Core analysis of the Hiram Brook Member of the Upper Albert Formation, interpretation of the depositional environment, and determination of reservoir prospectivity

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The Hiram Brook Member is Carboniferous in age and is the uppermost member of the Albert Formation (Horton Group). The studied cores are from the Moncton Subbasin of the Maritimes Basin, which is located in southeastern New Brunswick. In this study a portion of one core (Albert Mines 4), totalling 107.4 m in length, is discussed. Detailed

sedimentological data are used to interpret the depositional environment, lateral continuity of sedimentary facies, and reservoir potential of the Hiram Brook Member.

Two lithofacies are recognized in the sedimentological succession. Facies 1 consists of sandy siltstone and comprises the basal part of the Hiram Brook Member. It generally contains low-angle cross beds and abundant pervasive penecontemporaneous soft-sediment deformation. Poorly developed paleosol horizons are locally common. Diagenetic characteristics include minor pyrite mineralization on fractures and the presence of calcite veins. There are no biogenic structures present. However, rootlets, wood fragments, and a fish fossil have been observed.

Facies 2 is a breccia/conglomerate. Facies characteristics include; sharp contacts with erosive bases, steep, poorly defined bedding, and abundant breccia/conglomerate horizons. Clasts consist of metasedimentary rocks, gneiss, and granite and range from angular to rounded. These originate from the Proterozoic to middle Devonian basement complex and are locally derived. This facies is matrix to clast supported. Bedsets characteristically fine upwards. Facies 2 is locally interbedded with facies 1. Trace fossils include *Skolithos*, *Taenidium,* and broad *Arenicolites*.

Analysis of facies 1 indicates a dynamic lacustrine environment that sporadically emerged into the influence of wave reworking. The overall succession indicates cyclic rising and falling of the relative lake level attributed to either, sediment supply or subsidence. Low-angle, thin, parallel lamination reflects rhythmic fluctuations of sediment supply under constant sedimentation. Evidence for event sedimentation include the presence of flame structures that are caused by pulses of sediment being mobilized and rapidly deposited. Abundant graded beds also support this interpretation.

Facies 2 is oxidized and is interpreted to represent a decrease in relative lake level. Large angular clasts indicate a proximal source. Cyclic reduced zones indicate rapid burial generating contrasting geochemical conditions, interrupted by event periods of deposition possibly caused by land-based floods. Bioturbation *(Skolithos)* reflects the pause between event deposits and reflects favourable conditions for colonization. Climbing current ripples suggest unidirectional currents and high sedimentation rates.