Mississippi, and Alabama consists of deposits of four principal depositional systems: (1) the Holly Springs delta system which is volumetrically the largest system; (2) the Pendleton bay–lagoon system which extends into eastern Texas; (3) a restricted shelf system east of the delta system; and (4) an unnamed fluvial system which crops out along the flanks of the northward-trending Mississippi trough. Sandstone isolith maps outline the geometry of the delta mass and show at least three lobe complexes separated by mud-rich interdeltaic subembayments.

Detailed facies maps, on which information derived primarily from electric logs is used, allows recognition of seven principal component facies of the delta system: (1) bar-finger sand facies; (2) interdistributary bay mud-salt facies; (3) distributary channel sand facies; (4) prodelta mud facies; (5) distributary mouth bar–delta front sand facies; (6) interdistributary deltaic plain sand-mud-lignite facies; and (7) destructional phase sand-mud-lignite facies. Two principal types of delta lobes differentiated by their areal geometry, internal facies relations, and distributary channel development, can be recognized in the Holly Springs delta system. Bird-foot lobes were constructed where distributaries prograded over thick prodelta mud sequences; thinner, more lobate shoal-water delta lobes formed on shallow, sandy shelves or on foundered plains of older deltas.

A distinct correlation between depositional environment and the production of oil exists in the Holly Springs and Rockdale delta systems, which comprise the lower Wilcox of southeast Texas. Sand units associated with facies of the distal margins of individual delta lobes or with the destructional units are the most prolific reservoirs, and production is therefore centered along the flanks of the major lobe complexes where maximum delta destruction and interfingering with marine mud occurred.

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Wilcox Dipmeter Applications

Thick lenticular Wilcox sandstone bodies of fluvial channel, bar-finger, or marine-bar origin are favored objectives of drilling in the active Mississippi-Louisiana Wilcox (Eocene) play. Correct utilization of dipmeter surveys will facilitate development and exploration drilling for these thick sandstone bodies. Detailed computation with a maximum number of computation levels is necessary; also, detailed analysis by geologically oriented personnel is essential.

An approach to sandstone-trend determination is presented using sandstone cross-bedding and counter-regional dip due to differential compaction. Substantiation is provided by an example area, Milligan Bayou field, Avoyelles Parish, Louisiana.

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Sedimentation in Breton Sound and Effects of Mississippi River-Gulf Outlet

The Mississippi River-Gulf outlet is a channel 36 ft deep and 500 ft wide extending from a point south of Michoud, Louisiana, southeastward across the marshes and Breton Sound into the Gulf of Mexico. The outlet was constructed by the U.S. Army Corps of Engineers to provide additional access to the Port of New Orleans and thereby ease traffic on the Mississippi River. The channel crosses a delta lobe constructed when the Mississippi River flowed down a course east of its present course. The sedimentary environments and the features formed by the destruction of the now abandoned and subsiding lobe have a great influence on sedimentation in the outlet and, conversely, the outlet has had a profound effect on the environments on which it has been superimposed. The outlet has encountered an excessive amount of shoaling in its Breton Sound reach. In an effort to determine the cause(s) of the shoaling and the source(s) of the shoal material, a study was made of the factors influencing sediment distribution in the Breton Sound area (*e.g.*, tides, winds, spoil, and sediment distribution, salinity, current directions, and velocities). The principal source of the shoal material was determined to be the spoil dredged from the outlet itself which returns to the channel by density flow rather than by normal deposition of suspended material.

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Depositional Environments of Sandstones as Interpreted from Subsurface Measurements—an Introduction

A sedimentary rock is a product of its provenance and transportational mechanisms as well as of its environment of deposition. As such, a sedimentary rock reflects the physical and chemical conditions under which the sediment was transported, deposited, and buried. The combined factors of size, energy, and water depth give an indication of the environments of deposition and these factors are represented directly or indirectly on the IES log (in the Gulf Coast, the "base line" corresponding to impervious beds is commonly shale, and peaks on the left correspond to pervious beds, commonly sandstone). Therefore, it is necessary to know graphically the environmental transitions and configurations as shown on the log. These transitions are of three general types. *Type a* appears to be the most common transition in Gulf Coast stratigraphy and exemplifies an abrupt change from one size fraction to another; therefore this transition indicates an abrupt environmental change or a local unconformable surface. *Type b* is a gradual transition from sandstone to shale or *vice versa* through an interbedded sequence of sandstone and shale. On a local scale this transition could be attributed to a gradual regressive or transgressive oscillation. *Type c* is the least common and most difficult to recognize. This transition suggests a gradual size change (*i.e.*, graded bedding) and could appear at the top of a transgressive phase or the base of a regressive phase. Hence nine different combinations, with minor modifications, are possible in a sandstone-shale sequence and these are used to interpret the possible environments of deposition of the beds.

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Bar and Barrier-Island Sands

Elongate sand bodies may be classified as depositional dip sands (alluvial, channel, *etc.*) or depositional strike sands (bar, barrier, *etc.*). Bar and barrier sand bodies generally exhibit several characteristic properties. Among these are shape, relations with surrounding strata, mineral content, grain size and sorting, size and sorting trends, and carbonate and heavy-mineral content. These properties define the sand body and permit its identification. Depositional strike