

DOE-ID NEPA CX DETERMINATION

SECTION A. Project Title: Decoding Zeolite Crystallization and Stage III in Nuclear Waste Glasses by Coupled Modeling and Experiments – University of California, Los Angeles

SECTION B. Project Description

The University of California, Los Angeles, in collaboration with Pacific Northwest National Laboratory (PNNL), proposes to identify the thermodynamic propensity for zeolite precipitation and the kinetics thereof as a function of the solution conditions (composition, pH, and temperature). Objectives of the project include: (1) elucidate the mechanism of zeolite formation in nuclear waste immobilization glasses and to predict the thermodynamic stability of relevant secondary phases (zeolites, clays, C–S–H, etc.) as a function of the solution conditions; (2) reveal the rate-limiting step of zeolite precipitation and to quantify the kinetics of zeolite precipitation as a function of the solution conditions; and (3) embed the information above into a usable model predicting the corrosion kinetics of nuclear waste immobilization borosilicate glasses.

SECTION C. Environmental Aspects / Potential Sources of Impact

Chemical Use/Storage and Chemical Waste Disposal – Glasses will be synthesized with simulated (non-radioactive) waste elements. Batching, melting, and sample preparation activities result in small amounts of non-hazardous laboratory waste.

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 activities aimed at identifying the thermodynamic propensity for zeolite precipitation and kinetics as a function of the solution conditions.

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