Einarson, Murray D. (Einarson and Associates, Mountain View, CA)

STRATIGRAPHIC CONTROLS ON THE DEEP MIGRATION OF DISSOLVED CONTAMINANTS IN SOUTH LAKE TAHOE, CALIFORNIA

The geology of South Lake Tahoe has received considerable scrutiny in the last three years as a result of a multi-million dollar lawsuit filed by the South Tahoe Public Utility District. In the lawsuit, the District sought compensation for the loss of a portion of their groundwater resource. The District maintained that they had to shut off several deep supply wells as a protective measure to prevent them from being contaminated with the gasoline additive MTBE. MTBE had been detected in the shallow water table aquifer at several locations. While no MTBE had been detected in wells screened solely in deeper aquifers, the District maintained that contamination of the deep aquifer was inevitable. A key technical point in their allegation was that the sediments underlying South Lake Tahoe lack thick, laterally-continuous aquitards that would impede the deep migration of shallow contaminants. Detailed evaluation of borehole lithologic and geophysical logs from the District's supply wells, however, show that thick lacustrine clay aquitards separate shallow and deeper aquifers and likely afford more protection from shallow contamination than previously thought. These aquitards were deposited on the floor of ancestral Lake Tahoe during Pleistocene interglacial periods. Correlation of these units with near-shore seismic profiles obtained in the 1960's suggests that the clay aquitards extend laterally for distances of 60,000 feet or more. The aquitards are thickest near the center of the groundwater basin and pinch out laterally near the adjacent mountains. It is these forebay regions that constitute the most direct pathway for contaminant migration to deeper aquifers. Finally, subsurface discharge of inorganic compounds (i.e., nutrients) to Lake Tahoe is suspected of being a factor in the declining clarity of the lake. Because the aquitards prevent deep cycling of groundwater, the time that it takes for dissolved nutrients to reach Lake Tahoe may be less than initially thought. The relatively short residence time may not allow for complete attenuation of many of those compounds.