

# FINDING OF NO SIGNIFICANT IMPACT

for the

## University of Utah Energy and Geosciences Institute, Frontier Observatory for Research into Geothermal (FORGE)

Beaver County, Utah

DOE/EA-2070D

**Agency:** U.S. Department of Energy (DOE)

**Action:** Adoption of Environmental Assessment (EA), issuance of Finding of No Significant Impact (FONSI)

**Summary:** The DOE has completed the *Final Environmental Assessment for the Frontier Observatory for Research into Geothermal (FORGE), Milford, Beaver County, Utah* (FORGE EA). The FORGE EA was prepared in accordance with Council on Environmental Quality (CEQ) and DOE the National Environmental Policy Act (NEPA) implementing regulations at 40 CFR Parts 1500 through 1508 and 10 CFR Part 1021, respectively. The DOE's National Energy Technology Laboratory (NETL) prepared the FORGE EA to evaluate potential environmental, cultural, and socioeconomic impacts of providing cost-shared funding to a proposed project to design and build the Frontier Observatory for Research into Geothermal Energy (FORGE).

The FORGE program was designed to establish a dedicated field laboratory site where the subsurface scientific and engineering community would develop, test, and improve technologies and techniques for the creation of cost-effective and sustainable enhanced geothermal systems (EGS) in a controlled, ideal environment. The proposed Utah FORGE site is approximately 10 miles northeast of Milford in Beaver County, Utah, on private, State of Utah, and U.S. Bureau of Land Management (BLM) lands. The DOE's proposed action is to provide cost-shared funding to the Energy and Geoscience Institute (EGI) at the University of Utah and its partners for the proposed Utah FORGE site. The project would include one or more deep geothermal research wells, monitoring wells, groundwater wells, a modular office structure, utility tie-ins, and monitoring equipment.

The FORGE program consists of three phases: 1. Planning, 2. Site Characterization and Preparation, and 3. Technology Testing and Evaluation. In order to select the optimal location for the FORGE project, the proposed projects undergo competitive down-selections at critical points in the project.

- Phase 1, Planning: During Phase 1, the objective was to complete technical and logistical planning tasks that demonstrate the site's viability and the team's full commitment and capability to implement Phase 2 and 3. Phase 1 was completed by all selected projects in September 2016, and DOE competitively assessed each project location for technical

merits and potential environmental impacts prior to selecting two projects to proceed to Phase 2. The two projects selected include proposed FORGE sites near Milford, Utah and Fallon, Nevada. Phase 2, Site Characterization and Preparation, was further sub-divided into site activities.

- Phase 2A: Phase 2A consisted of the completion of an environmental information volume to assist DOE in assessing the environmental resource areas and potential impacts of the project. Phase 2A also required the installation of a preliminary seismic array to assess regional seismicity and the development of a techno-economic assessment of proposed infrastructure requirements to support FORGE operations during latter stages of the project. Phase 2A was completed by both proposed project teams in March 2017.
- Phase 2B, Site Characterization: Phase 2B will take approximately 12 months and commenced in the first quarter of 2017. It includes the drilling of a deep scientific research well to a depth of 7,536 feet to verify that the Utah FORGE site has the characteristics required for FORGE. (Drilling of the well is complete.) Geophysical surveying, including a three-dimensional (3-D) reflection seismic survey using vibroseis trucks, would augment these activities. In addition, a groundwater investigation well was planned to be drilled during Phase 2B to a depth of 1,000 feet to assess water availability and groundwater temperature beneath the project area. Recent economic analyses of groundwater supply costs have resulted in deferring this well to a later phase of the project.

Following Phase 2B, the two remaining project sites would be assessed for technical merit and potential environmental impacts, and the final FORGE location would be selected. The final FORGE project site would proceed to Phase 2C and be fully instrumented for surface and subsurface investigation and be readied for R&D technology testing and evaluation during Phase 3.

- Phase 2C, Site Preparation: If the Utah FORGE site is selected, Phase 2C would take approximately 8 to 12 months and would include the construction of infrastructure elements to support operations. These elements would include electric power and fiber optic lines to the FORGE area, a 2-acre fenced compound containing a 1,000-square-foot office and secure storage facilities to support research, on-site activities and a communications hub, water wells and associated surface pipelines, the FORGE Phase 3 well pad, and seismic monitoring holes up to 1,000 feet deep. Monitoring equipment, including tiltmeters and global positioning system (GPS) monuments, would also be installed.
- Phase 3, Site Operation: If the Utah FORGE site is selected, Phase 3 would be a 5-year term during which the subsurface scientific and engineering community could apply to use FORGE as a field laboratory for projects to test EGS technologies, techniques, and instruments. Phase 3 would include the drilling and stimulation of at least one injection well and one production well, both expected to be strongly deviated. Monitoring of flow between the injection and production wells would allow for measurement of the efficiency of heat being extracted from the host rock. A pre-existing well, Acord-1, would be cleaned out and made available for testing tools. Extensive scientific

monitoring would be conducted at the well site and in the surrounding area. The DOE would decommission the well site at the end of Phase 3, which is expected to be in 2024.

Based on the analysis in the FORGE EA, DOE has determined that the proposed action is not a major Federal action significantly affecting the quality of the environment within the context of NEPA, and thus does not require the preparation of an Environmental Impact Statement (EIS). This FONSI does not constitute a decision to select any alternative, and it is not a decision to proceed with the project.

**FOR FURTHER INFORMATION, CONTACT:** This FONSI and the FORGE EA are available on DOE's National Energy Technology Laboratory web site, <https://www.netl.doe.gov/library/environmental-assessments> and DOE's NEPA web site at <https://energy.gov/nepa/nepa-documents>. For additional information, please contact:

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**PROPOSED ACTION:** The DOE's proposed action is to provide cost-shared funding to the Energy and Geoscience Institute (EGI) and its partners for the proposed Utah FORGE site. If approved, the DOE proposes to provide EGI with approximately \$20 million of financial assistance through Phase 2C. Phase 3 funding is not yet appropriated, but could be approximately \$130 million. The University of Utah EGI team would use their portion of the financial assistance to fully instrument, characterize, and permit the Utah FORGE site for a field laboratory to conduct cutting-edge research on EGS.

Through the FORGE initiative, the DOE seeks to develop and demonstrate new technologies in harnessing geothermal energy, with the purpose of developing methods for creating EGS in areas with near-surface heat but insufficient permeability or water for natural geothermal reservoirs to have formed. The proposed action would further the objectives of the FORGE initiative by providing funding to collect new data on conditions at the Utah FORGE site and detailed information to determine if the Utah site has the characteristics required for FORGE.

**ALTERNATIVES:** The DOE's NEPA regulations require that EAs include a "No Action" alternative (10 CFR 102.321(c)). The FORGE EA analyzes the Proposed Project and a "No Action" alternative. Because the DOE's proposed action is limited to providing financial assistance in cost-sharing arrangements to selected applicants in response to a competitive funding opportunity, DOE's decision is limited to either accepting or rejecting the project as proposed by the proponent, including its proposed technology and selected sites. Only two projects have proceeded through the multi-step selection process to this phase of work, and those are the only projects available for selection as the final FORGE project: the Utah FORGE project analyzed in the FORGE EA and a FORGE project proposed in Fallon, Nevada. The project proposed for Fallon, Nevada is the subject of a separate EA initiated by the BLM, and is not

analyzed in the FORGE EA. The DOE’s consideration of reasonable alternatives in the FORGE EA is therefore limited to the Utah FORGE project and the No Action Alternative.

**PUBLIC INVOLVEMENT:** A notice of availability was placed in the Beaver County Journal on January 31, 2018, to announce the beginning of a 30-day public review and comment period for the draft EA. The draft EA was available for public review from January 31, 2018 through March 2, 2018. No public comments were received. The draft EA and final EA are available on DOE’s National Energy Technology Laboratory website, <https://www.netl.doe.gov/library/environmental-assessments> and DOE’s NEPA website at <https://energy.gov/nepa/nepa-documents>.

**ENVIRONMENTAL IMPACTS:** The EA disclosed the potential impacts of the Proposed Project and No Action Alternative.

**Table 1: Summary of Environmental Impacts of the Proposed Project**

<i>Resource Area</i>	<i>Impacts</i>
Land Use	The Proposed Project would affect 82.4 acres of private land, 19.5 acres of state land, and 27.7 acres of BLM-administered land. There would be no impacts to existing leases or rights-of-way.
Atmospheric Conditions and Air Quality	<p>Project activities would not affect Beaver County’s status as an attainment area for national ambient air quality standards (NAAQS).</p> <p>Pollutant emissions from vehicles and equipment used during project activities, though measurable and adverse, would be unlikely to negatively affect the air quality in the analysis area and its current attainment status.</p> <p>Emissions of H<sub>2</sub>S would be minimized through the use of properly weighted drilling mud, which should keep the well from flowing during drilling. No H<sub>2</sub>S emissions would occur during decommissioning because the wells would be plugged.</p> <p>The presence of blow-out prevention equipment, the short-term releases of such non-condensable gases in the project area would not be expected to violate NAAQS standards.</p> <p>Impacts to climate change would be minor based on the intermittent nature of project activities and the short-term life of the project (5 years).</p>
Hydrologic Conditions and Water Quality	The features that would be constructed for the Proposed Project would cross five unnamed, intermittent streams in six locations. These intermittent streams are primarily dry and only receive surface flows during peak flow events. The crossings would result from the power line and accompanying two-track road, the surface water line, and proposed groundwater well 12 (under the G1 groundwater wellfield option). There would be no impacts from the power line

	<p>because it would span the intermittent streams. The two-track road would cross the stream directly, but impacts would be minimal because the stream rarely has any surface water flow. Surface water line crossings would be minimized by the installation of appropriately sized culverts as needed.</p> <p>Stormwater runoff would likely increase slightly from vegetation removal and soil compaction during excavation for facilities, road construction, and well pad construction.</p> <p>Less than 0.5 acre of wetlands could be impacted by ground disturbance associated with construction or drilling activities. Impacts to wetlands would be minimized through the use of best management practices that limit ground disturbance and prevent the release of fluids or pollutants to the surrounding environment.</p> <p>The potential for groundwater impacts from releases of produced fluids generated at well sites would be mitigated because such releases would discharge to a lined reserve pit to prevent seepage to groundwater. A grouting and casing program for the construction of all wells would be implemented to prevent degradation of groundwater quality during and after well drilling. Blow out prevention equipment would be used while drilling below the surface casing. The potential for groundwater impacts from accidental spills of hazardous materials would be mitigated by preparation of and adherence to a spill prevention control and countermeasure plan.</p> <p>Decommissioning of the project would involve the plugging of all wells, removal of the project components, and full reclamation of well pads and access roads to return the land to a condition approximate or equal to that which existed before the disturbance. Cessation of groundwater withdrawal and injection would return the geothermal reservoir to a condition approximate or equal to that which existed before the Proposed Project. No irreversible or long-term effects to water resources would occur.</p>
<p>Geologic and Soil Conditions</p>	<p>Project activities would affect less than 0.5% of the total acreage of each type of surface geology in the analysis area (watersheds intersected by the Proposed Project). Given the lack of any significant seismicity on the Opal Mound fault over the last 30 years of injection, it is unlikely earthquakes will occur in response to injection at the FORGE area on this structure.</p> <p>The Proposed Project would affect less than 0.5% of the total acreage of each soil type in the analysis area. Direct impacts to soils would include changes in soil functions due to soil exposure from vegetation removal, mixing of soil horizons, potential loss of topsoil</p>

	<p>productivity, soil compaction, and increased susceptibility to wind and water erosion. Use of equipment for mechanical treatment of vegetation may compact soils, which would reduce soil infiltration rates, leading to increases in overland flow of water, erosion, and displacement of soil. Reclamation of the project area would help avoid a long-term loss of soil or soil fertility at disturbed sites. The potential for increased erosion and sedimentation would be greatest in the short term and would decline over time in areas where reclamation is implemented, and in other areas as natural stabilization occurs.</p>
<p>Vegetation and Wildlife</p>	<p>The Proposed Project would affect approximately 0.14% of vegetation in the analysis area (watersheds intersected by the Proposed Project).</p> <p>During the life of the project and until the site is decommissioned and reclaimed, well pads and access roads would be monitored for noxious weeds. If found, the authorized state or federal agent would be notified, and the weeds would be treated following a program approved by the authorized state or federal agency to eliminate further spreading. Treatment would continue until the weeds have been eradicated. In addition, all equipment used for construction and drilling would be power washed before arrival in the FORGE area to remove any invasive, non-native weed seeds.</p> <p>Reclamation would help mitigate potential impacts to vegetation by removing applied gravel, spreading topsoil removed during construction of well pads, and re-vegetating with native seed mixtures or other plants preferred by the landowners.</p> <p>Impacts to general wildlife species would include loss of approximately 0.14% of the habitat (forage, groundcover, etc.) in the analysis area (watersheds intersected by the Proposed Project). Effects on wildlife from human activity and noise during construction would consist of auditory and visual disturbances to individual wildlife present in the FORGE area, which could cause stress to individual animals. Some individuals would likely leave the immediate area, resulting in a temporary spatial redistribution of individuals or habitat-use patterns. Construction activity and noise would be direct impacts that would disappear at the completion of the project. However, some human activity and noise associated with the FORGE project operations would be present consistently for 5 years following construction. Vehicle use associated with the project would result in an increased risk of vehicle-animal collisions on project access roads and could cause stress, injury, or mortality to individual animals. Prudent speed limits would be observed to protect wildlife and reduce the risk of vehicle-animal collisions. Potential impacts to</p>

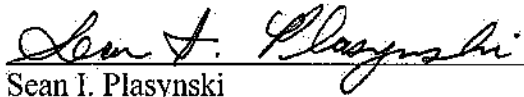
	<p>migratory birds would be minimized through nest surveys and buffers, as well as reseeded of disturbed areas with native seed.</p> <p>Project activities would permanently remove approximately 0.18%–0.19% of the total year-long crucial pronghorn habitat in the analysis area. The small quantity of disturbance in crucial pronghorn habitat would not likely affect the overall health of the habitat. Project development could impede movement of Pronghorn and other big game species and create habitat fragmentation. Human activity and noise would generally cause the same impacts to big game as to general wildlife. In addition, overall habitat changes could cause individuals to select suboptimal habitat.</p>
<p>Socioeconomic Conditions</p>	<p>Economic activity attributable to the project includes an increase in local employment; purchase of materials and services from local sources; and expenditures in the local economy by non-local workers for items such as accommodations, food, and recreation. Project-related effects associated with the construction and decommissioning of the project would be relatively short lived, whereas those associated with operations would last longer. Because the project would be completed and decommissioned after 5 years, long term lasting impacts on the local economy are not anticipated.</p> <p>It is anticipated that the local labor force cannot provide suitably skilled workers for the specialized tasks associated with operating the project. Because the duration of the operation phase of the project is limited and the number of similar jobs for skilled workers in Beaver County is relatively low, it is likely that most workers would not relocate to the area permanently. In the absence of sizeable increases in the number of residents as a result of project construction, impacts to community facilities and services are not expected.</p> <p>Assuming that up to 30 workers would relocate to the FORGE area during the peak activity month, the project could result in a temporary increase of approximately 0.7% of the total jobs and 18.9% of the total construction jobs in Beaver County.</p>
<p>Historic and Cultural Resources</p>	<p>Actions that cause surface and subsurface physical disturbance could result in the damage, destruction, or inadvertent discovery of cultural resources. Any damage or destruction of cultural resources would be long term. The magnitude and extent of the impacts would depend on the current state of the cultural resources and their eligibility for the NRHP. Indirect impacts would include the loss of research potential and interpretation possibilities.</p> <p>Two archaeological sites intersected by the project area are listed on the NRHP (42BE52 and 42BE52), and two sites have been determined eligible for the NRHP by SHPO (42BE2198 and</p>

	42BE3184). Based on the results of an inventory and addendum, and SHPO’s concurrence, the Proposed Project would not have an adverse effect on 42BE52, 42BE2198, 42BE52, and 42BE3184. If the BLM Cedar City Field Office, DOE (in any future EAs), or SHPO determine at a later date that the Proposed Project would adversely impact one or more of these sites, then a plan to minimize or mitigate the adverse effect could be required before a notice to proceed for construction of the project is issued.
Visual Resources	The Proposed Project would result in changes to the existing landscape through surface disturbance; removal of vegetation; temporary placement of drill rigs; installation of a power line and fiber optic line; construction of an office building and associated parking (along with a fence); and creation of a groundwater wellfield, seismic monitoring drillholes, survey monument stations, and tiltmeter sites. The implementation of the project would not exceed management objectives for VRM Class IV on adjacent BLM lands. Reclamation would reduce visual contrasts over time. In general, the project would repeat the same vertical and horizontal lines that already exist on the landscape; it is expected to be consistent with the existing scenic quality.
Health and Safety Factors	Air emissions resulting from the Proposed Project would be unlikely to exceed NAAQS.  Employees present during the drilling phase would use proper personal protective equipment to avoid damages to hearing and health. The nearest residences and sensitive receptors to the FORGE area are approximately 7 miles away in the town of Milford. With 7 miles of distance, 100 dB(A) at the FORGE area would be reduced to approximately 19 dB(A). This is below the typical background noise levels for a rural environment; therefore, no impacts to sensitive receptors are anticipated. The noise associated with operational activities is anticipated to be substantially less than the noise associated with drilling and construction. Therefore, no noise impacts are anticipated at sensitive receptors during the operational phase of the Proposed Project.

**DETERMINATION:** The potential environmental impacts associated with the establishment of a dedicated field laboratory site for the development, testing, and improvement of technologies and techniques for the creation of cost-effective and sustainable EGS evaluated in the FORGE EA include minor impacts and low risks. The proposed action does not constitute a major Federal action significantly affecting the quality of the human environment within the context of NEPA (42 U.S.C. 4321), the Council on Environmental Quality NEPA regulations (40 CFR 1500-1508), and the DOE NEPA implementing regulations (10 CFR 1021). Accordingly based on the analysis in the FORGE EA, an EIS is not warranted and this FONSI will be issued. This FONSI is not a decision to select any alternative or to proceed with the Proposed Project.



Issued in Pittsburgh, PA this 13<sup>th</sup> day of April, 2018.

A handwritten signature in cursive script, reading "Sean I. Plasynski", written over a horizontal line.

Sean I. Plasynski

Acting Director

National Energy Technology Laboratory