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NEAR-FIELD MIGRATION OF RADIONUCLIDES IN THE SUBSURFACE AT THE NEVADA TEST SITE: EVIDENCE FOR COLLOID TRANSPORT OF RADIONUCLIDES THROUGH FRACTURED VOLCANIC ROCK. Annie B. Kersting, Lawrence Livermore National Laboratory, Livermore CA 94550 and Joseph L. Thompson, Los Alamos National Laboratory, Los Alamos NM 87545.

Our ability to characterize and mitigate contamination of radionuclides in the subsurface is limited by our understanding of the mechanisms and major pathways for transport. There is strong evidence that particles and colloids (< 1 μm) are ubiquitous in groundwater and that they have the potential to enhance the transport of contaminants that strongly sorb to the solid phase. In order to investigate the migration of radionuclides via colloids we carried out a series of filtration experiments using groundwater pumped from wells downgradient from an underground nuclear test event. We analyzed unfiltered groundwater, colloidal material caught on a series of filter sizes, and the ultrafiltrate for gamma-emitting radionuclides and tritium. Tritium, $^{60}Co$, $^{137}Cs$, $^{152,154,155}Eu$ and Pu isotopes were detected in the unfiltered groundwater samples. Most of the activity was caught on the filters; the ultrafiltrate had only a few percent of the radionuclides other than tritium. The colloidal material consists of zeolites (mordenite), clays (illite), and cristobalite ($SiO_2$). These minerals are consistent with the lithology of the host aquifer (volcanic tuff). We conclude that radionuclides can and do bind to colloids that then may be transported significant distances in the saturated zone.

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