

Eagle Ford Development Case Study Utilizing 3D Seismic in Structurally Complex Area, Atascosa County, Texas

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Abstract

Development of the Eagle Ford oil accumulation in South Texas may generally be divided into two gradational trends, black oil and volatile oil. The black oil trend is characterized by: shallower depth, thinner Eagle Ford interval, lower gravity oil (<35°), lower GOR (<1000 to 1), and generally poorer economic returns than the volatile oil trend. Many areas of Eagle Ford development are also structurally simple with only regional basinal dip. However, Abraxas Petroleum Corporation is developing an area in the black oil trend that is structurally complex due to graben faulting and resultant folding. Because of the faulting during Eagle Ford deposition, the Eagle Ford interval expands from about 100 ft. thick outside the graben to about 180 ft. within the graben. The expanded interval provides opportunity, but economic development in this part of the trend requires extreme attention to detail and high coordination between geology, geophysics, drilling and completion.

Interpretation of the 3D seismic data set over the field area requires drastic geologic assumptions in order to accurately convert to depth. Velocity values based on the drilling and geosteering of nine, widely spaced horizontal wells indicates that velocity is faster near the downthrown side of growth faults. Improved interpretation of the 3D seismic data has resulted in improved geosteering of the horizontal wells.

Stratigraphically, the Eagle Ford was divided into 13 para-sequences in an attempt to determine if certain intervals had different characteristics during frac treatments and resulting productivity. Frac gradient plots indicate that areas near faults have subnormal gradients, but position within the Eagle Ford does not exhibit a consistent trend. However, well performance relative to Eagle Ford completion interval does indicate a correlation.