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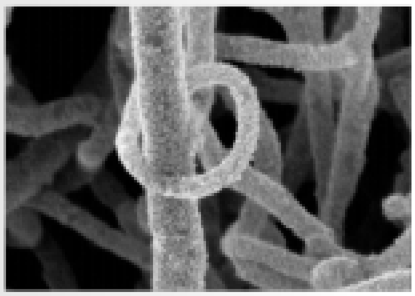

Annual Report 2000

Interfacial Chemistry and Engineering

August 2001

Pacific Northwest National Laboratory

Operated by Battelle for the U.S. Department of Energy

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-cesium 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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PNNL-13504
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Interfacial Chemistry and Engineering

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

August 2001

Prepared for the U.S. Department of Energy
under Contract DE-AC06-76RL01830

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