

SECTION A. Project Title: Effects of High Dose on Laser Welded, Irradiated AISI 304SS – Boise State University**SECTION B. Project Description**

Boise State University, in collaboration with Texas A&M University, Purdue University, the Westinghouse Materials Center of Excellence, and Idaho National Laboratory, proposes to assess the mechanical integrity of laser weld repairs of highly irradiated, He-containing AISI 304 stainless steel under extended LWR service conditions. After laser welding, the materials will undergo ion irradiation followed by X-ray diffraction and miniature mechanical tests to measure mechanical properties and residual stress concentrations. Post-ion-irradiation examination will then be performed to provide microstructural corroboration of the observed XRD and miniature mechanical tests.

SECTION C. Environmental Aspects / Potential Sources of Impact

Radioactive Material Use – The project will work with radioactive AISI 304SS in Westinghouse hot cell facilities. Welds will be made in-hot-cell, and then cross-sections will be polished and cut into 3 mm diameter discs of-250 micrometer thickness. A total of 22 such discs will then be shipped to Texas A&M for ion irradiation, then subsequently shipped to the Center for Advanced Energy Studies (CAES) for materials characterization. All involved facilities (Westinghouse, Texas A&M, and CAES) have established procedures for handling these quantities of radioactive materials. Disposal will involve long-term storage in the NSUF sample library at CAES/Idaho National Laboratory.

Radioactive Waste Generation – Radioactive waste will be generated at the Westinghouse Hot Cell Facility during the performance of the work effort. Specifically, machining and cutting chips will be generated during the cutting and surface milling of hex block specimens in preparation for laser welding. Additional cutting chips will be generated when the laser welded specimens are cross sectioned for subsequent TEM disc preparation. Radioactive grinding debris will be generated during the mechanical grinding of small welded sections to thin the sections for TEM disc punching. Additional mechanical grinding will be required on the punched out TEM discs. Contaminated saw blades, milling tools, fixturing tooling and grinding papers will be generated during these efforts. The Westinghouse Hot Cell Facility has extensive expertise handling and disposing of this type of radioactive waste. All work will be performed to Westinghouse Hot Cell Facility site-specific procedures and regulatory guidelines. Further, all work will be supervised by the Westinghouse Environmental Health & Safety Organization and the Hot Cell Facility Radiation Safety Officer.

Mixed Waste Generation – Mixed waste will be generated at the Westinghouse Hot Cell Facility during the performance of the work effort. Specifically, it is required that the 22 TEM discs be electropolished; the electropolishing process will generate mixed waste. The Westinghouse Hot Cell Facility has extensive expertise handling and disposing of this type of mixed waste. All work will be performed to Westinghouse Hot Cell Facility site-specific procedures and regulatory guidelines. Further, all work will be supervised by the Westinghouse Environmental Health & Safety Organization and the Hot Cell Facility Radiation Safety Officer.

Chemical Use/Storage – Chemicals will be used at the Westinghouse Hot Cell Facility during the performance of the work effort. Specifically, cleaning solvents (such as acetone and methanol) and possible decontamination cleaners will be used. In addition, electropolishing etchants will also be used. The Westinghouse Hot Cell Facility has extensive expertise handling and storing a wide range of chemicals. All work will be performed to Westinghouse Hot Cell Facility site-specific procedures and regulatory guidelines. Further, all work will be supervised by the Westinghouse Environmental Health & Safety Organization and the Hot Cell Facility Radiation Safety Officer.

Chemical Waste Disposal – It is anticipated that all chemicals used at the Westinghouse Hot Cell Facility during the performance of this work effort will be radiologically contaminated after use and therefore will be classified as mixed waste as discussed above. All work will be performed to Westinghouse Hot Cell Facility site-specific procedures and regulatory guidelines. Further, all work will be supervised by the Westinghouse Environmental Health & Safety Organization and the Hot Cell Facility Radiation Safety Officer.

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.

DOE-ID NEPA CX DETERMINATION

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.

B3.10 Siting, construction, modification, operation, and decommissioning of particle accelerators, including electron beam accelerators, with primary beam energy less than approximately 100 million electron volts (MeV) and average beam power less than approximately 250 kilowatts (kW), and associated beamlines, storage rings, colliders, and detectors, for research and medical purposes (such as proton therapy), and isotope production, within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible), or internal modification of any accelerator facility regardless of energy, that does not increase primary beam energy or current. In cases where the beam energy exceeds 100MeV, the average beam power must be less than 250 kW, so as not to exceed an average current of 2.5 milliamperes (mA).

Justification: The activity consists of research on the mechanical integrity of laser weld repairs of highly irradiated, He-containing stainless steel under light water reactor service conditions.

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

Approved by Jack Depperschmidt, DOE-ID NEPA Compliance Officer on 09/27/2016