

SHALE GAS POTENTIAL OF THE MOWRY SHALE IN WYOMING LARAMIDE BASINS

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ABSTRACT

The Cretaceous Mowry Shale in Wyoming is an outstanding source rock and a potential shale gas target. Total organic carbon (TOC) content of the Mowry Shale ranges from 0.7 percent to 5.1 percent. In Wyoming, the thickness of the Mowry Shale decreases from approximately 600 feet in the northwest part of the state to approximately 250 feet in the southeast part, whereas the TOC content of the Mowry increases from northwest to southeast. T_{max} for Mowry samples ranges from 411° C to 455° C. Vitrinite reflectance values range up to 1.7 at present-day depths greater than 10,000 feet. Displacement pressures range from 300 pounds per square inch (psi) at 500 feet present-day burial depth to more than 2,000 psi at 13,000 feet. The ¹³C nuclear resonance spectra indicate that the aliphatic carbon peak

of the Mowry Shale is greatly diminished at 13,000 feet. Therefore, the kerogen remaining in the formation at this depth has very little capacity to generate liquid or gaseous hydrocarbons. Thermal maturation modeling suggests that for each gram of TOC in the Mowry Shale, about 80 milligrams (mg) of gas was generated, 18 mg of gas was expelled, and 62 mg of gas remains stored in the shale. Sonic and seismic interval velocities show a pronounced slowdown where significant quantities of natural gas remain in the Mowry Shale. The attributes of the Mowry Shale described above suggest that it has significant potential as a shale gas prospect. With new drilling and completion techniques, the recovery of natural gas remaining in the Mowry could be substantial.

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