# Sedimentologic and Diagenetic Influences on Sealing Potential: Lower and Upper Tertiary Shales, Deepwater Gulf of Mexico

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## EXTENDED ABSTRACT

**Exploratory drilling during the past 15 years has demonstrated the viability of the lower Tertiary petroleum system in the deepwater Gulf of Mexico (Meyer et al., 2007; Rains et al., 2007). Therein, lowstand (i.e., turbiditic) sandstones are known to offer reservoir potential within submarine fan depositional systems (Galloway, 2000); these reservoirs are encased in relatively thick mudstone (source and/or seal) sequences. Although deepwater sandstone reservoirs have been the focus of extensive analysis (e.g., Chen et al., 2012), genetically associated mudstone lithofacies have received limited study. Consequently, variations in seal character and seal quality are major risks in deepwater plays. Our previous studies concluded that upper Tertiary deepwater mudstone sequences typically consist of 8 to 10 interstratified mudstone lithotypes. Each shale type has distinctive fabrics and textures, which correlate strongly with variations in seal rock properties (Dawson and Almon, 2002). Furthermore, analyses of mudstone samples from outcrop analogs (Ethridge et al., 2004; Sutton et al., 2004) yield data that are generally consistent with our current understanding of 'seal controls' determined from studies of subsurface samples from deepwater Gulf of Mexico wells. That is, sealing capacity, determined from mercury-injection capillary-pressure (MICP) analysis, varies with fabric, texture, stratigraphic occurrence and position (i.e., proximal vs. distal) within the depositional setting. Overall, micro-scale textural features overshadow compositional attributes in controlling shale properties and ultimately, the sealing potential of mudstone units.**

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