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PMC-EF2a
(2.06.02)

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

RECIPIENT: Baker Hughes Oilfield Operations Inc. **STATE:** CO

PROJECT TITLE : High Temperature 300C Directional Drilling System

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-EE0000075	DE-EE0002782	GFO-10-104	2782

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:

Baker Hughes Oilfield Operations Inc. (Baker-Hughes) would develop a drilling and steering system for Geothermal Enhanced Systems. The drilling and steering system would provide optimum performance in temperatures of up to 300°C (572°F) in hard rock formations, and under the high pressures encountered in boreholes at depths of up to 10,000 meters (33,000 feet). The system would include Drill Bit, Steerable Motor, and Drilling Fluid, and consists of 26 Tasks divided over the 4 phases described below. The DOE funds would be used to provide partial support for personnel working on the project, and to design, manufacture and test prototype drill bits, motors, drilling fluids and drilling fluid handling equipment.
The development of this project would take place at the following three locations:
2001 Rankin Road
Houston, TX 77073
- The Rankin Road Center (RRC) is home to executive, research and development, manufacturing and support roles. The campus consists of approximately 90 acres with 850,000 square feet under roof.
- Motors, directional equipment and drilling fluids involved in this project would be developed, manufactured and initially tested at this location.

9110 Grogans Mill Road
The Woodlands, TX 77380
- The Grogans Mill Road facility is home to research and development, manufacturing and support roles. The campus consists of approximately 25 acres with 287,000 square feet under roof.
- Bits would be assembled and tested at this location.

8550 Ferguson Rd
Beggs, OK 74421
- Located on a one-square-mile plot, the Baker Hughes BETA test rig is capable of testing drill assemblies to 3,500 feet.

Phase I through III; Phase IV, Tasks 1 through 3 and 6 are Categorical Excludable since they include informational gathering and laboratory work to develop geothermal technologies.
Phase I: Feasibility and Concept
Task 1.0 Analysis of Hard Rock Drillability Data
Task 2.0 Conceptual Layout of Drill Bits
Task 3.0 Laboratory Evaluation of Drilling Fluid / Lubricant Concept
Task 4.0 Evaluate Waste Management Equipment
Task 5.0 Laboratory Verification of Drilling Performance

Task 6.0 Evaluation of Alternative Downhole Drive/Steer Concepts
Task 7.0 Match Motor Performance with Drill Bits
Task 8.0 Prioritize Motor/Steer Concept Opportunity
Task 9.0 Provide 300C DDS Integral Concept, including Drilling Fluids

Phase II: Development and Design
Task 1.0 Design of Prioritized Drill Bit Type
Task 2.0 Design of Steerable Downhole Drive Unit
Task 3.0 Design of Drilling Fluid
Task 4.0 Design of Waste Management Equipment
Task 5.0 300C DDS System Design

Phase III: Manufacturing and Assembly
Task 1.0 Manufacture of Prototype Drill Bits
Task 2.0 Manufacture of Prototype Motor/Steering Systems
Task 3.0 Assembly of Motor/Steering Systems
Task 4.0 Production of Drilling Mud Batch
Task 5.0 Production of Waste Management Process
Task 6.0 Compatibility Verification/System Check

Phase IV, Tasks 4 and 5 are not Categorical Excludable, since the test well locations have not been identified and therefore cannot be analyzed at this time. The well(s) need to be identified prior to a NEPA analysis for Phase IV, Tasks 4 and 5.

Phase IV: Testing
Task 1.0 Laboratory Tests of Drill Bit and Fluid in Relevant Rocks
Task 2.0 Fluids and WM Laboratory Tests of Drill Bit and Fluid in Relevant Rocks
Task 3.0 Motor/Steering System Laboratory Testing
Task 4.0 System Testing at BETA Test Rig
Task 5.0 Field Testing in Commercial Well
Task 6.0 Project Management and Reporting

Baker-Hughes indicates that no new permits are needed for this proposal; hazardous/toxic waste would be disposed of properly according to OSHA and RCRA; air pollutants would be expelled via fume hoods with scrubbers. Baker-Hughes claims to have a Health, Safety & Environmental Operational Control in place that covers Chemical Management, Wellsite Safety, Waste Management, Minimization and Recycling.

Condition of Approval:
Allowable: Phase I through III; Phase IV, Tasks 1through 3 and 6
Prohibited: Phase IV, Tasks 4-6; System Testing at BETA Test Rig and Field Testing in Commercial Well
Phase I through III; Phase IV, Tasks 1 through 3 and 6 comprises of information gathering, conventional laboratory operations, and potential development of geothermal energy, therefore tasks listed above are categorized into Categorical Exclusion 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 IV, Tasks 4-6; System Testing at BETA Test Rig and Field Testing in Commercial Well
This restriction does not preclude you from:
Phase I through III; Phase IV, Tasks 1through 3 and 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: Kristin Kerwin Date: 12·23·2009
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