PMC-ND
(1.08.09.13)

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

RECIPIENT: Michigan Technological University **STATE:** MI

PROJECT TITLE: Rapid Bayesian High Entropy Alloy Designs Fabricated via Wire Arc Additive Manufacturing

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0001980	DE-EE0009122	GFO-0009122-001	

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 Michigan Technological University (MTU) to develop processes to rapidly screen and test novel alloy materials for use in high temperature systems (e.g. power generation applications). MTU would develop machine learning algorithms to aid in the optimization of alloy design. Wire Arc Additive Manufacturing (WAAM) and rapid characterization techniques would then be applied to the fabrication process. Laboratory-scale alloy samples would be produced and characterized via this methodology.

Proposed project activities would be completed over two Budget Periods (BPs), with a Go-No/Go Decision Point in between each BP. This NEPA review is applicable to all work from both BPs. BP1 would focus on alloy design and screening activities. Work activities to be performed during this BP would include material characterization, cost modeling, computer analysis/programming sample coupon production via the WAAM technique, performance testing, and alloy screening/down-selection. BP2 would focus on material validation and test article production. Activities to be performed would include material characterization of down-selected alloys, fabrication of larger-scale test articles (via WAAM, induction melting, casting and forging), and performance testing (e.g. hot tensile, creep rupture, and corrosion resistance).

All project activities would be coordinated by MTU and performed at existing, purpose built laboratory facilities. MTU and its project partner, United Technologies Research Center (UTRC) would each perform material characterization, performance, testing, and alloy fabrication activities at their laboratory facilities in Houghton, MI and Hartford, CT, respectively. MTU would perform limited, laboratory-scale synthesis of alloy materials. UTRC would perform, larger-scale synthesis, resulting in material coupons for characterization/testing. Less than 2000 lbs. of metals would be used over the course of the project. Both entities regularly perform work similar in nature to that included in the scope of this project. No modifications to existing facilities, ground disturbing activities, or changes to the use, mission, or operation of existing facilities would be required. No additional permits, licenses, or authorizations would be required.

Project work would involve the use and handling of industrial chemicals, metals, and alloys, some of which are potentially hazardous to human health (e.g. nickel). Additionally, the WAAM process has several specific safety hazards associated with it, including electrocution hazards, intense optical radiation from arc, and pinch points. The use and handling of these materials and equipment would be performed in controlled laboratory/manufacturing environments that regularly perform work similar in nature to that included in the scope of this project. Potential risks would be mitigated through adherence to established corporate health and safety policies and procedures. Protocols would include personnel training, the use of personal protective equipment, monitoring, and engineering controls. Both MTU and UTRC would adhere to the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), as mandated by the US Occupational Health and Safety Administration (OSHA). MTU and UTRC would observe all applicable Federal, state, and local health, safety, and environmental regulations.

NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Advanced Manufacturing Office
This NEPA determination does not require a tailored NEPA Provision.
NEPA review completed by Jonathan Hartman, 04/21/2020

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: Casey Strickland Date: 4/22/2020

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