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**U.S. DEPARTMENT OF ENERGY
OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY
NEPA DETERMINATION**



RECIPIENT: Washington Department of Natural Resources, Washington Geological Survey **STATE:** WA

PROJECT TITLE : Geothermal Play-Fairway Analysis of Washington State Prospects

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-EE000841	DE-EE0006728	GFO-0006728-003	GO6728

Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Order 451.1A), I have made the following determination:

CX, EA, EIS APPENDIX AND NUMBER:

Description:

- A9 Information gathering, analysis, and dissemination** Information gathering (including, but not limited to, literature surveys, inventories, site visits, and audits), data analysis (including, but not limited to, computer modeling), document preparation (including, but not limited to, conceptual design, feasibility studies, and analytical energy supply and demand studies), and information dissemination (including, but not limited to, document publication and distribution, and classroom training and informational programs), but not including site characterization or environmental monitoring. (See also B3.1 of appendix B to this subpart.)
- B3.1 Site characterization and environmental monitoring** Site characterization and environmental monitoring (including, but not limited to, siting, construction, modification, operation, and dismantlement and removal or otherwise proper closure (such as of a well) of characterization and monitoring devices, and siting, construction, and associated operation of a small-scale laboratory building or renovation of a room in an existing building for sample analysis). Such activities would be designed in conformance with applicable requirements and use best management practices to limit the potential effects of any resultant ground disturbance. Covered activities include, but are not limited to, site characterization and environmental monitoring under CERCLA and RCRA. (This class of actions excludes activities in aquatic environments. See B3.16 of this appendix for such activities.) Specific activities include, but are not limited to: (a) Geological, geophysical (such as gravity, magnetic, electrical, seismic, radar, and temperature gradient), geochemical, and engineering surveys and mapping, and the establishment of survey marks. Seismic techniques would not include large-scale reflection or refraction testing; (b) Installation and operation of field instruments (such as stream-gauging stations or flow-measuring devices, telemetry systems, geochemical monitoring tools, and geophysical exploration tools); (c) Drilling of wells for sampling or monitoring of groundwater or the vadose (unsaturated) zone, well logging, and installation of water-level recording devices in wells; (d) Aquifer and underground reservoir response testing; (e) Installation and operation of ambient air monitoring equipment; (f) Sampling and characterization of water, soil, rock, or contaminants (such as drilling using truck- or mobile-scale equipment, and modification, use, and plugging of boreholes); (g) Sampling and characterization of water effluents, air emissions, or solid waste streams; (h) Installation and operation of meteorological towers and associated activities (such as assessment of potential wind energy resources); (i) Sampling of flora or fauna; and (j) Archeological, historic, and cultural resource identification in compliance with 36 CFR part 800 and 43 CFR part 7.

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide federal funding to Washington State Department of Natural Resources to address the overarching theme of uncertainty quantification and reduction for geothermal exploration, specifically through the development of Geothermal Play Fairways. Phase/Budget Period 1 of the Geothermal Play Fairway Analysis FOA was reviewed by GFO-FOA0000841-001 (CX A9; 07/31/14). A subsequent NEPA Determination (GFO-0006728-001; CX A9, B3.1; 03/04/16) reviewed Budget Period 2 activities. Budget Period 3 was reviewed by GFO-0006728-002 (CXs A9, A11; 08/28/17), which restricted certain tasks pending the definition of temperature-gradient ("TG") well locations and required drilling activities. This NEPA Determination is to review the remainder of Budget Period 3:

- Task 17: Drill Temperature-Gradient Holes
- Task 18: Detailed Core and Image-Log Analysis
- Task 19: Log Temperatures at Drill Sites
- Task 20: Plug and Abandon Holes
- Task 21: Process New Data and Refine Models

Associated activities would include the rotary drilling and logging of multiple TG wells in order to document subsurface

temperature changes with depth in the Washington State (WA) Geothermal Play Fairway region. Drilling would be carried out by the U.S. Geological Survey Research Drilling Program in partnership with the WA Geological Survey (WGS). The WA Play Fairway project consists of two primary study areas located in the vicinities of: 1) Mount St. Helens ("MSH") and 2) Mount Baker ("MB"). The recipient has already received geothermal exploration permits from the WA Department of Natural Resources (DNR) for three wells in the Mount St. Helens study area (MSH17-24, MSH 77-2, MSH 28-4) and four wells in the Mount Baker study area (MB76-31, MB52-26, MB87-22, and MB18-1). Three alternate sites for MB18-1 are covered by the DNR permit for this proposed well, although only one of the four possible sites for MB18-1 may be drilled per permit stipulations. Therefore a total of 10 potential sites have been identified and are reviewed herein, but the proposed project would be limited to a maximum of seven TG wells. Further, based on current project plans, it is likely that only four or five prioritized sites would be drilled depending on timing and budget considerations.

All three proposed MSH study area well sites are located north of Mount Saint Helens between the Spirit Lake Highway and the Green River, on privately held timberland with existing geothermal leases held by AltaRock Energy Inc. The four proposed MB study area well sites are located southeast of Mount Baker. The MB18-1 "main" site plus nearby alternates are located on privately held timberland with no geothermal lease. The other three proposed MB area sites are within the Mount Baker-Snoqualmie National Forest on existing geothermal leases held by CYRQ Energy (and managed by AltaRock). The recipient has received a temporary special-use permit from the U.S. Department of Agriculture Forest Service (USFS) authorizing the proposed drilling and measurement activities at these sites, and is required by DOE to comply with any associated terms and conditions set forth by this agency. For those TG well sites located on private land at both the MSH and MB study areas, the recipient has received written confirmations from the relevant landowners/leaseholders that demonstrate full cognizance and support of the proposed activities.

The proposed drilling activities at each study area would be as follows. A temporary exploratory hole (TG well) would be drilled at two or three of the proposed sites. Each hole would be drilled to a maximum depth of 1,600 feet and completed (casing/cement) following appropriate Washington Administrative Code (WAC) DNR implementing rules and regulations. During drilling, a wireline geophysical log may be run and/or spot coring obtained. Each site would be occupied for approximately two to three weeks during drilling. At the conclusion of drilling operations and initial measurements, all equipment, materials, supplies, camp facilities, and personnel would be demobilized from that location. After approximately 30 days from completion of drilling, a geologist from WGS would return and use a wire-line temperature probe to measure the subsurface temperature at regular depth intervals. If measurements indicate that the temperature profile has not yet equilibrated after drilling, the WGS may elect to return to the site occasionally for a few hours at a time to log temperatures until an equilibrated profile is collected. Once sufficient measurements have been collected, and within six months of drilling, the well would be properly plugged and abandoned by the USGS in accordance with all permitting requirements and WA State statute. Alternatively, a site(s) meeting certain regulated criteria may be left open and the permit(s) transferred to the land or leaseholder as outlined in WAC 332-17-340. Regardless, after project-related work is complete, each site would be properly reclaimed in accordance with applicable Federal and state regulations, notably WA State DNR, USFS, and BLM rules and requirements for this process and its timeframe. No further development of these sites would be carried out by the project.

The proposed work would not involve any new construction or permanent physical modifications of these sites beyond the aforementioned excavation of a single TG well. Superficial ground disturbance resulting from the temporary and short-term occupation of these sites by equipment, vehicles, and personnel would be covered or refilled, and the only remaining effect of project activities would be traces of restored surfaces and tire tracks. All 10 potential well sites and related drilling activities would be contained entirely to previously developed land such as borrow pits, quarries, log yards, or the shoulders and dead ends of logging roads with very little, if any, existing vegetation. The work area at each site would be approximately 100 ft by 100 ft and would be accessed by existing roads. The proposed MSH sites are located on rural timberland in a flat open staging area for logging equipment and timber yarding. The MSH sites would require minor management of relatively young/recent vegetation growth within the work area perimeters. Depending on location, such activities may include: the covering of grass by addition of gravel; the removal of some small spruce trees (less than 5 ft tall) and/or alder saplings (less than 4 inch diameter); the trimming or possible removal of up to six alder trees (approximately 10 inches in diameter or less) that have branches extending over the proposed well site; and the removal of scotch broom. The proposed MB sites on National Forest land are located within an existing rock quarry or contiguous log storage yard. The proposed main site and alternate sites for MB 18-1 are located on recently logged forest land adjacent to a large road junction with an equipment storage area and rock quarry. No removal of vegetation would be required for any of the MB sites.

The proposed project would require a source of water at each site to perform drilling activities. At this time, water sources and means of access have not yet been specified; the recipient would either purchase and transport municipal water via established commercial avenues, or properly withdraw water from available local sources such as wells or surface reservoirs. The latter option would require a permit from the WA State Department of Ecology. Prior to undertaking drilling activities at any proposed location, the recipient is required to submit to the DOE Project Officer information regarding the source of water to be used, and, if applicable, all necessary written authorizations and/or

permits from the WA State Department of Ecology.

Erosion-control methods would be employed for any groundwater produced during drilling, including straw bales, silt fencing, sump berms, check dams of pea gravel-filled burlap bags, and/or immediate mulching of exposed areas. Any such materials would be utilized to responsibly manage and dispose of waste water onsite in accordance with State and local storm water management and permitting requirements. The proposed work would not disperse turbid or contaminated waters. No dredging or filling would be conducted as part of the proposed project. Rotary drilling also produces rock chips of local subsurface geologic formations. It is anticipated that several cubic yards of cuttings would be produced from each hole drilled, and these natural, non-hazardous materials would be dispersed over the surface in the immediate area of each well site per site reclamation guidelines and relevant permit requirements. All other non-hazardous waste commonly generated on drill rig sites would be properly contained in temporary receptacles and entirely removed from the study area at the completion of operations. Isolated and short-term sources of air emissions from travel to and from the sites plus operation of the drill rig itself would not have the potential to meaningfully impact atmospheric levels within this rural attainment area. All equipment and vehicles used would pass relevant industrial air quality standards.

The drilling operation would operate under OSHA standards and take all necessary and customary safety and health precautions. Onsite project participants would wear personal protective equipment (PPE) in compliance with strict health and safety rules set forth by the recipient and the driller to minimize risk. In addition to complying with all applicable Federal, state, county, and municipal laws, ordinances, and regulations, the recipient and USGS would implement and strictly adhere to industry Best Management Practices to minimize the potential environmental impacts of the proposed project.

DOE has reviewed all 10 prospective well sites and the surrounding environment. Based on this context for the activities described above, DOE has concluded that no adverse impacts to sensitive resources are expected as a result of the proposed work at any location based on the following summations for each study area, respectively:

Mount St. Helens:

No work would be located in wetlands, floodplains, or designated wildness areas. According to the U.S. Fish and Wildlife Service Endangered Species Program website (IPaC), there are no federally listed plant species expected to occur at this study area. Excluding one listed fish species (aqueous habitats are outside the boundaries of project work), IPaC identifies four threatened or endangered (T&E) wildlife species that are believed to occur near the proposed well sites. However, this study area does not contain any designated critical habitats, and there is no known recorded presence of listed species at the proposed work sites. IPaC also identifies one Migratory Bird species with an estimated summer breeding range overlapping this region, but a low probability of occurring near the specific work areas given the lack of preferred habitat. Due to these considerations in conjunction with the short duration of drilling activities, small (less than one acre) and impermanent project footprint on previously disturbed land, and minimal scale of proposed vegetation clearing within thinned timberland, DOE has determined the proposed activities would have no effect on T&E species or Migratory Birds at MSH sites.

Mount Baker:

No work would be located in wetlands, floodplains, or designated wildness areas. According to the U.S. Fish and Wildlife Service Endangered Species Program website (IPaC), there are no federally listed plant species expected to occur at this study area. Excluding two listed fish species (aqueous habitats are outside the boundaries of project work), IPaC identifies seven threatened or endangered wildlife species that are believed to occur near the proposed well sites, including the Marbled Murrelet and Northern Spotted Owl. The three proposed well sites on National Forest land overlap with designated critical habitat for the Marbled Murrelet and Northern Spotted Owl, while MB18-1 sites do not. However, given the previously disturbed nature of all MB sites, which have already experienced a significant degree of ground clearing and/or excavation, DOE has concluded that the proposed activities would not have the potential to affect critical habit. To reduce the potential disruption of individual T&E birds that may occupy or pass through the area during operations, the USDA Forest Service permit obtained by the recipient includes a condition that limits project activities to between two hours after sunrise and two hours before sunset. The recipient is required by DOE to comply with the terms of this noise restriction while conducting project activities at all MB sites. In consideration of the aforementioned siting factors, special requirements, and the limited footprint and duration of project activities, DOE has determined the proposed activities would have no effect on listed T&E species. IPaC also identifies two Migratory Bird species with an estimated summer breeding range overlapping this region, including the Bald Eagle, but due to the lack of vegetation, ideal habitats, or documented eagle nests around the MB sites, the proposed activities are not expected to impact these species.

If the recipient or other project participants encounter cultural or archaeological artifacts during project activities, all activities must immediately cease in the vicinity of the discovery. The Recipient must notify the DOE Project Officer (and the USDA Forest Service for those sites located on National Forest land) of the discovery within forty-eight hours

of the discovery. The activities in the vicinity of the discovery must cease until an evaluation of the discovery is completed by the appropriate officials and the DOE Contracting Officer provides written authorization to resume the activities. If the Recipient seeks to relocate the affected work to another nearby site, the Recipient must first obtain written authorization from the DOE Contracting Officer. With the siting of drilling locations on previously developed or disturbed land, small scale and footprint of project activities, and the aforementioned stop-work requirement, DOE does not anticipate any impacts to archaeological or cultural resources as a result of the proposed project.

Based on the review of the proposal, DOE has determined the proposal fits within the class of action(s) and the integral elements of Appendix B to Subpart D of 10 CFR 1021 outlined in the DOE categorical exclusion(s) selected above. DOE has also determined that: (1) there are no extraordinary circumstances (as defined by 10 CFR 1021.410 (2)) related to the proposal that may affect the significance of the environmental effects of the proposal; (2) the proposal has not been segmented to meet the definition of a categorical exclusion; and (3) the proposal is not connected to other actions with potentially significant impacts, related to other proposals with cumulatively significant actions, or an improper interim action. This proposal is categorically excluded from further NEPA review.

NEPA PROVISION

DOE has made a final NEPA determination for this award

Insert the following language in the award:

If the Recipient intends to make changes to the scope or objective of this project, the Recipient is required to contact the Project Officer, identified in Block 15 of the Assistance Agreement before proceeding. The Recipient must receive notification of approval from the DOE Contracting Officer prior to commencing with work beyond that currently approved. If the Recipient moves forward with activities that are not authorized for Federal funding by the DOE Contracting Officer in advance of a final NEPA decision, the Recipient is doing so at risk of not receiving Federal funding and such costs may not be recognized as allowable cost share.

Insert the following language in the award:

You are required to:

Prior to undertaking drilling activities at any proposed location, the recipient is required to submit information regarding the source of water to be used, and, if applicable, all necessary written authorizations and/or permits from the WA State Department of Ecology.

If the recipient or other project participants encounter cultural or archaeological artifacts during project activities, all activities must immediately cease in the vicinity of the discovery. The Recipient must notify the DOE Project Officer (and the USDA Forest Service for those sites located on National Forest land) of the discovery within forty-eight hours of the discovery. The activities in the vicinity of the discovery must cease until an evaluation of the discovery is completed by the appropriate officials and the DOE Contracting Officer provides written authorization to resume the activities. If the Recipient seeks to relocate the affected work to another nearby site, the Recipient must first obtain written authorization from the DOE Contracting Officer.

Note to Specialist :

Geothermal Technologies Office
This NEPA determination requires a tailored NEPA Provision.
NEPA review completed by Whitney Doss, 05/11/2018

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature:  Casey Strickland Date: 5/16/2018
NEPA Compliance Officer

FIELD OFFICE MANAGER DETERMINATION

Field Office Manager review required

NCO REQUESTS THE FIELD OFFICE MANAGER REVIEW FOR THE FOLLOWING REASON:

- Proposed action fits within a categorical exclusion but involves a high profile or controversial issue that warrants Field Office Manager's attention.
- Proposed action falls within an EA or EIS category and therefore requires Field Office Manager's review and determination.

BASED ON MY REVIEW I CONCUR WITH THE DETERMINATION OF THE NCO :

Field Office Manager's Signature: _____
Field Office Manager

Date: _____