High Resolution Sequence Stratigraphy and Reservoir Characterization of Mississippian Strata in Central and Eastern Oklahoma

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ABSTRACT

The “Mississippian Limestone” of the Mid-Continent has a geologically complex arrangement of facies. These complexities span throughout the region and have proven problematic in predicting subsurface facies variations. Until recently, a number of studies on the “Mississippian Lime” were focused on large-scale variations in lithofacies. More recent work has defined a sequence stratigraphic hierarchy detailing facies changes that occur due to high-frequency sea level changes. This study will expand on previous work in the region by developing a sequence stratigraphic framework in Okfuskee County, Oklahoma. This will allow for better prediction of subsurface variations in the region, as well as correlation of facies and sequence stratigraphic architecture to other parts of Oklahoma.

The “Mississippian Limestone” is an aerially extensive mixed carbonate and siliciclastic system containing a variety of carbonate environments and subenvironments. Each of these settings has a variety of associated characteristics, including: rock texture, allochems, sedimentary structures, fossils, ichnofacies, pore types, along with probable variations in facies and reservoir distribution. Signi¬cant lateral and vertical heterogeneity at multiple scales, from kilometer to meter or smaller, commonly occurs in carbonates and has been documented in the Mississippian system of the Mid-Continent. This study integrates multiple data sets (core, wireline logs, and thin sections) to interpret facies and reservoir variability within a sequence stratigraphic framework. Construction of 2-D regional to sub-regional cross sections tied to the sequence stratigraphy should lead to better predictability of reservoir distribution and architecture.