

Abstract

Analysis of the Depositional Systems, Lithofacies, Diagenesis, and Reservoir Quality of the Lower Cretaceous Pettet Limestone Reservoir Section in the Wright Mountain Field in the East Texas Basin

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The Pettet Limestone of the Wright Mountain field on the northeastern flank of the East Texas Basin in Smith County, Texas has been a carbonate hydrocarbon reservoir for nearly 70 years. The Upper Sligo interval (Pettet Limestone) was deposited during the lower most part of the Aptian composite section (124 to ~123 Ma) putting the Pettet carbonate strata in a transgressive setting that overlapped continental to shallow marine siliciclastics. The goals of this investigation include: (1) defining the regional and local depositional setting, (2) characterizing the carbonate and siliciclastic lithofacies that compose the section, (3) creating a depositional model that explains the lithofacies in the cored Pettet B and C units, (4) characterizing the type and abundance of organic matter within the lithofacies, (5) describing the paragenesis of the lithofacies, and (6) evaluating the pore types and reservoir quality of the different lithofacies. A depositional model was developed to help understand comparable skeletal oolitic lime packstone and grainstone deposits occurring in other oil and gas fields. The Pettet Limestone of the Wright Mountain field interpreted as an off-shoal complex (lateral to shoal body). The Pettet B and C units show evidence of a shoaling upward sequence but not necessarily into complete shoal-water complexes (higher

energy carbonate shallow-water complexes). The model proposed suggests the Pettet B and C were deposited laterally adjacent to the shoal, in a slightly deeper, lower-energy setting towards the bottom of fair-weather wave base. Products of resedimentation are present in the Pettet Limestone and are likely results of storm remobilization, transport, and subsequent deposition.



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