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Coal Quality and Overburden Reconstruction of Upper Cretaceous and Tertiary Coal-Bearing Formations, Plains Area, Alberta

Statistical analyses of chemical data obtained from 685 coal samples have been carried out to determine the distribution of coal quality in the Alberta plains. Distributions of components of proximate and ultimate analyses and heating value for each of the major Upper Cretaceous and Tertiary coal-bearing units, namely Belly River Group, Wapiti Formation, Horseshoe Canyon Formation, and Scollard Formation, were investigated.

A least-squares regression analysis of all data, regardless of formation, of calorific value, CV (Kcal/kg), corrected to a moist mineral matter free basis, on equilibrium moisture, MEQ, yielded the equation

$$CV = 7599\text{-}105.58\ MEQ.$$

The maximum depth of coal seam burial, D (meters), was reconstructed on the basis of published graphs relating equilibrium moisture loss to depth of burial of coal seams. The resulting equation was

$$\log_{[10]}MEQ = 1.865\text{-}0.000416(D).$$

This equation facilitated reconstruction of both the maximum paleotopographic elevation and the amount of sediment removal from the plains area of Alberta. Near surface coals (shallower than 300 m) varied in rank from subbituminous to high volatile bituminous C, with rank increasing in a west-southwest direction (i.e., toward the foothills and mountains region) because of the progressively greater amounts of overburden that existed in that direction during Tertiary time. Erosion has since removed between 880 and 1,900 m of sediment, with the greatest amount of removal occurring in a west-southwest direction. An average coalification gradient of 1.67 of Kcal/kg/m (0.91 BTU/lb/ft) was determined by using the reconstructed overburden.

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Salt-Induced Growth Structures and Subsequent Overthrusts, Northeastern Amadeus Basin, Central Australia

Thicknesses of the late Proterozoic–Early Cambrian Arumbera Sandstone and Middle Cambrian Giles Creek Formation show initiation of growth of the Brumby anticline during the Middle Cambrian. Growth probably resulted from flowage of bedded salt in the late Proterozoic Bitter Springs Formation, possibly due to uneven deposition of fluvial sediments of the Arumbera. Such early growth structures are more likely to be oil prone than anticlines that formed later, during the Alice Springs orogeny (Late Devonian–Early Carboniferous), because adjacent source rocks were not buried as deeply. Positive source-rock analyses are known from several late Proterozoic units in the Northeast Amadeus basin.

Four major tectonic elements formed during the Alice Springs orogeny: (1) the N'Dahla nappe in the north, (2) the Phillipson nappe in the center, (3) tectonic windows (autochthon?) southward in the Phillipson nappe, and (4) the Camel Flat nappe in the south. Isopach maps drawn for each tectonic element suggest a minimum of 10 to 20 km of southward movement for each of the two northern nappes. A strike-slip fault along the east side of Todd River anticline, with 1 to 1.5 km of left-lateral offset, forms a prominent north-trending lineament across the dominant east-northeast trend of most of the folds in the Northeast Amadeus basin. It is paralleled on both sides by closed, doubly plunging anticlines. Major strike-slip faults and north-trending anticlines were not widely recognized previously in the Amadeus basin.

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Depositional Environments and Diagenesis of Frobisher-Alida Interval, Madison Group (Mississippian, North Dakota Williston Basin

The Frobisher-Alida interval is a well log-marker-defined interval, not lithologically based, which extends across middle and upper Mission Canyon carbonates into lower Charles evaporite from the basin center toward the eastern basin margin. The interval represents a regressive sequence with superimposed minor transgressive pulses. A wide spectra of depositional and diagenetic environments with associated fabrics and porosities are represented in these carbonates.

Basin-margin carbonates are dominated by supratidal sediments with lesser amounts of intertidal and subtidal sediments. Major fabric types of important producing zones consist of major developments of hypersaline, and minor development of caliche and vadose, ooid and pisolite wackestones to grainstones. Intercalated with these are fenestral mudstones to laminated dolomudstones, gastropod mudstones, and evaporite "mush" dolomudstones. In addition, desiccation cracks and minor occurrences of karst breccias and laminated crusts indicate periods of subaerial exposure. Porosities associated with the supratidal-subaerial realm include well-developed interparticle, fenestral, vuggy, and intercrystal types, and in places are filled with clear spar and/or void-filling clear anhydrite cement.

Basinward, subtidal sediments dominate the interval. These consist of cyclic, shallow open-marine bioclastic mudstones to packstones-grainstones and, partly restricted marine burrowed peloidal mudstones to bioclastic wackestones. Upsection, noncyclic burrowed bioclastic peloidal mudstones to wackestones indicate increasingly restrictive conditions. Interparticle porosity is exhibited in the bioclastic grainstones. Intercrystal porosities are developed from selective dolomitization of burrows and mudstones.

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Coal Geology of Eastern McCreary and Western Whitley Counties, Kentucky

On the southern flank of the Pocahontas basin, Kentucky, Lower to Middle Pennsylvanian sedimentary rocks contain the coal-bearing strata of eastern McCreary and western Whitley Counties. These strata are divided into two major formations, the Lee and the Breathitt, each composed of quasi-cyclic sequences of sandstone, siltstone, coal, and shale, which have been interpreted as paralic lithogenetic units reflecting depositional environments that periodically intertongued laterally.

Cores from six exploratory drill holes penetrating the formations are described, and analyses of basic lithologies in conjunction with geophysical logs are integrated into detailed stratigraphic columns. Correlation using key beds is established, producing geologic sections and a stratigraphic framework to