Sedimentology and Ichnology of the Lower Cretaceous (Neocomian) Kamik Formation in the Parsons Lake Gas Field, Mackenzie Delta Region, Northwest Territories

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ABSTRACT

The Beaufort-Mackenzie Delta region of the Northwest Territories is currently one of the most active frontier areas of oil and gas exploration in Canada. The Lower Cretaceous (late Valanginian to middle Hauterivian) Kamik Formation forms part of a major clastic succession that hosts significant reserves of natural gas in the subsurface of the Beaufort-Mackenzie Delta region. The onshore Parsons Lake gas field with reserves of approximately 1.8 trillion cubic feet (TCF) represents the largest discovery to date from the Kamik Formation.

Sedimentological and ichnological analysis of the sandstone-dominant Kamik Formation in the Parsons Lake field indicates that these strata represent the deposits of a storm-influenced, mixed wave- and river-dominated deltaic setting. Interpreted facies include prodelta, delta front, delta plain and distributary channel deposits. Recognized trace fossils include representatives from the *Skolithos*, *Cruziana* and *Zoophycos* ichnofacies. Identified ichnotaxa include, *Rhizocorallium*, *Asterosoma*, *Teichichnus*, *Cylindrichnus*, *Arenicolites*, *Diplocraterion, Ophiomorpha, Macaronichnus, Rosselia, Palaeophycus*, *Chondrites*, *Planolites*, *Helminthopsis*, *Phycosiphon*, *Thalassinoides*, *Skolithos*, *Conichnus*, *Zoophycos,* fugichnia and cryptic bioturbation. Overall trace fossil diversity is low to moderate with the majority of individual forms displaying diminutive morphologies. In addition to the recognizable ichnotaxa are numerous other distinct, as of yet unnamed forms.

These trace fossil assemblages suggest deposition within biologically stressed marine and marginal marine environments, typical of those found in deltaic settings. An integrated approach utilizing sedimentology and ichnology is key to developing a more refined paleodepositional model to assist with future exploration and development of the Kamik Formation as a major gas bearing succession within the frontier Beaufort-Mackenzie basin.