

DOE-ID NEPA CX DETERMINATION

SECTION A. Project Title: High throughput assessment of creep behavior of advanced nuclear reactor structural alloys by nano/microindentation – Regents of the University of Minnesota

SECTION B. Project Description

The University of Minnesota (UMN), in collaboration with Los Alamos National Laboratory (LANL), Bruker Nano Surfaces, and the University of California (UC) – Berkeley, proposes to develop a method for testing a wide variety of physical and chemical characteristics of advanced reactor steels in a short time using nano- and/or micro-indentation. If successful, the techniques and datasets generated by this proposed work may be adapted for beamline use in NSUF facilities where *in-situ* nanomechanical testing can be conducted during ion beam irradiation. The tasks associated with this project are (1) Initial characterization of starting alloy microstructures; (2) Nanochemical-based creep testing; (3) Imaging of deformed structures beneath indents from Task 2; (4) Bulk dead-load creep testing; and (5) Inputs to model and modeling guidance/development/validation. Existing laboratory facilities will be used.

SECTION C. Environmental Aspects / Potential Sources of Impact

Chemical Use/Storage, Chemical Waste Disposal, and Hazardous Waste Generation – Chemicals to be used in the proposed work consist of acid etchants (hydrochloric, nitric, and/or sulfuric) and solvents for cleaning sample surfaces (acetone, ethanol, and methanol). The waste generated will be disposed of through the UMN Regulated Waste program which complies with all local and national hazardous waste regulations.

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.

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 university-scale research activities to aid in developing a high-throughput method for testing physical properties of advanced reactor steels.

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 08/07/2019