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trometry (C_{9+} alkanes and biomarkers). These results suggest that oil produced from the upper and middle members of the Minnelusa Formation in the Powder River basin is derived locally from the Pennsylvanian black shale and is not a product of long-range migration from the Phosphoria Formation in western Wyoming.

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Petroleum Source-Rock Potential of Pennsylvanian Black Shales in Powder River Basin, Wyoming, and Northern Denver Basin, Nebraska

We analyzed 70 black shale samples from the middle member of the Minnelusa Formation (Pennsylvanian) in the Powder River basin of Wyoming and South Dakota, and from equivalent rocks of Desmoinesian age in the northern Denver basin of Nebraska. Organic-carbon content of these shales ranges from less than 1 to 26 wt.% (average = 5.4 wt.%). The shales contain predominantly type II organic matter and yield an average of 27,000 ppm hydrocarbons upon pyrolysis (S_2 yield, Rock-Eval). These data indicate that the shales are excellent potential source rocks. Thermal maturation data (vitrinite reflectance, pyrolysis, hydrocarbon geochemistry) indicate that some hydrocarbon generation has occurred, although complete generation of available hydrocarbons has not occurred for the samples analyzed in this study.

We analyzed 12 oil samples from fields producing from the Minnelusa Formation for comparison with extracts from the black shales. Two, and possibly three, genetic oil types are produced from sandstone reservoirs in the Minnelusa Formation. One type is produced from sandstone reservoirs in the upper member (Permian), and a second type is produced from the middle member Leo sandstones (Pennsylvanian). This second oil type can be subdivided into two subgroups based on chemical composition, although we cannot determine from our data whether these are genetically distinct oils. Extracts from the black-shale samples correlate well with the two or three oil types based on stable carbon isotope composition and detailed molecular hydrocarbon composition determined by gas chromatography-mass spec-