Distribution of Isotopic and Environmental Tracers in Groundwater, Northern Ada County, Southwestern Idaho

Candice Adkins
U. S. Geological Survey
230 Collins Road
Boise, ID 83702
(208) 387-1331
cadkins@usgs.gov

Residents of northern Ada County, Idaho, depend on groundwater for domestic and agricultural uses. The population of this area is growing rapidly and groundwater resources must be understood for future water-resource management. The U.S. Geological Survey, in cooperation with the Idaho Department of Water Resources, used a suite of isotopic and environmental tracers to gain a better understanding of groundwater ages, recharge sources, and flow paths in northern Ada County. Thirteen wells with depths ranging from 30 to 580 feet were sampled for field parameters, major anions and cations, nutrients, oxygen and hydrogen isotopes, tritium, radiocarbon, chlorofluorocarbons, and dissolved gasses. Major cations and anions indicated calcium-bicarbonate and sodium-bicarbonate water types in the study area. Oxygen and hydrogen isotopes carried an oxygen-18 excess signature, possibly indicating recharge from evaporated sources or water-rock interactions in the subsurface. Chlorofluorocarbons detected modern (post-1940s) recharge in every well sampled; tritium data indicated modern water (post-1951) in seven, predominantly shallow wells. Nutrient concentrations tended to be greater in wells signaling recent recharge based on groundwater age dating, thus confirming the presence of recent recharge in these wells. Corrected radiocarbon results generated estimated residence times from modern to 5,100 years before present. Residence time tended to increase with depth, as confirmed by all three age-tracers. The disagreement among residence times indicates that samples were well-mixed and that the sampled aquifers contain a mixture of young and old recharge. Due to a lack of data, no conclusions about sources of recharge could be drawn from this study.