CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
COLORADO RIVER BASIN REGION

ORDER NO. R7-2006-0082

WASTE DISCHARGE REQUIREMENTS
FOR

ORMAT NEVADA INC., OWNER/OPERATOR
NORTH BRAWLEY GEOTHERMAL EXPLORATION PROJECT
WELLFIELD MUD SUMPS
North Brawley Known Geothermal Resource Area (KGRA) - Imperial County

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

1. Ormat Nevada Inc. proposes to drill geothermal exploration wells on private land within the North Brawley Known Geothermal Resource area (KGRA). The site is located north of the town of Brawley in Imperial County. The address for Ormat Nevada Inc. is 6225 Neil Road, Suite 300, Reno, Nevada, 89511.

2. This Board Order regulates the handling and disposal of drilling wastes generated by Ormat Nevada Inc. during geothermal exploration well drilling, testing, and maintenance within the North Brawley KGRA. The boundaries of the North Brawley KGRA are shown on Attachment A.

3. The Discharger reports that the exploration program will initially consist of six (6) geothermal wells. Locations proposed for exploration wells are shown on Attachment B Ormat Nevada Inc. reports that if the geothermal exploration project is successful, more wells may be added to the project. All geothermal well drilling performed by Ormat Nevada within the North Brawley KGRA will be regulated under this Order.

4. Ormat Nevada Inc. submitted a Report of Waste Discharge dated July 6, 2006 for the North Brawley Geothermal Exploration Project.

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 C.

6. Exploration wells are drilled to determine the power generation potential of the area and to gather scientific information about the geothermal resource. If the exploration project is successful, Ormat Nevada Inc. intends to build a power plant in the area.

7. Definition of terms used in this Board Order:

    a. **Facility** – The entire parcel of property where Ormat Nevada Inc. or related geothermal industrial and drilling activities are conducted.

    b. **Waste Management Unit (WMUs)** – Mud sumps 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 the land, waste management unit, or who is responsible for the operation of a waste management unit. Specifically, the terms "discharger" or "Dischargers" in this Order includes Ormat Nevada Inc. and the landowners.

Geothermal Drilling Wastes

8. The following wastes are generated during construction, operation, and maintenance of exploration, production, and injection wells:

    a. **Geothermal brine** - The Discharger reports geothermal brines in the area of the North Brawley KGRA are hot saline solutions that contain Total Dissolved Solids (TDS) ranging from 70,000 to 100,000 mg/L. Major constituents are predicted to be the following:

        1. Sodium (Na)
        2. Chloride (Cl)
        3. Calcium (Ca)
        4. Potassium (K)
        5. Sulfate (SO_4)
        6. Lithium (Li)
        7. Lead (Pb)
        8. Arsenic (As)

    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 resource via injection, or discharged into permanent Class II surface impoundments constructed pursuant to Title 27 of the California Code of Regulations (Title 27).

10. Drilling muds and rock cuttings generated during well drilling, testing, or maintenance will be discharged to mud sumps designed to temporarily (less than one (1) year) contain the material while drying. Mud sumps will be built with a minimum of twelve (12) inches of compacted clay with permeability of approximately $1x10^{-6}$ cm/sec, or synthetic liners of equivalent permeability. Discharges of drilling mud and cuttings from well drilling operations to mud sumps are exempt from the permit requirements of Title 27 of the California Code of Regulations (CCR), as set forth in Section 21565(b)(2) of Title 27.

11. Drilling fluid will not contact geothermal brine.

12. Clay liner compaction must be certified by a Civil Engineer or Certified Engineering Geologist registered by the State of California. Synthetic liner placement and welding must be certified by the installer to verify factory requirements were satisfied, and no damage occurred during placement. Both types of certification must be submitted, in writing, to the Regional Board prior to use of the temporary mud sump. After cleanout of discharged geothermal solids, the integrity of the liner must be re-certified before reuse.

Drilling Waste Disposal

13. Liquid wastes produced from drilling, testing, and maintenance of geothermal wells, will be contained in portable tanks and re-injected into the geothermal resource, or discharged to a Class II surface impoundments built to construction standards of Title 27 Solids discharged to mud sumps will be removed offsite, or closed in place provided representative samples of solids are shown not to be hazardous or designated waste. Such materials are exempt from regulation as solid waste under Title 27. Section 20090 of Title 27 states "The following activities shall be exempt from the SWRCB-promulgated provisions of this subdivision, so long as the activity meets, and continues to meet, all preconditions listed: (g) Drilling Waste--Discharges of drilling mud and cuttings from well-drilling operations, provided that such discharges are to on-site sumps and do not contain halogenated solvents, and further provided that, at the end of drilling operation, the Discharger either: (1) removes all wastes from the sump; or removes all free liquid from the sump and covers residual solid and semi-solid wastes, provided that representative sampling of the sump contents after liquid removal shows residual solid wastes to be nonhazardous. If the sump has appropriate containment features, it may be reused."

Surface Water

14. Surface water in the area of the North Brawley KGRA consists of canals and agricultural drains operated and maintained by Imperial Irrigation District.

15. The Facility is not located in a 100-year flood plain.

Regional Groundwater

16. The regional groundwater flow direction within the Imperial Valley is toward the Salton Sea, a closed basin with a surface elevation of approximately 225 feet below sea level. The North Brawley KGRA is located approximately 120 feet below sea level; groundwater flows in a general northwest direction.

Local Groundwater

17. The Discharger reports that shallow groundwater in the area of the North Brawley KGRA occurs approximately ten (10) feet below ground surface with a general northwest flow direction, and 10,000 to 20,000 mg/L TDS.

18. Groundwater depth, gradient, and quality in the area of the North Brawley KGRA may be influenced, at times, by irrigation of adjacent agricultural fields, and by recharge from nearby canals.

Regional Geology

19. The North Brawley Geothermal Exploration site 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. The site is located on the north central portion of the trough, and is underlain by deltaic and lacustrine formations associated with the Colorado River delta. Bedrock in this area of the Salton Trough is only three (3) miles below the ground surface.

Climate

20. 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.

21. 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

22. The Water Quality Control Plan for the Colorado River Basin Region of California (Basin Plan) as amended to date, designates the beneficial uses of ground and surface waters in this region.

23. The beneficial uses of groundwater in the Imperial Hydrological Unit are:

    c. Municipal Supply (MUN)*
    d. Industrial 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. For example, the actual MUN usage of the Imperial Hydrologic Unit is limited only to a small portion of that ground water unit."

24. The beneficial uses of surface waters in the area of the North Brawley Geothermal Exploration Project are as follows:

    e. Imperial Valley Drains

        i. Freshwater Replenishment (FRSH)
        ii. Water Contact Recreation (RECI)
        iii. Non-contact Water Recreation (RECII)
        iv. Warm Freshwater Habitat (WARM)
        v. Wildlife Habitat (WILD)
        vi. Preservation of Rare, Threatened, or Endangered Species (RARE)

    f. All American Canal System

        i. Municipal (MUN)
        ii. Agricultural (AGR)
        iii. Aquaculture Supply (AQUA)
        iv. Freshwater Replenishment (FRSH)
        v. Industrial (IND)
        vi. Groundwater Recharge (GWR)
        vii. Water Contact Recreation (RECI)
        viii. Non-Contact Water Recreation (RECII)
        ix. Warm Freshwater Habitat (WARM)
        x. Wildlife Habitat (WILD)
        xi. Hydropower Generation (POW)
        xii. Preservation of Rare, Threatened, or Endangered Species (RARE)

Storm Water

25. 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 National Pollutant Discharge Elimination System (NPDES) permits, and to implement Best Conventional Pollutant Technology (BCPT) to reduce or eliminate industrial storm water pollution.

Anti-Degradation Policy

26. State Water Resources Control Board (State Board) Resolution No. 68-16 ("Policy with Respect to Maintaining High Quality Waters of the State"; hereafter 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 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

27. The Imperial County Planning Department prepared a Negative Declaration for the North Brawley Geothermal Exploration Project. The Imperial County Planning Commission certified the Negative Declaration during a meeting on September 7, 2006.

Notification

28. The Board has notified the Discharger and all known interested agencies and persons of its intent to adopt Waste Discharge Requirements (WDRs) for said discharge, and has provided them with an opportunity for a public meeting, and to submit comments.

29. The 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 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 California Water Code.

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 designated 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. Prior to drilling a new well at the facility, the Discharger shall notify, in writing, the Regional Board Executive Officer of the proposed change.

5. Any substantial increase or change in the annual average volume of material to be discharged under this Order must be submitted in writing to the Regional Board Executive Officer for review and approval.

6. Liquid or solid geothermal waste discharged to and/or contained in Title 27 Class II surface impoundments, tanks, or mud sumps shall not overflow the respective containment.

7. For liquids contained in Title 27 Class II surface impoundments, a minimum freeboard of two (2) feet shall be maintained at all times.

8. Final disposal of waste from mud sumps and/or tanks shall be accomplished to the satisfaction of the Regional Board Executive Officer upon abandonment or closure of operations.

9. Following well completion, the respective mud sump or tank shall have all drilling mud and cuttings tested and disposed of in accordance with applicable laws and regulations.

10. Prior to removing solid material discharged to mud sumps, an analysis of the material must be conducted and the material must be disposed of in a manner consistent with that analysis and applicable laws and regulations.

11. Public contact with wastes containing geothermal wastes shall be precluded through fences, signs, or other acceptable alternatives.

12. Mud sumps shall be constructed, operated and maintained to ensure their effectiveness, in particular:

    a. Erosion control measures shall be implemented;

    b. Liners in mud sumps shall be maintained to ensure proper function, and

    c. Solid material shall be removed from mud sumps in a manner that minimizes the likelihood of damage to the liner.

13. 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.

14. Surface drainage from tributary areas or subsurface sources, shall not contact or percolate through waste discharged at this site.

15. The Discharger shall use the constituents listed in Monitoring and Reporting Program No. R7-2006-0082 and revisions thereto, as “Monitoring Parameters”.

16. The Discharger shall implement the attached Monitoring and Reporting Program No. R7-2006-0082 and revisions thereto, in order to detect, at the earliest opportunity, any unauthorized discharge of waste constituents from the facility, or any impairment of beneficial uses associated with (caused by) discharges of waste to the mud sumps.

17. 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.

18. 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 to occur.

B. Prohibitions

1. Drilling fluid shall not come in contact with geothermal brine.

2. The discharge of solid geothermal waste to mud sumps as a final means of disposal is prohibited without authorization by the Regional Board Executive Officer.

3. The Discharger shall not cause degradation of any groundwater aquifer or water supply.

4. The discharge of waste to land not owned or controlled by the Discharger is prohibited.

5. Use of geothermal brine or drilling muds for dust control on access roads, well pads, or within the plant area is prohibited.

6. The discharge of hazardous or designated wastes to areas other than a waste management unit authorized to receive such waste is prohibited.

7. Permanent (longer than one (1) year) disposal or storage of drilling waste to mud sumps is prohibited, unless authorized by the Regional Board Executive Officer.

8. Any permanent or temporary mud sump must be lined. Drilling waste shall not penetrate the lining during the containment period.

9. Geothermal drilling wastes in mud sumps or tanks shall not enter any canal, drainage, or drains (including subsurface drainage systems), except as allowed under an appropriate NPDES permit.

10. The Discharger shall properly dispose of any materials, including liquids and sediment, removed from the tanks and mud sumps.

11. The Discharger shall neither cause nor contribute to the contamination or pollution of groundwater via the release of waste constituents in either liquid or gaseous phase.

12. Direct or indirect discharge of any waste to surface water or surface drainage courses is prohibited.

C. Provisions

1. The Discharger shall comply with Monitoring and Reporting Program No. R7-2006-0062 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 USEPA.

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 in this facility that results 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, and obtain revised requirements before implementing the modification.

5. All clay lined mud sumps shall be certified by a California Registered Civil Engineer or Certified Engineering Geologist.

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:

    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 California Water Code, 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; and

d. Monitoring must be conducted according to test procedures described in the Monitoring and Reporting Program, unless other test procedures have been specified in this Board Order or approved by the Regional Board Executive Officer.

12. The Discharger is the responsible party for the WDRs, and the monitoring and reporting program for the facility. The Discharger shall comply with all conditions of these WDRs. 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.

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.

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 November 16, 2006.

Ordered by: _____
ROBERT PERDUE, Executive Officer

_____
Date