

Investigations of the Fundamental Surface Reactions Involved in the Sorption and Desorption of Radionuclides

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Abstract

Surface complexation models describing solution and surface-phase reactions have been used for 30 years. Data for these models are derived from experimental techniques with recent advances enabling investigation of complex surfaces. Efforts are directed at understanding sorption and desorption behavior of contaminants from mineral surfaces, as effected by microbial modifications, employing isolates obtained from Nevada Test Site deep alluvium as a model system. The contaminants will be radionuclides with emphasis on actinide elements. Characterization of sediments will include bulk analysis by surface area measurements, particle size distribution, X-ray diffraction, microprobe analysis, chemical extractions, and molecular and cultivation-based microbial community structure assessments. Studies on surface interaction includes: XPS; XAFS; X-ray emission spectroscopy; TEM analysis; and SEM characterization. Non-radioactive isotopes of contaminants will be used when necessary. Collaborators include UNR, UNLV, and DRI. Outcomes will enhance basic scientific understanding of contaminant behavior on surfaces with significant implications to management of DOE sites.