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(1.08.09.13)

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

RECIPIENT: University of Hawaii Manoa **STATE:** HI

PROJECT TITLE: Comprehensive analysis of Hawaii's geothermal potential through Play Fairway integration of geophysical, geochemical, and geological data

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0000841	DE-EE0006729	GFO-0006729-007	GO6729

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.
B5.3 Modification or abandonment of wells	Modification (but not expansion) or plugging and abandonment of wells, provided that site characterization has verified a low potential for seismicity, subsidence, and contamination of freshwater aquifers, and the actions are otherwise consistent with best practices and DOE protocols, including those that protect against uncontrolled releases of harmful materials. Such wells may include, but are not limited to, storage and injection wells for brine, carbon dioxide, coalbed methane, gas hydrate, geothermal, natural gas, and oil. Covered modifications would not be part of site closure.

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide federal funding to the University of Hawaii at Manoa (UH) 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. Previous NEPA Determinations (GFO-FOA0000841-001 and GFO-0006729-002 through 006) reviewed Budget Periods (BP) 1, 2, and a few tasks in BP3 of the project. This NEPA review is for the remaining project tasks in BP3 (Tasks 17 – 21, 23, 24).

Remaining tasks include the shipping of supplies and a drill rig to the island of Lāna'I, installation of temporary casing in up to two existing wells and subsequent deepening of the wells, downhole geophysics, and analyses and archiving of the resultant drill core. Data from the drilling activities would be used to refine and improve the BP2 Play Fairway probability and confidence models and integrate the results from BP3 activities.

The proposed drilling sites are located within the Pālāwai Basin on Lāna'I. The proposed drilling would deepen Lāna'i Well 10 using wireline core drilling technology. Lāna'i Well 10 (WELL ID: 5-4555-001, latitude 20.765278º, and longitude -156.919444º) was drilled in 1989 but has not been used by the current land management company, Pūlama Lāna'i. Depending on the outcome of Well 10 deepening, and if all conditions allow, UH may also deepen Lāna'i Well 9 (WELL ID: 5-4854-001, latitude 20.81082º, and longitude -156.914048º). Lāna'i Well #9 was drilled in 1990 and also is currently not in use.

At each location a small diameter drilling rig, similar to a conventional water well rig, would require an area of approximately 1 acre for placement of the rig, supply containers, and ancillary equipment. This area would be prepared by leveling and clearing any debris and obstructions that may exist, if needed. Each drill site was previously disturbed as part of the original drilling of the wells and therefore there would be no potential to affect historic properties as a result of project activities. At each well a stabilizing temporary casing string would be installed in the existing hole to minimize the amount of drilling fluid required, protect and stabilize the drill string, and minimize erosion of the sidewalls of the open hole. Core drilling would commence using conventional water well drilling fluids on a 24/7 schedule with two alternating drilling crews with periodic breaks to allow for equipment maintenance and repair, downhole measurements, or borehole stabilization operations. The main drilling fluid would be brackish water to which bentonite clay and Alcomer 120L, both of which are National Sanitation Foundation certified, would be added. Drilling depth is expected to be at least 3000' to allow characterization of the deeper geologic and hydrologic conditions beneath the Pālāwai Basin. If drilling conditions are favorable, a greater depth may be achieved but State permit conditions will limit maximum drilling temperatures to less than 100 degrees Celsius and may restrict the total drilling depth attained. Drilling would be periodically suspended to allow samples of formation fluids to be collected. After drilling is completed, a perforated liner would be lowered into the borehole to stabilize the formation and then drilling fluids would be cleared from the borehole by bailing. After the bore is cleared of drilling fluids, monitoring instruments would be suspended in the hole for periodically determining formation water conditions and to sample formation fluids.

The island of Lāna'i is home to large colonies of the endangered Hawaiian petrel (Pterodroma sandwichensis). The closest Hawaiian petrel nesting colonies to the proposed project are approximately 3,000 m from Well 9 and 6,500 m from Well 10. Hawaiian petrels are the only federally-protected species for which the project may present a potential adverse impact, primarily through light attraction and fallout while birds are transiting over the Pālāwai Basin in and out of the breeding colonies. Hawaiian petrels may traverse the project area at night during the breeding, nesting and fledging seasons (March 1 to December 15). Outdoor lighting could result in seabird disorientation, fallout, and injury or mortality. Seabirds are attracted to lights and after circling the lights they may become exhausted and collide with nearby wires, buildings, or other structures or they may land on the ground. Downed seabirds are subject to increased mortality due to collision with automobiles, starvation, and predation by dogs, cats, and other predators. Young birds (fledglings) traversing the project area between September 15 and December 15, in their first flights from their mountain nests to the sea, are particularly vulnerable.
Though not protected under the Endangered Species Act, there is also a colony of wedge-tailed shearwaters (Ardenna pacificus) in the vicinity of the project that may also be impacted by lighting. Unlike other Hawaiian seabird species, wedge-tailed shearwaters nest in littoral vegetation along coastlines. Wedge-tailed shearwaters are considered a protected species under the Migratory Bird Treaty Act.

To avoid and minimize potential project impacts to seabirds the DOE will require, as part of the terms and conditions of the award with UH, the following measures be incorporated into the project:
• Fully shield all outdoor lights so the bulb can only be seen from below bulb height and only use when necessary.
• Install automatic motion sensor switches and controls on all outdoor lights or turn off lights when human activity is not occurring in the lighted area.
• Avoid nighttime construction during the seabird fledging period, September 15 through December 15.
• Have a qualified observer on-site during night-time drilling operations and if seabirds (any seabirds including Hawaiian petrels or wedge-tailed shearwaters) are observed in the project area, turn off lights immediately. After one hour, turn lights on and observe for seabirds in the project area for 15 minutes. If seabirds are not observed,

operations may be resumed at that time.

With the implementation of the above measures, the U.S. Fish and Wildlife Service anticipates the impacts to seabirds resulting from the proposed project to be insignificant or discountable and therefore concurred with the DOE's not likely to adversely affect determination in a letter received February 13, 2019 (01EPIF00-2019-I-0149).

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 project.

NEPA PROVISION

DOE has made a final NEPA determination.

Include the following condition in the financial assisstance agreement:

To avoid and minimize potential project impacts to seabirds the Recipient must incorporate the following measures into the proposed project activities:
• Fully shield all outdoor lights so the bulb can only be seen from below bulb height and only use when necessary.
• Install automatic motion sensor switches and controls on all outdoor lights or turn off lights when human activity is not occurring in the lighted area.
• Avoid nighttime construction during the seabird fledging period, September 15 through December 15.
• Have a qualified observer on-site during night-time drilling operations and if seabirds (any seabirds including Hawaiian petrels or wedge-tailed shearwaters) are observed in the project area, turn off lights immediately. After one hour, turn lights on and observe for seabirds in the project area for 15 minutes. If seabirds are not observed, operations may be resumed at that time.

Notes:

Geothermal Technologies Office
This NEPA determination requires a tailored NEPA provision.

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.

The proposed action is categorically excluded from further NEPA review.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: Electronically Signed By: Casey Strickland Date: 2/21/2019

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