Determining Hydrocarbon Distribution Using Resistivity, Tuscaloosa Marine Shale, Southwestern Mississippi

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ABSTRACT

The Tuscaloosa Marine Shale has been rapidly gaining interest throughout the petroleum industry and the availability of published data concerning the reservoir is insufficient to meet industry needs. The purpose of this study was to investigate the Tuscaloosa Marine Shale Trend within southwestern Mississippi using electric logs and IHS's Petra[®] mapping software to document its structure, stratigraphy, and hydrocarbon distribution.

A total of 178 electric logs, 14 mudlogs, numerous core and sidewall core descriptions, scout ticket data, and existing studies were utilized to complete this study. Structure contour maps, isopach maps, and regional cross-sections were generated to define the geologic character of the area and a net pay map was generated to determine the hydrocarbon distribution. The resistive, hydrocarbon-bearing section of the basal Tuscaloosa Marine Shale generally thickens with depth throughout southwestern Mississippi. Mudlogs indicate that gas volume and pressure also increase with depth. The areas of thickest high resistivity are located within the southern portion of Wilkinson County where thicknesses reach 210 ft. The only caveat is that the resistive section lies directly above the potentially water-bearing Lower Tuscaloosa sands within these areas which could lead to increased hydraulic fracturing risks. These sands are located between 0 and 170 ft below the base of the Marine Shale throughout the study area. This study identifies areas favorable for commercial hydrocarbon production while indicating areas potentially hazardous to hydraulic fracturing.