

SECTION A. Project Title: Investigating the Behavior of Enhanced Pelletized Clay Mixtures Intended for the Isolation of High-Level Nuclear Waste – Texas A&M University**SECTION B. Project Description**

Texas A&M University proposes to advance the current understanding of the behavior of pelletized clay mixtures intended for the isolation of high-level nuclear waste (HLW) and spent nuclear fuel (SNF). The following are the four main objectives of this project: 1) Gain a better understanding of the key features associated with the behavior of pelletized clay mixtures, including the degradation of this type of material when subjected to multi-physics processes. Particular attention will be paid to: i) the effect of high temperatures (up to 190°C) on the response of pellet mixtures, and ii) engineering of pellet mixtures to enhance their thermal conductivity; 2) Produce high-quality experimental data related to clay-pellet mixtures involving tests at different scales from microfabric/microstructural studies up to medium-scale laboratory tests, which will contribute to expanding the current database in this area. The experimental campaign includes a variety of stress levels, temperatures, stress history, and clay degradation scenarios; 3) Upgrade the thermo-hydro-mechanical (THM) constitutive and numerical models to be used to gain a better understanding of these types of materials under different conditions, and for designing geological repositories for HLW/SNF; 4) Develop training opportunities for graduate and undergraduate students on this topic. This project consists of the following tasks: 1) Project management, data gathering and planning; 2) Macroscopic experimental investigation; 3) Fabric/microfabric experimental investigation; 4) Constitutive modeling; and 5) Numerical modeling and applications.

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 occurring 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). For purposes of this category, “demonstration actions” means actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial deployment. Demonstration actions frequently follow research and development and pilot projects that are directed at establishing proof of concept.

Justification: The activity consists of fundamental, experimental, and numerical/analytical/computational investigations to advance current understanding of the behavior of enhanced clay-pelletized mixtures subjected to high temperatures (up to 190°C) and hydration.

Is the project funded by the American Recovery and Reinvestment Act of 2009 (Recovery Act) Yes No

Approved by Jason Anderson, DOE-ID NEPA Compliance Officer, on 09/10/2021.