

DOE-ID NEPA CX DETERMINATION

SECTION A. **Project Title: The effect of LWR primary coolant water chemistry (LiOH vs. KOH) on stainless steel: An integrated experimental and computational study of the corrosion response of stainless steel for different surface microstructures and mechanical stress factors**

SECTION B. Project Description

The University of Illinois at Urbana-Champaign (UIUC) proposes to study the effect of surface microstructure, mechanical stress factors, and radiation damage on the corrosion response of stainless steel under two different alkaline pressurized water reactor primary water alkalizing agent chemistry conditions. The project will investigate mechanical stress factors such as strain rate, residual stress, deformation induced persistent slip bands, radiation damage, and fatigue cracks. The ion accelerator at UIUC that will allow performance of bombardment studies with high energy metal ions and protons to mimic fast neutron damage. Modeling will be performed to understand the physical phenomena associated with the measured corrosion response.

SECTION C. Environmental Aspects / Potential Sources of Impact

Chemical Use/Storage, Chemical Waste Disposal: Standard laboratory chemicals such as methanol will be used. Storage and disposal will be in accordance with university protocols.

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 study the effect of surface microstructure, mechanical stress factors, and radiation damage on the corrosion response of stainless steel.

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