PMC-EF2a
(2.04.02)

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

RECIPIENT: University of Minnesota **STATE:** MN

PROJECT TITLE : An integrated experimental and numerical study: Developing a reaction transport model that couples chemical reactions of mineral dissolution/precipitation with spatial and temporal flow variations in CO2/brine/rock systems

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0000075	DE-EE0002764	GFO-10-221	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:

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:

The University of Minnesota would develop a model for chemical interactions between super-critical CO2 and Enhanced Geothermal System (EGS) reservoir rocks and their effects on modifications of pore space geometries and related reservoir rock porosity and permeability owing to mineral dissolution/precipitation processes. All project work would occur on the campus of the University of Minnesota in Minneapolis, Minnesota.

The project is divided into two phases with multiple tasks. All Phase 1 tasks would be addressed concurrently and Phase 2 overlaps with Phase 1 as the new model develops.

Phase 1

1. Laboratory studies of interactions between supercritical CO2, water and/or brine, and four end-member rock types selected from likely CO2 injection sites would be conducted.
2. Analysis of the three-dimensional geometry of the rock matrix using time series X-ray tomography to better constrain the specific locations of mineral dissolution and precipitation over time.
3. Investigation of the displacement behavior of an injection-fluid advancing through the native pore fluid, wetting behavior of the fluids, relative permeability to complex pore structures, etc. by using particle image velocimetry with an analog pair of immiscible fluids.
4. Development and application of lattice-Boltzmann models to provide a critical link between the laboratory experiments in Task 1 and the development of the parameterized equation to be included in the code for the model.

Phase 2

5. Development of the new reactive transport model
6. Project Management and reporting

Reports and other deliverables will be provided in accordance with the Federal Assistance Reporting checklist following the instructions included therein.

According to the R&D Laboratory Questionnaire, all laboratories where the work would take place at the University have internal safety protocols that meet Federal and State laboratory standards. The Aqueous Geochemistry lab includes fume hoods, eye washes, safety showers, and fire safety equipment. No toxic wastes or air pollutants would be produced and all liquid effluent is expected to meet a nonhazardous designation or be dilute solutions of lower toxicity chemicals that would be sewered pending written confirmation from the University's Chemical Waste Program.

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: _____ Date: 3/1/10
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