Multilevel Monitoring of the Edwards and Trinity Aquifers and Implications for Groundwater Flow

Brian A. Smith, Ph.D., P.G. and Brian B. Hunt, P.G.

The Edwards and Trinity Aquifers are significant sources of water for domestic, industrial, and agricultural use and for ecological resources in Central Texas. In southern Travis and northern Hays Counties demand for groundwater has increased considerably in recent years. The Trinity Aquifer has increasingly become a source of water as limits have been placed on the Edwards Aquifer. Proper management of these aquifers requires an understanding of factors affecting the hydraulic relationship between the two aquifers. Until recently, there has been insufficient head data and water-quality data to assess the hydrologic connection and potential for flow between the Edwards and the Trinity Aquifers.

This talk will present potentiometric data collected from three Edwards/Trinity well pairs and a deep multiport well, plus water-quality and permeability data from 13 zones in the multiport well. Potentiometric data from all four sites show that head values are considerably higher in the Edwards than in the middle Trinity. Head differences between the Edwards and middle Trinity are as much as 160 ft at the northern well pair and about 50 ft at the southern well pair.

Water-quality data show that groundwater from the 13 sampling zones of the multiport well can be divided into three distinct hydrochemical facies: calcium bicarbonate, calcium sulfate, and an intermediate facies. The calcium sulfate facies has the highest levels of sulfate, magnesium, calcium, and total dissolved solids (TDS) and is associated with zones in the upper member of the Glen Rose Formation. The lowest TDS zones are in the Edwards, the Cow Creek Limestone, and a rudist reef unit in the lower member of the Glen Rose Formation. Slug tests from the 13 zones indicate the zones of low TDS generally correspond to the zones with the highest permeability.

Significant head differences between zones and the distribution of hydrochemical facies suggest that there is very little, if any, vertical flow between zones. Faults in the area do not appear to create pathways for vertical flow nor do they create barriers to lateral flow. Relay-ramp structures, that are common in the Balcones Fault Zone, could provide the lateral continuity of lithologic units and therefore lateral flow through the units.