General Order Three is applicable to the Lease. General Order Number **R5-2017-0036-008** is hereby assigned to all produced wastewater discharges into the pond. Aera 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 letter also serves as formal notice that the portions of Cleanup and Abatement Order R5-2015-0746 (CAO) that apply to the active Lockwood EOB pond are hereby rescinded. The CAO was issued on 1 December 2015 for ponds at the Fulton, Lockwood, Moco 35, National USL, Shale 14, and W&S Leases in the Midway-Sunset Oil Field. An inactive unlined pond and an inactive sand basin are present on the Lockwood lease. A request for preparation and submittal of pond closure plans will be forthcoming under a separate cover.

General Order Three regulates the discharge of produced wastewater into ponds. Aera's Lockwood EOB is a "pond" based on the definition in General Order Three's Attachment A (Definition Of Terms). 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 Aera 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 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. Aera 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 under General Order Three is officially terminated. Aera 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."* Aera has provided an estimation of the maximum monthly discharge volume of the pond. However, the estimates are based on limited data that may underestimate historic discharges. The Report states, *"The fluids from the EOB are pumped back into the system within 24 hours of resolving an upset condition."* Therefore, this NOA does not limit the Facility to a maximum monthly discharge volume at this time. However, the "capacity" of the pond is identified in the Report as being 4,320 barrels with two feet of freeboard shall not be exceeded. Any increase in discharge volume that would exceed the "capacity" constitutes a facility expansion requiring an evaluation under the California Environmental Quality Act (CEQA).

4. Aera shall not discharge produced wastewater outside of the pond except for a permitted dust control use. If Aera 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.
5. **By 4 March 2019**, Aera 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 4 February 2019**, Aera 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 4.b.

The Report states that, *"There is no groundwater present in the alluvium near the Lockwood EOB. Attachment D.11.a Lockwood Well Logs (Appendix C), shows the upper 600 feet of the alluvium is air sands and shales. Well Loc-12M near the EOB indicates the top of the Tulare Formation is approximately 450 feet below ground surface."* The geophysical logs included in the Report's *"Attachment D.11.a Lockwood Well Logs (Appendix C)"* indicate the presence of fluids above 400 ft. bgs and within the zone identified as "alluvium." This needs to be assessed.

7. In the 5 March 2018 Report Aera states that a Construction Quality Assurance (CQA) report was not prepared for the pond's engineered liner. Aera shall provide **by 4 March 2019** information regarding the integrity of the pond's liner. This information is needed so that potential percolation can be assessed.

8. Aera shall operate and maintain the pond 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, Aera must submit a Report of Waste Discharge (Form 200).
9. **By 4 February 2019**, Aera shall, pursuant to Provision E.7 of General Order Three, submit a solids management plan for approval by the Executive Officer. This plan shall include the information required by Provision E.7. Aera shall, also include the information described in General Order Three, Attachment B, Information Needs Sheet, Item B.8. (a. – c.).

According to information provided with the NOI, the discharge is contained within the pond. The NOI reports that, *“Oil and gas facilities that have not released storm water resulting in a discharge of a reportable quantity (RQ) for which notification is or was required pursuant to 40 CFR Parts 110, 117, and 302 at any time after November 19, 1987 are not required to be permitted unless the industrial storm water discharge contributed to a violation of a water quality standard.”* Order Number 2014-0057-DWQ (NPDES General Permit CAS000001) specifies waste discharge requirements for discharges of storm water associated with industrial activities. If the conditions or regulatory policies change, the Lease may need coverage under NPDES General Permit CAS000001. Coverage under NPDES General Permit CAS000001 is not needed at this time.

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

Aera 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

Area 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 T10000007029.

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.

Please review the attached memorandum for more information. 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: 4 December 2018 Memorandum
General Order Three
1 March 1991 Standard Provisions

cc: Cameron Campbell, District Deputy of the California Division of Oil Gas and Geothermal Resources, Bakersfield (NOA and Memorandum only, Via email)
Howard D. Barlow, Senior Engineer, Amec Foster Wheeler Environment and Infrastructure, Inc., Fresno
Keith Nakatani, Oil and Gas Program Manager, Clean Water Action
(NOA and Memorandum only, Via Email)

Aera Energy LLC
Notice of Applicability for General Order Three
Lockwood Dehydration Plant
Midway-Sunset Oil Field
Kern County

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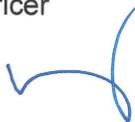
4 December 2018

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
Senior Engineering Geologist
PG No. 5946



Zachary J. Jarvie
Engineering Geologist



DATE: 4 December 2018

SUBJECT: NOTICE OF INTENT (NOI) REVIEW, CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD, ORDER NUMBER R5-2017-0036, WASTE DISCHARGE REQUIREMENTS FOR OIL FIELD DISCHARGES TO LAND, GENERAL ORDER NUMBER THREE, AERA ENERGY LLC, LOCKWOOD DEHYDRATION PLANT, MIDWAY-SUNSET OIL FIELD, KERN COUNTY

Aera Energy LLC (Aera) operates the Lockwood Dehydration Plant, also called the "Lockwood Lease" (Lease), in the Midway-Sunset Oil Field, on the southwest side of Midoil Road, approximately 2.5 miles west of the town of Taft. The Lease has a single geomembrane lined surface impoundment (pond) used for temporarily holding produced wastewater (discharge). The pond is in the west half of the southeast corner of Section 16 of T32S, R23E, MDB&M. Aera identifies the pond as the "Lockwood Dehydration Plant, Emergency Overflow Basin" (Lockwood EOB).

On 7 March 2018, Central Valley Regional Water Quality Control Board (Central Valley Water Board) staff received an email from staff at Amec Foster Wheeler Environmental and Infrastructure Inc. (Amec). The email contained a link to download a technical report, dated 5 March 2018 and titled "Technical Report For General Order Number Three, Lockwood Dehydration Plant, Midway-Sunset Oil Field, Kern County, California" (Report). The Report requested coverage of the Lockwood EOB under Order R5-2017-0036, Waste Discharge Requirements General Order For Oil Field Discharges To Land, General Order Number Three (General Order Three). This memorandum provides a summary of the information provided.

Two other ponds are present on the Lease. The Report does not include a proposal for covering their associated discharges under General Order Three. The first pond is inactive and unlined and approximately 100 feet (ft.) north of the Lockwood EOB. The second pond is identified by Aera in a submittal dated 15 June 2015, as the "Lockwood Wtr Pit, T-8" (Lockwood Sand Basin) and is described as a concrete lined "Sand Basin" that is used "to separate solids from produced fluids." The Lockwood Sand Basin is approximately 950 ft. north

of the Lockwood EOB. In an email correspondence dated 1 October 2018, Aera staff indicated that the Lockwood Sand Basin is no longer in use. Closure plans for these two surface impoundments will be requested under a separate cover.

BACKGROUND INFORMATION

General Order Three regulates oil field wastewater discharges where: 1) produced wastewater exceeds 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, May 2018 (Basin Plan); and 2) there is no first encountered groundwater or first encountered groundwater is of poor quality and does not support beneficial uses as identified in the Basin Plan as Municipal and Domestic Supply (MUN), or Agricultural Supply (AGR), or Industrial Service Supply (IND) or Industrial Process Supply (PRO).

Regulatory History

On 15 January 2015, Central Valley Water Board staff (Staff) inspected the Lockwood EOB and the unlined pond located approximately 100 feet (ft.) north of the Lockwood EOB. The Lockwood Sand Basin was not inspected. As a result of the inspection, a Notice of Violation (NOV), dated 10 April 2015, was issued. The NOV indicated that Aera needed to submit either a Report of Waste Discharge or Closure Plans for the ponds.

On 1 April 2015, the Central Valley Water Board issued "*California Water Code Directive Pursuant to Section 13267*" (13267 Order), which required that Aera "*collect representative samples of wastewater within each of the ponds.*" In response a report, dated 15 June 2015, was provided by Aera that contained analytical results from samples collected on 3 June 2015 from ponds identified by Aera as the "*Lockwood Dehy EOB*" (Lockwood EOB) and the "*Lockwood Wtr Plt, T-8*" (Lockwood Sand Basin).

On 1 December 2015, Cleanup and Abatement Order (CAO) R5-2015-0746 was issued to Aera for ponds in the Fulton, Lockwood, Moco 35, National USL, Shale 14, and W&S Leases in the Midway-Sunset Oil Field. The Lockwood EOB was included among those identified in the CAO. In response to the CAO, Aera conveyed a letter dated 8 February 2016, and a one page work plan (Work Plan).

In May 2017, Central Valley Water Board staff received a Notice of Intent (NOI) for coverage of eight ponds in the Midway-Sunset Oil Field under General Order Three. The NOI package included: an application fee; a completed Form 200, Application/Report of Waste Discharge General information form for Waste Discharge Requirements or NPDS Permits; and, a "*Technical Report for General Order Three...*," dated 6 May 2017. In a review letter dated 27 July 2017, Central Valley Water Board staff indicated that each pond or group of ponds in the Midway-Sunset Oil Field should be permitted separately, and that individual NOI's must be submitted for each. The letter also advised Aera that prior to submitting a revised NOI for each pond or group of ponds, Aera should evaluate each independently to determine which can be covered under General Order Three or under General Order Two.

POND CHARACTERISTICS AND CAPACITY

The Report describes the Lockwood EOB as being “...trapezoidal in shape with a length of approximately 120 feet and a width varying from 71 feet at one end to 41 feet at the other end, for an average width of 66 feet,” and 10 ft. deep. The Report states that the “capacity” of the pond, at 2 ft. of freeboard, is 4,320 barrels.

The Report states that “*The interior slopes for the EOB are constructed at slopes of 2 horizontal to 1 vertical (2:1).*” The Report states that The Lockwood EOB is “...constructed below surrounding grades and lined with 30-mil 8130 XR-5 reinforced geomembrane.” Construction drawings and specifications for the geomembrane liner are provided in Appendix A of the Report.

The Report indicates that two feet of freeboard will be maintained in the Lockwood EOB. This is required by the General Order Two Discharge Specifications, Item B.

DISCHARGE CHARACTERISTICS

The Report states that the Lockwood Dehydration Plant treats “fluid” produced from the following Leases in the Midway Sunset Oil Field: “*Lockwood Diatomite/Wilmax;*” “*Buena Fe/Monarch;*” “*Republic Sec 5 Fee, 7 Gov, 8 Fee;*” “*Wilbert; St. Lawrence Fee;*” “*Cheney/Stimson Production;*” and, “*Lockwood Heavy/Spellacy.*”

The Report states that “*Produced water from the Lockwood Dehydration Plant is disposed at Valley Water Management Company’s Broad Creek facility.*”

Flow Volumes

The Report states that “*When an upset occurs in water processing system, the EOB receives tank overflow or releases from pressure relief valves. When operations are restored to normal conditions, the fluids are pumped back into the process by an on-site pump.*”

The Report states that “*When the EOB is in use, the fluid level is monitored by video surveillance and level indicators to ensure fluid levels don’t exceed capacity. Operations staff maintains daily logs of when fluids were sent to and removed from the EOB. The fluids from the EOB are pumped back into the system within 24 hours of resolving an upset condition.*”

The Report states that “...*the Lockwood Dehydration Plant EOB receives an estimated maximum discharge volume of 1,638 bbls per month, or less than half the capacity of the pond. Operations procedures require that the discharged fluids are removed within 24 hours of upset conditions being resolved.*”

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.*”

Produced wastewater must not be allowed to over top and flow outside of the ponds. General Order Three prohibits produced wastewater discharges outside of the ponds.

Dust Control and Solid Reuse

With regards to the use of wastewater for dust control, the Report states: *“Consistent with Provision E.6 of the General Order, Aera proposes to utilize produced water for dust suppression in the oil field covered by this NOI. Analytical data, along with a detailed management plan will be supplied for this use and no application of produced water to land will occur until the Executive Officer approves the management plan.”*

With regards to solid wastes generated at the Facility the Report states that *“Solid wastes from the facility are recycled and shipped to the South Belridge Central Waste facility to be added to the road mix.”* The Report also states that *“Consistent with Provision E.7 of the General Order, Aera proposes to continue to beneficially utilize solids generated from the oil field covered by this Notice of Intent (NOI) along with other Aera properties consistent with the current practices. Analytical data, along with a detailed management plan, consistent with Provision E.6 and items B.8 (a-c) will be supplied to describe both the centralized road mix processing facility in South Belridge and the regional use of that product for the construction of roads and well pads throughout Aera’s operating properties.”*

Discharge Specification B.16 of General Order Three requires that the discharger monitor the accumulations of solids within the ponds and as necessary, remove them. Additional General Order Two requirements for solids are in Section D, titled *“Solids Disposal Specifications.”*

Waste Constituents

The Report states that, *“No hazardous wastes are known to be generated at this facility. If any hazardous wastes are generated, they will be disposed in accordance with State and Federal laws.”*

The Report states that, *“Produced water was sampled from the WEMCO at the Lockwood Dehydration Plant.”* The chain of custody form for the sampling states that the Lockwood Dehydration Plant EOB sample, “MW-22,” was collected on 3 November 2017.” The sample results are summarized in **Table 1**, below.

Table 1 Selected constituent concentration data for wastewater collected on 3 November 2017 from the Lockwood EOB.

| Sample Point: "MW-22," Lockwood EOB | | |
|--|----------------------|------------------------------|
| Constituents of Salinity | Concentration | Units |
| Total Dissolved Solids (TDS) | 7,100 | milligrams per Liter (mg/L) |
| Chloride | 2,500 | mg/L |
| Dissolved Boron | 45 | mg/L |
| Volatile Organic Compounds (VOC), and Polynuclear Aromatic Hydrocarbons (PAH) | | |
| Benzene | 13 | micrograms per Liter (µg/L) |
| sec-Butylbenzene | 0.24 | µg/L |
| Ethylbenzene | 9.0 | µg/L |
| Isopropylbenzene | 1.5 | µg/L |
| p-Isopropyltoluene | 0.13 | µg/L |
| n-Propylbenzene | 6.7 | µg/L |
| Toluene | 6.7 | µg/L |
| 1,2,4-Trimethylbenzene | 5.9 | µg/L |
| 1,3,5-Trimethylbenzene | 1.4 | µg/L |
| Total Xylenes | 15 | µg/L |
| Acenaphthene | 0.86 | µg/L |
| Chrysene | 0.24 | µg/L |
| Fluorene | 0.19 | µg/L |
| Naphthalene * | 5.0 / 3.4 | µg/L |
| Phenanthrene | 2.0 | µg/L |
| Pyrene | 0.29 | µg/L |
| Radioactivity | | |
| Gross Alpha | 4.87 ± 18.8 | picoCuries per Liter (pCi/L) |
| Gross Beta | 36.8 ± 22.2 | pCi/L |
| Radium-226 | 4.86 ± 3.61 | pCi/L |
| Radium-228 | 8.96 ± 5.68 | pCi/L |
| Total Uranium | <0.34 | pCi/L |

* Naphthalene was detected at concentrations of 5.0 µg/L with U.S. EPA method 8260B (VOCs), and 3.4 µg/L with U.S. EPA method 8270C-SIM (PAHs).

UNSATURATED SOIL AND GROUNDWATER CHARACTERISTICS

Regarding underlying conditions and first encountered fluids the Report states: *“There is no groundwater present in the alluvium near the Lockwood EOB. Attachment D.11.a Lockwood Well Logs (Appendix C), shows the upper 600 feet of the alluvium is air sands and shales. Well Loc-12M near the EOB indicates the top of the Tulare Formation is approximately 450 feet below ground surface.”*

With regards to underlying soils, the Report states: *“The alluvium is predominantly composed of coalescing alluvial fan deposits with little consistent internal structure, except for a fine-grained zone up to 100 feet thick at the base of the alluvium. This basal alluvial unit varies from clay to fine silt and acts as a confining layer, preventing the vertical migration of fluids.”*

Provision 4 of General Order Three

Provision 4 of General Order Three requires that Aera either: 1) demonstrate 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) obtain a Basin Plan amendment under the timeline outlined in General order Three Provision 4.b.

The Report states that, *“A Basin Plan Amendment is not required since it has been demonstrated that no groundwater is present near the Lockwood facility. Furthermore, the construction materials used at the Lockwood facility and geology in the area do not allow groundwater to reach protected waters.”*

The Report states that, *“There is no groundwater present in the alluvium near the Lockwood EOB. Attachment D.11.a Lockwood Well Logs (Appendix C), shows the upper 600 feet of the alluvium is air sands and shales. Well Loc-12M near the EOB indicates the top of the Tulare Formation is approximately 450 feet below ground surface.”*

Appendix C of the Report contains geophysical logs for 12 wells, 10 of which are within 500 ft. of the Lockwood EOB. The geophysical logs presented include the following: Gamma Ray (GR), and Caliper (CALI), Spontaneous Potential (SP); Dual Induction/Deep Resistivity (IDL), and Shallow Resistivity (SFL); and, Neutron Porosity (NPHI), and Density Porosity (DPHI). Annotations to the geophysical logs states state the *“Alluvium”* is *“entirely air-filled pore space,”* and this is indicated by *“High levels of Deep Resistivity,”* and *“Density-Neutron log cross-over character.”* Exceptions for these log conditions are attributed to *“Drilling Fluid Invasion”* and *“Rough Hole / Wash-Outs,”* as explained in the following note that accompanies most of the logs:

“Petrophysical Evaluation Note: *appearance of what appears to be original, in-situ oil saturation is not correct. This phenomenon is an artifact of the drilling process. Depending on the drilling fluid properties, highly porous and permeable air-filled sands can locally be preferentially invaded by drilling fluids. The Neutron-Density tools sense only ~5”-10” into the formation, while the Deep Resistivity tool senses ~90” into the formation. In these*

situations, the lack of neutron-density crossover fools the petrophysical algorithms into calculating saturations which are not actually present in these shallow sands. Deep Resistivity sees well beyond the near-wellbore drilling fluid invasion zone, and is therefore a much more reliable indicator of air-filled pore space in this near-surface environment. Additionally, the caliper logs indicate some wash-outs and hole roughness in the shallow interval. This amplifies the false saturation condition described above. In such a wash-out, the density-neutron tools may only see drilling fluid within its field of investigation.”

Central Valley Water Board staff have reviewed the geophysical logs described above. These geophysical logs are for boreholes drilled between 1979 and 1982. In some of the geophysical logs provided, between about 300 and 400 ft. below ground surface (bgs) and within the zone identified as “alluvium,” there are several 5 to 30 ft. thick zones in which the “Neutron-Density log crossover” is not observed, the deep resistivity log varies, and the caliper log does not show an increase or variability, indicating a “wash out.” The presence of fluids at these locations is indicated. A stronger indication of the presence of fluids above a depth of 400 ft. bgs is indicated in the geophysical logs identified as: LOC-11L, LOC-12I, LOC-12M, LOC-12N, and LOC-20C.

Aera needs to address the inconsistencies associated with the geophysical log interpretations. Accurate assessments of the underlying hydrogeologic conditions in the “alluvium,” above the Tulare Formation, are needed. The indicated first occurrence of hydrocarbon bearing fluid needs to be supported by available data.

The Report does not include information about the integrity of the pond’s liner. This information is needed so that potential percolation can be assessed.

SUMMARY

The Report indicates that first encountered fluids are comingled with hydrocarbons in the Tulare formation, which is encountered at a depth of approximately 450 ft. bgs. Based on the conditions described in the Report, coverage under General Order Three appears to be appropriate for the pond. Potential fluid within the “alluvium” that overlies the “Tulare Formation” needs to be assessed and properly described. Specifically Aera needs to more accurately assess hydrogeologic conditions. Aera also needs to provide information about the integrity of the pond’s 30-mil reinforced geomembrane liner. As per Title 23, CCR, section 2200, the discharge shall be given a TTWQ (threat to water quality) and CPLX (complexity rating) of 3C. Aera is responsible for annual fees associated with this rating, unless conditions or regulatory policies change.