

Depositional Systems Interpretation and Petrophysical Characteristics of the Leonardian Carbonates (Clear Fork Group) from Tex-Mex, SE Field, Central Basin Platform, Gaines County, West Texas

Seyram Nyamasekpor¹, Julie Bloxson¹, and Baysah Saylea¹

¹Stephen F. Austin State University, Nacogdoches, Texas

Abstract

The Leonardian carbonates series deposited in shallow water platforms during the Lower Permian Period (Leonardian Stage) contain charged hydrocarbon-bearing reservoirs in the Permian Basin. The original oil in place for these reservoirs is estimated to be about 15 billion barrels of oil accounting for 15 percent of the total in place resources within the Permian Basin. The Clear Fork Group carbonates, located in the Tex-Mex, SE Field, Gaines County, West Texas, contain a succession of Leonardian carbonates at depth within the subsurface. These carbonates provide key insights into the depositional facies and paleoenvironmental settings during the Leonardian Stage.

Although some outcrop studies have been conducted on the Leonardian carbonates, not much has been done to interpret the depositional environments of these carbonates from subsurface data.

In this study, a combination of core and well logs are utilized to study, improve, and complement the depositional systems interpretations of the Clear Fork Group Leonardian carbonates occurring in the Tex-Mex, SE Field. Descriptions of the facies coupled with previously measured mineralogy, porosity, and permeability results are correlated to their associated well logs. Interactive Petrophysics software is then used to create a core-calibrated mineral model of the formation, along with porosity and permeability analysis. These models are extrapolated across the field using well-log data provided by S&P Global and then exported into Kingdom software to create paleoenvironmental and reservoir characteristic maps of the area. The results of this study will help provide a better model for understanding the depositional processes of the Leonardian Clear Fork Group carbonates within the Tex-Mex, SE Field on the Central Basin Platform. Also, it will serve as a reference point for the interpretation and correlation of paleoenvironments for similar carbonates deposited within the Lower Permian Period in the Permian Basin and worldwide.