PMC-EF2a

(2/06/02)

U.S. DEPARTMENT OF ENERGY
EERE PROJECT MANAGEMENT CENTER
NEPA DETERMINATION

RECIPIENT: NREL **STATE:** CO

PROJECT TITLE : Design and Fabrication of 30 kW Molten Salt Thermal Storage Test Unit; NREL Tracking No. 12-001

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
		NREL-12-001	

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:

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.
DOE/EA 1440 S-II (NREL STM)	Final Supplement-II to Final Site-Wide Environmental Assessment of the National Renewable Energy Laboratory's (NREL) South Table Mountain Complex (November 2009)
DOE/EA 1440 (NREL STM)	Final Site-Site Wide Environmental Assessment of the National Renewable Energy Laboratory's (NREL) South Table Mountain Complex (February 2003)

Rational for determination:

The Department of Energy (DOE) Concentrating Solar Power (CSP) Program has determined that thermal energy storage is a key component for the commercialization of utility-scale CSP plants. The proposed project would consist of the fabrication and installation of a 30 kilowatt (kW) test unit that would circulate molten salt between two storage tanks located in the Thermal Storage Process Laboratory within the Energy System Integration Facility (ESIF) at the National Renewable Energy Laboratory's (NREL's) South Table Mountain (STM) Campus.

The test unit would include two storage tanks, that are each capable of producing 30 KW at one time, with a capacity of 25 cubic feet (ft3) and heaters to maintain salt temperatures, ranging from 290o Celcius (C) to 800oC. Molten salt would flow from one tank to the other tank by applying low pressure (via compressed nitrogen) to one of the tanks. The unit would be designed for molten salt to flow in either direction. The test unit would be fully instrumented with temperature, pressure, and flow sensors. The compressed nitrogen cylinders would be located with the molten salt test unit in the same test bay. Extra cylinders would be stored along the north wall of the laboratory or in the hallway that is just to the south of the laboratory. All gases would be stored in tanks supplied by Praxair, using wall mounted cylinder brackets, upheld with adjustable, locking straps.

Fabrication of the test unit would involve standard fabricating methods including metal working, machining, welding, and pipe fitting. These procedures would be performed off-site at Optimation Technology, Inc.'s (subcontractor) indoor facility located in Rush, New York. When completed, the test unit would be shipped from New York to NREL STM via ground transportation. Installation would be performed by NREL facility personnel. This process would involve installing the "turnkey" unit and making electrical connections to the unit. The installed equipment would be permanently located in the Thermal Storage Process Laboratory within the ESIF building (See Area A in the lower right-hand corner of diagram in attachment ESIF_TES_Floor.pdf). The Thermal Storage Process Laboratory has four test bays along its west wall. The units would be located in adjacent bays (See Area B in attachment ESIF_TES_labs). Operation of the equipment would be performed by the NREL CSP Program. Test unit fabrication and installation would occur by December 2012. Operation would follow installation and be on-going.

After installation, the unit would test the performance of thermal energy storage concepts at a laboratory-scale using molten salt. NREL expects to test approximately one to two weeks per month, on average. Sodium and potassium nitrate salts would be shipped in bags, added to the unit as solid pieces, and melted in the tanks using electric heaters. 288 kg of salt would be required to charge the unit. The salt would also be contained and stored in the molten salt test unit. The test unit could store and use about 1,100 kg of the salt. These salts are generally benign but are considered oxidizing agents because of their nitrate content. They would be physically isolated from any fuel, solvents, or other combustible materials. The salt mixture may be reused for several years before it reaches the end of its useful

life. At the end of testing, the salt would be stored for reuse or disposed as an oxidizer (special waste or other designation as appropriate). Any disposal would be done following all NREL procedures and any applicable state and federal regulations. Extra salt would be stored in bins or cabinets along the east wall of the lab.

No criteria pollutants would be emitted as a result of this project; however, some nitrogen gas (estimated 35 ft3) would be emitted once per day during testing, as molten salt is forced to flow from one tank to another. This gas would be vented from the building safely. This is accomplished by vents from the ceiling to which the exhaust of analytical equipment is snorkeled. Safety protocols are in place that govern laboratory behavior regarding instruments, chemicals handling, waste disposal, and laboratory operations. These protocols would be monitored by the EH&S department.

All tank components would be fabricated from an appropriate alloy (instrumentation, piping, and vessels) and would be compatible with the molten salt's maximum operating temperature (800oC) and maximum pressure (up to 20 psig). The system would be designed to be compatible with the addition of minor amounts of lithium and calcium nitrate, Na/K/Li carbonate salts and molten metals, such as tin, zinc and aluminum to the molten salts. If these items are added to the system, proper management and disposal requirements shall be addressed, in accordance with NREL's waste, safety and spill procedures.

The process is not expected to produce any liquid effluent because the salt and metal (potentially minor amounts) freeze as it approaches room temperature. Any intentional or unintentional release of liquid salts or metal would collect in secondary containment and solidify.

Compressed nitrogen would be housed in the laboratory, as stated above, and shall be stored in a cool, dry, well-ventilated area in tightly sealed containers that are labeled in accordance with OSHA's Hazard Communication Standard [29 CFR 1910.1200]. Containers of nitrogen shall be protected from physical damage and heat.

With respect to safety (including electrical hazards and pressurized vessels), after the fabrication subcontract is in place, a Safe Operating Procedure (SOP) for the test unit would be written that identifies risks and safeguards for its operation. All OSHA requirements, building codes, H&S procedures and requirements would be followed. In addition, pressurized vessels must be constructed and tested to meet pressure vessel codes. Once the equipment is ready for use and the SOP is approved, a readiness verification (RV) would be conducted and only when all requirements are met and issues addressed, the RV would be approved. Furthermore, during the 100% review meeting, the Subcontractor shall work with NREL safety staff to identify safety risks to personnel and the environment and determine appropriate design and procedural controls for maintaining adequate safety during the operation of each test unit. The Subcontractor will provide support documentation that is required for generating a SOP for the test unit.

Originally, oil and molten salt test units were envisioned and designed. However, this project would fabricate only the molten salt test unit because of new guidance from the DOE Concentrating Solar Power (CSP) Program and budget limitations. The oil unit does not align with DOE's current research priorities; therefore, NREL does not have plans to build this unit. DOE/NREL could decide to build the oil unit in the future; however, the oil unit is not a part of this scope of work. If implemented, an additional NEPA review would be required, at that time.

Based on the information above, this proposed action would qualify for Categorical Exclusion B3.6.

NEPA PROVISION

DOE has made a final NEPA determination for this award

Insert the following language in the award:

Insert the following language in the award:

You are required to:
If you intend to make changes to the scope or objective of your project, you are required to contact the Project Officer. You must receive notification of approval from the DOE Contracting Officer prior to commencing with work beyond that currently approved.

Note to Specialist :

EF2a completed by Amy Van Dercook on 4/24/2012.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: Electronically Signed By Lori Gray / Lori Gray Date: 4/24/2012
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