

**Paleogeomorphology and Petrography of the McMurray Formation (revisited),
Northeast Alberta – Paleogeographic Implications**

Dale A. Leckie*

Nexen Inc., Calgary, Canada

Dale_Leckie@Nexeninc.com

and

Safaa A. Seif El-Dein

Contrex Consulting, Calgary, Canada

Summary

Paleotopographic maps of the Sub-Cretaceous unconformity show details of complex dendritic paleodrainage in the McMurray sub basin that is constrained by the Grosmont High, Wainright Ridge, and a southeast upland. Integration of petrographic re-evolution with the maps has implications on regional paleogeography and depositional models. Sediments are texturally sub mature with minimal detrital matrix, varying degree of sorting and roundness. Sediments are mineralogically mature quartzose sand. Quartz is dominant, with lesser feldspar (mainly potash), chert, and igneous plutonic lithoclasts. Common rounded quartz, feldspar, heavy minerals and abraded authigenic quartz suggest a recycled source originating in the Athabasca Quartzite. Angular fresh feldspars and polyquartz indicate a Canadian Shield contribution. Chert (silicified carbonate) grains are probably derived from the subjacent Devonian carbonates.

Paleogeomorphology and petrography indicate sediment derivation from the east or northeast. Tributaries flowed against this provenance trend from the north, west and south draining overall northeastwards into a marine basin in northern Saskatchewan. There is no evidence of a large river flowing from the south. Implications of the paleodrainage pattern and provenance suggest that most of the McMurray sediments were transported into the basin by tidal processes, consistent with the well-accepted incised valley depositional models.