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FC
USGS
AGSO
Memo 4
NM
Dona Ana Co.
10/13/77

ANADARKO PRODUCTION COMPANY
A Panhandle Eastern Pipe Line Company Subsidiary

P.O. BOX 1330
Houston, Texas 77001
(713) 526-5421

October 13, 1977

Mr. Reid Stone
Area Geothermal Supervisor
U.S. Geological Survey
345 Middlefield Rd., Mail Stop 92
Menlo Park, California 94025

Mr. Daniel C. B. Rathburn
District Manager
Bureau of Land Management
U.S. Department of Interior
P. O. Box 1420
Las Cruces, New Mexico 88001

RECEIVED

FILED OCT 13 1977
FEDERAL BUREAU OF INVESTIGATION
U.S. DEPARTMENT OF JUSTICE

Re: Plan of Operations, Sundry
Notice, and Notice of Intent
to Conduct Geothermal Resources
Exploration Operations, T26, 27,
& 28S-R1 & 2W, Dona Ana County,
New Mexico
(Kilbourne Hole Area)

Gentlemen:

In compliance with Title 30, CFR 270.34 and 270.78, Anadarko Production Company hereby submits a Plan of Operations for Drilling of Shallow Temperature Gradient Holes, Form 3200-9; "Notice of Intent to Conduct Geothermal Resources Exploration Operations", which contains the information required by Title 43, CFR 3209.1-1 (b) (1), (2), (3), (4), and (6); Sundry Notice; and a letter concerning archaeological assessment on the area involved.

Anadarko Production Company plans to drill shallow (500') temperature gradient holes on, and around, geothermal leases which have been issued to Anadarko in the Kilbourne Hole Area of Dona Ana County, New Mexico. The geothermal leases affected by the proposed study are listed below and also are indicated on the accompanying map:

Tract #1	NM25718	T27S-R1W
Tract #2	NM25719	T27S-R1W
Tract #3	NM25720	T27S-R1W

UNIVERSITY OF UTAH
RESEARCH INSTITUTE
EARTH SCIENCE LAB.

Mr. Reid Stone
Mr. Daniel C. B. Rathburn

-2-

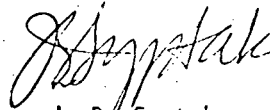
October 13, 1977

Tract #4	NM25721	T27S-R1W
Tract #5	NM25722	T27S-R1W
Tract #6	NM25723	T27S-R1W
Tract #8	NM25724	T28S-R1W
Tract #9	NM25725	T28S-R1W
Tract #10	NM25726	T28S-R1W

Anadarko Production Company respectfully requests your approval of the proposed geothermal exploration program.

Please address all correspondence regarding this application to the attention of: J. B. Syptak, Geothermal Staff Geologist.

Very truly yours,



J. B. Syptak
Staff Geologist

JBS:bb

Enclosures

cc: USGS - 3 sets
BLM - 3 sets
Contractor - 1 set

PLAN OF OPERATIONS

SHALLOW (500') TEMPERATURE HOLES

Shallow (500') temperature gradient holes will be drilled and temperatures measured on lands covered by Geothermal Leases NM25718, NM25719, NM25720, NM25721, NM25722, NM25723, NM25724, NM25725, NM25726 and surrounding lands in portions of Townships 26, 27, and 28S, Ranges 1 and 2W; upon approval by the Authorized Officers of the USGS and Bureau of Land Management. A map is enclosed showing (1) the proposed locations of the holes to be drilled; (2) the referenced Federal leases; and (3) general topographic features.

A reconnaissance archaeological survey (Cultural Resources Investigation) of about 41 sections in the Kilbourne Hole Geothermal Area, Dona Ana County, New Mexico, was made in October 1975, by Stanley D. Bussey. A copy of his evaluation is enclosed. An additional survey is not considered to be needed, in that a recent comprehensive drilling program was approved and has been completed recently in the same area by another operator.

Existing roads and trails will be used to the extent possible.

No water supply nor any road building material will be required.

No campsites, air strips, or other supportive facilities will be required.

The topographic features of the land and its drainage patterns are shown on the enclosed map. There will be little waste material for disposal.

None of the operations should cause any significant fire hazard and the crew will be requested not to smoke, or if they do, to use extreme caution; however, very sparse vegetation renders fire danger highly improbable.

The exact date of commencement and completion cannot be predicted due to the uncertainty of approval dates by the Supervisor of the USGS (Title 30, CFR 270.34) for lands covered by the referenced leases and the Authorized Officer of the Bureau of Land Management (Title 43, CFR 3209) for those lands not covered by the referenced leases. It is anticipated that operations will commence within 30 days following the latter of the two approvals and, thereafter, should be completed within 45 days in the absence of adverse weather conditions.

Description of Operations

1. Location

The location of each proposed temperature gradient well is indicated approximately on the enclosed map and the plan of operations indicates the approximate location of each wellsite and the approximate order of drilling; these wellsites will be surveyed, staked and flagged in advance of field inspection.

2. Drilling Rig

The drilling contractor has not yet been selected, but the rig that will be used will probably be similar to a Mayhue 1000 or Failing 1500.

3. Drilling Program

Hole Size & Bits:

4-3/4" tricone rock bits and drag bits will be used.

Casing & Cement:

The wells will be completed for temperature observation with 1" black iron pipe and cemented in the annulus from ground level to a depth of 10'.

Drilling Fluid:

The wells will be drilled with water. Gel (bentonite clay) will be added if required for hole cleaning. A supply of lost circulation material and weighting material will be kept on location.

Well Depth:

The maximum depth to which the wells will be drilled is 500'. However, well depths may be considerably less if extreme temperature, artesian water flows, hard drilling or lost circulation is encountered.

4. Drilling Fluid Sump

A steel circulating tank will be used and excess drilling fluid will be discarded into the sump. It is estimated that the excess volume will be about 10 bbls.

5. Observation Time

The wells may be used for temperature observation for about 45 days or slightly longer than the entire program which is estimated at about 30 days.

6. Abandonment

The wells will be abandoned by filling the hole with drilling mud and then cement from ground level to a depth of 10', if the well is not used for temperature observation. If the well is used for temperature observation and was completed with pipe, the pipe will be filled with cement from ground level to a depth of 10' and cut off below ground level. The ground will then be restored as best as possible to its original contours.

October 1, 1975

Mr. Reed Stone
Area Geothermal Supervisor
U. S. Geological Survey
345 Middlefield Rd.
Mail Stop #35
Menlo Park, California 94025

Dear Mr. Stone:

I have been asked by Anadarko Production Company to conduct an archaeological survey (Cultural Resources Investigation) of about 41 sections in the Kilbourne Hole Geothermal Area, Dona Ana County, New Mexico. After contacting them about their plan of operations, it is my professional opinion that no archaeological survey is needed before the first phase of their work.

Anadarko's first phase will be a gravity survey. In performing this survey, they will drive over the area in a four-wheel drive carryall and take gravity readings at section corners, quarter sections and the centers of sections. This work will involve no modification or disturbance of the surface and will have no adverse effect on the cultural resources of the area (the area is presently driven over by hunters, recreational vehicles, etc.).

In view of the nature of the work planned for the first phase, I request that you accept this letter in lieu of a survey report and permit them to perform their gravity survey without a Cultural Resources Inventory.

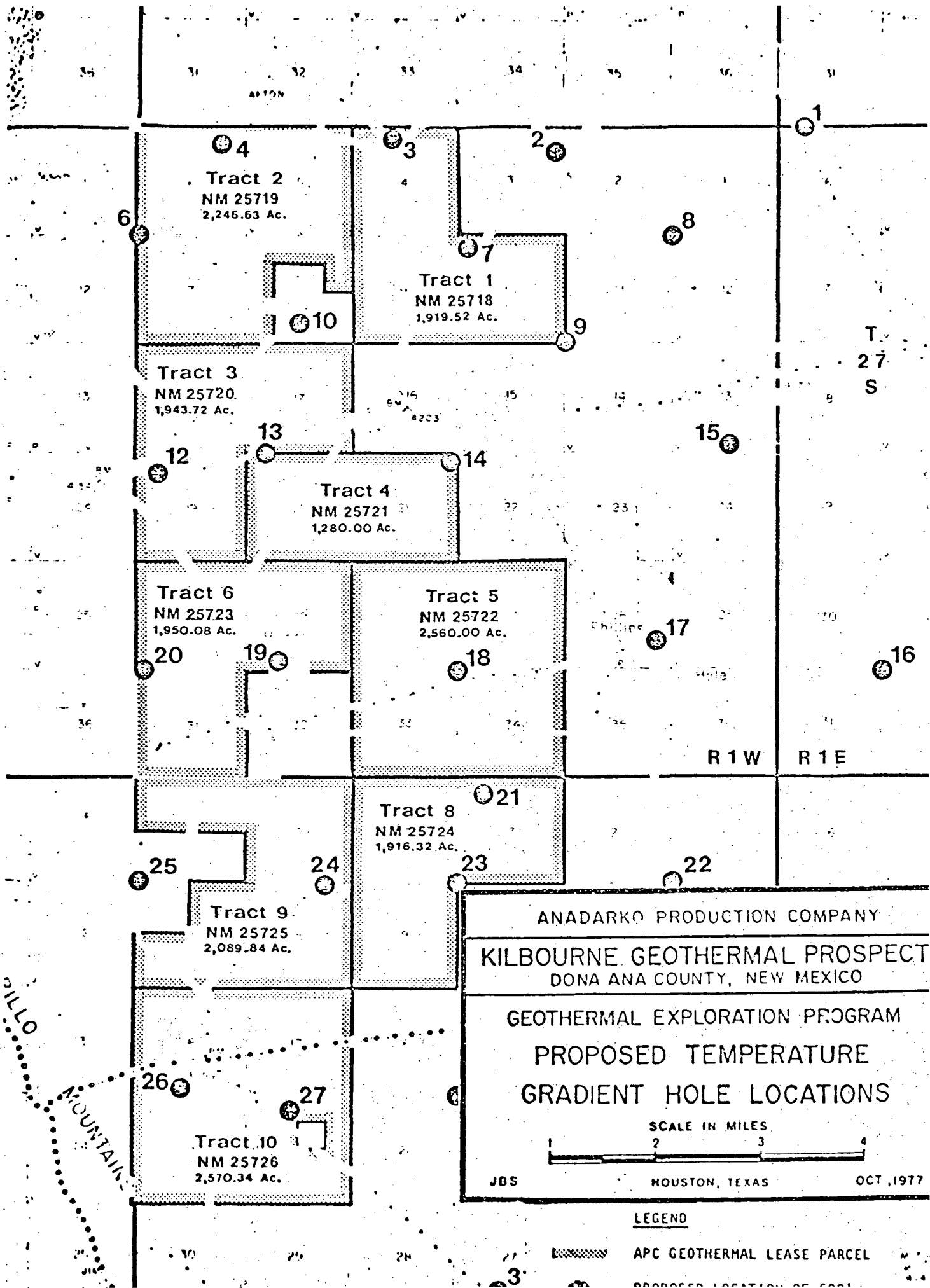
Later, a Cultural Resources Inventory should be performed in affected areas before any operations which modify or affect the surface of the land are approved.

Sincerely,

Stanley D. Bussey
Asst. Prof. of Anthropology
Director, University Museum
Directory, Cultural Resources
Management Division

SD3/ea

cc G. McVicker, Las Cruces BLM
R. H. Peacock, Anadarko



ANADARKO PRODUCTION COMPANY
A Panhandle Eastern Pipe Line Company Subsidiary

P.O. BOX 1330
Houston, Texas 77001
(713) 526-5421

October 21, 1977

Mr. Reid Stone
Area Geothermal Supervisor
U.S. Geological Survey
345 Middlefield Road, Mail Stop 92
Menlo Park, California 94025

Mr. Daniel C. Rathburn
District Manager
Bureau of Land Management
U.S. Department of Interior
P. O. Box 1420
Las Cruces, New Mexico 88001

RECEIVED

AREA GEOTHERMAL SUPERVISOR
U.S. GEOLOGICAL SURVEY
BUREAU OF LAND MANAGEMENT
U.S. DEPARTMENT OF INTERIOR
LAS CRUCES, NEW MEXICO

Re: Plan of Operations
Sundry Notice & Notice of
Intent to Conduct Geothermal
Resources Exploration Operations
T26, 27, & 28S-R1 & 2W, Dona Ana
County, New Mexico
(Kilbourne Hole Area)

Gentlemen:

In compliance with Title 30, CFR 270.34 and 270.78, Anadarko Production Company hereby submits a Plan of Operations for Drilling of Intermediate Depth Temperature Gradient Holes, Form 3200-9; "Notice of Intent to Conduct Geothermal Resources Exploration Operations", which contains the information required by Title 43, CFR 3209.1-1 (b) (1), (2), (3), (4), and (6); Sundry Notice; and a letter concerning archaeological assessment on the area involved.

Anadarko Production Company plans to drill 2000' temperature gradient holes on, and around, geothermal leases which have been issued to Anadarko in the Kilbourne Hole Area of Dona Ana County, New Mexico. The geothermal leases affected by the proposed study are listed below and also are indicated on the accompanying map:

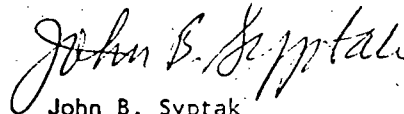
Tract #1	NM25718	T27S-R1W
Tract #2	NM25719	T27S-R1W
Tract #3	NM25720	T27S-R1W
Tract #4	NM25721	T27S-R1W
Tract #5	NM25722	T27S-R1W
Tract #6	NM25723	T27S-R1W
Tract #8	NM25724	T28S-R1W
Tract #9	NM25725	T28S-R1W
Tract #10	NM25726	T28S-R1W

-2-

Anadarko Production Company respectfully requests your approval of the proposed geothermal exploration program.

Please address all correspondence regarding this application to the attention of J. B. Syptak, Geothermal Staff Geologist.

Very truly yours,



John B. Syptak
Staff Geologist

JBS:bb

Enclosures

cc: USGS - 3 sets (transparency by separate cover)
BLM - 3 sets
Contractor - 1 set

PLAN OF OPERATIONS
GEOTHERMAL RESOURCE EXPLORATION OPERATIONS
2000' TEMPERATURE GRADIENT-HEAT FLOW HOLES

1. LOCATION

Shallow (500') temperature gradient holes will be drilled and temperatures measured on lands covered by Geothermal Leases NM25718, NM25719, NM25720, NM25721, NM25722, NM25723, NM25724, NM25725, NM25726 and surrounding lands in portions of Townships 26, 27, and 28S, Ranges 1 and 2W, upon approval by the Authorized Officers of the USGS and Bureau of Land Management. A map is enclosed showing: (a) the proposed locations of the holes to be drilled; (b) the referenced Federal leases; and (c) general topographic features.

2. CULTURAL RESOURCE SURVEY

A reconnaissance archaeological survey (Cultural Resources Investigation) of about 41 sections in the Kilbourne Hole Geothermal Area, Dona Ana County, New Mexico, was made in October, 1975, by Stanley D. Bussey. A copy of his evaluation is enclosed.

3. TIMING

The exact date of commencement and completion cannot be predicted due to the uncertainty of approval dates by the Supervisor of the USGS (Title 30, CFR 270.34) for lands covered by the referenced leases and the Authorized Officers of the Bureau of Land Management (Title 43, CFR 3209) for those lands not covered by the referenced leases. It is anticipated that operations will commence within 30 days following the latter of the two approvals and, thereafter, should be completed within 45 days in the absence of adverse weather conditions.

4. EQUIPMENT

Equipment to be used during the course of exploration operations are as follows: Rotary Drilling Rig, Water Truck, Support Pickup and Geophysical Van. The drilling contractor has not been selected, but the equipment used will probably be similar to a Failing 2500. Each is described in detail below:

Drilling Rig:

Type - Conventional rotary, mud or air

Maximum Rated Depth - 2500'

Mounted on - Truck, 3-axle (2-rear driven)

Gross Weight - 40,000 lbs. (Approx.)

Water Truck:

Capacity - 2000 gal.

Mounted on - Truck, 3-axle

Gross Weight - Under 8000 lbs.

Geophysical Van:

Van, 4-wheel drive

Gross Weight - Under 6200 lbs.

During the course of drilling the gradient holes, it is likely that at various times all the above mentioned equipment will be on site. A typical arrangement for this equipment is shown in the accompanying diagram "C". Although the arrangement of equipment may change somewhat, it is expected that drilling operations will result in a disturbed area approximately 50' in radius from the hole location.

5. DRILLING AND COMPLETION PROCEDURES

The heat flow holes proposed herein are scheduled to be drilled to a total depth of 2000' below ground level. Drilling will be by conventional rotary mud or air.

If mud is used, a Bentonite type drilling mud will be utilized. In addition to Bentonite mud, a supply of Barite will be on hand (and used as necessary) to control artesian flow, as well as lost circulation material to combat lost circulation zones and minimize loss of drilling fluids to formations being penetrated. In no case will poisonous or otherwise toxic drilling fluid additives be employed.

Nominal hole diameter will be 5" to 6", depending on the type of bit used (either conventional roller or drag type).

The hole will be completed in such a manner as to prevent subsurface inter-zonal migration of water and surface leakage by: (a) running a capped string of 2" black iron pipe from surface to total depth; (b) filling the annular space between the hole and the 2" pipe with heavy mud and cuttings to 200' below ground level and with cement from 10' below ground level to the surface; (c) filling the 2" pipe with water; (d) placing a cap on the pipe; and (e) locking the pipe within a small 10' below ground level concrete blockhouse.

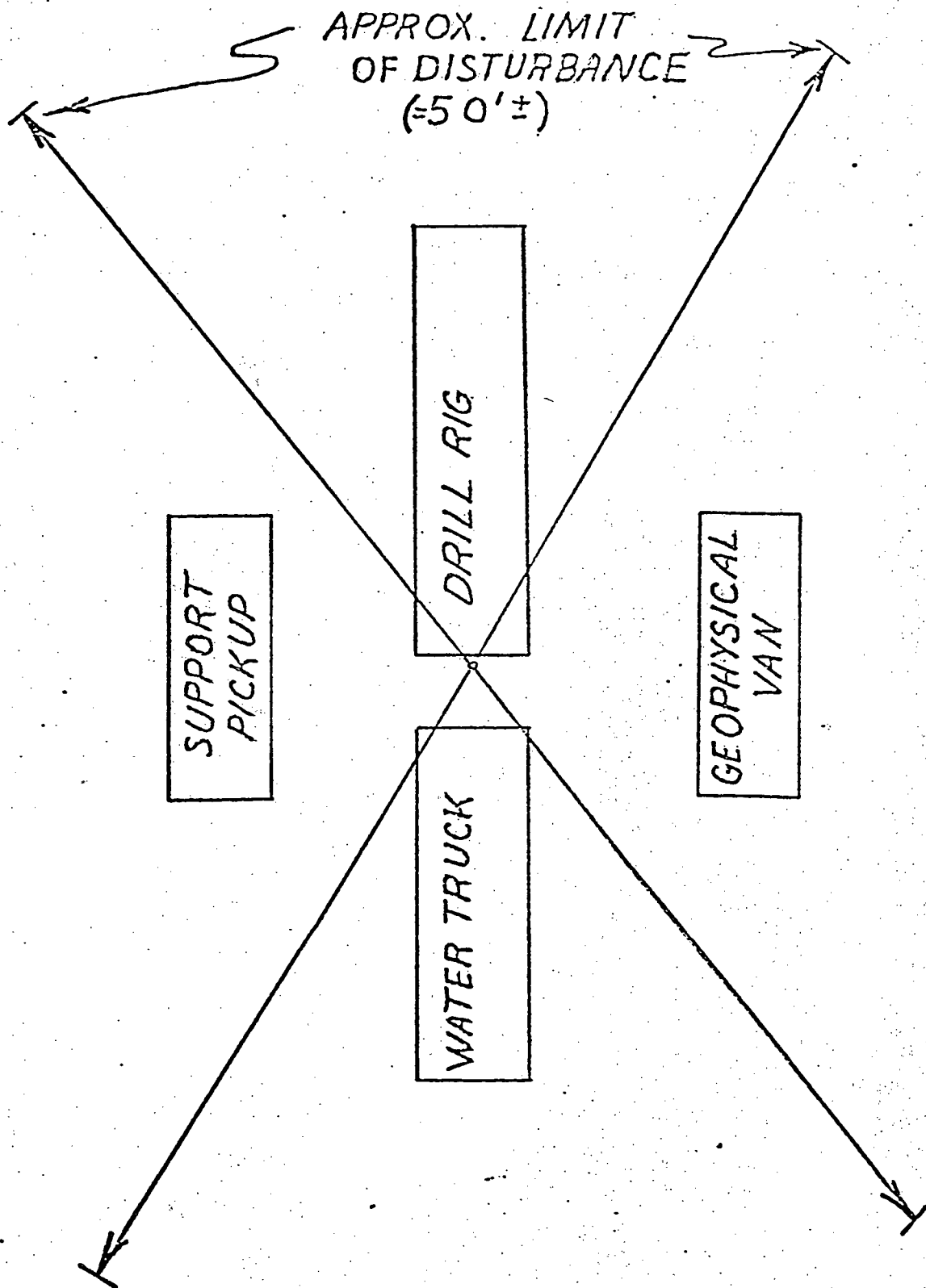


DIAGRAM C

SCALE: 1" = 5' (approx)

6. ACCESS

Access to the proposed hole location will be on existing roads and trails wherever possible. It is probable, however, that some access improvement (i.e., grading) will be necessary to reach the proposed locations. Where this is necessary, the route will take the shortest distance possible from an existing road or trail to the hole location. Removal of soil and vegetation will be kept to the minimum amount necessary to enable equipment to reach the site. All access improvements will be coordinated with the appropriate agency and we will comply with their stipulations.

7. SURFACE DISTURBANCE

Other than the proposed drillsite, no other areas of potential surface disturbance exist, with the possible exception of equipment getting stuck in mud; this, however, would be along designated access routes or existing roads and trails and is a situation that will be avoided if at all possible.

8. WASTE DISPOSAL

Waste material from this exploration operation will be those wastes resulting directly from drilling operations (i.e., mud, cuttings, etc.).

Drilling mud and cuttings will be disposed of at the hole site. Drilling sites will be selected so that the discharge of mud and cuttings will not contaminate lakes and perennial or intermittent streams.

9. OPERATIONS

Several techniques will be employed to ensure that exploration operations are carried out with maximum safety to life and property and minimal impact on the environment and its attendant natural and cultural resources. These are outlined as follows:

a. Before exploration operations commence:

- (1) Hole locations will be chosen to minimize surface disturbance. The proposed well locations will be surveyed, staked and flagged in advance of field inspection.
- (2) Cross-country travel necessary to reach the hole locations will exercise due care that the routes chosen minimize surface disturbance and damage to vegetation and wildlife.
- (3) Mud pit locations will be selected so that any excavation will cause the minimum possible damage to vegetation and wildlife.

b. During drilling operations:

- (1) A fulltime graduate geologist experienced in the proposed geothermal exploration operations will be assigned to the project while drilling is being conducted.
- (2) Surface casing fitted with a 2" fill-up line and cemented into competent rock, as well as a blowout preventor (Hydril Pneumatic Annular Type, or equivalent), will be employed to ensure that formation pressures can be controlled. An H₂S detector/alarm system will also be utilized during drilling operations.
- (3) No artesian flows are known to lie within the area where operations are to be conducted; however, a supply of Barite will be kept on hand for use if artesian flow is encountered.
- (4) If artesian flow occurs, the hole will be completed as detailed in Section "6", with the exception that the annular cement plug will be placed from total depth to 6" below ground level.
- (5) During drilling operations (when drilling with mud), return temperature will be measured and recorded every 10'.
- (6) If mud return temperature reaches 180°F, all drilling operations will cease and circulation will be maintained for thirty minutes while monitoring mud temperature and mud pit volume for possible hot artesian flow or lost circulation. If neither occurs, 2" pipe will be run to total depth and the hole will be completed as in Section "6". If artesian flow is noted, the hole will be completed as in Section "10", Item "b(4)". If lost circulation occurs, it will be controlled with lost circulation material and completed as in Section "6".
- (7) If there should be a sudden marked increase in mud return temperature of several degrees in only a few feet, all drilling operations will cease and

circulation will be maintained for thirty minutes monitoring mud temperature and mud pit volume for possible hot artesian flow or lost circulation. If neither, then drilling will continue cautiously while keeping careful watch on mud return temperature and mud pit volume. In no case will drilling operations continue after mud return temperature reaches 180°F. Depending on conditions, hole will be appropriately completed as in Section "6" or Section "10", Item "b(4)".

- (8) If flowing steam or hot water (180°F) is encountered, further drilling will stop immediately and the hole will be completed as in Section "10", Item "b(4)".
- (9) Every effort will be made to minimize the possibility of a fire. Ground fires will be built only in areas clear of vegetation for a radius of 10'. Internal combustion engines operated onsite will be equipped with a USFS-approved spark arrestor.
- (10) Fire fighting equipment on hand will consist of:
(a) water truck, approximate 2000' gallon capacity, equipped with an auxiliary water pump and hose that can be used to extinguish a fire should one break out; (b) a #0 long-handled (46") shovel for each crew member; (c) a dry chemical fire extinguisher with classification 3-A:20-B:C.
- (11) Mud and cuttings will not be discharged into the surface where such discharge could cause: (a) soil erosion; (b) pollution of surface waters or lakes and perennial or intermittent streams; (c) undue harm to wildlife or other natural resources.
- (12) All equipment to be operated during this program has met Federal regulations with regards to noise and air pollution.
- (13) The area where operations are to be conducted has a very low human population and, as such, it is anticipated that there will be no hazards to public health and safety.
- (14) Every effort will be made to preserve the natural vegetation and animal life of the area by restricting equipment movement to the minimum necessary to efficiently complete the proposed operation.

(15) If American antiquities or other objects of historic or scientific interest including, but not limited to, historic or prehistoric ruins, fossils or artifacts are discovered in the performance of the permit, the item(s) or condition(s) will be left intact and immediately brought to the attention of the Authorized Officer.

(16) All equipment will be operated at a safe and reasonable speed.

c. After drilling is completed:

(1) The drillsite will be completely cleaned of trash and debris.

(2) All drill cuttings will be discharged onto the surface. Cuttings will then be blended with excavated material from mud pit; this material will then be used to back-fill the mud pit as close as practical to original ground contour.

(3) The disturbed area will be restored as nearly as practical to its original condition.

10. ABANDONMENT

After the desired data has been obtained, the hole will be abandoned by: (a) cutting off 2" pipe at ground level; (b) filling the top 10' of 2" pipe with cement; and (c) covering the hole with dirt to original surface contour. Except as otherwise noted, all test equipment - both surface and subsurface - will be removed at the completion of the exploration operations.

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AFTON

PRINCIPAL

Tract 2
NM 25719
2,246.63 Ac.

33 Tract 1
NM 25718
1,919.52 Ac.

Tract 3
NM 25720
1,943.72 Ac.

Tract 4
NM 25721
1,280.00 Ac.

Tract 6
NM 25723
1,950.08 Ac.

Tract 5
NM 25722
2,560.00 Ac.

Tract 8
NM 25724
1,916.32 Ac.

Tract 9
NM 25725
2,089.84 Ac.

Tract 10
NM 25726
2,570.34 Ac.

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27
S

R 1 W R 1 E

ANADARKO PRODUCTION COMPANY

KILBOURNE GEOTHERMAL PROSPECT
DONA ANA COUNTY, NEW MEXICO

GEOTHERMAL EXPLORATION PROGRAM
PROPOSED TEMPERATURE
GRADIENT HOLE LOCATIONS

SCALE IN MILES



JBS

HOUSTON, TEXAS

OCT, 1977

LEGEND

APC GEOTHERMAL LEASE PARCELS

PROPOSED LOCATION OF 2000'
TEMPERATURE GRADIENT HOLES



DILLO MOUNTAINS

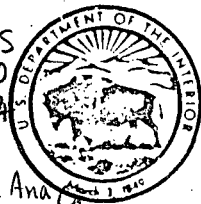
Bourne Hole

Hunts Hole

Phillips

Hole

FC
USGS
AGSO
Memo
NM
Dona Ana Co.



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

11/18/77

Memorandum

To: Interested Parties

NOV 18 1977

From: Area Geothermal Supervisor

Subject: Plan of Operation, Anadarko Production Company, Federal Leases
NM-25718 through NM-25726, Kilbourne Hole KGRA, Dona Ana County,
New Mexico (Ref: 1760 AGS-73-NM25721 EA #103)

Anadarko Production Company has submitted a Plan of Operation in accordance with 30 CFR 270.78(b)(5) to drill sixteen (16) 500' and four (4) 2000' temperature gradient holes on Federal leases NM-25718 through NM-25726 in the Kilbourne Hole KGRA, Dona Ana County, New Mexico. A copy of the Plan of Operation is attached for your review and files.

An Environmental Analysis (EA #103) will be prepared by the Office of the Area Geothermal Supervisor for the proposed action. You are invited to participate in a field inspection led by Ken Bull, Salt Lake City District Geothermal Supervisor, USGS, on November 30, 1977. Participants are asked to meet at 9:30 a.m. at the U.S. Bureau of Land Management, Las Cruces District Office, 1705 N. Valley Drive, Las Cruces, New Mexico, 87401 (FTS 572-0257, COM 505-523-5571).

All comments concerning the proposed action must be received no later than December 14, 1977, by:

Area Geothermal Supervisor
Conservation Division
U.S. Geological Survey
345 Middlefield Road MS 92
Menlo Park, California 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. Further, we solicit your comments and suggestions on the proposed action even though you may not be able to participate in the inspection. All comments will be given serious consideration in the preparation of the environmental analysis and any subsequent conditions of approval thereafter.

UNIVERSITY OF UTAH
RESEARCH INSTITUTE
EARTH SCIENCE BLDG.

The Area Geothermal Supervisor's Office does not send draft Environmental Analyses (EA's) to interested parties for review for work proposed by lessees pursuant to 30 CFR 270.78. 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 and the Salt Lake City District Geothermal Supervisor's Office, as well as the appropriate BLM DM Office and the State Director, BLM Office.

A handwritten signature in black ink, appearing to read "Reid Stone". The signature is written in a cursive style with a long horizontal stroke extending to the right.

INTERESTED PARTIES

ANADARKO PRODUCTION CO. (100% WI)

PLAN OF OPERATION: (16) 500' and (4) 2000' TGH's (EA #103)

FEDERAL LEASES: NM-25718 through NM-25726

KILBOURNE HOLE KGRA

DONA ANA COUNTY, NEW MEXICO

State Director
Bureau of Land Management
P.O. Box 1449
Santa Fe, New Mexico 87501
FTS 476-1217 (505-988-1217)

District Office
Bureau of Land Management
Attn: Daniel Rathbun
P.O. Box 1420
Las Cruces, New Mexico 88001
FTS 572-0257 (505-523-5571)

Area Manager
Bureau of Land Management
Las Cruces-Lordsburg Resource Area
Attn: Gary McVicker
P.O. Box 1420
Las Cruces, New Mexico 88001
FTS 527-0257 (505-523-5571)

District Geothermal Supervisor
U.S. Geological Survey-Consv. Div.
350 South Main Street, Room 442
Salt Lake City, Utah 84111
FTS 588-5245 (801-524-5245)

Area Geologist, SRMA
U.S. Geological Survey-Consv. Div.
P.O. Drawer 1857
Roswell, New Mexico 88201
FTS 476-9257 (505-622-9257)

Conservation Manager, Central Region
U.S. Geological Survey
Attn: Don Libbey
7200 West Alameda Ave.
Lakewood, Colorado 80226
FTS 234-2855 (303-234-2855)

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

Geothermal Environmental Advisory
Panel-U.S. Geological Survey
Attn: Max Crittenden
345 Middlefield Road, MS 75
Menlo Park, California 94025
FTS 467-2317 (415-323-8111, x2317)

Regional Director, Region 2
U.S. Fish and Wildlife Service
P.O. Box 1306
Albuquerque, New Mexico 87103
FTS 474-2321 (505-766-2321)

Field Supervisor
Ecological Services
U.S. Fish and Wildlife Service
Attn: Robert Bridges
P.O. Box 1306
Albuquerque, New Mexico 87103
FTS 474-2914 (505-766-2914)

U.S. Fish and Wildlife Service
Office of Biological Services
Attn: L.A. Mehrhoff
4620 Overland Road, Room 210
Boise, Idaho 83705
FTS 554-1931 (208-834-1931)

U.S. Department of Energy
Div. of Geothermal Energy, 3rd Floor
Attn: Bert Barnes
20 Massachusetts Ave. NW
Washington, D.C. 20545

U.S. Environmental Protection Agency
Environmental Monitoring and Support
Attn: Michael O'Connell
P.O. Box 15072
Las Vegas, Nevada 89114
FTS 595-2969 (702-736-2969)

New Mexico Dept. of Fish and Game
Attn: William Huey
Villagra Building
Santa Fe, New Mexico 87503
FTS 476-2143 (505-827-2143)

INTERESTED PARTIES: ANADARKO PRODUCTION COMPANY
(16) 500' and (4) 2000' TGH's (EA #103)

New Mexico State Land Office
Attn: Jack Kennedy
P.O. Box 1148
Santa Fe, New Mexico 87501
FTS 476-5378

New Mexico Energy Resources Board
Attn: Dennis Fedora
P.O. Box 2770
Santa Fe, New Mexico 87501
(505-827-2471)

New Mexico State Engineers Office
Attn: S.E. Reynolds
Bataan Memorial Building
State Capitol
Santa Fe, New Mexico 87503
(505-827-2526)

State of New Mexico
New Mexico Bureau of Mines
Socorro, New Mexico
(505-835-5402)

Oil Conservation Commission
Attn: Carl Ulvog
P.O. Box 2088
Santa Fe, New Mexico 87501
(505-827-2434)

Environmental Improvement Agency
Attn: Thomas Baca
P.O. Box 2348
Crown Building
Santa Fe, New Mexico 87503
(505-827-5271)

University of Utah Research Institute
Attn: Phillip Wright
391 Chipeta Way
Salt Lake City, Utah 84108
(801-581-5226)

Amax Exploration, Inc.
Attn: Larry Hall
4704 Harlan Street
Denver, Colorado 80212
(303-433-6151)

California Energy Company, Inc.
Attn: Paul Storm
P.O. Box 3909
Santa Rosa, California 95402

Chevron USA, Inc.
Minerals Staff
Attn: Pat Smith
P.O. Box 3722
San Francisco, California 94119
(415-894-2726)

Dresser Industries, Inc.
MAGCOBAR Division
Attn: Jim Fox
475 17th Street, Suite 1600
Denver, Colorado 80202

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

GeothermEx
Attn: James Koenig
901 Mendocino Avenue
Berkeley, California 94707
(415-524-9242)

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

Gulf Mineral Resources Company
Exploration Dept.
Attn: E.W. Westrick
1720 South Bellaire Street
Denver, Colorado 80222
(303-758-1700)

Hydro-Search, Inc.
Attn: Virgil Wilhite
333 Flint Street
Reno, Nevada 89501
(702-322-4137)

INTERESTED PARTIES: ANADARKO PRODUCTION COMPANY

(16) 500' and (4) 2000' TGH's (EA #103)

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

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

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

Republic Geothermal, Inc.
Attn: Dwight Carey
11823 East Slauson Ave., Suite 1
Santa Fe Springs, California 90670

Republic Geothermal, Inc.
Attn: Jim Sheidenberger
2544 Cleveland Avenue
Santa Rosa, California 95401

Sunoco Energy Development Company
Attn: C. Clark, Jr.
12700 Park Central Place, Ste. 1500
Dallas, Texas 75251
(214-744-4300)

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

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

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

Mr. Clyde E. Kuhn
2207 Carrol Street
Oakland, California 94606
(415-451-3714)

Tom Merlan, SHPO
New Mexico State Planning Office
505 Don Gastar Avenue
Santa Fe, New Mexico 87501

Dona Ana County Manager
City Courthouse, Room 104
Las Cruces, New Mexico 88001
(505-523-5634)

cc: Reading File 101-02
Subj. File 1760 (2403-01a) NM-25721
(POO for AGS-71-NM25721 EA#10)
ENV EA#103
ENG
OPE - Workbook
OPE - Example Book

BGKarnacki/ew/11/14/77

MAR 20 1978

UNITED STATES
DEPARTMENT OF THE INTERIOR

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



FC
USGS
AGSO
Memo 4
NM
Dona Ana Co.
3/17/78

MAR 17 1978

JPR

Memorandum

To: Interested Parties

From: *Acting* Area Geothermal Supervisor

Subject: Plan of Operation, Chevron Resources Company, Leases NM-31729
and NM-31731, Radium Springs KGRA; Dona Ana County, NM
Ref: 1760 AGS-79-NM31729 EA#109-8

Chevron Resources Company has submitted a Plan of Operation in accordance with 30 CFR 270.78 (b) (5) to drill seven (7) 500' temperature gradient holes, with option to deepen to 2000', on Federal Leases NM-31729 and NM-31731 in the Radium Springs KGRA, Dona Ana County, NM. A copy of the Plan of Operation is attached for your review and files.

An Environmental Analysis (EA#109-8) will be prepared by the Office of the Area Geothermal Supervisor for the proposed action. You are invited to participate in a field inspection led by Ken Bull, Salt Lake City District Geothermal Supervisor, USGS, on March 30, 1978. Participants are asked to meet at 8:30 a.m. at the Bureau of Land Management Las Cruces District Office, 1705 N. Valley Dr., P.O. Box 1420, Las Cruces, NM 88001, Tel: (505) 523-5571, FTS 572-0257.

Parties planning to attend should notify the Salt Lake City District Geothermal Supervisor by March 24, 1978.

All comments concerning the proposed action must be received no later than April 10, 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

UNIVERSITY OF UTAH
RESEARCH INSTITUTE
EARTH SCIENCE LAB.

Further, we solicit your comments and suggestions on the proposed action even though you may not be able to participate in the inspection. All comments will be given serious consideration in the preparation of the environmental analysis and any subsequent conditions of approval thereafter.

The Area Geothermal Supervisor's Office does not send draft Environmental Analyses (EA's) to interested parties for review for work proposed by lessees pursuant to 30 CFR 270.78. 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 and the Salt Lake City District Geothermal Supervisor's Office, as well as the appropriate BLM District Manager's Office and the New Mexico State Director, BLM Office.

Barry A. Boudreau

Attachment

INTERESTED PARTIES for EA#109-8
CHEVRON RESOURCES COMPANY
Plan of Operation - 7-500' STGH's
Federal Leases NM-31729 and NM-31731
Radium Springs KGRA Area
Dona Ana County, New Mexico
AGS-79-NM31729

U.S. Geological Survey, Conserv. Div.
District Geothermal Supervisor
Attn: Ken Bull
350 South Main St., Rm. 442
Salt Lake City, UT 84111
(801) 524-5245
FTS: 588-5245

U.S. Geological Survey
Conservation Manager, Central Region
Attn: Area Geologist
7200 West Alameda Ave., Denver, CO
(303) 234-2855
FTS: 234-2855

U.S. Geological Survey, Conserv. Div.
Attn: Area Geologist, SRMA
P.O. Drawer 1857
Roswell, NM 88201
(505) 622-9257
FTS: 476-9257

Geothermal Env. Advisory Panel
Attn: Max Crittenden
345 Middlefield Rd., MS 75
Menlo Park, CA 94025
(415) 323-8111, Ext. 2317
FTS: 467-2317

Bureau of Land Management
New Mexico State Director
P.O. Box 1449
Santa Fe, NM 87501
(505) 988-1217
FTS: 476-1217

Bureau of Land Management
Socorro District Office
P.O. Box 1456
Socorro, NM 87801
(505) 835-0412
FTS: 474-5511

Bureau of Land Management
Las Cruces District Office
P.O. Box 1420
Las Cruces, NM 88001
(505) 523-5571
FTS: 572-0257

Bureau of Land Management
Geothermal Coordinator
Attn: Ted Holland
Denver Federal Center, Bldg. 50
Denver, CO 80225
(303) 234-5098
FTS: 234-5098

U.S. Fish and Wildlife Service
Regional Director, Region 2
P.O. Box 1306
Albuquerque, NM 87103
(505) 766-2321
FTS: 474-2321

U.S. Fish and Wildlife Service
Ecological Services
P.O. Box 1306
Albuquerque, NM 87103
(505) 766-2914
FTS: 474-2914

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

U.S. Department of Energy
Div. of Geothermal Energy, 3rd Floor
Attn: Bert Barnes
20 Massachusetts Ave. NW
Washington, D.C. 20545
(202) 376-4902
FTS: 376-4902

INTERESTED PARTIES for CHEVRON RESOURCES COMPANY, EA#109-8

U.S. Environmental Protection Agency
Environmental Monitoring and Support
Attn: Michael O'Connell
P.O. Box 15072
Las Vegas, NV 89114
(702) 736-2969
FTS: 595-2969

Environmental Improvement Agency
Attn: Thomas Baca
P.O. Box 2348
Crown Building
Santa Fe, NM 87503
(505) 827-5271

State of New Mexico Offices:

New Mexico Dept. of Fish and Game
Attn: William Huey
Villagra Building
Santa Fe, NM 87503
(505) 827-2143
FTS 476-2143

New Mexico State Land Office
Attn: Jack Kennedy
P.O. Box 1148
Santa Fe, NM 87501
(505) 827-5378
FTS: 476-5378

New Mexico Energy Resources Board
Attn: Dennis Fedora
P.O. Box 2770
Santa Fe, NM 87501
(505) 827-2471

New Mexico State Engineers Office
Attn: S.E. Reynolds
Bataan Memorial Building
State Capitol
Santa Fe, NM 87503
(505) 827-2526

New Mexico Bureau of Mines
Socorro, NM
(505) 835-5402

Oil Conservation Commission
Attn: Carl Ulvog
P.O. Box 2088
Santa Fe, NM 87501
(505) 827-2434

New Mexico State Planning Office
Attn: Tom Merlan
New Mexico State Historical Preserv. Off.
505 Don Gastar Ave.
Santa Fe, NM 87501
(505) 827-5191
FTS: 476-5191

Dona Ana County Manager
City Courthouse, Rm. 104
Las Cruces, NM 88001
(505) 523-5634

University of Utah Research Institute
Earth Science Laboratories
Attn: Phillip Wright
391 Chipeta Way
Salt Lake City, UT 84108
(801) 581-5226

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

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

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

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Minerals Staff
Attn: Pat Smith
P.O. Box 3722
San Francisco, CA 94119
(415) 894-2726

INTERESTED PARTIES for CHEVRON RESOURCES COMPANY, EA#109-8

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Richardson, TX 75080
(214) 238-9554

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

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

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

Getty Oil Company
Attn: Dan Sparks
P.O. Box 5237
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(805) 399-2961

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(303) 758-1700

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Attn: Virgil Wilhite
333 Flint St.
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(702) 322-4137

ICF, Inc.
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1990 M St. NW
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Occidental Geothermal, Inc.
Attn: B. Wyant
5000 Stockdale Highway
Bakersfield, CA 93309
(805) 327-7351

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

Republic Geothermal, Inc.
Attn: Dwight Carey
11823 East Slauson Ave., Suite 1
Santa Fe Springs, CA 90670
(213) 945-3661

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

Southland Royalty Company
Attn: Jere Denton
1600 First National Bank Bldg.
Fort Worth, TX 76102
(817) 390-9200

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

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

INTERESTED PARTIES for CHEVRON RESOURCES COMPANY, EA#109-8

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

VTN
Attn: Dick Hallett
2301 Campus Dr.
P.O. Box C-19529
Irvine, CA 92713
(714) 833-2450

Mr. Clyde E. Kuhn
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Oakland, CA 94606
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Mr. Jack McNamera
Law Center, Rm. 422
University of Southern California
(213) 741-7569

Warren M. Woodward
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Reno, NV 89511
(702) 825-3079

bcc: Reading file 101-02
(Subj. file 1760 (2403-01a) NM- 31729 (POO for AGS-79-NM31729 EA#109-8)
ENV EA# 109-8 R. Hoops
ENG
OPE

ADDITION TO PLAN OF OPERATION (EXHIBIT "A")
SHALLOW TEMPERATURE GRADIENT HOLES
DEEPER THAN 500 FEET

The normal drilling procedures (Exhibit "A") will be changed to adhere to U.S.G.S. requirements when drilling shallow temperature gradient holes deeper than 500 feet. The logistical and environmental factors will remain the same since the drilling equipment is identical. The changes for the holes deeper than 500 feet are as follows:

1. An 8 3/4 inch hole will be drilled to 10 % of proposed total depth and 6 5/8 inch (O.D.) welded, steel casing will be lowered into the hole and cemented into place. The cement will be allowed to set for a minimum of 24 hours.
2. A small cellar will then be dug to allow for the blow-out preventer and flange to be attached to the surface casing beneath the truck-mounted drill rig.
3. A bag or ram type blow-out prevention unit will be bolted into place. The blow-out equipment will conform to U.S.G.S. requirements.
4. The remaining hole to proposed total depth will be completed as a temperature gradient hole as described in Exhibit "A".
5. Drilling operations will be suspended immediately if:
 - a. Mud-out temperature reaches 175°F and cannot be lowered or stabilized by the addition of cooling devices or materials.
 - b. Flowing steam or hot water at or greater than 175°F is encountered.
6. If the temperature limit as described in item "5a" is reached, the hole will be completed as a temperature gradient hole or abandoned as described in Exhibit "A".
7. If the temperature limit as described in "5b" is reached, the hole will be completed as a temperature gradient hole by inserting 1 inch (I.D.) black steel pipe and filling the hole with drilling mud and laying a 100 foot plug both above and below the casing shoe. Then a ten foot cement surface plug will be added. If the hole is to be abandoned the 1 inch black steel pipe will not be placed in the hole.
8. Should cold artesian flow be encountered, the hole will be completed as a temperature gradient hole or abandoned as in Item "6".

9. A 10'x10' sump will be dug on the drill site to provide adequate water for cooling and well control. Upon completion of the drilling operations, it will be filled in and the ground surface restored as near as practical to its original condition.

CHEVRON RESOURCES COMPANY

PLAN OF OPERATION

SHALLOW TEMPERATURE GRADIENT HOLES

EXHIBIT "A"

1. Description of the Operation

The Shallow Temperature Observation Hole Program, as conducted by the Chevron Resources Company, requires the drilling of 250-500 foot holes with a diameter of 4-3/4 to 5-3/8 inches. The number of holes will vary with the size of the area to be evaluated. These holes will be drilled by a state licensed drilling contractor using a truck mounted drill rig. The mud-out temperature will be monitored continually during the actual drilling.

Once each hole is completed a 1 inch (I.D.) black steel pipe, sealed at the bottom, will be placed in the hole with the top being 8-12 inches from the ground surface. The pipe is then filled with water and capped. The hole is then back-filled with cuttings and/or drilling mud to within 10 feet of the surface. The remaining void is then filled with cement.

As necessary, the pipe is unearthed and a temperature probe is lowered to total depth. Once the series of temperature logs is completed, the pipe is then filled with cement and buried. The ground surface is then smoothed and returned to as nearly as practical to pre-drilling condition.

The drilling operations will be suspended if the mud-out temperature reaches 125°F and cannot be lowered or stabilized with the addition of well-head or cooling devices. The hole will then be completed as a temperature gradient hole or abandoned.

The drilling operations will also be suspended if flowing hot water or steam at 150°F or more is encountered. The hole will then be completed as a temperature gradient hole by placing 1 inch (I.D.), black, steel pipe to total depth and cementing from total depth to surface. If the hole is to be abandoned it will be plugged with cement from total depth to surface.

If cold artesian flow is encountered the hole will be completed or abandoned as described in the paragraph above.

The equipment for drilling, as well as the drill rig, consists of a water truck and a light pickup truck. The temperature probe consists of a thermometer or thermister device on the end of a wire line and a small tripod-mounted wheel for lowering the probe down the hole.

2. The following plan of operations as required by Section 270.34 of the Federal Regulations for Geothermal Operations on public acquired and

withdrawn lands, covering paragraphs (a) through (h), is submitted pursuant to Section 270.78:

- (a) The hole locations, lease numbers (Exhibit "B") and outline of a typical drill site layout (Exhibit "C") are attached.
- (b) No new roads will be constructed for this operation. Access to area of operations will be along existing roads.
- (c) No water sources on federally administered lands will be developed and no road building material will be used.
- (d) Campsites, airstrips or other supporting facilities will not be required.
- (e) Minimal access scars, limited mainly to tire impressions, may occur during the course of drilling the hole. All such disturbances will be restored as nearly as possible to pre-drilling condition. All materials will be removed from the area once the hole is completed.
- (f) Topographic features of the drill site areas and drainage can be observed from the attached map (Exhibit "B").
- (g) If drilling mud or foam are used they will be contained by portable steel containers. When the hole is completed, the mud residue will be dried and spread on the ground surface.
- (h) The Chevron Resources Company will use all reasonable precautions to prevent waste of geothermal resources and other natural resources found in the area. At all times during operations the following precautions will be taken:

Traffic will be light and only when necessary. Light pickups will be used whenever possible. To the extent possible, only existing roads, fence lines or jeep trails will be used.

Site preparation will be limited to driving the truck-mounted drill rig to the site and setting it up for drilling.

Since the topography is not severe, the construction of drill pads will not be required.

All vehicles will be equipped with spark arresters and will carry the required fire-fighting equipment and all adequate fire protection measures will be taken to prevent any damage from fire.

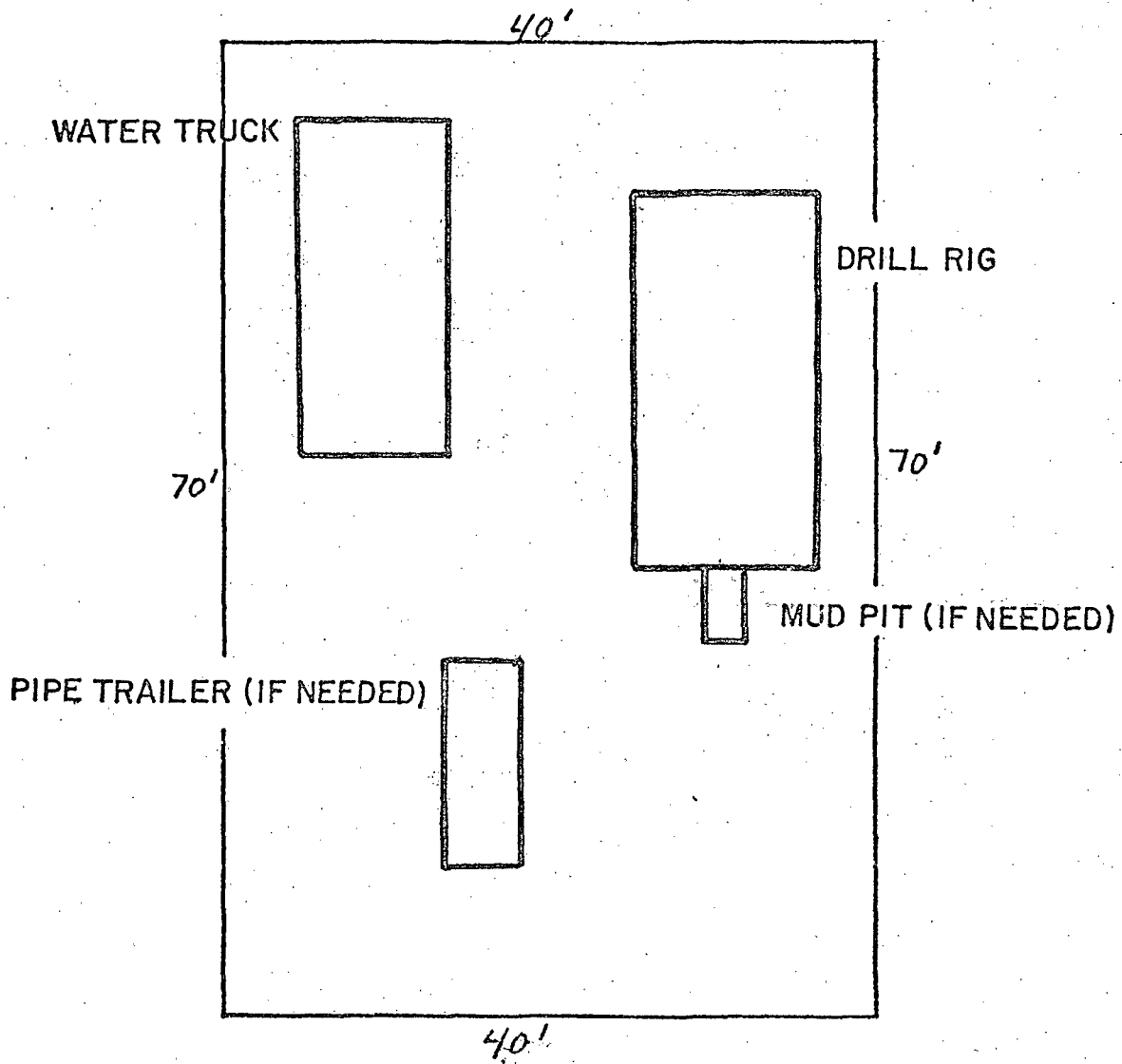
No water or other material will be pumped onto the surface of the ground which might result in soil erosion. Appropriate care will be taken so that natural drainage will not be affected and so that no pollution can occur to surface or ground water.

Geothermal operations will have no material impact on fish and the

disturbance of wildlife and vegetation in the area will be minor due to the short duration of operations and the limited number of personnel comprising the field crews. No significant damage or destruction of vegetation will occur and unavoidable dislocation of wildlife will be short term only.

Mufflers and other available devices will be used on all vehicles to control noise pollution. Minor air pollution will occur from vehicle exhaust, but all feasible measures will be used to control this pollution, in compliance with applicable laws, rules and regulations. Minor air pollution will occur from dust caused by vehicle traffic on dirt roads. Since this pollution is dependent upon natural road conditions and is temporary it therefore has no significant affect on the areas environment.

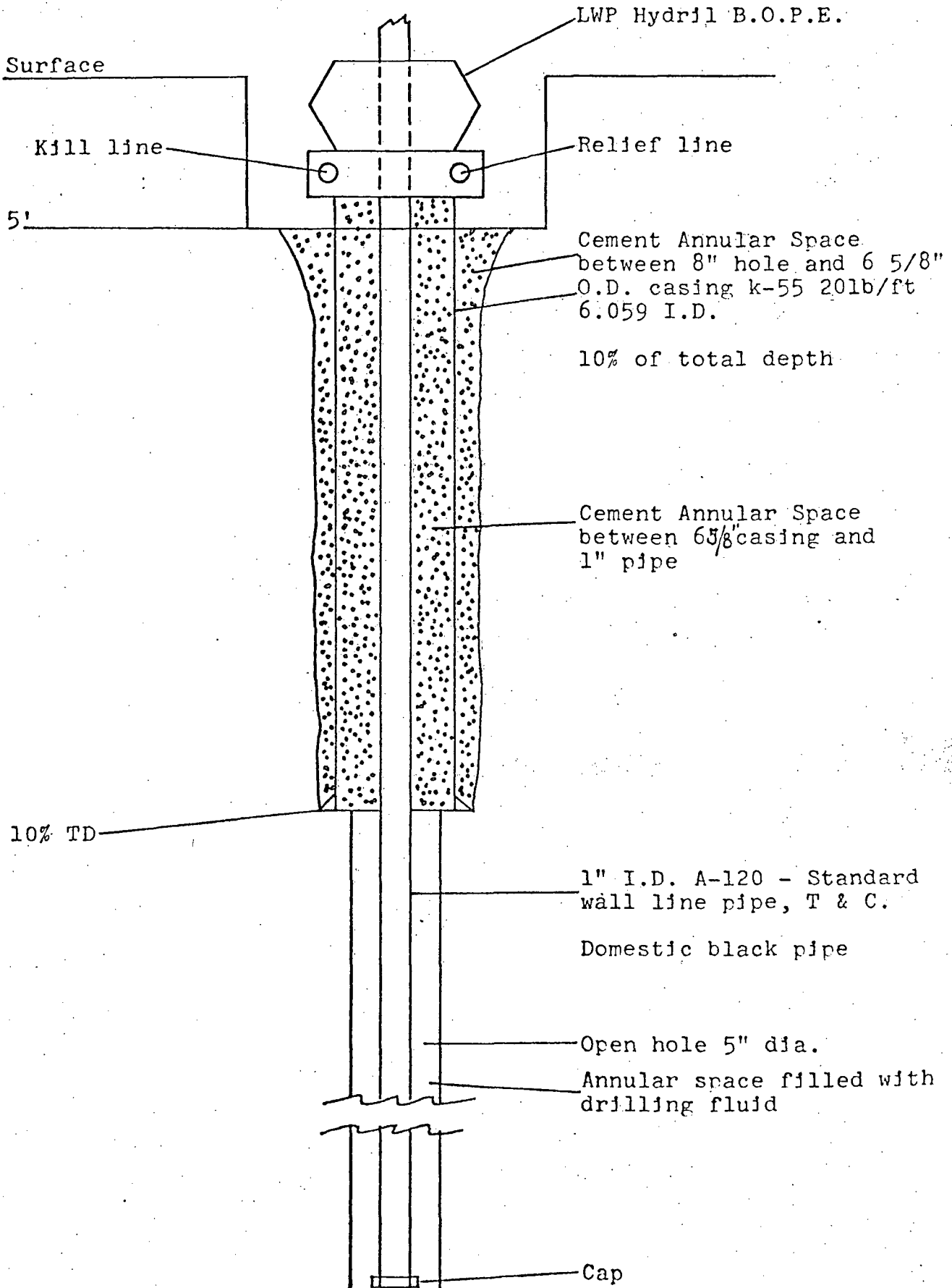
There will be very little hazard to public health and safety due to the lack of population in the area. All such hazard is confined to the crew or the rig. All appropriate safety measures and equipment will be utilized.



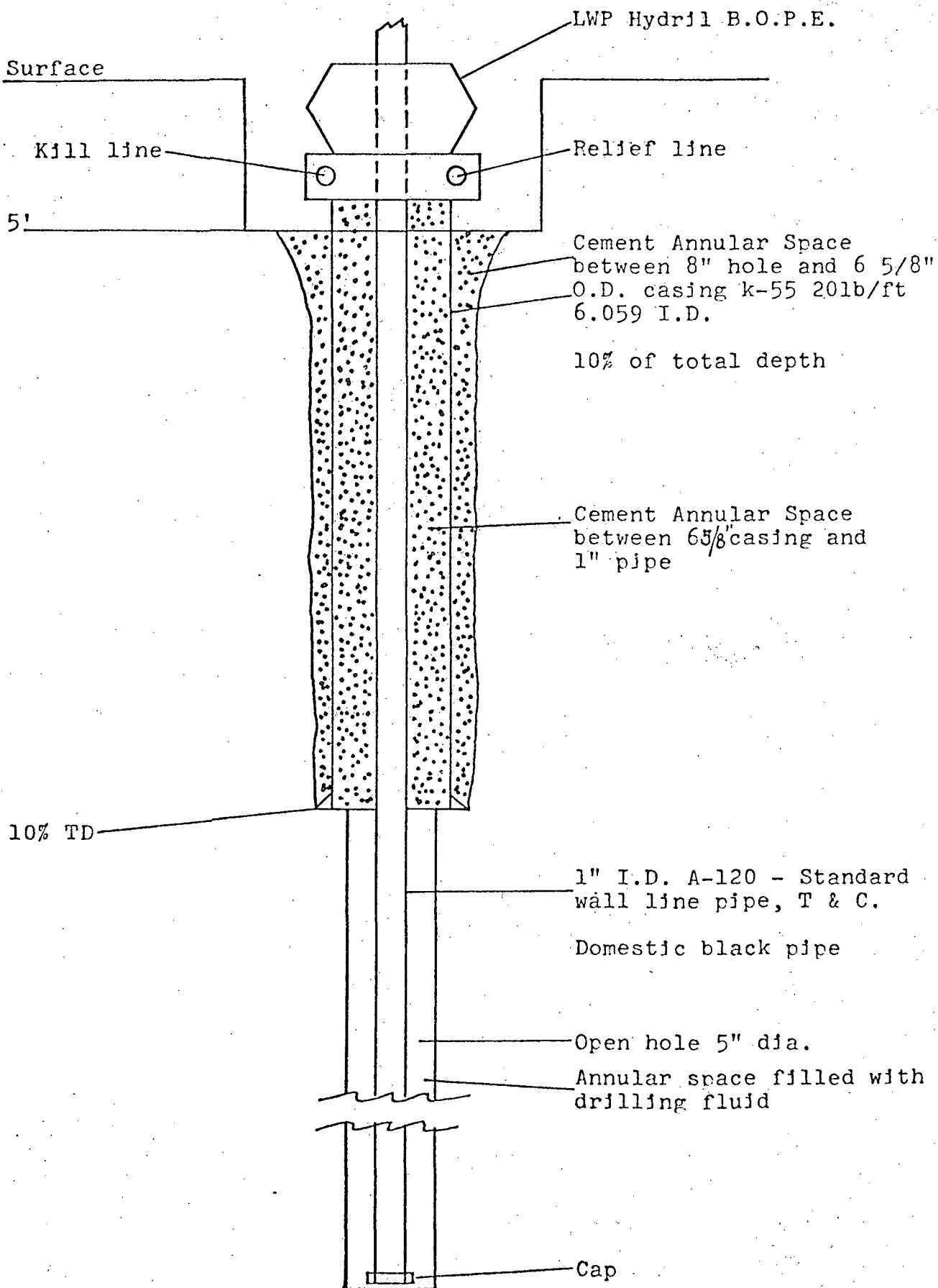
SCHEMATIC OF SHALLOW TEMPERATURE HOLE DRILL SITE

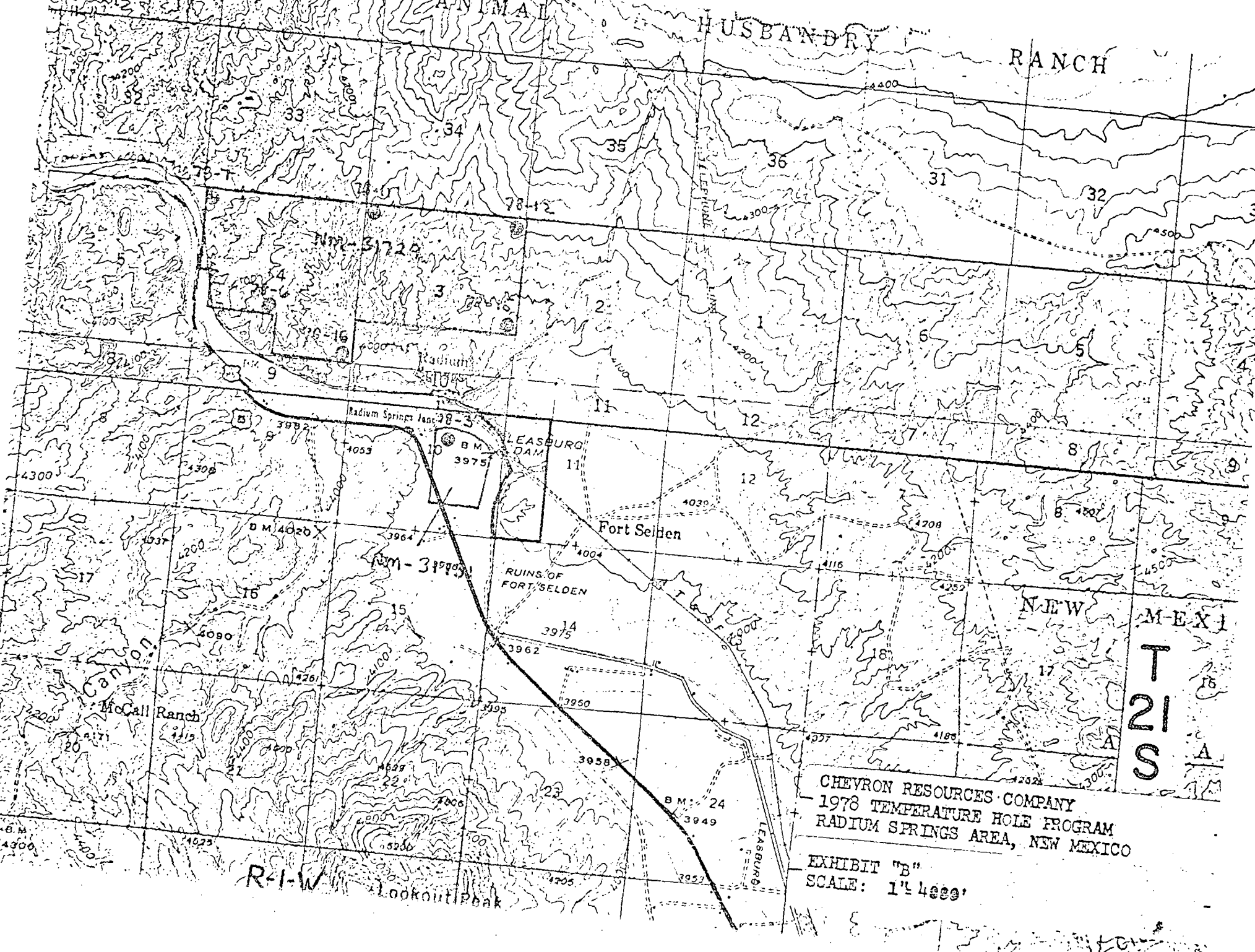
EXHIBIT "C"

Schematic Diagram Temperature Gradient Well and B.O.P.E.



Schematic Diagram Temperature Gradient Well and B.O.P.E.





ANIMAL HUSBANDRY RANCH

NEW MEXICO
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S

CHEVRON RESOURCES COMPANY
1978 TEMPERATURE HOLE PROGRAM
RADIUM SPRINGS AREA, NEW MEXICO

EXHIBIT "B"
SCALE: 1"=4000'

R-I-W
Lookout Peak