PMC-EF2a
(20402)

U.S. DEPARTMENT OF ENERGY
EERE PROJECT MANAGEMENT CENTER
NEPA DETERMINATION

RECIPIENT: NREL **STATE:** TX

PROJECT TITLE : Sologen Geothermal Co-Production Field Demonstration; NREL Tracking No. 12-020

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
	DE-AC36-08GO28308	NREL-12-020	GO28308

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:

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.)
B1.18 Water supply wells	Siting, construction, and operation of additional water supply wells (or replacement wells) within an existing well field, or modification of an existing water supply well to restore production, provided that there would be no drawdown other than in the immediate vicinity of the pumping well, and the covered actions would not have the potential to cause significant long-term decline of the water table, and would not have the potential to cause significant degradation of the aquifer from the new or replacement well.
B1.31 Installation or relocation of machinery and equipment	Installation or relocation and operation of machinery and equipment (including, but not limited to, laboratory equipment, electronic hardware, manufacturing machinery, maintenance equipment, and health and safety equipment), provided that uses of the installed or relocated items are consistent with the general missions of the receiving structure. Covered actions include modifications to an existing building, within or contiguous to a previously disturbed or developed area, that are necessary for equipment installation and relocation. Such modifications would not appreciably increase the footprint or height of the existing building or have the potential to cause significant changes to the type and magnitude of environmental impacts.
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.
B4.12 Construction of powerlines	Construction of electric powerlines approximately 10 miles in length or less, or approximately 20 miles in length or less within previously disturbed or developed powerline or pipeline rights-of-way.
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.
B5.5 Short pipeline segments	Construction and subsequent operation of short (generally less than 20 miles in length) pipeline segments conveying materials (such as air, brine, carbon dioxide, geothermal system fluids, hydrogen gas, natural gas, nitrogen gas, oil, produced water, steam, and water) between existing source facilities and existing receiving facilities (such as facilities for use, reuse, transportation, storage, and refining), provided that the pipeline segments are within previously disturbed or developed rights-of-way.
B5.12 Workover of existing wells	Workover (operations to restore production, such as deepening, plugging back, pulling and resetting lines, and squeeze cementing) of existing wells (including, but not limited to, activities associated with brine, carbon dioxide, coalbed methane, gas hydrate, geothermal, natural gas, and oil) to restore functionality, provided that workover operations are restricted to the existing wellpad and do not involve any new site preparation or earthwork that would have the potential to cause significant impacts on nearby habitat; 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.
B5.15 Small-scale renewable energy research and development and pilot projects	Small-scale renewable energy research and development projects and small-scale pilot projects, provided that the projects are located within a previously disturbed or developed area. Covered actions would be in accordance with applicable requirements (such as local land use and zoning requirements) in the proposed project area and would incorporate appropriate control technologies and best management practices.

Rational for determination:

B1.30 Transfer actions

Transfer actions, in which the predominant activity is transportation, provided that (1) the receipt and storage capacity and management capability for the amount and type of materials, equipment, or waste to be moved already exists at the receiving site and (2) all necessary facilities and operations at the receiving site are already permitted, licensed, or approved, as appropriate. Such transfers are not regularly scheduled as part of ongoing routine operations.

BACKGROUND

BACKGROUND

U.S. Department of Energy's (DOE) National Renewable Energy Laboratory (NREL) proposes to enter into a Cooperative Research and Development Agreement (CRADA) with Sologen Systems, LLC (Sologen) for a geothermal co-production field demonstration project at existing oil and gas wells in Brazoria County, Texas. The propose of the field demonstration project is to collect data to reduce the uncertainty in performance and cost estimates for coproduced geothermal energy, and therefore lower the barrier for market uptake.

PROPOSED ACTION

Under the terms of the CRADA, NREL would loan DOE-owned Organic Rankine Cycle (ORC) low temperature geothermal power generation units to Sologen for the duration of the two year CRADA. NREL would also provide technical assistance, monitoring, and financial support for certain field activities. Specifically NREL would:
- Transport up to two DOE-owned ORC units from Rocky Mountain Oilfield Testing Center (RMOTC) in Casper, WY to the proposed project site in Brazoria County, Texas
- Procure, install, and maintain data collection systems for the geothermal system, including performance and site weather data, that would allow detailed information on system operations to be collected, stored, and ultimately uploaded to the Geothermal Data Repository (GDR).
- Analyze plant operating data and publish non-proprietary technical papers and reports that document results of the field demonstrations.
- Identify opportunities to improve system operation, and where feasible to test these opportunities.
- Provide technical assistance as needed to support Sologen with their activities, such as troubleshooting issues that may rise during field operations

Under the proposed CRADA Sologen would:
- Install and start up the ORC geothermal units and associated equipment at the proposed field demonstration site.
- Operate and provide routine maintenance of the geothermal systems
- Provide a connection to electric grid. Sologen would retain any proceeds from any power sales
- Maintain and share data that is collected as part of the project that is not part of NREL's data collection system. Examples would include fluid chemistry tests, maintenance logs, methane production rates, etc.
- Be responsible for the operational safety at the proposed field demonstration site.

A project description is uploaded to the PMC database providing greater detail. The period of performance of CRADA could be extended beyond two years. At the end of project the DOE-owned equipment would be assigned to new uses or disposed of.

The location of the proposed project is in Brazoria County, Texas. Exhibit Map C in the PMC provides the general location along the Texas Gulf Coast. This area of Brazoria County is a rural agricultural area primarily used for rice cultivation as well as oil and gas production. The project area, where the well workovers would occur and co-

production plant would be constructed is at the following coordinates: Lat 29 deg. 17' 22.95"N; Long 95 deg. 11' 31.41"W. This is the location of the existing well pad and physical plant. A second map (BRP Geothermal Lease – attached) shows the project area at a closer scale within the Brazoria Geothermal Lease. The project would utilize up to four existing oil and gas wells, as depicted on the map as 2X, 3X, 4X, and 5X. The well numbers 5X and 3X would be of initial interest and the remaining 2 wells (2X and 4X) would be held in reserve in case unforeseen circumstances prevent or reduce production at Well 5X. Well 5X would be used for brine production while Well 3X would be used as the injection well. The wells have been in oil and gas production in previous years and are currently in a "shut-in" condition, but not abandoned. Wells would be reopened and certain depths of the well casing of Well 5X would be perforated at the appropriate depth to produce an adequate flow. The target flow rate is anticipated at 25,000 bbl/day at a temperature of 290 degrees Fahrenheit.

The proposed physical plant function is illustrated in a flow diagram (ProcessFlowRev3-Model.pdf) uploaded to the PMC. The brine would flow through the production wellhead and through a de-sander, then to a 3-phase separator where the hot water brine and natural gas is separated. Any oil in the brine is also separated into a 210 barrel storage tank where it can be periodically emptied by a tanker truck. Natural gas is further dehydrated, compressed, and then used as fuel for a 1600 kW gas generator to create electricity. Hot brine, stripped of natural gas and oil, is run through geothermal plant (Pratt & Whitney PureCycle 280 kW Organic Rankine Cycle Generator) to generate electricity. A cooling tower (Induced Draft, Crossflow Cooling Tower – see attached specs: RMOTC_Cooling_Tower_Specs.pdf) would be used to regulate temperature and water pressure with a freshwater makeup originating from a groundwater well that would be drilled on site. Finally, all water, including blow-down water would be transferred to tanks and re-injected into the formation via the injection well (e.g., Well 3X).

POTENTIAL ENVIRONMENTAL IMPACTS OF PROPOSED ACTION

Soil disturbance would occur at the existing well pad and physical plant during site grading for placement of the equipment, trench digging for the placement of piping between production and injection wells, and digging for the placement of utility poles. All disturbances are within previously disturbed areas including road right-of-ways, utility easements, or well pads. A majority of the disturbance would be confined to the existing and previously disturbed well pad and plant area (0.89 acres). The trenching of the injection well pipeline (0.22 acres), and the installation of 12 to 15 power poles for the transmission line (maximum of 15 poles each with a 9 SQFT disturbance – 135 SQFT) would occur within existing right-of-ways and utility easements. The potential total ground disturbance from the project is estimated at 1.12 acres. All applicable federal, state, and local construction stormwater permitting and erosion control requirements would be followed.

According to data from the U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS), which is uploaded to the PMC, the proposed area of disturbance consists of Bacliff clay, 0 to 1 % slope. This soil type is not currently classified as prime farmland, but would be if drained. As the affected soils are not currently classified as prime farmland and are previously disturbed, no prime farmland would be impacted by the proposed action. Additionally, per the maps uploaded to the PMC from the U.S. Fish and Wildlife Service (USFWS) and the Federal Emergency Management Agency (FEMA), there are no jurisdictional wetlands or 100-yr floodplains present in or adjacent to the proposed project area. The area of the proposed project is previously disturbed by prior oil and gas activities, and no impacts to cultural resources are anticipated.

USFWS does not indicate the vicinity of any critical habitat in the proximity of the proposed project per the map uploaded to the PMC. The Texas Annotated County List of Rare Species for Brazoria County from Texas Parks & Wildlife Department is also uploaded to the PMC. Although some species could possibly use the adjacent rice fields and stream (see Mustang Lake East and Persimmon Bayou on Google Earth and attached maps), the project area is a previously used well pad and physical plant. The area previously disturbed would not be expanded and therefore not affect any wildlife habitat. No impact to rare state or federally protected species is anticipated to occur. Because the well pad and physical plant would not be expanded and because the project's construction activities would be conducted outside of the breeding period, no impact to migratory birds is anticipated. The short segment of overhead powerlines would be constructed per standard industry practices minimizing the potential for collision and electrocution.

Based on past DOE geothermal projects at nearby wells (PB#1 and PB#2 on Exhibit Map "A"), the formation the Sologen wells are in is very low in hydrogen sulfide therefore air emissions of this compound are anticipated to be very low. The grading and construction of proposed facilities would create fugitive dust as well as generate typical combustion emissions from mobile sources, such as trucks, front-end loaders, etc. Fugitive dust emissions would be minimized by following standard construction and erosion control measures. Emissions from mobile sources would be short in duration and intensity and would be de minimis. The cooling tower would generate very small amounts of particulate pollution via dissolved solids in the water drift and would be further reduced by the cooling tower's internal drift eliminators. The use of the gas combustion engine would produce primary air pollutants (NOx, SOx, etc.) and volatile organic compounds emissions that may be regulated, dependent on the type of gas burned, the hours of operation, and the air emission equipment used with the engine. All applicable USEPA NSPS Quad-I and Quad-J regulations would be followed as well as all air emission requirements per State of Texas. A Permit by Rule form for the engine would be submitted to State of Texas in addition to any other applicable permit, form, notification, or supporting documentation.

All applicable regulations for the operation of production and injection wells per the Texas Railroad Commission's Oil & Gas Division and the Texas Commission on Environmental Quality would be followed. All applicable permits would be modified and/or filed, including 1) a drill permit to re-enter the injection well; 2) an injection permit for the injection well; 3) a P-5 Operator registration form; 4) a P-4 Well operator transfer form; and 5) a pipeline permit. The water well for the freshwater makeup would be drilled, installed, and operated in accordance with all applicable federal, state, and local standards, thus eliminating wellhead protection and aquifer communication issues.

Non-ozone depleting refrigerants would be stored on site during maintenance procedures when the heat exchanger is cleaned. Corrosion and/or scaling inhibitor may be added into the geothermal fluid and subsequently injected into the subsurface formation. The exact agent would be determined subsequent to the flow test when the composition of the fluid (brine) is determined. Most agents are surfactants of one type or another, common to oilfield operations, and are typically not hazardous. Should hazardous chemicals be used, all regulations and permitting would be followed for use, storage, and disposal. All applicable safety standards would be followed and standard industry safety practices would be observed.

NEPA DETERMINATION
Based on review of the project information and the above analysis, DOE has determined this proposed project would not have a significant individual or cumulative impact to human health and/or environment. DOE has determined the proposed project is consistent with the actions contained in DOE categorical exclusion A9 "Information gathering, analysis, and dissemination," B1.18 "Water supply wells," B1.30 "Transfer actions," B1.31 "Installation or relocation of machinery and equipment," B3.1 "Site characterization and environmental monitoring," B4.12 "Construction of powerlines," B5.3 "Modification or abandonment of wells," B5.5 "Short pipeline segments," B5.12 "Workover of existing wells," and B5.15 "Small-scale renewable energy research and development and pilot projects," and is 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 you intend to make changes to the scope or objective of your project you are required to contact the Project Officer identified in Block 11 of the Notice of Financial Assistance Award before proceeding. You must receive notification of approval from the DOE Contracting Officer prior to commencing with work beyond that currently approved.

Note to Specialist :

EF2a created by Rob Smith on 12/13/2012

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: Electronically Signed By: Lori Gray Lori Gray Date: 12/13/2012
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