DOE/NV/10180-1

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Conservation Division, MS 92
345 Middlefield Road
Menlo Park, CA 94025

DOE/NV/10180--1

DE85 005476

JUN 25 1980

Memorandum

To: Distribution List (see below)

From: Acting Deputy Conservation Manager - Geothermal

Subject: Final EA 151-80, [Northwest Geothermal Corp.'s (NGC) Plan of Exploration, Mt. Hood Area, Clackamas County, Oregon]

Enclosed is the Final Environmental Assessment (EA 151-80) prepared for NGC's Plan of Exploration which addresses the construction of one well pad and associated access road, and the drilling of one well.

If you have any questions concerning this EA, please contact Buford Holt or Jean Hopkins of this office at (415) 323-8111, ext. 2848, or FTS 467-2848.

Buford Holt

FI William F. Isherwood

Enclosure

A Joint Venture

DISTRIBUTION LIST

Conservation Manager, WR
GEAP Chairman
DGS, Santa Rosa
Forest Supervisor, Mt. Hood NF
Northwest Geothermal Corporation
Department of Energy
Kay Wilcox, Oregon State Clearinghouse (2)
Judy Rounts, Oregon Environmental Council

PREPARED BY:

✓ U.S. Geological Survey
Menlo Park, California

Interagency Agreement DE-AI08-81NV10180

(and)

✓ ~~Forestry~~ Service
U.S. Forestry Service
Department of Agriculture
Gresham, Oregon

80/81

Interagency Agreement DE-AI08-79NV10068

79/80

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Geothermal

EA No. 151-80

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
AREA GEOTHERMAL SUPERVISOR'S OFFICE
345 MIDDLEFIELD ROAD
MENLO PARK, CALIFORNIA

USUAL ENVIRONMENTAL ASSESSMENT

May 1980

Operator Northwest Geothermal Corp. Project Name and No. Old Maid Flat #7A
Location See Figures Section 15 Township 2 S Range 8 E
County Clackamas State Oregon Field/Unit Mt. Hood
Lease No. OR-13994
Joint Field Inspection Date: May 1, 1980

Prepared by: Jean Hopkins

Field Inspection Participants, Titles, and
Organizations:

Mel Suchy	USFS, Portland Regional Office
Kyle Huber	Northwest Geothermal Corp.
Carl Petterson	Northwest Geothermal Corp.
Jack Meyer	Northwest Geothermal Corp.
Charles Smay	USFS, Zigzag District
Roje Gootee	USFS, Zigzag District
Gordon Pearigen	USFS, Zigzag District
Becky Lockett	USFS, Zigzag District
Larry Zimmerman	USFS, Zigzag District
George Berscheid	USFS, Mt. Hood Supervisor's Office
Dennis Olmstead	Oregon Department of Geology
Patrick Keeley	Oregon Dept. of Fish & Wildlife, Clackamas
James Newton	Oregon Dept. of Fish & Wildlife, Portland
Chuck Wassinger	USGS, Santa Rosa
Jean Hopkins	USGS, Menlo Park

Related Environmental Documents

1. EAR - Old Maid Flat Geothermal Prospecting Permit, USFS
Zigzag Ranger District, Mt. Hood National Forest, July 1976
2. Mt. Hood Land Management Plan, USFS, Mt. Hood National Forest, 1977
3. EA 110-8 (Northwest Natural Gas, deepening OMF #1, OR-13994, 6/78)
4. EA 132-9 (Northwest Natural Gas, drilling 3 shallow temperature
gradient holes, OR-13993, OR-14204, 8/79)

INTRODUCTION

The Area Geothermal Supervisor (AGS) received a Plan of Operations (POO) from Northwest Geothermal Corporation (NGC) on 2/12/80. In the POO, NGC proposed two operations: testing and abandoning an existing 1219 meter (m) geothermal temperature gradient hole, designated as OMF No. 1, and drilling and testing a new 1524 m geothermal exploratory hole, to be designated as OMF No. 7A. The POO was amended on 5/6/80, to provide for the use of an impermeable plastic lining in the sump, and for the use of a drilling additive (see Appendix A).

The proposed area of operations is Section 15, T. 2 S., R. 8 E., within Federal lease OR-13994, Mt. Hood National Forest, Clackamas County, Oregon (see Figures 1 and 2). The U.S. Forest Service (FS) is the surface managing agency of the leasehold.

This Environmental Assessment (EA) describes the proposed action and the existing environment, discusses the environmental impacts anticipated from NGC's proposal for OMF No. 7A, and recommends approval conditions to reduce or eliminate those impacts.

Because proposed operations on OMF No. 1 involve surface or subsurface disturbance already discussed in previous EA's, this EA does not include further environmental review of OMF No. 1. Permission to conduct the testing operations at OMF No. 1 was granted by a Sundry Notice issued 2/26/80 (see Appendix B). The decision to exclude consideration of the testing operation at OMF No. 1 from this EA was made after a field inspection to the site on 5/1/80 (see Appendix C). OMF No. 1 was originally drilled under a USFS permit. The EAR for the project, entitled "Old Maid Flat Geothermal Prospecting Permit," was completed on 7/7/76. EA 110-8, prepared by this office on 6/19/78, analyzed the environmental impacts of deepening the hole from 563 m to 1219 m. Both these documents are available from the Zigzag Ranger District, the USGS Santa Rosa District Geothermal Supervisor, and this office.

FIGURE 1.-- LOCATION OF NORTHWEST GEOTHERMAL CORP.'S LEASE OR-13994, T2S, R8E WM, CLACKAMAS AND HOOD RIVER COUNTIES, OREGON.

FIGURE 2.-- LOCATION OF PROPOSED WELL SITE AND ACCESS ROAD.

DESCRIPTION OF THE PROPOSED ACTION

NGC proposes to construct one well pad (approximately .3 ha in size) and one 750 m. access road, to drill one 1524 m. exploratory well, and to test the well in order to determine hydrothermal fluid quality and reservoir productivity. The operation is described in detail in the POO, which was distributed to Interested Parties on 3/24/80, and is now available from the Zigzag Ranger District Office and this office.

NGC estimates that it will begin operations as soon after June 1 as all necessary permits are acquired. Drilling will be completed and the culverts on the access road pulled out by 10/15/80, before the beginning of the rainy season. If the well appears to be producible, it will be capped; otherwise, it will be abandoned according to USGS Geothermal Resources Operational Order 3, and the site will be reclaimed under FS supervision.

At the time of NGC's application, several leaseholds in Old Maid Flat, including OR-13994, contained Non-Surface Occupancy provisions. The original need for these provisions has been resolved in portions of the area, including the proposed area of operations considered in this EA. The FS recently completed the environmental assessment required for modification of lease terms. The Bureau of Land Management, which is the lease issuing agency, accepted FS recommendations to convert a portion of the leasehold to Conditional Development Status on 6/6/80. The new lease stipulations appear as Appendix D.

All geothermal operations on lease OR-13994 are subject to the requirements of the 1970 Steam Act Rules and Regulations (30 CFR 270), Geothermal Resources Operational (GRO) Orders, and Lease Terms and Conditions.

The Recommended Approval Conditions, which will further reduce environmental impacts, were formulated after consideration of all comments expressed by interested parties, and are recommended as a result of this EA. The Approval Conditions will be appended to a joint approval letter signed by the FS and the USGS, and sent to the operator. Responsibility for compliance inspections rests with the USGS Santa Rosa District Geothermal Supervisor. Assistance may be provided by the Zigzag Ranger District and the Oregon Department of Geology and Mineral Industries.

NGC must also obtain drilling and construction permits from the USGS, and a state fill or removal permit from the State Department of Lands. The State Department of Environmental Quality requires a permit for any offsite disposal of drilling muds or fluids. The proposed action will not encroach upon the adjacent Mt. Hood Wilderness Area, and is consistent with Forest Service land use allocation and related management direction. There are no nearby pending actions that will be affected by the proposal.

DESCRIPTION OF THE ENVIRONMENT

The Old Maid Flat area lies in a U-shaped glacial valley located on the west flanks of Mt. Hood, 80 km east of Portland (see Figures 1 and 2). Access to the area is via Oregon State Highway 26 and forest roads N12 and S25.

The slope of the valley floor is gradual, ranging from 2 to a 10 percent grade and dipping to the west-northwest. The valley walls are steeper, about 30-60 percent. The elevation of Old Maid Flat is 609 to 914 m; elevation at Site 7A is approximately 914 m.

As a result of Mt. Hood's most recent volcanic activity, about 200 years ago, the valley floor was covered with a 30 to 60 m-thick volcanic ash or mudflow. The soil does not support heavy vegetative growth, only sparse stands of lodgepole pine, Douglas fir and true firs. Taller and thicker vegetation is found along streams.

Precipitation in the Old Maid Flat area ranges from 216 to 254 cm. per year, occurring primarily as rain in the spring and fall. Snowfall ranges between 0 to 91 cm. per year; summers are relatively dry.

The Sandy River is the major stream drainage in the valley. The Muddy Fork and Ramona Creek, both tributaries of the Sandy River, cross the proposed area of operations. The Muddy Fork is approximately 46 m north of the drill pad.

The Old Maid Flat area is described in greater detail in two Forest Service documents, the Mt. Hood Planning Unit document, "Proposed Leasing of Geothermal Resource with Nonsurface Occupancy Restrictions," September 1977, available from the Zigzag Ranger District Office, and the "USFS Input to USGS Environmental Assessment for Geothermal Test Drilling, Old Maid Flat," 4/4/80, which is reproduced as Appendix E to this document. Figures 3 and 4 depict the access road crossing at Sandy River and drill site 7A.

Figure 3. View of Sandy River Crossing of Access Road to Site 7A,

Figure 4. Site 7A, Old Maid Flat

PARAMETERA. GEOLOGY

1. Other Local Mineral Resources to be Protected: No leasable minerals in area. (Personal Communication, 5/5/80, Charles Brook, Area Geologist's Office)
2. Hazards
 - a. Land Stability: The gradual slope of the valley and relative competence of the volcanics make stability problems unlikely. (General knowledge)
 - b. Subsidence: Because of limited extent of proposed action, it is not expected to result in subsidence. (General knowledge)
 - c. Seismicity: Few earthquakes have been recorded on Mt. Hood, and these have occurred at the summit. None have been recorded at Old Maid Flat. (pers. comm., Dave Williams, USGS-Geol. Div.)
 - d. High Pressure Zones/Blowout Prevention: Drilling plans indicate adequate blowout prevention equipment. (NGC POO; Appendix E; GRO Order 2)
 - e. Volcanic Hazards: Last major eruption was 220 years ago. Minor eruptions occurred about 120 years ago. An eruption potential exists, but timing is impossible to predict. Greatest danger to Old Maid Flat is from mud flows. (Blackwell and Steele, 1979; pers. comm., P. Hammond, Portland State Univ.)

B. SOILS

1. Soil Character: Soil is described in USFS contribution to EA Slope is gradual, so no impact on stability expected. Road and pad construction will disrupt soil horizons and compaction of soils will reduce an already low regeneration potential. (USFS (Appendix E); general knowledge)
2. Erosion/Sedimentation: Soil has high permeability, slight surface erosion potential and a low subsoil erosion potential; slopes are gradual. Although regeneration potential is low, erosion and sedimentation will be controlled by appropriate scheduling of operations, sound engineering practices and design, and revegetation. (USFS (Appendix E); GRO Order 4, item 5; NGC POO, p. 9 B; Recommended Approval Conditions 3, 6).

- C. AIR QUALITY: Status of project area is not available, but FS recognizes air quality as high. Operations will result in increased dust and the potential of encountering H₂S in drilling fluids. Mitigate by watering roads and continuous monitoring of the drilling fluid return line for H₂S to determine need for controls on sustained operations. No state or regional permit required. (USFS (Appendix E, p. 3); NGC POO, p. 9; pers. comm., Fritz Scherwin, Ore. DEQ)

*Information source(s) enclosed in parenthesis.

D. NOISE LEVELS: Although there has been no baseline monitoring of noise levels in Old Maid Flat, levels are low except during periods of high recreational traffic. Levels will increase during construction, drilling and testing operations, but will meet Federal standards of less than 65 dB(A) at lease boundary or 0.8 km from noise source, whichever is greater. (USFS (Appendix E); GRO Order 4, item 11)

E. WATER RESOURCES

1. Hydrologic Character

- a. Surface Waters: The three streams in the area follow meandering courses that change frequently. Natural sedimentation is occasionally heavy because of glacial origin of streams. Surface waters will be protected from impact by sound engineering in stream crossing, pad and sump construction. Drilling water source will be the Muddy Fork (Recommended Approval Conditions 1, 5; USFS (Appendix E); NGC POO)
- b. Ground Waters: Wells will be cased to 975 m minimum to protect ground waters from possible contamination. Sump liner will protect from percolation. (GRO Order 2, item 1; GRO Order 4, item 9; Appendix A; Recommended Approval Condition 2)

2. Water Quality

- a. Surface Waters: No discharge to surface waters; all drilling wastes and produced fluids will be retained in steel tanks and/or a sump with impermeable liner. Disposal of produced fluids will depend on fluid quality. (NGC POO, p. 10; GRO Order 4, item 9A; Recommended Approval Condition 2)
- b. Ground Waters: No changes to ground water flows are expected. (Previous drilling experience in area)

F. FLORA AND FAUNA

1. Endangered and Threatened Species Determination

Based on the informal comments received from USFS, Zigzag Ranger District on April 8, 1980, and from USFWS on May 29, 1980, we determine that there would be no effect on listed endangered and threatened species and/or their critical habitat. Corydalis aqua-gelidae, a candidate species, and Haplopappus hallii, on the watch list, may occur in the proposed area of operations. A botanical survey for these two plants was completed on 6/5/80. No specimens of either species were found. (Appendix F)

2. Flora: Approximately .85 ha of lodgepole pine-red alder-Douglas fir would be cleared for the road and pad. If a productive well is developed, erosion prevention measures and partial revegetation will be required. If the well is abandoned, complete revegetation will be required. Regeneration potential is low. (USFS (Appendix E, p. 6); Recommended Approval Condition 3)
3. Fauna: Operational periods are not expected to affect local fish populations, despite slight and temporary increase in sedimentation. Some wildlife will be temporarily displaced from the area, due to noise and increased activity. (USFS (Appendix E, p. 10))

G. LAND USES

1. General: The land will be removed from present recreation, and wildlife habitat use, for two to three months. (NGC POO)
2. Affected Floodplains and/or Wetlands: Old Maid Flat is technically a mud flow, not a floodplain. Floodplain is limited to within banks of Sandy River. There is no access route to the pad site which does not cross the river. (Pers. comm., Chuck Wassinger, USGS Cons. Div.; general knowledge)
3. Roadless/Wilderness Areas: The proposed operation will not occur in any roadless or wilderness areas; temporary increase in noise levels may affect nearby Mt. Hood wilderness area. (General knowledge)

H. AESTHETICS: FS visual quality objective for the site is partial retention. Proposed operations meet this objective. (USFS (Appendix E, p. 3))

I. SOCIO-ECONOMICS: No significant effect expected. Twelve to fifteen people will be employed on site for up to three months; no permanent structures will be needed (NGC POO p. 8)

J. CULTURAL RESOURCES DETERMINATION

Based on the formal comments received from the Forest Service on June 3, 1980, we determine that there would be no effect on cultural resources (Appendix G)

K. OTHER: Old Maid Flat is a popular recreational area. Potential public harm will be averted by posting of signs and maintenance of locked access gates. Effects will be temporary and limited to the duration of operations. (USFS, (Appendix E); NGC POO p. 9; Recommended Approval Conditions 4, 7)

L. ADEQUACY OF RESTORATION PLANS: The POO, GRO Orders, and Recommended Approval Conditions allow adequate restoration of the area. USGS and FS post-operations inspections will insure that mitigation is effective. (POO; GRO Order 4; Approval Conditions)

ALTERNATIVES TO THE PROPOSED ACTION

1. Disapproving the proposed action would result in no impacts to the physical environment in the Old Maid Flat area. However, Mt. Hood National Forest operates under a multiple use management policy. This geothermal resource exploration proposal is compatible with the elements of that management plan, and disapproval would not be an appropriate alternative.
2. Approving the proposal with the Recommended Approval Conditions will limit the environmental impacts to acceptable levels. There would be temporary (two to three months) adverse effects on wildlife, recreation, air quality and noise levels. There would also be a temporary, but longer term, impact on vegetation, due to the low regeneration potential of the soil type in the area.
3. Approving the proposal without the Recommended Approval Conditions could result in unacceptable impacts to water quality of the three streams in the area, as well as the adverse effects described above.

RECOMMENDED APPROVAL CONDITIONS

The following approval conditions are in addition to the Special Lease Stipulations (Appendix D).

1. The minimum size culvert to be installed in Ramona Creek shall be 24" in diameter. Culvert installation at the Sandy River and Ramona Creek access road crossings shall result in no change to the existing stream gradient.
2. Fuel storage tanks shall be bermed and lined with an impermeable material to contain accidental spills.
3. If the well appears producible, site restoration shall consist of constructing erosion control ditches and water bars along the dirt access road, terracing in the cleared drill site area, and reseeding disturbed areas as specified by the Forest Service. If the well is abandoned, site restoration will be accomplished in a timely manner. Such restoration will consist of injection or removal of fluids and erosion control measures which include reshaping the land to near natural contours and reseeding disturbed areas as specified by the Forest Service.
4. Unless a drilling crew or drilling supervisor is present, Northwestern Geothermal Corp. shall provide a watchman on the drill site, 24 hours a day, during all drilling and testing operations to provide for public safety and fire prevention.
5. Water for pumping shall be obtained from the Muddy Fork, immediately adjacent to site 7A, under FS supervision. If it is not feasible to obtain water from the Muddy Fork, an alternate source shall be the Sandy River.
6. Construction of the access road and drill sites will be permitted only during periods of appropriate soil moisture and stream flow conditions, as determined by the FS. Removal of culverts and all other restoration activities shall be completed by October 15, 1980, if at all possible, to avoid the fall rainy season.
7. The operator shall comply at all times with FS directives related to surface operations necessary to the drilling operations, including, but not limited to, employee parking, control of access, and fire protection.
8. If trees are used to secure drilling rig guy cables, the cables should be run through hoses or across 2 x 4 wood blocks to prevent the cables from girdling the trees.
9. The cleared timber will remain the property of the FS. Timber will be cut and stacked, and slash disposed of, per FS directives.

EIS DETERMINATION

In my opinion, the proposed action does not constitute a major Federal action significantly affecting the quality of the human environment in the sense of NEPA, Section 102(2)(C).

Acting Rory E. Kaschen 6/23/80 Bruce H. Bellier 6/24/80
Chief, Environmental and Date for District Geothermal Supervisor Date
Safety Section

I determine that preparation of and Environmental Impact Statement is not required.

Bruce H. Bellier 23 June 1980
Acting Deputy Conservation Manager - Geothermal Date

FINDING OF NO SIGNIFICANT IMPACT

We have considered the proposed construction of one drill pad, the drilling of one geothermal exploratory well, and the construction of the associated access road in the preceding pages of this EA and find, based on the analysis of environmental considerations provided therein, no evidence to indicate that it will significantly (40 CFR 150.27) impact the quality of the human environment if the Recommended Approval Conditions are followed.

CONTROVERSIAL ISSUES AND CONSERVATION DIVISION RESPONSES

Response to Zigzag Ranger District (see p. 6, Mitigation Measures and Constraints, Appendix E):

1. This mitigation measure is included as Recommended Approval Condition No. 3.
2. This mitigation measure is included as Recommended Approval Condition No. 3.
3. This concern is met by Recommended Approval Condition No. 7.
4. This mitigation measure is the FS responsibility and at FS discretion. Since it does not affect the operator, it is not included as a Recommended Approval Condition.
5. Recommended Approval Condition No. 4 provides for a watchman or other NGC representative on-site at all times during drilling and testing. On page 9, Section D of the POO, NGC agrees to construct a fence around the drill site. The Forest Service is authorized to conduct on-site inspections in Recommended Approval Condition No. 7.
6. Page 8, Section G of NGC's POO provides for sanitary facilities.
7. Page 10, Section G of NGC's POO provides for garbage removal.
8. Page 9, Section B and Page 10, Section G of NGC's POO provide for retention and removal of drilling muds and produced fluids. DOE's letter dated 5/6/80 (see Appendix A) provides for lining the sump with an impermeable material.
9. Page 7, paragraph 3 of NGC's POO describes the construction of culverts. Recommended Approval Condition No. 1 addresses culvert size on the Ramona Creek crossing, and culvert installation. Recommended Approval Condition No. 6 urges completion of operations by October 15, 1980.
10. Recommended Approval Condition No. 6 provides for FS discretion on construction scheduling.
11. We feel that all parties concerned agree on this point, and it is unnecessary to include it as an Approval Condition.
12. This mitigation measure is included as Recommended Approval Condition No. 8.
13. This mitigation measure is included as Recommended Approval Condition No. 9.

OREGON PROJECT NOTIFICATION AND REVIEW SYSTEM

STATE CLEARINGHOUSE

Intergovernmental Relations Division

155 Cottage ST NE

Salem, Oregon 97310, Phone: 378-3732

P N R S STATE REVIEW

Project #: 8004 5 400 Due Date: MAY 02 1980

To Agency Addressed: If you intend to comment but cannot respond by the return date, please notify us immediately. If no response is received by the due date, it will be assumed that you have no comment and the file will be closed

PROGRAM REVIEW AND COMMENT

To State Clearinghouse: We have reviewed the subject Notice and have reached the following conclusions on its relationship to our plans and programs:

- () It has no adverse effect.
- () We have no comment.
- () Effects, although measurable, would be acceptable.
- () It has adverse effects. (Explain in Remarks Section)
- () We are interested but require more information to evaluate the proposal. (Explain in Remarks Section)
- () Please coordinate the implementation of the proposal with us.
- (✓) Additional comments for project improvement. (Attach if necessary)

If the project would require the removal, fill or alteration of 50 cubic yards or more of material within the banks of the waterway(s), we urge the applicant to apply for state fill or removal permits well in advance of construction deadlines to prevent unnecessary project delays. Specific information on the need for permits may be obtained from the Division of State Lands' office at 1445 State Street, Salem, OR 97310. Phone 378-3805.

Thank you for the opportunity to comment on this project.

Response to Oregon Department of Lands Comments:

We have advised NGC that the State requires a State Fill or Removal Permit for this operation.

OREGON PROJECT NOTIFICATION AND REVIEW SYSTEM

STATE CLEARINGHOUSE

Intergovernmental Relations Division
155 Cottage St NE
Salem, Oregon 97310, Phone: 378-3732

MAY 07 1980

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- ☐ Please coordinate the implementation of the proposal with us.
- ☒ Additional comments for project improvement. (Attach if necessary)

REMARKS (Please type or print legibly)

Comments are attached.

The Oregon Department of Fish and Wildlife has reviewed the Northwest Geothermal Corporation plan of operations for geothermal exploratory drilling and testing in the Old Maid Flat area.

There does not appear to be any problems associated with the testing of OMF No. 1, provided all fluids are retained on the site and not allowed to enter adjacent waters.

The following recommendations are made in reference to the drilling of well No. 7A:

- 1) Culvert installation associated with the Sandy River and Ramona Creek access road crossings shall be installed so there is no change in the existing stream gradient.
- 2) The minimum size culvert to be installed in Ramona Creek shall be 24-inch diameter.
- 3) All drilling mud and other fluids from this well shall be retained on the site and not allowed to enter adjacent waterways.
- 4) Following completion of the field operations, culverts and backfill materials shall be removed or blended into the flood plain, with the area retaining a natural appearance.

Any potential environmental problems should be coordinated with our district fish biologist, Jay Massey. Mr. Massey can be contacted at 17330 S. E. Evelyn Street, Clackamas, Oregon 97015.

We appreciate the opportunity to review and comment on this plan.

cc: Bill Saltzman
Jay Massey

Response to Oregon Department of Fish and Wildlife comments:

1. This recommendation is incorporated in Recommended Approval Condition No. 1.
2. This recommendation is incorporated in Recommended Approval Condition No. 1.
3. This concern is met satisfactorily by the Plan of Operation (III C, VI C & G) and by GRO Order No. 4, section 9.
4. This concern is met satisfactorily by Recommended Approval Condition No. 3, the Plan of Operation (III C, D), and GRO Order No. 4, section 2.

check.

OREGON PROJECT NOTIFICATION AND REVIEW SYSTEM

STATE CLEARINGHOUSE

Intergovernmental Relations Division
155 Cottage ST NE
Salem, Oregon 97310, Phone: 378-3732

P N R S STATE REVIEW

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- () Please coordinate the implementation of the proposal with us.
- (X) Additional comments for project improvement. (Attach if necessary)

REMARKS (Please type or print legibly)

OMP Site 7A should have a quick
check by a cultural resource tech

Heather
Mt Hood
old mail flat

Response to Oregon Department of Historic Preservation comments:

1. The Forest Service is preparing a cultural resource inventory on the access road and OMF Site 7A.

OREGON PROJECT NOTIFICATION AND REVIEW SYSTEM

STATE CLEARINGHOUSE

RECEIVED

APR 14 1980

Intergovernmental Relations Division
155 Cottage Street
Salem, Oregon 97310, Phone: 378-3732

STATE SOIL AND WATER
CONSERVATION COMMISSION

P N R S STATE REVIEW

Project #: 8004 5 400 Due Date: MAY 02 1980

To Agency Addressed: If you intend to comment but cannot respond by the return date, please notify us immediately. If no response is received by the due date, it will be assumed that you have no comment and the file will be closed

Clackamas - Geothermal Exploratory Drilling + Testing
Mt. Hood, Oregon, Old Maid Flat Area
PROGRAM REVIEW AND COMMENT

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- (X) Please coordinate the implementation of the proposal with us.
- () Additional comments for project improvement. (Attach if necessary)

REMARKS (Please type or print legibly)

^{SWCD}
The Clackamas County would like to have progress reports.
CLACKAMAS COUNTY SWCD
256 Warner Milne Rd.
Oregon City, OR 97045
Phone: 657-1141

Response to Oregon Department of Soil and Water:

1. We have contacted the Clackamas County Soil and Water Conservation District, and will continue to keep them informed of activities related to this proposal.

OREGON PROJECT NOTIFICATION AND REVIEW SYSTEM
STATE CLEARINGHOUSE

Intergovernmental Relations Division
155 Cottage St. NE
Salem, Oregon 97310, Phone: 378-3732

P N R S STATE REVIEW

Project #: 8000 5 100 Due Date: 11/1/80

To Agency Addressed: If you intend to comment but cannot respond by the return date, please notify us immediately. If no response is received by the due date, it will be assumed that you have no comment and the file will be closed

PROGRAM REVIEW AND COMMENT

To State Clearinghouse: We have reviewed the subject Notice and have reached the following conclusions on its relationship to our plans and programs:

- () It has no adverse effect.
- () We have no comment.
- () Effects, although measurable, would be acceptable.
- () It has adverse effects. (Explain in Remarks Section)
- ☒ We are interested but require more information to evaluate the proposal. (Explain in Remarks Section)
- () Please coordinate the implementation of the proposal with us.
- () Additional comments for project improvement. (Attach if necessary)

REMARKS (Please type or print legibly)

We need to know why this project does not require an environmental assessment per the Geothermal Steam Act of 1970.

UNITED STATES
DEPARTMENT OF THE INTERIOR

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

APR 25 1980

Memorandum

To: Kay Wilcox, State Clearinghouse, Salem, OR

From: Acting Area Geothermal Supervisor

Subject: Notice of Interest for PNRs Number 8004-5-400 (N.W. Geothermal Corp. - Plan of Operation - Mt. Hood)

We have received the Energy Agency's request for additional information on this project (copy of Notice is attached, per your request). We will be preparing an Environmental Assessment (EA) for this project. After several postponements due to late snowfall, we are planning a field inspection of the proposed site of operations on May 1, 1980. Notice of the inspection was sent on April 10, 1980.

After the inspection, we will prepare an EA and send copies to the State Clearinghouse. If you have any questions about the EA or the procedures, please call Jean Hopkins of this office at (415) 323-8111, Ext. 2888, or FTS 467-2888.

William F. Isherwood

Attachment

OREGON PROJECT NOTIFICATION AND REVIEW SYSTEM

STATE CLEARINGHOUSE

Intergovernmental Relations Division
155 Cottage SE NE
Salem, Oregon 97310, Phone: 378-3732

P N R S STATE REVIEW

Project #: 8004 5 400

Due Date: MAY 32 1980

To Agency Addressed: If you intend to comment but cannot respond by the return date, please notify us immediately. If no response is received by the due date, it will be assumed that you have no comment and the file will be closed

PROGRAM REVIEW AND COMMENT

To State Clearinghouse: We have reviewed the subject Notice and have reached the following conclusions on its relationship to our plans and programs:

- ☐ It has no adverse effect.
- ☐ We have no comment.
- ☒ Effects, although measurable, would be acceptable.
- ☐ It has adverse effects. (Explain in Remarks Section)
- ☐ We are interested but require more information to evaluate the proposal. (Explain in Remarks Section)
- ☒ Please coordinate the implementation of the proposal with us.
- ☐ Additional comments for project improvement. (Attach if necessary)

REMARKS (Please type or print legibly)

A special permit under OAR 340-14-050 will be required for any off site disposal of drilling mud or fluid.

Response to Oregon Department of Environmental Quality's comments

Appropriate coordination of field operations with State agencies will be maintained.

RECEIVED

MAY 1 1980

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

April 29, 1980

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

Gentlemen:

The Mazamas, a mountain climbing and outdoor recreation club of approximately 2700 people, appreciate the continuing reports and opportunities to respond to the Geothermal drilling activities in the Mt. Hood National Forest.

The plan of operations for the Old Maid Flat Area seems to be thorough and complete. We feel special attention should be kept on fluids pumped from wells during flow tests to minimize any accidental soil erosion.

It must be continually recognized that this drilling site is in a prime recreational area which will probably see increasing use in the near future due to its proximity to Portland. We dislike any operation such as this where construction of roads and bridges or widening of existing ones is required. However, we realize there is need for the Geothermal resource if it has the potential to be put to good use. So we request that development of the geothermal resource proceed with minimum impact on the recreational value of the Old Maid Flats Area.

We anxiously await to see the testing results.

Sincerely,

Paul Herner, Chairman
Conservation Committee

Response to The Mazamas comments:

Northwest Geothermal Corporation's Plan of Operation, along with Recommended Approval Conditions 3 and 6, and GRO Order No. 4, item 5, provide protection against soil erosion hazards.

This project will have only a temporary impact on the recreational value of the Old Maid Flat area; operations should be completed by October 15, 1980.

REFERENCES

Blackwell, D.D. and J.L. Steele, 1979, Heat Flow Modeling of the Mount Hood Volcano, Oregon, Southern Methodist University.

Mt. Hood National Forest, 1976, Old Maid Flat Geothermal Prospecting Permit.

Mt. Hood National Forest, 1977, Proposed Leasing of Geothermal Resource with Nonsurface Occupancy Restrictions.

APPENDIX A

Amendment to POO, 5/6/80

CONSERVATION DIVISION
GEOTHERMAL DISTRICT OFFICE

MAY 8 1980

SANTA ROSA, CALIFORNIA
RECEIVED

Department of Energy
Nevada Operations Office
P.O. Box 14100
Las Vegas, NV 89114

MAY 6 1980

Encl. Sec.
Chief, Operations
Sec.
NOTED - C. W. MORGAN
C. D. SINGER
T. X. W.

D. A. Hull, Oregon Dept. of Geology
& Mineral Industries, Portland, OR
C. Massinger, USGS, Santa Rosa, CA
J. Geyer, US Dept. of Agriculture,
Forest Service, Gresham, OR
J. Meyer, Northwest Geothermal Corp.,
Portland, OR

MAY 6 1980

MT. HOOD GEOTHERMAL DRILLING, ONF NO. 7A EXPLORATORY HOLE

EA #151-80

The attached information describes an additive, Adomite HFR-II, which is being considered for use in the drilling fluid system in lieu of bentonite during ONF No. 7A drilling activities. The additive is being used successfully by our drilling support contractor, Fenix & Scisson (F&S), at the Nevada Test Site. Its use has resulted in both technical and economic benefits, and F&S has recommended it be used for the subject drilling activities.

We are now intending to cover the bottom and sides of the earthen reserve pit with an impermeable plastic lining of suitable durability, therefore, all drilling fluids will be positively contained for ultimate disposal in accordance with State and Federal requirements.

We would appreciate any comments with respect to environmental or technical considerations associated with the proposed use of the Adomite additive.

J. N. Fiore

J. N. Fiore, Project Engineer
Geothermal Branch
Energy Applications Division

EAD:JHF-549

Enclosure:
As stated

cc w/encl:
P. K. Ortega, F&S, NTS
S. R. Elliott, CSEM

Highly efficient liquid friction reducer

May also be used as a viscosifier, foam stabilizer and coagulant

- Yields rapidly

ASP-G11-F

NALCO.

ADOMITE,
WFR-II

FRICTION REDUCER
FOR WATER BASED
FRAC FLUIDS

PRINCIPAL USES

As a FRICTION REDUCER for fresh water fracturing, one gallon or less of ADOMITE® WFR-II per 1000 gallons water will give 70-80% friction reduction. ADOMITE WFR-II is an oil external emulsion of approximately 1/3 high molecular weight polyacrylamide copolymer, 1/3 water and 1/3 light hydrocarbons. Because of built-in activators in ADOMITE WFR-II, it can be added to the fracturing fluid in the blender and begins yielding in seconds. ADOMITE WFR-II is anionic, is not adversely affected by shear in normal usage, and is compatible with bactericides such as ADOCIDE®, NALCO® P-25-F and NALCO 3991.

use as a FOAM STABILIZER in air drilling, 1/2 to one gallon ADOMITE WFR-II per 1000 gallons water, in conjunction with 3-5 gallons ADOFOAM® BF-1/1000 gallons will significantly stabilize foam.

In fresh water drilling (water wells, shot-holes, mining core-holes, etc), 2-5 gallons ADOMITE WFR-II per 1000 gallons water will VISCOSIFY or thicken drilling water so as to prevent sloughing and carry heavy cuttings.

As a COAGULANT, from 5-10 ppm ADOMITE WFR-II (.005 to .010 gallons/1000) following a treatment of 10 ppm NALCO 2 or alum will normally coagulate clays and other suspended matter in fresh water.

GENERAL DESCRIPTION

Odor.....	Slight
Color.....	White
pH of 1% Solution.....	7.0
Specific Gravity.....	1.07
Pounds per Gallon.....	8.9
Pour Point.....	-20° F

HANDLING

No special precautions are needed for handling ADOMITE WFR-II, but contact with skin and eyes should be avoided. Do not take internally. It is not corrosive to carbon steel. Galvanized metals and natural or synthetic rubber should be avoided. Teflon or inert materials should be used for gaskets and pump seals. ADOMITE WFR-II can be gravity fed into blender tub or pumped into blender suction line. Centrifugal pumps at blender suction and/or discharge greatly speed-up breaking of the emulsion for quick yield. In drilling and other applications, pumping of fluid containing ADOMITE WFR-II through a centrifugal pump or agitation with a drum type mixer will rapidly and completely put the polymer into solution.

STORAGE

As with most water in oil emulsions, long standing will allow some of the hydrocarbon to separate to the top. Drums of ADOMITE WFR-II should be laid on the side and rolled before use to insure even distribution of the polymer. Recovery after standing or freeze-thaw is complete with moderate agitation.

SHIPPING

ADOMITE WFR-II is shipped in 55-gallon non-returnable steel drums or 5-gallon metal cans, F.O.B., Sugar Land, Texas.

NALCO CHEMICAL COMPANY
ADOMITE WELL STIMULATION CHEMICALS

P. O. Box 87 □ Sugar Land, Texas 77478

APPENDIX B

Sundry Notice, OMF No. 1, 2/26/80

RECEIVEDUNITED STATES
DEPARTMENT OF THE INTERIOR
B271980 GEOLOGICAL SURVEY

AREA SUPERVISOR'S OFFICE

CONSERVATION DIVISION

LAND RECLAMATION NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9-331-C for such proposals.)

1. oil well ☐ gas well ☐ other Geothermal2. NAME OF OPERATOR
Northwest Natural Gas Co.3. ADDRESS OF OPERATOR
123 N.W. Flanders, Portland, Oregon4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
AT SURFACE:
AT TOP PROD. INTERVAL:
AT TOTAL DEPTH:

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

REQUEST FOR APPROVAL TO:

TEST WATER SHUT-OFF ☐FRACTURE TREAT ☐SHOOT OR ACIDIZE ☐REPAIR WELL ☐PULL OR ALTER CASING ☐MULTIPLE COMPLETE ☐CHANGE ZONES ☐ABANDON* ☒(other) Hydrology testing

SUBSEQUENT REPORT OF:

☐☐☐☐☐☐☐☐

5. LEASE

OR 13994

6. IF INDIAN, ALLOTTEE OR TRIBE NAME

7. UNIT AGREEMENT NAME

8. FARM OR LEASE NAME

9. WELL NO.

One

10. FIELD OR WILDCAT NAME

Old Maid Flat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA

Sec. 15, T2S, R8E

12. COUNTY OR PARISH

Clackamas

13. STATE

Ore

14. API NO.

15. ELEVATIONS (SHOW DF, KDS, AND WD)

2750 Feet contour-photo

(NOTE: Report results of multiple completion or zone change on Form 9-330.)

DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)

The basic elements of the testing plan are to displace approximately 70 Bbls. of existing drilling mud from the lower 1,000 ft. of open hole with fresh water, remove existing 2-inch pipe, isolate the lower 800 ft. to 1,000 ft. of hole with open hole packer and tubing, swab about 100 Bbls. of fluid from the hole, and, if possible, continuously pump up to 400 Bbls. of fluid from the hole while measuring flowrate and borehole fluid levels. All drilling mud and produced fluid will be retained in steel tanks during the test. Upon completion of the test all collected fluids will be injected into the borehole. An alternative to injecting into the wellbore will be to haul produced fluids to the nearby quarry in Section 21 and disperse on the ground surface if fluid quality will allow. See back for abandonment plan.

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct

SIGNED [Signature] TITLE Exploration Super. DATE 2/14/80

(This space for Federal or State office use)

APPROVED BY [Signature]
CONDITIONS OF APPROVAL, IF ANY:TITLE Dist. Super. DATE _____

FEB 26 '80

*See Instructions on Reverse Side

APPENDIX C

Field Inspection Memo, 5/6/80

UNITED STATES
DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY
Conservation Division, MS 92
345 Middlefield Road
Menlo Park, CA 94025

May 6, 1980

Memorandum

To: Files

Through: Chief, Environmental & Safety Section
Chief, Operations Section

From: Jean Hopkins

Subject: Environmental Analysis of Testing of OMF No. 1 (EA 151-80,
Mt. Hood)

After the field inspection on May 1, and discussions with USFS representatives from the District and Supervisor's Offices, I advise against including the proposed testing of OMF No. 1 in EA #151-80.

The proposed operation would involve no surface disturbance; the access road is in satisfactory condition, and there has been no revegetation of the pad since the last operation, which was discussed in EA #110-8. Northwest Geothermal Corp. proposes to clean out the mud in the hole, place an isolation packer above the lower 1,000', remove the fluid, and pump to test hydrothermal fluid quality and reservoir characteristics. After completion of testing, the hole will be abandoned and the pad site will revert to its original use as a parking lot for the Ramona Falls trailhead.

NGC hopes to complete this operation by May 31. They advised Chuck Wassinger that Sing Well Services was scheduled to appear on site during the week of May 12.

Jean Hopkins
Jean Hopkins

cc: B. Holt
D. Bickmore
Roje Gootee,
Zig Zag Ranger District

APPENDIX D

Revised FS Lease Stipulations, OR-13994

Conditional Development Stipulations

Because of insufficient knowledge of the type or scale of development of geothermal resources which may be proposed, this lease, No. ¹³⁴⁹⁴ Sec 16, 15, W/4 W/4 14, is approved and issued subject to the following conditions which shall prevail, notwithstanding any terms or conditions of the lease to the contrary. The lessee shall comply with these stipulations unless they are modified by mutual agreement of the lessee, Forest Supervisor, USGS Supervisor, and Authorized Officer (BLM).

1. Surface disturbing exploration and testing may be conducted under a plan of operation approved on the basis of an environmental assessment of only the proposed specific action. Lessee may drill small-diameter temperature gradient holes; drill and complete one or more deep test and/or injection wells from no more than one drill pad per section; conduct all necessary testing to determine the extent and commerciality of the resource; and operate small wellhead generating units for up to 180 days for testing purposes.
2. Subsequent operations involving the commercial development and utilization of any geothermal resource so explored and evaluated are contingent upon an appropriate environmental assessment, and approval of a proposed plan of operation for development, utilization, injection, and production. Operations may be denied or limited if:

- a. Development prevents or unnecessarily hinders the multiple-uses of the leased lands which were established at the time of lease issuance as defined in the Federal Land Policy and Management Act (Section 103(c) 43 USC 1702) and the Forest and Rangeland Renewable Resource Planning Act of 1974 (15 USC 1601-1610) as amended by the National Forest Management Act of 1976 (16 USC 472A).

Development will prevent or unnecessarily hinder only if there are no satisfactory mitigation factors or suitable locations for production facilities within the leased lands.

B. Development precludes the eventual restoration of the affected lands to a resource character, level of use or productivity reasonably equivalent to the near pre-lease state or to its natural condition.

3. This lease will not necessarily terminate under the foregoing conditions and future plans may be acceptable. If a plan is rejected, or operations are denied for the foregoing reasons, lease term extension and a waiver or modification of rentals and royalties will be considered by the authorized officer.

APPENDIX E

"USFS Input to USGS Environmental Assessment for Geothermal
Test Drilling, Old Maid Flat," 4/4/80

U.S.F.S. Input to U.S.G.S.'

ENVIRONMENTAL ASSESSMENT

for

Geothermal Test Drilling

Old Maid Flat

Mt. Hood National Forest

Prepared by:

R. S. Gootee - Resource Forester

Rebecca Jo Lockett - Forester Trainee

April 4, 1980

I. INTRODUCTION

International recognition of supply limitations of petroleum products has led to a significant intensification of the search for alternative energy sources. Mt. Hood and other recently active volcanic peaks and hot springs have received particular attention as potential sources of geothermal energy, a technically and economically viable supplement to national energy resources. Rules and regulations relating to the exploration for geothermal resources on federal lands are outlined in the Geothermal Steam Act of 1970 (30 USC 1001-1025); in the Federal Register under Title 43, Chapter II (38 FR 35082, December 21, 1973); the Geothermal Resource Operational Orders released through the U.S. Geological Survey; U.S. Geothermal Energy Research, Development and Demonstration Act of 1974 (PL 93-410); State of Oregon Administrative Rules - Compilation Sections 20-005 through 20-170, 1972; and the U.S. Forest Service Manual, Title 2800.

This Environmental Assessment was prepared to document the evaluation of the impact of one application submitted by Northwest Geothermal Corporation (NGC) for exploratory drilling and testing on Old Maid Flat, Zigzag Ranger District, Mt. Hood National Forest. NGC's proposal would involve activity on two separate sites:

1. Testing an existing 4000' temperature gradient hole designated as OMF #1 (2S, 8E, 15cd), and
2. Drilling and testing a new 5000' to 6000' deep-test hole to be referred to as OMF #7a (2S, 8E, 15ac).

Detailed descriptions of the operations proposed on these sites are provided in the Plan of Operations included in Appendix A.

II. AFFECTED ENVIRONMENT

The Old Maid Flat area is a deep, U-shaped glacial valley located on the west flanks of Mt. Hood. As a result of the mountain's most recent volcanic activity, the valley floor is made up of volcanic ash or mud-flow materials, approximately 100 to 200 feet thick. The Sandy River is the major stream drainage in this valley.

The slopes of the valley are gradual (2-10%), while the valley walls are steeper (30-60%). Generally, the elevation ranges from 2000' to 3000'. Major access to this area is via Oregon State Highway 26 and forest roads N12 (Lolo Pass Road) and S25.

Precipitation in the vicinity of Old Maid Flat ranges from 85 to 100 inches per year, occurring primarily as rain in the spring and fall. Depending upon the severity of the winter, Old Maid Flat accumulates 0 to 36 inches of snow from late October until March. The summers are relatively dry.

The two drilling sites considered in this environmental assessment are located within one-half mile of one another. OMF #1 is on the south side of the Sandy River at the end of forest road S25, at about 3000' elevation. OMF #7a is adjacent to the Muddy Fork of the Sandy River. Its elevation is approximately 2600 feet.

Timber and Soils

The timber at OMF #1 is average quality 100 year old Douglas fir (site index 90) and Hemlock. The soil (Mt. Hood Soil Resource Inventory #342, See Appendix B) has moderate to severe surface erosion potential and high subsurface erosion potential. There is a low compaction hazard and high soil and site damage susceptibility associated with this type of soil. This soil produces moderate to low runoff and has moderate infiltration rates. Regeneration potential of this soil is moderate to high.

Site #7a supports a similar timber type with the addition of some red alder, although the stocking level is low. The soil (SRI #346) has slight surface erosion potential and low subsoil erosion potential. There is a low compaction hazard and low soil and site damage susceptibility associated with this soil. This soil has a low runoff potential and rapid infiltration rates. The regeneration potential is low.

Water

The Sandy River and Ramona Creek (a tributary of the Muddy Fork of the Sandy River) are adjacent to or will be affected by road construction to the drilling sites. The Muddy Fork is approximately 150 feet north of the drill pad of OMF #7a. All streams are considered to produce generally high quality water, although there has been no monitoring on or above involved reaches to date. There are no sources of chemical pollution, but natural sedimentation is occasionally heavy because of the glacial nature of the streams. The Sandy River and the Muddy Fork are Class II streams, while Ramona Creek is Class III (see FSM 2121.33 for definitions of stream classes). These streams are shallow and their courses change often. As a result of these meandering stream courses, the opportunity for fish habitat is limited. In addition, the Bull Run Watershed Management Unit boundary is located about 2 miles to the northwest of the drilling sites. A ridge separates these two drainages.

Wildlife and Fish

No federally classified, threatened or endangered wildlife species are known or expected to occur in the area affected by the test projects. However, western spotted frog (Rana pretiosa), considered threatened by the State of Oregon, is a possible (although unconfirmed) resident of the project area. R. pretiosa is dependent upon riparian habitat for reproduction. Ramona Creek is the most likely location for R. pretiosa, with the riparian habitat of Muddy Fork also a possibility.

The extremely young, sandy soils and relatively harsh climatic conditions on Old Maid Flat have created a unique vegetative sere in the project area. The vegetative community is small and

uncharacteristic of adjacent areas; consequently it is a key component of the overall habitat diversity of the area. A list of wildlife species specifically associated with or dependent upon this unique habitat is not available. Maintenance of the natural seral progression and of the associated riparian ecotonal complex is highly desirable.

Noise

Existing levels of noise in the Old Maid Flat area are low except during occasional periods of heavy recreation traffic. There has been no monitoring of the noise levels in this area to date.

Air

The present air quality is recognized as high, although no specific data exists supporting that assumption. Possible pollutants include limited dust and exhaust emissions from traffic, and smoke during wildfire and/or prescribed burning in nearby drainages.

Visual Quality Objectives

The visual quality objective for the area surrounding OMF #1 is retention. In general, retention means that man's activities are not evident to the casual forest visitor. Partial retention is the visual quality objective for the OMF #7a area. This objective means man's activities may be evident but must remain subordinate to the characteristic landscape. The location of Site #7a will allow this.

Wilderness

Both drilling sites are approximately one-third mile west of the designated Mt. Hood Wilderness boundary. Furthermore, both sites are within or immediately adjacent to portions of a RARE II area (the Mt. Hood Additions #6093). The final decision for these RARE II area fragments has not been formalized. These areas were omitted from the recent Wilderness area expansion; no further additions to the Mt. Hood Wilderness are anticipated.

Cultural

There are no known cultural sites or resources in the vicinity of the drilling sites. A cultural resource inventory will be conducted when the snow melts off Site #7a, prior to commencing geothermal operations. The State Historic Preservation Office (SHPO) has been consulted for their input.

Social

Although the drilling sites are near Portland (about 60 miles), the immediate vicinity has a low population density. The Highway 26 corridor supports a non-industrial, recreation/resort community.

The majority of the community is seasonal or part-time residents. Both drill sites are 3 miles east of the forest boundary with no private land inholdings. All occupancy is transient, recreational traffic.

Recreation

Dispersed recreation use is heavy during all seasons in the Old Maid Flat area. Some popular attractions include day hiking and backpacking, fishing, mushroom picking, horseback riding, overnight camping, cross country skiing and snowshoeing and hunting. Two developed campgrounds, Riley and McNeil, are about two and one-half miles west of the drilling sites. Riley campground has been developed to accommodate the many horseback riders in the area.

Ramona Falls is a popular attraction, which is accessed by a two and one-half mile trail. The OMF #1 site was originally the Ramona Falls trailhead and parking lot. High water in November, 1977 severely damaged a portion of Road S25. As a result, in 1978 the trail was extended one mile west and the parking area and trailhead were relocated off of S25. Subsequently, Northwest Geothermal chose the abandoned parking lot as a suitable location for geothermal exploration. Because the trailhead relocation is considered temporary, the Forest Service plans to rehabilitate the original site. The objective includes upgrading the road and drill site area to provide adequate parking and trailhead facilities. Geothermal exploration activities will delay this project until operations are completed or developed to a point where the management direction for the Ramona Falls parking area and trailhead must be re-evaluated.

The Ramona Falls trail follows the Sandy River and loops back along the Muddy Fork. The extended trail passes through the parking lot occupied by OMF #1. This trail also accesses the Pacific Crest National Scenic Trail (PCNST) and the Timberline Trail Systems. A spur from the PCNST passes within one-quarter mile of OMF #7a.

Geothermal Exploration History of Old Maid Flat

Since 1977, Old Maid Flat and its recreational users have coexisted with casual surface exploration, several drilling programs, a short-line active seismic study and related activities without significant conflict. Three years of concentrated research have identified Old Maid Flat as among the most promising potential geothermal sites in the vicinity of Mt. Hood. The drilling and testing program considered in this report are Federally sponsored and represent the culmination of the Federal study on Mt. Hood.

Early in 1978, four Non Surface Occupancy leases were issued in the Old Maid Flat area. The original need for such provisions has been resolved in portions of the area. Currently, environmental assessment required for modification of lease terms is

in progress. Recommendations will be submitted to the Bureau of Land Management in coming weeks. In the event administrative processing is not completed, the Forest Service and Geological Survey anticipate a variance to the Non Surface Occupancy provision for this project. No encroachment on the Mt. Hood Wilderness Area is involved. Land use allocation and related management direction for the area allows this level of temporary activity.

III. EVALUATION CRITERIA

In order to be acceptable the proposal must conform to the following evaluation criteria:

1. Be compatible with the management principles specified in the Organic Act of 1897, the Multiple-Use-Sustained Yield Act of 1960, the National Environmental Policy Act of 1969, the Forest and Rangeland Renewable Resources Planning Act of 1974, the National Forest Management Act of 1976 and all other applicable Federal and State laws, directives and regulations.
2. Maintain established standards for air and water, existing land uses (trails and Wilderness, etc.) and unique or critical values of the area.
3. Provide for site restoration, maintenance of soil productivity and control of erosion.
4. Provide for public safety.

In addition, the proposed operations should fulfill the criteria listed below:

5. Maintain or enhance the quality of long-term recreational opportunities, visual resources, and wildlife and fisheries habitat.
6. Maintain noise levels within established standards. The primary objective is to minimize conflicts with recreationists using the surrounding areas.
7. Provide information concerning the availability and quality of geothermal resources in the Mt. Hood area.

IV. ALTERNATIVES CONSIDERED

A. Monitoring

Air Quality

As stated in the Plan of Operations (p. 9), NGC will provide continuous monitoring of the drilling fluid return line to warn of potential excessive concentrations of noxious gasses.

Water Quality

All produced fluids and drilling muds will be retained in steel tanks or earthen pits or sumps lined with material

which will prevent seepage of fluids or muds into the soil. NGC will be responsible for regular inspection of the tanks and pits to ensure that no unacceptable leakage is occurring. The method of disposal of produced fluids will be determined by the Forest Service and U.S. Geological Survey upon receipt of accurate data regarding the chemical composition of the fluids. NGC will be responsible for having fluid samples analyzed by a certified laboratory. If the produced fluids contain no harmful substances, they may be dispersed on the ground, at approved locations. If, however, the fluids are found to contain toxic chemicals or elements, or exceed capacities of available disposal sites, NGC will be required to re-inject the fluid into the wells.

Noise Levels

NGC will be responsible for maintaining noise levels within OSHA standards.

Erosion Control

Because of the temporary nature and limited scope of the proposed projects, visual monitoring of apparent erosion will be adequate. Appropriate erosion control structures and techniques such as roadside ditches, waterbars, terracing and seeding will be provided by NGC as requested by the Forest Service. Drainage structures should be in place no later than October 1, 1980.

B. Mitigation Measures and Constraints

The following mitigation measures will be required to minimize the impacts of the proposed action on the surface environment:

1. If a productive geothermal well is developed and future utilization of the site is considered a possibility, site restoration shall consist of construction of erosion control ditches, water bars, and terraces as directed by the Forest Service. Revegetation may be required where appropriate. The site will be kept free of litter and debris.
2. If a viable geothermal resource is not discovered and a decision is made to abandon the well(s), complete site restoration will be required. This will include injection or removal of fluids, re-shaping the land to its original contours, erosion control, and revegetation.
3. Employees and personnel involved in the proposed project will be required to park their vehicles in predetermined locations to prevent interference with through traffic on Road S 25.

4. If noise levels become sufficiently high to create a safety hazard for horseback riders using nearby trails, the Forest Service will post signs at appropriate points along such trails warning riders of noise levels which could possibly frighten horses.
5. NGC will be required to provide a watchman on each drill site twenty-four hours daily during all drilling and testing operations to provide for public safety and fire prevention. All pits and sumps will be surrounded with 3-strand-barbed-wire or woven-wire fence. All equipment will be subject to on-site industrial inspections by the Forest Service to ensure compliance with approved Spark Arrester standards (above basic muffler requirements).
6. NGC will provide and maintain human sanitation facilities at each site.
7. NGC will be responsible for garbage removal.
8. NGC will be required to contain and remove or re-inject all substances which could pollute streams or ground water. All fluids will undergo chemical analysis and be certified of acceptable quality prior to dispersal onto the ground surface. Earthen holding pits and sumps will be lined with plastic, clay, or other acceptable impermeable material. A shortage of dirt roads in the area and limited capacity of the lower rock quarry (to absorb waste fluids) may cause the need for re-injection of most fluids if the fluid volume exceeds the disposal capacity of the area.
9. Culvert bridges will be constructed at all major stream crossings to minimize impacts to the stream beds and riparian zones. These bridges will be removed following completion of the drilling and testing of OMF #7a and prior to the winter flood season. Completion of removal and restoration by October 15, 1980 is desirable to avoid the fall rainy season.
10. Construction of the access road and drill sites will be permitted only during periods of appropriate soil and stream flow conditions, as determined by the Forest Service.
11. Construction, drilling, testing and restoration will be completed as rapidly as feasible in order to minimize conflicts with other resource uses.
12. If trees are used to secure drilling rig guy cables, the cables should be run through hoses or across 2 x 4 wood blocks to prevent the cables from girdling the trees.

13. The cleared timber will remain the property of the Forest Service. Merchantable timber will be cut for use as sawlogs, while timber of less value will be made available to the public for firewood. Both merchantable timber and fuel wood will be decked near Road S 25 at landings selected by the Forest Service. Slash produced from logging will be burned in the roadway or at other Forest Service approved locations.

V. EFFECTS OF IMPLEMENTATION

A. General

The following effects may be expected to be equally characteristic of the activities proposed for both OMF #1 and OMF #7a:

This type of exploratory program will provide valuable information regarding the potential, or lack thereof, for a relatively clean alternative energy source in the Mt. Hood area.

No effect is anticipated upon civil rights issues.

This Environmental Assessment involves only exploratory geothermal operations; it does not address development or utilization of the resource. The environmental impacts of this stage of geothermal resource activity will be localized and short-term and will have little influence on the long-term productivity of the area.

The knowledge gained during this exploratory phase has direct bearing upon subsequent geothermal proposals in this area. The implications of exploratory findings are regional, long term, involve large segments of the public and major capital outlays, and may have unknown effects on hydrologic or geothermal resources. Any future proposals involving the development or utilization phases of geothermal activity are expected to require an Environmental Impact Statement.

The drilling of all wells involves a slight risk of "blow-out", the rapid escape of subsurface gases or liquids which have been held under pressure. Modern "blow-out preventers", such as those which will be utilized on the proposed wells, have all but eliminated the occurrence of this phenomenon, however, and no problems are anticipated at OMF #1 or OMF #7a.

B. OMF #1

Because the work proposed at OMF #1 involves only the testing of an existing hole, no new timber removal, site clearing or road construction will be required. Some soil compaction and disturbance will necessarily occur during the installation, operation and removal of the workover and testing equipment; however, these effects are expected to be short-term and insignificant.

All produced fluids will be contained in steel tanks until chemically analyzed and subsequently re-injected or dispersed at approved locations on the ground surface. No adverse impacts upon water quality are anticipated as a result of these operations. Fresh water for use during testing will be drafted from the Sandy River with vacuum trucks or portable pumps. Less than 100 barrels will be required for this purpose, and no significant effect upon the stream's volume or rate of flow will be experienced.

The noise and traffic generated during workover and testing of OMF #1 will be audible to recreationists and other forest users in the area during the 4 to 6 weeks required to complete these activities. Wildlife can also be expected to be temporarily disturbed or displaced by the increased noise levels and the presence of humans on the site. No threatened or endangered species of plants or animals will be affected by this proposal.

Minor amounts of dust and exhaust emissions from vehicles and derrick engines will be added to the air but will have negligible impact upon its quality. The well return line will be monitored to prevent the escape of any noxious gases.

Visual impacts will be limited to the site itself, where the presence of the workover rig and testing equipment will be readily visible to forest visitors. Site disturbance will also be evident until restoration has been completed.

No effects on cultural, historical or social resources will be generated by this proposal. Forest Service expenditures for this project will be limited to those necessary for environmental assessment and permit preparation, coordination and administration.

C. OMF #7a

Approximately 15 thousand board feet of timber will need to be cleared from the OMF #7a site and access right-of-way. The timber stand is composed primarily of Douglas fir and hemlock averaging 100 years of age. Scattered pockets of red alder and lodgepole pine occur throughout the area. Stocking levels are generally low and, due to the relatively young, volcanic soils, timber regeneration potential is also low. Significant soil disturbance will be necessary during road construction and site clearing and leveling; however, the moderate slopes and relatively low erosion potential characteristic of these soils will serve to minimize soil loss. Normal erosion control measures such as water bars and lead-off-ditches will provide adequate site protection. Low compaction hazard and soil and site damage susceptibility ratings indicate that grade restoration to the OMF #7a site should present no unusual problems, although revegetation will be difficult. Species selection will be critical.

The access road will be abandoned following completion of the geothermal testing, removal of the culvert bridges, and appropriate erosion control. Timber production along the approximately one-third mile road bed will be reduced indefinitely.

A slight temporary increase in sedimentation can be anticipated in the Sandy River and Ramona Creek during the construction and removal of the culvert bridges at the points where the access road will cross these streams. Operational periods are not expected to influence local fish populations. The drill site is adjacent to the Muddy Fork, from which fresh water will be drafted for use during drilling and testing operations. Because the water required for this purpose would be drawn from the river gradually over a several week time period, no significant effect upon the stream's volume is anticipated. There will be no effect upon stream temperatures or riparian habitat except at the location where the access road will cross the Sandy River and Ramona Creek. Retention of produced fluids in lined pits or sumps and subsequent disposal of these fluids in the manner described in Section IV, A, Water Quality, will provide adequate protection of streams and ground water from potential pollution from harmful substances which could occur in the geothermal fluids.

The effects of noise, traffic, dust and vehicular exhaust emissions will be similar to those described for OMF #1, but will be evident for 3 to 5 months rather than several weeks. No other major impacts upon recreationists and other forest users, wildlife or fisheries are expected. No threatened or endangered plant or wildlife species will be affected by this proposal.

The construction of an access road and drilling site is compatible with the "partial retention" Visual Quality Objective for the area. The proposed project area and operations will not be readily visible from any major trails or recreation use areas.

No significant impacts on cultural or social resources are anticipated. No expenditure of Forest Service funds will be necessary other than those required for the preparation of the Environmental Assessment and permit and the subsequent coordination and administration of the proposed project.

APPENDIX A

(Plan of Operations)

APPENDIX B

Mt. Hood Soil Resource Inventory

MAPPING UNIT

This Mapping Unit consists of Soil 342 and inclusions of Soils 7, 341 and 343. This unit is mapped on steep to very steep, smooth glaciated mountain slopes in the Bull Run Drainage.

342

VEGETATION

PACIFIC SILVER FIR ZONE

Overstory: Douglas-fir, noble fir, Pacific silver fir, western hemlock

Understory: Blue huckleberry, rhododendron

Groundcover: Beargrass

GEOLOGY

GLACIAL DEPOSITS

Soils in this mapping unit have formed in medium-textured glacial till. The till consists of silt to boulder-sized material of mixed geologic origin. Rock fragments are primarily andesites but some tuffs and breccias may also be present.

CLIMATE

Precipitation: 85 to 115 inches, 2160 to 2920 mm

Soil Temperature Class: Frigid

Mean Annual Soil Temperature: 47°F, 8°C

TOPOGRAPHY

Slope: 30 to 60 percent

Aspect: North and East

Elevation: 2000 to 4000 feet, 666 to 1333 meters

MANAGEMENT

This soil unit produces Site Class 4 and 5 Douglas-fir. Because of slope limitations, suspended cable systems should be employed during harvest operations. The soil mantle is stable and there is little danger of large scale mass failures.

SOIL 342

RANGE OF SOIL PROFILE CHARACTERISTICS

Litter: Decomposing needles and twigs from noble fir and western hemlock. Black amorphous organic matter. 1 to 2 inches thick.

Surface Layers: Very dark brown to dark brown gravelly loams and cobbly gravelly loams; moderate, fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; 30 percent coarse fragments; pH ranges between 5.5 and 6.0. 6 to 15 inches thick.

Subsoil Layers: Dark brown to brown cobbly loams and stony silt loams; weak, very fine and fine subangular blocky structure to massive; slightly hard, friable, slightly sticky, slightly plastic; 50 to 60 percent coarse fragments; pH ranges between 5.5 and 6.5. 25 to 40 inches thick.

Range of Soil Depth: 31 to 55 inches.

Modal Site Location: NE 1/4, NE 1/4 Sec. 13, T. 1S., R. 6E

Estimated U S D A Soil Classification: Cumulic Haplobrepts, loamy skeletal, mixed, non-acid, frigid.

MAPPING UNIT

346

Mapping Unit consists of Soil 346 and inclusions of Soils 7, 4 and 345. This unit is mapped on nearly level to sloping glacial outwash plains.

VEGETATION

PACIFIC SILVER FIR ZONE

Overstory: Douglas-fir, lodgepole pine

Understory: Rhododendron, salal

Groundcover: Trailing twinflower

GEOLOGY

GLACIAL DEPOSITS

The soils in this unit have formed in deep glacial outwash deposits. The soil profile is a mixture of silts, sands, stones and boulders of mixed geologic origin, however, the majority are from the Cascade Andesite Formation.

CLIMATE

Precipitation: 80 to 110 inches, 2030 to 2795 mm

Soil Temperature Class: Frigid

Mean Annual Soil Temperature: 47°F, 8°C

TOPOGRAPHY

Slope: 2 to 10 percent

Aspect: All aspects

Elevation: 1000 to 3500 feet, 300 to 1160 meters

MANAGEMENT

This soil unit produces very poor quality timber. This is probably a result of the low moisture holding capacity of the soil and frost pocket conditions. Road building activities are easily carried out because of low slopes and low soil erodibility.

SOIL 346

RANGE OF SOIL PROFILE CHARACTERISTICS

Litter: Decomposing needles and twigs from lodgepole pine. Decomposed organic matter containing many fine roots and fungal mycelia. 1 to 3 inches thick.

Surface Layers: Dark gray to dark yellowish brown very cobbly loamy coarse sand, single grain; soft, very friable, non-sticky, non-plastic; 40 to 60 percent coarse fragments; pH ranges between 5.5 and 6.0. 14 to 18 inches thick.

Subsoil Layers: Gray to yellowish brown to very cobbly coarse sand; massive, very hard, very firm, non-sticky, non-plastic; 50 percent coarse fragments; pH ranges between 5.5 and 6.0. 35 to 50 inches thick.

Range of Soil Depth: 49 to 70 inches.

Location: SE 1/4, SW 1/4 Sec. 18, T. 3S., R. 8E.

U.S.D.A. Soil Classification: Typic Udipsamments; sandy-skeletal, mixed, frigid.

UNITED STATES
DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY
Conservation Division, MS 92
345 Middlefield Road
Menlo Park, CA 94025

May 6, 1980

Memorandum

To: Files - 2500-05 EA #151

Through: Chief, Environmental & Safety Section
Chief, Operations Section

From: Jean Hopkins

Subject: Environmental Analysis of Testing of OMF No. 1 (EA 151-80,
Mt. Hood)

After the field inspection on May 1, and discussions with USFS representatives from the District and Supervisor's Offices, I advise against including the proposed testing of OMF No. 1 in EA #151-80.

The proposed operation would involve no surface disturbance; the access road is in satisfactory condition, and there has been no revegetation of the pad since the last operation, which was discussed in EA #110-8. Northwest Geothermal Corp. proposes to clean out the mud in the hole, place an isolation packer above the lower 1,000', remove the fluid, and pump to test hydrothermal fluid quality and reservoir characteristics. After completion of testing, the hole will be abandoned and the pad site will revert to its original use as a parking lot for the Ramona Falls trailhead.

NGC hopes to complete this operation by May 31. They advised Chuck Wassinger that Sing Well Services was scheduled to appear on site during the week of May 12.

Jean Hopkins

Jean Hopkins

cc: B. Holt
D. Bickmore
Roje Gootee,
Zig Zag Ranger District

APPENDIX F
Botanical Survey

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

Mt. Hood National Forest
19559 S.E. Division St., Gresham, OR 97030

REPLY TO: 2670 Threatened & Endangered Plants & Animals

June 11, 1980

SUBJECT: Geothermal Drill Site 7A

TO: John Geyer, Energy Coordinator

After reviewing the engineering plans, it appeared that the only potential for negative impact on threatened, endangered, or sensitive species from construction of the geothermal drill site 7A would be to the Clackamas Corydalis (Corydalis aquae-gelidae). On Thursday, June 5, 1980, Karen Boyer, Wildlife Biologist, and I searched the construction area, especially the Sandy River and Ramona Creek crossings. We are both familiar with the Clackamas Corydalis and its habitats. No sensitive plants were found on the site or along streams below the construction area. We, therefore, conclude that no threatened, endangered, or sensitive species would be impacted by the proposed construction.

George H. Benscheid
for DEAN LONGRIE
Wildlife Biologist

APPENDIX G

Cultural Resources Survey

OLD MAID FLAT 7A GEOTHERMAL EXPLORATION SITE
CULTURAL RESOURCE REPORT
PARTIAL FIELD INVENTORY - RECONNAISSANCE
T 2S 8E, SECTION 15
CLACKAMAS COUNTY, OREGON

INTRODUCTION

In compliance with 36 CFR 810, the following partial field inventory was conducted for the access road and geothermal drilling site for OMF 7A. Cultural Resource Technician, Wendy Evans, Zigzag Ranger District, conducted the field reconnaissance Survey.

AREA DESCRIPTION

The Old Maid Flat area is a deep U-shaped glacial valley, located on the West flanks of Mt. Hood. As a result of the mountain's most recent volcanic activity, the Sandy valley floor is volcanic ash or mudflow approximately 200 feet thick. The Sandy River is the major stream drainage in this valley. The slopes of the valley are gradual (2-10%), while the valley walls are steeper (30-60%). Generally, the elevation ranges from 2,000 to 3,000 feet. Major access to this area is via Oregon State Highway 26 and forest roads N-12 (Lolo Pass Rd,) and S-25.

The access road to OMF 7A, approximately 2,200 feet in length meanders in a Northeast direction from a point on forest road S-25 just before its Eastern most terminus.

The site of OMF 7A is approximately 2,600 feet in elevation. It is projected to occupy a 200 foot x 175 foot space on the edge of the flat valley floor just South of the Muddy Fork River, a class II stream. The site appears to be or have been in an area of transition. Although the present soil is sandy, covered with moss, the lodge pole forest blends into a considerably larger stand of fir trees bordering the Muddy Fork. While no cedar trees presently occupy the site, several sizable cedar snags lie on the forest floor.

PAST HISTORY

Very little about the influence of man in the Old Maid Flats area has been documented. A 1916 Oregon National Forest map shows a trail passing through the approximate project area leading to "Beaver Lakes" to the East in Section 14. References has been made to Indian trails encountered by Joel Palmer in 1845, one of which apparently passed near or through Lolo Pass. The extent of early Indian activity remains unknown.

METHOD

A field survey was conducted in which the ground cover was removed down to mineral soil approximately every 100 feet along the preliminary line for the surveyed access road. At the site itself, ground cover was disturbed to mineral soil on a N, S, W, E line at intervals of approximately 50 feet along a 200 foot axis. Approximately 20% of the total area was inventoried.

A heavy layer of moss readily covers mineral soil in this area. The Muddy Fork and Sandy Rivers have the potential of violent glacial streams. Destructive flooding and volcanic activity in this area have dramatically reshaped terrain. All of these factors will make the detection of any cultural resources extremely difficult.

RESULTS

No blaze line or evidence of tread of the trail documented on the 1916 map was found. Approximately 100 feet NW of the site several symmetrical depressions approximately 2 1/2 feet in diameter and 6 inches to one foot deep were found. There was no sign of an excavation pile nearby. The depressions were covered by moss like the surrounding area. They were not rock lined. One had a 3 inch diameter hemlock tree growing in it.

RECOMMENDATIONS

Although no definitive cultural resources were found, the terrain features in this area are similiar to those known to be frequented by prehistoric man. Once project activity begins in this area it would be advisable for a cultural resource technician to survey the disturbed site, since the removal of moss and some surface soils may expose some evidence of cultural resources.

REFERENCES

Cultural Resources Overview: Mt. Hood National Forest
Volumes I and II

History Of Mt. Hood by Jack Grauer

Oregon National Forest Map, 1916

Visitor Information Service Reference Book of the Mt. Hood
Area by Donald H. Whitmen, Volumes 1 and 2

GEOHERMAL EXPLORATORY DRILLING & TESTING

FIGURE 1 GENERAL LOCATION

EA No. 151-80

REVISION TO RECOMMENDED APPROVAL CONDITIONS

CONDITION NO. 3. Change to read as follows:

If the well appears producible, site restoration shall consist of constructing erosion control ditches and water bars along the dirt access road, terracing in the cleared drill site area, and reseeding disturbed areas as specified by the Forest Service. If the well is abandoned, site restoration will be accomplished in a timely manner. Such resoration will consist of injection or removal of fluids and erosion control measures which include reshaping the land to near natural contours and reseeding disturbed areas as specified by the Forest Service.

CONDITION NO. 5. Add sentence as follows:

If it is not feasible to obtain water from the Muddy Fork, an alternate source shall be the Sandy River.

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.