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OFFSHORE SEISMIC STRATIGRAPHIC CONTROLS ON SALTWATER INTRUSION IN LOS ANGELES AREA COASTAL AQUIFERS

Ground water overpumping in the Los Angeles basin in the early 20th century caused water levels to decline, reversed seaward hydraulic gradients in some coastal aquifers, and resulted in saltwater intrusion. United States Geological Survey geologists and hydrologists are working cooperatively with local water agencies to (1) understand and model the process of saltwater intrusion in this basin, and (2) identify potential pathways for the saltwater intrusion.

We collected over 2000 trackline-km of single- and multi-channel intermediate- and high-resolution seismic-reflection profiles (60 to 5000 Hz) from the Los Angeles/Long Beach Harbor complex and the adjacent San Pedro shelf. These data were used to develop a 3-dimensional seismic-stratigraphic model of the coastal aquifer system. The offshore seismic-reflection profiles were correlated with onshore geophysical and borehole data collected from four nearby drill sites that were cored continuously to depths ranging to 400 meters. These core holes provide detailed reference sections that furnish stratigraphic, age, and facies control for the seismic-reflection profiles.

A regionally correlative seismic sequence appears to correspond to the Gaspur channel aquifer, a major seawater intrusion pathway into freshwater aquifers. The areas where the Gaspur channel seismic sequence intersects the ocean floor have been mapped. Seawater likely intrudes into the Gaspur aquifer, then migrates up the Gaspur channel and into the underlying aquifers. How these units are hydraulically connected controls the flow of saltwater.

We are incorporating the offshore seismic and onshore core data in a regional groundwater flow simulation model for the Los Angeles basin. The seismic-stratigraphic model provides valuable data for defining stratal geometries, paleo-channels, and fault traces in the offshore that are potential pathways of saltwater intrusion. Incorporating these data into the simulation flow model should assist in predicting fluid flow and improve management of the precious groundwater
resource.