Finding of No Significant Impact
for the
Geothermal Temperature Gradient Core Drill, Santiam Pass

AGENCY: Department of Energy (DOE)

ACTION: Finding of No Significant Impact (FONSI) for the
Geothermal Temperature Gradient Core Drill, Santiam Pass

SUMMARY: DOE is proposing to share in the cost of drilling a 3000-ft core hole to evaluate temperature gradients, subsurface geology and the geothermal potential of an area in the Cascade Mountains. The proposed core hole will be located in the Deschutes National Forest in Oregon, near Santiam Pass. The proposed action has been described in the Environmental Assessment (EA) for Geothermal Temperature Gradient Core Drill Santiam Pass Area (No. OR-050-9-51) prepared by the U.S. Bureau of Land Management (BLM). DOE has determined that the BLM EA adequately addresses the impacts of the proposal and is hereby adopting the EA as DOE/EA-0410-14 in partial fulfillment of its NEPA responsibilities.

Based upon a review of the EA and an independent analysis, DOE has concluded that the proposed corehole drilling project does not constitute a major Federal action significantly affecting the quality of the human environment within the meaning of NEPA. Therefore, an environmental impact statement will not be prepared.

FOR FURTHER INFORMATION, CONTACT:

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COPIES OF THE EA ARE AVAILABLE FROM:

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MASTER

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SUPPLEMENTARY INFORMATION:

I. Background

Oxbow Geothermal of Reno, Nevada, has applied to the BLM for a Geothermal Drilling Permit for a single temperature gradient well in the Sisters Ranger District of the Deschutes National Forest, Oregon. This temperature gradient well is needed to evaluate the geothermal potential of the area and to provide information about the geology of the Cascade Mountains.

Pursuant to the Geothermal Steam Act of 1970 (30 USC 1001-1025), the BLM has the authority to lease federal lands for geothermal exploration and development and issues drilling and operations permits for such actions. The Santiam Pass area was leased for geothermal resources under the Belknap-Foley Geothermal Area Final Environmental Statement issued in September, 1981. The EA recently issued by the BLM documents the review of the environmental consequences of the proposed corehole drilling operation.

II. Proposed Action

DOE's proposed action is to share in the cost of corehole drilling and data analysis so that all scientific information gained from the well will be public information. The proposed 3000-ft. corehole will be drilled at the SE1/4 NW1/4 SE1/4 Section 24, T. 13 S., R. 71/2 E on the Deschutes National Forest in Jefferson County, Oregon. The proposed drilling program will entail the following actions:

1. Drill to approximately 500 feet and set surface casing.
2. Install blowout prevention equipment.
3. Core to the total depth (3000 ft).
4. Run 2.5-inch diameter pipe to total depth.

After drilling and completion the well will be capped, but will be available for periodic temperature measurements for a period of at least one year. There will be no surface occupancy of the site during this time. After the monitoring period, the well will be plugged and the remainder of the site rehabilitated in accordance with BLM and U.S. Forest Service requirements.

The drill site will be positioned on an existing clearing that has previously been disturbed and will cover an area approximately 100 feet by 100 feet. On this drill pad will be placed the truck-mounted drill rig, water tank, mud pit (s), fuel storage, a small work trailer and workshop.

All drilling fluids will be formulated from non-toxic components as defined by EPA. Drilling mud and fluids will be contained in steel or plastic-lined earthen pits and removed from the drill site upon project completion. Water for drilling will be obtained under a State of Oregon water right and hauled in by truck.

Conditions of Approval instituted by the BLM as part of the drilling permit include stringent provisions for discharge of fluids, control of spills, installation and testing of blowout prevention equipment and other equipment for well control, use of hydrogen sulfide (H₂S) detectors, and monitoring drilling fluid temperatures. These provisions have been applied to most corehole drilling projects permitted by the BLM and have proven to be effective for environmental protection.

Alternatives to the proposed action described above are: (1) to allow drilling at a different site, and (2) to disallow temperature gradient drilling at the site. The EA analysis indicates that alternate sites are less preferable than the proposed site for both environmental and geologic reasons.

III. Environmental Impacts

Potential environmental impacts of the proposed action and alternatives were analyzed in the EA. No significant impacts were determined in any category under routine or unplanned conditions. The results of the analysis are summarized below.

1) Review of Previous Drilling

Geothermal exploration on the Deschutes National Forest has been ongoing since 1974. Since 1975 there have been 37 drill or core holes permitted, ranging in depth from less than 1000 feet to greater than 4000 feet, to measure the temperature gradients of various areas of the forest. This drilling has occurred with minimal to no impact to the surface and subsurface resources. Surface impacts associated with temperature gradient core drilling are temporary in nature since all well sites are restored in accordance with lease stipulations and permit requirements. As a result of the experience gained in permitting and supervising these temperature gradient wells the BLM has developed a set of conditions of approval for the wells that have proven to mitigate all of the environmental concerns involved in the drilling of these types of wells.

2) Wildlife

The use of an existing cleared area and the minimal and short-term nature of the disturbance will result in little, if any, impacts to wildlife. Because of the time of year of the proposed action (summer), fawning and calving (spring) will not be impacted. The only threatened, endangered or sensitive specie that might be present in the area is the Northern Spotted Owl. The general project location is considered low quality habitat because of the tree species and the size of the trees. The Deschutes National Forest has examined the area using established protocol and has not located any owls. Since no trees will be removed, the Spotted Owl habitat will only be temporarily impacted by the presence of the drill rig. The existing habitat will still be present once drilling activity has ceased. Therefore, no impacts to the Northern Spotted Owls are expected.

3) Wilderness Values, Recreation, and Visual

There are no identified areas in the proposed project vicinity which have been designated as wilderness, areas of critical environmental concern, prime or unique farmlands, wild and scenic rivers or special areas. Therefore there will be no impacts to any of these special designation areas. The proposed project could possibly be heard from the Pacific Crest Trail and the Mt. Jefferson Wilderness Area. However, both the project and the resultant sound will be temporary in nature. Considering the proximity to Highway 20/126, the noise increase is not expected to be discernible to most people. Because the location of the proposed project is at an elevation higher than Highway 20/126 and because of the screening by the trees, the project will not be evident to the casual observer nor visually evident from the travel corridor.

4) Cultural Resources

A cultural resource survey conducted in the area by the U.S. Forest Service detected no cultural resources. As much for scientific interest as for potential mitigation, an archaeologist may be present during any excavations for the cellar and sumps in order to examine the near surface lithology. Should cultural material be found during these excavations, earth disturbing activities will stop until the site has been examined and a determination of effect completed.

5) Water Resources, Floodplains and Wetlands

There are no floodplains or permanent surface water in the proposed project area. There are a few very small wetland areas in the vicinity which will not be disturbed by site preparation activities. Any drainage from the drill pad will be contained by placing a small berm at the downslope side of the drill pad. Potential contamination of shallow groundwater resources will be prevented by the use of surface casing which precludes the loss of geothermal or drilling fluids from the well to shallow aquifers.

6) Well Blowout Hazard

Blowouts in which steam, gases, or hot water escape uncontrolled pose an environmental hazard in geothermal operations, but the risk is low. The potential adverse environmental effects of accidental releases of geothermal fluids include air contamination from gaseous emissions, pollution of surface and shallow groundwater resources, and hazards to health and safety of workers. Blowouts in exploratory work are highly unlikely due to required well control programs which include installation of blowout prevention equipment and periodic equipment testing and required safety drills. There have been no blowouts on core holes with the institution of these requirements and procedures. In the unlikely event of a blowout, the small diameter of the hole would prevent large quantities of materials from escaping. Provisions will be in place to enable the lessee to take immediate measures to control the well and resulting impacts on the surrounding environment would not be discernible.

IV. Finding

Based on the EA prepared by BLM and adopted as DOE/EA-0410, and DOE's independent analysis, the proposed core hole drilling does not constitute a major Federal action significantly affecting the quality of the human environment within the meaning of NEPA. An environmental impact statement for the proposed action is not required.

Issued in Washington, D.C., on _____, 1989.

Peter N. Brush
Acting Assistant Secretary
Environment, Safety and Health

S/
Gerube 9/27/89

U.S. Department of Energy

Assistant Secretary, Conservation and Renewable Energy

**Environmental Assessment (adopted) - Geothermal Temperature Gradient
Core Drill, Santiam Pass, Oregon**

(DOE/EA - 0410)

August 1989

**Conservation and Renewable Energy
U.S. Department of Energy
Forrestal Bldg.
1000 Independence Ave., SW
Washington, DC 20585**

Environmental Assessment
No. OR-050-9-51

GEOHERMAL TEMPERATURE GRADIENT
CORE DRILL
SANTIAM PASS AREA

I. NEED FOR ACTION

Oxbow Geothermal of Reno, Nevada has applied for a Geothermal Drilling Permit for a single temperature gradient well on the Sisters Ranger District of the Deschutes National Forest. This temperature gradient well is needed to evaluate the geothermal potential of the area and to provide information about the geology of the Cascade Mountains. This drill hole will be jointly funded by the applicant and the U.S. Department of Energy and therefore all scientific information gained from the well will be public information. The area was leased for geothermal resources under the Belknap-Foley Geothermal Area Final Environmental Statement issued in September 1981. This environmental assessment documents the review of the environmental consequences of the proposed drilling operation.

II. PROPOSED ACTION AND ALTERNATIVE

General Project Description Applicable to All Alternatives - The drill site would be positioned on an existing clearing that has previously been disturbed and would cover an area approximately 100 feet by 100 feet. On this drill pad would be placed the truck-mounted drill rig, water tank, mud pit(s), fuel storage, a small work trailer and workshop. All drilling fluids would be formulated from non-toxic components (as defined by EPA). Drilling mud and fluids would be contained in steel or plastic lined earthen pits.

Water for drilling would be hauled in by truck and obtained under State of Oregon permit. Blowout prevention equipment will be installed after surface casing is in place. Appendix B contains the Conditions of Approval which have been used on most previous temperature gradient wells. These have proven to be more than adequate to protect all of the environment, these Conditions of Approval will be made a part of the approval for the proposed project. Informal scoping discussions were held with Federal and State agency individuals and some interested public. The issues which were identified include the Northern Spotted Owl habitat, the no surface occupancy stipulation and the small "wetlands" in the area.

Proposed Action - It is proposed to drill a 3000 foot core hole at the SE1/4 NW1/4SE1/4 Section 24, T. 13 S., R. 71/2 E. The project would entail drill site preparation, drilling to approximately 500 feet and setting surface casing, installing blowout prevention equipment, coring to the total depth, running 6.4 cm diameter pipe to total depth, removing drilling equipment, and rehabilitating most of the site. The well would be monitored for at least one year after which the well would be plugged and the remainder of the site rehabilitated.

The proposed action is detailed in Appendix A, Plan of Exploration and Geothermal Drilling Permit application. Some of the items discussed in submitted Plan of Exploration will be modified in the approved Plan, Drill Permit and Conditions of Approval. These final documents would be controlling in the drilling of the proposed well.

Alternative No. 1 - Allow drilling of proposed temperature gradient hole at the proposed location, SE1/4NW1/4SE1/4 Section 24, T. 13 S., R. 71/2 E.

Alternative No. 2 - No Action - This alternative would disallow temperature gradient drilling at this site. However, other areas would then be examined to find a suitable drill site and therefore the no action alternative becomes the Alternative No. 3 - different location.

Alternative No. 3 - Different Location - An alternative site was examined in the field and determined to be acceptable but not as desirable as the proposed action site. This alternate site will not be considered further.

III. AFFECTED ENVIRONMENT

Previous Studies - The affected environment is thoroughly discussed in the Deschutes National Forest Land Management Plan 1978 and the Belknap-Foley Geothermal Area Final Environmental Statement, Geothermal Leasing Willamette and Deschutes National Forests.

General Description - The project area is within Land type 94, (Soil Resource Inventory, Deschutes National Forest, 1976) which occurs on uneven glaciated uplands at relatively high elevations. Elevation is approximately 4800 feet with an annual precipitation of 50-80 inches. The plant association is classified as Lodgepole Pine/Beargrass (CL-M4-11, Plant Associations of the Central Pumice Zone, September 1982). It includes Lodgepole pine, mountain hemlock, and true firs. A wide variety of forbs, grasses, sedges, and shrubs may be present including lupine, huckleberry, and beargrass.

Wildlife - Deer, elk, cavity nesters, small mammals, amphibians, birds and insects may be found in the project area.

Threatened, Endangered, Sensitive Species - The proposed project area is in habitat for the Northern Spotted Owl, a sensitive species. The general project location is low quality habitat (Martin, USFS Wildlife Biologist, Personal Communication, June 1989) because of the tree species, Lodgepole pine, mountain hemlock, and subalpine fir; and the size of these trees. Protocol established in the "Spotted Owl Inventory and Monitoring Handbook", Barss, January 12, 1989, Deschutes National Forest, has been followed to determine if the Northern Spotted Owl is present at the project area. No owls were detected following three separate nighttime visits. The Deschutes National Forest will be meeting with the U.S. Fish and Wildlife Service in July to discuss planned activities on the forest and anticipated impacts to the Northern Spotted Owl. There are no other known threatened, endangered or sensitive plant or animal species in the project area.

Recreation - The Pacific Crest Trail is located approximately one-half mile west of the proposed project area. The Mt. Jefferson Wilderness boundary is located approximately one-half mile north and across U.S. Highway 20/126 from the proposed project site. The general area has a moderate level of summer recreation use. A moderate to high level of winter recreation use is expected from both snowmobile and cross-country skiers. The geothermal lease for the proposed site has a no surface occupancy stipulation because of dispersed recreation unroaded area values. This stipulation allows modification of the stipulation for the type of activity proposed. (see Special Stipulation 4., Appendix C.)

Visual - The proposed project is within a retention foreground allocation because of its proximity to the U.S. Highway 20/126 travel corridor.

Cultural Resources - A cultural resource survey has been completed for the Key West timber sale, a timber sale planned for 1990, within which the proposed project is located. No cultural resources were detected in the survey.

Previous Drilling- Geothermal exploration on the Deschutes National Forest has been ongoing since 1974 by numerous organizations, and with several techniques. The U.S. Geological Survey has done extensive work in the region including geologic mapping, seismic studies and core hole drilling. Since 1975 there have been 37 drill or core holes permitted to measure the temperature gradients of various areas of the forest. The following shows the depths of these temperature gradient wells:

Depths	Number of Wells
Less than 1000'	20
2000 to 3000'	3
3000 to 4000'	7
4000'+	7

Wells have been drilled by the U.S. Geological Survey, Oregon Department of Geology and Mineral Industries, Sandia National Laboratories, and several private exploration companies.

IV. ENVIRONMENTAL CONSEQUENCES

Previous Drilling Environmental Results - Geothermal temperature gradient core drilling has occurred within the Deschutes National Forest with minimal to no impacts to the surface and subsurface resources. Surface impacts associated with temperature gradient core drilling are temporary in nature since all well sites are restored in accordance with lease stipulations and permit conditions of approval. As a result of the experience gained in permitting and supervising these temperature gradient wells there have been developed a set of conditions of approval for the wells that have proven to mitigate all of the environmental concerns involved in the drilling of these type of wells.

Impacts to Wildlife - Because of the time of year of the proposed project, fawning and calving would not be impacted. The use of an existing cleared area and the minimal disturbance, little, if any impacts to wildlife are expected.

Impacts to Threatened, Endangered, Sensitive Species - The only species in these categories that might be present is the Northern Spotted Owl. The Deschutes National Forest has examined the area and has not located any owls. The area appears to be marginal owl habitat. Since no trees will be removed, the Spotted Owl habitat would only be temporarily impacted by the presence of a drill rig. The existing habitat will still be present once drilling activity has ceased. Therefore no impacts to the Northern Spotted Owls are expected. However, a final decision on this proposed project will not be released until after the consultation with the U.S. Fish and Wildlife Service in July 1989.

Impacts to Recreation - The proposed project could possibly be heard from the Pacific Crest Trail and the Mt. Jefferson Wilderness Area. However, both the project and the resultant sound would be temporary in nature and considering the proximity to the Highway 20/126 the noise increase is not expected to be discernable to most people. The proposed project area is covered by a no surface occupancy stipulation for dispersed recreation unroaded values, but can be modified for this type of low-impacting project. Because of the minor and short-term impacts to the dispersed recreation unroaded experience the stipulation should be modified to allow for surface occupancy for this project.

Impacts to Visual - Because the location of the proposed project is at an elevation higher than Highway 20/126 and because of the screening by the trees, the project would not be evident to the casual observer nor visually evident from the travel corridor.

Impacts to Cultural Resources - No cultural resources were detected in the cultural survey completed on the proposed project site. However, as much for scientific interest as for potential mitigation, an archaeologist may be present during any excavations for the well cellar and sumps in order to examine the near surface lithology. Should cultural material be found during these excavations, earth disturbing activities will stop until the site has been examined and a determination of effect completed.

Impacts to Wilderness Values, Areas of Critical Environmental Concern, Prime or Unique Farmlands, Wild and Scenic Rivers, Special Areas - There are no identified areas in the proposed project area which have been designated as Wilderness, Areas of Critical Environmental Concern, Prime or Unique Farmlands, Wild and Scenic Rivers, or Special Areas. Therefore there will be no impacts to any of these special designation areas.

Impacts to Surface Water Resources, Floodplains and Wetlands - There are no floodplains or permanent surface water in the proposed project area. There are a few very small "wetland" areas. The drainage from the drill pad will be contained by placing a small berm at the downslope side of the drill pad.

Well Blowout Hazard - Blowouts in which steam, gases, or hot water escape uncontrolled, pose an environmental hazard in geothermal operations, but the risk is low. The potential adverse environmental effects of accidental releases of geothermal fluids include air contamination from gaseous emissions, pollution of surface and shallow ground water resources, and hazards to health and safety of workers. Blowouts in exploratory work are highly unlikely due to required well control programs which include installation of blowout prevention equipment and periodic equipment testing and required safety drills.

The blowout equipment and standard BLM testing procedures have resulted in no blowouts on wells that have been core drilled.

In the unlikely event of a blowout, the small diameter of the hole would prevent large quantities of materials from escaping. Such small amounts of escaping material would not have a discernible effect on surrounding subsurface geothermal features and surface resources since the lessee would take immediate measures to control the well.

IV. CONSULTATION/COORDINATION

The following individuals either participated in the environmental assessment or were consulted for their input to the EA.

Bureau of Land Management

Dennis Davis
Donald Smith

Geologist/Inspector
Assistant District Manager,
Resources

U.S. Forest Service - Sisters Ranger District

Donna Owens
Kevin Martin
Mollie Chaudet
Al McPherson

Realty Specialist
Wildlife Biologist
Timber Sale Planner
Resource Assistant

Others

Ken Lovegren
Paul Dewey

Blue Lake Resort
Sisters Forest Planning Council

APPENDICES

- A - PLAN OF EXPLORATION AND GEOTHERMAL DRILL PERMIT APPLICATION
- B - CONDITIONS OF APPROVAL - TEMPERATURE GRADIENT WELLS
- C - GEOTHERMAL LEASE AND SPECIAL STIPULATIONS
- D - REFERENCES CITED

APPENDIX A

PLAN OF EXPLORATION AND GEOTHERMAL DRILL PERMIT APPLICATION

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY, CONSERVATION DIVISION

GEO-THERMAL DRILLING PERMIT

The U.S. Geological Survey requires this form or other Supervisor approved form to be prepared and filed in triplicate with requisite attachments with the Supervisor. The Supervisor must approve this permit prior to any lease operation.

Form Approved
Budget Bureau No.

1. LEASE SERIAL NO.
OR- 20492

2. SURFACE NUMBER, NEAR ( ) FT
Other ( )

3. UNIT AGREEMENT NAME
N/A

4. WELL NO.
77-24

5. FIELD OR AREA
Santiam Pass

6. SEC. T., R., S. & R.
Sec 24 T13S R7½

7. COUNTY
Jefferson

8. STATE
Oregon

9. APPROX. STARTING DATE
August 1

10. ACRES APPLICABLE (WELL SPACING)
2½ ac

11. TYPE OF WORK: DRILL NEW WELL ( ) REDRILL ( ) DEEPEN ( ) PILE BACK ( ) DIRECTIONALLY DRILL ( ) OTHER ( )

12. WELL TYPE: PRODUCTION ( ) INJECTION ( ) HEAT EXCHANGE ( ) OBSERVATION ( ) WATER SUPPLY ( ) OTHER ( )
Thermal Gradient

13. WELL STATUS:
to be drilled

14. NAME OF LESSEE/OPERATOR
OXBOW POWER CORPORATION

15. ADDRESS OF LESSEE/OPERATOR
200 S. Virginia Street Suite 450 Reno, NV 89501

16. LOCATION OF WELL
At surface NW¼ SE¼ Sec. 24 T13S R7½E
At proposed prod. hole see attached map(Site 1)

17. DISTANCE FROM PROPOSED LOCATION TO NEAREST PROPERTY OR LEASE LINE
¼ mile E to Sec. 19 (lease line)

18. DISTANCE FROM PROPOSED LOCATION TO NEAREST WELL, DRILLING, COMPLETED, OR APPLIED FOR ON THIS LEASE
N/A

19. DRILLING MEDIA AND CHARACTERISTICS: AIR ( ) WATER ( ) MUD ( ) FOAM ( ) Other ( ) ☒ X

20. PROPOSED DEPTH
NEARNESS: 950 miles
TRUE VERTICALLY

21. ELEVATION: ESTIMATED ( ) FINAL ( )
6750'

22. EXISTING AND/OR PROPOSED CASING AND CEMENTING PROGRAM (List existing program (first, followed by proposed program, and separate by a sufficient space to clearly distinguish the two programs)

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	COUPLING (Collars & Threads)	CASING	SETTING DEPTH Top Bottom	QUANTITY OF CEMENT
SEE ATTACHED						

23. PROPOSED WORK SUMMARY

SEE ATTACHED

24. (Use additional space on reverse side of form)

SIGNED [Signature] TITLE Manager Land & Environment DATE 06/08/89

(This space for Federal use)

APPROVED BY _____ TITLE _____ DATE _____

COMMENTS OF APPROVAL, IF ANY:

This permit is required by law (30 U.S.C. 1023); regulations: 30 CFR 370.71; Federal Geothermal Lease Terms and Stipulations and other regulatory requirements. The United States Criminal Code (18 U.S.C. 1001) makes it a criminal offense to make a willfully false statement or representation to any Department or Agency of the United States as to any matter within its jurisdiction.

PLAN OF OPERATION
DOGAMI SANTIAM PASS TEMPERATURE GRADIENT HOLE

I. LOCATION

- ✓ The drillsite will be in Jefferson County on land managed by the Sisters Ranger District of the Deschutes National Forest.

The site location is marked "Site 1" on the attached map and is located along Forest Service Road 900 (Enclosure 1). An accurate location of the site is SE 1/4 NW 1/4 SE 1/4 SE 1/4 sec 24 T13S/R7 1/2E (24ddbd). The latitude is 44°25'26"N and the longitude is 121°50'22"W. The ground level elevation is ~4800 ft.

II. PROJECT DESCRIPTION

A. INTENT AND ANTICIPATED RESULTS

The goal of the project is to support research in resource assessment in the Cascade Range of Oregon. The specific objectives of the hole are to obtain temperature gradient, heat flow, and hydrologic information along the axis of Cascade Range volcanism.

The project will be completed in two phases. Phase I will include site identification, site selection, permitting, and pre-drilling environmental studies to satisfy NEPA requirements. Phase II will include drilling, data acquisition and interpretation, core curation, and final reporting. All information gathered in the course of the project will be made available to the public.

A rough schedule of events is as follows:

1. April 13 -- received letter from USDOE guaranteeing funding for Phase I studies.
2. May 1 -- receive contract from USDOE for completion of Phase I siting studies.
3. May 20 -- submit USFS environmental analysis to USDOE for environmental review process.
4. June 30 -- receive Phase II drilling money from USDOE.

5. July 15 -- complete state required bidding process. Sign a contract with a driller.
6. August 1 -- commence drilling.
7. September 30, 1989 -- complete drilling and suspend hole.
8. September 1990 -- abandon hole.

The general plan is to complete a diamond cored drill hole to the greatest depth possible with available support (900-950 m), then log the hole using accepted geophysical logging procedures. If possible during drilling, any deep thermal ($>50^{\circ}\text{C}$) aquifer that has sufficient flow will be airlifted. Down-hole fluid samples will be taken from these aquifers. Upon the completion of drilling a string of 6.4 cm diameter pipe will be set to total depth, filled with water, and surrounded with API approved cementing mud and/or cement (see detailed description of drilling operations below). The well will be suspended and the drill rig demobilized. The wellhead will be secured with a locked surface valve. Temperatures will be monitored for a period of one year. Not less than two complete temperature logs will be recorded. Following completion of temperature monitoring, the hole will be plugged and abandoned in accordance with existing State and Federal regulations.

SITE PREPARATION

Virtually no site preparation will be required. The final drill site will be in a small existing clearcut. No existing vegetation will be disturbed. The drill rig will be mounted on tandem-axle trucks and will require to modification of site topography. Trailer-mounted mud pits will be utilized. Water will be transported to the site via a tandem-axle tanker truck. A small reserve sump for site water storage may be required. If so, it will be dug with a backhoe and lined with plastic. Upon completion of drilling the plastic will be removed, the pit and cellar backfilled, and the topography restored to its original surface.

Access to the site will be via Forest Service Road 900, an unimproved road that connects with Highway 20. No modifications to the road is required to provide access to the proposed site.

DRILLING OPERATIONS

Drilling operations will be supervised by an on-site geologist.

It is anticipated that two drill rigs will be used in the drilling process. The upper 500' of the hole will be drilled by a truck-mounted air rotary water well rig. The first step will be to dig a 4' deep 6' x 6' cellar. A 12 3/4" hole will then be drilled to 35', and 10 3/4" O.D. K-55 (40.5#/ft) surface conductor casing will be run to total depth and cemented in place. With the surface conductor in place, a 9 3/4" hole will be drilled to 500'. 8 5/8" O.D. K-55 (32 #/ft) casing will be run to total depth and cemented in place. A manually operated gate valve rated to a minimum of 1500 psi will be installed and tested to 1000 psi. The pressure test will be witnessed by the USFS, BLM, and/or DOGAMI regulatory personnel.

A truck-mounted wireline coring rig will be brought in and the hole will be cored to the maximum depth practicable with available support (900-950m) HX (3.937" O.D.) rods will be used. If drilling problems require reductions in hole diameter, the first reduction will be to NX (2.875" O.D.) rods. During drilling operations the bottom-hole temperature will be measured whenever the drill rods are out of the hole. If the bottom-hole temperature exceeds 150°F (65°C), an annular preventer will be installed and tested. The test will be witnessed by USFS, BLM, and/or DOGAMI regulatory personnel.

Enclosure 2 is a diagram of the proposed hole design.

Upon completion of drilling, a suite of geophysical logs will be run. A string of 6.4 cm diameter iron pipe will be set to total depth and filled with water. The pipe will be surrounded with API approved cementing mud and/or cement. The well will be suspended and the drill rig demobilized. The wellhead will be secured with a locked surface valve. Temperatures will be monitored in the hole for a period of one year. Upon completion of temperature monitoring operations, the hole will be abandoned in accordance with State and Federal regulations.

Water for the project will be obtained from Lake Creek, the outlet of Suttle Lake. The water will be transported to the site via truck over Highway 20 and

Forest Service Road 900. DOGAMI has already obtained a water right from the Oregon Department of Water Resources for this water supply (Permit No. 50385) (see Enclosure 3). The haul route will include only 1/4 to 1/2 mile of travel over Road 900.

ABANDONMENT

Abandonment of the hole will be in accordance with applicable State and Federal regulations.

RESTORATION

The final site selected will be on ground that has been previously disturbed by logging operations. No vegetation is expected to be removed to create a drill site. Site restoration will involve returning the ground to the state which existed prior to the commencement of drilling operations.

III. ENVIRONMENTAL CONCERNS

Environmental analysis will be completed by the U.S. Forest Service as part of the permitting process. Results of the USFS environmental analysis will be forwarded to USDOE for review. The purpose of this review is to insure compliance with NEPA environmental requirements. Receipt of Phase II drilling monies is contingent upon the environmental analysis passing the USDOE review process. If further environmental studies are found to be needed, they will be completed by and/or contracted for by DOGAMI.

IV. CULTURAL RESOURCES CONCERNS

There are no standing water bodies or streams in the vicinity of the drill site. Water for drilling operations will be trucked to the site.

The planned operations will not affect air quality. Drilling operations involve running only one diesel engine.

Noise will not be a problem. The site is isolated and screened by trees. There are no commercial operations in the area.

Archaeological concerns will be addressed by the USFS environmental review.

V. CONTACTS

The project manager is:

Walter R. Benoit
Chief Geologist
Oxbow Geothermal Corporation
200 South Virginia Street, Suite 450 Reno, NV 89501
Phone: (702) 322-1300

A drilling manager has yet to be selected.

VI. EMERGENCY/FIRE CONTINGENCY PLAN

Fire precautions taken will be in accordance with USFS regulations. All vehicles will have exhaust systems in good working order. All internal combustion engines will have spark arresters. Fire extinguishers, axes, Pulaskis, shovels, and buckets will be available in quantities specified by Forest Service District regulations. A water supply will be available in the form of the water truck used to haul water to the drill site.

Prior to the commencement of operations, drilling crews will be briefed on the location and use of all firefighting equipment. All equipment will be checked to insure proper operation.

ANTIAM
 ASS
 PROJECT
 ENCLOSURE
 -2-89

ENCLOSURE 1:
 Portion of three fingered jack U.S.G.S
 7.5. minimum quad showing site 1 in
 T13S R 7½E Section 24.

Enclosure 2.

Preliminary Hole Design - Santiam Pass

Gradient Hole (SP-1)

01

APPENDIX B

CONDITIONS OF APPROVAL - TEMPERATURE GRADIENT WELLS

Deep Temperature Gradient Core Holes
Conditions of Approval for Geothermal Drilling

Permit No. OR-050-89-DSP-002
Well No. 77-24
Oxbow Power Company
Federal Lease OR 20492 (T. 13 S., R. 7½ E., Sec. 24)
Deschutes National Forest
Jefferson County, Oregon

General

- A. This hole is for determining stratigraphy, temperature gradient and geophysical information, or other information approved by the Authorized Officer and cannot be used to produce or flow test geothermal resources.
- B. Unless otherwise directed by the Authorized Officers, Deputy State Director for Minerals/District Manager or their designated representative, the lessee/operator shall comply with the following minimum requirements: (Waivers may be granted by the Authorized Officer whenever the lessee/operator can demonstrate on a site or project specific basis that some alternative method will satisfy the interest to protect life, property and the environment).
  1. All operations must be conducted in accordance with:
    - a. Terms and conditions noted in the approval letter dated _____ for the Plan of Exploration.
    - b. Special Lease Stipulations.
  2. A copy of this permit No. OR-050-89-DSP-002 with attached conditions, GRO orders and approved drilling program with all subsequently approved amendments (Sundry Notices) shall be retained at the well site for reference.
  3. Variances from the approved Plan of Exploration or well program must be approved in advance by the Authorized Officer or his/her representative.
  4. The Authorized Officer shall be contacted prior to actual entry onto the land. Contact shall be made as noted in Item 20 below.

Surface Protection Requirements

5. a. Operator will remove the minimum amount of vegetative cover necessary for safe operations and as directed by the Authorized Officer's designated representative.

- b. Prior to operations, the operator will develop a fire plan in cooperation with the Sisters District Ranger and submit to an equipment inspection in order to comply with State Fire Laws and approved muffler, spark arrester, and other fire equipment as outlined in Eastside Fire Protection and Suppression.
- c. Operator will monitor the condition of access roads. The roads will be watered as needed as determined by the Sisters District Ranger. On completion of drilling, all necessary measures will be taken to restore roads to original condition.
- d. Drilling fluids or cuttings shall not be discharged onto the surface where such discharge will contaminate lakes and perennial or intermittent streams. Drilling mud will be disposed of either by hauling to an approved sanitary land fill or other locations as approved by the Authorized Officer. All sumps/pits will be lined with impervious liners to prevent seepage.
- e. All drilling sumps and reserve pits shall be lined with impervious material.
- f. Unattended sumps shall be completely fenced to protect the public, domestic animals and wildlife.
- g. A berm shall be placed on the downslope side of the drill pad in such a manner as to prevent escape of minor fluid flows from the drill pad.

Surface Casing

- 6. a. The surface casing shall be installed in accordance with the Plan of Exploration - Preliminary Hole Design.
- b. The drill hole shall be conditioned prior to cementing with at least equivalent weight mud to the weight of cement to be used.
- c. Should little or no cement returns be encountered while cementing any casing string, the Authorized Officer shall be contacted before any further work is carried out. Remedial cementing operations may be required.

Blowout Prevention Equipment (BOPE)

- 7. Blowout Prevention Equipment and auxiliary support equipment shall be properly installed, frequently tested and shall include an annular BOPE, and a gate valve acceptable to the Authorized Officer.
- 8. The BOPE shall be pressure tested when installed, before drilling out the shoe of the surface casing or any intermediate casing strings, and immediately following any repairs or operations that require disconnecting a pressure seal in the assembly. BOPE shall be tested to 700 p.s.i. for 30 minutes.

9. A kill line shall be installed below the BOPE, leading directly to the mud pumps, and be fitted with a valve through which cement could be pumped, if necessary.
10. A choke line with an adjustable choke (sometimes called blowdown line) shall be installed below the BOPE. The choke line shall be placed in such a manner as to permit containment of displaced fluids and to minimize any safety hazard to personnel (properly tied down at the ends and bends). The choke line shall be either steel or steel reinforced hose capable of being tested to BOP test pressure. The choke line shall be pressure tested to 700 p.s.i. during the test of other BOPE.
11. BOPE shall have manually operated gates and hydraulic actuating systems and accumulators of sufficient capacity to close all of the hydraulically-operated equipment and have a minimum pressure of 69 bars (1,000 p.s.i.) remaining on the accumulator. Dual control stations shall be installed with a high pressure (N) backup system. One control panel shall be located at the driller's station and one control panel shall be located on the ground, at least 15 meters (50 feet) away from the wellhead.
12. During drilling operations, BOPE shall be actuated to test proper functioning, at least once each week on the drill pipe for the annular preventer, and at least once each week for the gate valve.

Related Well Control Supplies and Equipment

13.
  - a. A full opening drill string safety valve in the open position shall be maintained on the rig floor at all times while drilling operations are being conducted. This valve shall be pressure tested to 700 p.s.i. during the test of other BOPE.
  - b. Prior to core drilling, a test shall be conducted to determine if the hydraulic chuck will be adequate for shutting in the well should problems arise during core retrieval. If not adequate, a drill pipe safety valve or wireline BOP will be required to be installed.
  - c. An adequate supply of drilling fluid and lost circulation and weighting materials shall be at the drill site to cure significant lost circulation problems or abnormal formation pressures or water entries that may be encountered.

14. Hydrogen Sulphide Detectors

- a. A strategically placed and properly functioning hydrogen sulphide (H₂S) indicator and alarm system shall be emplaced at the drill site. This must include: a) At least two H₂S detectors with audio and visual alarms set no higher than 20 ppm and preferably at 10 ppm; b) At least one windsock type streamer prominently and strategically placed to display wind direction.

- b. An H₂S contingency plan should be formulated to include communications capability to readily contact an appropriate law enforcement office should the need arise. The plan must be kept on the drill site readily available to the drill foreman and crew.

15. Temperature Monitoring and Mud Requirements

- a. During drilling operations, inlet and outlet temperatures shall be recorded either hourly or at 30 ft. (9M) intervals.
- b. When drilling without the return of drilling fluid to the surface, the unstabilized bottom hole temperature (BHT) shall be recorded in the driller's log at a minimum of 100 ft. (30m) intervals. Should the BHT reach 125° F (52° C) and later 175° F (79° C), the recording intervals shall be decreased to 50 ft. (15m) and 30 ft. (9m) respectively. (Actual required intervals may be slightly shorter or longer, to coincide with core runs.)
- c. If a 175° F (79° C) circulating temperature is reached while drilling, further drilling shall stop immediately and the hole will be either:
  - (1) Equipped with mud cooling equipment to maintain the return flowline temperature at or below 175° F (79° C). If approved by the Authorized Officer, drilling may then be resumed;
  - (2) Reviewed by the Authorized Officer as to the adequacy of on-site drilling equipment and supplies to control the temperature and pressure and, if approved, drilling may be resumed.
  - (3) Completed as an observation hole by cementing steel tubing from total depth to surface; or
  - (4) Abandoned by cementing from total depth to surface.
- d. If a 212° F (100° C) BHT is reached while drilling without return of drilling fluids to the surface, the lessee shall immediately stop drilling and the hole will then be either completed as a c(3), abandoned as in c(4), or if approved by the Authorized Officer, the hole may be deepened, provided that an adequate supply of cold water is maintained on-site for pumping downhole to prevent flashing. An adequate supply of cold water is, at a minimum, that amount which is being used each day during current coring operations.

- e. High/low mud pit level indicators will not be required if mud pits can be visually monitored by driller during drilling operations. Desilters and desanders are not required.
- f. Any completion of this well will require the installation of an appropriate well head and a pressure gauge. The well head with valve and pressure gauge will also be required if the well is temporarily abandoned (suspended) for more than 30 days.

16. Witnessing BOPE Testing and Cementing Jobs

The Authorized Officer, or his/her designated representative, shall be given the opportunity to witness all BOPE pressure tests, cementing jobs, and P&A operations. At least 24 hour notice will be given prior to actual cementing and BOPE pressure testing and P&A operations. Contact can be made as noted in Item 20 below.

17. Reports

- a. Throughout the duration of drilling operations, drilling reports to the Authorized Officer shall be made on Monday, Wednesday and Friday mornings before 9:00 AM. The reports should include bottom hole depth, and significant temperatures encountered, e.g. in- and out-flow temperatures, the last bottom hole temperature, and if drilling without returns, the last few temperatures taken. Include any significant general information, problems or unusual encounters. Reports will be phoned in to Dennis Davis at the BLM Prineville District Office or, if he is not available, to his alternates as listed in Item 20.
- b. All reports after completion of drilling are to be submitted to the Authorized Officer (Prineville BLM District Manager). Duplicate copies of any drilling completion, temperature and other downhole survey reports and logs, lithology, depths of any waters encountered, and drill hole location shall be submitted to the Authorized Officer within 30 days of reaching total depth. Subsequent temperature logs are due 30 days after logs are run. The abandonment report is due 30 days after abandonment.
- c. The completion/abandonment report shall contain a copy of the approved Geothermal Drilling Permit and the following information for the hole drilled:
  - (1) A final hole designation and location;
  - (2) A driller's log or well history that notes the depths to the water table and other water aquifers, and to any other mineral deposits (salt, coal, etc.) encountered;

- (3) The method of completion, including cementing and casing or tubing used with wellhead components. The completion method may be presented by engineering drawings;
- (4) Complete details of the abandonment procedures;
- (5) Any information on drilling difficulties or unusual circumstances encountered would be helpful in assuring future safety or operations or protection of the environment in the area concerned; and
- (6) All temperature data and other logs or surveys run for the hole surveyed, if not previously submitted in writing.

18. Plugging and Abandonment

Plugging and abandonment operations shall be done in accordance with Geothermal Resource Operational Order No. 3, or in such other manner as is approved by the Authorized Officer. A dry hole marker, acceptable to the Authorized Officer, shall be required unless otherwise waived by the surface management agency.

19. Modifications in Plan of Operations/Drilling Permit

Any proposed modifications in the proposed plan of operations and/or drilling permit with respect to approved operations, approved casing, BOPE, cement, and other equipment, shall be submitted to the Authorized Officer for approval. Adequate lead time should be given so that operations can resume as soon as possible.

20. Bureau of Land Management contacts:

a.	Dennis Davis, Inspector	Day	(503) 447-4115
	Bend	Night	(503) 382-3440
b.	Dennis Simontacchi, Inspector	Day	(503) 947-2177
	Lakeview	Night	(503) 947-2355
c.	Steve Henderson, Inspector	Day	(503) 231-2048
	Portland	Night	(503) 642-4446
d.	Pat Geehan	Day	(503) 231-6812
	Deputy State Director of	Night	(503) 654-5166
	Mineral Resources, Portland		

APPENDIX C

GEOHERMAL LEASE AND SPECIAL STIPULATIONS

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OBM NO. 1804-0038
Expires January 31, 1986

OFFER TO LEASE AND LEASE FOR GEOTHERMAL RESOURCES

Serial No. OR 20492

The undersigned (see reverse) offers to lease all or any of the lands in item 2 that are available for lease pursuant to the Geothermal Steam Act of 1920 (30 U.S.C. 1001-1025).

Read Instructions Before Completing

1. Name Southland Royalty Company
c/o Meridian Oil Inc.
Street 801 Broadway Street P. O. Box 1855
City, State, Zip Code Billings, MT 59103
8994 119944 1199 116492

RECEIVED
1986 MAY 27 AM 8:30
STATE OFFICE
PORTLAND, OREGON

2. Surface managing agency if other than BLM: FS, USDA Unit/Project _____

Legal description of land requested (segregate by public domain and acquired lands):

T. 13 S., R. 7½ E., Meridian Willamette State Oregon County Linn and Deschutes

Sec. 23, all excluding that part within the Mt. Jefferson Wilderness boundary;
Sec. 24, all excluding that part within the Mt. Jefferson Wilderness boundary;
Sec. 25, all;
Sec. 26, all.

Amount remitted: Filing fee \$ 50.00 Rental fee \$ 1,960.00
Total acres applied for 1,960.00
Percent U.S. interest 100%
Total \$ 2,010.00

DO NOT WRITE BELOW THIS LINE

3. Land included in lease:

T. _____ R. _____ Meridian _____ State _____ County _____

Same as Item 2.

Attachment 1 shows the approximate location of the wilderness boundary. This lease specifically excludes all wilderness lands irrespective of any errors between the map and the final wilderness boundary.

Total acres in lease 1,960.00
Rental retained \$ 1,960.00

In accordance with the above offer, or the previously submitted competitive bid, this lease is issued granting the exclusive right to drill for, extract, produce, remove, utilize, sell, and dispose of all the geothermal resources in the lands described in item 3 together with the right to build and maintain necessary improvements thereupon, for a primary term of 10 years. Rights granted are subject to applicable laws, the terms, conditions, and attached stipulations of this lease, the Secretary of the Interior's regulations and formal orders in effect as of lease issuance and, when no inconsistent with lease rights granted or specific provisions of this lease, regulations and formal orders hereafter promulgated.

Type of lease:

☒ Noncompetitive

☐ Competitive

☐ Other _____

Described lands were
not within a KGEA

as of 5-28-86 *jc*

THE UNITED STATES OF AMERICA

by Robert E. Mallaka (Signing Officer)
Chief, Lands and Minerals
Adjudication Section
MAY 30 1986
(Title) (Date)

EFFECTIVE DATE OF LEASE June 1, 1986

4. (a) Undersigned certifies that:

(1) Offeror is a citizen of the United States; an association of such citizens; a municipality; or a corporation organized under the laws of the United States, any State or the District of Columbia; (2) All parties holding an interest in the offer are in compliance with 43 CFR 3200 and the authorizing Act; (3) Offeror's chargeable interests, direct and indirect, do not exceed that allowed under the Act; and (4) Offeror is not considered a minor under the laws of the State in which the lands covered by this offer are located.

(b) Undersigned agrees that signature to this offer constitutes acceptance of this lease, including all terms, conditions and stipulations of which offeror has been given notice, and any amendment or separate lease that may cover any land described in this offer open to lease application at the time this offer was filed but omitted for any reason from this lease. The offeror further agrees that this offer cannot be withdrawn, either in whole or part, unless the withdrawal is received by the BLM State Office before this lease, an amendment to this lease, or a separate lease, whichever covers the land described in the withdrawal, has been signed on behalf of the United States.

This offer will be rejected and will afford the offeror no priority if it is not properly completed and executed in accordance with the regulations, or if it is not accompanied by the required payments. Title 18 U.S.C. Sec. 1001 makes it a crime for any person knowingly and willfully to make to any Department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

SOUTHLAND ROYALTY COMPANY

uly executed this 15th day of May, 1986

By:

D. L. Black
(Signature of Lessee or Attorney-in-fact)
D. L. Black, Vice President

Described lands were
not within a KGRA
as of

Lease subject also to
attached stipulations.
See Exhibits "A" & "B"

LEASE TERMS

Sec. 1. Rentals—Rentals shall be paid to proper office of lessor in advance of each lease year until there is production in commercial quantities from the leased lands. Annual rental rates per acre or fraction thereof are: \$1 for noncompetitive leases and \$2 for competitive leases.

If this lease or a portion thereof is committed to an approved cooperative or unit plan which includes a well capable of producing leased resources, and the plan contains a provision for location of production, royalties shall be paid on the production allocated to this lease. However, annual rentals shall continue to be due for those lands not within a participating area.

Failure to pay annual rental, if due, on or before the anniversary date of this lease (or next fiscal working day if office is closed) shall automatically terminate this lease by operation of law. Rentals may be suspended by the Secretary upon a sufficient showing by lessee.

Sec. 2. Royalties—Royalties shall be paid to proper office of lessor. Royalties shall be computed in accordance with regulations and orders. Royalty rates on production are: 10 percent for steam, heat, or energy; 5 percent for byproducts; and 5 percent for demineralized water. Lessor reserves the right to establish reasonable minimum values on production after giving notice and an opportunity to be heard. Royalties shall be due and payable on the last day of the month following the month in which production occurred.

A minimum royalty shall be due for any lease year beginning on or after the commencement of production in commercial quantities in which royalty payments aggregate less than \$2 per acre. Lessee shall pay such difference at the end of lease year. This minimum royalty may be waived, suspended, or reduced, and the above royalty rates may be reduced for all or portions of this lease if the Secretary determines that such action is necessary to encourage the greatest immediate recovery of the leased resources, or is otherwise justified.

Sec. 3. Bonds—Lessee shall file and maintain any bond required under regulations.

Sec. 4. Diligence, rate of development, unitization, and drainage—Lessee shall perform diligent exploration as required by regulations and shall prevent unnecessary damage to, loss of, or waste of leased resources. Lessor reserves right to specify rates of development and production in public interest and to require lessee to subscribe to a cooperative or unit plan, within 30 days of notice, if deemed necessary for proper development and operation of the area, field, pool embracing these leased lands. Lessee shall drill and produce wells necessary to protect leased lands from drainage or pay compensatory royalty for drainage in amount determined by law.

Sec. 5. Documents, evidence, and inspection—Lessee shall file with proper office of lessor, within 30 days after effective date thereof, any contract or evidence of other arrangement for the sale or disposal of production. At such times and in such form as lessor may prescribe, lessee shall furnish detailed statements showing amounts and quality of all products removed, sold, proceeds therefrom, and amount used for production purposes or unavoidably lost. Lessee may be required to provide plats and schematic diagrams showing development work, improvements, and reports with respect to parties in interest, expenditures, and depreciation costs.

In the form prescribed by lessor, lessee shall keep a daily drilling record, a log, and complete information on well surveys and tests and keep a record of subsurface investigations and furnish copies to lessor when required. Lessee shall keep open at all reasonable times for inspection any authorized officer of lessor, the leased premises and all wells, improvements, machinery, fixtures thereon, and all books, accounts, maps, and records relative to operations, surveys, investigations on or in the leased lands. Lessee shall maintain copies of all contracts; sales agreements, accounting records, and documentation such as billings, invoices, or similar documents that support costs claimed as manufacturing, preparation, and/or transportation costs. All such records shall be maintained in lessee's accounting offices for future audit by lessor. Lessee shall maintain required records for 6 years after they are generated or, if an audit or investigation is underway, until released of the obligation to maintain such records by lessor. During existence of this lease, information obtained under this section shall be closed to inspection by the public in accordance with the Freedom of Information Act (5 U.S.C. 552).

Sec. 6. Conduct of operations—Lessee shall conduct operations in a manner that minimizes adverse impacts to the land, air, and water, to cultural, biological, visual, and other resources, and to other land uses or users. Lessee shall take reasonable measures deemed necessary by

lessor to accomplish the intent of this section. To the extent consistent with leased rights granted, such measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. Lessor reserves the right to continue existing uses and to authorize future uses upon or in the leased lands, including the approval of easements or rights-of-ways. Such uses shall be conditioned so as to prevent unnecessary or unreasonable interference with rights of lessees.

Prior to disturbing the surface of the leased lands, lessee shall contact lessor to be apprised of procedures to be followed and modifications or reclamation measures that may be necessary. Areas to be disturbed may require inventories or special studies to determine the extent of impacts to other resources. Lessee may be required to complete minor inventories or short term special studies under guidelines provided by lessor. If in the conduct of operations, threatened or endangered species, objects of historic or scientific interest, or substantial unanticipated environmental effects are observed, lessee shall immediately contact lessor. Lessee shall cease any operations that would result in the destruction of such species or objects.

Sec. 7. Production of byproducts—If the production, use, or conversion of geothermal resources from these leased lands is susceptible of producing a valuable byproduct or byproducts, including commercially demineralized water for beneficial uses in accordance with applicable State water laws, lessor may require substantial beneficial production or use thereof by lessee.

Sec. 8. Damages to property—Lessee shall pay lessor for damage to lessor's improvements, and shall save and hold lessor harmless from all claims for damage or harm to persons or property as a result of lease operations.

Sec. 9. Protection of diverse interests and equal opportunity—Lessee shall maintain a safe working environment in accordance with standard industry practices and take measures necessary to protect the health and safety of the public. Lessor reserves the right to ensure that production is sold at reasonable prices and to prevent monopoly.

Lessee shall comply with Executive Order No. 11246 of September 24, 1965, as amended, and regulations and relevant orders of the Secretary of Labor issued pursuant thereto. Neither lessee nor lessee's subcontractor shall maintain segregated facilities.

Sec. 10. Transfer of lease interests and relinquishment of lease—As required by regulations, lessee shall file with lessor, any assignment or other transfer of an interest in this lease. Lessee may relinquish this lease or any legal subdivision by filing in the proper office a written relinquishment, which shall be effective as of the date of filing, subject to the continued obligation of the lessee and surety to pay all accrued rentals and royalties.

Sec. 11. Delivery of premises—At such time as all or portions of this lease are returned to lessor, lessee shall place all wells in condition for suspension or abandonment, reclaim the land as specified by lessor, and within a reasonable period of time, remove equipment and improvements not deemed necessary by lessor for preservation of producible wells or continued protection of the environment.

Sec. 12. Proceedings in case of default—If lessee fails to comply with any provisions of this lease, and the noncompliance continues for 30 days after written notice thereof, this lease shall be subject to cancellation in accordance with the Act. However, if this lease includes land known to contain a well capable of production in commercial quantities, it may be cancelled only by judicial proceedings. This provision shall not be construed to prevent the exercise by lessor or any other legal and equitable remedy, including waiver of the default. Any such remedy or waiver shall not prevent later cancellation for the same default occurring at any other time.

Whenever the lessee fails to comply in a timely manner with any of the provisions of the Act, this lease, the regulations, or formal orders, and immediate action is required, the Lessor may enter on the leased lands and take measures deemed necessary to correct the failure at the expense of the Lessee.

Sec. 13. Heirs and successors-in-interest—Each obligation of this lease shall extend to and be binding upon, and every benefit hereof shall inure to, the heirs, executors, administrators, successors, or assigns of the respective parties hereto.

RECEIVED
BUREAU OF LAND MANAGEMENT

OR 20492
Exhibit "A"

1986 MAY 27 AM 8:30

Special Stipulations
Willamette National Forest
STATE OFFICE
PORTLAND, OREGON

The lessee shall comply with the following special conditions and stipulations unless they are modified by mutual agreement of the lessee, the authorized officer of the Bureau of Land Management and the authorized representative of the United States Department of Agriculture, Forest Service.

1. All surface disturbing operations, other than "casual use" as defined by 43 CFR 3209.0-5(d), must be culturally cleared by the authorized representative of the Forest Service. When a lessee cultural report is necessary to comply with standard lease term No. 6, it must be signed and certified by a qualified archaeologist acceptable to the authorized representative of the Forest Service.
2. The lessee shall make every possible effort to prevent, control and suppress any fire on federally owned or managed lands or near the lease operational site. All uncontrolled fires shall be immediately reported to Forest Dispatch 503-687-6712.
3. Prior to submission of a plan of operation for surface disturbing operations, the lessee shall meet with the authorized representative of the Forest Service, to be apprised of specific requirements, restrictions, administrative rules and regulations, e.g., timber sales, special use permits, experimental studies contracts and resource closures. This meeting may be waived if the lessee is sufficiently aware of local problems and ground rules of the area involved in the proposed operation.
4. In order to protect developed recreation sites, unstable/very unstable land types and dispersed recreation unroaded area values, the lessee agrees not to occupy or use the surface of the following described lands unless this stipulation is modified or eliminated.

Willamette Meridian, Oregon

T. 13 S., R. 7½ E.,

Secs. 23, 24, 25, and 26, those parts shown in - 460.00 acres
blue on Attachment 1. *offer*

5. No permanent facilities such as power plants allowed on the following described land unless this stipulation is modified or eliminated. Roads, drill pads, transmission lines and pipelines are permitted.

Willamette Meridian, Oregon

T. 13 S., R. 7½ E.,

Secs. 23, 24, 25, and 26, those parts shown in
green on Attachment 1.

OR 20492
Exhibit "B"

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SPECIAL STIPULATION

The Bureau of Land Management has reviewed existing information and planning documents and except as noted in attached special stipulations, knows of no reason why normal development, subject to the controls of applicable laws and regulations, and the lease terms and conditions, cannot proceed on the leased lands. However, specific activities could not be considered prior to lease issuance since the nature and extent of the geothermal resource were not known and specific operations have not been proposed. The lessee is hereby made aware that, consistent with 43 CFR 3262.4, all post lease operations will be subject to appropriate environmental review and may be limited or denied, but only if unmitigatable and unacceptable impacts on other land uses or resources would result.

RECEIVED
BUREAU OF LAND MANAGEMENT
1986 MAY 27 AM 8 30
STATE OFFICE
PORTLAND, OREGON

Mt. Jefferson Wilderness - Deny Lease

No Surface Occupancy

Substantial Development Constraints

Lease Appl. OR 20492

JEFFERSON
DESCHUTES

OR 20485
OR 20487
OR 20491
OR 20492
OR 20493
3210 (943.

MAY 30 1986

DECISION

Assignor:

Southland Royalty Company : Assignment of Record Title Interest
c/o Meridian Oil Inc. : in Geothermal Resources Lease(s)
P.O. Box 1855 : Lease Date: June 1, 1986
Billings, MT 59103 :

Assignee:

Oxbow Geothermal Company :
c/o Oxbow Geothermal Corporation :
200 South Virginia Street, Suite 450 :
Reno, NV 89501 :

Assignment(s) Approved

The assignment of geothermal lease OR 20485, et al. is hereby approved simultaneously with the issuance of the lease effective June 1, 1986.

Oxbow Geothermal Company, the assignee, having gained an undivided 100 percent interest in the record title to the lease, will be responsible for payment of rental.

/s/ Robert E. Mollohan

Chief, Lands and Minerals
Adjudication Section

Dupl. Orig., Assignor
Orig., Assignee w/copy of assignment

cc:
920
Willamette & Deschutes NF, w/copy of assignment
940
Accounts (943.5)
MMS

943.3:JClark:mjo:5-28-86:x6917:(1904m)

APPENDIX D

REFERENCES CITED

APPENDIX D

REFERENCES CITED

1. Belknap-Foley Geothermal Area Final Environmental Statement, Geothermal Leasing Willamette and Deschutes National Forests
2. CL - M4-11, Plant Associations of the Central Pumice Zone, September 1982
3. Deschutes National Forest Land Management Plan 1978
4. Martin, USFS Wildlife Biologist, Personal Communication, June, 1989
5. Soil Resource Inventory, Deschutes National Forest, 1976
6. Spotted Owl Inventory and Monitoring Handbook, Barss, January 12, 1989, Deschutes National Forest

Finding of No Significant Impact

Reference: EA No. OR-050-9-51
Santiam Pass Core Hole

The Bureau of Land Management, Prineville District and the Deschutes National Forest, Sisters Ranger District, have analyzed a proposal to drill a 3000-foot core hole and monitor the temperatures for one year at a location on the Sisters Ranger District.

The attached environmental assessment (EA) describes the proposed action and two alternatives. It discusses the potential environmental consequences of the proposed action and the mitigation measures that are applicable. It discusses the lack of potential impacts to the visual resources because of screening from most viewpoints; the temporary noise which may not be discernable above the Highway 20/126 traffic noise; the potential spotted owl habitat which will not be altered and in which no owls have been located; and the Conditions of Approval that have been used on many previous core holes with a proven record of mitigation of environmental concerns. The EA was available to the public beginning June 20, 1989.

The conditions of approval if adopted would assure that no significant adverse impacts would occur to the human environment.

Determination

On the basis of the information contained in the EA and all other information available to me, it is my determination that the alternatives analyzed do not constitute a major Federal action affecting the quality of the human environment. Therefore, an Environmental Impact Statement is not necessary and will not be prepared.

7/21/89
Date

District Manager
U.S.D.I.
Bureau of Land Management
Prineville District