

PMC-ND

(1.08.09.13)

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

**RECIPIENT:** Southwest Research Institute**STATE:** TX

PROJECT TITLE: Development of a High-Efficiency Hybrid Dry Cooler System for sCO₂ Power Cycles in CSP Applications

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0001840	DE-EE0008739	GFO-0008739-001	

Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Policy 451.1), 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 funding to Southwest Research Institute (SwRI) to develop a novel dry cooling system for incorporation into concentrated solar power (CSP) applications. The cooling system would utilize thin sheet foils formed to fins, in place of the traditional etching method which results in waste materials. SwRI would research the impacts of hybrid heat exchangers on the CSP power cycle and ultimately, a demonstration hybrid heat exchanger would be designed, fabricated, and tested. The project would be completed over two Budget Periods (BPs), with a Go/No-Go Decision Point in between each BP.

Proposed project activities under BP1 would focus on performance modeling, design work, and prototype-scale fabrication trials. Specific tasks would include power cycle modeling, Levelized Cost of Energy (LCOE) and sensitivity studies, heat exchanger design development, fabrication trials (e.g. bonding and brazing trials), prototype heat exchanger fabrication, and prototype performance testing. BP2 activities would consist of the fabrication, commissioning and testing of a demonstration hybrid dry cooler system. Task work would include system design optimization, development of a manufacturing plan, fabrication of the demonstration heat exchanger, and performance testing.

SwRI would oversee all project activities and coordinate task work with its project partner Vacuum Process Engineering (VPE). All activities would be performed at existing, purpose-built laboratory facilities that regularly perform work similar in nature to that included in this project. Laboratory testing and fabrication activities would be performed primarily at SwRI's research campus in San Antonio, TX and at VPE's facilities in Sacramento, CA, with some fabrication being performed by qualified third-party vendors.

A single demonstration heat exchanger of between 1-2 MW capacity and a high-capacity blower would be fabricated, as well as various prototype exchangers during the manufacturing trials. These would all be installed and tested at SwRI's facilities. Testing would be performed using an existing supercritical carbon dioxide (sCO₂) test loop at SwRI. The test loop would receive minimal modifications in order to install the demonstration heat exchanger

and associated equipment (e.g. adaptor pipe spools and air-side equipment). Existing electrical wiring at SwRI's facilities would be routed in order to power the high-capacity blower. No other facility modifications would be required. Both the blower and heat exchanger would be installed in a roofed, open-air area adjacent to SwRI's research facility. No ground disturbing activities or changes in the use, mission, or operation of existing facilities would be required for completion of project activities. Likewise, no additional permits or authorizations would be required.

The project would include the use and handling of high powered laboratory equipment, industrial chemicals, and volatile materials (e.g. high pressured CO₂). In order to mitigate against potential risks associated with this handling, SwRI and VPE would adhere to established health and safety policies and procedures. Protocols would include personnel training, the use of personal protective equipment, engineering controls, test loop monitoring, controlled commissioning tasks, and internal safety assessments. SwRI and VPE would adhere to all relevant Federal, state, and local health and safety regulations.

During test loop testing CO₂ would be vented into the atmosphere. The vented CO₂ would be within permissible levels. Waste materials would also be produced by the chemical etching process utilized for fabricating micro-channel heat exchanger layers. All waste material would be collected in the fabrication facility and any hazardous material would be properly disposed of. SwRI and its project partners would adhere to all relevant Federal, state, and local environmental regulations.

NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Solar Energy Technologies Office

This NEPA determination does not require a tailored NEPA Provision.

NEPA review completed by Jonathan Hartman, 06/26/2019

FOR CATEGORICAL EXCLUSION DETERMINATIONS

The proposed action (or the part of the proposal defined in the Rationale above) fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D. To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Subpart D, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Subpart D, Appendix B.

There are no extraordinary circumstances related to the proposed action that may affect the significance of the environmental effects of the proposal.

The proposed action has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)), and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

The proposed action is categorically excluded from further NEPA review.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature:

 Electronically
Signed By: Kristin Kerwin

NEPA Compliance Officer

Date: 6/27/2019

FIELD OFFICE MANAGER DETERMINATION

- Field Office Manager review not required
- Field Office Manager review required

BASED ON MY REVIEW I CONCUR WITH THE DETERMINATION OF THE NCO :

Field Office Manager's Signature: _____
Field Office Manager

Date: _____