

SECTION A. Project Title: The Thermodynamics of Crystallization and Phase-Separation in Melt-Derived Nuclear Waste Forms – The University of Tennessee**SECTION B. Project Description**

The University of Tennessee, in collaboration with the University of California, Davis, Oak Ridge National Laboratory (ORNL), and Pacific Northwest National Laboratory (PNNL), proposes to gain detailed and fundamental understanding of stability of glass waste forms to be used for safe and reliable encapsulation of nuclear waste. The project will seek to understand thermodynamic and structural properties involved in crystallization and phase separation in melt-derived waste form glasses and glass-ceramics by using a baseline glass composition with varying additives. This will be achieved by combining neutron scattering, advanced calorimetric measurements, and extensive modeling study.

SECTION C. Environmental Aspects / Potential Sources of Impact

Chemical Use/Storage / Chemical Waste Disposal – Isopropanol will be used to wash sample holders and other equipment. Heat solution experiments for gas adsorption studies use aqueous and organic solvents. The universities have procedures in place to handle the chemical waste that will be generated through this project.

Radioactive Material Use/Radioactive Waste Generation – Some samples will be measured by neutron total scattering, and this will slightly activate the samples. These samples will be stored for a couple months and disposed by Oak Ridge National Laboratory (Spallation Neutron Source) following their standard procedures for activated materials. They are a user facility and once the samples are measured they will handle all further sample storage and disposal. This will be very small sample quantities, probably not exceeding 5 grams during the entire project time.

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 glass waste forms.

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 08/22/2017