

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

ORDER NO. 88-88

**WASTE DISCHARGE REQUIREMENTS
FOR
GEO OPERATOR CORPORATION
GEOTHERMAL DEVELOPMENT WELLS
EAST MESA KNOWN GEOTHERMAL RESOURCE AREA (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 May 6, 1988.
2. GEO Operator Corporation is a subsidiary of Geothermal Resources International, Inc., Corporation Number 957208 in the State of California.
3. The discharger has drilled four exploratory geothermal wells in accordance with Waste Discharge Requirements (Board Orders No. 88-13 and 88-18) adopted by the Regional Board on January 27, 1988. Information about these wells has been reported by the discharger as follows:

Well	Location	Total Depth	Order No.
44-9	SE $\frac{1}{4}$, NW $\frac{1}{4}$, Section 9	8,694'	88-18
42-16	NE $\frac{1}{4}$, NW $\frac{1}{4}$, Section 16	8,001'	88-18
27-8	SW $\frac{1}{4}$, SW $\frac{1}{4}$, Section 8	10,714'	88-13
53-17	SW $\frac{1}{4}$, NE $\frac{1}{4}$, Section 17	11,639'	88-13

(All well locations are in T16S, R17E, SBB&M)

4. The discharger began drilling two geothermal wells in June 1988 in accordance with Waste Discharge Requirements (Board Order No. 85-98) adopted by the Regional Board on November 20, 1985. Regional Board staff verified the location of these two wells during an inspection on June 28, 1988 as follows:

Well	Location
24-8	NW $\frac{1}{4}$, NW $\frac{1}{4}$, Section 8, T16S, R17E, SBB&M
41-7	NW $\frac{1}{4}$, NE $\frac{1}{4}$, Section 7, T16S, R17E, SBB&M

5. The discharger proposes to drill twelve additional geothermal wells for production and injection of geothermal fluids in the East Mesa KGRA. These

replaced by 90-005

wells and those listed above will supply geothermal fluid to operate a 37 megawatt (net) power plant to be constructed by the discharger in the SW $\frac{1}{4}$, NW $\frac{1}{4}$, Section 7, T16S, R17E, SBB&M.

The twelve additional wells will be directionally drilled from eight well pads as described below:

Well Pad	Locations (within T16S,R17E, SBB&M, except as noted)
7A	NW $\frac{1}{4}$, Section 7
7B	SW $\frac{1}{4}$, Section 7
7C	NE $\frac{1}{4}$, Section 7
7D	SE $\frac{1}{4}$, Section 7
8-1A	NW $\frac{1}{4}$, Section 8
12A	NE $\frac{1}{4}$, Section 12, T16S, R16E, SBB&M
12B	SE $\frac{1}{4}$, Section 12, T16S, R16E, SBB&M
18A	NE $\frac{1}{4}$, Section 18

6. The discharger reports that other wells may be needed to be drilled from the pads described above during the 30-year life of the project to replace any original wells that no longer produce as required.
7. The discharger reports that drilling mud, drill cuttings, and cleanout fluids would be discharged to clay lined drilling containment basins or steel tanks located at the drilling sites. Liquids would be removed from the containers and injected into the wells or would be allowed to evaporate. The discharger proposes to either use the residual solids for on-site construction purposes or to bury the dried residual solids in the clay lined basins if they are non-hazardous and meet the requirements of this Order, or dispose of the residual solids at a waste management unit approved by the Regional Board to receive said wastes.
8. The discharger proposes to construct at each well pad a temporary brine containment basin to hold brine from flow tests of the wells at the pad. These basins would have capacities of 250,000 gallons each with the exception of well pad 7A, which would have a capacity of 500,000 gallons and would service both the 7A and 7C well pads. No brine basin is proposed for the 7C well pad due to the shallow depth of ground water in this location. Liquids discharged to these basins would be evaporated or disposed of through injection.
9. Geothermal fluids in this portion of the East Mesa KGRA are known to have Total Dissolved Solids concentrations of 1,600 mg/l to 15,000 mg/l. The fluids do not contain any constituents at levels either in 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 Code of Regulations, Title 22, Chapter 30, Article 11, Section 66699.

10. There are no surface waters in the vicinity of the discharge. Shallow ground waters are of marginal quality and presently are not beneficially used. Deep ground waters are being tested for potential geothermal power production.
11. This discharge is subject to Section 2511 (g), Subchapter 15, Chapter 3, Title 23 of the California Code of Regulations and Section 25143, Chapter 6.5, Division 20 of the Health and Safety Code.
12. The Water Quality Control Plan for the Colorado River Basin Region of California was adopted on November 14, 1984.
13. An Environmental Assessment (CA # 067-88-28) was prepared for this project by the U. S. Bureau of Land Management. This Environmental Assessment covered all portions of the project to be located on federal lands administered by the Bureau of Land Management. A Finding of No Significant Impact (FONSI) based on the Environmental Assessment noted above, was approved by the BLM on April 28, 1988. The only portion of this project on private land is located in Section 16, T16S, R17E, SBB&M. The Imperial County Planning Department approved a Notice of Determination on January 13, 1988 for the portion of the project in Section 16 and determined that there will be no significant impacts on surface or ground waters from this project.

The Regional Board approved on November 20, 1985, Negative Declaration SCH # 85100213 for the three wells covered by Board Order No. 85-98 in accordance with California Environmental Quality Act and State Guidelines. The Board determined that there will be no substantial adverse effect on the environment as a result of the use of these wells.

Regional Board staff has reviewed the above documents (in accordance with Section 15221, Title 14, of the California Code of Regulations) and finds that this project should not have a significant environmental impact on water quality if conducted according to requirements and provisions of this Order.

14. The Board has notified the discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for the proposed discharge.
15. The Board in a public meeting heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED, GEO Operator Corporation shall comply with the following:

A. Discharge Specifications

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

2. Drilling mud, drill cuttings, and cleanout fluid shall be discharged into either:

a. Earthen basins with a minimum six (6) inch compacted clay lining having a coefficient of permeability of 1×10^{-6} cm/sec. or less. Clay lining shall be defined as:

at least 40 percent of the material, by weight, passing a No. 200 U.S. Standard Sieve; or

b. Earthen basins lined with a synthetic liner of not less than 32 mil thickness approved by the Executive Officer; or

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

All basins and containers shall be constructed, protected, and maintained to ensure their effectiveness.

3. Drilling muds 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 liquid, and covered, or may be discharged in a manner approved by the Regional Board Executive Officer for disposal of said waste.

4. Geothermal brine shall be injected subsurface or discharged into temporary containment basins having liners with a coefficient of permeability of 1×10^{-7} cm/sec. or less. Basins shall be constructed, protected, and maintained to ensure their effectiveness.

5. A minimum freeboard of two (2) feet shall be maintained at all containment basins at all times.

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

7. Fluids discharged by subsurface injection shall not be discharged into any subsurface zone which has a total dissolved solids concentration of less than 3,000 mg/l, unless the total dissolved solids concentration of the injection water is less than or equal to that of the receiving water.

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

9. All containment basins shall be designed, constructed, operated, and maintained to prevent inundation or washout due to floods with a 100-year return period.

B. Provisions

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

2. At least ten (10) days prior to the discharge of any material into a containment basin, the discharger shall submit to the Regional Board a report signed by a California Registered Civil Engineer or California Certified Engineering Geologist, advising the Executive Officer that the containment basin and attendant facilities are constructed to meet the requirements of this Order.
3. The discharger shall submit to the Regional Board, at least 30 days prior to commencement of operation at each new well site, a written report on the proposed method and estimated costs of cleanup and closure in accordance with the requirements of this Order.
4. The discharger shall submit to the Regional Board, at least 30 days prior to discharge to any newly constructed containment basin, written adequate assurance that money is committed in the amount of \$100,000 to insure that all containment basins are cleaned up and closed in accordance with the specifications and provisions of this Board Order No. 88-88.
5. 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.
6. 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 SEP 22 1988.



Executive Officer

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

MONITORING AND REPORTING PROGRAM NO. 88-88
FOR
GEO OPERATOR CORPORATION
GEO THERMAL DEVELOPMENT WELLS
EAST MESA KNOWN GEO THERMAL RESOURCE AREA (KGRA)
Imperial County

Location of Discharge: Sections 7, 8, 9, 16, 17, and 18, T16S, R17E, and Section 12, T16S, R16E, SBB&M.

MONITORING

GEO Operator Corporation (discharger) 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 or California Certified Engineering Geologist, 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:

<u>Constituent</u>	<u>Unit</u>	<u>Reporting Frequency</u>
a. Volume of discharge contained in each temporary containment basin.	Gallons	Monthly
b. Volume of geothermal waste discharged at a waste management facility, and name of facility.	Gallons	Monthly
c. Total Dissolved Solids concentration and volume of fluid injected into each injection well.	mg/l, gallons	Monthly
d. 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 taking to correct same and to limit detrimental effects.
5. At least ten (10) days prior to burial of drilling waste, the discharger shall submit to the Regional Board a report verifying that the waste to be buried meets the requirements contained in Discharge Specification 3. (above).

REPORTING

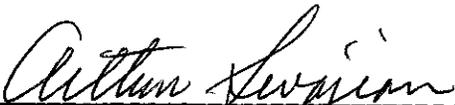
Except for Item 1 and 2, above, the monitoring program shall be implemented immediately upon commencement of discharge at each site.

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

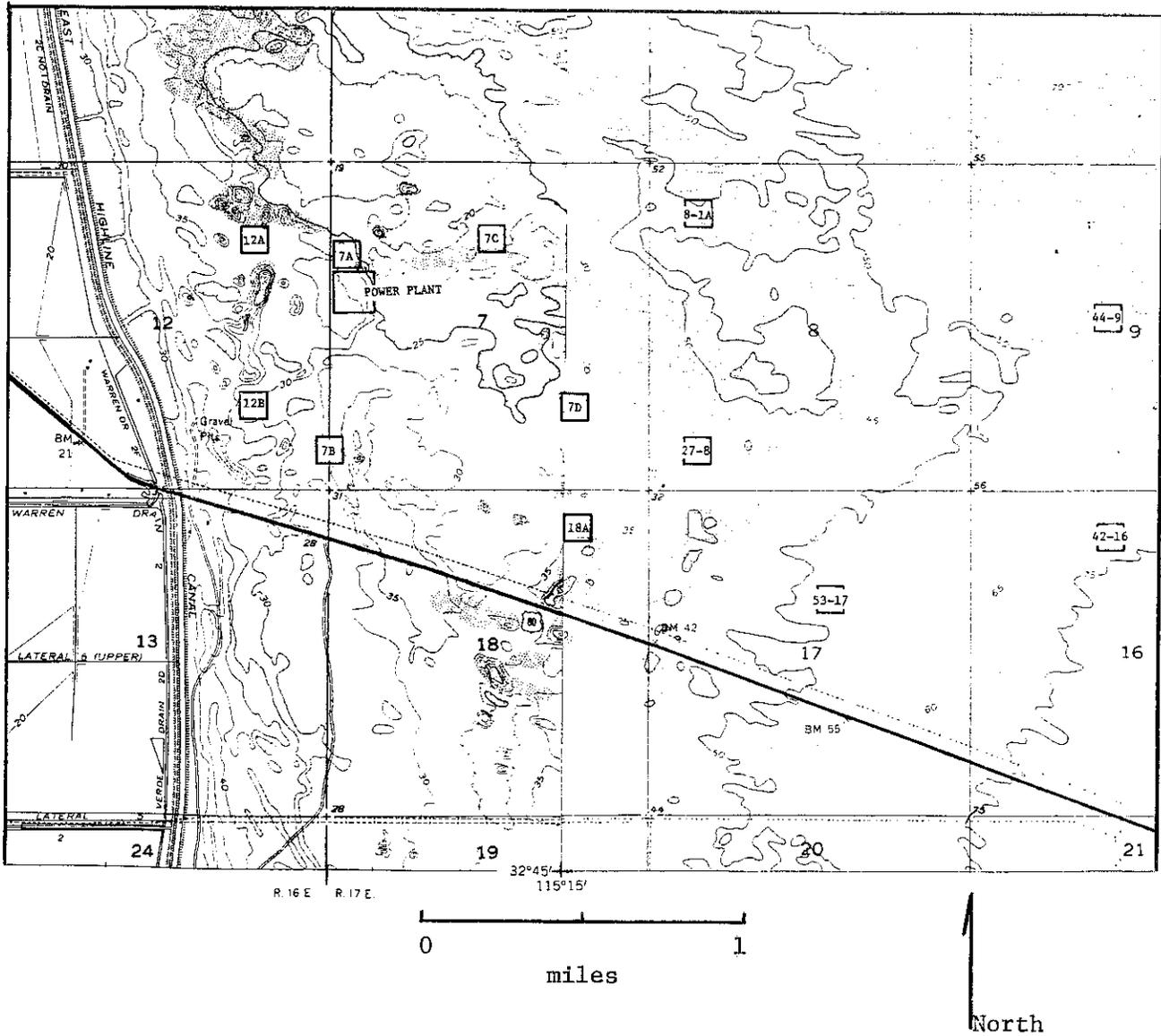
ORDERED BY:


Executive Officer

SEP 22 1988

Date

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - 7



GEO OPERATOR CORPORATION
GEOTHERMAL DEVELOPMENT WELLS
EAST MESA KNOWN GEOTHERMAL RESOURCE AREA (KGRA)
Imperial County

Sections 7, 8, 9, 16, 17, 18, T16S, R17E,
and Section 12, T16S, R16E, SBB&M
USGS Glamis SW and Holtville East 7.5 min. Topographic Maps

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