

PMC-ND

(1.08.09.13)

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



RECIPIENT: University of California, Irvine

STATE: CA

PROJECT TITLE: Tandem particle-slurry batch reactors for solar water splitting

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0000966	DE-EE0006963	GFO-0006963-001	

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 University of California Irvine (UCI) to design a numerical model of a centralized solar-based, hydrogen production plant that utilizes particle slurry reactors consisting of state-of-the-art materials, and a 12-inch-by-12-inch model reactor that generates hydrogen at a rate of three liters per eight hours of solar illumination.

The proposed activities would include numerical modeling and simulations of tandem, particle-slurry solar reactors where the two slurry-reactor vessels are stacked optically in series, and designing, fabricating, and evaluating the components of a practical reactor, including state-of-the-art, electrocatalyst-containing, light-absorbing particles, redox shuttles, and porous separators. Numerical modeling and simulation activities would occur at Lawrence Berkeley National Laboratory in Berkeley, CA and at the California Institute of Technology in Pasadena, CA. All bench-scale laboratory activities would occur in established laboratories at UC Irvine in Irvine, CA. The project would involve the use and handling of various hazardous materials such as nanoscale particles, metal salts, organic solvents and aqueous electrolytes. Laboratory waste would be generated at a rate of approximately 4 liters per day while experiments are running. In the laboratory, solvent and chemical fumes would be emitted, based on their room-temperature vapor pressure, but would be contained in a fume hood. Materials would be synthesized from precursors that may be combusted during synthesis at high temperature, but the exhaust from these reactions would also be vented to a fume hood or similar exhaust system.

The proposed project would involve five, eight-hour, outdoor tests of a 12-inch-by-12-inch model reactor that consists of a predominantly aqueous electrolyte and nanoparticle solution. The model reactor would be thoroughly tested indoors at bench scale prior to any outdoor tests. Outdoor testing would be fully contained and would occur on the UCI campus in a designated area that has been approved by the University's Environmental Health and Safety (EH&S) Department. The reactor would be self-contained, and would have a large secondary storage container to fully contain any liquid leaks.

Nanoscale semiconductors and electrocatalyst materials would be synthesized, characterized, and evaluated electrochemically. These materials would pose specific, individual risks and may be harmful if inhaled due to their small particulate sizes. The proposed project would operate within an EH&S approved Standard Operating Procedure (SOP)

(attached in the PMC) which includes specifications requiring work with nanomaterials to occur under a fume hood or within an enclosed glove box. The SOP also defines the waste material disposal process. All hazardous materials disposal would be managed in accordance with federal, state, and local environmental regulations. Existing University and laboratory health and safety policies and procedures would be followed including the utilization of employee training, proper protective equipment, engineering controls, monitoring, and internal assessments.

For all work conducted at DOE laboratories, project activities may be subject to additional NEPA review by the cognizant NEPA Compliance Officer for the lab and would be required to meet the laboratory health and safety requirements.

Based on review of the project information and the above analysis, DOE has determined that the proposed activities would not have a significant individual or cumulative impact to human health and/or environment. DOE has determined that the proposed activities are 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 for the lab and would be required to meet the labs health and safety requirements.

Note to Specialist :

Fuel Cell Technologies Office
This NEPA determination requires a tailored NEPA provision. Please see above
Review completed by Logan Sholar on 7/6/2015

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature:



Kristin Kerwin

Date: 7/6/2015

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