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by D.S. Muller and
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Stratigraphic Entrapment of Hydrocarbons in the Upper Cretaceous Lewis Shale and Lower Fox Hills Sandstone, Eastern Green River Basin, Wyoming

The eastern Green River basin is an active hydrocarbon province in central Wyoming. BP America is involved in a multi-rig, multi-year program in the basin. BP currently has seven rigs operating in the basin. Production is primarily from tight Cretaceous sandstones requiring hydraulic fracture stimulation to produce at economic rates.

Early exploration and development in the eastern Green River Basin was primarily driven by high production rates associated with shoreline deposits at the top of the Almond Formation. These sands and underlying paralic and coastal plain deposits of the Almond were deposited during the final transgression of the Cretaceous cratonic

seaway of the central United States. Much of the subsequent development in the basin has targeted less extensive sands deposited within the Main Almond in the environments behind the transgressive/stillstand bar deposits.

Hydrocarbons within the regressive phase of this third order filling cycle have increasingly been recognized and targeted as drilling has progressed in the basin.

The Almond is overlain by the Lewis Shale. The Asquith Marker, a regionally recognizable Maximum Flooding Surface within the lower Lewis, marks the overall transition from the transgressive phase to the regressive episode associated with the infilling. Above the Asquith marker, the overlying sediments of the remainder of the Lewis and overlying Fox Hills and Lance Formations accomplished the final infilling of this last phase of the Cretaceous intracratonic seaway.

Hydrocarbons within the regressive phase of this third order filling cycle have increasingly been recognized and targeted as drilling has progressed in the basin. This presentation addresses the stratigraphy, trapping configuration, results, and recent developments associated with the younger strata of the Lewis Shale and Fox Hills Sandstone in the eastern Green River Basin. Stratigraphic traps within the Upper Cretaceous Lewis and Fox Hills of the Red Desert Basin occur in sands deposited within basin floor fans, slope fans, lowstand-wedge deposits, shelf margin deltas and nearshore marine environments associated with the final major regression of the Western Interior Cretaceous Seaway. Lewis gas and condensate are generally produced as part of a co-mingled production stream together with gas from the underlying Almond Formation of the Mesaverde Group. Production logs and standalone Lewis producers demonstrate that the Lewis is locally a very

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Figure 1 Location of the eastern Green River Basin, south-central Wyoming.

significant component of the hydrocarbon production stream within the Red Desert basin portion of the eastern Green River basin

Entrapment in Lewis Shale within the Red Desert basin occurs at present updip, distal edges of sand packages that were deposited from a northerly provenance (“Red Desert Delta” or “Sheridan Delta”) within and near the margins of the Lewis seaway during the Maastrichtian. Geometries, log character, seismic data, and other characteristics of the sands within the Lewis Shale for a number of different traps at several stratigraphic levels indicate that deposition occurred in a variety of settings. ■

Bibliographical Sketch

DAVE MULLER received his Bachelor’s degree in geology from Colgate University in 1977. He was a Fulbright Scholar at the University of Iceland in 1978 and received his MS from the University of Colorado in 1980. He joined Amoco in 1980 and is currently a Geological Associate with BP. Dave’s career has run the gamut, from operations and development, equity negotiations,

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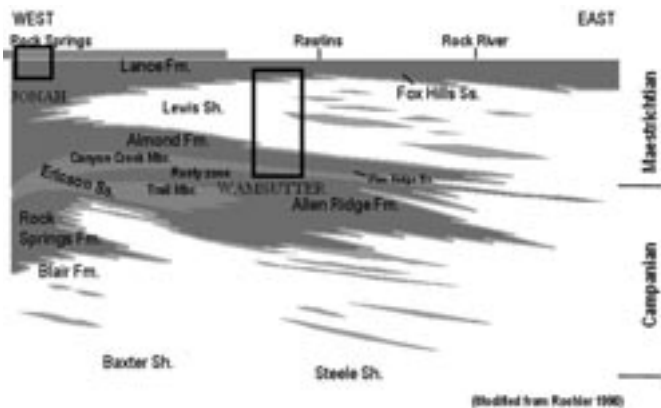


Figure 2. Simplified Wheeler diagram, stratigraphic setting of the Upper Cretaceous Lewis Shale.

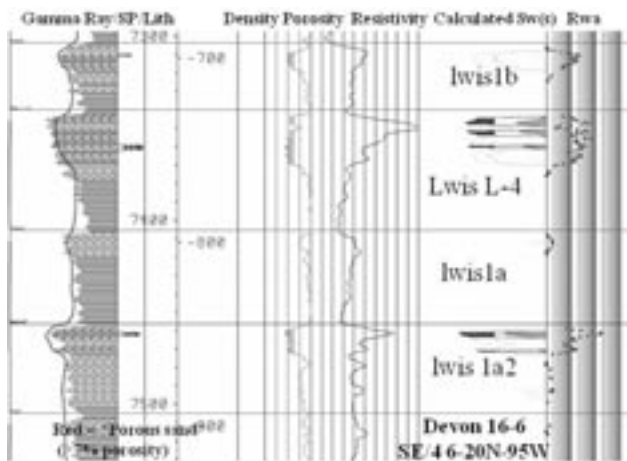


Figure 3. Devon 16-6-20-95 (SE/4 16-20N-95W), a high rate producer from multiple zones in the Upper Lewis/Fox Hills.