

PMC-ND

(1.08.09.13)

U.S. DEPARTMENT OF ENERGY

OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY

NEPA DETERMINATION

**RECIPIENT:** NREL**STATE:** CO**PROJECT TITLE:** STM Science & Technology Facility PDIL Cleanroom; NREL Tracking No. 15-006

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
	DE-AC36-08GO28308	NREL-15-006	GO28308

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:

DOE/EA-1968	SITOWIDE ENVIRONMENTAL ASSESSMENT, U.S. DOE NATIONAL RENEWABLE ENERGY
(NREL STM)	LABORATORY, SOUTH TABLE MOUNTAIN CAMPUS, GOLDEN, COLORADO

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to install and operate a cleanroom for photovoltaic (PV) silicon wafer washing and etching within the Science & Technology Facility (S&TF) at the National Renewable Energy Laboratory (NREL) South Table Mountain (STM) campus located in Golden, Colorado.

PROPOSED ACTION DESCRIPTION

The proposed state-of-the-art 156 millimeter (mm) PV silicon wafer research and development facility would be installed and operated within the Process Development and Integration Laboratory (PDIL) inside the S&TF. This would include an ISO 6 / Class 1000 cleanroom that would accommodate a 156 mm capable tool set including an automated wet processing station (AWPS) and multiple diffusion furnaces, waste neutralization system, scrubbers, and ultrapure water room. The project would also include a multi-use PV research work area, a solvent work area, an acid work area, and a manual wet station. The new cleanroom would be approximately 2000 SQFT and would be located in the west bays (5 and 6) of the PDIL on the northern side of the second floor of the S&TF. This would consist of an ISO 6 compliant cleanroom lab space surrounded by an enclosed interstitial space with a mechanical mezzanine above. The lab would have separate areas for silicone device processing, multiuse PV research and a gowning room. Existing tools and utilities would be relocated and the Bay 6 utility recess would be demolished. Utilities would be added and enhanced as necessary to accommodate the needs of the new cleanroom. Currently, the floor below Bays 5 and 6 serves as a small waste collection and neutralization area. This area would be demolished and prepared to house a new neutralization and waste collection area. The PDIL is an operational laboratory inside the S&TF and would remain at least partially functional during the construction phase of the project. The subcontractor would construct temporary partitions and utilities, schedule deliveries, perform utility shutdowns and control dust and noise in a manner that has minimal impact to the operation of the laboratory.

Once operational, the cleanroom would typically conduct a 25-silicon wafer process run one to five times a week. First the wafers would be cleaned to remove oxides, and then cleaned again to prepare the surfaces for etching. Etching would be used to expose varying surfaces of each wafer and to increase surface area for subsequent deposition steps in making PV devices. Along with these liquid bath steps, a diffusion furnace would be used to further modify wafers. In order to wash and etch silicon wafers several acidic and caustic baths at the AWPS or the manual wet station would be used. For the AWPS, wafers would be loaded into the tool and dipped in sequence of

ten baths, which contents can be changed based on the process desired. The manual wet station would consist of two baths, one for etching and one for rinsing. Additional chemicals would be stored in seven supply cabinets and automated to supply chemicals to the wet stations with the capacity to store up to 55 gallons each.

The proposed action would incrementally increase the use of hazardous materials and chemicals at the STM campus, but would be types of chemicals already in use. All hazardous materials would be handled in new clean room and many of the processes are automated. The clean room would include chambers that isolate hazards from researchers and therefore reduce handling and exposure. NREL is dedicated to proper hazardous material handling and disposal practices, so the project activities that involve these materials would pose no risk to the public. All hazardous materials would be managed in accordance with federal, state, and local environmental regulations, as well as NREL policies and procedures. Similarly, the operation of the clean room would result in incrementally increases of hazardous waste generation at the STM campus, such as contaminated PPE, spent solvents, spent wastes, wipes, etc. All hazardous waste generated would be managed in accordance with federal, state, and local environmental regulations, as well as NREL policies and procedures.

Rinsing and dilution in processing requires ultrapure water system. This would be a reverse osmosis system using tap water supplied to the S&TF. Typically, two gallons of tap water would yield one gallon of deionized water and one of wastewater. This wastewater could be used to dilute chemical effluent, be used in the scrubbers, or be transferred to the building evaporative cooling towers. DOE and NREL are committed to developing a system that recycles and reuses water within the clean room and for other uses as regulations allow. Based upon the concentrations and constituents identified, the treatment of acidic or caustic wastewaters would not require a hazardous waste treatment permit as it falls under the elementary waste neutralization exemption in the Colorado Hazardous Waste Regulations [CHWR Section 100.10(a)(6)].

The proposed project would include an acid wet scrubber and an ammonia wet scrubber to control emissions. NREL EHS would estimate potential emissions and would then determine if any additional air permits are required. NREL would then work with DOE and the State of Colorado to acquire needed permits. However, at this time, an air permit for the clean room is not anticipated.

DETERMINATION

Installation and operation of a PV silicon wafer washing and etching clean room was part of the Proposed Action analyzed in the December 2014 NREL STM Site-Wide Environmental Assessment (DOE/EA-1968). The proposed activities were described and analyzed in DOE/EA-1968 under "S&TF Photovoltaic Research Modifications – Proposed Action Item A". DOE/EA-1968 and the Finding of No Significant Impact (FONSI) are hereby incorporated by reference.

DOE has determined the proposed activities and associated impacts were addressed in DOE/EA-1968. No additional NEPA review is required.

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.

Note to Specialist :

NEPA review completed by Rob Smith on 02/11/2015.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: _____

NEPA Compliance Officer

Date: 2/12/2015

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: _____