DOE-ID NEPA CX DETERMINATION

CX Posting No.: DOE-ID-20-064

SECTION A. Project Title: Diffuse field ultrasonics for I situ materials property monitoring during additive manufacturing using the SMART Platform – Pennsylvania State University

SECTION B. Project Description

Pennsylvania State University proposes to develop and integrate a self-contained *in situ* ultrasound suite for assessment of part quality and materials properties during the additive manufacturing (AM) process. The SMART (Sensing Microstructure using Acoustics in Real-Time) Platform is an enhanced AM build plate capable of sensing microstructure through diffuse ultrasonic scattering. The interaction and scattering of ultrasound from discontinuities such as grain boundaries and porosity enables the received ultrasonic waveforms to contain encoded microstructural information. This research intends to determine whether material behavior in the Damage Precursor Zone (where structural defects are too small to be visible) can be sensed prior to build failure.

SECTION C. Environmental Aspects / Potential Sources of Impact

The university has procedures in place to handle any waste that will be generated through this project. The action would not create additional environmental impacts above those already occurring at the university.

SECTION D. Determine the Level of Environmental Review (or Documentation) and Reference(s): Identify the applicable categorical exclusion from 10 CFR 1021, Appendix B, give the appropriate justification, and the approval date.

Note: For Categorical Exclusions (CXs) the proposed action must not: 1) threaten a violation of applicable statutory, regulatory, or permit requirements for environmental, safety, and health, including requirements of DOE orders; 2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities; 3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that pre-exist in the environment such that there would be uncontrolled or unpermitted releases; 4) adversely affect environmentally sensitive resources. In addition, no extraordinary circumstances related to the proposal exist which would affect the significance of the action, and the action is not "connected" nor "related" (40 CFR 1508.25(a)(1) and (2), respectively) to other actions with potentially or cumulatively significant impacts.

References: B3.6 Siting, construction, modification, operation, and decommissioning of facilities for small-scale 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 development.

Justification: The activity consists of an investigation to develop a means of detecting material defects in additive manufacturing prior to build failure.

Is the project funded by the American Recovery and Reinvestment Act of 2009 (Recovery Act) ☐ Yes ☒ No

Approved by Jason Sturm, DOE-ID NEPA Compliance Officer on 8/6/2020