

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. R5-2006-0073

WASTE DISCHARGE REQUIREMENTS
FOR
AERA ENERGY LLC
ROW 4 / LOST HILLS WASTEWATER DISPOSAL FACILITY
SOUTH BELRIDGE OIL FIELD
KERN COUNTY

The California Regional Water Quality Control Board, Central Valley Region (hereafter Central Valley Water Board) finds that:

1. Aera Energy LLC, a California limited liability company, (Discharger) owns and operates crude oil production wells, oil and produced water treatment plants, and wastewater disposal facilities in the South Belridge Oil Field.
2. The Row 4 / Lost Hills Wastewater Disposal Facility (Facility) consists of 107 unlined surface impoundments. Wastewater discharged at the Facility includes: (a) oil field produced water from the Dehydration 20 Plant and Dehydration 27 Plant; (b) backwash water from treatment filters at the Water Plant 27; and, (c) softener regeneration wastewater from ion exchange units at Water Plant 27.
3. This Order implements the *Water Quality Control Plan for the Tulare Lake Basin, Second Edition - 1995* (Basin Plan), which designates beneficial uses, establishes water quality objectives, and contains implementation plans and policies for all waters of the Basin.
4. The discharges are subject to the requirements of Title 27, California Code of Regulations, Section 20090(b) et seq (Title 27), and are currently regulated by Waste Discharge Requirements (WDRs), Resolution No. 58-193. The WDRs are outdated and are being updated to reflect Basin Plan policy, current regulations, and site-specific technical information.

LOCATION AND DESCRIPTION

5. The South Belridge Oil Field is on the west side of the San Joaquin Valley, approximately 35 miles west of the city of Bakersfield and nine miles south of Lost Hills, in Kern County as shown on Attachment A, which is attached to and made part of this Order.
6. The unlined Row 4 impoundments are in Section 34 (Assessor Parcel Number 085-220-21-8) and the unlined Lost Hills impoundments are in Sections 25 and 26 of T28S, R21E, MDB&M (Assessor Parcel Numbers 085-220-31-7 and 085-220-34-1). Wastewater is conveyed to the Row 4 impoundments via pipelines from the Dehydration 20 Plant, Dehydration 27 Plant, and Water Plant 27. Wastewater is conveyed from the Row 4 impoundments to the Lost Hills impoundments via a short pipeline that crosses under Lost Hills Road. The impoundments are shown on Attachment B, which is attached to and made part of this Order.
7. The impoundments, which have a surface area of approximately 250 acres, are used for the disposal of wastewater by evaporation and percolation. The Discharger has reported that

approximately 33,885,000 barrels of wastewater were discharged to the Facility during the 12 months ending in June 2005.

8. The impoundments are unlined and do not meet the prescriptive construction criteria for Class II surface impoundments as specified in Title 27, Section 20005, et seq.
9. The land use around the Row 4 impoundments consists of oil and gas production. The land use around the Lost Hills impoundments consists of irrigated row crops and orchards.
10. The South Belridge Oil Field lies on the Antelope Plain, an alluvial piedmont consisting of coalescing alluvial fans from the Temblor Range to the west. The region slopes to the east towards the San Joaquin Valley.
11. The site is in the South Valley Floor Hydrologic Unit, Antelope Plain Hydrologic Area (No. 558.60), as depicted on interagency hydrogeologic maps, prepared by the Department of Water Resources in August 1986.
12. The climate in the area is semi-arid, with hot, dry summers and cool winters. Available weather data through 1997 from a monitoring station at South Belridge indicates the average annual precipitation is 5.96 inches. The annual Class A pan evaporation rate is approximately 108 inches at Lost Hills.
13. The 100-year and 1000-year, 24-hour precipitation events calculated by the California Department of Water Resources (DWR) are 2.53 inches and 3.32 inches, respectively, for the South Belridge monitoring station based on data through 1997.
14. The stream channel identified as Chico Martinez Creek is immediately to the north of the Lost Hills impoundments. It terminates in an orchard to the east of the Lost Hills impoundments and in the NW¹/₄ of Section 25, T28S, R21E, MDB&M (Attachment B). An unnamed stream channel is immediately to the south of the Row 4 and Lost Hills impoundments. Natural flow in the channels occurs during infrequent high precipitation storm events. Chico Martinez Creek and the unnamed stream channel are defined as West Side Streams in the Basin Plan.
15. Federal Emergency Management Agency Flood Insurance Rate Map, Community Panel No. 060075 0675 B, dated 26 September 1986, shows the Lost Hills impoundments are surrounded on the north, east, and south by areas of 100-year flooding (Zone A) by Chico Martinez Creek.
16. Table II-I in the Basin Plan designates West Side Streams as having beneficial uses that include: agricultural supply; industrial service and process supply; water contact and non-contact water recreation; warm freshwater habitat; wildlife habitat; rare and endangered species habitat; and groundwater recharge. Some beneficial uses may not be applicable to a body of water.
17. The California Aqueduct and Belridge Water Storage District's 415 North Canal are approximately 0.95 and 0.05 miles northeast of the impoundments, respectively. The Belridge Water Storage

District's 500 Canal crosses Lost Hills Road between the Row 4 and the Lost Hills impoundments (Attachment B).

HYDROGEOLOGIC INFORMATION

18. The Discharger has conducted a hydrogeologic investigation to delineate the geology and evaluate groundwater conditions in the area east of the South Belridge Oil Field. Predecessor companies to the Discharger have installed 67 groundwater monitoring wells between 1984 and 1992. Currently, 47 groundwater monitoring wells are sampled by the Discharger. An adjacent property owner has installed five groundwater monitoring wells and eight water supply wells. The DWR installed two groundwater monitoring wells. Attachment C, which is attached to and made part of this Order, shows the locations of all groundwater monitoring and water supply wells in the area east of the South Belridge Oil Field with the wells near the impoundments highlighted.
19. The youngest sediments are Holocene Alluvium, which consists of a heterogeneous sequence of alternating sand, silt, and clay. Underlying the Alluvium is the Late Pleistocene Upper Tulare Formation, which also consists of alternating sand, silt, and clay.
20. Reports submitted by the Discharger describe how the stratigraphically lowest sand layer in the Alluvium is laterally continuous and has been designated as the 22K Sand. Underlying the 22K Sand is the Corcoran Clay Equivalent (CCE), which likely correlates with the Corcoran Clay identified further to the east. Unconformably underlying the CCE are Upper Tulare sediments. Attachment D, which is attached to and made part of this Order, shows the stratigraphy.
21. Three stratigraphic intervals have been identified by the Discharger as aquifer zones containing water-bearing sands. Discontinuous water-bearing sand layers separated by clay layers within the Alluvium have been collectively designated as the unconfined Aquifer I. Underlying Aquifer I is a discontinuous clay aquitard. Below this aquitard is the 22K Sand which is water-bearing and is designated as the semi-confined 22K Aquifer. Underlying the 22K Aquifer is another aquitard, the CCE. Below the CCE in the upper Tulare sediments is a thick sequence of relatively continuous, permeable water-bearing sand layers separated by clay layers collectively designated as the confined Aquifer II. Attachment D shows the three aquifer zones.
22. Hydrogeologic information indicates that the geology beneath and to the east and northeast of the Facility does not preclude wastewater from migrating downgradient to the northeast.
23. Oil and wastewater is produced from the Belridge Diatomite and the lower Tulare Formation. The shallowest production is in the lower Tulare Formation at a depth of approximately 300 feet.
24. The Discharger operates 46 Class II injection disposal wells permitted by the California Division of Oil, Gas, and Geothermal Resources to inject wastewater into the Tulare Formation. The wells are in Section 20 and 21, T28S, R21E and Section 11, T29S, R21E, MDB&M. During August 2005, the Discharger reported 2,851,016 barrels of wastewater were injected into 16 disposal wells.

25. No known Holocene faults traverse or are projected through the South Belridge area. The nearest known Holocene fault is the San Andres Fault zone, located 15 miles southwest of the site.

WASTEWATER CHARACTERISTICS AND CLASSIFICATION

26. Wastewater in the impoundments is sampled and analyzed by the Discharger each quarter and the results reported semi-annually. On 26 May 2005, wastewater samples were collected from the inlet impoundment, a middle impoundment, and from the terminal impoundment. A state certified laboratory analyzed the samples and the Discharger reported the following results in the *Semi-Annual Monitoring Report January - June 2005*:

<u>Impoundment</u>	<u>EC</u> µmhos/cm	<u>TDS</u> mg/L	<u>chloride</u> mg/L	<u>boron</u> mg/L
Inlet	46,000	24,000	13,000	79
Middle	39,000	24,000	13,000	80
Terminal	34,000	27,000	15,000	99

27. Non-hazardous waste that contains pollutants that, under ambient environmental conditions at a waste management unit, could be released in concentrations exceeding applicable water quality objectives or that could reasonably be expected to affect beneficial uses of the waters of the state is defined in California Water Code, §13173 (b) as “Designated Waste.”
28. The Discharger conducted a feasibility study of disposal alternatives, and decided to implement: (a) wastewater recycling; and, (b) wastewater disposal to Class II disposal wells permitted by the California Division of Oil, Gas, and Geothermal Resources.
29. The Discharger, in correspondence dated 3 August 2005, committed to permanently cease wastewater discharges to land for purposes of disposal and close the surface impoundments in accordance with the time schedule contained in this Order.

BASIN PLAN INFORMATION

30. The Basin Plan contains maximum numerical salinity limits for the disposal of oil field production wastewater in unlined impoundments overlying groundwater with existing and future probable beneficial uses. The maximum concentration limits are: electrical conductivity at 25° C, 1,000 µmhos/cm; chloride, 200 mg/L; and, boron, 1 mg/L.
31. Table II-2 in the Basin Plan lists the beneficial uses of groundwater. The facility is in the Kern County Basin Hydrologic Unit and the 259 Detailed Analysis Unit (DAU), which has the following beneficial uses of groundwater: municipal and domestic supply (MUN), agricultural supply (AGR), and industrial service supply (IND). Due to the size of the DAU, the listed uses may not exist throughout the DAU. The Basin Plan defines MUN as uses of water for community, military, or individual water supply systems, including, but not limited to, drinking water supply. The Basin Plan defines AGR as uses of water for farming, horticulture, or ranching, including, but not limited

to, irrigation, stock watering, or support of vegetation for range grazing. The Basin Plan defines IND as uses of water for industrial activities that do not depend primarily on water quality, including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well repressurization.

32. The Basin Plan allows the Central Valley Water Board to consider criteria for exceptions to beneficial uses of groundwater. One of the exception criteria for both the MUN and AGR beneficial use designations is: "The aquifer is regulated as a geothermal energy producing source or has been exempted administratively pursuant to 40 CFR, Section 146.4 for the purpose of underground injection of fluids associated with the production of hydrocarbon or geothermal energy..." An exception criteria for just the MUN designation is: "The total dissolved solids (TDS) must exceed 3,000 mg/L (or an electrical conductivity exceeding 5,000 μ mhos/cm) and the aquifer cannot be reasonably expected to supply a public water system."
33. Where the Central Valley Water Board finds that one of the exception criteria apply, it may remove the designation for the particular water body through a formal Basin Plan amendment, which includes a public hearing. The exception becomes effective upon approval by the State Water Resources Control Board (State Water Board) and Office of Administrative Law. Table II-2 in the Basin Plan lists those beneficial use exceptions that have been considered by the Central Valley Water Board. The Central Valley Water Board has not considered a request or amended the Basin Plan to allow an exception to the beneficial uses of groundwater for this location.

GROUNDWATER INFORMATION

34. The Discharger owns and operates 35 industrial supply wells in Sections 20, 21, 27, 28, 34, and 35 of T28S, R21E, MDB&M, approximately one mile south to three miles northwest of the impoundments. The wells supply approximately 420,000 barrels per day of groundwater for use by the Discharger for waterflood injection. The groundwater has concentrations that average about 14,667 mg/L for TDS, 8,700 mg/L for chloride, and 45 mg/L for boron.
35. The Discharger owns and operates two groundwater wells near Spicer City and in Section 10, T28S, R22E, MDB&M, approximately six miles northeast of the impoundments. The wells are a facility supply source for non-drinking water.
36. Twelve groundwater monitoring wells near the impoundments are completed in Aquifer I. Eleven of the wells were installed by a predecessor company to the Discharger between 1984 and 1992. One well was installed in 2003 by an adjacent property owner. Water samples collected by the Discharger and the predecessor company between 1984 and 2005 had the following chemical concentration ranges in mg/L:

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<u>Well</u>	<u>TDS</u>	<u>Chloride</u>	<u>Boron</u>
212(1)-25	11,500 – 26,100	4,673 – 11,000	28.5 – 99
212(2)-25	10,840 – 19,600	4,340 – 4,940	10.0 – 16.0
218(1)-25	11,600 – 20,400	3,940 – 7,500	15.8 – 68.0
218(2)-25	12,201 – 20,300	6,520 – 8,600	32.0 – 68.0
25G1	9,957 – 25,300	4,248 – 9,000	11.7 – 44
25J1	3,927 – 6,730	356 – 2,942	4.3 – 12.6
285(2)-24	2,190 – 4,890	45.7 – 650	1.4 – 9.2
313R1	4,700 – 6,800	647 – 2,000	3.9 – 9.9
323Q1	12,000 – 21,700	4,700 – 6,210	5.9 – 16.2
324K1	5,050 – 5,950	510 – 1,260	6.9 – 12.4
327K1	6,970 – 16,000	1,200 – 6,600	7.4 – 19
MW-1B	4,510 – 4,900	650 – 860	8.4 – 9.0

Wells 212(1)-25, 212(2)-25, 218(1)-25, 218(2)-25, 25G1, 323Q1, and 327K1 have TDS, chloride, and boron concentrations that have increased with time. Impacted groundwater in Aquifer I extends downgradient to the east of the impoundments for at least 0.5 miles to monitoring well 25G1.

37. Seventeen groundwater monitoring wells near the impoundments are completed in the 22K Aquifer. Sixteen of the wells were installed by a predecessor company to the Discharger between 1984 and 1992. One well was installed in 2003 by an adjacent property owner. Water samples collected by the Discharger and the predecessor company between 1984 and 2005 had the following chemical concentration ranges in mg/L:

<u>Well</u>	<u>TDS</u>	<u>Chloride</u>	<u>Boron</u>
13F1	1,600 – 10,000	291 – 4,300	4.0 – 20
13H1	2,475 – 21,900	360 – 7,810	3.0 – 19
212(3)-25	9,270 – 16,000	4,140 – 7,423	25.4 – 61
23J1	3,430 – 17,500	411 – 5,600	8.5 – 26.2
24P1R	11,000 – 14,800	4,860 – 7,100	25.3 – 62
25G2	4,371 – 18,000	612 – 7,500	5.5 – 48
25J2	3,673 – 14,000	473 – 5,200	4.1 – 35
218(3)-25	1,900 – 20,900	880 – 5,400	3.1 – 26.9
284(3)-35	3,230 – 10,700	404 – 2,800	5.2 – 14
285(3)-24	7,200 – 14,600	3,130 – 5,800	14.2 – 47
313N3	2,620 – 4,400	139 – 1,300	4.0 – 8.2
313R3	7,000 – 10,300	2,700 – 3,500	9.9 – 21.4
323G3	4,200 – 8,460	1,200 – 2,770	5.6 – 16
325D4 / 325DPZ3	4,500 – 9,490	592 – 2,800	4.6 – 11
327K3	9,900 – 24,600	3,400 – 9,100	4.0 – 84
7N2	2,568 – 7,640	333 – 2,500	4.1 – 15
MW-1A	13,100 – 15,000	6,100 – 6,100	34.9 – 42

Some of the wells had high TDS, chloride, and boron concentrations since they were installed while others have shown increasing concentrations with time. Groundwater has been impacted by wastewater migrating from the impoundments. Impacted groundwater in the 22K Aquifer extends downgradient to the east-northeast for at least 1.5 miles to well MW-1A and to the north-northeast for at least 2.7 miles to monitoring well 7N2.

38. Analytical results of groundwater samples collected in well 7N2 between July 1986 and January 1993 had the following concentration ranges: TDS, 2,568 - 3,097 mg/L and chloride, 333 - 407 mg/L. Between July 1986 and November 1997, the boron concentration ranged from 4.1 - 5.3 mg/L. These concentrations are considered background water quality in the 22K Aquifer near the California Aqueduct.
39. Analytical results of groundwater samples collected in well 7N2 between July 1993 and May 2005 had the following concentration ranges: TDS, 3,120 – 7,640 mg/L; and, chloride, 450 – 2,500 mg/L. Beginning in November 1999, the boron concentration ranged from 6.1 - 15 mg/L. Groundwater in well 7N2 became impacted with wastewater migrating from the impoundments in late 1993.
40. Three groundwater monitoring wells near the impoundments are completed in Aquifer II. The predecessor company to the Discharger installed two of the wells in 1984 and 1990. An adjacent property owner installed the third well in 2003. Water samples collected by the Discharger and the predecessor company between 1984 and 2005 had the following chemical concentration ranges in mg/L:

<u>Well</u>	<u>TDS</u>	<u>Chloride</u>	<u>Boron</u>
13E5	2,800 – 4,463	199 – 496	7.1 – 10.0
24P3	1,980 – 6,300	211 – 425	0.68 – 3.8
MW-3	1,300 – 2,100	360 – 381	5.9 – 6.6

The results from wells 13E5, 24P3, and MW-3, located approximately 2.0 miles north, 0.3 miles northeast, and 1.15 miles east of the impoundments respectively, indicate that groundwater in Aquifer II has not been impacted by wastewater from the impoundments.

41. The Discharger has not delineated the lateral extent of groundwater impacted by wastewater migrating from the impoundments. In accordance with the time schedule contained in this Order, the Discharger must complete an investigation to determine the lateral extent of wastewater impacts on groundwater in Aquifer I and the 22K Aquifer. Following completion of the investigation, a plan is to be submitted to implement a Corrective Action Program in accordance with Title 27, California Code of Regulations, Section 20430.

CEQA AND OTHER LEGAL REFERENCES

42. The action to adopt WDRs for existing facilities is exempt from the provisions of the California Environmental Quality Act (Public Resources Code Section 21000, et seq.), in accordance with Title 14, California Code of Regulations, Section 15301.
43. This Order requires the Discharger to submit technical reports as authorized under Section 13267(b)(1) of the California Water Code, which states in part:

“In conducting an investigation specified in subdivision (a), the Central Valley Water Board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste within its region, or any citizen or domiciliary, or political agency or entity of this state who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge, waste outside of its region that could affect the quality of waters within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the Central Valley Water Board requires. The burden, including costs, of these reports shall bear a reasonable relationship to the need for the report and the benefits to be obtained from it. In requiring those reports, the Central Valley Water Board shall provide the person with a written explanation with regard to the need for the reports, and shall identify the evidence that supports requiring that person to provide the reports.”
44. The technical reports required by this Order and the attached “Monitoring and Reporting Program No. R5-2006-0073” are necessary to assure compliance with these WDRs. The Discharger operates the Facility that discharges the waste subject to this Order.
45. The Discharger is not required to obtain coverage under a National Pollutant Discharge Elimination System (NPDES) general industrial stormwater permit, provided the Facility has not experienced a reportable spill since 19 November 1987. It is the responsibility of the Discharger to comply with United States Environmental Protection Agency federal stormwater regulations (40 CFR Parts 122, 123, and 124) should the Facility not qualify for exemption.
46. This Order imposes significant new and more stringent requirements compared to those in WDRs Resolution No. 58-193. This Order is consistent with the antidegradation provisions of State Board Resolution 68-16. Provided the Discharger complies with the Order, discharges in the future should not cause adverse impacts on groundwater.

PROCEDURAL REQUIREMENTS

47. The Central Valley Water Board has notified the Discharger, interested agencies, and persons of its intent to prescribe WDRs for this discharge and has provided them with an opportunity to submit their written views and recommendations.
48. The Central Valley Water Board, in a public meeting, heard and considered all comments pertaining to this proposed Order.
49. Any person adversely affected by this action of the Central Valley Water Board may petition the State Water Board to review the action. The petition must be received by the State Water Board

within 30 days of the date of issuance of this Order. Copies of the law and regulations applicable to filing petitions are available at http://www.waterboards.ca.gov/water_laws and will be provided upon request.

IT IS HEREBY ORDERED, that Resolution No. 58-193 be superseded, and that pursuant to Sections 13263 and 13267 of the California Water Code, Aera Energy LLC, its agents, successors, and assigns, in order to meet the provisions of Division 7 of the California Water Code and plans, policies, and regulations adopted thereunder, shall comply with the following:

A. PROHIBITIONS

1. The acceptance, treatment, or discharge of “hazardous waste” is prohibited. For purposes of this Order, the term “hazardous waste” is as defined in Title 23, California Code of Regulations, §2510, et seq.
2. The discharge of waste to land other than wastewater associated with the production of petroleum hydrocarbons described in Finding No. 2 is prohibited.
3. Discharges to surface water or surface water drainage courses are prohibited.
4. After the impoundments are closed, the temporary discharge of wastewater to any impoundment(s) retained for use during an upset or emergency condition is prohibited without having a Spill Prevention Control and Countermeasures (SPCC) Plan previously approved by the Executive Officer. The uses of an impoundment during an upset or emergency condition must be described in the SPCC Plan. Any impoundment(s) used for emergency containment must have been constructed in accordance with the applicable criteria in the Department of Water Resources – Division of Dam Safety publication entitled *Guidelines for the Design and Construction of Small Embankment Dams*.

B. SPECIFICATIONS

1. Wastewater discharged to unlined surface impoundments that do not meet the prescriptive construction criteria for classified waste management units as specified in Title 27 and overlying groundwater with existing and future probable beneficial uses shall not exceed the following limits prescribed in the Basin Plan: electrical conductivity at 25° C, 1,000 µmhos/cm; chloride, 200 mg/L; and, boron, 1 mg/L.
2. In order to comply with Specification B.1, the Discharger shall implement its disposal alternatives and closure plans for the surface impoundments described in Finding No. 2 and Finding No. 6 in accordance with the time schedule contained in Provision C.12 of this Order.
3. The impoundment berms shall be maintained to prevent seepage or leakage caused by erosion, slope failure, or animal burrowing.
4. Wastewater production shall be controlled to the extent necessary to maintain consistent compliance with the terms of this Order.

5. The impoundments shall have sufficient freeboard to prevent overtopping as a result of successive precipitation events, high velocity winds, or seismic shaking. In no case shall there be less than two feet (measured vertically) of freeboard.
6. Precipitation and drainage control systems shall be designed, constructed, and maintained to accommodate the anticipated volume of precipitation and peak flows from surface runoff under 100-year, 24-hour precipitation conditions. Annually, prior to the anticipated rainy season, any necessary erosion control measures shall be implemented, and any necessary construction, maintenance, or repairs of precipitation and drainage control facilities shall be completed to prevent erosion or flooding of the impoundments.
7. The impoundments shall either be free of oil or effectively netted to preclude entry of wildlife in accordance with Title 14, California Code of Regulations, §1770 (b) (3).
8. Public contact with wastewater shall be precluded through such means as fences, signs, and other acceptable alternatives.
9. The Discharger shall operate and maintain the impoundments in a manner that prevents liquids, precipitates, and sludges from concentrating to hazardous levels.

C. PROVISIONS

1. The Discharger shall comply with the attached Monitoring and Reporting Program No. R5-2006-0073, which is part of this Order, and any revisions thereto as ordered by the Executive Officer.
2. The Discharger shall comply with those applicable sections of the "*Standard Provisions and Reporting Requirements for Waste Discharge Requirements*" (Standard Provisions) dated August 1997, which are attached to, and by reference, a part of this Order. To the extent that the Standard Provisions are inconsistent with any terms, conditions, or requirements in this Order, this Order shall govern.
3. In the event of any change in control or ownership of the wastewater disposal facility, then the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall also be forwarded to this office, at least 14 days in advance of the change in control or ownership.
4. To assume ownership or operation of the wastewater disposal facility under this Order, the succeeding owner or operator must apply in writing to the Central Valley Water Board requesting transfer of the Order within 14 days of assuming ownership or operation of the facility. The request must contain the requesting entity's full legal name, the State of incorporation if a corporation, the name, address, and telephone number of the persons responsible for contact with the Central Valley Water Board, and a statement that the new owner or operator assumes full responsibility for compliance with this Order. Failure to submit the request shall be considered a discharge without requirements, which is a violation of the

California Water Code. Transfer of this Order to a succeeding owner or operator shall be approved or disapproved by the Central Valley Water Board.

5. The Discharger shall maintain a copy of this Order and make it available at all times to facility operating personnel, who shall be familiar with its contents, and to regulatory agency personnel upon request.
6. The Discharger shall immediately notify Central Valley Water Board staff of any flooding, equipment failure, slope failure, or other change in site conditions, which could impair the integrity of waste containment facilities or precipitation and drainage control structures.
7. The Central Valley Water Board will review this Order periodically and will revise these requirements when necessary.
8. Technical and monitoring reports specified in this Order and additional technical reports and plans that may be required as directed by the Executive Officer as provided for in the California Water Code Section 13267 are to be prepared by or under the direction of and signed and certified by the appropriate registered professional licensed by the State of California. A licensed professional may be a Registered Geologist, Registered Civil Engineer, Certified Engineering Geologist, or Certified Hydrogeologist.
9. The Discharger shall demonstrate financial responsibility for initiating and completing corrective action of all known or reasonably foreseeable releases, and shall submit a report of financial assurance by **April 30th of each year** for Executive Officer review and approval. The assurances of financial responsibility shall name the Central Valley Water Board as beneficiary and shall provide that funds for corrective action shall be available to the Central Valley Water Board upon issuance of any order under California Water Code, Division 7, Chapter 5. The Discharger shall adjust the cost annually to account for inflation and any changes in facility design, construction, or operation.
10. The Discharger shall demonstrate financial responsibility for closure and post-closure maintenance, and shall submit a report of financial responsibility by **April 30th of each year** for Executive Officer review and approval. The assurances of financial responsibility shall name the Central Valley Water Board as beneficiary and shall provide that funds for closure and post-closure maintenance shall be available to the Central Valley Water Board upon issuance of any order under California Water Code, Division 7, Chapter 5. The Discharger shall adjust the cost annually to account for inflation and any changes in facility design, construction, or operation.
11. This Order does not authorize violation of any federal, state, or local laws or regulations.

COMPLIANCE SCHEDULE

12. The Discharger, whose wastewater effluent exceeds the limitations stated in Specification B.1 shall implement a wastewater disposal program consistent with current state regulations and policy. The wastewater disposal program shall include the following tasks to be completed by the compliance dates:

Task & Description	Compliance Date
<p><u>Compliance Plan</u> The Discharger shall submit a detailed master plan & time schedule describing how compliance will be achieved with this Order.</p>	30 June 2006
<p><u>Groundwater Investigation Work Plan</u> The Discharger shall submit a detailed work plan & time schedule to determine the lateral impact of wastewater on groundwater.</p>	31 July 2006
<p><u>Cease Wastewater Discharge</u> The Discharger shall cease the discharge of wastewater to the facility in accordance with the Compliance Plan.</p>	2 January 2007
<p><u>Closure Plan</u> The Discharger shall submit a plan in accordance with Title 27, California Code of Regulations, Section 21400. The plan shall include a Report of Waste Discharge.</p>	29 June 2007
<p><u>Complete Groundwater Investigation</u> The Discharger shall complete an investigation to determine the lateral impact of wastewater on groundwater.</p>	2 September 2008
<p><u>Corrective Action Plan</u> The Discharger shall submit a Corrective Action Plan</p>	31 December 2008

The Discharger shall, where appropriate, submit quarterly reports describing progress towards achieving compliance with each task, and shall report any delay in the implementation of any required task, describing in detail the reasons for such delay.

I, PAMELA C. CREEDON, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region on 23 June 2006.

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KERN COUNTY

-13-

PAMELA C. CREEDON, Executive Officer

DLW: 6/23/06

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2006-0073
FOR
AERA ENERGY LLC
ROW 4 / LOST HILLS WASTEWATER DISPOSAL FACILITY
SOUTH BELRIDGE OIL FIELD
KERN COUNTY

Compliance with this Monitoring and Reporting Program is required pursuant to Water Code Section 13267.

A. REQUIRED MONITORING REPORTS

- | | |
|--|------------------------|
| 1. Proposed Sampling and Analysis Plan (Section C) | By 30 June 2006 |
| 2. Facility Monitoring (Section C.1) | As necessary |
| 3. Wastewater Monitoring (Section C.2) | Semi-Annually |
| 4. Groundwater Evaluation Monitoring (Section C.3) | Semi-Annually |

B. REPORTING

The Discharger shall report monitoring data and information as required in this Monitoring and Reporting Program. Reports that do not comply with the required format will be **REJECTED** and the Discharger shall be deemed to be in noncompliance with the Waste Discharge Requirements. In reporting the monitoring data required by this program, the Discharger shall arrange the data in tabular form so that the date, the constituents, the concentrations, and the units are readily discernible. Data shall also be submitted in a digital database format acceptable to the Executive Officer. The data shall be summarized in such a manner so as to illustrate clearly the compliance with Waste Discharge Requirements or the lack thereof. A short discussion of the monitoring results, including notations of any water quality violations, shall precede the tabular summaries.

The monitoring reports must be signed by a person identified below:

1. For a corporation: by a principal executive officer of at least the level of senior vice-president.
2. For a partnership or sole proprietorship: by a general partner or the proprietor.
3. A duly authorized representative of a person designated in a, b or c above if:
 - a. The authorization is made in writing by a person described in a or b of this provision;
 - b. the authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a Unit, superintendent, or position of equivalent

responsibility. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and,

- c. the written authorization is submitted to the California Regional Water Quality Control Board, Central Valley Region (hereafter Central Valley Water Board).

The monitoring reports must include the following certification on the cover page:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

The reporting frequencies and report periods are:

<u>Sampling Frequency</u>	<u>Reporting Frequency</u>	<u>Reporting Periods End</u>	<u>Report Date Due</u>
Monthly	Semi-Annually	Last day of Month	31 January 31 July
Semi-Annually	Semi-Annually	31 December 30 June	31 January 31 July
Annually	Annually	31 December	31 January

The results of any monitoring conducted more frequently than required at the locations specified herein or by the waste discharge requirements shall be reported to the Central Valley Water Board.

C. MONITORING

All monitoring shall be conducted in accordance with an approved sampling and analysis plan. A proposed Sampling and Analysis Plan for the facility shall be submitted by **30 June 2006**.

Method detection limits and practical quantitation limits shall be reported. All peaks shall be reported, including those that cannot be quantified and/or specifically identified. Samples for the constituents of concern shall be collected and analyzed in accordance with the methods listed in Table I.

The Discharger may use analytical test methods, including new U.S. EPA approved methods, provided the methods have method detection limits equal to or lower than the analytical methods specified in this Monitoring and Reporting Program.

1. **Facility Monitoring**

a. **Freeboard Monitoring**

Freeboard measuring devices shall be installed in each of the perimeter surface impoundments. Freeboard levels shall be observed and recorded monthly and reported semi-annually.

b. **Facility Inspection**

The Discharger shall inspect all containment facilities for damage semiannually. The Discharger shall report any damages observed to the Central Valley Water Board staff immediately. Any necessary work related to construction, maintenance, or repairs shall be implemented within 30 days of the inspection. Any subsequent repairs conducted by the Discharger shall be reported to the Central Valley Water Board staff within 30 days of completion of the repairs.

c. **Storm Events**

The Discharger shall inspect all precipitation, diversion, and drainage facilities for damage within 7 days following a storm yielding one inch or more of precipitation within 24 hours. Necessary repairs shall be completed within 30 days of the inspection. The Discharger shall report any damage and subsequent repairs within 30 days of completion of the repairs.

d. **Earthquake Events**

The Discharger shall perform a full-scale facility inspection within 7 days following an earthquake that could potentially damage waste management units and/or the facility. Necessary repairs shall be completed within 30 days of the inspection. The Discharger shall report any damage and subsequent repairs within 30 days of completion of the repairs.

2. **Wastewater**

Sampling stations shall be established where representative grab samples of the wastewater discharge can be collected. As a minimum, wastewater samples shall be collected from (1) the influent to the initial impoundment; and (2) from the final impoundment. Samples should be representative of the volume and nature of the discharge. The following shall constitute the wastewater monitoring program:

<u>Constituent</u>	<u>Units</u>	<u>Sampling Frequency</u>
Total Discharge Flow to the facility	barrels	Monthly
Field Parameters ¹		Semi-annually
Monitoring Parameters ¹		Semi-Annually
Constituents of Concern ¹		Semi-Annually

¹ See Table I

3. **Groundwater Evaluation Monitoring**

An evaluation monitoring program shall be conducted by the Discharger. The monitoring program shall include those wells listed in Table II and additional wells as needed to investigate the wastewater impacts in groundwater.

The Discharger shall operate and maintain a Groundwater Monitoring Evaluation System in accordance with the Monitoring Plan described herein. The Discharger shall collect, preserve, and transport groundwater samples in accordance with the approved Sample and Analysis Plan.

Water level elevations shall be collected according to the monitoring schedule set forth below. The Discharger shall determine groundwater flow rate in any zone(s) of saturation monitored pursuant to this Monitoring and Reporting Program, and report the results semi-annually. Additionally, hydrographs of each well shall be prepared showing the elevation of groundwater with respect to the elevations of the top and bottom of the screened interval and the elevation of the pump intake. Hydrographs of each well shall be submitted annually.

Groundwater samples shall be collected and analyzed according to the monitoring schedule set forth below. The Constituents of Concern shall be evaluated with regards to the cation/anion balance semi-annually. The chloride and total dissolved solids monitoring parameters and the calcium, sodium, and sulfate constituents of concern shall be graphically presented using a geochemical chart annually.

The following shall constitute the groundwater evaluation monitoring program:

<u>Constituent</u>	<u>Units</u>	<u>Sampling Frequency</u>
Groundwater Level Elevations	Ft. & hundredths, M.S.L.	Semi-Annually

MONITORING AND REPORTING PROGRAM NO. R5-2006-0073
AERA ENERGY LLC
ROW 4 / LOST HILLS WASTEWATER DISPOSAL FACILITY
SOUTH BELRIDGE OIL FIELD
KERN COUNTY

Field Parameters ¹	Semi-Annually
Monitoring Parameters ¹	Semi-Annually
<u>Constituents of Concern¹</u>	Semi-Annually
¹ See Table I	

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

Ordered by: _____
PAMELA C. CREEDON, Executive Officer

23 June 2006
Date

DLW: 6/23/06

TABLE I
MONITORING PARAMETERS

Constituent	Units	US EPA Method
<u>Groundwater Elevation</u>		
Groundwater Elevation	Ft. & hundredths, M.S.L.	
<u>Field Parameters</u>		
Temperature	°C	
Specific Conductance	µmhos/cm	
pH	pH units	
<u>Monitoring Parameters</u>		
Total Dissolved Solids (TDS)	mg/L	160.1
Specific Conductance	µmhos/cm	120.1
Chloride	mg/L	300.0
Boron, dissolved	mg/L	6010B
<u>Constituents of Concern</u>		
<u>Standard Minerals</u>		
Alkalinity as CaCO ₃	mg/L	310.1
Bicarbonate Alkalinity as CaCO ₃	mg/L	310.1
Carbonate Alkalinity as CaCO ₃	mg/L	310.1
Hydroxide Alkalinity as CaCO ₃	mg/L	310.1
Sulfate, dissolved	mg/L	300.0
Nitrate-N, dissolved	mg/L	300.0
Calcium, dissolved	mg/L	6010B
Magnesium, dissolved	mg/L	6010B
Sodium, dissolved	mg/L	6010B
Potassium, dissolved	mg/L	6010B
<u>Aromatic Hydrocarbons</u>		
Benzene	µg/L	8260B
Ethylbenzene	µg/L	8260B
Toluene	µg/L	8260B
m,p-Xylenes	µg/L	8260B
o-Xylene	µg/L	8260B

TABLE II

MONITORING WELLS

MONITORING AND REPORTING PROGRAM NO. R5-2006-0073
 AERA ENERGY LLC
 ROW 4 / LOST HILLS WASTEWATER DISPOSAL FACILITY
 SOUTH BELRIDGE OIL FIELD
 KERN COUNTY

Program	Aquifer I	22K Aquifer	Aquifer II
Evaluation Monitoring	25G1 25J1 212(1)-25 212(2)-25 218(1)-25 218(2)-25 285(2)-24 313R1 323Q1 327K1	7N2 13F1 13H1 24P1R 25G2 25J2 212(3)-25 218(3)-25 284(3)-35 285(3)-24 313R3 323G3 325D4 / 325DPZ3 327K3	13F2 24P3

INFORMATION SHEET

ORDER NO. R5-2006-0073

AERA ENERGY LLC

ROW 4 / LOST HILLS WASTEWATER DISPOSAL FACILITY

SOUTH BELBRIDGE OIL FIELD

KERN COUNTY

Aera Energy LLC (hereafter Discharger) owns and operates the Row 4 / Lost Hills wastewater disposal facility in the South Belridge Oil Field. The facility consists of 107 surface impoundments that receive oil field produced water from the Dehydration 20 Plant and Dehydration 27 Plant, backwash water from treatment filters at the Water Plant 27, and softener regeneration wastewater from ion exchange units at the Water Plant 27. The impoundments, which have a surface area of approximately 250 acres, are used for the disposal of wastewater by evaporation and percolation. Approximately 33,885,000 barrels of wastewater were discharged to the impoundments during the 12 months ending in June 2005. The impoundments are unlined and do not meet the prescriptive construction criteria for surface impoundments as specified in Title 27. The wastewater disposal operation is currently regulated by Waste Discharge Requirements (WDRs), Resolution No. 58-193. The WDRs are outdated and are being updated to reflect Basin Plan policy and current State regulations. Resolution No. 58-193 is superseded by this Order. Resolution No. 58-193 cannot be rescinded because it continues to regulate two additional wastewater disposal facilities in the South Belridge Oil Field that are owned and operated by the Discharger.

The facility lies on Quaternary age lithologic units, which include the Alluvium and the Tulare Formation. Alluvium contains sand, silty sand, silt, and clay beds. At the base of the Alluvium is a sand bed known as the 22K Sand and an underlying silt and clay bed known as the Corcoran Clay Equivalent (CCE). The CCE is the lateral equivalent of the Corcoran Clay. The Tulare Formation is comprised of interbedded clay, silt, and sand.

The Discharger has conducted an investigation to determine the hydrogeology and lateral and vertical extent of wastewater migration in the subsurface. The Discharger or predecessor companies have installed 67 groundwater monitoring wells to the east of the South Belridge Oil Field. Three stratigraphic intervals have been identified by the Discharger as aquifer zones containing water-bearing layers. The shallowest aquifer is designated as the unconfined Aquifer I, which consists of discontinuous water-bearing sands separated by clays. Below a discontinuous clay aquitard at the base of Aquifer I is the 22K Sand, which is water-bearing and is designated as the semi-confined 22K Aquifer. Underlying the 22K Aquifer, is the CCE. Unconformably underlying the CCE are water-bearing zones in the Tulare Formation collectively designated as the confined Aquifer II.

Groundwater in Aquifer I is impacted by wastewater migrating from the impoundments for at least 0.5 miles downgradient to the east in monitoring well 25G1. Groundwater in the 22K Aquifer is impacted by wastewater migrating from the impoundments for at least 1.5 miles downgradient to monitoring well MW-1A and to the north-northeast for at least 2.7 miles downgradient to monitoring well 7N2. Groundwater in Aquifer II is not impacted by wastewater from the impoundments in monitoring wells 13E5, 24P3, and MW-3.

The Discharger has not delineated the lateral extent of groundwater impacted by wastewater migrating from the impoundments. In accordance with the time schedule contained in the Order, the Discharger must complete an investigation to determine the lateral extent of wastewater impacts on groundwater in Aquifer I and the 22K Aquifer; and, after completion of the investigation, submit a plan to implement a Corrective Action Program in accordance with Title 27.

INFORMATION SHEET

ORDER NO. R5-2006-0073
AERA ENERGY LLC
ROW 4 / LOST HILLS WASTEWATER DISPOSAL FACILITY
SOUTH BELRIDGE OIL FIELD
KERN COUNTY

-2-

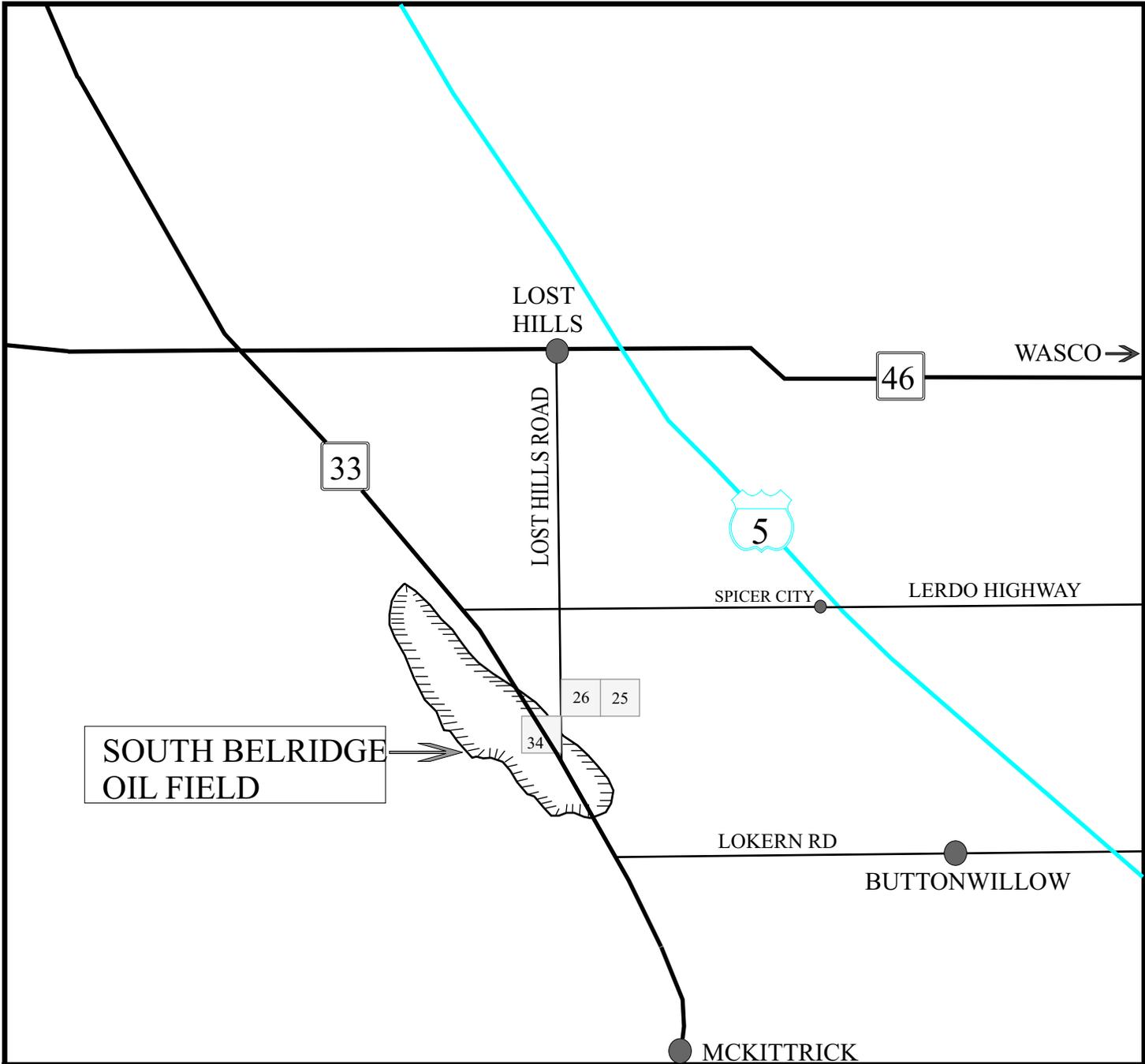
The beneficial uses of groundwater in the area are designated by the Basin Plan as municipal and domestic supply, agricultural supply, and industrial service supply. There are no municipal or domestic supply wells in the area.

Wastewater in the impoundments is sampled and analyzed by the Discharger each quarter and the results reported semi-annually. The Discharger collected wastewater samples from the inlet impoundment, a middle impoundment, and the terminal impoundment during May 2005. The samples had the following salinity concentration ranges: EC, 34,000 - 46,000 $\mu\text{mhos/cm}$; TDS, 24,000 - 27,000 mg/L; chloride, 13,000 - 15,000 mg/L; and boron, 79 - 99 mg/L. The wastewater is classified as designated waste, and the discharge is subject to the requirements of Title 27 for discharges of waste to land. The wastewater has salinity concentrations that exceed maximum numerical salinity limits prescribed in the Basin Plan for oilfield discharges.

The Discharger has submitted a letter of commitment to permanently cease the discharge of wastewater to the impoundments in accordance with the Compliance Schedule. The Order contains a Compliance Schedule requiring the Discharger to cease the discharge of wastewater to unlined impoundments and close the impoundments.

The action to adopt WDRs for an existing facility is exempt from the provisions of the California Environmental Quality Act (Public Resources Code Section 21000, et seq.) in accordance with Title 14, California Code of Regulations, Section 15301.

DLW: 6/23/06



Waste Discharge Requirements For
Aera Energy LLC
Row 4 / Lost Hills Wastewater Disposal Facility
South Belridge Oil Field
Kern County

Order Number R5-2006-____

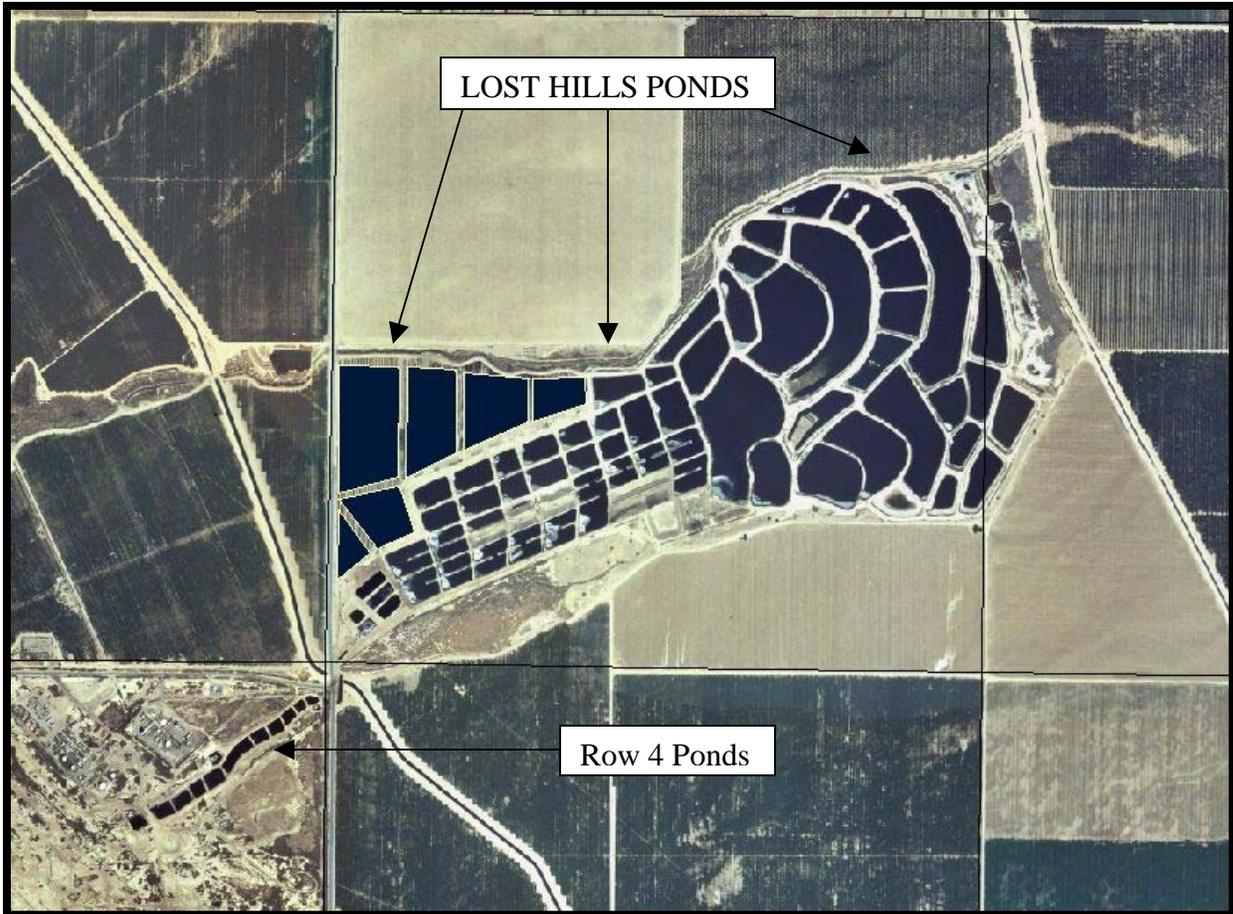
LOCATION MAP



Not to Scale

Sections 25, 26, & 34, T28S, R21E, MDB&M
 Belridge 7.5 Minute USGS Quadrangle

Attachment A



**Waste Discharge Requirements For
Aera Energy LLC
Row 4 / Lost Hills Wastewater Disposal Facility
South Belridge Oil Field
Kern County**

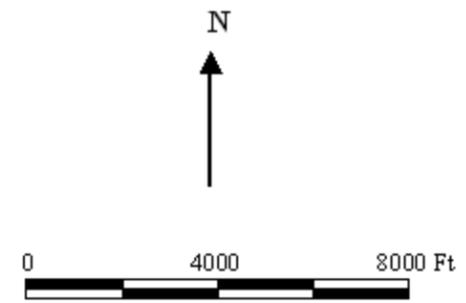
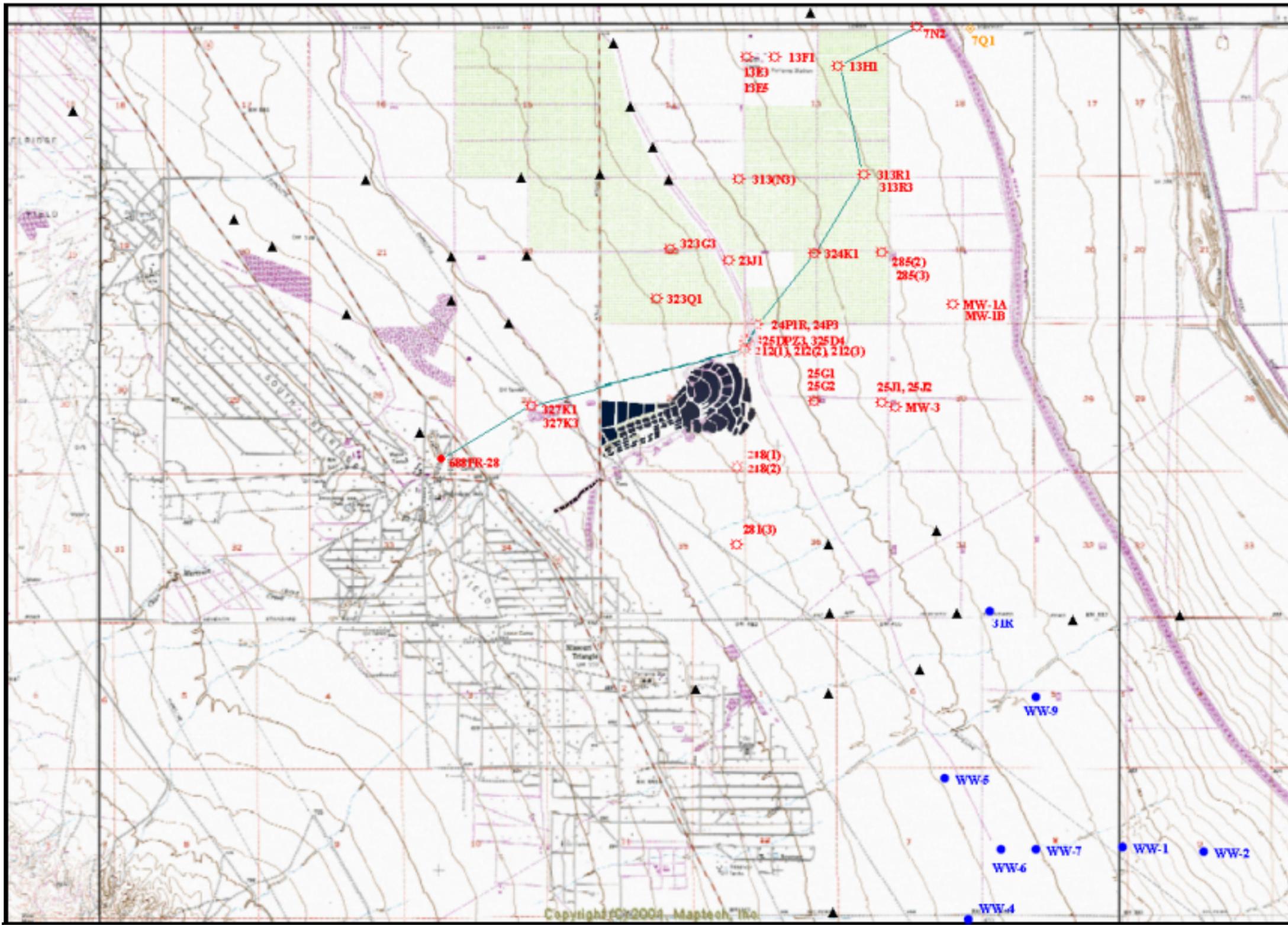
Order Number R5-2006-_____

VICINITY MAP

Sections 25, 26 & 34 T28S, R21E, MDB&M
Belridge 7.5 Minute USGS Quadrangle

N
↑
1" = 1,550'

Attachment B



LEGEND

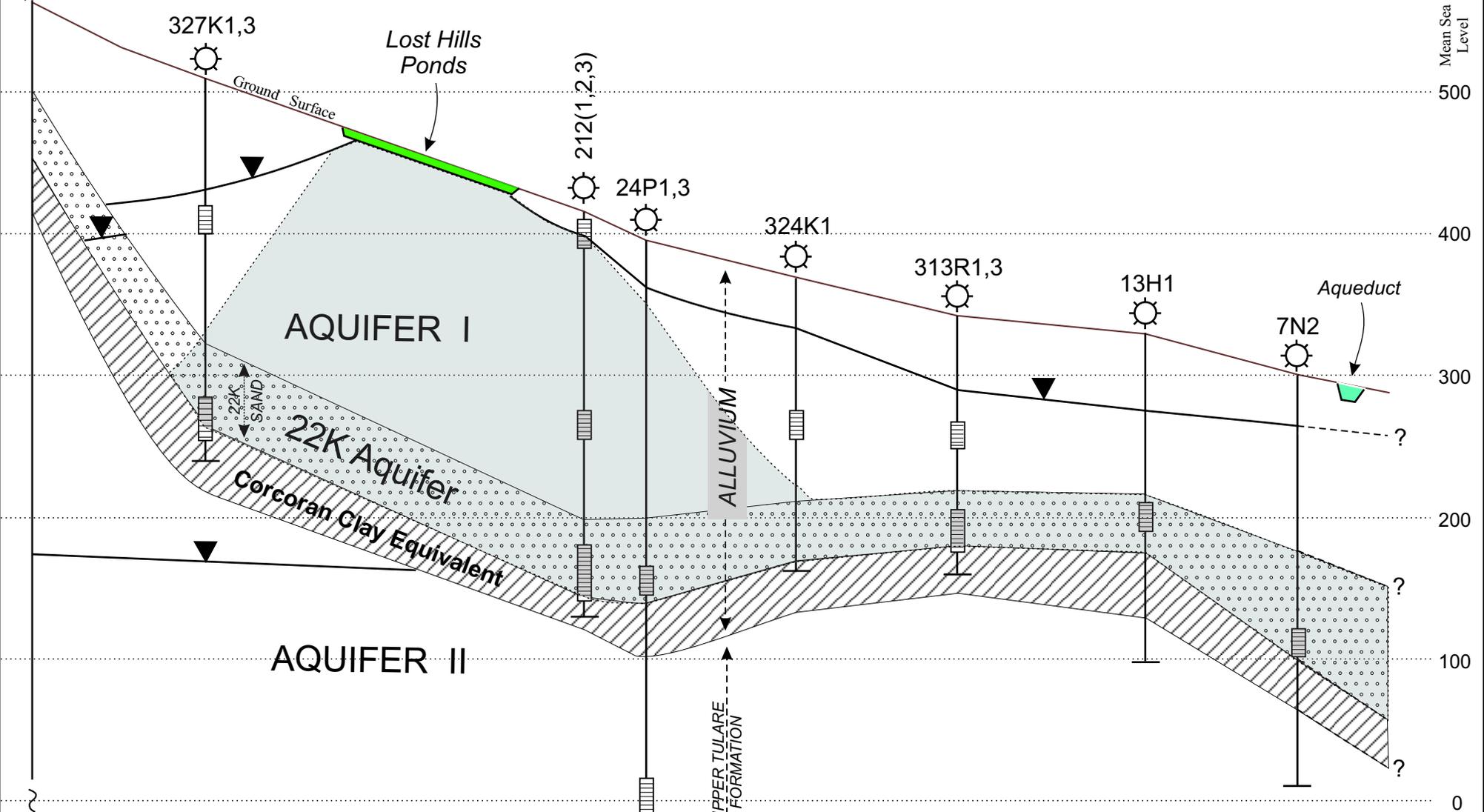
- ⊗ Groundwater monitoring well(s)
- Oil well 688FR-28 drilled in 1990
- ◇ Boring 7Q1 drilled in 1945
- ▲ Location of other groundwater monitoring well(s)
- Water supply wells
- Line of cross-section (Attachment D)

**Waste Discharge Requirements For
Aera Energy LLC
Row 4 / Lost Hills Wastewater Disposal Facility
South Belridge Oil Field, Kern County**

Order No. R5-2006-_____

WELL LOCATION MAP – South Belridge Area

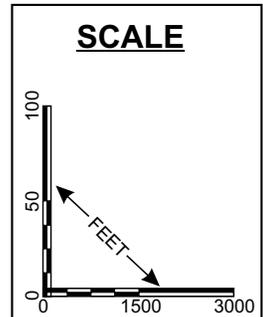
Attachment C



TD
1,430 ft.

LEGEND

	Monitoring Wells		Steam Injector
	Screened Intervals		Groundwater Surfaces
	Approximate extent of wastewater impacted groundwater		



**Waste Discharge Requirements For
Aera Energy LLC
Row 4/Lost Hills Wastewater Disposal Facility
South Belridge Oil Field
Kern County**

Order No. R5-2006-_____

CROSS-SECTION Attachment D