

ROCK PROPERTIES AND SEISMIC ATTRIBUTES ANALYSIS OF CHERT RESERVOIRS IN THE DEVONIAN THIRTYONE FORMATION, WEST TEXAS

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ABSTRACT

Fractured chert reservoirs of Devonian age in west Texas have produced over 700 million barrels of oil, and about the same amount of mobile hydrocarbon remains intact. These reservoirs are characterized by microporosity, heterogeneity and compartmentalization, which result in low recovery rates of less than 30%. We utilize cores, petrophysical logs, and 3-D seismic data to characterize the deep-water depositional facies and fracture distribution of these reservoirs on the Central Basin Platform. Gassmann's fluid substitution method, which uses elastic properties measured from core samples, is validated to calculate the elastic properties and model the seismic responses to the variation of fluids in the reservoir rock. We utilize newly developed seismic attributes to infer distribution of various lithofacies, high-porosity zones and fractures. Our goal is to establish statistical relations between P-wave velocity and porosity measured from cores, between impedance and producing zones, and between initial production rates and seismic "fracture lineaments".