

Structure, Stratigraphy, and Depositional Environment of the *Heterostegina* Limestone and Overlying Sandstones in the Lake Pontchartrain Area of Southeast Louisiana

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The *Heterostegina* zone of the Oligocene Anahuac Formation in southeastern Louisiana occurs in the subsurface as an extensive shelf reef complex. The *Heterostegina* limestone is overlain by strata associated with the Oligocene *Discorbis* and lower Miocene *Robulus* (43) biostratigraphic zones.

Examination of electric logs and drill cuttings from wells in the Lake Pontchartrain area of southeastern Louisiana reveals the importance of the *Heterostegina* reef as a paleoenvironmental punctuation marking a significant shift in regional depositional patterns that occurred between the generally transgressive Oligocene seas and the generally regressive Miocene seas. The *Discorbis* and *Robulus* (43) zone sedimentary rocks in the study area are interpreted to represent a transition of environmental conditions following the transgressive reefal carbonate environment in place during *Heterostegina* reef deposition. Fauna identified in thin section from the *Heterostegina* reef interval suggest deposition in a warm, shallow-marine environment relatively free of significant clastic influx. An eastward migration of late Oligocene-early Miocene stream systems

introduced an influx of clastic sediments onto the ancient shelf of the Lake Pontchartrain area, which influenced the termination of favorable conditions for *Heterostegina* reef growth.

The *Robulus* (43) zone strata are characterized by a cyclic sequence of limestone, shale, and sandstone. Within this interval, two general lithofacies are identified. Lithofacies I is characterized by thick, shore-parallel sandstone deposits and is interpreted to have been deposited in association with a barrier-beach/tidal-inlet channel environment. Lithofacies II is characterized by shale-prone sandstone intervals, which are immediately overlain by calcareous mudstones and limestones deposited in the offshore inner-middle neritic environment.

Five oil and gas fields in the study area have produced hydrocarbons from the interval of interest. The occurrence of hydrocarbons at these locations with respect to mechanisms of entrapment and areal extent of the reservoirs was characterized through detailed subsurface mapping.

Targeted Infill Drilling at Stratton Field Using 3-D Seismic

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Stratton field is located on the Vicksburg flexure trend in Nueces and Kleberg Counties, South Texas. It has produced more than 2.8 Tcf of gas since 1937 from Frio fluvial/deltaic sandstones and Vicksburg shallow-marine sandstones. The field is a combination stratigraphic and faulted structural trap, and contains numerous highly compartmentalized sandstone reservoirs. Continuous infield drilling is required to keep the field producing, and 3-D seismic data have been used to select the best locations for these wells.

In 1992, an 8-mi² seismic survey was completed in the southern end of the field, and the resulting structural interpretation presented many more fault traps than were apparent in the 2-D seismic interpretation. So far, all of the new wells drilled within the survey have encountered untapped compartments enclosed by fault traps. Furthermore, fault cuts in the new wells have always been within 20 ft of the position predicted by seismic data.