

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
COLORADO RIVER BASIN REGION**

ORDER NO. R7-2007-0043

WASTE DISCHARGE REQUIREMENTS
FOR
ICELAND AMERICA ENERGY LLC, OWNER/OPERATOR
TRUCKHAVEN GEOTHERMAL EXPLORATORY WELL
WELLFIELD MUD SUMP/CONTAINMENT BASIN

Truckhaven Geothermal Leasing Area - Imperial County

The California Regional Water Quality Control Board, Colorado River Basin Region, finds that:

1. Iceland America Energy LLC (Discharger), proposes to drill a geothermal exploration well on land in which surface ownership is held by the California Department of Recreation, and mineral rights are leased from S. F. Pacific Properties LLC. The address for Iceland America LLC is 707 Wilshire Boulevard, Suite 4500, Los Angeles, CA 90017. The address for the California Department of Recreation is State Vehicular Recreation Area, P.O. Box 360, Borrego Springs, CA 92004. The address for S.F. Pacific Properties LLC is 4545 Airport Way, Denver, CO 80239.
2. This Board Order regulates the handling and disposal of drilling wastes generated by Iceland America Energy LLC during geothermal exploration drilling and testing within the Truckhaven area.
3. The Discharger reports that the exploration program will consist of one geothermal well at the location shown on Attachment A.
4. Iceland America completed the submission of a Report of Waste Discharge on March 14, 2007.
5. The project will consist of well pad construction, geothermal exploration drilling, and waste handling and disposal. A typical well pad configuration is shown on Attachment B.
6. An exploration well is proposed to determine the power generation potential of the area and to gather scientific information about the geothermal resource. If the exploration project is successful, Iceland America Energy LLC intends to build a power plant in the area.
7. Definition of terms used in this Board Order:
 - a. **Facility** – The entire parcel(s) of property where Iceland America Energy LLC will construct a mud sump/containment basin, or related geothermal industrial and drilling activities are conducted.
 - b. **Waste Management Unit (WMUs)** – Mud sumps/containment basins are WMUs.
 - c. **Discharger** – The term “discharger” means any person who discharges waste that could affect the quality of the waters of the State, and includes any person who owns

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the land, waste management unit, or who is responsible for the operation of a waste management unit.

Geothermal Drilling Wastes

8. The following wastes are generated during construction, operation, and maintenance of geothermal exploration wells:
 - a. **Geothermal Fluids** – The Discharger reports geothermal fluids in the area of Truckhaven are low-salinity aqueous solutions with a Total Dissolved Solids (TDS) concentration of approximately 4,000 mg/kg.
 - b. **Drilling muds with additives** – Drilling mud is inert mineral clay such as bentonite clay. Drilling mud additives may include sodium bicarbonate, soda ash, drilling soap, organic polymers, wood fibers, graphite, cottonseed hulls, walnut shells and cement. Drilling mud additives do not render the drilling mud hazardous when used according to manufacturer's specifications.
 - c. **Drill cuttings (rock)** – small rock fragments pulverized during drilling and forced to the surface by drilling mud, aerated mud, and/or air.

Drilling Waste Containment (WMUs)

9. The Discharger proposes to contain geothermal brine generated during drilling, testing, or maintenance by discharging into large portable tanks. Geothermal brine will be returned to the geothermal reservoir via injection, or discharged off-site to an appropriate facility authorized to receive such waste.
10. Geothermal wells are drilled to minimize mixing of drilling mud and cuttings with geothermal brine. Only a small amount of brine may commingle with drilling mud, primarily brines in that part of the formation displaced by the drill bit.
11. Drilling muds and rock cuttings generated during well drilling and testing will be discharged to the mud sump/containment basin designed to temporarily (less than one (1) year) contain the material while drying. The mud sump/containment basin will be approximately 60 feet by 100 feet by 10 feet deep, and will be operated to maintain a minimum of two (2) feet of freeboard.

Drilling Waste Disposal

12. Geothermal brine produced from drilling, testing, and maintenance of geothermal wells, will be contained in portable tanks and returned to the geothermal reservoir, or discharged off-site to an appropriate facility authorized to receive such waste.
13. Solids discharged to the mud sump/containment basin will be removed offsite, or closed in place provided representative samples of solids are shown not to be hazardous or designated waste.

Surface Water

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14. Surface water in this area of the Truckhaven Geothermal Lease Area include the Salton Sea (one mile to the east), and ephemeral streams including Arroyo Salada (¼ mile to the north) and Surprise Wash (one mile to the southeast).

Regional Groundwater

15. The regional groundwater flow direction within the Imperial Valley is toward the Salton Sea, a closed basin with a surface elevation of approximately 230 feet below sea level. The elevation of the proposed Facility is approximately 50 feet below sea level. The groundwater flow direction near the Facility is generally toward the east.

Local Groundwater

16. The Draft Environmental Impact Statement for the Truckhaven Geothermal Leasing Area indicates that groundwater quality in the West Salton Hydrologic Unit is of marginal to poor quality for domestic and irrigation purposes due to elevated concentrations of fluoride, boron, and total dissolved solids. TDS concentrations reportedly average about 5,800 mg/L.
17. The depth to groundwater at the Salton City landfill, approximately ¾ -mile to the south, ranges from 20 to 32 feet.

Regional Geology

18. The Truckhaven Geothermal Lease Area is located within the Salton Trough area of southeast California. The Salton Trough is a tectonically active zone containing numerous faults associated with the San Andreas Fault Zone. The site is located on the central portion of the trough, and is underlain by deltaic and lacustrine formations associated with the Colorado River delta. Bedrock in this part of the Salton Trough is approximately three (3) miles below ground surface.

Climate

19. Climate in the region is arid. Climatological data obtained from 1951 to 1980 indicate an average seasonal precipitation of 2.5 inches, and an average annual pan evaporation rate greater than 100 inches.
20. The wind direction follows two general patterns:
 - a. Seasonally from fall through spring, prevailing winds are from the west and northwest. Most of these winds originate in the Los Angeles Basin. Humidity is lowest under these conditions.
 - b. Summer weather patterns are dominated by intense heat induced low-pressure areas that form over the interior desert, drawing air south of the Facility. Humidity is highest under these conditions.

Basin Plan

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21. The Water Quality Control Plan (Basin Plan) for the Colorado River Basin Water Board as amended to date, designates the beneficial uses of ground and surface waters in this region.
22. The beneficial uses of groundwater in the West Salton Hydrologic Unit are:
 - a. Municipal Supply (MUN)*
 - b. Agricultural Supply (IND)

*With respect to the MUN designation, the Basin Plan states: "At such time as the need arises to know whether a particular aquifer which has no known existing MUN use should be considered as a source of drinking water, the Regional Board will make such a determination based on the criteria listed in the 'Sources of Drinking Water Policy' in Chapter 2 of the Basin Plan. An indication of MUN for a particular hydrologic unit indicates only that at least one of the aquifers in that unit currently supports a MUN beneficial use."
23. The intermittent beneficial uses of surface waters (ephemeral streams) in the West Salton Hydrologic Unit are as
 - a. Freshwater Replenishment (FRSH)
 - b. Non-contact Water Recreation (RECII)
 - c. Groundwater Recharge (GWR)
 - d. Wildlife Habitat (WILD)

Storm Water

24. Federal regulations for storm water discharges were promulgated by the U.S. Environmental Protection Agency (40 CFR Parts 122, 123, and 124). The regulations require specific categories of facilities that discharge storm water associated with industrial activity to obtain a National Pollutant Discharge Elimination System (NPDES) permit, and to implement Best Conventional Pollutant Technology (BCPT) to reduce or eliminate industrial storm water pollution.

Anti-Degradation Policy

25. State Water Resources Control Board (State Water Board) Resolution No. 68-16 ("Policy with Respect to Maintaining High Quality Waters of the State"; hereinafter Resolution No. 68-16) requires a Regional Board in regulating the discharge of waste to maintain high quality waters of the state (i.e., background water quality) until it is demonstrated that any change in quality will be consistent with maximum benefit to the people of the State, will not unreasonably affect beneficial uses, and will not result in water quality less than that described in plans and policies (e.g. violation of any water quality objective). The discharge is required to meet Waste Discharge Requirements (WDRs) that result in the best practicable treatment or control of the discharge necessary to assure pollution or nuisance will not occur, and the highest water quality consistent with maximum benefit to the people will be maintained.

CEQA

26. The Imperial County Planning Commission adopted a Mitigated Negative Declaration during a meeting on July 27, 2005. The Environmental Checklist identified no impacts to water quality. The Board has considered the Mitigated Negative Declaration. Compliance with these WDRs shall prevent and mitigate any potential water quality impacts.

Notification

27. The Regional Board has notified the Discharger and all known interested agencies and persons of its intent to adopt WDRs for said discharge, and has provided them with an opportunity for a public meeting, and to submit comments.
28. The Regional Board, in a public meeting, heard and considered all comments pertaining to this discharge.

IT IS HEREBY ORDERED, that in order to meet the provision contained in Division 7 of the California Water Code (CWC) and regulations adopted there under, the Dischargers shall comply with the following:

A. Specifications

1. The treatment or disposal of wastes at this Facility shall not cause pollution or nuisance as defined in Section 13050 of Division 7 of the CWC.
2. Waste material at this Facility must be contained at all times.
3. Containment of waste shall be limited to the areas designated for such activity. Any revision or modification of the waste containment area, or change in operation that alters the nature and constituents of the waste produced, must be submitted in writing to the Regional Board Executive Officer for review and approval before the change in operation or modification of the designated area is implemented.
4. Liquid or solid geothermal waste discharged to tanks shall be contained at all times.
5. A minimum freeboard of two (2) feet shall be maintained in mud sump/containment basin at all times.
6. Following well completion, residual solids and semisolids contained in tanks shall be tested for constituents listed in Monitoring and Reporting Program No. R7-2007-0043, and for additional constituents requested by Regional Board Executive Officer (if any). Disposal of this material shall be in accordance with applicable laws and regulations based on analytical results of sampling and analysis.
7. Prior to removing solid material discharged to the mud sump/containment basin, the material shall be tested for constituents listed in Monitoring and Reporting Program No. R7-2007-0043, and for additional constituents requested by the Regional Board Executive Officer (if any). Disposal of this material shall be in accordance with applicable laws and regulations based on analytical results of sampling and analysis.

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8. Public contact with material containing geothermal wastes shall be precluded through fences, signs, or other appropriate alternatives.
9. The mud sump/containment basin shall be constructed, operated and maintained to ensure:
 - a. The control of erosion;
 - b. That liners function properly;
 - c. Protection from flooding or inundation from the 100-year 24-hour storm event; and
 - d. Solid materials are removed in a manner that prevents damage to the liner.
10. Upon ceasing operation at the Facility, all waste, natural geologic material contaminated by waste, and surplus or unprocessed material, shall be removed from the site and disposed of in accordance with applicable laws and regulations.
11. Surface drainage from tributary areas or subsurface sources, shall not contact or percolate through waste discharged at this site.
12. Water used for the process and site maintenance, shall be limited to the amount necessary for the process, dust control, and for cleanup and maintenance.
13. Construction of the mud sump/containment basin shall include a continuous 1-foot-thick clay liner with a hydraulic conductivity of less than or equal to 1×10^{-6} cm/sec, or an equivalent system approved by the Regional Board's Executive.

B. PROHIBITIONS

1. Geothermal wells shall be drilled to minimize mixing of drilling mud and cuttings with geothermal brine. Only a small amount of brine may commingle with drilling mud, primarily brines in that part of the formation displaced by the drill bit. Geothermal brine will not be discharged into mud sumps/containment basins. Geothermal brine observed in mud sumps/containment basins (if any) will be removed immediately, stored in portable tanks, and returned to the geothermal reservoir, or discharged off-site to an appropriate facility authorized to receive such waste. Prior to off-site disposal of geothermal brine, the Discharger shall submit a sampling plan to the Executive Officer for review and approval. The plan shall include constituents of concern and a proposed waste disposal facility authorized to receive geothermal brine.
2. The Discharger shall not cause degradation of any groundwater aquifer or supply water.
3. The discharge of waste to land not owned or controlled by the Discharger is prohibited.
4. Use of geothermal fluids or drilling muds for dust control on access roads, well pads, or within the Facility area is prohibited.
5. The discharge of hazardous or designated wastes to areas other than a waste management unit authorized to receive such waste is prohibited.

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6. Permanent (longer than one year) disposal or storage of drilling waste to the mud sump/containment basin is prohibited, unless authorized by the Regional Board Executive Officer.
7. Direct or indirect discharge of geothermal brine and/or drilling wastes to surface water or surface drainage courses prohibited.
8. The Discharger shall not cause or permit the release of pollutants, or waste constituents in a manner that could cause or contribute to a condition of contamination, nuisance, or pollution.

C. Provisions

1. The Discharger shall comply with Monitoring and Reporting Program No. R7-2007-0043 and future revisions thereto, as specified by the Regional Board Executive Officer.
2. Unless otherwise approved by the Regional Board Executive Officer, all analyses shall be conducted at a laboratory certified for such analyses by the California Department of Health Services. All analyses shall be conducted in accordance with the latest edition of "Guidelines Establishing Test Procedures for Analysis of Pollutants", promulgated by the U.S. Environmental Protection Agency.
3. Prior to any change in ownership of this operation, the Discharger shall transmit a copy of this Board Order to the succeeding owner/operator, and forward a copy of the transmittal letter to the Regional Board.
4. Prior to any modification that would result in a material change in the quality or quantity of discharge, or material change in the location of the discharge, the Discharger shall report all pertinent information in writing to the Regional Board Executive Officer for review and approval before implementing the modification.
5. Based on representative sampling, clay liners must be certified by a Civil Engineer or Certified Engineering Geologist, registered by the State of California, to have a minimum thickness of one foot, maximum hydraulic conductivity of 1×10^{-6} cm/sec, and relative compaction of at least 90 percent. Synthetic liners must be certified by a Civil Engineer or Certified Engineering Geologist, registered by the State of California, that installation was in accordance with manufacturer recommendations, and that no damage occurred during placement. The certification must be submitted in writing to the Regional Board prior to use of the mud sump/containment basin. After cleanout of discharged solids, the integrity of the liner must be re-certified before reuse.
6. The Discharger shall ensure that all site-operating personnel are familiar with the content of this Board Order, and shall maintain a copy of this Board Order at the site.
7. This Board Order does not authorize violation of any federal, state, or local laws or regulations.
8. The Discharger shall allow the Regional Board, or an authorized representative, upon presentation of credentials and other documents, as may be required by law, to:

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- a. Enter upon the premises regulated by this Board Order, or the place where records must be kept under the conditions of this Board Order;
 - b. Have access to and copy, at reasonable times, any records that shall be kept under the condition of this Board Order;
 - c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Board Order, and
 - d. Sample or monitor at reasonable times, for the purpose of assuring compliance with this Board Order, or as otherwise authorized by the CWC, any substances or parameters at this location.
9. The Discharger shall comply with all of the conditions of this Board Order. Any noncompliance with this Board Order constitutes a violation of the Porter-Cologne Water Quality Act, and is grounds for enforcement action.
10. The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control, and related appurtenances, that are installed or used by the Discharger to achieve compliance with this Board Order. Proper operation and maintenance also includes adequate laboratory controls, and appropriate quality assurance procedures.
11. The Discharger shall comply with the following:
 - a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity;
 - b. The Discharger shall retain records of all monitoring information, copies of all reports required by the Board Order, and records of all data used to complete the application of the Board Order, for a period of at least five (5) years from the date of the sample, measurement, report or application. This period may be extended by the Regional Board Executive Officer at any time;
 - c. Records of monitoring information shall include:
 - i. The date, exact place(s), and time of sampling or measurement(s).
 - ii. The individual(s) who performed the sampling or measurement(s).
 - iii. The date(s) analyses were performed.
 - iv. The individual(s) responsible for reviewing the analyses.
 - v. The results of such analyses.
12. The Discharger is the responsible party for the WDRs, and the monitoring and reporting program for the Facility. Violations may result in enforcement action, including Regional Board Orders or court orders that require corrective action or impose civil monetary liability, or modification or revocation of these WDRs by the Regional Board.
13. The Discharger shall furnish, under penalty of perjury, technical monitoring program reports submitted pursuant to the specifications provided by the Regional Board Executive Officer. Specifications are subject to periodic revision as may be warranted.

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14. The monitoring reports shall be certified to be true and correct, and signed, under penalty of perjury, by an authorized official of the company.
15. This Board Order does not convey property rights of any sort, or any exclusive privileges; nor does it authorize injury to private property, invasion of personal rights, or infringement of federal, state, or local laws and regulations.
16. This Board Order may be modified, rescinded, or reissued for cause. The filing of a request by the Discharger to modify, or rescind or reissue a Board Order does not stay any Board Order condition. Likewise, notification of planned changes or anticipated noncompliance does not stay any Board Order condition. Causes for modification include: changes in land application plans, sludge use, or disposal practices; or promulgation of new regulations by the State or Regional Boards, including revisions to the Basin Plan.
17. Within thirty (30) days of the adoption of this Board Order, the Discharger shall submit a list of surface landowners (including names for responsible contacts, addresses and phone numbers) for all land containing existing or proposed facilities and/or appurtenances related to the operation of this geothermal exploration project. This list will be used to contact responsible parties if corrective action measures become necessary due to a release of pollutants to the environment.

I, Robert Perdue, Executive Officer, do hereby certify the foregoing is a full, true and correct copy of an Order adopted by the California Regional Water Quality Control Board, Colorado River Basin Region, on May 16, 2007.

Ordered by: _____
Original signed by
ROBERT PERDUE
Executive Officer