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SEAWATER INTRUSION OF PRODUCING AQUIFERS IN THE LONG BEACH AREA, CALIFORNIA: INSIGHTS FROM NEW USGS COREHOLE DATA

The U.S. Geological Survey, with support from local water management agencies, is building a sequence-stratigraphic model of the Long Beach area to elucidate the Quaternary history of the southwestern Los Angeles basin, its associated hydrogeologic framework, and its geologic structure. Relying mainly on newly developed reference sections using extensive coring and advanced geophysical logging at new multi-well monitoring sites, we are investigating the potential for seawater to invade the Silverado aquifer, the region's primary groundwater producer and resource.

Core and log data reveal the Silverado to be an amalgamation of fluvial channel, deltaic distributary channel, and shallow marine sands and gravels that are overlain by typically fining-upward parasequence sets of paralic and non-marine high-stand system tract deposits (Lynwood and Gage aquifers). Well correlations and log data suggest that the entire package has been folded progressively into a broad NW-trending anticline that overlies the Wilmington oil field. Our interpretation predicts that fold growth and erosion of the Gage sediment along the fold crest during low-stands would preferentially remove the fine-grained aquitards and provide a highly permeable pathway for seawater from the overlying Gaspur channel deposits to invade the Silverado.

To test this model, we recently drilled a well into the crest of the fold. There, silt and clay-rich beds capping the Gage and Lynwood parasequences are mostly absent, and incipient seawater intrusion occurs within the upper portion of the Silverado. These observations indicate that the fold and its attendant sedimentological effects may contribute significantly to the vulnerability of this important groundwater resource.