DOE-ID NEPA CX DETERMINATION

CX Posting No.: DOE-ID-18-048

SECTION A. Project Title: Multiphysics degradation processes, and their mitigation, in engineered and geological barriers: experiments and simulation – Duke University

SECTION B. Project Description

Duke University, in collaboration with Lawrence Berkeley National Laboratory and University of Montpellier, France, proposes to fill the gaps in understanding of mechanisms of a series of degradation processes potentially affecting geo-materials involved in nuclear waste disposal, including buffers, seals, backfills, as well as host rock intended to isolate the waste. The project will address: (i) effects related to electro-chemistry of clays, including an increasing ionic concentration due to evaporation, enhancing the clay shrinkage and reducing its swelling capacity, and long-term effects of transformations of clays and rocks changing their mechanical strength and permeability; (ii) mechanisms of air entry into micro-, nano-meter pores in silts, clays and zeolites; and (iii) superposition of thermal and evaporation effects. The focus of the research will be on the degradation of geomaterial-based barriers through drying-cracking due to forced ventilation and heat flux, as well as its possible enhancement by, and interaction with, cracking of the excavation damage zone.

SECTION C. Environmental Aspects / Potential Sources of Impact

The university has procedures in place to handle any waste that will be generated through this project. The action would not create additional environmental impacts above those already permitted at the university.

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: This activity consists of university-scale research aimed to improve the understanding of mechanisms of degradation processes potentially affecting geo-materials involved in nuclear waste disposal.

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 08/02/2018