

PMC-ND

(1.08.09.13)

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

**RECIPIENT:** Colorado School of Mines**STATE:** CO

**PROJECT TITLE** New Approaches to Low-Cost Scalable Doping for Interdigitated Back Contact Crystalline Silicon Solar Cells

<b>Funding Opportunity Announcement Number</b>	<b>Procurement Instrument Number</b>	<b>NEPA Control Number</b>	<b>CID Number</b>
DE-FOA-0001387	DE-EE0007553	GFO-0007553-001	

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 the Colorado School of Mines (CSM) to grow thin films for Silicon (Si) and Si-based materials such as Silicon Oxide, Silicon Nitride, metal films, and transparent conducting oxides using chemical vapor-phase deposition techniques for use in the fabrication of solar photovoltaic (PV) cells.

Proposed activities would include growth of Si-based thin films and integration into test structures. Growth of thin films would be completed by CSM in dedicated laboratory facilities on campus in Golden, CO. Further thin film growth would be completed using dopant gases (PH<sub>3</sub> and B<sub>2</sub>H<sub>6</sub>) in the dedicated Si-based PV research facility at the National Renewable Energy lab (NREL) in Golden, CO. NREL would also be responsible for integration of these thin films into small 20X20 mm test cells. The facilities in which this lab work would occur are purpose-built for the type of activities being proposed; therefore, no new or modified permits, construction of new facilities or physical modifications to existing facilities would occur as a result of the proposed project.

Project activities proposed to be carried out at CSM would necessitate the use and/or handling of various hazardous materials, including gases such as SiH<sub>4</sub> and Si<sub>2</sub>H<sub>6</sub>. All such handling will occur in-lab, and the Environment Health and Safety Department at CSM is dedicated to proper hazardous material handling and disposal practices. Activities proposed to be carried out at NREL would necessitate the use/handling of hazardous dopant gases such as PH<sub>3</sub> and B<sub>2</sub>H<sub>6</sub>. Again, all such handling would occur in-lab, and all hazardous materials would be managed in accordance with already established procedures that are consistent with federal, state, and local environmental regulations. All hazardous materials would be disposed of according to pre-existing standard operating procedures consistent with local, state and federal guidelines. Non-hazardous solid wastes would be disposed of through normal municipal waste streams. No siting, construction or major expansion of waste storage, disposal, recovery, or treatment actions/facilities would be required.

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.

Based on the review of the proposal, DOE has determined the proposal fits within the class of action(s) and the integral elements of 10 CFR 1021 subpart B 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 Technology Office

This NEPA determination requires a tailored NEPA provision.

Review completed by Rebecca McCord 07/27/2016

#### SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature:



Electronically Signed By: Kristin Kerwin

NEPA Compliance Officer

Date: 8/1/2016

#### 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: