

DOE-ID NEPA CX DETERMINATION

SECTION A. Project Title: Reduced Diffusion and Enhanced Retention of Multiple Radionuclides from Pore Structure Characterization of Barrier Materials for Enhanced Repository Performance – University of Texas at Arlington

SECTION B. Project Description

The University of Texas at Arlington proposes high-resolution, multiple-scale characterization and visualization of the pore-network structure of low-permeability barrier materials and realistic quantification of radionuclide diffusion and retention within barrier materials. This project will achieve the following research objectives: (1) Multi-scale and complementary approaches to characterizing and quantifying pore structure (especially connected pore space as a function of sample sizes) for enhanced isolation of radionuclides from low pore connectivity for a range of generic low-permeability barrier materials (clay/shale, salt, crystalline rock, and tuff). (2) Mechanistic understanding of the intercalation process, and magnitude, of radionuclides in clay minerals for their enhanced retention in barrier materials. (3) Realistic assessment of diffusion and retention of radionuclides in cm-sized intact-/whole-rock barrier materials, using “unsaturated transport-sorption approach”, to address the uncertainty of diffusion and the batch-sorption Kd (distribution coefficient) values in the performance assessment with the context of their enhanced performance of geological repository to store high-level radioactive wastes. (4) Multiple (mercury intrusion capillary pressure, gas and liquid diffusion) approaches to achieving uncertainty assessment of radionuclide diffusion in barrier materials.

SECTION C. Environmental Aspects / Potential Sources of Impact

Chemical Use/Storage, Waste Disposal, and Hazardous Waste Generation – Some hazardous chemicals will be used in the project but involve a small quantity at approximately 1 liter per year. The University of Texas at Arlington has the Environmental Health and Safety (EHS) office to handle these routine hazardous wastes.

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 understanding and quantifying the pore structure and its emergent effect on diffusion and retention of various radionuclides in barrier materials.

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 08/06/2018