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

RECIPIENT: Nevada Bureau of Mines and Geology, University of Nevada, Reno **STATE:** NV

PROJECT TITLE : Discovering Blind Geothermal Systems in the Great Basin Region: An Integrated Geologic and Geophysical Approach for Establishing Geothermal Play Fairways

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-EE0006731	DE-EE0006731	GFO-0006731-002	GO6731

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.
B3.6 Small-scale research and development, laboratory operations, and pilot projects	Siting, construction, modification, operation, and decommissioning of facilities for smallscale research and development projects; conventional laboratory operations (such as preparation of chemical standards and sample analysis); and small-scale pilot projects (generally less than 2 years) frequently conducted to verify a concept before demonstration actions, provided that construction or modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Not included in this category are demonstration actions, meaning actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial deployment.

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide federal funding to the University of Nevada Reno (UNR) 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 on July 31, 2014. A subsequent NEPA Determination (GFO-0006731-001; CX B3.1, B3.2, B3.6; February 25, 2016) reviewed Budget Period 2 activities. This NEPA Determination is for Budget Period 3 (BP3) activities.

Budget Period 1 and 2 activities of this award have led to the anticipated drilling of temperature gradient wells that will

be funded separately from this award. These drilling activities are part of the projects selected under the Geothermal Play Fairway Analysis FOA. To minimize drilling risks, establish operational consistency across awards, and ensure recipients have a qualified drilling contractor, the drilling activities will be conducted by the United States Geological Survey (USGS). Funding for the drilling activities will be paid directly to USGS by DOE; however, those costs are still considered part of the project and therefore subject to NEPA. These drilling activities would not occur without the project activities proposed under this award. While this award does not include funding for drilling of the temperature gradient wells, the locations for where drilling would occur, activities necessary to permit the wells, analysis of well data, and site reclamation after drilling is completed are all under the control of, and are the responsibility of, the University of Nevada Reno. Because of the above, temperature gradient well drilling is a connected action to the proposed project activities being funded under this award and, therefore, the drilling and its associated impacts will be reviewed as part of this award. Initial project work planned in Budget Period 3 will define drill locations and required drilling activities, so there is insufficient data available at this time to complete a thorough review of the anticipated drilling activities (Task 27) and any potential associated impacts. These activities (Task 27) will be reviewed once drilling is fully defined.

Proposed BP3 activities associated with Tasks 25-26 and 28-33 would include data integration and analysis, computer modeling, permitting, reporting, geochemical analyses, and field work including fluid sampling, geoprobe borings, geophysical surveys (gravity and magnetic) and magnetotelluric surveys. Field activities would occur on Bureau of Land Management (BLM) land administered by the Carson City, Winnemucca, Battle Mountain, and Elko District Offices and possibly some private lands. For all work occurring on Bureau of Land Management lands, the recipient would submit project information to the appropriate BLM office for review and approval prior to initiating field activities on those lands.

Initial field activities would be performed in two study areas within the Nevada Play Fairway study area: 1) southern Gabbs Valley, and 2) northern Granite Springs Valley. Some field activities may occur at two additional study areas as standby locations in the event that higher priority areas are rejected for any reason: 3) southern Sou Hills, and 4) Crescent Valley. All four areas were surveyed during BP2 of the project, and the proposed BP3 field work would obtain additional data to supplement previous results identifying several priority areas of high geothermal potential. The activities at each site would vary as described below.

Gravity and magnetic geophysical surveys would occur in southern Gabbs Valley and northern Granite Springs Valley. These passive, low-impact surface techniques would require overland hiking and/or ATV riding to planned station locations. At each station, gravity surveys would involve using a small piece of portable electronic equipment (~8 kg) called a gravimeter to take approximately 300-700 measurements in each area. Magnetic surveys would involve the laying out of a sensor array of cables at each station. The exact number of magnetic stations per project area would be determined during the course of field work, with the aim being for individual station measurements to cover approximately 100-500 km total of surveyed line within each area. Although the exact locations within the two selected study areas have yet to be finalized, both methods are considered non-invasive and would require no new surface disturbance to complete; therefore, impacts are not expected to any resources of concern regardless of location.

Work in southern Gabbs Valley and northern Granite Springs Valley would also include infill resistivity stations (magnetotelluric "MT" surveys). MT field survey is a passive measurement technique that requires minor and temporary ground disturbance. Access to MT survey locations would be along or adjacent to existing roads and/or right-of-ways (both study areas) or playa (Granite Springs Valley only). MT sites would consist of antennae, electrode, and data logger that would be installed at each location. There would be approximately 20-35 MT stations per area. The antennae and electrodes would be buried, and disturbance at each MT site would involve two trenches ~1.0 m long x 15 cm wide x 15-30 cm deep for the antennae and another small hole (~10 cm x 10 cm x 20 cm deep) for each of the electrodes with the electronic data logger remaining on the surface. Total surface disturbance at each site would be less than 1.5 square meters. All disturbance would be reclaimed within 24 hours.

In addition to geophysical and MT surveys, geoprobe sampling would occur in both southern Gabbs Valley and northern Granite Springs Valley. Geoprobe sampling may also occur in southern Sou Hills and Crescent Valley. Approximately 10 holes would be sampled at Gabbs Valley and Granite Springs Valley, with additional geoprobes at Sou Hills and/or Crescent Valley project areas depending on initial results. Geoprobe is a direct push ground penetration method to collect soil samples quickly and with minimal physical and chemical disturbance to the sample media, using a rig setup that is much smaller than a conventional drill rig. The geoprobe assembly is the size of a pickup truck or smaller. Due to size limitations, this method uses less energy than drilling, requires minimal ground clearing, no construction, and cannot penetrate very deep (less than 100m). Overland travel with this machinery is required, and would be minimally disruptive to the ground surface because geoprobe sites would be accessed along existing roads and right-of-ways or, for Granite Springs Valley, via an existing road and playa subject to approval by the district BLM office.

While the exact locations and density of MT and geoprobe surveys within the specific areas of interest have yet to be identified, sites would be located to the extent possible in previously disturbed areas such as right-of-ways, and would

not be located in wetlands, designated wilderness areas, or areas with known protected species. According to the U.S. Fish and Wildlife Service Endangered Species Program website (IPaC), there are no critical habitats for federally listed plant or wildlife species within any of the proposed project areas. Further, there are no listed plant species expected to occur at any study area, nor are there listed wildlife species expected to occur at the Granite Springs Valley area. Within the Crescent Valley and Sou Hills project areas, IPaC identifies one threatened fish species but project work would not occur in or near trout habitat. At the Gabbs Valley area, IPaC identifies two threatened wildlife species that are believed to occur near proposed project locations; however, due to the aforementioned siting requirements, lack of critical habitat, and the isolated and short-term nature of the MT and geoprobe sampling techniques, DOE has determined the proposed activities would have no effect on listed species regardless of the exact locations where field work is conducted. During the installation of an MT station and geoprobe sampling, if cultural or archaeological artifacts are encountered, the recipient would stop the site installation immediately and inform the DOE Project Officer of the finding. The affected installation would be relocated to another nearby site.

Hazardous materials would not be used in the proposed BP3 activities. No non-hazardous waste would be generated by field surveys. Industry standard health and safety protocols would be employed for geoprobe activities, including proper personal protective equipment (PPE), engineering controls on moving parts, and monitoring potential safety risks such as dangerous working conditions like inclement weather, mechanical problems, etc.

Based on the review of the proposal, DOE has determined Tasks 25-26 and 28-33 in Budget Period 3 fit 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. Tasks 25-26 and 28-33 in Budget Period 3 are categorically excluded from further NEPA review.

NEPA PROVISION

DOE has made a conditional NEPA determination for this award, and funding for certain tasks under this award is contingent upon the final NEPA determination.

Insert the following language in the award:

You are restricted from taking any action using federal funds, which would have an adverse affect on the environment or limit the choice of reasonable alternatives prior to DOE/NNSA providing either a NEPA clearance or a final NEPA decision regarding the project.

Prohibited actions include:
Task 27 – Temperature-Gradient (TG) Drilling
This restriction does not preclude you from:
Task 25 – Permitting
Task 26 – Geoprobe Drilling
Task 28 – Geochemical Analyses/Fluid Sampling
Task 29 – Potential Fields Geophysical Surveys
Task 30 – Magnetotelluric Surveys
Task 31 – 3D Modeling
Task 32 – Conceptual Models and Resource Capacity Estimates
Task 33 – Final Reporting and Project Review
If you move forward with activities that are not authorized for federal funding by the DOE Contracting Officer in advance of the final NEPA decision, you are 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:
During the installation of an MT station and geoprobe sampling, if cultural or archaeological artifacts are encountered, the recipient must stop the site installation immediately and inform the DOE Project Officer of the finding. The affected installation would be relocated to another nearby site.

For all work occurring on Bureau of Land Management lands, the recipient must submit project information to the appropriate BLM office for review and approval prior to initiating field activities on those lands.

Note to Specialist :

Geothermal Technologies Office
This NEPA determination requires a tailored NEPA Provision.
NEPA review completed by Whitney Doss, 08/28/2017

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: Electronically Signed By Casey Strickland Date: 8/28/2017
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: _____ Date: _____
Field Office Manager