

# **Lithologic Controls on Reservoir Quality and Production Trends in the Carbonate Pettet Formation, Rusk County, East Texas**

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## **Abstract**

The Early Cretaceous (Barremian-Aptian) Pettet Formation of East Texas was deposited as part of a shallow-water tropical carbonate system on the giant Comanche Platform of the northern Gulf of Mexico. It consists of mainly muddy green algae-rich platform interior carbonates punctuated by skeletal-oolitic shoals, which fringed topographic highs in shallow, high-energy depositional settings. The Pettet Formation is broken into four subunits (Pettet A, B, C, and D), each representing a high-frequency sequence (HFS). Within the framework of these sequences, mapping of shoal distribution uncovers progradational and retrogradational patterns both at a larger (composite) and finer (inter-HFS) scale. In Rusk County, East Texas, the Pettet B and C shoal intervals span a large portion of the county and are commonly targeted for oil and gas production. Despite fairly similar shoal facies composition and areal extent, a comparison of hydrocarbon production data from the two intervals reveals that the Pettet B is consistently a better performer than the Pettet C, with a calculated 160% better oil production (mean cumulative production per well of 29,235 versus 18,645 barrels of oil) and 220% better gas production (mean cumulative production per well of 102,232 versus 46,551 thousand cubic feet of gas). This study examines different factors that influenced the reservoir quality of the Pettet B and C intervals from a geologic perspective, including differences in facies, shoal architecture, the timing of deposition, diagenesis, and present-day structure.