



Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3393

FINDING OF NO SIGNIFICANT IMPACT

Brady Hot Springs Well 15-12 Hydro-Stimulation Environmental Assessment DOI-BLM-NV-W010-2012-0057-EA; DOE/EA-1944

AGENCY: U.S. Department of Energy, Golden Field Office (DOE)

ACTION: Finding of No Significant Impact (FONSI)

SUMMARY: The U.S. Department of Energy (DOE) proposed to authorize the expenditure of federal funding¹ to Ormat Technologies, Inc. (Ormat) to characterize a geothermal system with low natural productivity, develop a plan to stimulate the productivity of the system, stimulate a well in the system and monitor the productivity or injectivity of the well in relation to other wells available in the system.

The U.S. Department of Interior, Bureau of Land Management, Humboldt River Field Office (BLM) is the lead federal agency with DOE as a cooperating agency on the *Brady Hot Springs Well 15-12 Hydro-Stimulation Environmental Assessment; DOI-BLM-NV-W010-2012-0057-EA; DOE/EA-1944*, which included an evaluation of the potential environmental impacts associated with DOE's proposed action and a no action alternative. DOE was invited by BLM to participate in the NEPA process as a cooperating agency (40 CFR 1501.6 and 1508.5). DOE accepted formal cooperating agency status and retained review and comment responsibility pertaining to the EA. The EA was prepared in accordance with NEPA, as amended, the CEQ Regulations for Implementing of NEPA (40 CFR 1500 to 1508), the Federal Land Policy and Management Act (FLPMA) of 1976, and BLM's NEPA Handbook (H-1790-1; 2008).

DOE hereby adopts the above referenced EA: *Brady Hot Springs Well 15-12 Hydro-Stimulation Environmental Assessment; DOI-BLM-NV-W010-2012-0057-EA; DOE/EA-1944* and incorporates this EA by reference into this FONSI.

This FONSI was prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality (CEQ) Regulations for Implementing NEPA, as amended, 40 CFR 1508.13; and DOE NEPA Regulations, 10 CFR 1021.322.

¹ Prior to the issuance of this FONSI, DOE authorized Ormat Technologies, Inc. (Ormat) to use a percentage of their federal funding for preliminary activities, which include preparation of the *Brady Hot Springs Well 15-12 Hydro-Stimulation Environmental Assessment; DOI-BLM-NV-W010-2012-0057-EA; DOE/EA-1944* (EA), and scientific information gathering. These activities are associated with the Proposed Project and do not significantly impact the environment nor represent an irreversible or irretrievable commitment by the Department of Energy in advance of the conclusion of the EA for the Proposed Project.

PROJECT DESCRIPTION: DOE's proposed action is to authorize the expenditure of approximately \$4.5 million of federal funds by Ormat for the purpose of conducting Enhanced Geothermal Systems (EGS) activities at target geothermal well 15-12 to increase energy production by enhancing natural hydraulic connections within the existing hydrothermal system at their Brady Hot Springs power plant facility located on its federal geothermal lease on BLM-administered public lands. By providing financial assistance to support this project, DOE would further its mission to support a program of research, development, demonstration and commercial application for EGS. Further, the project would further DOE's objective to support projects intended to characterize a geothermal system with low natural productivity, develop a plan to stimulate the productivity of the system, stimulate a well in the system and monitor the productivity or injectivity of the well in relation to other wells available in the system.

The proposed project is located north of the Hot Springs Mountains, approximately 50 miles northeast of Reno, in Churchill County, Nevada. The project would be located on an existing production well and drill pad (Well 15-12) located on federal geothermal lease NVN 065558 held by Ormat. This lease and other federal leases and adjacent private lands comprise lands that are used for the commercial production of geothermal power at the Brady Power Plant.

Ormat's well 15-12 was installed in April 2007 to serve as a production well; however, further testing revealed that the well does not have sufficient hydraulic connections with the geothermal reservoir and it has since remained inactive. Ormat proposes to implement a hydro-stimulation program to increase energy production by enhancing natural hydraulic connections within the existing hydrothermal system. Hydro-stimulation involves creating better hydraulic connections by injecting cool geothermal water (temperatures ranging from 90-140°F) to further open the existing network of minute cracks in the rocks deep underground, where natural fractures already occur. During the process, geothermal water produced from the geothermal production wells and processed at the geothermal plant would be injected at wellhead pressures less than 1,400 pounds per square inch at depths ranging from approximately 4,245 to 5,096 feet below ground surface. The proposed action outlines environmental monitoring programs that include the injection of tracer compounds to identify movement of geothermal fluid, a water quality and quantity monitoring plan, and a seismic monitoring plan.

PUBLIC INVOLVEMENT IN THE EA PROCESS: On September 20, 2012, a 30-day public scoping period was initiated to identify potential concerns and solicit comments from the public and government agencies. Notification of the scoping period was provided to 125 agencies, organizations, businesses, and individuals via direct mail. In addition, the scoping letter and project details were posted on the BLM, Winnemucca District (WD) NEPA website. A comment letter was received from the U.S. Environmental Protection Agency and the comments were subsequently addressed in the Preliminary EA.

On November 21, 2012, the Preliminary EA was posted on both the BLM WD NEPA website and the DOE Golden Field Office Public Reading Room website for a 30-day public review

period. The BLM mailed letters to interested parties requesting substantive comments on the Preliminary EA by December 22, 2012. A comment letter was received from the U.S. Environmental Protection Agency (EPA) in reference to the Preliminary EA commending the BLM and Ormat for providing an improved document and analysis that promotes and furthers the purpose of NEPA.

A comment letter was received from the Nevada Division of Wildlife (NDOW) regarding sump construction (i.e., fencing, sloping, and/or escape ramps) and reclamation. NDOW also raised a concern regarding the potential storage of liquids in the sump which may be harmful to wildlife. Given that surface disturbance activities (i.e., sump construction and reclamation) were previously analyzed and approved under EA NV-020-05-07 and the Decision Record dated December 2004, combined with the fact that no harmful liquids would be stored in the sumps (as indicated in the Preliminary EA) review of the NDOW comments did not identify any areas in the Preliminary EA that required additional monitoring and/or mitigation.

No additional comments or concerns were provided to the BLM during the public review period. In total, the comments received did not result in a change to the analysis or conclusions made from the analysis.

DOE's process for carrying out its responsibilities for its NEPA review is consistent with its implementing regulations at 10 CFR 1021. DOE has conducted a rigorous environmental analysis through the NEPA process for this proposed funding action to evaluate the potential environmental impact associated with the proposed project and public comments were sought at various points in the process. As a cooperating agency with BLM, DOE was involved in the development and review of the EA. The Preliminary EA was available to the public and to Federal, state and local agencies for review and comment prior to a final decision on the Proposed Action. Given that the proposed action consists of sub-surface activities only and surface disturbance activities (i.e., sump construction and reclamation) were previously analyzed and approved under EA NV-020-05-07 and the BLM Decision Record dated December 2004, resource areas considered in the EA were only those present and potentially affected.

KEY ISSUES: Concerns and topic areas raised by the public, as well as those raised by the specialists from the cooperating agencies, were used to develop key issues that were analyzed and addressed in the EA. Key issues encompass those resources potentially impacted by the project, and include Native American Religious Concerns, Water Quality (Surface and Ground), Geology (including Seismicity), and Water Quantity (Surface and Ground).

Native American Religious Concerns

On September 20, 2012, letters providing information relating to the proposed action were sent to the following tribes: Fallon Paiute and Shoshone Tribe, Lovelock Paiute Tribe, and Pyramid Lake Paiute Tribe. In addition, follow-up phone calls were conducted to ascertain if the Tribes had any concerns regarding the proposed action. From the letters and phone contacts made, it was determined that none of the Tribes had any concerns regarding the proposed action.

On November 21, 2012, a letter and copy of the Preliminary EA were provided to the above referenced Tribes. No comments or concerns were provided to the BLM from the Tribes contacted regarding review of the Preliminary EA.

Water Quality (Surface and Ground)

Cool geothermal water for the injection would be transferred through a temporary surface pipeline from the Brady geothermal plant, approximately one mile from the northeast, and contained in the existing well 15-12 sump where it would be reused and injected into the well. Based on the absence of surface water in the affected environment and no plans to discharge water onto the surface, no impacts to surface water are anticipated from the proposed hydro-stimulation activities.

It is proposed that cool geothermal water from the Brady geothermal plant, which is produced from the deeper portion of the reservoir, would be reinjected during this hydro-stimulation. The cool geothermal water would be diverted temporarily to an existing lined sump next to the well before reinjection. It is anticipated that nearly 100 percent of the cool geothermal water would be reinjected into the reservoir from which it is produced. The water not reinjected would be lost to evaporation. The proposed injection pressures would allow for the opening of minute cracks to better connect this well to the existing geothermal reservoir. The geothermal reservoir exists with its own pressure system balanced by the production and the injection wells. The water removed from the reservoir gets reintroduced into the reservoir, thereby creating this closed circuit. Therefore, no change in the groundwater quality in the project area is anticipated. Groundwater at all depths is thermally altered and chemically similar, giving evidence to comingled aquifers in the affected environment, the potential to degrade the quality of the aquifers does not exist.

Geology (including Seismicity)

No known impacts would occur to the surface geology of the area. Hydro-stimulation activities should not impact the geothermal reservoir except for increasing connectivity of the wells by increasing the size of minute cracks in a portion of the rock 500 feet thick at a depth of 4,245 feet. No other mineral resources would be affected by the proposed action.

It is reasonable to assume that impacts to geology may occur due to microseismic events resulting from the hydro-stimulation of well 15-12. This is due to the physical shifting of the minute cracks in the rock at this depth. Based on what is known about the affected environment and Ormat's Protocol for Induced Seismicity² (EA Section 3.2.1), it is estimated that the potential induced seismicity would be low, in the realm of a magnitude of zero to two.

² The DOE requires that EGS demonstration projects throughout the U.S. follow the DOE *Protocol for Addressing Induced Seismicity Associated with Enhanced Geothermal Systems*. The protocol includes the preparation of an induced seismicity mitigation plan. Ormat's implementation of the protocol and all mitigations derived from this implementation were included as part of the project design features during the EA, and are incorporated and enforceable through DOE's financial assistance award to Ormat.

Water Quantity (Surface and Ground)

No impacts to surface water quantity are anticipated from hydro-stimulation of well 15-12. Water from the geothermal plant used in the activities would be contained in the lined sump adjacent to the well.

It is proposed that cool geothermal water from the Brady geothermal plant, which is produced from the deeper portion of the reservoir, would be reinjected during this hydro-stimulation. The cool geothermal water would be diverted temporarily to an existing lined sump next to the well before reinjection. It is anticipated that nearly 100 percent of the cool geothermal water would be reinjected into the reservoir from which it is produced. The water not reinjected would be lost to evaporation. The proposed injection pressures would allow for the opening of minute cracks to better connect this well to the existing geothermal reservoir. The geothermal reservoir exists with its own pressure system balanced by the production and the injection wells. The water removed from the reservoir gets reintroduced into the reservoir, thereby creating this closed circuit. Therefore, no change in the groundwater quantity in the project area is anticipated. Groundwater at all depths is thermally altered, giving evidence to comingled aquifers in the affected environment, the potential to create a comingling of aquifers does not exist.

DETERMINATION: Based on information presented in the EA, DOE has determined that authorizing the expenditure of federal funds by Ormat for the purpose of conducting Enhanced Geothermal Systems (EGS) activities at target geothermal well 15-12 to increase energy production by enhancing natural hydraulic connections within the existing hydrothermal system at their Brady Hot Springs power plant facility located on its federal geothermal lease on BLM-administered public lands would not be a major federal action significantly affecting the quality of the human environment, as defined by NEPA. As part of the DOE funded project, DOE is proposing to fund the construction of a production/injection pipeline to move fluids between well 15-12 and the Brady's power plant. Once EGS activities are completed at well 15-12, Ormat would analyze whether well 15-12 is viable as either a production or injection well. If Ormat determines that well 15-12 is viable and decides to install the production/injection pipeline, DOE would undergo additional NEPA review of the proposed pipeline at that time.³

This determination is subject to the continued use of the established Conditions of Approval for well 15-12 (refer to Appendix A of the EA) and implementation of the monitoring programs presented in the proposed action (refer to Sections 2.1 and 3.2.1 of the EA). In addition, authorization of operations conducted by Ormat will be subject to the following BLM condition:

- It is the responsibility of Ormat to ensure all onsite employees and contractors are aware of the Conditions of Approval for well 15-12 to operate at the site and be aware of potential consequences of conducting activities that are not part of the proposed

³ Prior to pipeline construction, testing and evaluation of well 15-12 must meet certain technical requirements suggesting that it will increase power production at the Brady's power plant following stimulation to be eligible for DOE funding.

action. Accordingly, Ormat will be required to provide all employees and contractors who intend to work at the site, copies of the proposed action, the BLM-approved Geothermal Sundry Notice, BLM FONSI, and BLM Decision Record. Ormat will also provide employees and contractors a copy of the associated EA.

This condition will also be incorporated and enforceable through DOE's financial assistance award to Ormat. The preparation of an Environmental Impact Statement is not required and DOE is issuing this Finding of No Significant Impact.

Copies of the Final EA are available at
http://www.eere.energy.gov/golden/Reading_Room.aspx or from:

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