DOE-ID NEPA CX DETERMINATION

CX Posting No.: DOE-ID-20-073

SECTION A. Project Title: Developing constitutive relationships for the properties of unsaturated bentonite buffers under high temperatures

SECTION B. Project Description

The University of California, San Diego proposes to characterize the effects of high temperatures (up to 200 °C) on the mechanisms and material properties governing coupled heat transfer, water flow, and volume change in unsaturated, compacted granular bentonite, and to understand and simulate the multiphase hydration process of bentonite buffers in deep geological repositories with closely spaced waste packages or dual purpose containers. The project tasks will include a combination of element-scale testing to measure bentonite material properties under high temperatures, tank-scale testing to capture the coupled processes during bentonite hydration under high temperatures, development of quantitative relationships to represent the experimentally-observed thermo-hydro-mechanical behavior, and numerical simulations of bentonite buffer hydration involving high temperatures for different initial densities and rates of water supply from the host rock.

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: The activity consists of university-scale research activities to characterize the effects of high temperatures the mechanisms and material properties governing coupled heat transfer, water flow, and volume change in unsaturated, compacted granular bentonite, and to understand and simulate the multiphase hydration process of bentonite buffers in deep geological repositories.

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 8/6/2020