



Annual Report 2000

Interfacial Chemistry and Engineering

August 2001

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Cover photo: Structural and energetic model of Cs⁺ exchange with K⁺ in a layer lattice silicate mineral (e.g., muscovite). Muscovite is a 2:1 layer silicate containing structural layers of octahedrally coordinated Al(III) over- and underlain by layers of tetrahedrally coordinated Si(IV). Isomorphic substitutions in these layers lead to charge imbalance and a cation exchange capacity. These types of exchange reactions control the migration velocity of radio-caesium beneath leaked single shell tanks at Hanford and other DOE sites.

Environmental Dynamics and Simulation researchers have 1) developed molecular models of this exchange reaction; 2) identified the key layer lattice silicates in Hanford sediments controlling Cs⁺ exchange using advanced spectroscopic techniques such as synchrotron X-ray microscopy; 3) studied the thermodynamics and kinetics of Cs⁺ adsorption and desorption on Hanford sediments; and 4) collaborated on the development of a multi-component reactive transport model to forecast Cs migration velocities beneath leaked high level waste tanks at Hanford.

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Annual Report 2000

Interfacial Chemistry and Engineering

J. W. Grate, Interim Associate Director
and the Staff of the Interfacial Chemistry
and Engineering Program

August 2001

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