Iodine-129 in the Eastern Snake River Plain Aquifer At and Near the Idaho National Laboratory, Idaho: 2010-12

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Iodine-129 (129I) is a carcinogenic radionuclide with a 15.7 million-year half-life. As part of routine groundwater monitoring at the Idaho National Laboratory, the U.S. Geological Survey, in cooperation with the U.S. Department of Energy, collected groundwater samples from 2010 to 2012 from 62 wells to track concentration trends and changes of 129I that was contained in wastewater discharged at the INL from 1953 to 1988. Concentrations of 129I in the aquifer ranged from 0.0000013±0.0000005 to 1.02±0.04 picocuries per liter (pCi/L), and generally decreased in wells near the Idaho Nuclear Technology and Engineering Center (INTEC), relative to previous sampling events. The average concentration of 129I in groundwater from 15 wells sampled during four different sample periods decreased from 1990 to 2012. Concentrations decreased in all but two wells within a 3-mile radius of the INTEC, and all but one sample had concentrations less than the U.S. Environmental Protection Agency maximum contaminant level of 1 pCi/L. These decreases are attributed to the discontinuation of disposal of 129I in wastewater and to dilution and dispersion in the aquifer. The decreases in 129I concentrations in areas around the INTEC where concentrations increased between the 2003 and 2007 sample period were attributed to less recharge to the unsaturated zone near INTEC either from less flow in the Big Lost River or from less local snowmelt and anthropogenic sources, which may have previously served as a mechanism to move remnant wastewater below INTEC to the aquifer.

Although wells near the INTEC sampled in 2011–12 showed decreases in 129I concentrations when compared with previously collected data, some wells south and east of the Central Facilities Area, near the INL site boundary, and south of the INL showed small increases. These slight increases are attributed to variable discharge rates of wastewater that eventually moved to these well locations as a pulse of water from a particular disposal period.