to the clay platelets and as replacement ions in the lattice of carbonate minerals. Samples obtained from near the mouth of the bay contained a greater amount of shell material, and, therefore, the barium contents were expectedly higher.

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Composition and Diagenesis of Upper Cretaceous San Miguel Sandstone, Northern Webb County, Texas

In northern Webb County, Texas, the Upper Cretaceous San Miguel Formation of the Maverick basin contains sandstones that range in composition from feldspathic litharenites to lithic arkoses. Data include petrographic analysis of sidewall cores from two wells and cuttings from two additional wells. Volcanic rock fragments represent the predominant lithic constituents and consist of trachytic keratophyres. Plagioclase phenocrysts occur in a trachytic groundmass of albite-oligoclase laths and microlites.

Known Late Cretaceous volcanics, which have been reported from eruption centers to the north and northwest, consist of labradorite-olivine-basalt, nephelite-melilite "basalts," phonolite, nephelinite, and serpentinized basalts. This assemblage suggests that the keratophyric grains were derived from a different volcanic province. The most likely potential source areas for these keratophyric volcanic centers existed to the west or southwest, probably in Mexico. No Late Cretaceous keratophyric volcanics have been reported within this area. Perhaps such eruption centers did exist in Mexico and subsequently were buried or obscured by Cenozoic volcanic centers.

Sandstones from the superjacent Olmos Formation, in the same area, contain only 5 to 10% keratophyric rock fragments. This small percentage suggests that the keratophyric volcanic center had become dormant or extinct by the end of San Miguel "time," and the eroded volcanic centers were shedding much less debris during Olmos "time."

Major porosity-occluding cements in the San Miguel are chlorite, kaolinite, and ferroan calcite. Much secondary porosity was created by partial to complete solution of plagioclase and volcanic rock grains. In many intervals large primary and secondary voids are lined by chlorite and filled by kaolinite.

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Jurassic Petroleum Geology of Southwestern Clarke County, Mississippi

Electric logs from wells in southwestern Clarke County, Mississippi, illustrate the structural and stratigraphic relations which affect hydrocarbon production. The fields studied (West Nancy, Nancy, East Nancy, Prairie Branch, and Lake Utopia) are coincident with salt-cored structures and are aligned from northwest to southeast, parallel with the updip limit of the salt. Production depths increase basinward and southwesterly. The fields produce from primary porosity in oolitic grainstones of the upper Smackover Formation. Prairie Branch and East Nancy also produce from siliciclastic sands of the underlying Norphlet Formation, whereas West Nancy has additional production from oolitic grainstones of the overlying Buckner Member of the Haynesville Formation.

The general depositional sequence that controlled hydrocarbon accumulations is: deposition of siliciclastic sands of the Norphlet; accumulation of carbonate muds of the lower Smackover and initiation of salt movement; and formation of offlapping shingles of oolite sands of the upper Smackover on faulted salt-cored structures. Structural movement was complete by the end of Haynesville deposition. Hydrocarbon migration most likely occurred during Haynesville deposition, because most Smackover and Norphlet pay zones coincide with Smackover highs and not with Haynesville structures.

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Gray Sandstones (Jurassic) in Terryville Field, Louisiana—Basinal Deposition and Exploration Model

Deep (~ 13,000 ft, 4,000 m) hydrocarbon production at Terryville field is from various zones within Upper Jurassic siliciclastics that are referred to informally as the "gray sandstone" section. This sequence of interbedded sandstones and shales occurs in the Smackover section or within the lower Bossier shale seaward of the Upper Jurassic shelf edge, and is correlative to and coeval with inner shelf facies deposited north of the field area.

The "Gray" section at Terryville field consists of at least four sandstone bodies separated by black shales and silty to sandy shales. The shales are thinly bedded and harbor a locally abundant ichnocommunity of *Chondrites, Planolites,* and *Scalarituba*; small ammonoids and bivalves are present locally in these beds. Thin layers and lenses of sandstones (lenticular and flaser bedding, partial Bouma sequences) are intercalated with the shales locally, and commonly are heavily bioturbated by *Teichichnus* and *Arenicolites.* The sandstones are fine grained, feldspathic sublitharenites, locally conglomeratic (shale clasts), with rare ooids and comminuted skeletal fragments. The four sandstones in the field area are of stacked, lobate geometry. The lobes consist internally of anastomosing lenses of sandstones and conglomeratic sandstones interbedded with and replaced laterally by shales and sandy shales. The long axes of these lobes and lenses are oriented normal to regional upper Smackover shelf-edge trends. Stacked "megasedimentation packages" are recognized within each sandstone lobe. These packages consist internally of repetitive second-order sedimentation units, including partial Bouma sequences, locally conglomeratic graded beds (normal and reverse), massive textureless beds, and coarse rhythmites. The thickness and internal grain size of these component units have a tendency to decrease systematically upward from the base of and laterally within each megasedimentation package. Stacked packages within and immediately surrounding the depoaxes of each lobe coarsen upward from repetitive units of sandstones to conglomeratic sandstones.

The areal distribution, vertical stratigraphy, geometry, bedform characteristics, and texture of the "Gray" sandstones, and their regional relation to upper Smackover carbonate facies to the north, suggest their formation as progradational submarine-fan complexes deposited in a basinal environment. The sandstones and conglomeratic sandstones are interpreted as braided distributaries and associated facies deposited in upper and midfan environments. At distances from these distributaries, the thinner sandstone packages and the interbedded shales and sandstones represent proximal overbank to midfan deposits. The intervening shales are interpreted as basin plain and distal overbank deposits.

Although trapping at Terryville field is mainly structural, sandstone trends and geometries control reservoir occurrence, and this aspect of stratigraphic entrapment should be expected in future "Gray" sandstone fields in this area. Reservoir permeabilities in the "Gray" sandstones are limited because of the presence of pore-filling chlorite, illite-smectite, and dolomite.