DOE-ID NEPA CX DETERMINATION

CX Posting No.: DOE-ID-18-098

SECTION A. Project Title: Development of Corrosion Resistant Coatings and Liners for Structural Materials for Liquid Fueled Molten Salt Reactors – University of Wisconsin

SECTION B. Project Description

The University of Wisconsin, in collaboration with General Atomics, Terrestrial Energy USA, EPRI, Computherm, LLC, McMaster University (Canada), and University of Bochum (Germany), proposes to develop corrosion-resistant coatings and liners (claddings) for structural materials for use in fuel dissolved molten salt environments for future Molten Salt Reactors (MSR). The claddings, which will be subjected to rigorous mechanical testing, including thermal cycling and flexural four-point bend tests to ensure mechanical integrity of the interface, will be evaluated for radiation damage resistance given that structural materials will be subjected to a significant neutron flux in thermal and fast liquid fueled MSRs.

SECTION C. Environmental Aspects / Potential Sources of Impact

Radioactive Material Use and Waste Generation – Molten salt experiments will be conducted in one of the laboratories belonging into the Characterization Laboratory for Irradiated Materials (CLIM) at the University of Wisconsin. Approximately 50 – 100 g of LiF-BeF2 salt will be used, and all experiments will be performed in the dedicated glove-box. Elemental analysis is outsourced to the Wisconsin State Hygiene Lab. All solid Be-contaminated material generated as part of the experiment are disposed of as hazardous waste through the University Environmental Health and Safety (EHS) department. No liquid waste is expected from the experiments with molten salt.

Chemical Use/Storage, Chemical Waste Disposal, and Hazardous Waste Generation – At the conclusion of the experiment, all remaining salt and metal samples are stored in a sample library maintained by the Couet group. If any organic solvents are used for equipment cleaning or sample preparation, waste is disposed of as liquid chemical waste through EHS. Uranium fluoride will be purchased to a US company or given by Oak Ridge National Laboratory. The salt will remain sealed in its original packaging until open in the glovebox. The glovebox is equipped with high-efficiency particulate air (HEPA) filters on all its lines in contact with the outside environment. Total uranium mass will not exceed 10 g. The main source of waste generation is the solidified salt at the end of the experiment. The University of Wisconsin, Department of Engineering Physics, has appropriate procedures approved by the University Radiation Safety Office for the waste segregation and storage. At the end of the project, all samples and generated waste will be stored safety by the 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.

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 aimed at developing corrosion-resistant coatings and liners (claddings) for structural materials for use in fuel dissolved molten salt environments.

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