Cretaceous Transgression of Coahuila Peninsula, Potrero de la Mula and Sierra del Fuste, Coahuila, Mexico

Exposures of the Late Jurassic to Early Cretaceous Coahuila peninsula have been reported at three localities northwest of Torreon and at Potrero de la Mula in central Coahuila. Exposures also occur at Sierra del Fuste, about 25 km northwest of the La Mula outcrops. At Potrero de la Mula, granites to granodiorites containing xenoliths are cut by dikes of six ages. Deep pre-Cretaceous weathering, thin transgressive arkose, and overlap by the Padilla Formation confirm these as basement rocks.

In early Neocomian time the basement was a source of detritus for the basinward San Marcos Formation. Subsequently, seas partly covered the La Mula area, depositing the lagoonal facies (Oballos Member) of the Padilla Formation, which thins to a featheredge against the higher parts of the basement. A 1 to 2-m arkose, which seems restricted to paleotopographic lows, is present at the base of the Padilla. Overlying the Padilla, marine shales and a progradational sequence of fluvial and marginal-marine sandstones compose the La Mula Formation. Upper La Mula shales grade upward into sabkha deposits of the lower La Virgen Formation. Normal-marine shelf conditions existed at Potrero at several different times, causing carbonate tongues to be deposited in the La Virgen Formation and ultimately forming the Cupido Formation. Possible subaerial exposure of the Cupido preceded deposition of the La Peña shales and calcareous mudstones, which grade upward into calcareous mudstones of the Aurora Formation.

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Movement of Subsurface Waters Under Sabkha, Abu Dhabi, United Arab Emirates, and Its Relation to Dolomite Genesis

Field work was carried out during the years 1971-73 to investigate the hydrology of the Abu Dhabi sabkhas with the purpose of determining (1) the source of subsurface water inducing the diagenesis of Holocene sediments and (2) the directions and rates of hydrologic movements. The ionic ratios of Cl/Br and K/Br and the stable isotope contents of the subsurface brines of the sabkha separated them into three distinct categories according to their origin: (1) coastal sabkha zone, of evaporated marine waters from supratidal flooding (a) daily near the coast from the lagoon and (b) occasionally farther inland from the open sea; (2) intermediate sabkha zone, a mixture of marine waters with meteoric groundwaters which are isotopically altered by capillary evaporation and/or diagenesis, that is, the oxygen-18 content increases while the deuterium content remains relatively constant; and (3) continental sabkha zone, of meteoric groundwater with variable isotopic composition as a result of evaporation and sporadic addition of rainwater.

The intermediate sabkha zone is the site of extensive diagenesis, precipitation of gypsum and anhydrite, and formation of dolomite. Unusual winter storms in conjunction with spring tides produce high supratidal flooding in the intermediate zone by open seawater. The groundwater table rises nearly to the surface. Floodwaters dissolve and transport away interstitial salts, which are carried seaward surficially or downward through the aquifer at an average rate of 11 cm/year. Subsequent secular evaporation tends to lower the groundwater table and induce Darcy flow under a vertical hydraulic gradient of evaporative pumping, that is, upward movement of water through the saturated zone to replace water lost by capillary evaporation. An appreciable vertical groundwater gradient is induced by the presence of a cemented crust which serves as an aquiclude about 1 to 2 m below the surface.

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Massive Marine-Sandstone Facies, Mackerel Field, Gippsland Basin, Australia

The Esso-Hematite Mackerel oil field in the Gippsland basin, Australia, is in a high-quality Paleocene sandstone section and has been delineated by four exploratory wells.

A predevelopment stratigraphic model of the field was constructed from detailed analysis of high-quality seismic data. Although the sandstone section initially appeared to be massive and homogeneous, seismic data quality was sufficient to separate 11 discrete depositional units, each with an apparent marine progradational character. The boundaries of these seismic units were then tied back to minor variations in log and core lithologic characteristics, providing facies and depth control for the model.

It was possible, therefore, to construct a detailed geologic picture—with emphasis on the vertical and lateral extent of facies distribution. petrographic character, and reservoir properties—in a section which initially appeared to be generally ambiguous in its stratigraphic and paleoenvironmental position in the depositional framework of the surrounding area.

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Test-Tube Pyrolysis—Simple Technique for Identifying Yield and Maturity of Source Rocks

When small samples (i.e., well cuttings) of kerogen-rich rock are pyrolyzed in a test tube placed over a propane torch, oil-like material may be generated and condense as a brown residue around the walls of the tube. This simple technique may be used to identify source rocks capable of generating liquid oil. The artificial test-tube-generating process is believed to be similar to that associated with natural time- and temperature-dependent processes accompanying rock burial in depositional basins. The relative amount of oily residue pyrolytically generated in a test tube is therefore a semiquantitative measure of the natural oil-generating capacity of the rock. Source rocks which have been subjected to advanced stages of thermal maturation are not capable of generating liquid hydrocarbons and there-