

Hydrocarbon Potential of Paleogene (Wilcox) Deep-Water Lowstand Sandstone Facies, Northeastern Gulf of Mexico: Extension of the Offshore Gulf of Mexico Paleogene (Deep-Water Wilcox) Play

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Petroleum system analysis and characterization of Paleocene-Eocene (Midway, Wilcox, and Claiborne groups) depositional sequences in the northeastern Gulf of Mexico, involving outcrop study, well log and core analysis, and 2-D seismic interpretation, resulted in the recognition of Upper Paleocene and Lower-Middle Eocene third-order unconformity-bounded depositional sequences. The Paleogene depositional history of the eastern Gulf Coastal Plain was dominated by fluvial-deltaic, marginal marine, and marine shelf sedimentation. The deposits of the lowstand systems tracts associated with these sequences consist of fluvial-deltaic, estuarine, tidal-influenced, and coastal barrier cross bedded sandstone facies of 12-30 m in thickness. The lowstand sandstone facies associated with the Upper Paleocene to Middle Eocene depositional sequences have potential as reservoirs in the offshore northeastern Gulf of Mexico. These potential reservoir facies are predicted to occur in deepwater settings as lowstand fan and wedge sandstone accumulations. Of these potential hydrocarbon targets, the quartz-rich sandstone facies of the Wilcox Group appear to have the highest reservoir potential of these lowstand deposits. These sediments accumulated in fluvial-deltaic and coastal barrier environments in the eastern Gulf Coastal Plain where they attained a thickness of 18 m. The Wilcox is a hydrocarbon reservoir in Mississippi. These Wilcox reservoirs have porosities of 15-35% and permeabilities of 200-600 millidarcies. The Paleogene section approximates 305 m in thickness in the eastern Gulf Coastal Plain and continental shelf area of the northeastern Gulf of Mexico and includes numerous shale intervals that could serve as vertical and lateral seal rocks. The petroleum source rocks are probably Upper Jurassic beds because the thermal maturation level of the Paleogene shale and lignite beds onshore in Alabama and Mississippi and the northeastern Gulf of Mexico continental shelf area is low (<0.5 Ro) for oil generation. Also, the kerogen type contained in these beds is gas prone. However, Paleogene shale beds in the continental slope area may have potential to be thermally mature for the generation and expulsion of oil. Therefore, the sedimentary, geochemical, and petrophysical properties of the Paleogene (Paleocene-Eocene) strata give the Wilcox lowstand sandstone facies a high priority as a potential petroleum reservoir target in the offshore northeastern Gulf of Mexico.