

Architecture of Submarine-fan Complexes, Delaware Basin, Texas

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In Ford-Geraldine Field area, Reeves-Culberson Counties, Texas, the South Wells Member of the Cherry Canyon Formation has four submarine channel complex intervals of fine grained sandstones which are separated by thick condensed sections of mudstone and associated laminated siltstones. The channel sands are mostly deposited as massive Ta partial Bouma Sequences. Within each channel interval, 1 - 6 partial Bouma Sequences were observed and are characterized by irregularly distributed, calcite-cemented zones (2" to 2' in thickness). The calcite-cemented zones are a dominant control on heterogeneity in porosity and permeability distribution.

Calcite cement is found to be distributed throughout the reservoir quality sandstones in four cored-wells (~750 ft) in the member. The cement occurs in zones which are characterized as blocky (continuous across the core width), spike-like, and elliptical bodies and can reduce porosity from >24% to <10%, with similar reduction in permeability. Each individual partial Bouma sequence contains at least one cemented interval.

Prediction of the distribution of these non-reservoir intervals is important in reservoir characterization because they influence both fluid pathways and reservoir compartmentalization. These calcite-cemented zones are capable of acting as either barriers or baffles to flow within the reservoir and are apparent on sonic logs. Their distribution and morphology is documented in an attempt to predict the lateral extent of these cemented-reservoir intervals by correlating well data in related submarine fan complexes. The presence of these potential barriers and baffles to fluid flow within highly complex reservoir geometries will impact primary, water-flood, and CO₂-flood recoveries.