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**GEOCHEMISTRY, WATER SOURCES, AND PATHWAYS IN THE ZONE OF
CONTRIBUTION OF A PUBLIC-SUPPLY WELL, SAN ANTONIO, TEXAS**

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ABSTRACT: The National Water-Quality Assessment Program of the U.S. Geological Survey studies the transport of anthropogenic and natural contaminants to public supply wells (PSWs) with the goal of better understanding source, transport, and receptor factors (such as wellfield management practices) that affect contaminant movement to PSWs. One study area is in the San Antonio segment of the Edwards aquifer, an important water resource in a rapidly urbanizing region in south-central Texas. Like many karst aquifers, the Edwards aquifer responds rapidly to changes in hydrologic conditions and is susceptible to contamination. A delineated local-scale study area (based on a flow-modeled zone of contribution to a selected PSW and its associated wellfield) is representative of the regional aquifer, including unconfined (recharge) and confined aquifer zones. Results for a variety of geochemical constituents were compared for groundwater samples from wells throughout the regional aquifer, the wellfield and PSW, nearby monitoring-well clusters, and selected depths in the PSW. PSW samples from different hydrogeologic zones were not geochemically distinct and were representative of confined groundwater from the regional aquifer. Samples collected from different depths in the PSW under a variety of pumping conditions were relatively homogeneous for most constituents with the notable exception of tritium/helium-3 age tracers. Geochemical and isotopic data were useful tracers of recharge, groundwater flow, fluid mixing, and water-rock interaction processes affecting water quality at the PSW. Contaminants of concern for the long-term sustainability of the aquifer include nitrate and anthropogenic organic compounds (specifically, atrazine, deethylatrazine, trichloromethane (chloroform), and tetrachloroethene). Organic compounds and nitrate were frequently detected in samples collected from the PSW and in regional groundwater samples at concentrations <1 ug/L for organic compounds and 0.7-3.1 mg/L for nitrate, indicating groundwater quality is affected by anthropogenic organic compounds and nitrate. Groundwater age tracers indicate the water from the PSW is likely young (< 1 to 22 years), although age-tracer results do not correlate with other geochemical tracers that provide independent information about groundwater residence time (for example, dolomite saturation indices, Mg/Ca ratios, organic contaminant occurrence). The results of this study will assist decision-makers managing groundwater in the Edwards and other karst aquifers.

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