ORDER NO. 76-64 (REVISED)

WASTE DISCHARGE REQUIREMENTS FOR REPUBLIC GEOTHERMAL, INC. East Mesa Area - Imperial County

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

- Republic Geothermal, Inc., (hereinafter also referred to as the discharger), 11823 E. Slauson Ave., Suite 1, Santa Fe Springs, California 90670, submitted a Report of Waste Discharge dated September 29, 1976, and an addendum dated April 29, 1977.
- 2. The discharger proposes to drill up to 12 deep-test wells in the East Mesa area of Imperial County. A total of 24 possible well locations are available to the discharger for drilling and well development, of which, by agreement with the United States Geological Survey, the discharger may drill and develop a maximum of 12. The selection of the 12 well sites to be drilled and developed is dependent upon the results of on-going and proposed testing programs. The possible well locations are as follows:

Section 20, T15S, R17E, SBB&M

Well No.	Location					
18-20	100'E, 175'N from SW corner					
38-20	1420'E, 175'N from SW corner					
58-20	2740'E, 175'N from SW corner					
78-20	4060'E, 175'N from SW corner					

-1-

Section 21, T15S, R17E, SBB&M

18-21

100'E, 175'N from SW corner

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Section 28, T15S, R17E,	SBB&M
Well No.	Location
12-28	100'E, 4135'N from SW corner
Section 29, T15S, R17E,	SBB&M
12-29	100'E, 4135'N from SW corner
14-29	100'E, 2815'N from SW corner
18-29	100'E, 175'N from SW corner
32-29	1420'E, 4135'N from SW corner
34-29	1420'E, 2815'N from SW corner
36-29	1420'E, 1495'N from SW corner
38-29	1420'E, 175'N from SW corner
52-29	2790'E, 4135'N from SW corner
58-29	2790'E, 175'N from SW corner
72-29	4060'E, 4135'N from SW corner
78-29	4060'E, 175'N from SW corner
Section 30, T15S, R17E,	SBB&M
16-30	100'E, 1495'N from SW corner
18-30	100'E, 175'N from SW corner
36-30	1420'E, 1495'N from SW corner
56-30	2740'E, 1495'N from SW corner
58 – 30	2740'E, 175'N from SW corner
76-30	4060'E, 1495'N from SW corner
78-30	4060'E, 175'N from SW corner

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24

-2-

3. The discharger proposes that all drilling muds will be stored in unlined storage basins. Muds not disposed of by the processes described in Finding No. 4.a. (below) will be either neutralized and spread on the surface of existing and/or proposed roads or trucked to an approved solid waste disposal site.

Following is a list of possible drilling fluid components which the discharger proposes to use in the well drilling fluid:

Collodial clay (drilled solids)MicaWyoming Bentonite plus .1% acrylic acidTannic acidCane fiberCaustic sodaGround nut shellsLimeBarium sulphateCypanThread dopeBit lubeLignite or leonardite brown coalDiesel oil

Bentonite will be the main component; the other substances are additives and may or may not be used, depending on the particular drilling conditions. The pH level of the drilling fluid is not expected to exceed 8.5 at any time. Caustic soda will be utilized at a concentration of approximately 0.2 lbs. per barrel (357 lbs.) of drilling fluid.

- 4. The discharger proposes to discharge, other than by direct reinjection, a maximum of 232 acre-feet of fluids at a maximum discharge rate of 0.39 acre-feet-per-operating-day (126,000 gpd) from the twelve proposed deep-test geothermal wells into unlined storage basins. The fluids in the basins will be neutralized and then spread onto access roads and well pads in the vicinity of the geothermal wells to aid in dust control and compaction of soils. Said discharge from each well shall consist of the following:
 - Well clean-out fluid will be produced consisting of 1,000 barrels of displacement water (primarily fresh water) and 9,000 barrels of geothermal reservoir fluid mixed with sand, drilling filtrates and drilling muds, for a total of 10,000 barrels (1.3 acre-feet).
 - b. From each well approximately 90,000 barrels
 (11.6 acre-feet) of geothermal fluid will be produced
 during initial flow testing and sand clean-out.

-3-

c. The discharger states that, subsequent to inital clean-out, each well will be placed on substantial production tests which will produce approximately 3 million barrels (387 acre-feet) of geothermal fluid. Most of this fluid will be discharged into steel tanks and then reinjected into wells specifically drilled or converted for disposal purposes.

Prior to injection the fluid will be filtered. Approximately 50,000 barrels (6.5 acre-feet) of the production-test geothermal fluid will be used for filter backflush and will then be discharged into the unlined basins, neutralized, and spread on access roads and well pads.

The discharger has submitted the following analyses of water samples drawn from two existing deep-test geothermal wells in the vicinity of the proposed wells. The analyses are as follows:

Well No.	Location	Date Sampled	Total Dissolved Solids
16-29	1495'N, 100'E of SW corner,	4/23/76	2069 mg/l
	Sec. 29, T15S, R17E, SBB&M	6/15/76	1978 mg/l
38-30	100'N, 1420'E of SW corner,	4/23/76	1907 mg/l
	Sec. 30, T15S, R17E, SBB&M	6/15/76	1737 mg/l

5. The discharger proposes that the surface discharge of wastewater will be restricted to the access road lying on the common boundary of Sections 31 and 32, T15S, R17E, SBB&M and to well pads and access road within two of the discharger's leases in the East Mesa area of Imperial County. The leases are described as follows:

Lease CA 966		E≟	SE ¹ / ₄	Sec.	23,	S클 See	24.	Sec.	25.
(2549.09	acres)	E ¹ 2	NE 1	Sec.	26,	TĨ5S,	R16E,	SBB&N	4

 $S_{\frac{1}{2}}^{\frac{1}{2}}$ Sec. 19, SW $_{\frac{1}{4}}^{\frac{1}{4}}$ Sec. 20, W $_{\frac{1}{2}}^{\frac{1}{2}}$ Sec. 29, Sec. 30, T15S, R17E, SBB&M

Lease CA 1903 (2560.00 acres) $E_{\frac{1}{2}}^{\frac{1}{2}}$ Sec. 20, Sec. 21, $W_{\frac{1}{2}}^{\frac{1}{2}}$ Sec. 22, $W_{\frac{1}{2}}^{\frac{1}{2}}$ Sec. 27, Sec. 28, $E_{\frac{1}{2}}^{\frac{1}{2}}$ Sec. 29, T15S R17E, SBB&M

-4-

- 6. The discharger proposes that clean-up will be accomplished upon abandonment of the well. All residue removed from the storage basins will be disposed of at an approved solid waste disposal site.
- 7. The discharger states that a maximum of approximately 12-15 persons will be working at the well sites at any one time. Portable sanitary facilities will be provided at the sites.
- 8. The Water Quality Control Plan for the West Colorado River Basin was adopted by the Regional Board on April 10, 1975. This Order implements the objectives stated in said Plan.
- 9. Two shallow groundwater monitoring wells located near the SW corner of Section 30, T15S, R17E, SBB&M have TDS reported at 1600 and 1700 mg/l. Seven other shallow monitoring wells located about two miles south of the discharger's area (Sections 5 & 6, T16S, R17E, SBB&M), have TDS reported to range from 1,100 to 14,000 mg/l.
- 10. The Board has notified the discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for the proposed discharge.
- 11. The Board in a public meeting heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED, Republic Geothermal, Inc., shall comply with the following:

- A. Discharge Specifications
 - 1. Neither the treatment nor the discharge shall cause a pollution or a nuisance.

-5-

2. The sum of the volumes of geothermal fluids discharged onto the ground in accordance with this Order and Order No. 76-35 shall not exceed 126,000 gallons-per-operating-day.

- 3. The total cumulative volume of geothermal fluids discharged onto ground from the drilling and development of the geothermal wells listed in Finding No. 2 (above) shall not exceed 232 acre-feet for the life of the project.
- 4. The surface discharge of geothermal fluids, other than into storage basins, or for use in maintaining access roads, well pads, and other improvements in the general area, is prohibited.
- 5. The total dissolved solids concentration of geothermal fluids contained in active storage in earthen basins shall not exceed 2300 mg/l.
- 6. Surface runoff of geothermal fluids is prohibited.
- 7. Geothermal fluids shall not be allowed to pond, except in the storage basins.
- 8. Reinjection of geothermal fluids contained in the earthen storage basins is prohibited.
- 9. Geothermal wastes discharged by subsurface injections shall be discharged into the zone of extraction, or zones that contain a total dissolved solids content which is equal to or greater than that contained in the zone of extraction.
- 10. Adequate protective works and maintenance shall be provided to assure that storage basins will not become eroded or otherwise damaged during the project period, and/or until all geothermal materials are removed.
- 11. A minimum freeboard of at least two (2) feet shall be maintained in all storage basins.
- 12. All geothermal wastes shall be removed from the storage basins with cleanup of all contents upon abandonment of the basins. Lack of activity on the site for a period of six (6) months shall constitute abandonment for the purpose of this Order.
- B. Provisions
 - 1. The discharger shall comply with "Monitoring and Reporting Program No. 76-64 (Revised)" and "General Provisions for Monitoring and Reporting", and future revisions thereto, as specified by the Executive Officer.

-6---

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 November 18, 1976 and revised on <u>May 18, 1977</u>.

Dettin Sevajian Executive Officer

-7-

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MONITORING AND REPORTING PROGRAM NO. 76-64 (REVISED) FOR REPUBLIC GEOTHERMAL, INC. East Mesa Area - Imperial County

Location: Sections 28, 29, and 30, T15S, R17E, SBB&M

MONITORING

Republic Geothermal, Inc., shall report monitoring data to the Regional Board in accordance with the following schedule:

Cor	<u>istituents</u>	Units	Reporting Frequency
1.	Volume discharged to storage basin	Gallons	Monthly
2.	Volume discharged to access roads and well pads	Gallons	Monthly
3.	Volume injected to sub- surface strata from each storage basin	Gallons	Monthly
4.	Volume contained in each storage basin	Gallons	Monthly
5.	Total dissolved solids con- tent of waste fluid in acti storage in the storage basi	- lve in* mg/l	Weekly when dis- charging, other- wise monthly
6.	Total dissolved solids concentration of ground- water contained in strata receiving waste fluid in- jection*	mg/l	At least 10 days prior to commence ment of injection
7.	Location and depth of disposal wells		At least 10 days

*Total dissolved solids as determined by chemical analysis.

-1-

ment of injection

- 8. Immediate reporting of any accidental spillage or release of waste material, and also, plan for immediate measures being taken to correct same and limit detrimental effects.
- 9. Prior to the initial discharge of geothermal fluids to the ground, the discharger shall inform the Regional Board of the Total dissolved solids* content of the fluid to be discharged.
- Within 10 days after the initial discharge of geothermal 10. fluid from a well, the discharger shall report said initial discharge to the Board.
- 11. At least ten (10) days prior to destruction of any storage basins the discharger shall request a Regional Board staff inspection and approval of the cleanup procedure.
- 12. Report of completion of removal of all geothermal waste from storage basins and cleanup of premises - Reported within one week following completion of work.

REPORTING

The above monitoring program shall be implemented immediately upon commencement of well discharge at each site.

Monthly reports shall be submitted to the Regional Board by the 15th day of the following month. Reports for Item 8 (above) shall be forwarded immediately, and if at all possible shall be preceded by phone communication to the Regional Board's office. Phone No. (714) 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

1977 Mav 18. Date

*Total dissolved solids as determined by chemical analysis.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - 7



SITE MAP FOR REPUBLIC GEOTHERMAL, INC. East Mesa Area - Imperial County

Location: Sections 20, 21, 28, 29, & 30, T15S, R17E, SBE&M Glamis & Holtville 15' Topographic Maps

Order No. 76-64

ORDER NO. 76-64

WASTE DISCHARGE REQUIREMENTS FOR REPUBLIC GEOTHERMAL, INC. East Mesa Area - Imperial County

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

- 1. Republic Geothermal, Inc., (hereinafter also referred to as the discharger), 2544 Cleveland Avenue, Suite 5, Santa Rosa, California 95401, submitted a Report of Waste Discharge dated September 29, 1976.
- 2. The discharger proposes to drill up to 12 deep-test wells in the East Mesa area of Imperial County. A total of 24 possible well locations are available to the discharger for drilling and well development, of which, by agreement with the United States Geological Survey, the discharger may drill and develop a maximum of 12. The selection of the 12 well sites to be drilled and developed is dependent upon the results of on-going and proposed testing programs. The possible well locations are as follows:

Well No.	Location
18-20	100'E, 175'N from SW corner
38-20	1420'E, 175'N from SW corner
58-20	2740'E, 175'N from SW corner
78-20	4060'E, 175'N from SW corner

Section 21, T15S, R17E, SBB&M

Section 20, T15S, R17E, SBB&M

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100'E, 175'N from SW corner

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Daren	12-28	100'E, 4135'N 1	from SW corner
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Section	1 29.	T15S.	R17E.	SBB&M
	/ /			

Well No.	Location
12-29	100'E, 4135'N from SW corner
14-29	100'E, 2815'N from SW corner
18-29	100'E, 175'N from SW corner
32-29	1420'E, 4135'N from SW corner
34-29	1420'E, 2815'N from SW corner
36-29	1420'E, 1495'N from SW corner
38-29	1420'E, 175'N from SW corner
52-29	2790'E, 4135'N from SW corner
58-29	2790'E, 175'N from SW corner
72-29	4060'E, 4135'N from SW corner
78–29	4060'E, 175'N from SW corner
Section 30, T15S, R17E	, SBB&M
16-30	100'E, 1495'N from SW corner
18-30	100'E, 175'N from SW corner
36-30	1420'E, 1495'N from SW corner
56-30	2740'E, 1495'N from SW corner
58-30	2740'E, 175'N from SW corner
76-30	4060'E, 1495'N from SW corner
78-30	4060'E, 175'N from SW corner

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Following is a list of possible drilling fluid components which the discharger proposes to use in the well drilling fluid:

Colloidal clay (drilled solids)	Mica
Wyoming Bentonite plus .1% acrylic acid	Tannic acid
Cane Fiber	Caustic soda
Ground nut shells	Lime
Barıum sulphate	Cypan
Thread dope	Bit lube
Lignite or leonardite brown coal	Diesel oil

Bentonite will be the main component; the other substances are additives and may or may not be used, depending on the particular drilling conditions. The pH level of the drilling fluid is not expected to exceed 8.5 at any time. Caustic soda will be utilized at a concentration of approximately 0.2 lbs. per barrel (357 lbs.) of drilling fluid.

- 4. The discharger proposes to discharge, other than by direct reinjection, a maximum of 232 acre-feet of fluids at a maximum discharge rate of 0.39 acre-feet-per-operating-day (17,000 gpd) from the twelve proposed deep-test geothermal wells into bentonite-lined storage basins. The fluids in the basins will be neutralized and then spread onto access roads and well pads in the vicinity of the geothermal wells to aid in dust control and compaction of soils. Said discharge from each well shall consist of the following:
 - a. Well clean-out fluid will be produced consisting of 1000 barrels of displacement water (primarily fresh water) and 9,000 barrels of geothermal reservoir fluid mixed with sand, drilling filtrates and drilling muds, for a total of 10,000 barrels (1.3 acre-feet).
 - b. From each well approximately 90,000 barrels (ll.6 acre-feet) of geothermal fluid will be produced during initial flow testing and sand clean-out.
 - c. The discharger states that, subsequent to initial cleanout, each well will be placed on substantial production tests which will produce approximately 3 million barrels (387 acre-feet) of geothermal fluid. Most of this fluid will be discharged into steel tanks and then reinjected into wells specifically drilled or converted for disposal purposes. All reinjection will take place at a depth sufficient to prevent contact with the freshwater aquifer.

Prior to injection the fluid will be filtered. Approximately 50,000 barrels (6.5 acre-feet) of the productiontest geothermal fluid will be used for filter backflush and will then be discharged into the bentonite-lined basins, neutralized, and spread on access roads and well pads.

-3-

The discharger has submitted the following analyses of water samples drawn from two existing deep-test geothermal wells in the vicinity of the proposed wells. The analyses are as follows:

<u>Well No.</u>	Location	Date <u>Sampled</u>	Total Dissolved Solids
16-29	1495'N, 100'E of SW corner,	4/23/76	2069 mg/l
	Sec. 29, T15S, R17E, SBB&M	6/15/76	1978 mg/l
38-30	100'N, 1420'E of SW corner,	4/23/76	1907 mg/l
	Sec. 30, T15S, R17E, SBB&M	6/15/76	1737 mg/l

5. The discharger proposes that the surface discharge of wastewater will be restricted to the access road lying on the common boundary of Sections 31 and 32, T15S, R17E, SBB&M and to well pads and access road within two of the dischargers leases in the East Mesa Area of Imperial County. The leases are described as follows:

Lease CA 966	Εl	2 SE1/4	Sec.	23,	S1/2 Sec	. 24,	Sec. 25,
(2549.09	acres) E½	2 NE1/4	Sec.	26,	T158,	R16E,	SBB&M

S½ Sec. 19, SW¼ Sec. 20, W½ Sec. 29, Sec. 30, T15S, R17E, SBB&M

Lease CA 1903 (2560.00 acres) E½ Sec. 20, Sec. 21, W½ Sec. 22, W½ Sec. 27, Sec. 28, E½ Sec. 29, T15S R17E, SB8&M

- 6. The discharger proposes that clean-up will be accomplished upon abandonment of the well. All residue removed from the storage basins will be disposed of at an approved solid waste, disposal site.
- 7. The discharger states that a maximum of approximately 12-15 persons will be working at the well sites at any one time. Portable sanitary facilities will be provided at the sites.
- 8. The Water Quality Control Plan for the West Colorado River Basin was adopted by the Regional Board on April 10, 1975. This Order implements the objectives stated in said Plan.
- 9. Shallow groundwaters in the vicinity of the discharge are saline and are not beneficially used.
- 10. The Board has notified the discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for the proposed discharge.
- 11. The Board in a public meeting heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED, Republic Geothermal, Inc., shall comply with the following:

- A. Discharge Specifications
 - 1. Neither the treatment nor the discharge shall cause a pollution or a nuisance.
 - 2. The discharge of geothermal fluids to any canals, drainage channels or drains which could provide flow to Salton Sea is prohibited.
 - 3. The sum of the volumes of geothermal fluids discharged onto the ground in accordance with this Order and Order No. 76-35 shall not exceed 17,000 gallons-per-operating-day.
 - 4. The total cumulative volume of geothermal fluids discharged onto the ground from the drilling and development of the geothermal wells listed in Finding No. 2 (above) shall not exceed 232 acre-feet for the life of the project.
 - 5. The surface discharge of geothermal fluids other than into lined storage basins or onto the access roads and well pads described in Finding No. 5 (above), is prohibited.
 - 6. The discharge onto the ground of geothermal fluids having a Total Dissolved Solids concentration in excess of 3,000 mg/l is prohibited.
 - 7. Surface runoff of geothermal fluids is prohibited.
 - 8. Geothermal fluids shall not be allowed to pond, except in the storage basins.
 - 9. All geothermal wastes shall be removed from the storage basins with cleanup of all contents upon abandonment of the basins. Lack of activity on the site for a period of six (6) months shall constitute abandonment for the purpose of this Order.
 - 10. There shall be no seepage or overflow from temporary storage basins.
 - 11. Adequate protective works and maintenance shall be provided to assure that storage basins will not become eroded or otherwise damaged during the project period, and/or until all geothermal, materials are removed.
 - 12. A minimum freeboard of at least two (2) feet shall be maintained in all storage basins.

13. Geothermal wastes discharged by subsurface injections shall be discharged into the zone of extraction, or zones that contain a total dissolved solids content which is equal to or greater than that contained in the zone of extraction, or to other zone(s) approved by the Executive Officer.

B. Provisions

- 1. The discharger shall comply with "Monitoring and Reporting Program No. 76-64" and "General Provisions for Monitoring and Reporting", and future revisions thereto, as specified by the Executive Officer.
- 2. Prior to the discharge of any geothermal materials into storage basins, the discharger shall submit to the Regional Board a certificate signed by a California Registered Civil Engineer stating that the basin and attendant facilities are constructed to meet the requirements of this Order.

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 <u>November 18, 1976</u>.

-6-

• MONITORING AND REPORTING PROGRAM NO. 76-64 FOR REPUBLIC GEOTHERMAL, INC. East Mesa Area - Imperial County

Location: Sections 28, 29, and 30, T15S, R17E, SBB&M

MONITORING

Republic Geothermal, Inc., shall report monitoring data to the Regional Board in accordance with the following schedule:

Constituents		Units	Reporting Frequency
1.	Volume discharged to storage basin	Gallons	.Monthly
2.	Volume discharged to ground	Gallons	Monthly
3.	Volume injected to sub- surface strata from each storage basin	Gallons	Monthly
4.	Volume contained in each storage basin	Gallons	Monthly
5.	Total dissolved solids content of waste fluid in storage basin*	mg/l	Weekly whén dis- charging to ground, otherwise monthly
6.	Total dissolved solids concentration of groundwater contained in strata receiv- ing waste fluid injection*	mg/l	At least 10 days prior to commence- ment of injection
7.	Location and depth of disposal wells		At least 10 days prior to commence- ment of injection
8.	Immediate reporting of any accidental spillage or release of waste material, and also, plan for immediate measures being taken to correct same and limit detrimental effects.		

*Total Dissolved Solids as determined by chemical analysis.

-1-

- 9. Prior to the initial discharge of geothermal fluids to the ground, the discharger shall inform the Regional Board of the Total Dissolved Solids*content of the fluid to be discharged.
- 10. Report of completion of removal of all geothermal waste from storage basins and cleanup of premises Reported within one week following completion of work.
- 11. At least ten (10) days prior to destruction of any storage basins the discharger shall request a Regional Board staff inspection and approval of the cleanup procedure.
- 12. Within 10 days after the initial discharge of geothermal fluid from a well, the discharger shall report said initial discharge to the Board.

REPORTING

The above monitoring program shall be implemented immediately upon commencement of well discharge at each site.

Monthly reports shall be submitted to the Regional Board by the 15th day of the following month. Reports for Item 8 (above) shall be forwarded immediately, and if at all possible shall be preceded by phone communication to the Regional Board's office. Phone No. (714)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

1976 November 18. Date

*Total Dissolved Solids as determined by chemical analysis.

-2-

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD - 7



SITE MAP FOR REPUBLIC GEOTHERMAL, INC. East Mesa Area - Imperial County

Location: Sections 20, 21, 28, 29, & 30, T15S, R17E, SBB&M Glamis & Holtville 15' Topographic Maps

Order No. 76-64