

Sedimentology and Stratigraphic Framework of the Upper Clearwater Formation at Caribou Lake, Alberta

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Summary

The Caribou Lake Oils Sands deposit is located approximately 70 km north west of Cold Lake, Alberta (Fig. 1). Husky Energy has proposed a Thermal Demonstration Project for the area and the application is currently pending.

The Upper Clearwater Formation constitutes the primary reservoir unit and comprises a series of coarsening-upward regionally extensive deltaic regressive parasequences. In the project area the regional sediments have been eroded by a northwest-southeast trending incised valley. This valley may represent a complex fill comprising several amalgamated valley fills but the sand-dominated monotonous nature of the facies render the identification of sequence boundaries ambiguous. This valley fill constitutes the main bitumen reservoir and is interpreted as a transgressive tide-dominated estuarine deposit. The Clearwater Formation is capped by a significant transgressive surface and is overlain by marine mudstone at the base of the Grand Rapids Formation.

The two dominant reservoir facies are subtidal sand bars and channels and comprise sporadically bioturbated dominantly fine- to medium-grained, cross-bedded and planar laminated sandstone with subordinate thin (mm-cm) to thick (dm) laminated mudstone. Central estuary basin and/or marginal estuarine deposits form a third facies which is present in the eastern portion of the lease area and are generally non-prospective. This facies consists primarily of bioturbated, heterolithic mudstone and siltstone. The low diversity of trace fossils and the forms present are indicative of brackish water conditions and contrast markedly in character with the bioturbation present within the offshore marine shales of the regionally extensive deltaic parasequences found outside the valley complex.