Examining Depositional Controls on Deepwater Wilcox Reservoirs in the Gulf of Mexico Basin

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ABSTRACT

The Wilcox deposition, late Paleocene to early Eocene in age between 60–48.5 Ma, records one of the largest periods of sand deposition into the Gulf of Mexico Basin. Sand presence is ubiquitous in deepwater Wilcox wells; however, a high degree of variance in reservoir quality is observed in the numerous well penetrations. Although temperature and compaction trends play a role in reservoir quality, primary depositional fabric is the main contributor. Basin position relative to sediment entry points in deepwater Gulf of Mexico sub-basins and local changes in paleo-topography within these sub-basins affect the distribution of reservoir facies and organization of architectural elements. Facies that are both proximal and axial to the initial input point in proximal basin margin settings are expected to have better quality reservoir, higher net-to-gross, increased sand amalgamation, and increased erosion than zones that are distal and off-axis. Deepwater reservoir architecture is classified into: primary channel/feeder, proximal lobe, medial lobe, and distal lobe elements. Identification of sediment entry points from inboard into outboard basins is critical in predicting vertical and lateral stacking patterns and reservoir facies distribution. The interplay between erosion and deposition from sediment gravity flows reflects changes in gradient and accommodation space. As flow exits confinement and transitions to distributive flow, higher density grains drop out of transport near the entry points and lower density grains such as silt/clay particles continue to travel further basinward. Deepwater Wilcox reservoir prediction incorporate inferences of relative paleo-topographic setting and identification of preferential sediment flow direction from seismic mapping.

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