LATE TERTIARY AND QUATERNARY DEPOSITIONAL SYSTEMS IN THE SUBSURFACE OF CENTRAL TEXAS COASTAL PLAIN

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ABSTRACT

Late Miocene, Pliocene and Pleistocene deposits in the subsurface of the Central Texas Coastal Plain were subdivided into six operational units equivalent to the surface-defined Fleming, Goliad, Willis, Lissie, and Beaumont Formations. These sedimentary units constitute the last major depositional episodes in the northwestern Gulf Coast Basin. Late Miocene deposition is represented by transgressive shelf and shallow-marine shales overlain by progradational clastics of the upper part of the Lower Fleming, Upper Fleming, and Lower Goliad-Willis units. A minor Pliocene transgressive event is represented by downdip, marine embayment facies of the Upper Goliad-Willis unit. Finally, Pleistocene high-stand fluviodeltaic progradation (Lissie and Beaumont units) terminated pre-Holocene sedimentation.

Interpretation of sediment distribution (Fig. 1), established by constructing a series of net and percentage sand-maps for each unit, permits delineation of the following main depositional systems: fluvial braided-meanderbelt and floodbasin; fluviodeltaic; lagoon; large marine embayments; small bay-head deltas; thick wave-dominated deltas; strandplain; and thick, stacked coastal barriers. Western fluviodeltaic systems were consistently less active than the eastern ones, which deposited greater volumes of sand.

Inherited, subtle structural influence of the deeper seated San Marcos Arch had some effect on sediment distribution and paleogradients. Shallow extensions of the deeper Vicksburg, Frio, and Miocene fault systems display respectively decreasing (from 400 feet; 122 m) displacements in the section studied. Faults clearly played a central role in the distribution of fluvial, deltaic, and strike-oriented coastal sands.

Most sands in the updip parts of the operational units contain fresh water, whereas those of downdip areas contain predominantly brackish to saline waters (Fig. 2). The area with greatest reservoir potential for fresh water includes Victoria, Jackson, Wharton, and Colorado Counties. Possible use of sealed, thick coastal sands in the Lower Fleming unit for the disposal of industrial and municipal liquid-waste is recommended.

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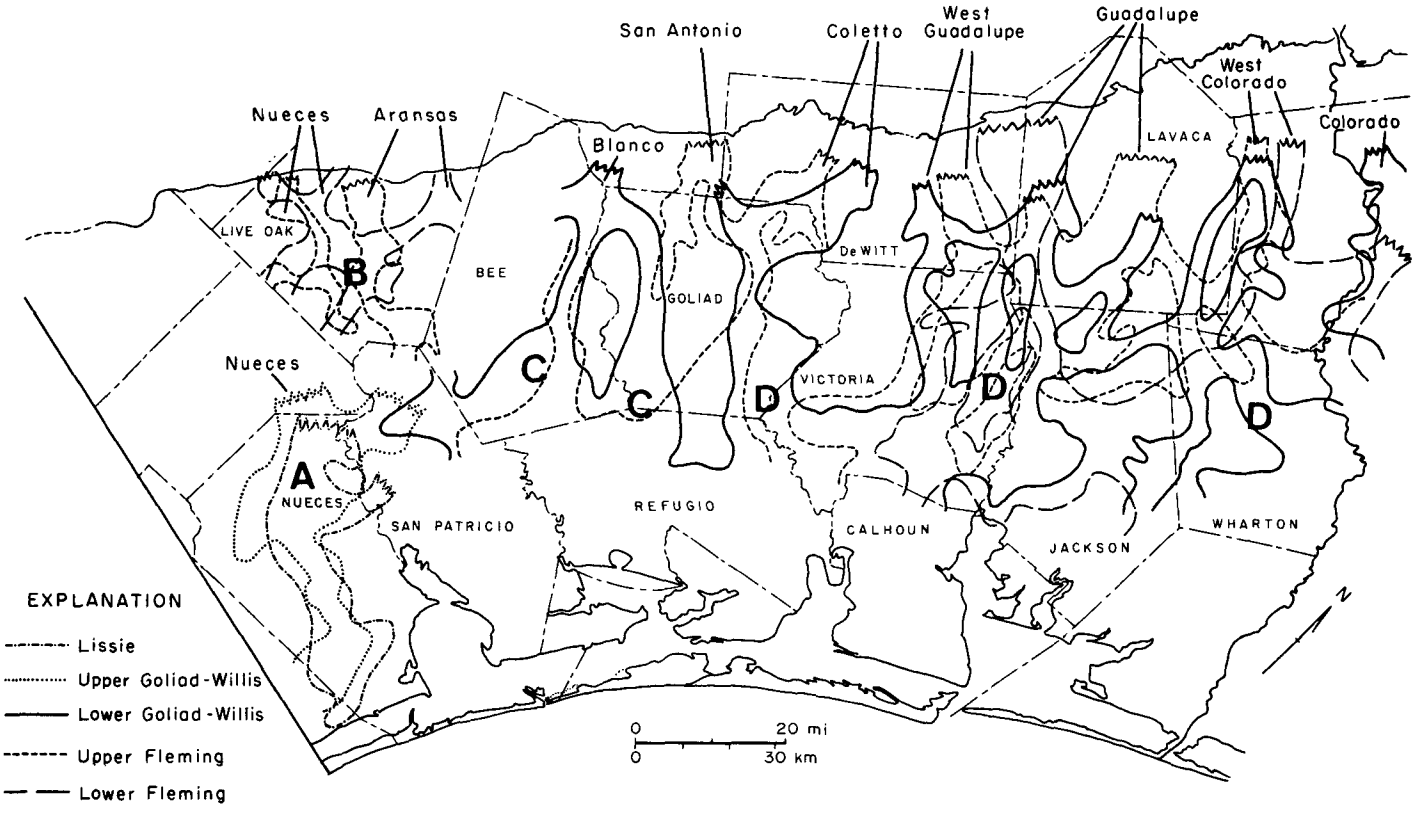

Figure 1. Superposed Fleming to Lissie fluvial sand trends.

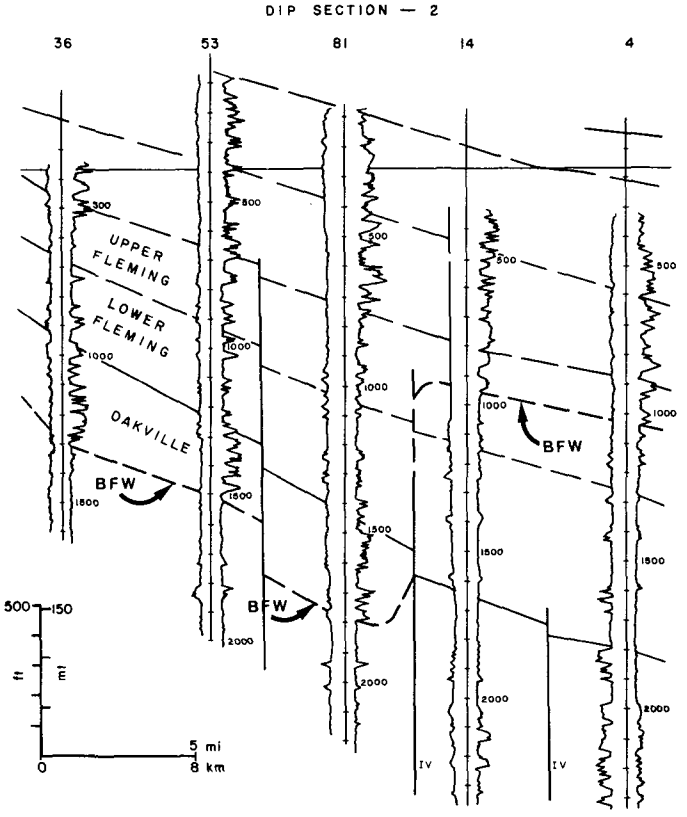

Figure 2. Faults and the base of the fresh-water aquifier (BFW), Jim Wells County.