

<b>SECTION A. Project Title: The Impacts of Pore-Scale Physical and Chemical Heterogeneities on the Transport of Radionuclide-Carrying Colloids – Colorado School of Mines</b>
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<b>SECTION B. Project Description</b>
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The Colorado School of Mines proposes to identify the dominant transport mechanisms of radionuclide-carrying colloids in saturated porous media under the influence of pore-scale physical and chemical heterogeneities. Tasks will include:

- 1) Build and characterize microfluid bead-based sediment analogs
- 2) Identify the impacts of physical and chemical heterogeneities on radionuclide-bearing colloidal transport based on experiments in both microscopic sediment analogs and macroscopic columns
- 3) Develop an accurate pore-scale numerical model
- 4) Build a continuum pore-scale numerical model.

The macroscopic column experiments will be conducted at Pacific Northwest National Laboratory.

<b>SECTION C. Environmental Aspects / Potential Sources of Impact</b>
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**Radioactive Material Use** – For the purpose of this project, we will use radionuclide such as  $^{137}\text{Cs}$  and  $^{90}\text{Sr}$  in the column flow experiments. Those experiments will only be conducted at the Pacific Northwest National Laboratory.

**Radioactive Waste Generation** – Because of the use of radionuclide, radioactive waste (radionuclide-contaminated water) will be generated in the amount of ~10 liters. The Pacific Northwest National Laboratory will handle disposal of the waste.

**Chemical Use/Storage** – Chemicals such as organic solvent (~ 10 liters) and inorganic salts (~ 10 grams) will be used in this project. They will be safely stored in the laboratory at Colorado School of Mines, complying with the safety rules of Colorado School of Mines.

**Chemical Waste Disposal** – Chemical waste will be generated in the form of liquid (~ 10 liters) and solid waste (~ 1 kg). They will be disposed by the Environmental Health & Safety Department at Colorado School of Mines, following the safety rules of Colorado School of Mines.

<b>SECTION D. Determine the Level of Environmental Review (or Documentation) and Reference(s):</b> Identify the applicable categorical exclusion from 10 CFR 1021, Appendix B, give the appropriate justification, and the approval date.
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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 evaluating transport mechanisms of radionuclide-carrying colloids for research purposes.

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

Approved by Jack Depperschmidt, DOE-ID NEPA Compliance Officer on 11/14/2013