AAPG International Conference
Barcelona, Spain
September 21-24, 2003

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Assessment of Reservoir Character, Architecture, and Production Prediction in a Sequence Stratigraphic Framework

Research on two mature gas fields tested the hypothesis that reservoir properties and production performance are controlled by their position in a sequence stratigraphic framework. The tested dataset includes well logs, core data, a 3D seismic volume, and a complete production dataset.

Correlation of petrophysics, facies, and production information with a given sequence stratigraphic framework allowed several conclusions for the Tiger Shoal and Starfak Fields in offshore Louisiana:

(1) Sand content, porosity, and permeability statistics show that fourth-order lowstand systems tracts (LST) have the highest values compared to highstand (HST) or transgressive (TST) systems tracts. The interpreted rock properties follow a typical trend that is different for each fourth-order systems tract. (2) Third-order sequence systems tracts show high variation in sandstone porosity with no clear trend. More reservoir attributes incorporated in future research could clarify existing uncertainties. (3) Cumulative gas production correlates to the fourth-order systems tracts. In addition, a strong correlation to sand distribution, and perforated feet exists. LST have the highest cumulative production, sand content, and most feet of perforation. (4) The highest monthly gas rate per foot was produced from HST, which are dominated by deltaic facies. LST are dominantly fluvial sandstones, which are less homogeneous than deltaic facies. (5) Sedimentary facies can be correlated to cumulative production, but also cumulative/foot and monthly production/foot. Facies data confirm the general picture of the systems tracts regarding rock properties, but they reveal differences that could not be detected during the analysis of fourth-order systems tracts only.