

**Another Reason to Venture North: New Evidence for Petroleum Systems in Paleozoic and Cretaceous Strata, Peel Plateau, Yukon Territory, Canada**

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Peel Plateau of northeastern Yukon Territory is a prospective petroleum region underlain by up to 4.5 km of Paleozoic and Cretaceous strata. Cretaceous strata are flat lying and relatively undeformed, while Paleozoic strata are exposed in structural uplifts along the western extent of Peel Plateau (Richardson Mountains) and the southern limit of Peel Plateau (Mackenzie Mountains). Paleozoic outcrops and well cuttings from 18 of the region's exploratory wells were examined to assess the hydrocarbon potential of the region.

Early investigations in this area occurred during the 1960s and 1970s by oil and gas companies and the Geological Survey of Canada. During this exploration phase, industry drilled 19 wells in Yukon's Peel Plateau, identifying 6 minor gas shows in Upper Paleozoic strata. This region has remained largely unexplored since the 1970s until the commencement of this study in 2004. The current study involves government, industry and university affiliates concerned with the hydrocarbon potential of the Peel region.

Since 2006, field investigations of Upper Paleozoic and Cretaceous strata have identified evidence for potential petroleum systems in the Yukon Peel, including gas seeps, oil stains, bitumen occurrences and gas shows. Earlier resource assessments (based largely on 1960s and 1970s exploration), concluded that there is the potential for approximately 3 Tcf of gas with no potential for oil. These new investigations have revealed the presence of gas at surface (confirming earlier findings), as well as oil-stained sandstone and siltstone (contrary to earlier findings). Biomarker analyses of solvent extracts from oil-stained samples indicate that there are two compositionally distinct oil families present, including Upper Paleozoic and Cretaceous oil sources.

In addition to field investigations, archival well cuttings were analysed using Rock-Eval/TOC analyses to determine source rock potential. Thermal maturation indices suggest that a large succession of rocks, formerly thought to be overmature, are within the oil window, further supporting the potential for oil in the system. Potential source rocks include the Upper Devonian Canol, Imperial and Tuttle formations, an Upper Devonian to Early Carboniferous black shale (possibly Ford Lake), as well as Cretaceous Arctic Red and Martin House formations. In light of these recent findings, a new resource assessment of the region's hydrocarbon potential is currently underway.