

PMC-ND

(1.08.09.13)

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

**RECIPIENT:** Edison Welding Institute (EWI)**STATE:** OH

PROJECT TITLE: Machine Learning Enhanced Development of Functionally Graded Materials Enabled by Directed Energy Deposition

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0001980	DE-EE0009118	GFO-0009118-001	

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 Edison Welding Institute (EWI) to develop a novel manufacturing process utilizing functionally graded materials (FGMs), or materials with a gradually changing composition and structure, produced through an additive manufacturing technique. This project would be completed over two Budget Periods (BPs), with a Go/No-Go Decision Point in between each BP. This NEPA Determination is applicable to both BPs.

The project would focus on development of both directed energy deposition (DED) and machine learning (ML) methods. Proposed activities would include computer modeling, algorithm development, material synthesis via deposition, mechanical testing using material coupons (e.g. durability testing, tensile testing, corrosion testing), and material characterization. At the end of the project, the additive manufacturing process would be demonstrated through the fabrication of two sub-scale components (i.e. engine cases). This demonstration would occur at EWI's research and development facility in Buffalo, NY, which routinely manufactures parts via additive manufacturing as part of its regular course of business.

EWI would lead project management and coordinate all project activities between project partners. EWI would also perform design work, analysis, material synthesis, material characterization, component fabrication, and testing activities at its facilities in Buffalo, NY and Columbus, OH. GE Research would perform material selection/characterization, component and process design, computer modeling, and algorithm development (e.g. machine learning) at its facility in Niskayuna, NY. University of South Carolina would perform computer-based process modeling at its campus in Columbia, SC. Argonne National Laboratory (ANL) would perform material characterization at its laboratory facilities in Lemont, IL. All project work would be performed at existing purpose built facilities. 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 metal powders, gases and industrial solvents. All such handling would occur in controlled laboratory environments. In order to mitigate risks associated with the performance of project activities, EWI and its project partners would adhere to established corporate health and safety policies and procedures. Protocols would include employee training, the use of personal protective equipment, monitoring, and internal assessments. Hazardous materials would be labeled, stored, and disposed of in compliance with established corporate protocols. Additive manufacturing activities would use argon gas to purge the deposition chamber. Argon gas would be vented to the atmosphere in compliance with Environmental Protection Agency requirements. Material characterization to be performed at ANL would involve high temperature testing and the use of lasers. ANL regularly conducts experiments with both high temperature and lasers and would adhere to established safety procedures. EWI and its project partners would observe all applicable Federal, state, and local health, safety, and environmental regulations.

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:

[Advanced Manufacturing Office](#)

[This NEPA determination does not require a tailored NEPA Provision.](#)

[NEPA review completed by Jonathan Hartman, 07/30/2020](#)

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:



Casey Strickland

NEPA Compliance Officer

Date: 7/31/2020

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: _____