Plenary Talk PV VIII Thu 9:00 PV-Rooms

Plutonium in the Environment: Can we Predict its Subsurface Behavior? — •Annie Kersting — Glenn T. Seaborg Institute, Lawrence Livermore National Laborartory, CA USA

There is an acute need to expedite progress toward a permanent storage facility that can safely isolated long-lived radionuclides from the biosphere. Significant uncertainty remains on how to safely store long-lived radionuclides that will make up the majority of the dose after a few hundred years.Plutonium (Pu) is of particular interest because of its high toxicity and long half life (t1/2 239Pu 2.4 x104 yrs). The chemical interactions of Pu are dependent on its oxidation state, which in turn control its stability and solubility. Understanding the interplay (the bio-geo-chemistry) between Pu and the repository environment is necessary to predict the conditions for which Pu will either migrate or remain immobile. A mechanistic understanding of the surface structure and reactivity of coupled Pu*mineral, Pu*organic ligand, and Pu*microbe interfacial processes is needed to advance our understanding Pu. To elucidate the mechanisms controlling Pu transport, we have investigated Pu desorption rates from montmorillonite and other mineral colloids. These data suggest that Pu desorption rates are slow enough that colloid-facilitated transport of adsorbed Pu is possible at the field scale (km distances and decade timescales). Additional experiments show that the presence of organic matter plays an important role in stabilizing Pu both in solution and on mineral surfaces. Our experiments are helping to develop a conceptual model of Pu subsurface behavior.