Geologic Interpretation Of Turner Sandstone Integrating Core Data, Powder River Basin, Southwest Campbell County, Wyoming

David D. Clark[1], Glen E. Christiansen[2], and William F. Sawyer[2]

[1]Consulting Geologist, Farmington, NM
[2]Peak Exploration and Production, LLC, Durango, CO

ABSTRACT

The Upper Cretaceous Turner Sandstone Member of the Carlile Shale and stratigraphically equivalent Wall Creek Member of the Frontier Formation are currently attractive targets for horizontal drilling and multi-stage fracture stimulation completions in the deeper portions of the Powder River Basin. Large undeveloped prospective areas with few Wall Creek or upper Turner penetrations remain within the confines of the horizontal play. These hydrocarbon reservoirs in the area of interest are interpreted in the literature as storm-generated shelf sand ridges that were deposited below fair-weather wave base. They produce hydrocarbons from alternating layers of bioturbated sandy mudstone, bioturbated muddy sandstone, and cross stratified and structureless sandstone which are stacked in upward-coarsening sequences. Most upper Turner vertical producers were completed in the cleaner sandstone intervals that accumulated in elongated marine sand bodies. The emerging horizontal play has focused completions not only on the cleaner sandstone intervals, but also on lower resistivity, lower permeability, pervasively bioturbated, muddy sandstones that were deposited in areas surrounding the central sand ridges. Reliable open hole log interpretation of the muddy sandstone facies is problematic. Sidewall core samples acquired from the Iberlin #1-4H well, located in an area of southwest Campbell County with sparse Turner well control and virtually no Turner core data, have helped determine basic rock properties and fluid saturations, calibrate shaly-sand log analysis models, and validate interpretation of depositional environment.