Ground Water Sources and Pathways to a Public-Supply Well in a Glacial Aquifer System, Woodbury, Connecticut

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A glacial aquifer system was studied to identify factors that affect the ground-water quality in the contributing area to a community-supply well (CSW) in Woodbury, Connecticut. The distribution of pH, major and minor elements, stable isotopic values, recharge temperatures, dissolved organic carbon, and volatile organic compounds were used to identify recharge source areas, aquifer source material, anthropogenic sources, chemical processes, and ground-water pathways from recharge areas to receptors. Ground water in glacial stratified deposits contributes most of the water to the CSW and is young (< 6 yrs), mostly oxic, and provides most of the ground water to the community supply well (CSW). Ground water in fractured bedrock beneath the valley bottom contributes old (>50 yrs), reduced water of higher pH and ionic strength that comprises up to 11 percent of samples taken near the bottom of the glacial aquifer. Dissolved arsenic and uranium concentrations generally are near the reporting level, but a few wells screened in glacial deposits that are likely derived from underlying organic-rich Mesozoic shales, contain arsenic concentrations up to 7 μg/L. Septic-tank drainfields, road salting, chemical spills, stormwater drains, and lawn fertilizers, also provided contaminant sources to the CSW. Comparison of chloride concentrations and Cl/Br ratios indicates that most samples result from mixing of ground water and road salt or sewage. Leachate from septic-tank drainfields results in locally reduced conditions with nitrate concentrations up to 19 mg/L. Locally high concentrations of gasoline oxygenates (MTBE) and chlorinated solvents (PCE, TCE, and 1,1,1 TCA), and low concentrations of disinfection byproducts were detected in several wells including the CSW. Concentrations of TCE in raw water sampled from the CSW frequently exceeded the MCL of 5 μg/L.

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The 2007 Ground Water Summit