Dr. Dave Stonestrom
Research Hydrologist
U.S. Geological Survey, Menlo Park

A Hydrogeological Perspective on Nuclear Waste — Tales from the Trenches

The Hanford nuclear complex in Washington State was the premiere plutonium production facility (the larger of only two in the United States), operating between 1944 and 1986. The 1,500 square-kilometer complex housed the world's first full-scale nuclear reactors and fuel-reprocessing facilities—built in wartime haste, without benefit of pilot or environmental studies. Hanford's setting atop massive glacial Lake Missoula jökulhlaups deposits nestled between Rattlesnake Mountain and cliffs across a bend in the Columbia River afforded it secrecy, ample high-quality process and cooling water, and a thick unsaturated zone for waste disposal. However, the capacity of the unsaturated zone to absorb wastes repeatedly threatened to limit production. Eleven-hundred kilometers to the south-southeast, the Amargosa Desert in southern Nevada became home to the Nation's first disposal facility for civilian radioactive wastes. Operating from 1962–92, in early years it accepted virtually the entire waste stream (except fuel rods) from the nascent nuclear industry in California and adjoining states. As at Hanford, a thick sequence of unsaturated alluvial sediments effected waste isolation. Lessions from the restoration of Hanford and ongoing studies at the Amargosa Desert Research Site show the value of high-resolution geologic characterization and the need for process understanding of hydrochemically altered systems to enable the Nation to deal with nuclear waste—past, present and future.

Biography: **Dr. David Stonestrom** is a Research Hydrologist with the US Geological Survey in Menlo Park, California. His research examines the physical, chemical, and biological interactions involved in earth-surface processes controlling flow and transport through unsaturated zones. This research has included laboratory studies of liquid and gas transport through soils and sediments as well as field studies of unsaturated zones from the rain forests of Puerto Rico to the deserts of the southwestern US. Dave has served on various advisory and editorial boards including a National Research Council committee making recommendations to the US Department of Energy on environmental restoration of the Hanford facility. Dave is a founding co-leader of the USGS Toxic Substances Hydrology Program's Amargosa Desert Research Site. He holds a BS in Geology from Dickinson College and MS and PhD degrees in Hydrology from Stanford University.

Recent publications include:

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