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Deposition and Diagenesis of the Blossom Sand, Panola County, Texas

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ABSTRACT

The Upper Cretaceous Blossom Sand is a sandstone within the Austin Group. In the East Texas Basin, it is a historic gas reservoir located at depths of approximately 2000 ft below the surface. The Blossom Sand can be found in the subsurface of Arkansas and Louisiana and in outcrops in northeastern Texas. Since the discovery of the Carthage Field, the Blossom Sand has produced approximately 26 BCF of gas with minor amounts of oil. Because very little research has been conducted on this sandstone, the origin of its clay minerals and depositional style have gone largely unknown. This study provides insights into the depositional environment and diagenetic history of the Blossom Sand using thin section analysis, x-ray diffraction, x-ray fluorescence, scanning electron microscopy, and porosity and permeability measurements. Each method was used to identify clay minerals and their associations and variability, and correlated with porosity/permeability throughout the core to determine controls.

The major minerals found in this formation include quartz, calcite, and illite. The Blossom Sand is composed of two major sand facies that contain planar lamination, wavy bedding, bioturbation, pellets, and casts and molds of shallow marine bivalve organisms. Porosity and permeability are inversely correlated with calcite content based upon Ca concentrations, indicating that calcite cement is the primary control on porosity and permeability within the Blossom. Sedimentary structures indicative of multidirectional currents and shallow marine fossils suggest that the sands were deposited in nearshore environments. The presence of trace fossils like casts and molds indicate that dissolution and redistribution of biogenic carbonate resulted in calcite cement that controls the porosity and permeability of the Blossom Sand. Gaining a better understanding of the depositional environment and nature of porosity and permeability in sandstone reservoirs like the Blossom Sand can improve success in exploration, secondary recovery, or carbon capture and storage.

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