

Organic Rich Facies in the Lewis Shale as an Oil and Gas Source Rock, Greater Green River Basin, Wyoming, United States

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Abstract

The Lower Maastrichtian Lewis Shale is a series of sediment gravity flow (turbidite plus hyperpycnite) deposits of sandstones interbedded with shales in the Greater Green River Basin in Colorado and Wyoming. It has been informally divided into three members with varying amounts of shale, siltstone and very fine to medium grained sandstone. Large volumes of gas and some oil have been produced from the formation.

The Asquith Marker, in the lower Lewis Shale, is an organic-rich shale easily recognizable on GR log. This third order condensed section has a maximum thickness of 100 ft. All the previous analyses indicate that the Lewis Shale is generating gas; however, it has never been studied as a potential oil prone source or reservoir rock. Geochemical analysis from Champlin 276 Amoco D well indicates Asquith marker has a "high potential" to generate hydrocarbons and type II kerogen which can generate oil and gas. Also there is an oil field in the basin producing from the Lewis shale that supports the idea of oil potential.

Structural and stratigraphic maps were used to identify the areas where the Asquith Marker is thickest and is in the oil window. Samples of the Asquith interval taken from 5 well cuttings, and 8 outcrop samples, plus 6 core samples from other organic rich facies present in the formation were analyzed for Rock-Eval, vitrinite reflectance, XRD, and biomarker geochemistry from which the composition, maturity, oil potential and kerogen type is determined. The results from the analysis are integrated to determine the potential to generate oil from the Asquith Marker.