

Regional Stratigraphy and Sequence Stratigraphy of the Ferry Lake Anhydrite Northeastern Gulf of Mexico: Implications for Hydrocarbon Potential

F. O. Amadi

The University of Mississippi, foamadi@olemiss.edu

The Lower Cretaceous Ferry Lake Anhydrite in southern Mississippi is composed of approximately 76 meters (250 feet) of alternating carbonate and evaporite beds. Correlations of well logs indicate rhythmic depositional stacking of carbonate and anhydrite facies. Identification of these small-scale transgressive-regressive cycles, which formed during high-frequency eustatic sea-level fluctuations, is based on stratal geometry, nature of cycle boundaries, and facies stacking patterns. The Ferry Lake sequence is divided into nine high-frequency, fourth-order parasequences at the southern edge of the Mississippi Interior Salt Basin, and seven high-frequency, fourth-order cycle sets (FLP-1 to FLP-7) approximately 120 kilometers south of the southern rim. Fewer parasequences in the seaward direction result from pinchouts of evaporite beds and interfingering of evaporites with carbonate beds.

Analysis of a carbonate sample from 4,084 meters (13,398 feet) yielded 1.0% total organic carbon, vitrinite reflectance of 0.88%, and Tmax of 437 °C. These results indicate that the Ferry Lake is thermally mature and has hydrocarbon generative potential.

Parasequence stacking patterns suggest that the late stage highstand systems tracts, which are composed of evaporite beds, were deposited during a relative drop in sea level, and the transgressive systems tracts, composed of backstepping carbonate beds, were deposited during a minor relative sea-level rise. Classifying individual carbonate and anhydrite beds into high frequency, fourth-order parasequences provides understanding of reservoir, source, and seal distributions at the play and prospect scale.