

DOE-ID NEPA CX DETERMINATION

SECTION A. Project Title: High temperature molten salt reactor pump component development and testing – University of Wisconsin

SECTION B. Project Description

The University of Wisconsin (UW) proposes to provide the data needed to support design of larger scale molten salt pumps that could potentially be used for 100MW class reactor applications. This work will also support innovative designs for smaller scale pump systems that may be needed for micro-reactors, test loops or secondary systems within advanced reactors. The work conducted as a result of this proposal will be applicable to any salt cooled system and also advance the use of materials and understanding of other high temperature reactors. The following project objectives have been identified: 1) Develop a database of friction factors and wear rates on different combinations of pump bearing materials in different nuclear relevant salts over a range of temperatures, speeds and loads; 2) Evaluate materials compatibility of cermet, SmCo magnets, and ceramic coated wire in molten salts; 3) Test down-selected wetted bearing materials in a prototypic pump configuration for durations of up to 500 hours; 4) Develop advanced pump design concepts with high wetted cermet bearings, high temperature magnets and advanced ceramic coated wire. Construct and test on existing molten salt loop; and 5) Develop in-situ pump inspection techniques and pump health monitoring strategies to minimize O&M outages due to pump failures.

SECTION C. Environmental Aspects / Potential Sources of Impact

The university (and its partner university) has procedures in place to handle any waste that will be generated through this project. The action would not create additional environmental impacts above those already occurring at the universities.

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). For purposes of this category, “demonstration actions” means actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial deployment. Demonstration actions frequently follow research and development and pilot projects that are directed at establishing proof of concept.

Justification: The activity will provide relevant key information on the tribology of bearing material and components (magnets, couplers, ceramic coated wire, and coatings) in high temperature molten salts that will be required in the design of advanced reactor pumps.

Is the project funded by the American Recovery and Reinvestment Act of 2009 (Recovery Act) Yes No

Approved by Jason Anderson, DOE-ID NEPA Compliance Officer, on 09/17/2021.