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Summary of Facies, Sedimentology and Stratigraphy of Northwestern Saskatchewan's Bitumen Bearing Lower Cretaceous Dina Member (Mannville Group)

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Summary

The Bitumen bearing sandstones of the Mannville Group's Dina Member are located in northwestern Saskatchewan along the northeastern edge of the Western Canada Sedimentary Basin, sub-cropping below Pleistocene glacial deposits and residing primarily within sub-Mesozoic, paleo-topographic erosional lows. The bitumen saturated sandstones represent a significant resource with estimates as high as 2.3 billion barrels (371 million m^3) in place.

The Dina Member is stratigraphically equivalent to the lower portions of the McMurray Formation of Alberta and represents a proximal eastern extension of Alberta's bitumen rich, Athabasca basin. Throughout the study area, the Mannville Group has been extensively eroded by Pleistocene glacial processes and was consequently overlain by a thick succession of glacial till. The Dina member was deposited on the underlying Devonian carbonate unconformity surface within a paleo-topographic low developed within the upper reaches of an incised valley system and filled during a subsequent relative sea level rise.

Analysis of core drilled by Oilsands Quest Inc. in northwestern Saskatchewan indicates that the Dina member is represented by a wide range of siliciclastic facies which includes pebble conglomerates, coarse to fine sandstones, siltstones, mudstones and coals, however, the dominant lithology is coarse to medium grained sandstones which are normally fining upwards and often highly bitumen saturated. Eight recurring sedimentary facies in the Dina Member deposits are distinguished based on a combination of lithology, physical sedimentary and biogenic structures. These facies are interpreted to represent depositional systems ranging from high and low energy non-marine fluvial to marginal marine fluvio-tidal environments.