Depositional and Diagenetic Controls on Reservoir Quality in an Upper Wilcox Sandstone, Fields Field, Beauregard Parish, Louisiana
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Numerous studies have been conducted in the Texas Wilcox trend; however, only a handful of diagenetic and depositional studies have been conducted in the Wilcox Formation of Southwestern Louisiana. Located in this region is Fields Field which has produced from the Upper Wilcox sandstones since 1966 (approximately 4.4 MMBO and 30 BCFG). One Upper Wilcox sandstone is a 100 foot thick nearshore marine bar deposit that ranges in depths of 12260-12562 feet. This lithic arkose interval has an average 15% porosity and is productive in Fields Field in only some wells. Depositional and diagenetic processes are principal mechanisms that influence the economic viability of an oil and gas reservoir. The purpose of this study is to understand the depositional and diagenetic processes that affect reservoir quality to improve completion practices and further characterize the Upper Wilcox.

The Wilcox has been described as a prograding wave-dominated deltaic system (Galloway 2000). Fifteen Upper Wilcox rotary cores have been analyzed by petrographic thin sections, QEMScan, and SEM. Sands have planar parallel laminations or have been mildly to moderately bioturbated perpendicular to bedding. Authigenic mineral growth makes up an average 32.5% of the total rock composition. Primary intergranular and secondary porosity are partially or completely occluded by primarily quartz overgrowths, illite, chlorite, and smectite clays. Secondary porosity is a result of alkali-feldspar and other unstable grain dissolution. Foreshore facies have the best primary and secondary porosity and therefore, the best reservoir quality. The shoreface facies are affected by similar diagenetic processes; however, they have additional calcite and siderite cementation that further reduces or even completely occludes effective porosity. The results of this study will add insight to the future development of the Upper Wilcox Formation and other wave-dominated tight sandstone reservoirs.