The Mowry Shale, Review of Potential in the Big Horn Basin

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The Cretaceous Mowry Shale is a prolific source rock for quite a few of the Cretaceous reservoirs in many Rocky Mountain basins, including the Big Horn Basin. A few 1980-vintage wells have been completed out of the Mowry Shale as a bailout zone because of the shows seen while drilling through it. In the Powder River Basin there was more production encountered in vertical wells, but once again mainly as a bailout after conventional reservoirs proved nonproductive.

The Mowry Shale has been the subject of several concerted exploration programs over the last couple of years in the Powder River and Big Horn Basins. Recent horizontal drilling in the Powder River Basin has had mixed results. Newer technology application along with an understanding of the play concept can be expected to result in better commercial results.

The Mowry is a siliceous shale that ranges in gross thickness in the Big Horn Basin from 250 to over 400 ft. Amorphoussilica content ranges from 45 percent to as high as 70 percent. There are areas in the basin where very fine-grained turbidites are interbedded with siliceous shales in the Mowry. TOC content ranges from 1.1 percent to as high as 4.0 percent but there is a relationship between lower TOC values and higher thermal maturity. There are both type II and type III kerogens present in the Mowry.

The 2008 USGS evaluation of the Big Horn Basin describes the Mowry as a possible basin-centered oil accumulation. Overall reservoir characterization for the basin-centered Mowry is slightly different from the areas that have historically produced from the Mowry in the basin. Within the hydrocarbon-generation window, expulsion microfractures contribute to the overall matrix of reservoir pore space along with interparticle porosity and “large crack” fracture porosity. Horizontal drilling with effective completion technology will be key to making this play commercially successful.