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

RECIPIENT: University of Nevada, Reno **STATE:** NV

PROJECT TITLE: INnovative Geothermal Exploration through Novel Investigations Of Undiscovered Systems (INGENIOUS)

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002219	DE-EE0009254	GFO-0009254-001	

Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Policy 451.1), 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 funding to University of Nevada, Reno (UNR) to reduce the exploration risk for hidden geothermal systems in the Great Basin Region (GBR) by quantifying resource potential, uncertainty, and degree of exploration at several geothermal prospects in the GBR and developing new geothermal favorability maps, data products, software tools, and a geothermal developers' playbook that integrates the project findings and facilitates easy access for external stakeholders. The project would be completed over 3 Budget Periods (BPs) with a Go/No Go Decision Point between each BP.

The types of activities associated with the proposed project include data analysis, computer modeling, laboratory research, and field work. The scope of field work would include geothermal surveys and temperature gradient (TG) and slimhole drilling. Initial project work planned in Tasks 1-3 would define drill locations and required drilling activities, so there is insufficient data available at this time to complete a thorough review of the anticipated TG and slimhole drilling activities (Tasks 4 and 5, with the exception of Subtask 4.1) and any potential associated impacts. These activities will be reviewed once drilling is fully defined. This NEPA Determination is to review Tasks 1-3, Subtask 4.1, and Tasks 6-9.

During BP1, existing data sets from studies done to assess the likelihood of geothermal resources would be compiled from study sites in Nevada, Utah, Idaho, and Oregon. Two sites from this data set would be selected for further field-based resource assessments and TG drilling to expand on existing data. During BP2, new regional-scale modeling

algorithms would be applied to new datasets in order to develop maps that indicate geothermal resources. Conceptual modeling, field-based resource assessments, and TG and slimhole drilling of two additional study areas (in Nevada, Utah, Idaho, or Oregon) would be performed. During BP3, TG and slimhole drilling would occur at an additional study area in one of the four states, to finalize a best-practice exploration strategy for hidden geothermal systems in the Great Basin. A “geothermal developers’ playbook” document would be created and software tools for public distribution would be finalized to allow explorers to apply and adapt new regional and local-scale geothermal methodologies developed by the project.

The Great Basin Center for Geothermal Energy (GBCGE) within the Nevada Bureau of Mines and Geology (NBMG), a research and public service unit of UNR, is the lead organization on this project. The project also includes team members from Aprovechar Lab L3C, Cyrq Energy Inc, Geothermal Resource Group, Hi-Q Geophysical Inc, Idaho Geological Survey, Innovate Geothermal Ltd, Lawrence Berkeley National Laboratories, National Renewable Energy Laboratory, Southern Methodist University, U.S. Geological Survey, Utah Geological Survey, and W Team Geosolutions.

Activities associated with Tasks 1-3, Subtask 4.1, and Tasks 6-9 would include:

• Task 1: Data analysis and computer modeling from multiple existing sources of data from studies previously performed in most of Nevada, western Utah, southern Oregon, and southern Idaho. Field activities would be done in these 4 areas, including geological mapping of faults and surfaces and temporary utilization of existing GPS stations for strain/stress analysis. Task 1 activities would occur throughout BP1 and BP2.
• Task 2: Identification of up to 4 sites for further studies, in addition to the first site in the Granite Springs Valley region in Nevada. These 4 locations are anticipated to be on lands managed by the U.S. Bureau of Land Management (BLM) or U.S. Forest Service (USFS) in Nevada (Granite Springs Valley region), western Utah, southern Oregon, and/or southern Idaho. Field surveys would be conducted at these sites to acquire new data. Studies include drone mounted aeromagnetics, 2-meter temperature surveys, gravity, magnetics, magnetotelluric (MT) surveys, micro-seismic monitoring, new geological mapping, and geochemical water sampling from springs and wells. This would also include further development of modeling algorithms and favorability maps. Task 2 activities would occur across BP1 and BP2.
• Task 3: Computer modeling, estimations of resource potential at each site, and identification of thermal-gradient hole target locations. Task 3 activities would occur across all three BPs.
• Subtask 4.1: Design TG drilling program and obtain necessary permits for drilling at all 5 proposed sites. Task activities would occur across all three BPs.
• Task 6: Website/document preparation, software development, data compilation, and development of geothermal developers’ playbook website containing playbook package. Task 6 activities would occur across all three BPs.
• Task 7: Outreach and stakeholder engagement. Task 7 activities would occur across all three BPs.
• Task 8: Project management and reporting. Task 8 activities would occur across all three BPs.
• Task 9: Delivery and management of project data. Task 9 activities would occur across all three BPs.

Office work, including data analysis, computer modeling, and laboratory research, would occur in purpose-built facilities. No new physical modifications to existing facilities or changes in the use, mission, or operation of existing facilities would result from this project.

Task 1 field activities at each of the 4 study sites would be as follows:

• GPS measurements utilizing about a dozen existing stations (operated by University of Nevada, Reno). These are enabled by attaching an antenna and receiver in order to take readings and would be accessed by dirt roads or on foot.
• Geological and fault mapping of rock outcrops and geological formations, accessed by foot. Small samples of rock might be taken for analysis.

Subtask 2.2 and 2.3 field activities would be as follows, most occurring at all 4 study sites:

• Unmanned Aerial System (UAS) magnetics surveying at 4-5 of the detailed study areas done by team members of UNR’s Center of Transformative Environmental Monitoring Programs (CTEMPs) laboratory. This would be managed by an FAA licensed pilot, surveying about 50-70 line-km per day and typically at a flight altitude of 50 m above ground level and would last between 5-8 days. Existing road access would be used and gasoline powered generators would provide power for UAS battery recharge. UNR is responsible for ensuring that all activities involving small UASs are compliant with 14 CFR Part 107 or an applicable Certificate of Waiver or Authorization (COA). This includes, but is not limited to, aircraft requirements such as remote pilot-in-command certification, authorities and responsibilities; ensuring the small UAS is in a condition for safe operation; registration; understanding airspace classifications and requirements; and accident reporting (if applicable).
• Two-meter deep shallow temperature surveys which would be collected at 4-5 of the detailed study areas by team members for the University of Nevada, Reno. Two-person crews would travel in a Utility Task Vehicle (UTV). Some travel would be on existing roads, but some would require off-road travel. Rods about 1.5 cm in diameter would be driven into the ground anywhere from 100 to 800 meters apart. They are driven into the ground with an electric-

powered demolition hammer powered by a generator. Rods remain in the ground temporarily and are extracted without any discernible surface disturbance.
• Gravity surveys would be conducted at 4 sites, accessed using existing roads and by hiking on foot. A portable gravity meter would be placed on the ground for a few minutes and removed once the procedure is complete. There would be minimal disturbance to the landscape.
• Magnetic survey would be performed using backpack or all-terrain vehicle (ATV)-mounted magnetometer systems. Survey sites would be accessed via smooth playa surfaces or fairly well-established dirt roads. System are either towed behind or mounted above the ATV. For both systems, GPS data are viewed by the surveyor in real time. Data would be collected along parallel transects with 100-300 m spacing. A proton-precession base-station magnetometer would also be set up that would remain at the same position during the extent of the field session.
• Density and magnetic outcrop measurements and samples would be collected by hand. Measurements would be taken with a passive, non-invasive measurement with a hand-held unit.
• Magnetotelluric (MT) surveys would be conducted at 4 study sites, each about 10 km by 10 km in size, with stations spaced from 500 meters to 2 kilometers apart. There would be about 40-60 stations. Stations would be left up for about 20 hours and holes would be filled back in once the stations are removed. This is a passive electromagnetic measurement and sites would be accessed by foot or an existing road or two-lane track. No energy is put into the ground, the instruments listen to natural electric and magnetic signals. A magnetometer is made up of various components and would require a hole approximately 4 feet long, 6 inches wide, and 5 inches deep. If possible, another magnetometer is buried vertically. Four small connected electrodes are buried in a hole that is about 3 inches in diameter and 6 inches deep.
• Micro-earthquake (MEQ) monitoring would be done at 2 undetermined local-scale study sites. LBNL will install and maintain a surface seismic station array once a casual access permit is obtained by the local public lands office. Passive MEQ monitoring systems would be used covering about 5 km by 5 km with approximately 125 sensors deployed. Existing roads and vehicle trails will be used to get as close as possible to stations, then equipment will be walked in to each site. These small, portable sensors are buried about 6 inches deep or attached to rock. Sensors will remain in place for 3-6 months and will passively collect data. After data collection is complete, all sensors and electronics will be removed and holes will be filled in.
• Water samples would be collected from surface cold and hot springs. These would be accessed using existing roads and walking the sampling equipment to the sample site. Sampling equipment is hand-held and no trace of presence would remain at the site.

U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IPaC) database indicates that there are several endangered species, including flowering plants, that occur in the Great Basin Region. However, this project's field work would consist of temporary installations of small-scale measuring devices and equipment requiring minimal time on-site and minimal ground disturbance to install. Most work would occur along existing roadways and two-tracks with minimal off-road travel being done either on foot or by UTV/ATV. Work occurring in or near water sources would consist of obtaining small water samples only. Based on the above, DOE has determined that project activities in Tasks 1-3, Subtask 4.1, and Tasks 6-9 would have no effect on Endangered Species Act listed species or critical habitats.

During the installation of an MT station, if cultural or archaeological artifacts are encountered, the recipient must stop the site installation immediately and inform the DOE Project Officer of the finding within forty-eight hours of the finding. The affected installation would be relocated to another nearby site.

DOE also conducted a review of potential issues relating to other resources of concern and found that no effects would be expected to result from the proposed activities associated with Tasks 1-3, Subtask 4.1, and Tasks 6-9. Industry health and safety policies and procedures would be followed, including use of proper personal protective equipment, engineering controls, and monitoring potential safety risks. Permits would need to be obtained for proposed TG drilling sites. UNR and its project partners would observe all applicable Federal, state, and local health, safety, and environmental regulations.

Any work proposed to be conducted at a federal facility may be subject to additional NEPA review by the cognizant federal official and must meet the applicable health and safety requirements of the facility.

NEPA PROVISION

DOE has made a conditional NEPA determination.

The NEPA Determination applies to the following Topic Areas, Budget Periods, and/or tasks:

Task 1.0 Regional-scale play fairway analysis and workflow refinement
Task 2.0 Local-scale play fairway analysis of priority sites
Task 3.0 Conceptual modeling and resource assessment
Subtask 4.1 Drilling program specifications and permitting

Task 6.0 Geothermal developers' playbook
Task 7.0 Outreach
Task 8.0 Project management and reporting
Task 9.0 Data curation, delivery, and upload

The NEPA Determination does not apply to the following Topic Area, Budget Periods, and/or tasks:

Subtasks 4.2-4.6 Thermal gradient hole drilling
Task 5.0 Slimhole drilling

Include the following condition in the financial assisstance agreement:

During the installation of an MT station, if cultural or archaeological artifacts are encountered, the Recipient must stop the site installation immediately, inform the DOE Project Officer of the finding within forty-eight hours of the finding, and relocate the affected installation 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.

This project includes the use of small unmanned aerial systems (sUAS). The Recipient is responsible for ensuring that all activities involving sUAS are compliant with 14 CFR Part 107 or an applicable Certificate of Waiver or Authorization (COA). This includes, but is not limited to, aircraft requirements such as remote pilot-in-command certification, authorities and responsibilities; ensuring the sUAS is in a condition for safe operation; registration; understanding airspace classifications and requirements; and accident reporting (if applicable).

Notes:

Geothermal Technologies Office
This NEPA determination requires a tailored NEPA Provision.
NEPA review completed by Shaina Aguilar on 12/9/2020.

FOR CATEGORICAL EXCLUSION DETERMINATIONS

The proposed action (or the part of the proposal defined in the Rationale above) fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D. To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Subpart D, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Subpart D, Appendix B.

There are no extraordinary circumstances related to the proposed action that may affect the significance of the environmental effects of the proposal.

The proposed action has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)), and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

A portion of the proposed action is categorically excluded from further NEPA review. The NEPA Provision identifies Topic Areas, Budget Periods, tasks, and/or subtasks that are subject to additional NEPA review.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: Electronically Signed By: Casey Strickland Date: 12/11/2020
NEPA Compliance Officer

FIELD OFFICE MANAGER DETERMINATION

- [x] Field Office Manager review not required
- [ ] Field Office Manager review required

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

Field Office Manager's Signature: _____ Date: _____

Field Office Manager