Challenges with Marcellus Shale Horizontal Exploration Within or Near the Allegheny Highland

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ABSTRACT

Why does the Marcellus not produce as much gas in the Allegheny Highland as it does in other areas due west? Areas like Doddridge and Harrison County WV have proven to produce 1.8 - 2.2 BCFE per 1,000 ft of lateral consistently where as wells in the Allegheny Highland consistently range between 0.8 - 1.2 BCFE per 1,000 ft of lateral or worse. County scale 2D seismic, a microseismic survey, rock properties from well logs and well production are used to characterize the structural and stratigraphic frame work for Marcellus Shale within the Allegheny Highland. Three Marcellus Shale horizontal wells in Webster County WV (within the Allegheny Highland) have produced 0 mcf after stimulation. A microseismic survey on one of non-producers indicated that fracture stimulation was primarily focused below the Marcellus. It is assumed that basal frac barrier effectiveness potentially affected well performance in Webster County WV. Therefore, rock properties from well logs of the Marcellus Shale and the underlying Onondaga Limestone were compared over a larger area to highlight the importance of basal frac barrier effectiveness in relation to production performance. Also, county scale 2D seismic will be shown and interpreted to help determine possible completion hazards. It is proposed that the thickness and volume of shale in the underlying Onondaga Limestone, difference in minimum horizontal stress between the Marcellus and Onondaga, proximity to the structural front, and fault presence at Silurian to Ordovician level all play a role in frac barrier effectiveness.