PMC-ND
(1.08.09.13)

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

RECIPIENT: University of Arizona **STATE:** AZ

PROJECT TITLE: Sensing and arresting metal corrosion in molten chloride salts at 800degrees Celsius

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0001840	DE-EE0008539	GFO-0008539-001	

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 University of Arizona (UA) to develop cathodic protection (CP) techniques and associated materials to prevent corrosion resulting from molten chloride salts in metal vessels used in concentrating solar power (CSP) applications. Analysis/testing would initially be conducted at the laboratory scale to identify the materials and methods best suited for commercial-scale applications. Testing would then be performed using a molten salt flow loop at UA's campus to validate the effectiveness of the methods/materials developed. The project would be divided into three Budget Periods (BPs), with a Go/No-Go Decision Point in between each BP.

BP1 activities would focus on characterization and selection of materials to be used as anodes and electrode seals in pipe metal. Analysis and testing would be performed using 3-electrode quartz cells in anaerobic salts, with controlled exposure to different oxidant levels. BP2 activities would build on BP1 and would use metal pipes in molten salt for testing. BP2 would focus on developing ways to apply cathodic protection to metal pipe interiors. BP3 activities would further build on the first two BPs by incorporating lessons learned into the materials and processes used for flow loop testing. During BP3, a molten salt flow loop, modified for corrosion testing, would be used to take final experimental measurements and conduct case studies relating to corrosion and CP techniques.

Proposed project activities would have the same focus and structure each BP. However, the scale of testing would be increased from 3-electrode quartz cell testing in BP1, to metal pipe testing in BP2, and finally, flow loop testing in BP3. Specific activities would include metal corrosion rate detection and measurement, getter development/performance testing, development of CP techniques and materials, computer modeling of corrosion mechanisms, development of a corrosion test section for incorporation into UA's flow loop, and flow loop testing.

All project work would be performed at the Harbarger Building; an existing, purpose-built facility at University of Arizona's campus in Tucson, AZ. Minor upgrades would be made to the fans in the laboratory fume hood/ventilation system, in order to ensure proper ventilation during high temperature sparging of molten salts. These upgrades

would be completed prior to initiating laboratory activities. No change in the use, mission, or operation of existing facilities would be required as part of this project. Similarly, no additional permits would be required in order to conduct any of the work activities.

The project would involve the use and handling of various metals, chemicals and gases. The molten salt would also be heated to temperatures of approximately 800ºC. In order to mitigate against risks associated with project materials and processes, UA would implement various safety measures, including the use of spill catch equipment when handling molten salt and the use of fume hoods when handling gaseous chemicals. UA would adhere to established health and safety protocols, including use of property safety equipment, monitoring, and the provision of relevant safety training. All project activities would be conducted in accordance with local, state, and Federal health, safety and environmental regulations. All project materials would be disposed of by UA utilizing approved chemical disposal facilities.

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, 03/12/2019

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 Date: 3/19/2019

NEPA Compliance Officer

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: _____ Date: _____

Field Office Manager