

The Mancos Shale: Lithotyping and Play Characterization in a Cretaceous Mixed Sandstone-Mudstone System

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The areally extensive and compositionally diverse Mancos Shale (Cretaceous), represented by clastic shoreline to offshore marine environments, is host to oil and gas deposits throughout the Rocky Mountain region. Mancos rocks encompass a number of lithotypes from medium-grained sandstones to calcareous and highly argillaceous mudstones, with mudstones and siltstones predominating. An understanding of rock properties such as porosity type, sub-centimeter scale rock texture, and organic distribution is essential to characterizing fine-grained gas reservoirs and designing completion strategies.

In addition to the depositional facies identifiable in core and subsequently in open-hole logs, variability within the finergrained portions of the Mancos can be used to identify potential hydrocarbon targets. Patterns of lithologic variation (parasequences) in the mudstones and siltstones reflect subtle, systematic changes in sediment source and dispersal, and biogenic productivity. The interplay among these variables relates directly to reservoir quality.

The result is a variety of play types controlled by lithotypes, diagenesis, and post-depositional structure. They include tight gas sands, finely laminated siltstones and mudstones in coarsening upward parasequences, calcareous and pellet mudstones, and naturally fractured intervals.

In addition to log signatures, fine-grained sedimentary rocks are best characterized by core and petrologic analysis. Examples from Mancos Shale gas reservoirs and age-equivalent mudstones are examined at small scale to identify porosity types, texture, fabric, diagenetic features, types and conditions of organic matter, and the relationships between matrix components and natural fractures.