PMC-ND
(1.08.09.13)

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

RECIPIENT: Purdue University **STATE:** IN

PROJECT TITLE: Robust, Cost-Effective Heat Exchangers for 800 C Operation with Supercritical CO2

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0001186	DE-0007117	GFO-0007117-001	

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 federal funding to Purdue University to demonstrate robust heat exchangers (HEXs) for heat transfer between high-temperature fluids (such as molten halides) and supercritical carbon dioxide (SCCO2) as the working fluid for electrical energy conversion in the power block of concentrated solar power (CSP) systems.

Proposed activities would include manufacturing of Zirconium carbide particle-(ZrC/W-)based HEXs; bonding of components; corrosion testing; evaluation of thermal conductivity; HEX modeling and performance testing; and techno-economic analysis and creation of technology-to-market plan. HEX manufacturing, component bonding, corrosion testing, evaluation of thermal conductivity and HEX modeling and performance testing would be completed at Purdue University's research facility in Lafayette, IN. HEX manufacturing, component joining, HEX modeling and performance testing, techno-economic analysis, and creation of a technology-to-market plan would take place at Georgia Institute of Technology's research facility in Atlanta, GA. Additional corrosion testing would be undertaken by the University of Wisconsin at their research facility in Madison, WI. Further investigation into thermal conductivity would be completed at Oak Ridge National Lab (ORNL) in Oak Ridge, TN and the Edward Orton Ceramic Foundation in Westerville, OH. The facilities in which research, development and testing would take place were purpose-built for these activities; therefore, no adverse impacts to sensitive resources are expected as a result of the proposed project. No change in the use, mission or operation of existing facilities would arise out of this effort and no new or modified permits would be required.

The proposed project would necessitate high-temperature and high-pressure experiments and the use/handling of molten metals and processing materials. All participating facilities have well-established safety requirements, utilize personal protective equipment (PPE), such as eye protection, gloves and thermal isolation equipment/devices and require a security card for entrance. All wastes created as a result of this project would be non-hazardous solid waste and would be collected from labs for central storage until such time as they are disposed of through normal municipal waste streams according to university policy. No siting, construction or major expansion of waste storage, disposal, recovery, or treatment actions/facilities would be required. For all work conducted at DOE laboratories, project activities may be subject to additional NEPA review by the cognizant NEPA Compliance Officer and will be required

to meet the labs health and safety requirements.

Based on review of the project information and the above analysis, DOE has determined the proposed project would not have a significant individual or cumulative impact to human health and/or environment. DOE has determined that this project is consistent with actions outlined in DOE categorical exclusions A9 "Information gathering, analysis, and dissemination" and B3.6 "Small-scale research and development, laboratory operations, and pilot projects" and is therefore 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 you intend to make changes to the scope or objective of your project you are required to contact the Project Officer identified in Block 11 of the Notice of Financial Assistance Award before proceeding. You must receive notification of approval from the DOE Contracting Officer prior to commencing with work beyond that currently approved.

Insert the following language in the award:

You are required to:
For all work conducted at DOE laboratories, project activities may be subject to additional NEPA review by the cognizant NEPA Compliance Officer prior to initiating work and will be required to meet the labs health and safety requirements.

Note to Specialist :

Solar Energy Technologies Office
This NEPA determination requires a tailored NEPA provision.
Review completed by Rebecca McCord 09/08/2015.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: Electronically Signed By: Kristin Kerwin Date: 9/10/2015

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