

PMC-EF2a

(2.0+02)

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



RECIPIENT: General Electric, GE Global Research

STATE: NY

PROJECT TITLE : Multiparameter Fiber Optic Sensing System for Monitoring Enhanced Geothermal Systems

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-PS36-09GO99018	DE-EE0002787	GFO-10-105	2787

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 (including, but not limited to, literature surveys, inventories, audits), data analysis (including computer modeling), document preparation (such as conceptual design or feasibility studies, analytical energy supply and demand studies), and dissemination (including, but not limited to, document mailings, publication, and distribution; and classroom training and informational programs), but not including site characterization or environmental monitoring.
- B3.6** Siting, construction (or modification), operation, and decommissioning of facilities for indoor bench-scale research projects and conventional laboratory operations (for example, preparation of chemical standards and sample analysis); small-scale research and development projects; and small-scale pilot projects (generally less than two years) conducted to verify a concept before demonstration actions. Construction (or modification) will be within or contiguous to an already developed area (where active utilities and currently used roads are readily accessible).

Rational for determination:

GE Global Research (GE) would develop and evaluate fiber optic sensing technology for real time, multi-parameter monitoring of geothermal wells in Enhanced Geothermal Systems (EGS) lifecycle phases of site characterization, reservoir development and energy production. The work would take place at the GE Global Research Center campus, an OSHA VPP Star facility, at 1 Research Circle, Niskayuna, NY 12309. Prototypes will be tested at Sandia National Labs which has facilities that are approved and regulated by the Dept. of Energy.

The project is divided into two phases with multiple tasks and sub-tasks:

PHASE 1**1. System Architecture and Component Development**

- 1.1. System Level Specifications and Hardware Design – Specification and design of systems, sub-systems, and components compatible with field deployment.
- 1.2. Field Installation Design – Study of the logistics of field installation and the corresponding implications for system and component designs and supply chain process verification for all major surface and downhole components.
- 1.3. Point Optical Pressure Gauge Development – Develop and test a point pressure sensor and design and build an interrogation system for this sensor.
- 1.4. Distributed Pressure Sensor Survivability and Modeling – Work with commercial vendors and new design inputs to produce Fiber-Bragg Grating (FBG) sensors and an interrogation system, then assess the capability of the design.
- 1.5. Cable Design – Design a cable structure to allow the multifunctional fiber sensor to perform downhole.

2. Subsystem Procurement and Test

- 2.1. Fiber Development and Procurement – Evaluation of high temperature, hydrogen tolerant fibers.
- 2.2. Fiber Material Testing – Tests of basic fiber performance will be performed in conjunction with fiber vendors.
- 2.3. Distributed Temperature, Strain and Vibration Vendor Evaluation – Execution of distributed temperature and strain measurements by sourcing COTS interrogator equipment for different sensing modalities.
- 2.4. Sub-system test at Fiber Level – A test bed will be used to assess sub-system performance of each of the different sensing modalities.

3. Program Management**PHASE 2****1. Component and Subsystem Validation and Issue Resolution**

- 1.1. Distributed Temperature, Strain and Vibration Issue Resolution – Any COTS sub-system anomalies will be corrected via supplier interaction.
- 1.2. Point Optical Pressure Gauge Validation – Correct any design issues uncovered during evaluation of the sensor developed in Phase 1/Task 1.3 with a second iteration.
- 1.3. Distributed Pressure Cable Design Optimization – Optimize and validate the distributed pressure FBG design from Phase 1/Task 1.4.

2. System Integration and Test

- 2.1. Cable Fabrication – Fabricate and do baseline testing on the cable structure as designed in Phase 1/Task 1.5.
 2.2. System Hardware Integration and Test
 2.3. Field Deployment Planning – Hardware would be procured to enable system level testing and a list of suitable candidate geothermal wells for field test of the system would be generated and annotated with any unique requirements they might pose for deployment.

3. Program Management

The project management plan would be kept current during the duration of the project and would be shared with the DOE. GE would present a paper on their research every year of their research activities at either the annual GRC meeting or the annual Stanford Geothermal Workshop.

According to the GE laboratory questionnaire, no additional permits are needed. If liquid effluent is generated by the project, it would be containerized and disposed by shipment offsite to an appropriate disposal facility. Trained lab operations personnel and site Environmental, Health and Safety professionals audit and monitor to site procedures and applicable state and federal regulations. Storage of gases, chemicals, etc. is defined, as needed and disposal is handled through on-site trained Hazardous Waste handlers and shipped off site to an appropriate disposal facility.

Fume hoods are provided for operations that require it and laboratories using gases that could create a hazardous atmosphere are equipped with hazardous gas monitoring systems and alarms to a centralized control center.

This project is comprised of information gathering, data analysis, document preparation, and conventional laboratory operations; therefore the DOE has categorized this proposal into Categorical Exclusions A9 and B3.6.

NEPA PROVISION

DOE has made a final NEPA determination for this award

Insert the following language in the award:

Note to Specialist :

None Given.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: _____

NEPA Compliance Officer

Date: _____

3/15/10

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: _____

Field Office Manager

Date: _____