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Sedimentology and Ichnology of the Lower Cretaceous (Neocomian) Kamik Formation in the Parsons Lake Gas Field, Mackenzie Delta Region, Northwest Territories, Arctic Canada: Anatomy of a 2.0 TCF Frontier Gas Field

The Beaufort-Mackenzie Delta region of the Northwest Territories of Arctic Canada is one of the most active frontier areas of oil and gas exploration in North America. The onshore Parsons Lake gas field, with reserves of approximately 2.0 trillion cubic feet of natural gas currently represents the most significant discovery from the Lower Cretaceous Parsons Group (late Berriasian to early Hauterivian) in the Mackenzie Delta region. Ichnological and sedimentological analysis of the sandstone-dominant Kamik Formation, the uppermost formation of the Parsons Group, indicates that these strata represent the deposits of a prograding, wave-dominated deltaic system.

Previous investigations of the Parsons Group have strictly concentrated on the lithological and sedimentological characteristics with generalized ichnological descriptions. Preliminary lithofacies and ichnofacies analysis of the Kamik Formation have identified prodelta, delta front, delta plain and distributary channel deposits. Detailed core examination has identified a variety of burrow types, including a full suite of trace fossils from the Skolithos, Cruziana and Zoophycos ichnofacies. The majority of individual trace fossils present display low diversities and diminutive morphologies, indicative of deposition within biologically stressed marine and marginal marine environments.

Investigation of the sedimentological and ichnological characteristics of the Kamik Formation is essential for the development of a sound geological interpretation for this succession of rocks. An integrated approach utilizing lithofacies and ichnofacies analysis is key to developing a refined paleodepositional model to assist with the future exploration and development of the Kamik Formation as a major gas bearing succession within the frontier Beaufort-Mackenzie basin.