DOE-ID NEPA CX DETERMINATION

CX Posting No.: DOE-ID-20-101

SECTION A. Project Title: New Coatings for Nuclear Fuel Waste Canister Storage and Transport

SECTION B. Project Description

The Virginia Polytechnic Institute and State University proposes to develop novel silicon oxycarbonitride (SiOCN(H)) coatings for nuclear fuel waste canisters in order to address nuclear waste container corrosion and failure problems, identify new and effective mitigation strategies, and safeguard nuclear waste storage, transport, and disposal, in both terrestrial and marine environments. The proposed scope will develop effective corrosion-resistant SiOCN(H) coatings on 304/304L/304H canisters. Coating structural changes will be evaluated under different spent nuclear fuel storage conditions and their corrosion responses will be tested under aggressive and long-term brine conditions. The adherence of the SiOCN(H) coating to the 304 steel substrates/canister parts and the coating integrity will be examined based on optical microscopy. The bare canister surfaces and coating morphologies and compositions will be characterized by several parallel microscopy techniques to investigate the local structure and chemistry based on scanning electron microscopy, transmission electron microscopy, and energy dispersive spectroscopy.

SECTION C. Environmental Aspects / Potential Sources of Impact

Chemical Use/Storage, Chemical Waste Disposal: This research will involve chemical use in typical materials research labs involving commercially available chemicals.

Discharge of Wastewater: Water will be discharged into the sewer system in the research lab.

The university has procedures in place to handle any waste that will be generated through this project.

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 developing laboratory-scale chemical coatings for steel surfaces, and corrosion and mechanical property testing of the coatings.

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 8/11/2020