

DOE-ID NEPA CX DETERMINATION

SECTION A. Project Title: Experimental and Modeling Investigation of Overcooling Transients that include Freezing, in Fluoride-Salt Cooled High-Temperature Reactors (FHRs) – University of Wisconsin

SECTION B. Project Description

The University of Wisconsin proposes to recommendations for design features of FHR reactor components that would take advantage of the phenomena characteristic to fluoride salts in order to be resilient to overcooling, and to recover gracefully from over-cooling transients. In support of this task a MOOSEbased computational tool will be developed, backed by experimental studies with the prototypical (flibe) coolant, and with simulant fluids. Experimental work will be done with flibe, the prototypical coolant for FHR, as well as surrogate non-beryllium fluoride salt coolants such as flinak, and simulant fluids such as oils and non-fluoride liquid salts. The purpose of this task is to understand the freezing phenomenology, and to inform the development of constitutive models.

SECTION C. Environmental Aspects / Potential Sources of Impact

Chemical Use/Storage / Chemical Waste Disposal – The project will use and ultimately dispose of solid fluoride salts, such as LiF-BeF₂, LiF-NaF-KF, in quantities of 0.5 kg to a few kg. Disposal of bulk quantities is done through the UW EH&S Department. Disposal of solid materials contaminated with small amounts of these salts is done per UW EH&S guidelines. The action would not create additional environmental impacts above those already permitted at the university.

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 university-scale research aimed at investigating the freezing phenomenology in liquid fluoride salts for use in fluoride-salt cooled high-temperature reactors.

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 09/21/2016