

DOE-ID NEPA CX DETERMINATION

SECTION A. Project Title: Quantifying radionuclide sorption to engineered barrier materials under elevated temperature and ionic strength conditions – Clemson University

SECTION B. Project Description

Clemson University proposes to examine mechanisms and thermodynamics of actinide sorption to engineered barrier materials for nuclear waste repositories under high temperature and high ionic strength conditions. The work seeks to characterize actinide sorption to mineral surfaces and examine possible mechanisms of sorption at high temperature/ionic strength through examination of the effects of hydration and hydrolysis on actinide sorption. Interactions will be examined using batch sorption/partitioning experiments, potentiometric titrations, calorimetric titrations, high resolution electron microscopy, and x-ray absorption spectroscopy. Experiments will span the pH range of 4 to 9 and have actinide concentrations ranging from 10^{-11} M to 10^{-8} M, depending on the isotope being investigated, its solubility, and the instrumentation in use for the batch.

SECTION C. Environmental Aspects / Potential Sources of Impact

Radioactive Material Use – This project will use samples containing very small amounts of radioisotopes (typically less than one microgram). Clemson University is licensed by the South Carolina Department of Health and Environmental Control to conduct research with a range of fission/activation products, uranium isotopes, and transuranics. All work with radioactive material will be conducted in labs specifically designated as rad labs and those handling radioactive material will be appropriately trained and monitored, in accordance with university policy.

Radioactive Waste Generation – There will be small amounts of rad waste generated, generally less than 1 microgram of each isotope per experiment. All waste will be handled in accordance with Clemson University Office of Research Safety policy.

Chemical Use/Storage / Chemical Waste Disposal / Hazardous Waste Generation – Chemical acquisition and storage will be necessary to perform project experiments. The chemicals have been used in previous experiments and appropriate labeling, storage, and safety procedures are already implemented. All chemical disposal will be in accordance with university policy set by the Clemson University Office of Research Safety.

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 an investigation to reduce the uncertainty in strategies for sequestration of radionuclide-bearing wastes.

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 7/30/2020