

DOE-ID NEPA CX DETERMINATION

SECTION A. Project Title: Pulsed Thermal Tomography Nondestructive Examination of Additively Manufactured Reactor Materials and Components – Argonne National Laboratory

SECTION B. Project Description

Argonne National Laboratory, in collaboration with the Massachusetts Institute of Technology (MIT) and Westinghouse Electric, proposes to develop and demonstrate a novel non-destructive examination (NDE) technique for in-service inspection of additively manufactured (AM) reactor components and materials. The project will develop and demonstrate an advanced pulsed thermal tomography (TT) architecture and algorithms for in-service NDE of reactor components. To accomplish the objectives, the project will systematically evaluate performance of the TT imaging system on stainless steel and nickel alloy parts created by AM. This will be followed by NDE of AM components inside the MIT Nuclear Reactor Laboratory reactor core during a scheduled shutdown. The parts will be inserted into the reactor core during shutdown, and all NDE imaging will be performed during the shutdown. The objective is not to perform neutron irradiation but rather to learn how reactor spatial constraints limit the quantity and quality of collected information.

SECTION C. Environmental Aspects / Potential Sources of Impact

Radioactive Waste Generation – Small metallic parts will be inserted into the MIT research reactor during a scheduled shutdown. All materials will be removed from the reactor before the reactor restarts. The objective is not to perform neutron irradiation. The NDE instrument is non-contact, so there will be no contamination of the instrumentation. There will be no contamination of the part since the sample will be enclosed in a new clean capsule. A very small but measurable activation of the sample may occur due to a very small neutron flux in the shutdown state. If activated, the sample will be treated as radioactive waste and disposed by the MIT Nuclear Reactor Laboratory according to their standard procedures. The activation, if it occurs, will be low and mostly short-lived. The maximum amount of radioactive waste generated will be the total mass of the parts inserted into the reactor core which will be approximately one pound. The action would not create additional environmental impacts above those already permitted 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 research aimed at investigating non-destructive examination of additively manufactured nuclear reactor materials and components.

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 07/23/2018