Integrated High-Resolution Chemostratigraphy and Sedimentological Analysis of Meramec/Sycamore Unconventional Reservoir in the Merge Area.

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ABSTRACT

The Mississippian carbonate mudrocks have been one of the best unconventional hydrocarbon reservoirs in Oklahoma, from the Mississippi lime in the north through the Meramec along the Anadarko basin, ending with the Sycamore lime in the Ardmore basin. Unfortunately, a poor understanding of the transition from Mississippian limestones in norther Oklahoma to calcareous mudstones in central Oklahoma lead us to uncertainty in the geological limitation of the STACK and SCOOP plays, two of the more active plays in the US. The purpose of this study is to understand the conditions of deposition along the Merge area in Canadian and Grady counties.

Two cores located at the boundary between Canadian and Grady counties are used for this study. Cluster analysis of sedimentary structures and bioturbation index provided correlation with XRF chemostratigraphy measurements made on core at two-inch. Understanding of the facies distribution is important to differentiate between calcareous mudstone intervals and bioturbated and laminated mudstones. Thus, well logs correlation shows the transition of heterogeneous units from limestone to calcareous mudstones of the Meramec/Sycamore reservoir from north to south. The correlation is calibrated with the core descriptions to build a more robust geological model.

The high-resolution chemostratigraphy combined with detailed sedimentological analysis from cores provide the perfect tools to understand the deposition of the Meramec/Sycamore unconventional reservoir along the poorly explored Merge area between the STACK and SCOOP plays. The understanding of the depositional conditions is the most remarkable finding of this study due to its importance in predicting the facies distribution in the poorly explored areas.