characteristic marine structures.

An idealized vertical sequence within the veneer consists (in ascending order) of a laminated sandstone facies (in places containing chert pebbles), cross-stratified (0.3-m or 1-ft sets) sandstone facies, and an oscillation ripple sandstone facies. The upper part of the oscillation ripple sandstone facies may contain 6-sided polygonal structures filled with coarse-grained sandstone and chert pebbles, or it may be covered by a massive facies that contains abundant fluid-escape structures. Variations on the idealized veneer stratigraphy exist where some facies are absent, but the vertical sequence order is maintained.

Most of the formation is interpreted to be eolian in origin. Northerly winds deposited the large cross-bed sets in an extensive dune field. This event was followed by a period of marine transgression that reworked the uppermost part of the formation and formed the thin veneer. The abundance of fluid-escape structures and oscillation ripples in the veneer indicates rapid deposition by marine processes. The distinctive stratigraphy within the veneer reflects a deepening trend with the rising transgression.

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Hydrocarbon Potential Beneath Paris-Willard Thrust of Utah and Idaho

The Paris-Willard thrust trends in a north-south direction parallel with the eastern edge of the Bear Lake plateau of north-central Utah and southeastern Idaho. In places along the leading edge of the thrust, formations as old as the Cambrian Brigham Quartzite have overridden the Jurassic Nugget Sandstone and various Triassic formations. Movement on the Paris-Willard thrust began in latest Jurassic or earliest Cretaceous time, displacing rocks from the west to the east over 10 mi (16 km).

Seismic surveys indicate that from the leading edge to approximately 6 mi (10 km) west, the Paris-Willard thrust is relatively thin skinned. Detailed structural cross sections suggest that shales in the Triassic Woodside or Ankareh Formations, acted as "sled runners" for Cambrian quartzites moving on the overlying Paris-Willard plate. The thickness of this overlying thrust plate is believed to range between 3,000 and 8,000 ft (900 and 2,400 m), with a complete Paleozoic section present on the underlying Crawford thrust plate. With the exception of two wells drilled on the edge of the Paris-Willard thrust, 600 mi^2 (1,500 km^2) of potential Paleozoic reservoirs beneath the thrust have never been tested. Seismic interpretations indicate the presence of several large structures in the subthrust where formations such as the Phosphoria (which tested gas on the Crawford plate at Hogback Ridge field to the east), Weber, and Madison would be the primary objectives. Recent studies by several workers suggest units in the Phosphoria and other Paleozoic formations are excellent potential source rocks.

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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 spectrometry (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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Geochemistry of Black Shales in Minnelusa Formation and Desmoinesian Age Rocks (Permian-Pennsylvanian), and Associated Oils, Powder River Basin and Northern DJ Basin, Wyoming and Colorado

No abstract available.

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Petroleum Geology of Greater Altamont Area, Uinta Basin, Utah

The Greater Altamont area consists of a group of major, naturally fractured, overpressured petroleum reservoirs situated on the gently northward-dipping flank of the asymmetric Uinta basin. This area produces approximately 17,000 BOPD and 29 MMCFGD—one-half the petroleum production in the Uinta basin. It presently consists of three contiguously producing designated fields: Altamont, Bluebell, and Cedar Rim.

The Tertiary Uinta, Green River, Wasatch, and North Horn Formations and the Tertiary-Cretaceous Flagstaff Limestone are the source and reservoir rocks. The low-porosity sandstones and siltstones form the stratigraphic traps within the interbedded shales. Vertical fractures provide the necessary permeability in these formations. Producing intervals occur at depths between 3,700 and 18,613 ft (1,128 and 5,673 m), each with an average thickness of 311 ft (95 m).

Average recovery is expected to be approximately 12%. Completion techniques play an important role in the primary production of oil from the area. Several extraction methods used in the area have resulted in variation of longevity of the wells. Secondary recovery is not deemed feasible owing to the type of reservoir; repressuring would result in channeling along fractures, bypassing most of the oil in place. In the near future, the Greater Altamont area is envisaged to extend farther south, as indicated by Sonat's recently completed producing wells in T3S, R1-2W.

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Tar Sand Triangle—Largest United States Tar Sand Deposit

Estimates of 4-8 billion bbl of oil in place make the Tar Sand Triangle the largest known deposit of tar sand in the United States. At present, 14 different companies or individuals hold leases in the area, most of which are for in-situ development of the tar sand resource.

In the summer of 1982, the DOE/LETC drilled four core holes, three of which penetrated the principal bitumen-bearing sequence—the White Rim Sandstone. The locations of the core holes were selected to fill obvious gaps in the data available from previous holes drilled into or through the deposit.

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Seismic Facies and Reservoir Distribution in a Prograding Shelf-Slope-Basin Plain System: Chandler and Torok Formations, North Slope, Alaska

The Chandler-Torok sequence is one of several Cretaceous-Tertiary clastic wedges shed north and east from the ancestral Brooks Range hinterland into a rapidly subsiding foredeep trough. Each wedge consists of a