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Interfacial Reaction Studies of Plutonium on Manganese Oxide Hydroxide Mineral Surfaces

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Several U.S. DOE sites have been contaminated by transuranic radionuclides (TRU). To understand the transport of these TRU, the interaction of plutonium with manganese oxide hydroxide mineral surfaces is currently being studied. Manganese oxides, present as minor phases, can preferentially sequester TRU over iron oxide/hydroxide minerals present in larger amounts. To understand these interactions the sorption of plutonium ions on characterized mineral surfaces as a function of pH and actinide concentration are being studied. The oxidation state of the sorbed plutonium and the local structure of the metal sorption complexes have been determined using X-ray absorption fine structure (XAFS). Ultimately, this data will be used to develop surface complexation models in an attempt to predict TRU migration in the vadose zone.