

UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

RIVERSIDE DISTRICT OFFICE

RIVERSIDE, CALIFORNIA

AN ENVIRONMENTAL ANALYSIS RECORD

FOR THE LICENSING OF REPUBLIC GEOTHERMAL INC's 48MW
(NET) GEOTHERMAL POWER PLANT

(An Addendum to EA 99-100 and Prepared in Conjunction with EA 107-9,
by the Area Geothermal Supervisor's Office)

Prepared for the proposed construction and operation, for a
48-MW (Net) commercial geothermal power plant on Republic
Geothermal, Inc.'s Federal lease CA-966, East Mesa KGRA,
Imperial County, California.

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I. INTRODUCTION

Environmental Analyses Records (EARs) are prepared by the District Offices of the Bureau of Land Management (BLM) for geothermal lease applications on Federal lands and for geothermal power plants on these lands that exceed 20MW of net generating capacity. These EARs are prepared in accord with the 1970 Geothermal Steam Act and subsequent rules and regulations, and Section 102(2)(C) of the 1969 National Environmental Policy Act (NEPA).

A lessee is required to submit a Plan of Operation (POO) prior to commencing most geothermal operations on Federal leases. Depending on the proposed activity, a POO will address exploration, development, injection, utilization, or production.

EARs prepared by the BLM address the following topics:

- the proposed geothermal operations
- the existing environment associated with the proposed operations
- the potential environmental impacts that would result from implementing the proposed operations
- the measures for mitigating or eliminating potential environmental impacts
- the unavoidable adverse impacts
- the alternatives to the proposed operations.

One purpose of an EAR is to determine if an Environmental Impact Statement (EIS) addressing the proposal is needed, and EIS determinations are included at the end of the EARs.

In January 1978, Republic Geothermal, Inc. (RGI) submitted to the BLM a Plan of Utilization (POU), a Plan of Development (POD) and a Plan of Injection (POI). In these plans, RGI proposes to conduct geothermal operations on the firm's Federal geothermal leases CA-966 and CA-1903 that are located within the East Mesa Known Geothermal Resource Area, Imperial County, California. The POU describes the construction and operation of a 48MW (net) electrical power plant, and the POD and POI describes the operations required for support of the power plant. The proposed 48MW power plant operations are an expansion of RGI's 10MW research and demonstration power plant operations.

In August 1978, the Geothermal Environmental Advisory Panel (GEAP) reviewed RGI's 10MW POU, POD, and POI and EA (No. 99-100) was written on the plans.

In September 1978, the USGS approved EA 99-100 and determined that the construction, operation, and field-development associated with the 10MW power plant does not constitute a major Federal action significantly affecting the quality of the environment in the sense of NEPA, Section 102(2)(C). A five-year permit to operate the 10MW power plant has been issued by the Area Geothermal Supervisor's Office (AGS).

The AGS and BLM are adhering to the proposed regulations published in the Federal Register, V. 43, no. 22, p. 4264-4267 that requires the BLM to issue a license for a power plant that generates more than 20MW of electricity. These regulations require the AGS to issue a permit to construct and operate any sized power plant. Since the BLM is responsible for licensing the 48MW power plant, the BLM has assumed the responsibility for evaluating the environmental impacts associated with the construction and operation of RGI's power plant as described in the POU.

Concurrently with this EAR, the AGS is preparing an Environmental Analysis (EA-107-9) that addresses the POI and POD. This EAR addresses the POU for the 48MW power plant but does not address the POI and POD. Before issuing the permit to construct and operate the power plant, the AGS intends to adopt BLM's EAR.

Because EA 99-100 thoroughly addresses the same area in which the 48MW POU is proposed, this EAR is written as an addendum to EA 99-100. The potential impacts anticipated by implementing the 48MW POU are considered the same impacts as discussed for the 10MW POU in EA 99-100. The impacts will occur over the same area as the 10MW plant, as the additional construction will be confined to the area previously impacted by the 10MW facility. Discussions in this EAR are limited to describing the POU (proposed operations), measures for eliminating or mitigating environmental impacts, and alternatives to the proposed action. An EIS determination is included at the end of this EAR. Amendments to Chapters IV through XI are included in this EAR beginning on page 7.

In conjunction with this EAR the reader should peruse EA 99-100 for descriptions of the existing environment and potential environmental impacts. See EA 99-100 for descriptions of the existing environment and potential environmental impacts. EA 99-100 can be obtained from the AGS's Office in Menlo Park, California, and can be perused at the District Geothermal Supervisor's Office in Reno, Nevada and the BLM's El Centro, Riverside, and Sacramento offices.

II. DESCRIPTION OF THE PLAN OF UTILIZATION

Plan of Utilization

Under this Plan of Utilization (POU), Republic Geothermal Inc. (RGI) proposes to construct and operate a 48MW (net) commercial geothermal electric generating plant on their Federal geothermal leases CA-966 and CA-1903 at the East Mesa Known Geothermal Resource Area. The proposed power plant would directly utilize steam to power a single inlet 10MW turbine generator and dual inlet 54MW turbine generating unit.

Auxillary power plant facilities would include:

- * adding 8 additional cells to the 10MW unit cooling tower
- * additional condensate and cooling water pumps
- * an electrical transmission loop of 161 kV capacity
- * an administration building

Figure 1 illustrates a possible plot plan for the plant site.

Nineteen production wells are expected to be able to supply enough energy to run the proposed power plant. Each hour, approximately 6.555 million kg (14.421 million pounds) of 168°C geothermal fluid would flow in eight flash tanks; four high pressure units and four low pressure units which are all supplied by the nineteen production wells. About 11 percent of the geothermal fluid would flash to steam and would run the two turbines which in turn would rotate separate generators to produce two pole, three phase electricity at 60Hz and 13,800 volts. Some of the electricity produced (16MW) would be used for continuing geothermal production and running the internal plant facilities. The remaining 48MW would be sold to an outside utility, either the Imperial Irrigation District (IID), or San Diego Gas and Electric Company (SDG&E).

After passing through the two turbines, the steam would be condensed and cooled in a forced air draft cooling tower. The cooled condensate would then flow back to the two condensers, used to condense additional steam, and be recycled. In order to avoid corrosion problems, amino methylene phosphonate, or a similar corrosion inhibitor, would be added to the cooling water at a concentration of about 60 ppm (EA 99-100). About 15 ppm of chlorine may be added to control algae. Gas ejectors would be installed on the condensers to disperse the noncondensable gases to the atmosphere. Waste geothermal fluids and blowdown would be injected into the subsurface. Figure 2 illustrates the basic flow diagram for the proposed 48MW power plant.

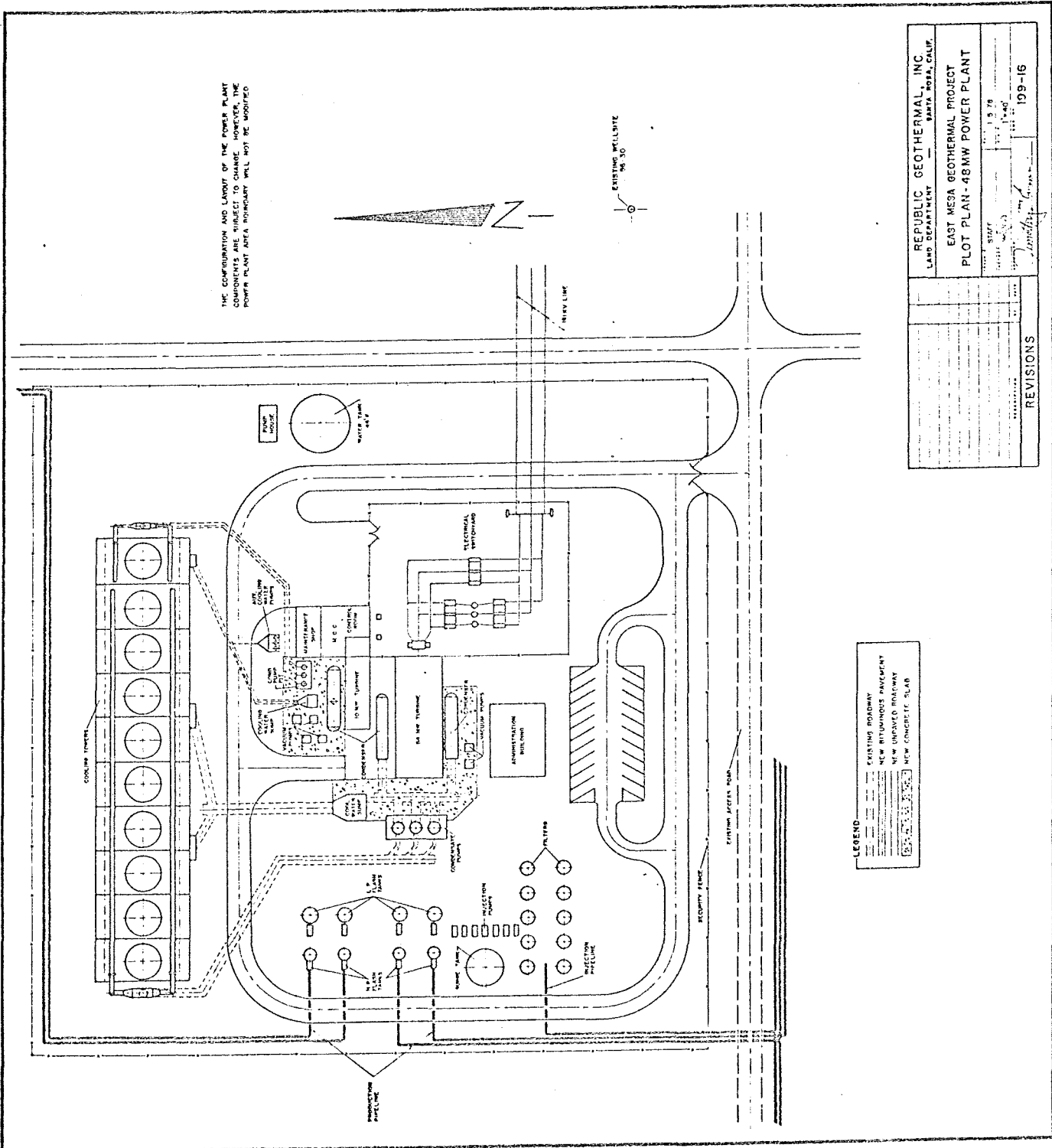


Figure 1

Since the system is expected to produce more condensed steam than would be evaporated in the cooling towers, no outside make-up water would be required. An initial 6 million l (4.9 acre-feet) of water would be required for the initial fill up of eight of the ten cooling towers. The other two towers would be full from the previously operating 10MW unit. This water would be obtained from either the nearby East Highland Canal or RGI's shallow water well located in the SW $\frac{1}{4}$ SE $\frac{1}{4}$, Sec. 29, T. 15 S., R. 17 E., SBB&M.

The proposed power plant site would be approximately 3 ha (7 acres) in size, measuring approximately 168 by 183 m. (550 x 580 feet). The power plant site may be paved. The majority of construction activities would be confined to this area. Some temporary activity will occur outside but adjacent to the plant boundaries.

Three alternative plant sites, designated A, B, and C, have been proposed. RGI has chosen site B as the most acceptable site based on engineering, economic, and environmental studies.

The power plant site will require an access road and a 161kV transmission line, constructed as a transmission loop. An access road 0.4 km (1/4-mile) long would need to be constructed for proposed plant site B. The plant site access road would be approximately 7.5 m (20 feet) wide and may be paved. The transmission loop would run up to approximately 7.3 km (4.8 miles) in length and connect to the existing IID 161kV line that runs south of and parallel to I-8. Approximately 6.4 km (4.0 miles) of this transmission line would not be on RGI's leasehold and will require a separate right-of-way from the BLM. Figures 3 and 4 illustrate the proposed plant site, access roads, and transmission line routes.

Nine people would be required to operated and maintain the power plant, production, and injection systems on a daily basis.

For a more detailed description of this proposed geothermal operation, see the POU previously sent to all Interested Parties.

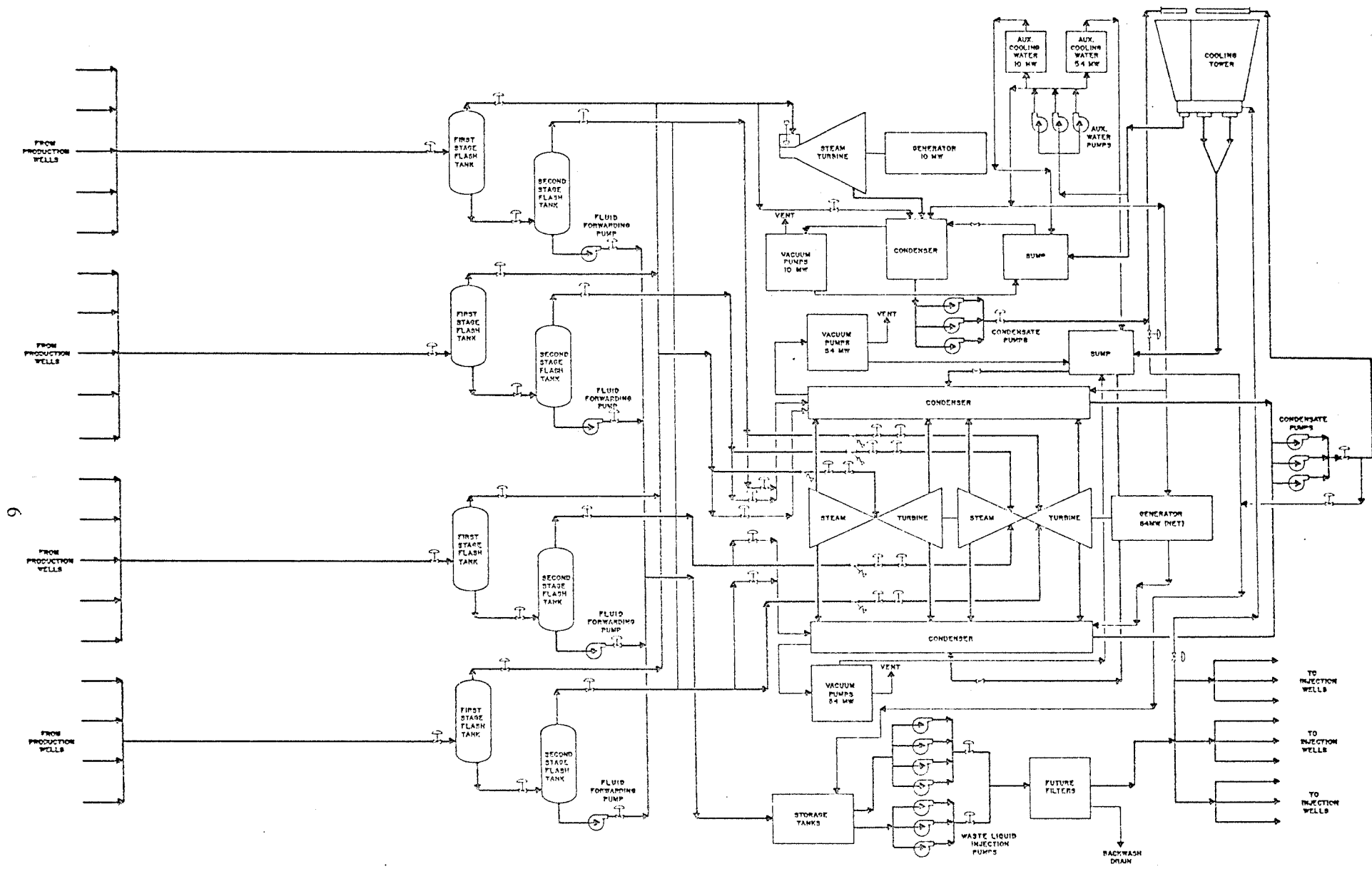


Figure 2

REVISIONS		REPUBLIC GEOTHERMAL, INC. LAND DEPARTMENT — SANTA ROSA, CALIF.	
		EAST MESA GEOTHERMAL PROJECT SCHEMATIC FLOW DIAGRAM — 40 MW POWER PLANT	
DATE	BY	DATE	BY
		199-17	

III. AMENDMENTS TO EA 99-100

Chapter IV. Public Need. . . . No change.

Chapter V. Base Line Environment

Air Quality

Page 42, paragraph 5, EA 99-100 is amended to read: As shown in Table 3 the total noncondensable gas emissions from the power plant are expected to be about 5,828 kg/hr (12,821 lbs/hr). The drift from the cooling tower is expected to be 1800 kg/hr (3,960 lbs/hr) of which 2.1 kg/hr (4.62 lbs/hr) will be particulates. A minor amount of ammonia vapor, approximately 6.4 kg/hr (14.08 lbs/hr) will be evolved from the cooling tower drift. For a more complete discussion of anticipated emissions, see the Plan of Utilization sent to interested parties in April, 1978.

Table 3, Anticipated Noncondensable Gas Emissions, has been updated, revised and included in this EAR as page number 11.

Chapter VI. IMPACT EVALUATION AND MITIGATING MEASURES.

Soils

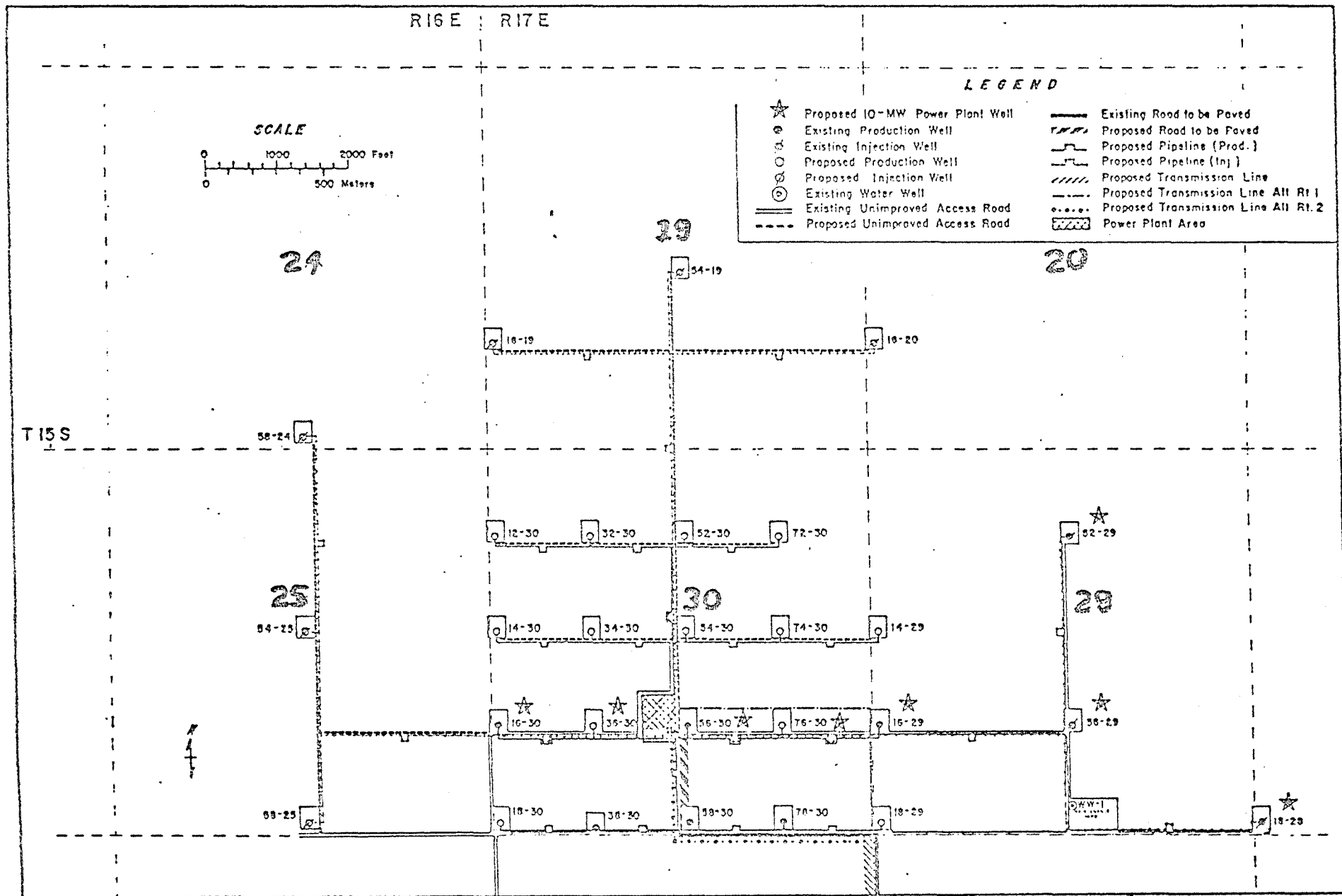
Page 77, paragraph 3, is amended to read: RGI's proposed 48MW power plant and associated field development would result in 44 ha (108 acres) of surface disturbance. Approximately 3 ha (7 acres) of the 44 ha (108 acres) disturbed are contained within the area for the power plant site and most of the 3 ha (7 acres) disturbance will be done during the construction of the 10MW R&D power plant.

HYDROLOGY

Page 78, paragraph 2, is amended to read: net loss of approximately 450 m³ of water/hr (0.36 acre-feet) This amount represents 6.7 percent of the total amount of fluid circulating through the power plant, or 5.6 percent of the combined average municipal Page 78, paragraph 4, is amended to read: Hence, the proposed 48MW power plant would be expected to produce a surplus of high quality water, estimated to be about 102,500 liters (0.083 acre-feet) per year.

ENDANGERED AND THREATENED SPECIES

Page 84, paragraph 5, is amended to include: The Andrews' dune scarab beetle was proposed as a threatened species on August 10, 1978 by the U.S. Fish and Wildlife Service.

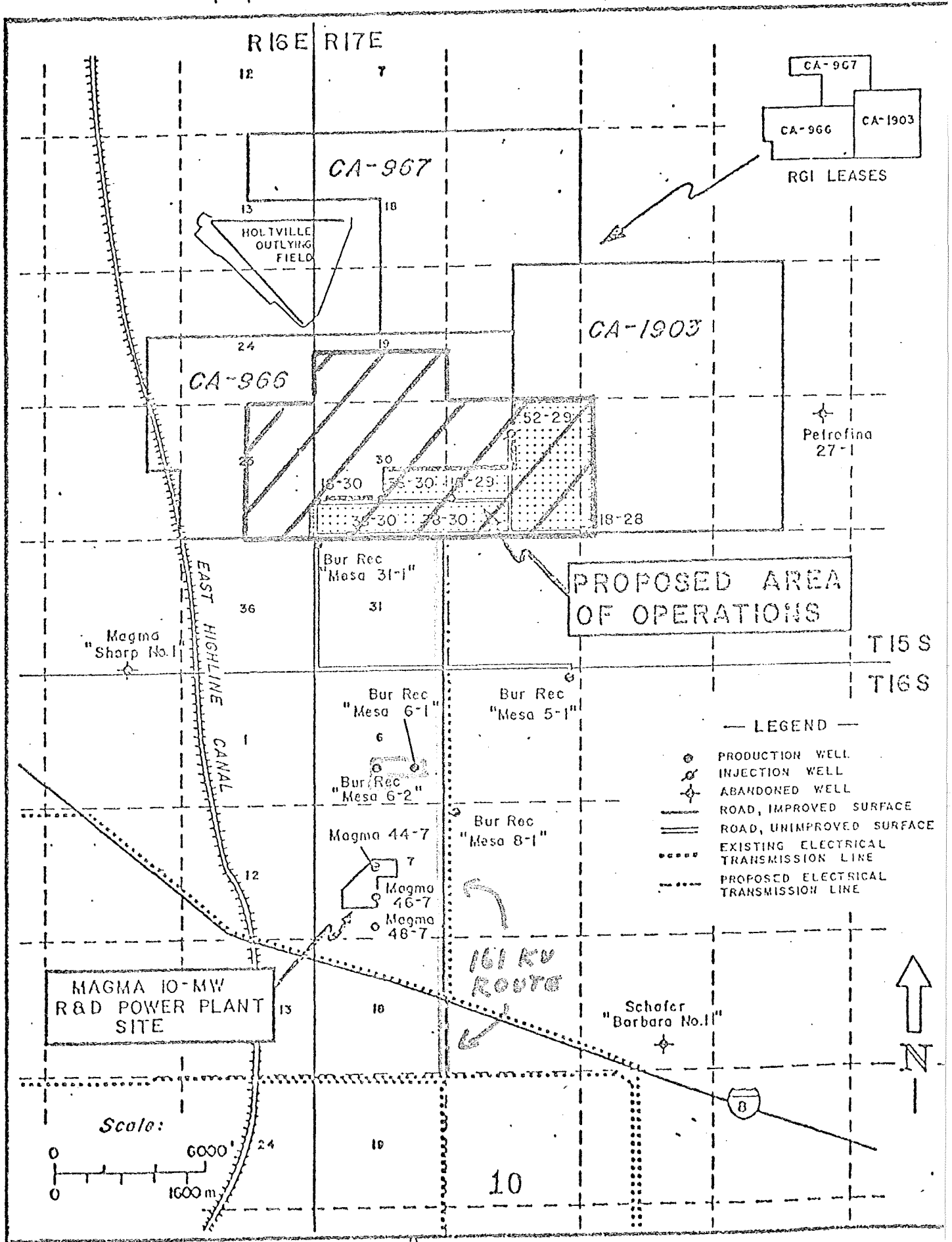


The conceptual field-development layout for Republic Geothermal, Inc.'s proposed 48-MW (net) power plant at East Mesa, California. This conceptual layout centers about alternative power plant site D, which RGI has chosen for the power plant. The production and injection pipelines, and production well-pump power lines would run adjacent to the roads. The eight wells that are to be used for RGI's 10-MW research and demonstration power plant are designated by stars (from Republic Geothermal, Inc.'s Plan of Development in Appendix A-1).

Figure 3

Figure 4

A map of a portion of East Mesa showing the geothermal activity that has occurred and Republic Geothermal, Inc.'s proposed area of operation for a 64-MW power plant.



Land Use and Socio-Economics

Page 88, paragraph 5, is amended to read: The RGI proposed geothermal development would have a moderate effect on the economy of Imperial County.

Chapter VII. Recommended Mitigating Measures.

Page 93, Mitigating Measure No. 7 is presently being implemented with salvage activities to be completed in early January, 1979.

All stipulations, conditions, and agreements listed in EA 99-100 which are applied to the 10MW power plant will, when applicable, also apply to the 48MW power plant.

Chapter VIII. Unavoidable Adverse Impacts.

Biology

Page 95, paragraph 1, is amended to read: Approximately 44 ha (108 acres) of surface disturbance would be necessary for the 48MW power plant and associated field development. Approximately 3 ha (7 acres) would be disturbed for the actual power plant site, most of it occurring during the construction of the 10MW R&D unit.

Chapter IX. Irreversible and Irrecoverable Commitments of the Resources.

Page 96, 3rd item, is changed to:

- * Diversion of 450 M³/hr (0.36 acre-feet) of water by evaporation in the cooling towers.

Chapter X. Relationship Between Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long Term Productivity.

No Change

Chapter XI. Alternatives to the Proposed Action.

No change

All coordination and correspondence material and responses are listed at the end of EA 107-9, being prepared concurrently with this EAR by the AGS on the 48MW POI and POD.

Noncondensable Gases Identified in East Mesa Production Fluid Name (Symbol)	Ratio of Noncondensable Gases in Production Fluid Weight Percent		Projected Noncondensable* Gas Emission Rate			
	Minimum	Maximum	Pounds/Hour		Kilograms/Hour	
			Minimum	Maximum	Minimum	Maximum
Carbon Dioxide (CO ₂)	94.452	95.038	12,136	12,212	5,505	5,539
Nitrogen (N ₂)	3.571	3.972	459	510	208	232
Methane (CH ₄)	0.374	1.123	48.1	144	21.8	65.4
Argon (Ar)	0.121	0.145	15.5	18.6	7.05	8.45
Ethane (C ₂ H ₆)	0.061	0.139	7.83	17.9	3.56	8.10
Propane (C ₃ H ₈)	0.084	0.114	10.8	14.6	4.90	6.64
Benzene (C ₆ H ₆)	0.015	0.065	1.93	8.35	0.874	3.79
Hydrogen (H ₂)	0.005	0.006	0.642	0.771	0.291	0.350
Hydrogen Sulfide (H ₂ S)	0.000	0.005	0.000	0.642	0.000	0.291
Toluene (C ₆ H ₅ CH ₃)	0.000	0.004	0.000	0.514	0.000	0.233
Total Noncondensable Gases	--	--	Approximately 12,850		Approximately 5,828	

* The calculation of noncondensable gas emission rates is based on the following assumptions:

- i. Geothermal fluids from Well Nos. 16-29 and 38-30 are characteristic of the geothermal reservoir.
- ii. Noncondensable gas content of the geothermal fluid is 0.094 percent by weight.
- iii. Up to 97.5 percent of the noncondensable gases in the geothermal fluid will volatilize and be released to the atmosphere.
- iv. Noncondensable gas concentration of the geothermal reservoir is spatially and temporally constant.

v. Geothermal fluid flow rate for the power plant is approximately 14.02 million pounds per hour.

$$\text{Emission Rate}^{**} = (0.00094)(0.975)(\text{weight percent}^{**}) \\ (14.02 \times 10^6 \text{ lbs/hr})$$

$$\text{Conversion: Kilograms/hour} = 0.4536 \text{ lbs/hr}$$

**Noncondensable gas of interest

DETERMINATION

I conclude that the requested action does not constitute a major Federal action significantly affecting the quality of the human environment in the sense of NEPA, Section 102(2) (C).

Riverside District Manager

Date

Referred to the State Director this date.

I concur and so determine that the proposed action does not constitute a major Federal action significantly affecting the quality of the human environment in the sense of NEPA, Section 102(2) (C).

State Director
Bureau of Land Management

Date

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DRAFT

EA #107-9
(CA-966)

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
CONSERVATION DIVISION
OFFICE OF THE AREA GEOTHERMAL SUPERVISOR
MENLO PARK, CALIFORNIA

ENVIRONMENTAL ANALYSIS NO. 107-9;
AN ADDENDUM TO ENVIRONMENTAL ANALYSES 99-100

Prepared for the proposed field-development and subsurface injection of geothermal fluids associated with a 48-MW (net) electrical power plant on Republic Geothermal, Inc.'s Federal leases CA-966 and CA-1903, East Mesa Known Geothermal Resource Area, Imperial County, California.

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I. INTRODUCTION

Prior to commencing most geothermal operations on Federal geothermal leases, a lessee is required to submit to the Area Geothermal Supervisor (AGS) a Plan of Operation, which, depending on the proposed activity, will address either exploration, development, injection, utilization, or production. In January 1978, Republic Geothermal, Inc. (RGI) submitted to the AGS a Plan of Injection (POI), a Plan of Development (POD) and a Plan of Utilization (POU). In these plans, RGI proposes to conduct geothermal operations on the firm's Federal geothermal leases CA-966 and CA-1903 that are located within the East Mesa Known Geothermal Resource Area, Imperial County, California. The POU describes the construction and operation of a 48-MW (net) electrical power plant, and the POD and POI describes the operations required for support of the power plant. The proposed 48-MW power plant operations are an expansion of RGI's 10-MW research and demonstration power plant operations.

Environmental Analyses (EA) are prepared by the Area Geothermal Supervisor's (AGS) Office, U.S. Geological Survey (USGS) for proposed geothermal operations on Federal geothermal leases that would result in environmental impacts. These EAs are prepared in accordance with the 1970 Geothermal Steam Act and subsequent rules and regulations, and Section 102(2)(C) of the 1969 National Environmental Policy Act (NEPA). EAs prepared by the AGS's office address these topics:

- the proposed geothermal operations
- the existing environment associated with the proposed operations
- the potential environmental impacts that would result from implementing the proposed operations
- the measures for mitigating or eliminating potential environmental impacts
- the unavoidable adverse impacts
- the alternatives to the proposed operations.

One purpose of an EA is to determine if an Environmental Impact Statement (EIS) addressing the proposal is needed, and an EIS determination is included at the end of EAs.

The AGS and the Bureau of Land Management (BLM) are adhering to the proposed regulations published in the Federal Register, V. 43, no. 22, p. 4264-4267 that requires the BLM to issue a license for a power plant that generates

more than 20 MW (net) of electricity. These regulations require the AGS to issue a permit to construct and operate any sized power plant. Since the BLM is responsible for licensing the 48-MW power plant, the BLM has assumed the responsibility for evaluating the environmental impacts associated with the construction and operation of RGI's power plant as described in the POU.

Concurrently with this EA, BLM is preparing an Environmental Analysis Record (EAR) that addresses the POU. This EA addresses the POD and the POI for the 48-MW power plant but does not address the POU. Before issuing the permit to construct and operate the power plant, the AGS intends to adopt BLM's EAR.

In August 1978, the Geothermal Environmental Advisory Panel (GEAP) reviewed RGI's 10-MW POU, POD, and POI and the EA (No. 99-100) written on the plans. In September 1978, the USGS approved EA 99-100 and determined that the construction, operation, and field-development associated with the 10-MW power plant does not constitute a major Federal action significantly affecting the quality of the environment in the sense of NEPA, Section 102(2)(C). A five year permit to operate the 10-MW power plant has been issued by the AGS.

Because EA 99-100 thoroughly addresses the same area which the 48-MW POD and POI are proposed, this EA is written as an addendum to EA 99-100. The potential impacts anticipated by implementing the 48-MW POD and POI are considered the same impacts as discussed for the 10-MW POD and POI in EA 99-100 and are summarized in Table 1, which is located at the end of this report. The impacts, however, would occur over an area about three times as large (780 ha vs 260 ha) and would be proportionally greater as the area to be disturbed for the 48-MW POD and POI is about three times as large as the area to be disturbed for the 10-MW POD and POI (41 ha vs 11 ha). Discussions in this EA are limited to describing the POD and POI (proposed operations), measures for eliminating or mitigating environmental impacts, and alternatives to the proposed action. An EIS determination is included at the end of this EA.

In conjunction with this EA, the reader should peruse EA 99-100 for descriptions of the existing environment and potential environmental impacts. EA 99-100 can be obtained from the AGS's Office in Menlo Park, California, and can be perused at the District Geothermal Supervisor's Office in Reno, Nevada and the BLM's El Centro, Riverside, and Sacramento offices.

II. DESCRIPTION OF THE PLAN OF DEVELOPMENT
AND OF THE PLAN OF INJECTION

Plan of Development

To support the 48-MW (net) power plant, Republic Geothermal, Inc. (RGI) proposes to develop 19 production and 9 injection wells, and construct attendant facilities.* These operations are proposed in the Plan of Development (POD):

- construct 20 well pads (No. 36-30, 76-30, 12-30, 14-30, 18-30, 32-30, 34-30, 52-30, 54-30, 72-30, 74-30, 14-29, 18-29, 56-29, 16-20, 16-19, 54-19, 58-24, 54-25, 58-25)**
- drill and complete 13 production wells (No. 36-30, 76-30, 12-30, 14-30, 18-30, 32-30, 52-30, 54-30, 34-30, 72-30, 74-30, 14-29, 18-29) and 7 injection wells (No. 56-29, 16-20, 16-19, 54-19, 58-24, 54-25, 58-25)
- conduct workovers and sustained tests on existing and proposed production and injection wells
- construct production and injection test facilities, including temporary waste disposal pipelines to transport geothermal waste to a temporary waste disposal or injection well
- construct production and injection pipelines
- construct power lines to production wells
- construct 8.7 km of road
- convert production wells to temporary waste disposal or injection wells
- discharge geothermal test fluids onto roads and onto well sites for dust control as needed

The drilling and testing of most of the production and injection wells is proposed in previously submitted Plans of Exploration that were approved by the Area Geothermal Supervisor (AGS) via Environmental Analyses (EA) 12, 29, 86, and 99-100. The drilling and testing of four production wells (14-30, 32-30, 54-30, and 72-30) and 6 injection wells (16-20, 16-19, 54-19, 58-24, 54-25, and 58-25) is a new proposal. Six (16-30, 56-30, 58-30, 16-29, 38-30, 78-30) of the 19 production wells and 2 (52-29, 18-28) of the 9 injection

* Five (No. 16-30, 36-30, 56-30, 76-30, 16-29) of the 19 production wells and three (No. 52-29, 56-29, 18-28) of the nine injection wells support RGI's 10-MW research and demonstration power plant.

** Eight of the 28 well pads have already been constructed and the wells drilled.

wells have been drilled. Production wells have been drilled to depths of about 2440 m, and two injection wells have been drilled to depths of about 2440 m and 1370 m. The producing and injecting intervals are about 1680 to 2290 m and 610 to 1520 m.

Each well would be drilled with mud and would require approximately a 0.7 ha drill pad. Geothermal fluids produced from the wells during testing would be placed into a storage basin and then would be spread on the drill pads and roads to keep down dust. After use, the mud would be neutralized and spread onto the surface of roads or trucked to a Class I dump site. Those portions of the drill pad required for production operations would be covered with gravel.

Most of the proposed road system for the 48-MW field development has been approved by the AGS via EAs 12, 29, and 86. The road that would run from well 58-25 and well 58-24, and the road that would run from power plant site B to well 54-19 are new proposals.

The proposed production and injection pipelines and the production well-pump power lines would be adjacent to the proposed roads. An area about 6 to 7.5 m wide would be needed for construction of the pipelines and well-pump power lines. Horizontal expansion loops would be built into the pipelines and positioned at about 0.4 km intervals; construction of these loops would disturb about 3.7 m³ of surface. The pipelines would be externally insulated and would be elevated about 0.3 m except at road crossings where the pipelines would be buried. The production well-pump power lines would be strung on 10-m high poles placed at 65- to 95- m intervals. Figure 1 illustrates the conceptual field-development layout for the proposed 48-MW power plant.

Water required for development operations would be procured from RGI's shallow water well WW-1 that is located in the SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 29, T. 15 S., R. 17 E. Geothermal test fluids may also be used (Dwight Carey, pers comm, May, 1978).^{*} Most of the water would be used for well-drilling purposes.

About 12 to 15 people could be working at any one time during drilling and/or production testing. These people would use the amenities afforded in nearby communities.

For a more detailed description of the proposed development operations, see the POD in Appendix A-1 and the previously submitted Plans of Operation (POO) that RGI references in the POD as being part of the POD. These POOs are incorporated in EAs 12, 29, 61, 81, 86, and 99-100. These POOs are available through the AGS's Office, Menlo Park, California and can be perused at the District Geothermal Supervisor's Office in Reno, Nevada and BLM's El Centro, Riverside, and Sacramento, California offices.

^{*} Dwight Carey works for Republic Geothermal, Inc. in Santa Fe Springs, CA.

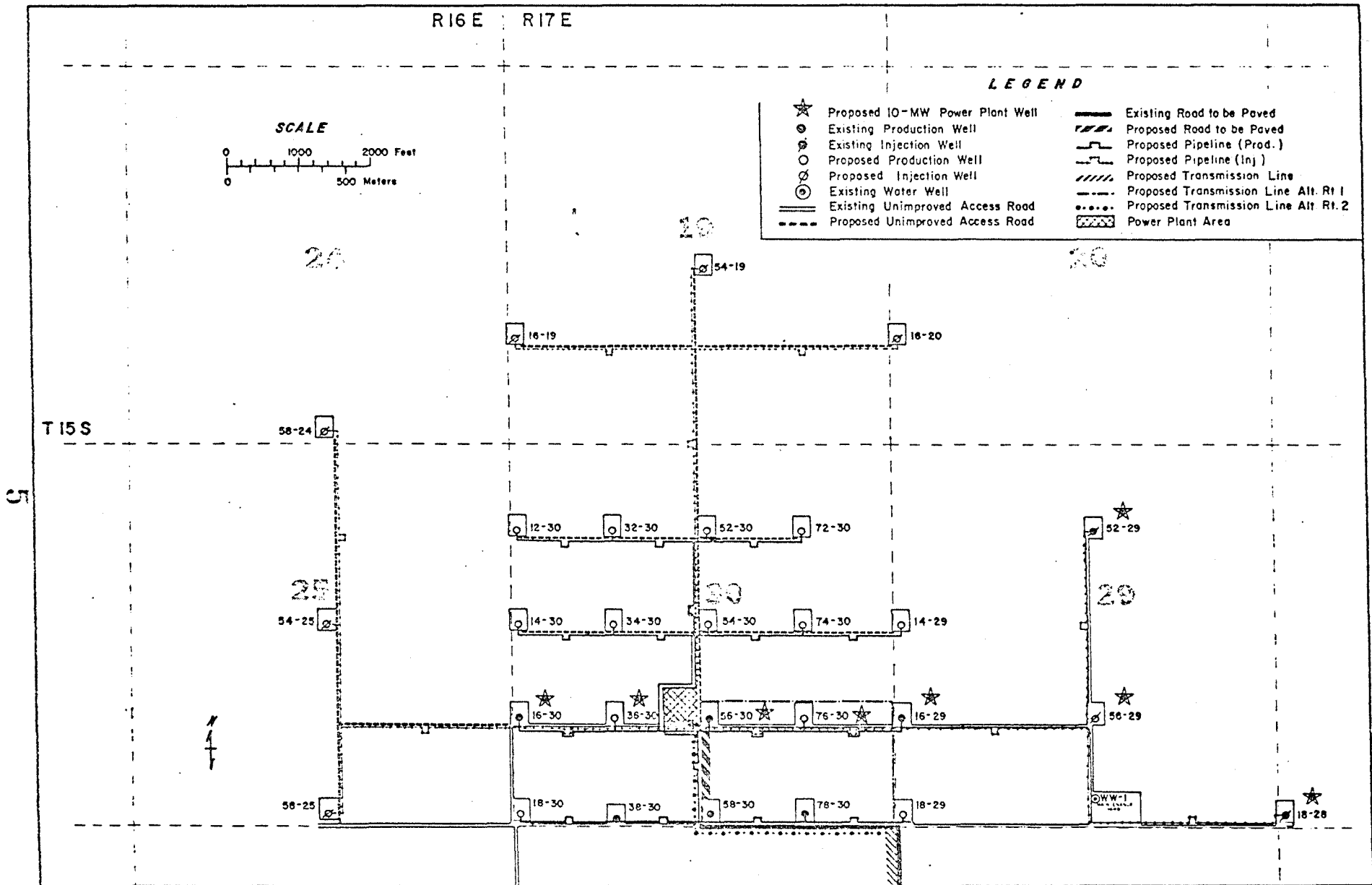


Figure 1. The conceptual field-development layout for Republic Geothermal, Inc.'s proposed 48-MW (net) power plant at East Mesa, California. This conceptual layout centers about alternative power plant site B, which RGI has chosen for the power plant. The production and injection pipelines, and production well-pump power lines would run adjacent to the roads. The eight wells that are to be used for RGI's 10-MW research and demonstration power plant are designated by stars (from Republic Geothermal, Inc.'s Plan of Development in Appendix A-1).

Plan of Injection

Under the Plan of Injection (POI), Republic Geothermal, Inc. proposes to inject into the subsurface excess geothermal fluid originating from well testing and from operating the 48-MW power plant. According to the POI, the purpose of injecting geothermal fluid into the subsurface is three-fold: 1) disposal, 2) reservoir recharge, and 3) minimize the possibility of surface subsidence due to geothermal-fluid withdrawal. The fluid would be injected into the subsurface via wells 18-28, 56-29, 52-29, 15-20, 54-19, 15-19, 58-24, 54-25, and 58-25. The fluid would be injected above the producing interval into about the 610- to 1520-m interval, at pressures of about 1034 to 3448 kPa above static pressures. About 90 percent of the produced geothermal fluids would be injected into the subsurface: the remaining 10 percent would be used in the power-plant cooling towers.

For a more detailed description of the proposed injection operations, see the POI in Appendix A-2.

III. RECOMMENDED MITIGATING MEASURES

Geothermal operations of Federal leases are subject to Geothermal Rules and Regulations (30 CFR 270), Geothermal Resource Operational (GRO) Orders, Lease Stipulations, and Special Lease Stipulations and Conditions, all of which provide measures to protect the environment. Geothermal operations are also subject to environmental protective measures proposed by an operator and approved by the Area Geothermal Supervisor (AGS). The Special Lease Stipulations and Conditions imposed on Republic Geothermal, Inc.'s (RGI) leases at East Mesa are listed on p. 90-91 of EA 99-100. The environmental protective measures proposed by RGI are listed on p. D-56 to D-61 of the Plan of Development and p. I-43 to I-48 of the Plan of Injection.

Additional mitigating measures are needed to protect the environment should RGI's proposals be implemented. These recommended Mitigating Measures are the same measures recommended in EA 99-100, and the justification for these measures are given in Chapter VI, Impact Evaluation and Mitigating Measures, of EA 99-100.* These Recommended Mitigating Measures were formulated by considering the comments and concerns expressed by Interested Parties (see Appendix B).

1. As approved by the AGS, neutralized drilling fluids may be used for dust control and road stabilization.
2. The lessee should notify and post warnings to all personnel that suspect ordnance may be present on leased lands. The warning signs shall state that operations shall immediately cease when ordnance is uncovered and that the Explosive Ordnance Detachment of the Yuma Proving Grounds (Tel: (602) 328-2841) shall be notified immediately to assist in removing and disposing of the ordnance.
3. In order to comply with Sec. 2 of GRO Order 4, a Plan of Restoration should be submitted to the AGS prior to abandonment of the area. This Plan of Restoration shall outline the procedures to reclaim the disturbed lands that were used during the life of the project. This plan will have to be mutually acceptable to the AGS and the Bureau of Land Management (BLM).
4. Wholesale clearing of vegetation should not be permitted. Vegetation removal should be limited to those areas that are absolutely necessary for placing and constructing geothermal facilities. Areas that undergo

* Three archaeological sites identified in EA 99-100 are present within RGI's proposed area of geothermal operations. Through the AGS approval of the 10-MW research and demonstration power plant, RGI is required to collect and salvage these sites (see Recommended Mitigating Measure 7, p. 93 of EA 99-100). At the time of this EA issuance, the sites were being collected and salvaged.

vegetative denudating or suffer irreversible vegetative damage and are no longer necessary for geothermal operations should not be left to recover naturally. These areas should be revegetated with native vegetation immediately after use, under the supervision of the AGS who would consult with the BLM.

5. Prior to disturbing the surface, the area to be disturbed should be surveyed for the presence of kit fox dens and mesquite hummocks. This survey would be supervised by the AGS who would use the expertise of the BLM. Power line poles should be placed 30 m from kit fox dens. Kit fox den buffer-zones for other surface disturbing activities should be determined on a case-by-case basis by consulting with the California Department of Fish and Game. Mesquite hummocks should be avoided whenever possible.
6. The geothermal fluids of the chemistry now being produced from RGI's wells could be used to water the roads for a period of not more than two years. If the geothermal fluids are determined not to be detrimental to vegetation, this restriction could be lifted by the AGS.
7. Hunting within and up to 0.4 km of the proposed area of operations should be prohibited, and signs posting this area should be erected.
8. The lessee should post appropriate warning signs for curves on lease roads.

IV. ALTERNATIVES TO THE PROPOSED ACTION

These two acts are alternatives to the proposed action:

- 1) Reject the proposal
- 2) Impose conditions to minimize impacts.

Alternative 1 is not consistent with the Federal energy policy to promote the development of clean energy sources. And, because the anticipated environmental impacts that would result from the proposed action could be satisfactorily mitigated, the alternative of rejecting the proposal would not be reasonable.

Alternative 2 would impose the Recommended Mitigating Measures listed in Chapter III. Altering the proposal by implementing these mitigating measures would reduce impacts to the environment. Alternative 2 is the recommended alternative.

Table 1. Impact summary for Republic Geothermal, Inc.'s Proposed 48-MW power plant field development at East Mesa, California.

ENVIRONMENTAL PARAMETER	IMPACT EVALUATION OF PROPOSAL	MITIGATING MEASURES	UNAVOIDABLE IMPACTS	TO DATE, CUMULATIVE IMPACTS FROM GEO- THERMAL ACTIVITIES
Seismicity	Injection operations could induce seismicity and natural seismicity may occur. Seismic activity could damage geothermal and other man-made facilities.	Seismic monitoring, GRO Order 4, Sec. 8D. Special Lease Stipulation and Condition 2.	Undeterminable	None
Subsidence	If subsidence occurs, geothermal and other man-made facilities, and the local irrigation and drainage network could be damaged.	Imperial Valley Subsidence Detection Network Monitoring Program. GRO Order 4, Sec. 8. Special Lease Stipulation and Condition 2.	Undeterminable	None
Soils 10	About 44 ha of surface would be disturbed	GRO Order 4, Sec. 2 and Sec.5 Item C2 and C4 of the POD EA 107 Recommended Mitigating Measures 1,3,4, and 6. Special Lease Stipulation and Condition 8. EA 12 and 29 Special Condi- tions 1,4, and 5.	None	About 10.5 ha of sur- face has been disturbed for roads and well pads.
Socio-Economics	Negligible			None
Visual Resources	Geothermal facilities contrast with surrounding desert.	GRO Order 4, Sec. 1. Paint structures with appro- priate colors to blend in with desert. Use vegetative screens	Visual contrast	Visual contrast from geothermal explora- tory activities

Table 1 cont'd

ENVIRONMENTAL PARAMETER	IMPACT EVALUATION OF PROPOSAL	MITIGATING MEASURES	UNAVOIDABLE IMPACTS	TO DATE, CUMULATIVE IMPACTS FROM GEO- THERMAL ACTIVITIES
Hydrology	Possible shallow ground water contamination via well bore, sump leakage, and surface pipe rupture.	GRO Order 2 and 6. CRWQCB Order 76-64 (revised).	None	None
Air	Suspended particulates from vehicular traffic and winds. Pollutants emitted from petroleum fueled engines.	GRO Order 4, Sec. 9A(3). Item C5a of the POD. EA 12 and 29 Special Condition 3.	Slight increase in air pollutants	Negligible
Biota 11	Vegetation over about 41 ha will be removed. Some wildlife will be killed.	GRO Order 4, Sec. 2 and 6. EA 107 Recommended Mitigating Measures 1,3,4,5, and 6. EA 12 and 29 Special Condition 5. Items C2a and C4 of the POD,	Loss and/or displacement of wildlife	Vegetation covering about 10.5 ha has been removed.
Cultural Resources	Cultural sites will be disturbed.	Sec. 18 of Geothermal Lease Special Lease Stipulation and Condition 1 GRO Order 4, Sec. 7 EA 99-100 Recommended Mitigating Measure 7	Salvage of cultural materials destroys relationship between cultural materials and environment.	A total of 16 archaeological sites or loci have been salvaged.
Land Use	Public access restricted	None	Public access restricted	

Table 1 cont'd

ENVIRONMENTAL PARAMETER	IMPACT EVALUATION OF PROPOSAL	MITIGATING MEASURES	UNAVOIDABLE IMPACTS	TO DATE, CUMULATIVE IMPACTS FROM GEO- THERMAL ACTIVITIES
Safety	<p>Hunting in the area endangers well being of individuals working with geothermal operations.</p> <p>Live ordnance has been found in the area.</p> <p>Curves in the roads present a hazard</p>	<p>EA 107 Recommended Mitigating Measure 7</p> <p>EA 12 and 29 Special Condition 6.</p> <p>EA 86 Recommended Mitigating Measure 3.</p> <p>EA 107 Recommended Mitigating Measure 2.</p> <p>EA 12 Special Condition 2</p> <p>EA 29 Special Condition 2</p> <p>EA 107 Recommended Mitigating Measure 3</p>	<p>None</p>	<p>None</p> <p>None</p> <p>None</p>
Noise 12	<p>Temporary noise from construction and drilling operations</p>	<p>GRO Order 4, Sec. 11</p> <p>Special Lease Stipulation and Condition 4</p> <p>Item C5b of the POD</p>	<p>None identified</p>	

DETERMINATION

I conclude that the requested action does not constitute a major Federal action significantly affecting the quality of the human environment in the sense of NEPA, Section 102(2)(C).

Area Geothermal Supervisor

Date

Referred to the Regional Conservation Manager this date.

I concur and so determine that the proposed action does not constitute a major Federal action significantly affecting the quality of the human environment in the sense of NEPA, Section 102(2)(C).

Conservation Manager, Western Region

Date

This report was prepared by

Jon Durham

Under the supervision of
Robert Kent
Chief, Environmental and Safety Section

APPENDIX A-1
PLAN OF DEVELOPMENT

The Plan of Development is contained in the document entitled "East Mesa Geothermal Project Plans of Operation, 48-MW (net) Power Plant." This document was seperately provided to Interested Parties and can be perused in the Area Geothermal Supervisor's Office in Menlo Park, California, the District Geothermal Supervisor's Office in Reno, Nevada, and The Bureau of Land Management's El Centro, Riverside, and Sacramento offices.

APPENDIX A-2
PLAN OF INJECTION

The Plan of Injection is contained in the document entitled "East Mesa Geothermal Project Plans of Operation, 48-MW (net) Power Plant." This document was separately provided to Interested Parties and can be perused in the Area Geothermal Supervisor's Office in Menlo Park, California, the District Geothermal Supervisor's Office in Reno, Nevada, and The Bureau of Land Management's El Centro, Riverside, and Sacramento offices.

APPENDIX B
COORDINATION AND CORRESPONDENCE



UNITED STATES
DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY
Area Geothermal Supervisor's Office
Conservation Division, MS 92
345 Middlefield Road
Menlo Park, CA 94025

APR 14 1978

Memorandum

To: INTERESTED PARTIES

From: Area Geothermal Supervisor

Subject: Plans of Operation for Development, Injection, and Utilization for 48 Megawatt Power Plant, Republic Geothermal, Inc., Federal Leases CA-966, CA-1903, East Mesa KGRA, Imperial Co., CA Ref: 1760 CA-966 POO for Development, and Injection EA #107-8 and 1760 CA-966 POO for Utilization, EA #92-8

Republic Geothermal, Inc., has submitted three Plans of Operation, in accordance with 30 CFR 270.34, for the development of the geothermal resource, including development and injection wells, pipelines and attendant facilities, and the construction of a 48 megawatt power plant for the production of electricity in the East Mesa KGRA, Imperial County, California. Copies of the plans are enclosed for your review.

A field inspection was held on the subject leases on October 25, 1977, for Republic Geothermal, Inc.'s previously submitted proposal for a ten megawatt power plant; no additional field inspection is deemed necessary for this new proposal at this time. You are encouraged, however, to visit the site at your own convenience. Further guidance can be provided by Mr. Bernie Moroz, Reno District Geothermal Supervisor (Tel: (702) 784-5676, FTS 470-5676.) Visitors should inform the above office as to when they propose to be on the site.

The Bureau of Land Management is the lead agency for the EAR to be prepared as a cooperative effort by local, state, and federal agencies. The BLM will license the site for the 48 megawatt plant. The Office of the Area Geothermal Supervisor will adopt the EAR as EA #92, to be used for the permit to construct the 48 megawatt plant.

Environmental Analysis #107-8 will be prepared by the Office of the Area Geothermal Supervisor to consider the environmental impacts of the Development and Injection Plans of Operation. Comments concerning aspects of any of the three proposed plans must be received no later than April 28, 1978, by:

Area Geothermal Supervisor
Conservation Division
U.S. Geological Survey
345 Middlefield Rd., MS 92
Menlo Park, CA 94025
Tel: (415) 323-8111, Ext. 2848

We urge you to send written commentary and will appreciate hearing from you even if you are of the opinion that the existing regulations, lease terms, and operational orders provide adequate environmental protection. All comments will be given serious consideration in the preparation of the environmental analyses and any subsequent conditions of approval thereafter.

The Area Geothermal Supervisor will send draft Environmental Analyses (EA #92-8 and EA #107-8) of the proposed action to interested parties for comment and review. Further, the Geothermal Environmental Advisory Panel (GEAP) will have a formal review of the USGS EA #92-8 and EA #107-8 and will hold a public hearing on the proposed action, in which all interested parties are invited to participate. Interested parties will be notified of the time, date, and place of GEAP's public review two weeks prior to the date of subject meeting.

Keith Stone

INTERESTED PARTIES EA #92-8
Plan of Utilization
INTERESTED PARTIES EA #107-8
Plan of Development and Injection
REPUBLIC GEOTHERMAL, INC.
48 MW Power Plant
Federal Leases CA-966, CA-1903
East Mesa KGRA
Imperial County, California

USGS-Conservation Division
Attn: Bernie Moroz
District Geothermal Supervisor
63 Keystone Ave., Suite 102
Reno, NV 89503
(702) 784-5676
FTS: 470-5676

USGS-Conservation Division
Conservation Manager, Western Region
Attn: Environmental Staff
345 Middlefield Road, MS 80
Menlo Park, CA 94025
(415) 323-8111, Ext. 2093
FTS: 467-2093

USGS-Conservation Division
Attn: Henry Cullins
Area Geologist, Pacific Area
345 Middlefield Road, MS 80
Menlo Park, CA 94025
(415) 323-8111, Ext. 2053
FTS: 467-2563

Geothermal Environmental Adv. Panel
Attn: Max Crittenden, Chairman
345 Middlefield Road, MS 75
Menlo Park, CA 94025
(415) 323-8111, Ext. 2317
FTS: 467-2317

U.S. Bureau of Land Management
State Director
Federal Office Bldg.
2800 Cottage Way, Rm. E-2841
Sacramento, CA 95825
(916) 484-4676
FTS: 468-4676

U.S. Bureau of Land Management
Attn: Gary Hillier, District Manager
1695 Spruce St.
Riverside, CA 92507
(714) 787-1462
FTS: 796-1462

U.S. Bureau of Land Management
El Centro Resource Area
Attn: David Mari
333 South Waterman
El Centro, CA 92243
(714) 352-5842
FTS: 894-2451

U.S. Bureau of Land Management
Geothermal Specialist
Attn: Theodore W. Holland
Denver Federal Center, Bldg. 50 (D-310)
Denver, CO 80225
(303) 234-5098
FTS: 234-5098

U.S. Fish and Wildlife Service
Office of Biological Services
Attn: L.A. Mehrhoff
Geothermal Advisor - Region I
4620 Overland Road, Rm. 210
Boise, ID 83705
(208) 834-1931
FTS: 554-1931

U.S. Fish and Wildlife Service
Attn: Felix Smith
2800 Cottage Way, R. E-2727
Sacramento, CA 95825
(916) 484-4731
FTS: 468-4731

U.S. Bureau of Reclamation, Region 3
Attn: Wayne Fernelius
P.O. Box 427
Boulder City, NV 89005
(702) 293-7753
FTS: 598-7753

U.S. Department of Energy
Div. of Geothermal Energy, 3rd Floor
Attn: A.G. Follett
20 Massachusetts Ave., NW
Washington, D.C. 20545
(202) 376-1690
FTS: 376-1690

U.S. Environmental Protection Agency
Environmental Monitoring & Support Lab
Attn: Michael O'Connell
P.O. Box 15027
Las Vegas, NV 89114
(702) 736-2969
FTS: 595-2969

USGS-Subsidence Research
Attn: Ben Lofgren
Federal Bldg., Rm. W2523
2800 Cottage Way
Sacramento, CA 95825
(916) 484-4258
FTS: 468-4258

State of California
Dept. of Fish & Game
Attn: Don Lollock
1416 Ninth St.
Sacramento, CA 95814
(916) 455-1383
FTS: 465-1383

State of California
Div. of Oil & Gas
Attn: Don Lande
5199 E. Pacific Coast Hwy., Suite 309
North Long Beach, CA 90804
(213) 590-5311

State of California
Dept. of Parks & Recreation
State Resources Agency
Attn: Knox Mellon, SHPO
P.O. Box 2390
Sacramento, CA 95811
(916) 445-2358

State of California
Calif. Regional Water Quality Board
Colorado River Basin Region
Attn: Arthur Swajian
73271 Highway 111, Suite 21
Palm Desert, CA 92260
(714) 346-7491

State of California
Water Resources Control Board
Attn: Alvin Franks
P.O. Box 100
Sacramento, CA 95801
(916) 322-4548

Imperial County Planning Board
Attn: Richard Mitchell
Imperial County Planning Director
County Services Bldg.
40 Main St.
El Centro, CA 92243
(714) 352-8184

Imperial Irrigation District
Attn: Helen French
1285 Broadway
El Centro, CA 92243
(714) 352-1991

AMAX Exploration
Attn: Larry Hall
4704 Harlan St.
Denver, CO 80212
(303) 433-6151

Aminoil U.S.A.
Attn: J.W. Kunau
P.O. Box 11279
Santa Rosa, CA 95406
(707) 527-5333

Anadarko Production Company
Attn: John Syptak
P.O. Box 1330
Houston, TX 77001
(713) 526-5421

Calif. Energy Company, Inc.
Attn: Paul V. Storm
P.O. Box 3909
Santa Rosa, CA 95402
(707) 526-1000

Chevron USA, Inc.
Attn: J.G. Turner/P. Smith
P.O. Box 3722
San Francisco, CA 94119
(415) 894-2726

Dresser Industries
MAGCOBAR Division
Attn: Jim Fox
475 17th St., Suite 1600
Denver, CO 80202

Earth Science Laboratory
University of Utah Research Institute
Research Park
391 Chipeta Way
Salt Lake City, UT 84108

Energy and Natural Resources Consultants
Attn: Richard Jodry
P.O. Box 941
Richardson, TX 75080

Geothermal Power Corp.
Attn: Frank G. Metcalfe
P.O. Box 1186
Novato, CA 94947
(415) 897-7833

Geothermal Resources Council
Attn: Mr. David Anderson
P.O. Box 1033
Davis, CA 95616
(916) 758-2360

GeothermEx, Inc.
Attn: James B. Koenig
901 Mendocino Ave.
Berkeley, CA 94707
(415) 524-9242

Getty Oil Company
Attn: Dan W. Sparks
P.O. Box 5237
Bakersfield, CA 93308
(805) 399-2961

Gulf Mineral Resources Co.
Exploration Department
Attn: E.W. Westrick
1720 S. Bellaire St.
Denver, CO 80222
(303) 758-1700

Hydro-Search, Inc.
Attn: Virgil Wilhite
333 Flint St.
Reno, NV 89501
(702) 322-4173

ICF, Inc.
Attn: Doug Fried
1990 M St., NW
Washington, D.C. 20036
(202) 785-3440

Mr. Clyde E. Kuhn
2207 Carroll St., Apt. 3
Oakland, CA 94606
(415) 451-3714

Lawrence Livermore Laboratory
Attn: Dave Snoeberger
Box 808, Mail Code L-523
Livermore, CA 94550
(415) 447-1100
FTS: 457-5501

Magma Power Company
Attn: Dick Foss/Tom Hinrichs
631 S. Witmer St.
Los Angeles, CA 90017
(213) 483-2285

Mr. Jack McNamera
Law Center, Rm. 422
University of Southern California
Los Angeles, CA 90007
(213) 741-7569

Occidental Geothermal, Inc.
Attn: B.J. Wyant
5000 Stockdale Highway
Bakersfield, CA 93309
(805) 327-7351

Phillips Petroleum Company
Attn: R.L. Wright
P.O. Box 752
Del Mar, CA 92014
(714) 755-0131

Republic Geothermal, Inc.
Attn: Dwight Carey
P.O. Box 3388
Santa Fe Springs, CA 90670
(213) 945-3661

Republic Geothermal, Inc.
Attn: J.L. Sheidenberger
2544 Cleveland Ave.
Santa Rosa, CA 95401
(707) 527-7755

San Diego Gas & Electric Co.
Attn: Larry Grogan/J.M. Nugent
P.O. Box 1831
San Diego, CA 92112
(714) 232-4252, Ext. 1715/1903

Southland Royalty Company
Attn: Jere Denton
1600 First National Bldg.
Fort Worth, TX 76102
(817) 336-9801

Sunoco Energy Development Co.
Attn: C.T. Clark, Jr.
12700 Park Central Pl., Suite 1500
Dallas, TX 75251
(214) 233-2600, Ext. 515

Thermal Power Company
Attn: K.R. Davis
601 California St.
San Francisco, CA 94108
(415) 981-5700

Union Oil Company of California
Geothermal Division
Attn: Neil J. Stefanides
Union Oil Center, Box 7600
Los Angeles, CA 90051
(213) 486-7740

V.T.N.
Attn: Richard A. Mallett
2301 Campus Drive
Irvine, CA 92713
(714) 833-2450

2207 Carroll Street
Apartment 3
Oakland, CA 94606
415+451-3714
27 April 1978

RECEIVED

APR 28 1978

AREA GEOTHERMAL SUPERVISOR'S OFFICE
CONSERVATION DIVISION
U.S. GEOLOGICAL SURVEY
MENLO PARK, CALIF.

Mr. Reid Stone
Area Geothermal Supervisor
U.S. Geological Survey
Conservation Division, MS 92
345 Middlefield Road
Menlo Park, CA 94025

Dear Mr. Stone:

Thank you for sending me a copy of Republic Geothermal's Plans of Operation for Development, Injection, and Utilization for a 48 Megawatt Power Plant on Federal leases CA-966 and CA-1903.

According to the PoO, Republic Geothermal's development operation will include the drilling and operation of 20 wells not covered in previous Plans of Operation. Not all of the proposed well sites and not all of the proposed road system has been previously evaluated and approved in USGS Environmental Analyses. Pipelines from production wells to the injection wells will be constructed along access roads.

With respect to these undertakings, please demonstrate compliance with the National Historic Preservation Act of 1966 and Executive Order 11593, "Protection and Enhancement of the Cultural Environment," in accordance with the procedures outlined in 36 CFR Part 800. Please also specify at what stage of development, operation and utilization will an EIS be prepared in accordance with Section 102(2)(C) of NEPA and an EIR prepared in accordance with the California Environmental Quality Act.

Your notice of submission and transmittal of these PoOs is dated April 14 and was received several days later. You have stipulated, however, that comments on these PoOs must be received no later than April 28th. I really don't think you have allocated enough time, in this case, for the review and preparation of responses to the PoOs. Please discontinue this practice in the future.

Sincerely,

Clyde E. Kuhn
Clyde E. Kuhn



United States Department of the Interior

BUREAU OF RECLAMATION
LOWER COLORADO REGIONAL OFFICE

P.O. BOX 427

BOULDER CITY, NEVADA 89005

MAY 9 1978

IN REPLY
REFER TO:
120.3

LC-724

Area Geothermal Supervisor
Conservation Division
U.S. Geological Survey
345 Middlefield Road, MS 92
Menlo Park, California 94025

Dear Sir:

We have reviewed the plan of Operation for Development, Injection, and Utilization for a 48-megawatt powerplant on the East Mesa KGRA in response to your request of April 14, 1978. We find the plan to provide adequate environmental protection.

Sincerely,

Dean F. Johanson
Acting Regional Planning Officer

In duplicate



RECEIVED

MAY 12 1978

AREA GEOTHERMAL SUPERVISOR'S OFFICE
CONSERVATION DIVISION
U.S. GEOLOGICAL SURVEY
MENLO PARK, CALIFORNIA



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT

May 3, 1978

Our Reference: MSA

ENVIRONMENTAL MONITORING AND
SUPPORT LABORATORY
P.O. BOX 15027
LAS VEGAS, NEVADA 89114
702/736-2969 (FTS:595-2969)

Area Geothermal Supervisor
Conservation Division, MS 92
U.S. Geological Survey
345 Middlefield Road
Menlo Park, CA 94025

RECEIVED
MAY 8 1978
AREA GEOTHERMAL SUPERVISOR'S OFFICE
CONSERVATION DIVISION
U.S. GEOLOGICAL SURVEY
MENLO PARK, CALIFORNIA

Dear Sir:

I have reviewed the Plans of Operation for development, injection, and utilization for a 48-megawatt power plant at the East Mesa KGRA in California submitted by Republic Geothermal, Inc., that were sent to Michael O'Connell. I have some questions concerning areas of interest to our Laboratory.

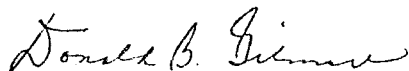
1. Republic Geothermal states that noncondensable gases and geothermal fluids will be monitored. How will this be done?
2. Since gaseous constituents may vary with time, will Republic Geothermal be required to periodically analyze the brine and vented gases and report the findings to an appropriate agency?
3. Republic anticipates that there should be only negligible environmental impacts from the proposed injection operations. What do they believe these impacts to be?
4. Should emergency venting or turbine bypass be necessary, will the cooling tower be able to handle the steam?
5. It is not clear from the description given of the condensed steam and cooling water cycle whether--after the initial fill of the eight cooling towers--any additional external water will ever be required during plant operation. Is there any additional information

available to substantiate Republic Geothermal's statement that "cooling makeup water will be provided by the steam condensate from the condenser"?

6. Disposal of spent brines is to be in an aquifer below 2,000 feet in depth and not into the producing horizon. What are the monitoring procedures to assure that the injected fluids will remain in the aquifer(s) and that injected fluids will not migrate to the shallow groundwater system nor lubricate the faults in the area?

I appreciate the opportunity to review and comment on these Plans.

Sincerely yours,



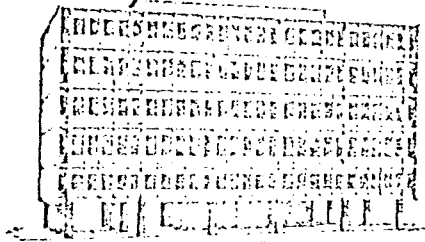
Donald B. Gilmore, Geologist
Monitoring Systems Design
and Analysis Staff
Monitoring Systems Research
and Development Division

cc:

T. Jones, Region IX, San Francisco, CA
M. F. O'Connell, ORP, EMSL-LV

COUNTY OF IMPERIAL

PLANNING DEPARTMENT
COURTHOUSE
EL CENTRO, CALIFORNIA 92243
(714) 352-8184
Richard D Mitchell
Planning Director



COUNTY SERVICES BUILDING

July 28, 1978

Mr. Reid Stone
Area Geothermal Supervisor
345 Middlefield Road
Menlo Park, CA 94025

RECEIVED
JUL 31 1978
AREA GEOTHERMAL SUPERVISOR'S OFFICE
CONSERVATION DIVISION
U.S. GEOLOGICAL SURVEY

Dear Mr. Stone:

The draft Environmental Analysis (EA #99-100) has been received and reviewed by my staff. We have found that the EA is complete, well written, and should serve the purpose desired.

The Planning Commission of Imperial County is currently scheduled to review this Environmental Assessment commencing at 10:30 a.m. on August 9, 1978. It would be helpful if an Executive Summary of the EA could be available for transmission to the Planning Commission prior to that time. Please advise if any such document is or can be made available.

The purpose of the hearing before the Planning Commission is to insure that the County's concerns are treated in the permitting process. This procedure was established in the Geothermal Element of Imperial County as a means of expediting the experimental and initial development of the Geothermal Resource on federal land.

Attached hereto is list of concerns that we feel should be included directly or indirectly in your approval of the Republic Geothermal application. It should be noted that these conditions are similar to those attached to the permit for the Heber Plant as tailored for the desert environment and federal land.

It is my intent to recommend to the Planning Commission that they approve the EA subject to these conditions being included in the permit. If you or your staff have any questions concerning any of these conditions, we would appreciate hearing about them as soon as possible.

Sincerely yours,

Richard D Mitchell
RICHARD D. MITCHELL
Planning Director

RDM/vs

cc Dewight Carey
Republic Geothermal, Inc. *Equal Opportunity Employer*

MITIGATING CONDITIONS

RGI 10 MEGAWATT PLANT

JUL 11 1970
AREA GEOTHERMAL SUPERVISOR'S OFFICE
CONSERVATION DIVISION
U.S. GEOLOGICAL SURVEY

- (1) Conformity With Application. The project shall be designed, constructed and operated strictly in accordance with the application.
- (2) Production and Injection Wells. The number of wells for initial development shall be limited to those contained in the application.
- (3) Permitting. The applicant shall secure all necessary permits.
- (4) Construction. All construction shall be by building permit and in accordance with County's building regulations and such requirements as are set forth in the publication entitled "Recommended Lateral Force Requirements and Commentary" by the Structural Engineers Association of California.
- (5) Pipelines. All fluid transmission lines on the plant site shall be designed and constructed to prevent damage to adjacent property or injury to personnel.
- (6) Drilling and Injection Regulations. Applicant shall comply with applicable laws and regulations pertaining to the drilling, maintenance, operation and/or abandonment of geothermal wells. Similarly, applicant shall comply with such laws and regulations pertaining to injection of geothermal brines.
- (7) Abandonment. Prior to abandonment, the applicant shall comply with all regulations of the Division of Oil and Gas, State of California and, in addition, shall comply with the following surface requirements:
 - a. All surface equipment and facilities shall be removed
 - b. All materials shall be removed to a depth of 6' below grade

c. All holes and depressions shall be filled with native material.

(8) Fencing. All unattended well sites shall be enclosed by a steel chain link type fence, six (6) feet high. There shall be no opening below such fence greater than four (4) inches. The gate shall be placed at a non-hazardous location and shall be locked at all times.

(9) Seismic Monitoring. Applicant shall submit a seismic monitoring plan for approval to Department of Public Works County of Imperial and shall install seismic instruments as required and approved. Data concerning number and magnitude of seismic events shall be provided to County annually.

(10) Subsidence Prevention. Permittee shall participate in the subsidence detection program as follows:

- a. The Permittee shall prepare and submit a plan to the Department of Public Works, County of Imperial, for approval of monument locations throughout the leasehold.
- b. Monuments shall be placed and a baseline survey conducted prior to any production or reinjection and shall be tied into the county level net.
- c. During operations each monument shall be surveyed by a licensed surveyor or Registered Civil Engineer qualified to perform this type of surveying annually and a report of such survey shall be submitted to the Department of Public Works.
- d. All field surveying by the applicant or its surveyor shall be performed in accordance with standards established by the Public Works Department.

Should the project cause detrimental subsidence, the Permittee shall take actions to correct problems and to prevent further occurrences with such actions subject to approval by the Division of Oil and Gas and Imperial County.

(11) Air Pollution. Applicant shall apply for and receive permits to operate from the Imperial County Air Pollution District and shall abide by any and all conditions or restrictions imposed by the APCD.

(12) Drainage. Applicant shall apply for and obtain the required discharge permit from the Colorado River Regional Water Quality Control Board.

(13) Aircraft Obstructions. The applicant shall comply with all FFA regulations for any facility extending above 150'.

(14) Waste Disposal. All waste, whether liquid or solid must be disposed of in an approved solid waste disposal site in compliance with the existing county, state and federal rules and regulations.

(15) Emergency Actions. The applicant shall advise the Public Works Department, County of Imperial of all significant emergencies and actions undertaken in response to said emergencies.

(16) Electronic Interference. The Permittee shall not operate electrical equipment or transmission facilities that would interfere with the reception of radio or television signals.

(17) Odor Control. The Permittee shall control all emissions to insure that no harmful or obnoxious odors be released as a result of their operations.

(18) Operations. All operations shall be conducted under the direction of a responsible engineer or agent. The name of this individual shall be

Responses to Interested
Parties' Comments

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Area Geothermal Supervisor's Office
Conservation Division, MS 92
345 Middlefield Road
Menlo Park, CA 94025

OCT 13 1978

Mr. Richard D. Mitchell, Planning Director
Imperial County Planning Department
County Services Bldg.
940 Main Street
El Centro, California 92243

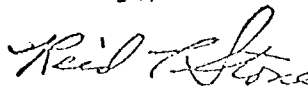
Dear Dick:

This letter is in response to the October 6 telephone conversation I had with you and Dave Pierson. In this telephone conversation, we discussed the mitigating conditions you want this office to impose on Republic Geothermal, Inc.'s planned 10-MW power plant operations at East Mesa.

I orally responded to each of your proposed mitigating conditions to the satisfaction of you and Dave. And, as I promised you and Dave, I have put my responses to the mitigating conditions into writing. These written responses are attached.

I hope that this resolves any differences we may have had in the matter of Republic's power plant operations. If you have any questions or problems pertaining to this matter, please do not hesitate to contact me.

Sincerely,,



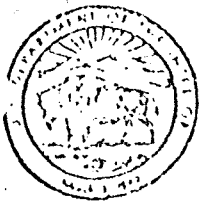
Area Geothermal Supervisor

Attachment

cc: Dave Pierson, Imperial Co. Public Works Dept.
Republic Geothermal, Inc.
BLM, Riverside District
BLM, Sacramento

RESPONSE TO IMPERIAL COUNTY PLANNING DEPARTMENT'S PROPOSED MITIGATING
CONDITIONS - RGI's 10-MW POWER PLANT, EAST MESA CALIFORNIA

- (1), (2). We agree with these two conditions. If RGI wants to deviate from their proposals as outlined in their Plans of Development, Injection, and Utilization, RGI must submit to and receive approval of such deviations from Imperial County and this office.
- (3), (4), (5). We agree with these mitigating conditions.
- (6), (7). This office has an agreement with the California Division of Oil and Gas. The DOG are notified of the proposed operation. The DOG is in agreement with the plan.
- (8). This office does not feel that fencing of the well sites are necessary. If sumps are left unattended and pose a problem for wildlife or the public, fencing of the sumps will be required.
- (9). This office will require RGI to join the County Seismic Monitoring Program. The Geothermal Environmental Advisory Panel will review Bureau of Reclamation's existing seismic network at East Mesa to ascertain if that seismic network is adequate. Either the USGS or the operators will be required to participate in the seismic monitoring program. The County will receive annual seismic reports.
- (10). RGI has been told to contact the County to receive instructions, guidance, and approval for placement of bench marks. RGI is required to tie-in their bench marks to the existing subsidence network. These bench marks will be resurveyed annually.
- (11). RGI has applied to the Imperial County Air Pollution District for a permit and shall be required to abide by the conditions or instructions imposed by the IAPCD.
- (12). RGI has applied and received a discharge permit from the CRWQCB.
- (13), (14), (15). We agree
- (16). RGI's power plant operation is not capable of creating any electrical interference.
- (17), (18), (19). We agree
- (20). The Federal government has required RGI to have a bond. We will encourage them to meet County insurance requirements.
- (21). We will encourage RGI to join the Geothermal Committee.
- (22). We concur if the fees are required by law; however, the County will have to be responsible for collecting the fees.



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Area Geothermal Supervisor's Office
Conservation Division, MS 92
345 Middlefield Road
Menlo Park, CA 94025

NOV 8 1978

Mr. Richard D. Mitchell
Imperial County Planning Commission
County Services Building
940 Main Street
El Centro, California 92243

Dear Mr. Mitchell:

On October 23, 1978, you wrote to me on the subject of Republic Geothermal, Inc.'s (RGI) 10-MW power plant at East Mesa. You said you needed to know the position that this office would take if detrimental subsidence were to occur at East Mesa as the result of RGI's geothermal operations. This office assumes that you would like us to impose that position upon RGI. Furthermore, you requested a response to Imperial County's need to stipulate that actions taken by RGI to combat detrimental subsidence must be approved by the California Division of Oil and Gas and Imperial County.

Should detrimental subsidence occur at East Mesa as the result of geothermal operations, this office would require the geothermal operator to take whatever action is necessary to alleviate the problem. Such an action may include reduced production rates, increased injection rates, or suspension of production. This requirement is imposed on all geothermal operators via Geothermal Resource Operational Order 4, Sec. 8B.

Prior to implementing procedures to mitigate subsidence, this office will consult with the California Division of Oil and Gas and the County of Imperial for advice and for consultation.

Thank you for expressing a concern for protection of the environment at East Mesa. This office is always available and willing to discuss any matters within this offices' purview.

Sincerely,

Area Geothermal Supervisor



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Area Geothermal Supervisor's Office
Conservation Division, MS 92
345 Middlefield Road
Menlo Park, CA 94025

DEC 21 1978

Mr. Donald R. Gilmore
U.S. Environmental Protection Agency
Office of Research and Development
P.O. Box 15027
Las Vegas, Nevada 89114

Dear Mr. Gilmore:

On April 14, 1978, this office sent to Interested Parties Republic Geothermal, Inc.'s (RGI) Plans of Operation for Development, Injection, and Utilization for a 48-MW power plant at East Mesa, California. In a subsequent letter, you posed to this office six questions concerning certain environmental aspects of RGI's proposal, concerns which are of interest to your laboratory.

This office is now in the process of evaluating the potential environmental impacts of RGI's proposal and is in a better position to respond to your questions. This office's response to your questions is attached.

Thank you for expressing interest in this office's environmental analysis procedures on RGI's proposal. If you have further questions concerning RGI's proposal, contact Jon Durham of this office (FTS 467-2848).

Barry A. Boudreau
Acting Area Geothermal Supervisor

Attachments:

cc: Roger Haskins, BLM Riverside District
Joe Edney, Imperial County Planning Department

.bcc: Reading file 101-02
Subject file 1760 CA-966 (POO for EA #107)
CA-966 (POO for EA #92)

Act. Cons. Mgr's Chron
ENV EA 92
ENV EA 107
ENV Chron

39

JDURHAM/hgp/12/18/78

Responses to EPA'S May 3, 1978 comments on Republic Geothermal, Inc's 48-MW
Plan of Development, Injection, and Utilization, East Mesa, California

1. Republic Geothermal, Inc (RGI) has not presented a program to monitor the noncondensable gases and geothermal fluids that would be produced by the 48-MW power plant. The Area Geothermal Supervisor is requiring lessees to comply with Draft Geothermal Resource Operational GRO Order 5, and Part 1G(1)(F) of this order requires the lessees to submit a proposed environmental monitoring program with the Plan for Production. This program must address the monitoring of air and water quality, noise, seismicity, land subsidence, and the ecological system of the Leased Lands.

Before the 48-MW power plant could be put in operation, RGI must submit a Plan for Production. This office will send to Interested Parties the Plan for Production, which will include RGI's proposed environmental monitoring program, and this office will evaluate the plan via another Environmental Analyses. RGI expects to submit this Plan for Production around the first of the year.

2. RGI will be required to periodically analyze the brine and gases and to report the analyses to this office.

3. This office does not know what negligible impacts RGI anticipates from the proposed injection operations.

4. At one time Republic Geothermal, Inc., planned "automatic emergency steam bypass through the condensers" should the steam turbine-generator unit develop a failure necessitating a shut down. RGI presently plans not to initiate shut down by bypassing steam through the condenser.

The plant operator in the control room can shut down the turbine-generator or shut down will occur automatically in case of failure of the turbine or generator or both in the following sequence:

- a. Excessive vibration, low lubrication pressure, turbine overspeed high temperature, etc., will trigger a sensor that shut off the steam valves to the turbine.
- b. The steam pressure will increase in the four flash tanks and the liquid level will begin to rise at bottom of tanks. Less steam will be flashed and more liquid buildup will occur. Though unlikely, should the steam pressure build up excessively in a flash tank, a pressure relief valve on the tank will vent the steam to the atmosphere.

- c. The individual flash tank automatic control system sensors will sense the high liquid level and shut off the geothermal inlet liquid pipelines to each of the flash tanks one by one and thus to the plant area. The flash tanks are now isolated from the production wells.
- d. The production well pumps equipped with high/low pressure sensors sense high pressure in the geothermal pipelines since the valves are shut off to the flash tanks.
- e. The pumps shut off and the fluid stops flowing. The plant is now shut down.

5. On line 36, p. U-6 of the Plan of Utilization, the figure 1,500,000 lb/hr is in error. According to Terry Thomas of RGI, the power plant will produce about 1,800,000 lb/hr of fresh water. Therefore, since the cooling tower evaporation rate is 1,700,000 lb/hr, a surplus of 100,000 lb/hr of fresh water would be produced by the power plant.

6. The production and injection wells will be continuously monitored for pressure changes. Certain changes in pressures could signify that fluids injected into the subsurface are leaking into the shallow ground water. Should this office believe that the geothermal fluids are entering and contaminating the shallow groundwater, RGI would be ordered to examine the situation through such means as shallow groundwater sampling.