IMPROVED SEQUENCE STRATIGRAPHIC AND RESERVOIR CHARACTERIZATION MODELS: MESAVERDE GROUP, SOUTHWESTERN WYOMING

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ABSTRACT

The combination of excellent outcrops and subsurface data sets makes the Rocky Mountain region a great place to do predictive stratigraphy and reservoir characterization. Several years ago, five behind outcrop core wells were drilled and logged in the Cretaceous Mesaverde Group, Rock Springs Uplift, Wyoming. The Mesaverde is a 2nd order regressive-transgressive clastic wedge that is estimated to contain 52,000 TCF and 776 MMBNGL in a variety of alluvial to open marine reservoirs. Data from these wells and surrounding outcrops, combined with regional studies, have resulted in significant updating of the depositional and reservoir-geological models for this succession.

Our studies document numerous 3rd and 4th-order sequence bounding unconformities and transgressive erosion surfaces that occur in both overall progradational and overall retrogradational successions. Synsedimentary faulting and lateral variations in subsidence, in conjunction with the presence of high-frequency unconformities, have resulted in a complex stratigraphy on basin to reservoir scales. Incised valleys have been identified in three of the four Mesaverde formations, including the overall transgressive Almond Formation. Reservoir architecture of the fluvio-estuarine Ericson Sandstone is strongly tied to changes in accommodation/sediment supply that can be linked to repeated transits of shoreline transgression and regression. Because of the ramp setting, shoreline dislocations associated with unconformities can be significant. The Blair Formation, previously interpreted as a slope and basin floor fan deposit, is re-interpreted as a lowstand delta. The sequence stratigraphic and reservoir models developed, have application not just to developing gas resources in the Mesaverde, but to improving our understanding of analogous reservoirs worldwide.

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