A Stratigraphic Approach to Chicot and Evangeline Aquifer Boundaries, Central Texas Gulf Coast

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ABSTRACT

The threat of impending drought conditions and increased demand on Texas coastal aquifers requires a new generation of numerical hydrogeological models to evaluate water resources more accurately. A stratigraphic study of the Chicot and Evangeline aquifers was undertaken using 140 geophysical well logs. Formational boundaries were established through incorporation of micropaleontologic data in the offshore area, chronostratigraphically based log correlations from the offshore area through the sand-dominated aquifers landward to the outcrop, and ties to mapped outcrop formation boundaries. Percent sand class was calculated from each log and used to map sand distribution and depositional facies.

Five stratigraphically distinct units corresponding to established geologic formations were identified. From surface downward, these include the Beaumont, Lissie, Willis (together constituting the Chicot Aquifer), Upper Goliad, and Lower Goliad (together constituting the Evangeline Aquifer) units. Sand distribution and well log character indicate that dominant depositional systems include dip-oriented fluvial meanderbelts, bayfill facies, low-gradient alluvial fans and fan deltas, incised valleys, and strike-oriented wave-dominated delta front facies and strandplain/barrier bar facies. The base of the Willis Formation (base Chicot Aquifer) is found to be generally deeper than the Source Water Assessment Project (SWAP) dataset, by as much as 500 ft. This represents a substantial departure from previously utilized aquifer boundaries. The Beaumont, Lissie, and Willis formations show a slight angular discordance at their updip termination, and each appears to extend landward for some distance as thin veneers. An abrupt decrease in sand content occurs below the base of the Willis (base of Chicot Aquifer). Mild unconformities occur within the Goliad Formation, with a pronounced surface marking the Upper/Lower boundary and being coincident in a decrease of sand content below the boundary.