Abstracts

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Hydrocarbon Generation in Lacustrine Rocks of Tertiary Age, Uinta Basin, Utah

No abstract available.

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Depositional Environment and Petroleum Geology of Muddy Formation (Lower Cretaceous) in Parts of Converse and Niobrara Counties, Wyoming

The Lower Cretaceous Muddy formation in northeastern Converse and northwestern Niobrara Counties, Wyoming, can be subdivided into informal lower, middle, and upper mappable units. The lower unit, predominantly sandstone and siltstone, is interpreted to be a subtidal channel-fill sequence. The channels were incised into the underlying Skull Creek Shale. The middle unit consists of mudstones and sandstones deposited on a broad intertidal flat. The upper unit is composed almost entirely of marine mudstones. The occasional sandstones that are found in the upper unit are thought to have been deposited as offshore bars in an inner to middle-shelf position.

The lower and middle units of the Muddy developed during a marine regression that began at the end of Skull Creek deposition. The upper unit reflects transgressive conditions that continued into the time of Mowry deposition.

Oil has been produced from the Muddy formation at several fields in the study area; Steinle Ranch field is the most significant.

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Lacustrine-Interdeltaic Coal in Fort Union Formation (Paleocene), Powder River Basin, Wyoming

The Tongue River Member of the Fort Union Formation, the major coal-bearing unit in the Powder River basin of Wyoming and Montana, records a history of paludal, fluvial-deltaic, and lacustrine sedimentation. Tongue River deltas filled the basin primarily from the eastern margin as they prograded into a lake (Lebo Shale Member) that occupied the basin axis. Major streams entered the Fort Union coastal plain from point sources, resulting in areas of broad interdeltaic coastal plain isolated from major clastic influx.

We mapped the clastic framework facies and the regional distribution of thick Tongue River coal seams using approximately 1,400 induction-electric logs. A detailed study of a thick coal seam in the center of the basin shows that coal occurrence is facies dependent. Peat accumulation began in interdeltaic and interdistributary areas at the loci of regional ground-water discharge. Upon delta abandonment, peat swamps overspread the abandoned lobes. The result is a thick, strike-parallel, interdeltaic coal seam bounded by fluvial-deltaic framework facies. The depositional model and coal-occurrence maps provide a guide for coal exploration and a framework for interpreting individual deposits in the Powder River basin.

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Hydrocarbon Potential Along Cordilleran Hinge Line in Utah, South of Uinta Axis

The Cordilleran hinge line of Utah has been one of the most persistent geologic features in western North America. Its influence on sedimentation patterns and tectonic events continues from the Precambrian. What the hinge line is or what is its cause remains unresolved; however, gross sedimentation patterns indicate the existence of an enduring western geosyncline that received tens of thousands of feet of sediment from the Precambrian to Late Permian. Subsequently, rocks of the geosyncline began to rise, and a general reversal of sedimentation patterns occurred. This tectonism not only elevated the western region but had at least three phases of igneous activity in parts of it.

These igneous phases range in age from Jurassic to Tertiary, and with accompanying faulting, they greatly modified the area adjacent to the hinge line. The main cause of this tectonism is considered to be related to divergent plate motions. Subsequent to the Oligocene phase of igneous activity, the area east of the hinge line gradually rose. The net effect put Cretaceous marine rocks higher than their one-time source areas.

Despite being the depositional site of many favorable marine rock units and having experienced some conducive tectonism, oil and gas finds along the hinge line have not only been few but also relatively small. Factors such as adequate source rocks and traps along the hinge line, the net effect of the igneous activity, as well as high cost for seismic exploration and drilling have prevented adequate testing of the region. In addition, exploration philosophies have been tied too closely to a Wyoming thrust belt model. Several relatively unexplored areas, some over 1,000 mi^2 (2,600 km^2), still have potential. Devonian through Tertiary rocks all have reasonable qualities to expect generation of hydrocarbons. Potential stratigraphic and structural traps are both present. If hydrocarbons are to be found in the area, an innovative and geologically intricate exploration scheme will be required.

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Stratigraphic Sequences and Paleoenvironmental Interpretation of Upper Cretaceous Almond Formation in Cow Creek Area, Little Snake River Coalfield, South-Central Wyoming

The Almond Formation is a paralic deposit, underlain by continental, fluvial Pine Ridge Sandstone and overlain by marine Lewis Shale. In the Cow Creek area, the Almond is 440-490 ft (135-150 m) thick and consists of two unnamed members. The lower member, 170-240 ft (52-73 m) thick, is composed predominantly of 5-25 ft (1.5-7.5 m) thick, repetitive, coarsening-upward sequences of thin brown mudstone and bioturbated, ripple-laminated sandstone. These sequences are commonly overlain by carbonaceous siltstone-mudstone and coals as thick as 16 ft and locally intertongue with trough cross-bedded sandstone.

The upper member is 230-290 ft (70-88 m) thick. The basal part consists of 40-60 ft (12-18 m) of gray clay shale, interbedded with sandstone toward the top, and 10-30 ft (3-9 m) of burrowed (*Ophiomorpha*) sandstone, hummocky cross-bedded in the lower part and trough cross-bedded in the upper part. The upper 160-220 ft (49-67 m) are primarily repetitive coarsening-upward sequences similar to those in the lower member, except the upper member contains brackish-water or shallow marine bivalves, more gray clay-shale than brown mudstone, and fewer, thinner (< 6 ft) coals.

The Almond in the Cow Creek area is a lower delta-plain deposit that intertongues with stacked shoreline deposits to the southeast. The coarsening-upward sequences of the lower member accumulated in the upper reaches of brackish-water bays. Sandy parts of these sequences are distributary-channel splays, which provided platforms on which freshwater peat swamps developed. The upper member was deposited in a more seaward location than the lower member. The basal part of the upper member is a shallow or restricted marine, offshore and shoreline deposit and the upper part accumulated in coastal bays and fringing swamps.

These paleoenvironmental interpretations, which are supported by results of Foraminifera studies, account for the origin and stratigraphic position of economically important coals in the lower member but not in the upper member of the Almond.