

OCCIDENTAL GEOTHERMAL INC.

PLAN OF OPERATION

UNITED STATES GEOTHERMAL LEASES

Serial No.: CA 5636 and CA 5637

IN

LAKE AND SONOMA COUNTIES

CALIFORNIA

DRILL SITES A and B

March 20, 1979

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Occidental Geothermal, Inc.
Plan of Operation
United States Geothermal Leases
Serial No.: CA 5636 and CA 5637
Drill Sites A and B

A. SCOPE

This Plan of Operation covers all activities required to construct roads and locations for the drilling of two exploratory wells, one each from drilling locations A and B as shown on the exhibits attached hereto.

The two sites have been selected to prove the geothermal resource of the land included in U. S. Geothermal Lease CA 5637.

Additional exploratory drilling could follow this initial phase if there is sufficient encouragement from the initial wells.

It is anticipated a total of six multiple drilling sites will be required to support final development of the resource.

Occidental Geothermal, Inc. is presently negotiating with several agencies for the construction of a power plant to be supported by the geothermal resource of these leases.

B. CONSTRUCTION

1. Location

This phase of the project is located entirely in Lake County and encompasses a total area of 548.91 acres more or less.

Land is described as follows:

Parcel 5: CA 5636
T11N R8W MDM
Sec 21: W1/2 NE1/4 -

Parcel 6: CA 5637
T11N R8W MDM
Sec 21: Lots 5, 6, 11 and 12, and E1/2 NE1/4,
Sec 22: NE1/4 NW1/4; W1/2 W1/2 and NE1/4 SW1/4

The location of the project including topographic features and drainage patterns of the land is shown on Exhibit A.

2. Access

At the present time the only access to the project is an improved fire road originating from the Socrates Mines Road in Lake County.

Additional access roads will be developed as part of the total project.

The right to utilize private existing access roads outside the project limits will also be secured.

Proposed alignment of the access roads to the initial drill sites are shown on Exhibit A.

3. Right to Construct Surface Facilities

Occidental Geothermal, Inc. will secure all necessary leases and other agreements required to construct roads and other surface facilities on private lands within the project area.

Negotiations are in progress between the Lessee and the surface owners of the two previously described leases. A copy of the final signed agreement covering compensation for surface damages will be filed with the USGS.

No major construction will be undertaken at a drill site until required leases and access easements have been obtained for that site.

4. Source of Water

During the construction of the surface facility and during drilling operations, substantial amounts of water will be required.

Within the limits of the project there are several springs feeding Anderson Creek. The rights for utilization of such water will be secured from the surface owner.

It is anticipated at this time that water for the initial construction and drilling will be obtained through purchase from private reservoirs or wells located outside the project limits.

5. Disposal of Waste Materials

All brush, trees, stumps and other debris generated during the construction of surface facilities will be disposed as follows:

Brush and tree limbs will be chipped.

Trees will be cut for firewood.

Tree stumps will be buried.

Top soil will be stockpiled for utilization on the of fill slopes to support revegetation.

Waste material generated during drilling operations will be disposed within the confines of a drilling waste sump constructed adjacent to the drilling platform and lined with an impervious clay liner. The liner will be two feet in thickness and will be constructed to provide a permeability of 10^{-6} cm. per second.

In the unlikely event of an oil spill around drilling equipment, provisions will be made to divert the oil into the drilling waste sump.

Drilling wastes that cannot be accommodated within the sump will be transported and disposed to an authorized Class II disposal site.

6. Source of Construction Materials

The construction of all surface facilities will not require the importation or exportation of soil.

All construction will be engineered to minimize disturbance of surface areas and to result in a balanced cut and fill.

Excess soil will be disposed on designated disposal sites within the project limits.

Rock required for building roads and drilling locations will be purchased from commercial rock producers near Middletown.

7. Construction and Drilling Facilities

The construction activities will be directed from the contractor's office in Middletown.

Office and shop facilities required for drilling operations will be located at each of the drill sites.

Construction support facilities and equipment will be secured through contracts with local contractors. No on-site housing facilities are required. Personnel will reside in housing facilities in nearby communities.

8. Construction Specifications

All surface facilities will be constructed on the basis of Drawing and Specifications developed and certified by a Registered Civil Engineer.

The construction Drawing and Specifications will also be reviewed and certified by a Registered Engineering Geologist.

The following are minimum design parameters that will be incorporated in the design of the surface facilities:

All drill sites will be developed for multiple wells (up to 4).

Engineered cut slopes: Not steeper than 1 horizontal to 1 vertical.

Engineered fill slopes: Not steeper than 1.5 horizontal to 1 vertical.

Slopes of drainage facilities: Not less than 2%

Drainage facilities will be designed for a 100 year storm intensity for the area.

Maximum road grade not to exceed 15%.

Compaction of engineered fills shall be not less than 90% based on ASTM Method D-1557-70.

Preliminary layouts of drill sites A and B including a typical arrangement of drilling equipment are shown on Exhibit B in the Appendix.

9. Geotechnical Investigations

Prior to finalizing the design of the surface facilities, certain geotechnical investigations will be performed to determine the stability of each drilling site and also to develop design parameters.

The extent of the geotechnical investigation will depend on evaluation of existing data as supplemented by field reconnaissance surveys.

The geotechnical investigation may include the following activities:

- a. Field surface geological reconnaissance.
- b. Seismic refraction surveys.
- c. Test pits and test trenches.
- d. Exploratory borings.

10. Construction Surveys

All construction will be performed on the basis of surveys.

Clearing limits will be defined by surveys.

No overclearing will be allowed.

A written description of the geotechnical phase will be filed prior to performing any work.

C. ENVIRONMENTAL CONSIDERATIONS

1. Environmental Assessment

The environmental aspects of this development were the subject of a study entitled "Proposed Geothermal Leasing Environmental Assessemnt Record" prepared by the Bureau of Land Management, Ukiah District, dated September, 1978. An existing Environmental Impact Report entitled "Ford Flat Geothermal Steam Area, Lake County" prepared by Atlantis Scientific is also on file with the USGS and Lake County. This report covers the lands included in CA 5636 and CA5637 and will be referenced and supplemented to provide site specific data for this project.

2. Sensitivity

Portions of the project area are environmentally sensitive.

There are two particular items of concern:

- a. The project area lies near a potential nesting habitat of the peregrine falcon, an endangered and fully protected species.
- b. Within the area are the headwaters of Anderson and Gunning Creeks, a source for domestic water for near-by communities.

All activities will be cognizant of these sensitive items. Construction of drill sites A and B will have minimal impact on these two items.

3. Vegetation

In order to determine the presence of rare, threatened and endangered plants, a field reconnaissance will be performed

by a qualified horticulturalist familiar with the vegetation encountered in the area.

The reconnaissance will be performed within a strip encompassing the expected area of disturbance. A written report will be submitted on the results of this reconnaissance.

4. Cultural Resources

Within the expected area of disturbance a field reconnaissance will be performed by an archaeologist to identify any archeological sites and other cultural finds. A written report will be submitted on the results of this reconnaissance.

Selection of final access roads and drilling sites will take into consideration the findings and recommendations of such a survey.

The American Native Heritage Committee will be consulted during the proposed archeological investigation.

5. Fire Prevention Measures

To mitigate environmental impacts due to fires the following measures will be taken:

- a. All construction and drilling equipment will be equipped with exhaust spark arresters.
- b. Water trucks, fire hoses, and spray nozzles will be available during construction and drilling activities.
- c. Stored water required for drilling will be available for fire fighting.
- d. Fire extinguishers will be located at strategic locations around drilling equipment.

- e. Safe smoking regulations will be developed and enforced.
- f. Fire hazard warning signs will be posted at the entrances to the project.

6. Soil Erosion and Siltation

In order to minimize soil erosion and related siltation of streams the following measures will be incorporated in the construction of access roads and drilling sites.

- a. All fill slopes will be compacted using rollers and "walked" with a crawler tractor.
- b. Discharge points of culverts shall have energy dissipators.
- c. Where the slope of the drainage ditches are over 10% the ditches will be lined with rock.
- d. Discharge points of culverts shall be carried to natural drainage channels.
- e. All cut and fill slopes will receive erosion protection by the application of straw and hydromulching.
- f. If required, siltation basins will be constructed.

7. Pollution Control of Surface and Ground Waters

To control possible pollution of surface water streams from spillage of fuel and oils around drilling equipment, ditches will be constructed around all equipment to divert such spillage into the drilling waste sump.

To control pollution of ground water, the drilling waste sump will be lined with an impervious clay liner.

Casing and cementing procedures during drilling operations will prevent contamination of ground waters.

8. Protection of Fish and Wildlife

Surface disturbance will be confined only to the areas required for the construction of access roads and drilling locations.

In those areas revegetation programs will be established to replace the lost growth. Such revegetation programs will be under the direction of a horticulturalist or landscape architect.

Siltation of streams effecting spawning and fish habitat will be controlled as outlined above.

9. Air and Noise Pollution Control

Air pollution created from drilling operations while drilling with air will be minimized by the use of a cyclonic separator and muffler. Such separators have been developed over the years by other developers at the Geysers and have been proven effective.

Their effectiveness is particularly increased by the introduction of water sprays in the blooie line and separator.

It is proposed that a similar muffler-separator will be used in the drilling operations on this project.

Noise generated by the drilling equipment will be controlled by mufflers. It is anticipated that the noise generated by the drilling operations will not exceed 65 db(A)

at a distance of one-half mile, and that the noise level at the nearest community two miles away will not exceed 55 db(A).

10. Protection Against Hazards to Public Health and Safety

- a. Hard hats will be worn by all construction and drilling personnel.
- b. Sanitary facilities will be provided through contract with a private company.
- c. Bottled drinking water will be provided.
- d. First-aid facility will be provided.
- e. Industrial safety and OSHA regulations will be followed.
- f. Radio or telephone communications will be provided for emergency calls.

D. COLLECTION OF BASE LINE DATA

Occidental Geothermal, Inc. has not collected base line data for water quality, noise, seismic and land subsidence activities and data on other ecological systems.

A program for the collection of such base line data is under way and such data will be available at the time the total plan of development is submitted.

APPENDIX

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

UNIVERSITY OF UTAH
RESEARCH INSTITUTE
EARTH SCIENCE LAB.

MAR 30 1979

Memorandum

To: INTERESTED PARTIES
From: Area Geothermal Supervisor
Subject: Plan of Operation, (Occidental Geothermal, Inc.,)
Federal Lease CA-5637, and Plan of Operation,
McCulloch Oil Corp., Federal Lease CA-5632,
Geysers-Calistoga KGRA, Lake and Sonoma Counties, CA

Occidental Geothermal, Inc. has submitted a Plan of Operation in accordance with CFR 270.34 to construct two drill sites and drill an exploratory well on each site, on Federal Lease CA-5637, Geysers-Calistoga KGRA, Lake and Sonoma Counties, CA. A copy of the Plan of Operation is attached for your review and files.

An Environmental Analysis (EA#121-9) will be prepared by the Office of the Area Geothermal Supervisor for the proposed action.

McCulloch Oil Corporation will submit a Plan of Operation to construct two drill sites and drill up to two wells on each site on the State of California's Federal Lease CA-5632 also in the Geysers-Calistoga KGRA, Lake County, California. A copy of the Plan of Operation will be forwarded to the interested parties upon receipt in this office.

A separate Environmental Analysis (EA#122-9) will be written by this office for the proposed McCulloch activities.

You are invited to participate in a joint field inspection for both lease areas, being led by Ted Hudson, Santa Rosa District Geothermal Supervisor, USGS, on April 19, 1979. Participants are asked to meet at the Chevron Service Station in Middletown, California, at 10:00 am.

All comments concerning the proposed actions must be received no later than May 3, 1979, by:

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

Tel: (415) 323-8111, Ext. 2848 (FTS 467-2848)

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.

Further, we solicit your comments and suggestions on the proposed action. All comments will be given serious consideration in the preparation of the Environmental Analysis and any subsequent conditions of approval.

The Area Geothermal Supervisor's Office will not send a draft Environmental Analysis to interested parties for review for the proposed action. Certain parties, however, such as the surface managing agency, the lessee, GEAP and USFWS will receive a copy of the completed EA. Other interested parties will not receive a copy of the final EA unless such parties comment on the proposed action in writing or request a copy of the particular EA pursuant to the Freedom of Information Act. Copies of Environmental Analyses are available for inspection during normal business hours at the Area Geothermal Supervisor's Office, the Santa Rosa District Geothermal Supervisor's Office, and the Ukiah BLM District Manager's Offices.

Attachment

A handwritten signature in cursive script, appearing to read "Reed Stone". The signature is written in dark ink and is positioned to the right of the "Attachment" label.

INTERESTED PARTIES FA #121-9

idental Geothermal, Incorporated
 Exploration Wells
 ulloch Oil Corporation
 r Exploration Wells

CA-5636, CA-5637
 Geysers-Calistoga KGRA
 CA-5632
 * * * Geysers- Calistoga KGRA

istrict Geothermal Supervisor
 SS, Conservation Division
 st Office Box 3539
 nta Rosa, California 95042
 IS 623-1326 Comm: 707-525-4326

Conservation Manager, Western Region
 ATTN: Environmental Staff
 USGS, Conservation Division
 345 Middlefield Rd., PS R0
 Menlo Park, California 94025
 *FIS: 467-2108 Comm: 415-323-8111

. Henry Collins
 ea Geologist, Pacific Area
 SS-Conservation Division
 5 Middlefield Road, PS 50
 nlo Park, California 94025
 IS: 467-2053 Comm: 415-323-8111

USGS-Subsidence Research
 ATTN: Bruce L. Massey
 Federal Building, Rm. #2528
 2800 Cottage Way
 Sacramento, California 95825
 *FIS 468-4258

. G. D. Robinson, Chairman
 othermal Environmental Advisory
 nel
 5 Middlefield Road, #3 19
 nlo Park, California 94025
 IS 467-2871 415-323-8111 X2871

U.S. Bureau of Land Management
 Geothermal Specialist
 ATTN: Theodore S. Holland
 Denver Fed. Center, B. 50 (1-310)
 Denver, Colorado 80225
 *FIS: 234-5098 Comm: 303-234-5098

ifornia State Director
 ureau of Land Management
 deral Building, Room E-2841
 00 Cottage Way
 ramento, California 95825
 IS: 468-4676 Com (916) 484-4676

Ukiah District Manager
 ureau of Land Management
 555 Leslie Street
 Ukiah, California 95428
 *Comm: 707-462-3873

S. Fish and Wildlife Service
 TN: Field Superv Ecological Serv
 00 Cottage Way
 ramento, California 95825
 IS: 468-4516 Comm: 916-484-4516

U. S. Fish and Wildlife Service
 ATTN: Gail Kobeditich
 Endangered Species Office
 2800 Cottage Way, Room E-2720
 Sacramento, California 95825
 *FIS: 468-4516 Comm: 916-484-4516

partment of Energy, Geothermal
 TN: Bennie Dixon
 Massachusetts Avenue, NW
 hington, D.C. 20545
 IS 376-1690 Comm: 202-376-1690

Mr. Jack Miller
 California Division of Oil & Gas
 240-D Coddington Center
 Santa Rosa, California 95401
 *Comm: 707-525-0479

ifornia Department of Fish & Game
 TN: Don Lollock
 16 Ninth Street
 ramento, California 95814
 IS 465-1383 Comm: 916-485-1383

State of California
 Department of Parks & Recreation
 ATTN: Knox Mellon, SHPU
 P.O. Box 2390
 Sacramento, California 95811

gional Water Quality Control Board
 TN: David Spetsinger
 00 Coddington Center
 nta Rosa, California 95401
 el: 707-545-2620

Governor's Office of Planning and
 Research - State Clearing House
 ATTN: Bill Kirkham and Susan Brown
 1400 Tenth Street
 Sacramento, California 95814

State of California
Water Resources Control Board
Attn: Alvin Franks
P.O. Box 100
Sacramento, California 95801
Phone: 916-445-2774

John Emio
California Department of Fish and Game
P.O. Box 47
Yountville, California 94599

Five American Heritage Committee
Attn: Stephen Rios
100 10th Street
Sacramento, CA 95814
Phone: 916-322-7791

State of California
Public Utilities Commission
Attn: Mr. William M. Foley
350 McAllister Street, Room 5062
San Francisco, California 94102

Tom Cordill
Lake County Planning Director
County Admin. Building, Rm. 105A
15 Mendocino Avenue
Santa Rosa, California 95401
Phone: 707-527-2412

Don Johnson
Lake County Planning Director
255 N. Forbes Street
Lakeport, California 95453
*Comm: 707-263-5471, ext. 240

Yoma State College
Attn: Dr. David A. Fredrickson
Chronology Laboratory
11 East Cotati Avenue
Eliot Park, California 94926
Phone: 707-664-2381

Earth Science Laboratory
Univ of Utah Research Institute
Attn: Phillip M. Wright
420 Chiveta way, Suite 120
Salt Lake City, Utah 84108
*Tel: (801) 581-5283

Geothermal Resources Council
Attn: Mr. David Anderson
P.O. Box 98
Eureka, CA 95616
Phone: 916-758-2360

Mr. Mike Eaton
Sierra Club
1107 9th Street, Room 419
Sacramento, CA 95814
*916-444-9132

John Kramer
for the Sierra Club
Pine Street
Eureka, California 95482
Phone: 707-462-6348

Aminoil USA, Incorporated
Attn: Mr. J.W. Kunau
Post Office Box 11279
Santa Rosa, California 95406
*FIS Ops: 623-1011 707-527-5353/2

Clyde E. Kuhn
Post Office Box 69
Eureka, California 95616

Occidental Geothermal, Inc.
Attn: B.J. Wyant
5000 Stockdale Highway
Cakersfield, California 93309
*Tel: (805) 327-7351

Public Geothermal, Incorporated
Northern California Office
Attn: J. L. Schneidenger
4 Cleaveland Avenue
Santa Rosa, California 95401
Phone: 707-527-7755

SAYSRIGHT Corporation
Attn: Mr. Wayne L. Sayer
Post Office Box 229
Fairfield, California 94533

Oil Company
Attn: Mr. F.W. Wankler
Office Box 92047
Postway Center
Los Angeles, California 90049
Tel: (805) 646-2751

Oil Company of California
Attn: Mr. Joseph L. Wilson
Office Box 7600
Los Angeles, California 90051
TELEPHONE: 213-495-6492

Geothermal Science Associates, Inc
Attn: Paul Zisman
E. Hillside Blvd.
San Diego, CA 92104
Tel: 573-3500

Jack McHamara
100 Wilshire Blvd, Suite 790
Los Angeles, California 90024
Tel: (213) 475-4933

Ray Chantley
Sloch Oil Corporation
100 Wilshire Blvd.
Los Angeles, California 90024
Tel: (213) 879-5252

Union Oil Company of California
Geothermal Division
Attn: Neil Stefanides
Union Oil Center, Box 7600
Los Angeles, California 90051
Tel: 213-486-7740

Union Oil Company
Attn: Don Ash
Post Office Box 6854
Santa Rosa, California 95406

New Albion Resources Company
Attn: J. P. Lucent
Post Office Box 168
San Diego, California 92112

Mr. Warren M. Woodward
125 Drew Drive
Reno, Nevada 89502
Tel: 702-825-3079