

Chemostratigraphy and sedimentology of the Devonian Hare Indian Formation, Northwest Territories, Canada

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The Hare Indian Formation is a Givetian-aged, organic-rich mudstone located in the Central Mackenzie Valley, Northwest Territories. The Hare Indian Formation is the lowermost formation of the Horn River Group, also comprising the Canol Formation, the Ramparts Formation and the Imperial Formation. This group is known for both its conventional and unconventional resources and resource potential. The Ramparts Formation and Kee Scarp Reef have produced crude oil since the 1920s. The Canol and Hare Indian formations were long considered to be the source rocks of these resources. Recent interest in unconventional resource plays has led to renewed attention to shales of the region. The Bluefish Member, the basal member of the Hare Indian Formation, is estimated to have 7.366 billion m³ of unconventional oil in place. The objective of this study is to use a combination of sedimentology and geochemical methods to produce a sequence stratigraphic framework and depositional model for the Hare Indian Formation. Previous studies have been unable to agree on a depositional model or sequence stratigraphic surfaces, and geochemical studies have focused on characterizing units for lithostratigraphy, rather than sequence stratigraphy. Data is collected using portable x-ray fluorescence (XRF) technology, stable isotope analyses of carbon and nitrogen, inductively coupled plasma mass spectrometry (ICP-MS), and sedimentological observations including core and outcrop logging and petrographic analysis. Using this integrated approach, this project will further our understanding of reservoir distribution and quality in the Central Mackenzie Valley, as well as similar unconventional Devonian resources abroad.