

DOE-ID NEPA CX DETERMINATION

SECTION A. Project Title: Low-Force Solid-State Technologies for Mitigation and Repair of Stress Corrosion Cracking in Dry Storage Canisters – University of Wisconsin

SECTION B. Project Description

The University of Wisconsin, in collaboration with Pacific Northwest National Laboratory and J Kessler Associates LLC, proposes to develop, evaluate, and competitive bench-mark two technologies for field mitigation and repair of stress corrosion cracking (SCC) in stainless steel canisters for dry cask storage of used nuclear fuel (UNF): (i) additive friction stir welding (AFSW) and (ii) cold spray deposition (CSD). The objectives of the proposed research are: (1) Prepare samples with simulated and stress corrosion cracks to investigate low heat input, solid state repair technologies; (2) Fabricate and characterize samples of fusion welds (substrates for studying mitigation and repair) and samples with cracks repaired by friction stir welding (for bench-marking); (3) Build laboratory scale low-force additive friction stir welding system with support from collaborating industry and establish its efficacy for repairing simulated cracks; (4) Develop the cold spray deposition process as a low-temperature repair method using simulated cracks; (5) Implement additive friction stir weld and cold spray deposition processes for mitigation and repair of stress corrosion cracks, including *in situ* limited gap repair; (6) Perform mechanical and SCC tests of nuclear certified gas metal arc weld (GMAW) coupons and coupons repaired by friction stir welding, cold spray, and additive friction stir welding to enable *competitive benchmarking of the four processes* and for use in finite element models to determine suitability of repairs for onsite containment and transportation; and (7) Address Nuclear Regulatory Commission (NRC) licensing requirements for use of additive friction stir weld and cold spray deposition repair technologies.

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 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 university-scale research activities aimed at development and evaluation of AFSW and CSD for field mitigation and repair of SCC in stainless steel canisters for dry cask storage of UNF.

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 08/14/2018