PMC-EF2a

(2.04.02)

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

RECIPIENT: Energy and Geoscience Institute at the University of Utah **STATE:** UT

PROJECT TITLE: Quantum Dot Tracers for Use in Engineered Geothermal Systems

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-EE0000075	DE-EE0002768	GFO-10-354	0

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:

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).

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.

Rational for determination:

The Energy and Geoscience Institute (EGI) at the University of Utah would develop and demonstrate a new class of tracers for use in characterizing fracture networks in Enhanced Geothermal Systems (EGS) reservoirs. Laboratory work will take place at the EGI Geothermal Group Laboratory and the Department of Chemistry at the University of Utah in Salt Lake City, UT. Field tests would be conducted at an as yet undetermined EGS injection well.

The project is divided into three phases with multiple tasks:

Phase 1 – Initial laboratory synthesis and testing (Year 1):

Tasks 1.1 through 1.7 include the design, synthesis, and fabrication of nonsorbing quantum dot tracers; numerical model development; and determination of thermal stabilities and flow properties of the nonsorbing quantum dot tracers.

Phase 2 – Continued laboratory synthesis and testing (Year 2):

Tasks 2.1 through 2.8 include testing the performance of the nonsorbing tracers under laboratory conditions simulating an EGS wellbore injection/backflow test; calibrate numerical model using the injection/backflow experiment results; design and fabricate second-generation nonsorbing quantum dot tracers; determination of thermal stabilities and flow properties of the second-generation nonsorbing quantum dot tracers; test the performance of the second-generation tracers under conditions simulating an EGS wellbore injection/backflow test; and modification of the surfaces of the nonsorptive quantum dot tracers to render them sorptive.

Phase 3 – Continued laboratory testing, large scale synthesis and field testing (Year 3):

Tasks 3.1 through 3.7 include the synthesis of sufficient quantities of nonsorbing tracers for field testing; design and conduct a field test using the nonsorptive tracers; characterization of the flow properties of the sorbing tracers; test the performance of the sorbing tracers under conditions simulating an EGS wellbore injection/backflow test; synthesis of sufficient quantities of sorbing tracers for field testing; and design and conduct a second field test using the sorbing tracers.

Since the location of the EGS wellbore to be used in field testing has yet to be determined, Phase 3 (tasks 3.3 and 3.7) of the project cannot be analyzed at this time. A NEPA determination for these tasks in Phase 3 of the project would be too early to determine but would need to be made prior to EGI beginning field testing.

According to the R&D Laboratory Questionnaire, no permits will be needed. All effluent solvents and chemicals would be stored in specially designated plastic bottles and transferred to containers for disposal according to state waste-management protocols. No air pollutants would be created by the project.

**NOTE: Prior to this NEPA determination, DOE obligated DOE funds in the amount shown on Block 13 of the Assistance Agreement cover page to conduct the project authorized by this award. However, only $76,806 of DOE funds, along with any associated ratio of recipient cost share, if applicable, was authorized for expenditure by the

Recipient. The following tasks were covered in the blanket CX for the Limited release of Funds modification:
o Task 1.1 Design and synthesize first-generation non-sorbing quantum dot tracers
o Task 1.2 Design and synthesize highly-luminescent non-sorbing water-soluble quantum tracers
o Task 1.3 Develop a numerical model to predict fracture surface area adjacent to an EGS wellbore based upon the behavior of non-sorbing quantum dot tracers with varying diffusivities

Condition of Approval: Allowable – Phase 1 (tasks 1.4 through 1.7), Phase 2 (all tasks), and Phase 3 (tasks 3.1, 3.2, and 3.4 through 3.6); Prohibited – Phase 3 (tasks 3.3 and 3.7).

All remaining tasks of this project (excluding tasks 3.3 and 3.7) are 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 conditional NEPA determination for this award, and funding for certain tasks under this award is contingent upon the final NEPA determination.

Insert the following language in the award:

You are restricted from taking any action using federal funds, which would have an adverse affect on the environment or limit the choice of reasonable alternatives prior to DOE/NNSA providing either a NEPA clearance or a final NEPA decision regarding the project.

Prohibited actions include:
Phase 3 (tasks 3.3 and 3.7)
This restriction does not preclude you from:
Phase 1 (tasks 1.4 through 1.7)
Phase 2 (all tasks)
Phase 3 (tasks 3.1, 3.2, and 3.4 through 3.6)
If you move forward with activities that are not authorized for federal funding by the DOE Contracting Officer in advance of the final NEPA decision, you are doing so at risk of not receiving federal funding and such costs may not be recognized as allowable cost share.

Note to Specialist :

None Given.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: _____ Date: 5/5/10
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