Composition and depositional environment of the Albert Formation oil shales, New Brunswick

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The predominantly lacustrine Albert Formation (late Devonian to ?early Viséan in age) consists mainly of grey sandstones and shales and contains oil, gas, albertite, oil shale, and salt. Our present level of understanding of the Albert oil shales has been attained largely from boreholes. Conventional core-logging techniques recognize oil shale units on a scale of metres. Bulk samples are taken at regular 1.0 - 1.5 m intervals and analyzed for their mineralogy and oil yield. This approach does not consider the variability of the oil shales (commonly on the order of 5-10 cm).

Detailed logging of three cores (Petro-Canada Dover No. 1 and 2, Can. Oxy. Albert Mines No. 5) and preliminary XRD and maceral analyses of core samples indicate four types of oil shale; with increasing amounts of organic matter:

Oil Shale D (marginal to very low grade)

Feldspar-rich rocks with lesser amounts of quartz, clays and analcite. Dolomite is usually absent or less than 5% of the mineral matter. Exinitic organic matter forms a small proportion and consists mainly of liptodetrinite with sporinite and some thin, discontinuous bands of lamalginite.

Oil Shale C (Low grade)

Feldspar-rich rocks, with quartz and clays; analcite is absent and dolomite forms 5-15% of the mineral matter. Exinitic matter consists largely of liptodetrinite with lamalginite, telalginite, and sporinite. Distinct organic-rich laminae are developed as lamalginite content increases.

Oil Shale B (Medium grade)

Clay-rich rocks (clay percent equal to or greater than feldspar), with quartz, and about 10% dolomite. Exinitic organic matter consists largely of lamalginite with telaginite and sporinite. Lamalginite forms thick accumulations of thin, fine bands such that distinct organic-rich and inorganic-rich laminae are present. Fusinite occurs locally.

Oil Shale A (high grade)

Dolomite-rich rocks, with minor clays, feldspar and quartz. Organic content is high with lamalginite forming thick accumulations of fine bands and giving organic-rich laminae which alternate with inorganic-rich laminae on a fine scale. Telalginite, sporinite and minor liptodetrinite and fusinite are also present.

The transition from oil shale D to oil shale A is inferred to reflect nearshore to offshore deposition in a lacustrine environment. In nearshore settings, clastic sediment with detrital organic matter (liptodetrinite) predominates, while further offshore, carbonate production and algal growth (lamalginite) are important.