

EOCENE DEPOSITIONAL SYSTEMS OF THE GULF COAST BASIN: THEIR RELATION TO OIL AND GAS

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ABSTRACT

Basic patterns of deposition responsible for accumulation of the thick terrigenous wedges of the Gulf Coast Basin are shown within the major units of the Gulf Coast Eocene -- Lower Wilcox, Upper Wilcox, Yegua, and Jackson. As indicated by regional mapping and three-dimensional reconstruction of genetic units, controlling and dominant elements in each of these thick terrigenous wedges are delta systems of varying kind and size. Deltas of the Lower Wilcox, Yegua, and Jackson are of the high constructive type and comparable in scale and composition to the Holocene Mississippi delta system. They were fed by large scale fluvial systems with high-volume sediment input; fluvial facies are concentrated locally at the basin margin. These deltas show marked dominance of fluvial and fluvially-influenced deposition, with development of extensive lignite-bearing delta plain facies, thick progradational delta front sand facies, and very thick, rapidly deposited prodelta mud facies commonly associated with growth faulting. Progradational sand facies show either lobate or elongate trends and geometries. Delta systems in the Lower Wilcox, Yegua, and Jackson, developed primarily in the Upper Gulf Coast, supported large scale, laterally associated, strike-fed systems (barrier bar and strandplain) toward the southwest into South Texas, comparable to the strike-oriented strandplain and barrier bar systems of the Holocene northwestern Gulf Coast.

Delta systems of the Upper Wilcox are of the high-destructive type, analogous to the Rhone and other modern deltas where marine modification and redistribution of fluvially-introduced sediments is characteristic. Upper Wilcox deltas were fed by numerous, relatively small fluvial systems with a moderately high sand load; updip fluvial facies are more or less continuous along the entire basin margin. Downdip deltas make up a series of sand thicks with axes roughly parallel to regional strike. Each of these sand thicks consists of local progradational sand facies (channel and channel-mouth bars) flanked marginally by cusped or chevron-trending sand units reworked from the area of the stream mouth as a series of coastal barriers. They make up the dominant facies in Upper Wilcox deltas. Associated prodelta mud facies is moderately thick to thin. These high-destructive deltas did not support a really extensive strike-fed systems.

In high-constructive deltas of the Lower Wilcox and Yegua, principal oil and gas reservoirs occur in the progradational delta front sands, so that trends are chiefly defined by geometry and distribution of these lobate or elongate sand bodies. Vertical stacking of facies commonly results in multi pay fields. Trends are discontinuous along the strike as facies between main lobes consist mostly of muds and tight sands. Attendant growth faulting, salt doming, and diapirism make structural traps dominant in these delta trends. In strike-

oriented depositional systems (barrier bars and strandplains) lateral to these delta systems, trends are regionally persistent with entrapment commonly stratigraphic and associated with lagoon- and shelf-side sand pinchouts. Oil and gas trends in the Upper Wilcox high - destructive deltas are defined by the local cusped-trending coastal barrier sands and the near-seaward or down-dip proconstructive delta trends and less persistent than those of strandplain and barrier bar trends. Principal oil and gas accumulation in the Upper Gulf Coast Upper Wilcox is in a series of en echelon-trending strandplain sands fronting updip deltas.