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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-FOA-0000841	DE-EE0006731	GFO-0006731-001	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:

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.
B3.2 Aviation activities	Aviation activities for survey, monitoring, or security purposes that comply with Federal Aviation Administration regulations.
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:

As part of Funding Opportunity Announcement DE-FOA-0000841 the Department of Energy (DOE) was seeking applications to address the overarching theme of uncertainty quantification and reduction for geothermal exploration, specifically through the development of Geothermal Play Fairways. A play fairway analysis defines levels of uncertainty with respect to the presence and utility of geothermal system elements, and translates them into maps to high grade the geographic area over which the most favorable combinations of heat, permeability, and fluid are thought to extend. The analysis is conducted on a regional (basin) scale, with the resulting maps covering areas up to several thousand square miles.

DOE selected 11 projects to participate in Phase 1, referred to hereafter as Budget Period 1 (BP1) of this FOA. A FOA-wide NEPA determination (GFO-FOA0000841-001, CX A9) was completed for this Budget Period in July of

2014. Since then a down-select to 6 projects was completed. DOE will complete additional NEPA review for each of the 6 remaining teams before expenditure of federal funds is authorized for BP2 activities. This NEPA determination addresses and evaluates BP2 activities as described in the Statement of Project Objectives submitted by the University of Nevada at Reno (UNR).

The proposed project activities include a down-select from approximately 24 potential study sites to 3-5 sites; geologic study of the 3-5 chosen sites; geochemical investigations; shallow temperature, LiDAR and gravity surveys; seismic reflection analysis; slip and dilation tendency analysis; 3D and thermal modeling; selection of final drilling targets; and reporting. The initial down-select, thermal modeling, seismic reflection analysis, final selection of drilling targets and reporting would be strictly intellectual, academic, or analytical activities and would be completed at UNR offices on campus in Reno, NV. Geologic and geochemical investigations and surveys would be completed by UNR staff in the field on Bureau of Land Management, U.S. Forest Service, and private land within the Nevada Play Fairway study area. Chemical analysis of rock, soil and water samples collected in the field would be completed at UNR labs on campus in Reno, NV. Slip and dilation tendency analysis and 3D modeling would take place at Lawrence Berkeley National Laboratories (LBNL) in Berkeley, CA.

The geologic investigations would involve mapping and assessment of the 3-5 chosen sites. UNR staff would hike in and map approximately 20 to 80 square kilometers at each site for 1) bedrock, structure, and Quaternary deposits; 2) any surface geothermal features; 3) delineation of stratigraphy; 4) selective geochronological dating; 5) the geometry and kinematics of fault systems; and 6) assessment of the regional stress field. Geochemical investigation would involve taking approximately 20 water samples from wells and springs at the chosen locations to validate geologic and structural analyses compiled in BP1. Shallow temperature surveys would involve taking subsurface temperature readings with a 2m by 5cm probe at the potential sites to aid in selection of the 3-5 sites. All shallow temperature survey work would occur along existing roads and two-tracks. Ground disturbance in these areas would be immediately reclaimed and no soil materials would be removed from the site. Once down-select is completed it is expected that an additional 30-50 readings would be taken to obtain a temperature distribution. LiDAR surveys would involve updating elevation data across approximately 70-75 square miles of the chosen study area. These readings would be collected via small plane passover at between 1000 and 5000m AGL and no special permitting would be required. Gravity surveys would involve combining available regional gravity data with new data collected with a gravimeter. This data would be collected by placing a gravimeter on the ground to read relative gravity; no ground disturbance would be necessary.

The U.S. Fish and Wildlife Service Endangered Species Program website (IPaC) identifies 16 endangered or threatened species and 31 migratory birds that are known to, or are believed to occur near the project site. Additionally, Nevada has historically been á source of culturally and archaeologically important artifacts. The proposed field activities would not be expected to impact species of concern or their habitat or archaeological resources, regardless of where the work is conducted.

The proposed project would not necessitate the use or handling of hazardous materials. All UNR personnel would be required to abide by UNR's safe and defensive driving guidelines when performing field work. Any work proposed to be conducted at a DOE laboratory may be subject to additional NEPA review by the cognizant DOE NEPA Compliance Officer for the specific DOE laboratory prior to initiating such work. Further, any work conducted at a DOE laboratory must meet the laboratory's health and safety requirements.

Based on review of the project information and the above analysis, DOE has determined the proposed project would not have a significant individual or cumulative impact to human health and/or environment. DOE has determined that this project is consistent with actions outlined in DOE categorical exclusions A9 "Information gathering, analysis, and dissemination", B3.1 "Site characterization and environmental monitoring", B3.2 "Aviation activities" and B3.6 "Small-scale research and development, laboratory operations, and pilot projects" and is therefore 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:
Any work proposed to be conducted at a DOE laboratory may be subject to additional NEPA review by the cognizant DOE NEPA Compliance Officer for the specific DOE laboratory prior to initiating such work. Further, any work conducted at a DOE laboratory must meet the laboratory's health and safety requirements.

Note to Specialist :

Geothermal Technologies Office
This NEPA determination requires a tailored NEPA provision.
Review completed by Rebecca McCord 02/12/2016.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: Electronically Signed By: Kristin Kerwin Date: 2/25/2016
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