PMC-ND
(1.08.09.13)

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

RECIPIENT: PARC, a Xerox company **STATE:** CA

PROJECT TITLE : Scalable, Infiltration-Free CeramicMatrix Composite manufacturing for Molten Salt Receiver (SIF CMC)

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002378	DE-EE0009808	GFO-0009808-001	

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.)
B3.15 Small-scale indoor research and development projects using nanoscale materials	Siting, construction, modification, operation, and decommissioning of facilities for indoor small-scale research and development projects and small-scale pilot projects using nanoscale materials in accordance with applicable requirements (such as engineering, worker safety, procedural, and administrative regulations) necessary to ensure the containment of any hazardous materials. Construction and modification activities would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible).
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 PARC, a Xerox company, for the creation of a novel ceramic matrix composite (CMC) manufacturing method, using an innovative resin that utilizes silicon carbide nanoparticles to increase its ceramic yield. The proposed project activities would take place over three budget periods (BPs).

PARC in Palo Alto, CA would design and formulate a high char yield resin using purchased nanoparticles for fiber reinforced ceramic fabrication, testing, and data analysis. Project activities would be done in conjunction with the University of Wisconsin-Madison (UWM) in Madison, WI, Ceramic Tubular Products (CTP) in Lynchburg, VA, and the National Renewable Energy Laboratory (NREL) in Golden, CO. UWM would perform corrosion testing and analysis of ceramics and ceramic matrix composites. CTP would fabricate, test, and analyze the CMC tubes and concentrated solar power (CSP) receiver efficiency. NREL would provide optical property measurements of ceramic and ceramic matrix composites, as well as data and receiver efficiency analyses.

The proposed project activities in BP1 would include the development of a composite resin utilizing purchased nanoparticles and the demonstration of CMC fabrication using this resin. Carbon fiber reinforced plastic (CFRP) with both the composite resin and a plain resin would be fabricated, pyrolyzed, and later tested for adhesion, corrosive

resistance, and environmental stability. A receiver design would be selected from literature and NREL's database, and a cost analysis of the receiver tube would be completed. At the beginning of each BP, salt composition used for testing corrosive resistance would be revised. BP2 would involve the fabrication and improvement of CMC plates using the composite resin to meet the properties required after completing a techno-economic analysis (TEA). Receiver modeling, design, and analyses would also be carried out. Lastly, BP3 would be comprised of the fabrication of CMC receiver tubes and testing of required properties for target receiver performance. Commercialization analysis would be completed at the end of the project.

The proposed project would involve the use and handling of various hazardous materials, including industrial solvents and corrosive materials. All such handling would occur in fume hoods and thus pose no risk to the public. All hazardous materials would be managed in accordance with Federal, state, and local environmental regulations. All hazardous waste would be disposed of by a licensed hazardous waste hauler. Existing corporate health and safety policies and procedures would be followed, including training, proper protective equipment, controls, monitoring, and assessments.

Silicon carbide nanoparticles would be used in this project and would be used in a lab fume hood. All persons working with these nanoparticles would wear personal protective equipment including gloves, safety goggles, face shields, and lab coats.

All activities would take place at existing, purpose-built facilities. There would be no modifications to or change in use of existing facilities and no ground disturbing activities outside of the field testing on previously disturbed ground which is currently utilized for this purpose. No new permits or licenses are needed.

Any work proposed to be conducted at a federal facility may be subject to additional NEPA review by the cognizant federal official and must meet the applicable health and safety requirements of the facility.

NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Solar Energy Technologies Office (SETO)
Review completed by Alex Colling on 02/16/2022.

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: 3/24/2022

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