Geochemical Evolution of Groundwater in the Beaver and Camas Creek Drainage Basins, Idaho

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The U.S. Geological Survey, in cooperation with the U.S. Department of Energy, is studying the movement of waste solutes in the eastern Snake River Plain (ESRP) aquifer at the Idaho National Laboratory (INL) in eastern Idaho. These studies include geochemical modeling of the aquifer, for which an understanding of the natural chemistry of groundwater at the INL is necessary. Consequently, the groundwater geochemistry of surface-water drainage basins that recharge the ESRP aquifer at and near the INL is being investigated. These basins contribute recharge to the ESRP aquifer as underflow along the northeastern INL boundary. The Beaver and Camas Creek drainage basins originate in the Beaverhead and Centennial Mountains, which are composed of sedimentary and volcanic rocks. Both ranges extend onto the ESRP, which is composed of basalt flows and inter-bedded sediment. Water samples collected from the drainage basins were calcium-magnesium bicarbonate water. The source of the water is primarily snowmelt from the mountains, and water in the Beaverhead and Centennial Mountains resides in sedimentary and sedimentary plus volcanic rocks, respectively. Groundwater from the Beaverhead Mountains is older and is enriched in magnesium relative to groundwater in the Centennial Mountains. As groundwater moves through basalt and sediment of the ESRP aquifer, water-rock interactions increase magnesium in the water at the expense of calcium, sodium, and potassium. Farther down gradient in the aquifer, irrigation recharge adds chloride and sulfate to the water.