occurs as both grain coats and pore bridgings, kaolinite forms scattered pore fills, and Fe-chlorite coats a few grains.

The channel-fill deposits are well to poorly sorted, very fine to medium-grained sandstones, commonly conglomeratic, and contain calcite-cemented zones. These deposits are mineralogically similar to the bar-finger deposits but contain abundant shale and fossil fragments at the base. Noncalcareous channel sandstones are characterized by scattered Fe-chlorite grain coatings and pore-filling illite.

Intergranular porosity is well developed and has not been severely reduced by the pervasive quartz overgrowth cementation. The eastern part of the project area contains a higher quality reservoir section because of the sparsity of clay zones in the bar-finger sandstone and the thicker channel-fill deposits in this area. Secondary porosity, produced by the dissolution of feldspar grains, has slightly enhanced the overall quality of the Benoist Sandstone.

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Holocene Infilling of Coastal Lagoons by Mixed Terrigenous Siliciclastic and Marine Carbonate Sediments, Vieques, Puerto Rico

Infilling of coastal lagoons along the southern coast of Vieques, Puerto Rico, during the Holocene transgression is the result of contributions from both terrigenous siliciclastic and marine carbonate sources. Four lagoons displaying varying infilling and interaction with open marine waters were chosen for detailed stratigraphic study. Cores taken perpendicular to modern lithotope trends show a well-defined sequence that is similar throughout the lagoons. The stratigraphy also defines two distinct origins of the lagoonal basins: those resulting from sheltering provided by Oligocene-Miocene limestones and those developed by accretion of beach ridges seaward of shallow embayments.

Sedimentation in both types of lagoons began with deposition of terrigenous colluvium. Rising sea level was accompanied by storm-generated marine derived gravels that accumulated above the colluvium. Intertidal mud-flat facies and subsequent *Diplanthera* peat deposits denote the existence of restricted intertidal and subtidal environments respectively. These facies were overlain by molluscan gravel and *Halimeda* sand indicating increased water depth and improved circulation with the open marine environment. Mangrove peats are prominent in cores from the lagoonal margins. They show seaward migration of this environment as terrigenous sediment continued to prograde into the lagoons.

Lagoonal margins display a terrigenous, siliciclastic-dominated progradational sequence, whereas the central and seaward portions display a mixed siliciclastic and carbonate transgressive sequence. These sequences occur in close geographic proximity and could provide problems of interpretation for the geologist concerned with the ancient record if detailed stratigraphic data were not available.

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Effects of Clays on Well Economics, Wire-Line Log Interpretation, and Completions

Composition and distribution of clays (both as clay minerals and true shales) can have a direct impact on the day-to-day and long-term economic performance of a well. Clays affect the following:

(1) Distribution and quantity of interstitial fluids (i.e., value of reserves in place). The specific composition of dispersed (authigenic) clays controls the surface area of the pore system. Water bound in micropores created by these dispersed clays can comprise ±70% of fluid volume, but the well may produce water-free hydrocarbons. In such shaly sands, calculation of S_w by itself often may not identify either the amount or type of fluid production. It can predict the presence of hydrocarbons, but is not an optimum indicator of fluid production.

(2) Rate of production (i.e., time value of reserves). The distribution of clays affects rate of production. Laminar clays will not reduce flow rates as significantly as dispersed clays. For example, a sand containing 20% clay distributed as laminae will have its net pay reduced by 20%. Production from the sand laminae is not affected by the clay. However, a sand with 20% clay dispersed in 30% pore space may not produce economic quantities of hydrocarbons. Furthermore certain clay minerals, such as fibrous illite, can significantly increase flow tortuosity and reduce daily flow rates.

(3) Wire-line log response (i.e., bypassed production). Calculated values of S_w, porosity, and V_{shale} must be interpreted considering clay type and shale distribution. High values of log derived S_w can indicate (a) highly productive laminated sand-shale sequences, (b) low permeability dispersed clay production, or (c) water production. Calculated porosities depend upon assumptions of rock density, which can be significantly altered by the presence of shales. V_{shale} is calculated from the gamma ray response, yet three of the four major families of clay minerals are nonradioactive and do not have any effect upon gamma response. Much production is bypassed due to inadequate knowledge of clay composition in potential horizons.

(4) Completion. The role of clay minerals on completion procedures is well documented. Clay minerals dispersed in pores can interact with common well-bore fluids and irreparably damage potentially productive sands. A knowledge of detailed clay compositions is vital to successful stimulation effects. Individual wells or whole zones can be written off as nonproductive if inappropriately designed stimulation efforts prove unsuccessful.

Identification of bypassed production and incorrectly stimulated zones are particularly important during field development because of the heavy front-end investment necessitated by development. Once this investment is made, then hydrocarbon-productive zones that were not obvious or considered uneconomic during exploratory evaluation, become important targets. Experience suggests that much bypassed production contains unusual clay content or clay distribution.

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Fluid Movement and Diagenesis in Fine-Grained Geopressured Sediments of Frio Formation (Oligocene), Kaplan Field, Southwestern Louisiana

Investigation of structure, temperature, pressure, salinity, and core samples at Kaplan field yields information on diagenesis of fine-grained sandstones deposited in an outer shelf/upper slope depositional environment. Cross sections and structural maps reveal a domal structure at 15,000 ft (4,572 m) of depth and a northeast-striking growth fault. Post depositional faults occur at shallower depths (11,500 ft; 3,505 m). A large growth fault forms the northern border of the study area. The shallow occurrence of