

PMC-ND

(1.08.09.13)

U.S. DEPARTMENT OF ENERGY
OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY
NEPA DETERMINATION

**RECIPIENT:** Massachusetts Institute of Technology**STATE:** MA

PROJECT TITLE: High Temperature Pumps and Valves for Molten Salt

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0001697	DE-EE0008381	GFO-0008381-001	

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.)

B3.6 Small-scale research and development, laboratory operations, and pilot projects Siting, construction, modification, operation, and decommissioning of facilities for smallscale research and development projects; conventional laboratory operations (such as preparation of chemical standards and sample analysis); and small-scale pilot projects (generally less than 2 years) frequently conducted to verify a concept before demonstration actions, provided that construction or modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Not included in this category are demonstration actions, meaning actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial deployment.

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide funding to Massachusetts Institute of Technology (MIT) to design, develop, fabricate, and test cermet/refractory materials to be used in pumps and valves for high temperature molten salt (capable of withstanding temperatures greater than 750°C or 800°, depending on the component in question). A centrifugal pump, valve plug, and vertical turbine pump would be developed from the cermet/refractory materials. One pump would also be developed from conventional materials (i.e. Nickel based alloys). Testing and materials development would focus on optimizing the cermet/refractory materials' corrosion resistance, as well as insuring that the components developed from the materials are mechanically stiff and creep resistant.

Proposed project activities would include characterization/materials testing, component fabrication, pump/valve system design and assembly, fabrication of test materials (ZrC/W, grafoil, W, and CFC), design assessment, performance testing (e.g. flow testing using pumps and valves), and cost analysis.

Performance/component testing would be performed using a closed loop system. The loop would measure approximately 5 ft. x 4 ft. x 3 ft. It would be installed in-lab, inside of a vacuum chamber at the ASE Laboratory at MIT's main campus in Cambridge, MA. The loop would consist of a pump, piping, a tank and a flow meter. It would be thermally insulated and have heaters and thermocouples for monitoring. The loop would be installed in existing facilities, using off-the-shelf components.

As part of this project, modifications would be made to MIT's facilities in order to renovate a dedicated laboratory space for testing. Modifications would be limited to facility upgrades and would not involve new construction (e.g. digging or demolition). Upgrades would include routing power, measuring 480 V and 208 V, to the third floor (where the laboratory would be established) via an existing column in one corner of the building; adding water lines to an existing main on the third floor; and adding approximately 4-5 exhaust ports (snorkels) to supplement an existing fume hood. The space to be modified measures approximately 800 sq. ft., with an additional 100-200 sq. ft.,

contiguous to the area in question, which may also be included as part of the area to be modified. The estimated start date of the facility upgrades would be in September, 2018. The modifications would take approximately 3 months to finish.

Additional design, fabrication, and testing of cermet components would be conducted by MIT's project partner, Purdue University. All testing would be performed at Purdue's Sandhage Laboratory (Lafayette, IN) using existing facilities and equipment that are purpose-built for these types of work activities.

Pump testing may also be carried out at Oak Ridge National Laboratory or the National Renewable Energy Laboratory towards the end of the project, depending on the results of previous testing at MIT and Purdue University. Any work proposed to be conducted at a DOE laboratory may be subject to additional NEPA review by the cognizant DOE NEPA Compliance Officer for the specific DOE laboratory prior to initiating such work. Further, any work conducted at a DOE laboratory must meet the laboratory's health and safety requirements.

The project would involve the use and handling of various hazardous materials, including metals, gasses and industrial solvents. All such handling would occur in-lab, at existing, dedicated facilities in accordance with Federal, state, and local environmental regulations. MIT and its project partners would adhere to existing health and safety policies and procedures, including employee training, proper protective equipment, engineering controls, monitoring, and internal assessments. Additional policies and procedures would be implemented as necessary as new health and safety risks are identified.

Based on the review of the proposal, DOE has determined the proposal fits within the class of action(s) and the integral elements of Appendix B to Subpart D of 10 CFR 1021 outlined in the DOE categorical exclusion(s) selected above. DOE has also determined that: (1) there are no extraordinary circumstances (as defined by 10 CFR 1021.410(2)) related to the proposal that may affect the significance of the environmental effects of the proposal; (2) the proposal has not been segmented to meet the definition of a categorical exclusion; and (3) the proposal is not connected to other actions with potentially significant impacts, related to other proposals with cumulatively significant actions, or an improper interim action. This proposal 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 the Recipient intends to make changes to the scope or objective of this project, the Recipient is required to contact the Project Officer, identified in Block 15 of the Assistance Agreement before proceeding. The Recipient must receive notification of approval from the DOE Contracting Officer prior to commencing with work beyond that currently approved. If the Recipient moves forward with activities that are not authorized for Federal funding by the DOE Contracting Officer in advance of a final NEPA decision, the Recipient is doing so at risk of not receiving Federal funding and such costs may not be recognized as allowable cost share.

Insert the following language in the award:

You are required to:

Any work proposed to be conducted at a DOE laboratory may be subject to additional NEPA review by the cognizant DOE NEPA Compliance Officer for the specific DOE laboratory prior to initiating such work. Further, any work conducted at a DOE laboratory must meet the laboratory's health and safety requirements.

Note to Specialist :

Solar Energy Technologies Office
This NEPA determination requires a tailored NEPA Provision.
NEPA review completed by Jonathan Hartman, 08/17/2018

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature:



Casey Strickland

NEPA Compliance Officer

Date: 8/20/2018

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: _____