The Effects of Unstable Flow on Uranium Transport In Variably Saturated Undisturbed Cores. (S01mayes123542-Oral)

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Abstract:

At the U.S. D.O.E.'s Hanford Reservation in southern Washington, accelerated migration of radionuclides has been observed in the vadose zone beneath the tank farms. Our goal is to provide an improved understanding and predictive capability of the coupled hydrogeochemical mechanisms responsible. The research strategy consisted of collecting undisturbed sediment cores (0.3 m x 0.3 m) to perform lab-scale, multiple nonreactive and reactive transport experiments at multiple water contents. Cores were acquired from fine-grained silty sand and caliche. Hydrologic processes governing transport were a strong function of sediment layering under unsaturated conditions. Steady-state unsaturated flow occurred parallel to horizontallybedded sediments, which suggests a component of lateral flow in the vadose zone. Unstable vertical finger flow was dominant where flow crossed beds, e.g., in cross-bedded sediments. Transport of U-carbonate in the caliche core was governed by multi-species processes, despite its relatively simple mineralogy (amorphous silica and calcium carbonate). Results demonstrate the importance of using undisturbed materials to characterize contaminant transport.

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