related to the adjacent prodelta slope.

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Well Log Analysis Concepts in Clastic and Argillaceous Sediments, United States Gulf Coast

Reliable estimates of amount, type, and distribution of clay minerals encountered in Gulf Coast sands improve log-derived determination of reservoir properties, such as porosity, hydrocarbon saturation, and permeability.

Log-derived determination of clay properties also provide information for geologic and formation evaluation studies, including detailed stratigraphic correlations, clay diagenesis, source rock potential, cation exchange capacity, overpressure detection and evaluation, and commercial hydrocarbon distribution in overpressure regimes.

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Diagenesis of Middle Miocene Sands in Geopressure Zone of Lirette Field, Terrebonne Parish, Louisiana

A study of temperature, pressure, and salinity distribution in the Lirette field reveals important information concerning the effects of the hydrodynamic regime on sandstone diagenesis. Mineralogic examination of associated shales also aids in the understanding of diagenesis in these sands.

The Lirette field is a large domal structure related to deep-seated salt, approximately 20,000 ft (6,096 m), bounded to the north and south by major growth faults. Isothermal surfaces in the Lirette field closely follow the structure. Isotherms commonly drop in downthrown fault blocks. Along fault leakage zones, temperatures increase. Pressure distribution in the Lirette field is primarily related to structure, and the presence of a sufficient shale to sand ratio. Formation water salinities are lower (<50,000 ppm) for wells that have been "flushed" by geopressured waters.

The well-documented decrease of smectite in mixed-layer illite-smectite is present in Lirette shales. A more detailed analysis indicates that some montmorillonite may be converted to beidellite before it is converted to illite.

Sandstone diagenesis in the Lirette field is complex and there are significant lateral and vertical variations. The relative sequence of diagenetic events in Lirette sands is as follows: (1) spherulitic calcite cement, probably formed at or near the sediment-water interface; (2) authigenic chlorite rims and platelets, which help to preserve primary porosity; (3) quartz and feldspar overgrowths, uncommon; (4) ferroan calcite cement, due to localized flushing of sandstones by waters released from clay diagenesis; and (6) authigenic kaolinite cement, which reduces porosity along fluid escape routes.

Extensive carbonate cement and orthomatrix are the primary contributors to decreased porosity. Late stage kaolinite cement in flushed zones also reduces porosity, but to a lesser extent.

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Clay Minerals as Indicators for Depositional Environment in South Halletsville Field, Lavaca County, Texas

The South Halletsville field, Lavaca County, Texas, has gas and condensate production from lower Wilcox sandstones and shales which have been interpreted as either channel turbidite deposits in outer-shelf to slope locations or deltaic and strand-plain sands and muds. Twenty-four core samples from the General Crude Oil Co. 1 A. G. Henkes Gas Unit were analyzed by X-ray diffraction methods to determine whether a semiquantitative estimate of clay mineral content would aid in determining the depositional environment. Discrete illite and chlorite are of particular interest because the presence of these minerals is interpreted as being due to original deposition.

Three shale samples, from 10,194 to 10,206 ft (3,107 to 3,111 m) and 11 sandstone samples, 10,180 to 10,194 ft (3,103 to 3,107 m) were selected from one core section. This sequence of samples is particularly important because it contains a shale and the overlying sandstone. In addition, a deeper sandstone was sampled in the interval of 11,032 to 11,072 ft (3,363 to 3,375 m).

If a turbidity-type event had occurred, the weight percent of non-diagenetic clays should (1) decrease significantly as the boundary is crossed between the shale and the overlying sandstone, and (2) gradually increase in progressively shallower samples within the sandstones. However, the weight percent for chlorite does not vary significantly regardless of a change in lithology, shale to sandstone, or a change in depth. The illite content gradually decreases with shallower depths in both core intervals. This sequence is more compatible with a transgressive deltaic environment.

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Exploration Ramifications of Subsurface Fluid Migrations in Lake Borgne–Valentine Area of Southeastern Louisiana

An area in southeastern Louisiana is studied to determine possible areas of subsurface fluid migrations. The lithology and structural geology are determined so as to identify potential pathways of these migrations. The bore-hole readings are also used to determine the patterns of temperature, pressure, and salinity parameters. Where vertical subsurface fluids have migrated, the fluids at shallow depth have temperature and salinity characteristics of fluids at greater depth, i.e., anomalously high temperatures and low salinities. In addition, the mass movement of the water from depth (out of the abnormally pressured zone) reduces the pressure and lowers the top of this zone.

Areas which indicate migrations are economically important because the migrating waters are theoretically capable of carrying hydrocarbons. Traps in the vicinity of these migrations are of special interest to the hydrocarbon explorationist. Anomalously high temperatures and low salinities are also of interest to the geothermal explorationist.

The part of southeastern Louisiana studied has twelve areas of possible subsurface fluid migrations and