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Association Round Table

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Abstracts of Papers

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PRESERVATION OF SEDIMENTARY SOURCE ROCKS IN FLUVIAL DEPOSITS

Sedimentary rock fragments are abundant in clastic sedimentary rocks of the Rocky Mountain region, but a quantitative basis for interpretation of the provenance of these deposits has not been previously available. Fluvial clastic rocks of the Duchesne River Formation (Eocene-Oligocene?) in northeastern Utah contain fragments of older sedimentary rocks derived from the Uinta Mountains. The source material consists of about 89% terrigenous clastic rocks, 10% carbonate rocks, and 1% chert. In the Duchesne River Formation, sandstone and conglomerate contain approximately 50% quartz grains and 50% rock fragments. Of the rock fragments, clastic sedimentary rocks constitute 35%, carbonate rock fragments 43% and chert fragments 22%. Pebble conglomerate is present and sandstone contains as much as 38% carbonate rock fragments at a distance of 64 km from the crest of the mountain range (32 km from the nearest flank). These relations indicate that carbonate rock fragments can be transported considerable distances and suggest that clastic sedimentary rock fragments are broken down relatively quickly, leaving the deposit enriched in fragments of carbonate rocks and chert.

Differences in proportions of rock fragments in deposits from different source areas, of different grain sizes, in different depositional environments, and after different distances of transport are considered. The quantitative relationship between composition of the source area and the deposit can be applied to provenance interpretations in areas where source beds have not been preserved.

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COAL DEPOSITS OF SAN JUAN BASIN

Coal is present in some degree through nearly the entire range of Cretaceous strata in the San Juan basin. Economically significant deposits in the southern part of the basin are present in the Gallup Sandstone, the Dilco and Gibson Coal Members of the Crevasse Canyon Formation, and in the Cleary Coal Member of the Menefee Formation. All these units belong to the Mesaverde Group. In the central and northern parts of the basin, minable and potentially minable coals occur in the Lower and Upper coal members of the Menefee Formation (Mesaverde Group) and in the younger Fruitland Formation. Coal in the Dakota Sandstone may have an economic potential in the Cortez area of southwestern Colorado.

The coal is the result of accumulation of vegetal debris principally within the shore-marginal paludal environmental band. Deposition in this zone was more or less constantly shifting as the sea either invaded the land area southwestward or withdrew toward the northeast. The orientation of the strand line, averaging about N55°W, is thought to have influenced the axial alinement of individual coal lenses. Zones and individual beds deposited under transgressive conditions become younger on the southwest, and, conversely, regressively deposited coal beds and zones are younger on the northeast. Particularly thick accumulations of coal are likely to occur in (1) areas of relative shoreline stability which are likely to be associated with major reversals in the direction of shoreline movement and (2) in conjunction with minor reversals in shoreline movement during major phases.

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GRAND FORKS (CRETACEOUS) OIL FIELD: DISCOVERY AND DEVELOPMENT, SOUTHERN ALBERTA

The Grand Forks field is in south-central Alberta, where the earliest drilling took place in 1909. The Grand Forks field was discovered in 1968, with most of the development drilling being done in 1971. It produces 26° API oil from a Lower Cretaceous sandstone of Neocomian to Aptian age. This sandstone is a channel sand trending NW-SE along the subcrop edge of the Jurassic. The Jurassic is highly incised in this area. Much of the sand in the Grand Forks field is believed to have as its source the underlying Sawtooth.

Primary features are common, consisting mainly of black laminae dipping at high angles. These appear to be black shale laminations at first glance, but closer examination by X-ray analysis reveals a remarkedly pure sand. On ignition this dark content yields a residual ash indicating its bituminous nature. Grain-size analysis reveals a high degree of sorting.

The field average porosity is 25% and the average permeability 3,000 md. Average connate water saturation has been determined from cores taken in oil to be 25%.

The field has been outlined by drilling with 24 wells either on production or being capable of production. These wells produce from a pay section up to 92 ft thick, revealing a reservoir containing more than 100 million bbl of oil in place.

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DEPOSITION AND HYDROCARBON POTENTIAL OF LOWER CRETACEOUS (DAKOTA) SANDSTONE SEQUENCE, CHACO SLOPE, SOUTHERN SAN JUAN BASIN, NEW MEXICO

The Chaco slope is the gently dipping, southern margin of the San Juan basin, bounded by the Zuni Mountains on the south, the Nacimiento Mountains on the east, the Defiance uplift on the west, and the "main gas producing trend" of the San Juan basin on the north. Approximately 6,800 sq mi fall within these arbitrary boundaries.

The Lower Cretaceous sandstone sequence, or Dakota Formation, for the purpose of this paper, is defined as that sandstone and shale unit occurring beneath the base of the Greenhorn Limestone and above the top of the Jurassic Morrison Formation. It includes, among the more important locally named units, the Graneros sandstone and shale interval, the Tres Hermanos sandstone, the Burro Canyon sandstone, and the Twowells sandstone. The Dakota of the Chaco slope is generally considered to be of early Late Cretaceous age based on paleontologic evidence.

Dakota deposition on the Chaco slope can be subdivided into four regional sandstone units and three regional shale units. The depositional environments of the sandstone units grade from fluvial in the west to deltaic and marine in the east. Accumulation of these sandstones occurred during stillstands of the northeast- to southwest-transgressing Dakota shorelines.

Oil and gas production has been established in the deltaic (pointbar) and/or marine facies at Hospah, Lone Pine, Stoney Butte, Snake Eyes, Red Mountain, Five Lakes, and Crosswise areas. The significant producing areas at the present time are attributed to a combination of structural and stratigraphic conditions. Recent photogeologic-geomorphic mapping indicates surface manifestation of these features. To date, approximately 250 Dakota wildcats have been drilled across the subject area.

The hydrocarbon potential of the Dakota Formation on the Chaco slope is analogous with the Muddy sandstone of the Powder River basin and the "D" and "J" sandstones of the Denver basin.