

DOE-ID NEPA CX DETERMINATION

SECTION A. Project Title: Bimetallic Composite Development & Compatibility in Flowing FLiBe as a Molten Salt Reactor (MSR) Structural Material – University of New Mexico

SECTION B. Project Description

The University of New Mexico, in collaboration with Oak Ridge National Laboratory (ORNL) and Massachusetts Institute of Technology (MIT), proposes to develop a bimetallic composite, Incoloy 800H/Ni-201, and test it under flowing FLiBe to investigate key high temperature mechanical behavior to support its ASME codification, and to quantify the performance gain of this bimetallic composite over single alloy candidates (Incoloy 800H, Hastelloy N, and SS 316). The major objectives of the proposed research are to: (1) fabricate Incoloy 800H/Ni-201 on an industrial scale; (2) evaluate key mechanical performance gains of Incoloy 800H/Ni-201, compared to single alloy candidates (SS 316, Incoloy 800H, Hastelloy N), required for the ASME codification; (3) quantify and validate attainable performance gains by using Incoloy 800H/Ni-201 in place of the current single alloy candidates in the context of ASME BPVC codification; and (4) assess the service time extension of key power plant components (i.e., heat exchangers, or pressure vessel) through stress modeling and simulation.

SECTION C. Environmental Aspects / Potential Sources of Impact

Chemical Use/Storage / Chemical Waste Disposal – The proposed experiments will be using FLiBe prepared by ORNL. The handling of the substance will be conducted only inside a glove box which is environmentally isolated from the lab space. The quantity will be relatively small. The subscale loop inside the glove box uses ~1L of FLiBe per test. It is anticipated that roughly ~ 10L will be used over 3 years at the most proactive test plan. The project will comply with the disposal practices that ORNL and MIT on FLiBe experiments have been conducting. Post-tested FLiBe in an isolated container and sent back to the location it was fabricated for disposal.

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 developing a bimetallic composite with enhanced compatibility with flowing FLiBe.

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 07/17/2017