CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
COLORADO RIVER BASIN REGION

ORDER NO. 88-13

WASTE DISCHARGE REQUIREMENTS
FOR
GEO OPERATOR CORPORATION
GEOTHERMAL EXPLORATION WELLS
East Mesa KGRA - Imperial County

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

1. GEO Operator Corporation (hereinafter also referred to as the discharger), 1330 North Dutton Avenue, Suite A, Santa Rosa, 95401, submitted a Report of Waste Discharge, dated June 30, 1987.

2. GEO Operator Corporation is a subsidiary of Geothermal Resources International, Inc., Corporation Number 957208 in the State of California.

3. The discharger proposes to drill four (4) exploration geothermal wells in the East Mesa KGRA on the following leases:

   Federal

   a. CA 6219 (2,000 acres)

      No. 1 - 660' North, 660' East, SW Corner, Sec. 8, T16S, R17E, SBB&M
      Well Name - 27-8

      No. 2 - 2375' South, 2350' East, NW Corner, Sec.8, T16S, R17E, SBB&M
      Well Name - 44-8

      No. 3 - 1500' East, 825' South, SW Corner, Sec. 8, T16S, R17E, SBB&M
      Well Name - 67-8

      No. 4 - 1600 South, 2900' East, NW Corner, Sec. 17, T16S, R17E, SBB&M
      Well Name - 53-17

4. A temporary containment basin, with a permeability equal to or less than 1×10^{-8} cm/sec including a two (2) foot freeboard would be constructed at each site, or metal containers capable of containing the maximum expected discharge of geothermal test fluid would be placed at each well site.

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5. The following wastes would be produced and discharged per well location in the following manner:

   a. The discharger proposes to discharge a maximum of 6000 cubic yards of geothermal drilling mud into metal containers.

b. The discharger proposes to discharge a maximum of 15,500 cubic feet of cuttings from holes into metal containers.

c. The discharger proposes to discharge a maximum of 2,000,000 gallons of geothermal test fluid into a temporary containment basin or metal tanks.

6. Geothermal fluids in this portion of the East Mesa KGRA are known to have a Total Dissolved Solids concentration range of 1,700 mg/l to 3,000 mg/l. The fluid does not contain any constituents at levels, within the fluid or in concentrated salt cake, which are classified as hazardous by the Department of Health Services, Toxic Substances Control Division, in accordance with California Administrative Code, Title 22, Chapter 30 Article 11, Section 66699.

   Reference:

   A. Report titled, "A Study to Determine the Environmental Effects of an Accidental Release of Hydrothermal Fluids on the East Mesa Ecosystems," Bureau of Reclamation, dated April 10, 1978.

7. The Water Quality Control Plan for the Colorado River Basin Region of California was adopted on November 14, 1984.

8. The beneficial uses of the ground water of the Imperial Hydrologic Subunit, as set forth in the above Plan, are for municipal and industrial purposes in some areas, however:

   a. Shallow ground waters in this area are brackish to saline and are not presently used.

   b. Deep ground waters in this area are brackish to saline and are being investigated for geothermal development.

9. The Board has notified the discharger and interested agencies and persons of its intent to prescribe Waste Discharge Requirements for the proposed discharge.

10. The Board in a public meeting heard and considered all comments pertaining to the discharge.

11. "The Regional Board approved on March 19, 1986 Negative Declaration SCH #86022622 for this project in accordance with the California Environmental Quality Act and State Guidelines. This Negative Declaration supplements the previously approved EA-EIR 99-100 (SCH #78071842) and all subsequent supplements. The Board determined that there will be no substantial adverse effect on the environment as a result of this project."

IT IS HEREBY ORDERED, the discharger shall comply with the following:

A. Discharge Specifications

1. Neither the treatment nor the discharge of wastes shall create a pollution or a nuisance as defined in Division 7 of the California Water Code.

2. Geothermal cleanout fluid and geothermal test fluid shall be injected subsurface or discharged for temporary storage into either:

   a. Temporary containment basins with a permeability equal to or less than 1×10^{-8} cm/sec.; or,

   b. Metal or other type containers approved by the Executive Officer.

3. A minimum freeboard of at least two (2) feet shall be maintained in each temporary containment basin.

4. Fluid discharged by subsurface injection shall not be injected into any subsurface aquifer which has a TDS concentration of less than 10,000 mg/l, unless the TDS concentration of the injection water is less than or equal to that of the receiving water, and the discharger shall demonstrate to the satisfaction of the Regional Board that injection into said zone will not pose a threat to water quality.

5. Fluids discharged by subsurface injection shall be injected below the fracture pressures of the receiving aquifer and of the confining layer immediately above the receiving aquifer.

6. Noninjected goethermal waste with extractable water containing a TDS concentration of more than 6,000 mg/l shall be discharged at a Class I or Class II waste management facility approved by the Regional Board to receive such waste.

7. Drilling mud and residual solids, with extractable water containing a total dissolved solids concentration which is less than 6,000 mg/l and not containing hazardous waste or halogenated solvents, may be left in the containment basins after removal of all free liquids, and covered, or may be discharged at a disposal site approved by the Regional Board to receive such waste.

8. Final disposal of residual wastes and cleanup of containment facilities shall be accomplished upon abandonment or closure of operations to the satisfaction of the Executive Officer. Lack of construction or operational activity on site for a period of one (1) year shall constitute abandonment for the purposes of this Order.

9. Operation and closure of these facilities shall be in accordance with Subchapter 15, Chapter 3, Title 23, of the California Administrative Code and any future revisions thereto.

REFERENCE

B. Provisions

1. The discharger shall comply with the "Monitoring and Reporting Program No. 88-13", and future revisions thereto, as specified by the Executive Officer.

2. Permanent (longer than one (1) year) disposal or storage of geothermal waste in on-site temporary containment basins is prohibited.

3. The discharger shall submit to the Board, at least 30 days prior to commencement of operation at each new well, a written report on the proposed method and estimated costs of cleanup and closure in accordance with the requirements of this Order.

4. At least ten days prior to the discharge of any material into a temporary containment basin, the discharger shall submit to the Regional Board a report signed by a California Registered Civil Engineer, advising the Executive Officer that the temporary containment basin and attendant facilities are constructed to meet the requirements of this Order.

5. The discharger shall submit to the Board, at least 30 days prior to discharge to any constructed facilities written adequate assurance that money is committed in the amount of $50,000.00 to insure that all facilities are cleaned up and closed in accordance with the specifications and provisions of this Board Order No. 88-13.

6. Prior to any change of ownership of these operations, the discharger shall transmit a copy of this Order to the succeeding owner/operator, and forward a copy of the transmittal letter to this Board.

7. This Order does not authorize violation of any federal, state, or local laws or regulations.

I, Arthur Swajian, 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 January 27, 1988.

Arthur Swajian
Executive Officer

CASE

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
COLORADO RIVER BASIN REGION

MONITORING AND REPORTING PROGRAM NO. 88-13
FOR
GEO OPERATOR CORPORATION
GEOTHERMAL EXPLORATION WELLS
East Mesa KGRA - Imperial County

Location of Discharge: Section 8, T16S, R17E, Section 17, T16S, R17E

MONITORING

GEO Operator Corporation shall report monitoring data to the Regional Board in accordance with the following schedule:

1. The discharger shall submit to the Board, at least 30 days prior to commencement of operation at each well, a written report on the proposed method and estimated costs of cleanup and closure in accordance with the requirements of this Order.

2. At least 10 days prior to the discharge of any material into a temporary containment basin, the discharger shall submit to the Regional Board a report signed by a California Registered Civil Engineer advising the Executive Officer that the temporary containment basin and attendant facilities are constructed to meet the requirements of this Order.

3. The discharger shall submit the following information:

Constituent	Unit	Reporting Frequency
a. Volume of discharge contained in each temporary containment basin.	Gallons	Monthly
b. Volume of geothermal waste containing greater than 6,000 mg/l TDS concentration, discharged at a Class II waste management facility, and name of facility.	Gallons	Monthly
c. Volume and TDS concentration of geothermal waste containing less than 6,000 mg/l TDS, discharged at a waste management facility approved by the Regional Board, and name of facility.	Gallons and TDS in mg/l	Monthly

Constituent	Unit	Reporting Frequency
d. Total Dissolved Solids concentration of fluid waste injected into each injection well.	mg/l	Monthly
e. Total dissolved solids concentration of ground water contained in strata proposed to receive fluid waste injection.	mg/l	At least ten days prior to commencement of injection

4. Immediate reporting of any accidental spillage or release of waste material, and immediate measures being taken to correct same and to limit detrimental effects.

5. Report of completion of removal of all geothermal waste from temporary storage basins within one (1) week following completion of work.

6. At least ten (10) days prior to destruction of each temporary storage basin, the discharger shall request a Regional Board staff inspection and approval of the cleanup procedures.

REPORTING

Except for Item 1 and 2, above, the above monitoring program shall be implemented immediately upon commencement of discharge at each site.

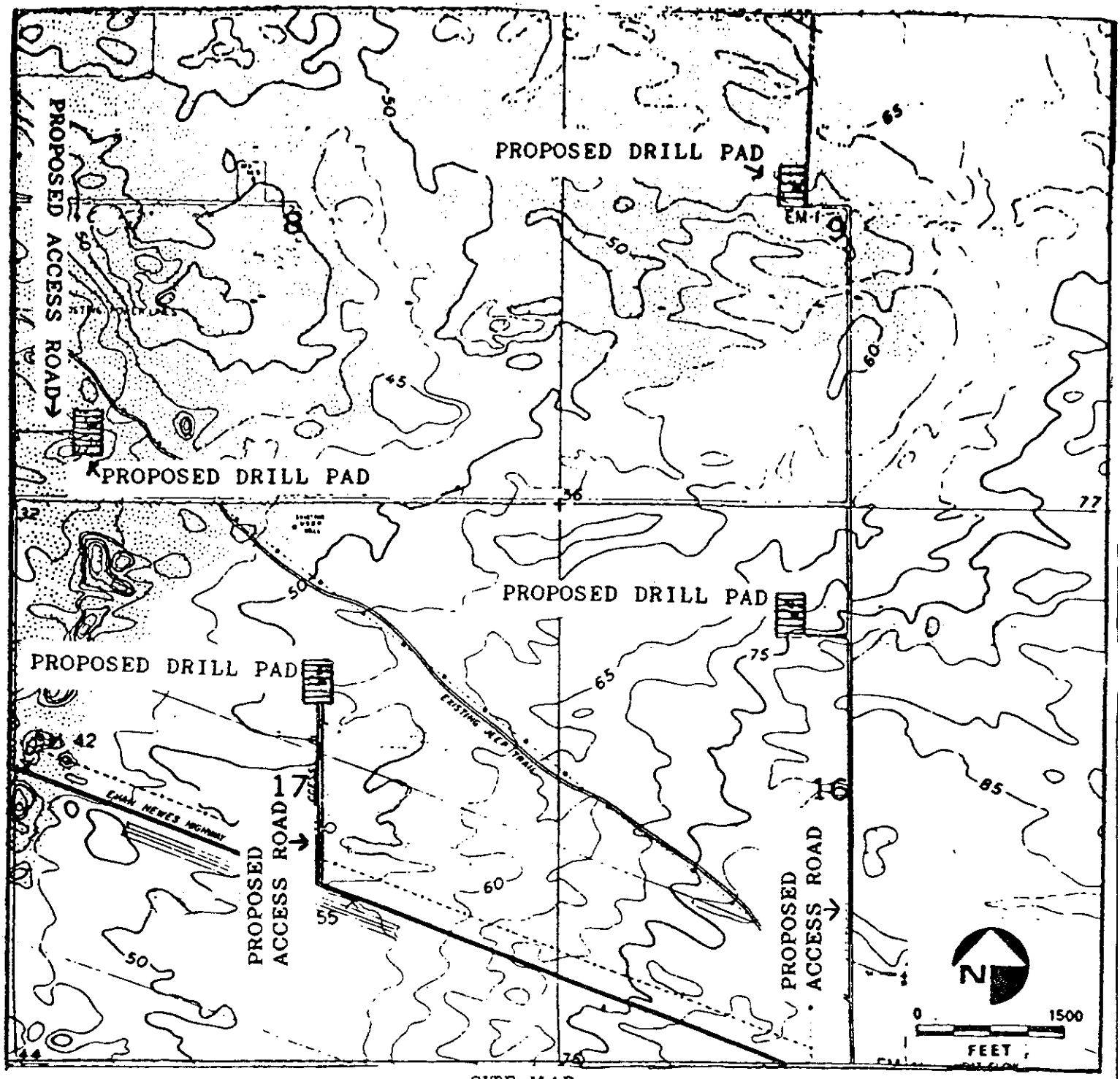
Monthly reports shall be submitted to the Regional Board by the 15th day of the following month. Reports of Item 4 (above) shall be forwarded immediately and shall be preceded by telephone communication to the Regional Board's office, telephone number (619) 346-7491. Copies of the reports submitted to the Board pursuant to this Monitoring and Reporting Program shall be maintained at the operations site, and shall also be made available to staff of the Regional Board upon request.

Mail reports to:

California Regional Water Quality Control Board
Colorado River Basin Region
73-271 Highway 111, Suite 21
Palm Desert, CA 92260

ORDERED BY: Arthur Swajian
Executive Officer

January 27, 1988
Date



SITE MAP

GEO OPERATOR CORPORATION
GEOTHERMAL EXPLORATION WELLS
EAST MESA KNOWN GEOTHERMAL RESOURCES AREA
East Mesa - Imperial County

Section 8, T16S, R17E, SBB&M
Section 17, T16S, R17E, SBB&M