# APPLICATION OF COMPUTED TOMOGRAPHY AND SCANNING ELECTRON MICROSCOPY IN THE DETERMINATION OF PORE SPACE CHARACTERIZATION OF A POTENTIAL UNCONVENTIONAL RESERVOIR: A CASE STUDY IN MOWRY SHALE IN THE POWDER RIVER BASIN, WYOMING

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Abstract

The Cretaceous Mowry Shale in the Powder River Basin, Wyoming is a well-known hydrocarbon source for formations both stratigraphically above and below including the Frontier, Turner and Muddy sandstones. Recent studies have focused on the hydrocarbon potential of the Mowry formation as an unconventional reservoir. The Mowry is primarily siliceous black shale that can be subdivided into three intervals. It trends from a fissile, weakly cemented and bioturbated shale into highly siliceous, thinly laminated, organic rich shale with the upper section coarsening into bioturbated silty shale. Twelve primary bentonite clay beds are distributed throughout the Mowry section and can be correlated across the Powder River Basin. Through analyzing cores, drill stem test, production data, rock evaluation and sequence stratigraphy, two ideal drill intervals have been suggested within the middle Mowry section. In this study, we utilize computed tomography (CT) and scanning electron microscope (SEM) to better understand the heterogeneity of pore space and fracture networks at varying depths of the Powder River Basin. A detailed analysis of fracture networks yields a structural model to explain the potential effects on pore space evolution. The CT and SEM investigation of available core samples within the potential drilling intervals provide critical information about micron to nanometer scale characteristics of Mowry shale. The results of this study will show changes in granular and organic-matter-hosted pore space, pore throat size and effective permeability due to sedimentological and structural processes and provide a better understanding for successful drilling practices.

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