

## **An Update of Hydrocarbon Potential in Yukon's Peel Region**

Tammy L. Allen

Yukon Geological Survey, Whitehorse, Yukon, Canada

tammy.allen@gov.yk.ca

and

Tiffani A. Fraser

Yukon Geological Survey, Whitehorse, Yukon, Canada

The Peel Plateau is a prospective petroleum region in northeast Yukon that for the most part is under-explored. As part of the "Regional Geoscience Studies and Petroleum Potential, Peel Plateau and Plain" project, field work was conducted during summer field seasons 2006 to 2008 in Yukon's Peel Plateau and adjacent Richardson Mountains. Recent field investigations confirm that strata within the Peel Plateau region host both oil and gas.

The presence of hydrocarbons can be attributed to the occurrence of Upper Paleozoic source rocks. Potential source rocks include marine shale of the Upper Devonian Canol and Imperial formations and Upper Devonian to Lower Carboniferous Tuttle Formation and Ford Lake Shale. Surface and subsurface samples collected from each of these units has been analysed for source rock potential by Rock-Eval pyrolysis.

Thermal maturation indicators such as Tmax, vitrinite reflectance and thermal alteration indices suggest that Upper Paleozoic strata typically range from immature with respect to hydrocarbon generation to within the 'oil window'. Thermal anomalies occur at surface on the eastern flank of the Richardson Mountains where Canol and Imperial formations are overmature as well as in the southeast Peel Plateau where Upper Paleozoic strata are locally overmature both at surface and subsurface.

Hydrocarbon exploration conducted during the 1960s and 1970s identified six minor gas shows in the Tuttle Formation. Recent investigations have identified two thermogenic gas seeps in Yukon's Peel region. One seep is adjacent to the mapped Trevor fault, whereas the other is to the east of the fault. In addition, there is previously unrecognized oil potential. Recent field and laboratory work has established and confirmed oil staining of sandstone in the Tuttle Formation and siltstone in the Ford Lake Shale. Preliminary results suggest that these oil stains were generated from Upper Paleozoic marine source rocks that appear to have remained within the Upper Paleozoic aged reservoirs. The stains tend to be moderately to heavily biodegraded. No hydrocarbons have been definitively linked to source rocks.

Collectively, these findings suggest that there may be one or more working petroleum systems in the region.