

Petroleum Reservoir Rock and Source Rock Potential in Lower Paleozoic Strata of Peel Plateau and Plain, Northwest Territories and Yukon

L.P. Gal*

Northwest Territories Geoscience Office, Yellowknife, NT, Canada
len_gal@gov.nt.ca

L.J. Pyle

Geological Survey of Canada – Pacific, Sidney, BC, Canada

T. Allen & T. Fraser

Yukon Geological Survey, Whitehorse, YT, Canada

Y. Lemieux

Geological Survey of Canada – Yellowknife, NT, Canada

and

T. Hadlari and W. Zantvoort

Northwest Territories Geoscience Office, Yellowknife, NT, Canada

International and North American Frontiers

This poster presents some initial observations and analytical data from samples obtained as part of the multi-disciplinary and multi-agency “Regional Geoscience Studies and Petroleum Potential, Peel Plateau and Plain” project (<http://www.nwtgeoscience.ca/petroleum/PeelPlateau.html>).

In the Peel Plateau and Plain (Peel area), early Paleozoic strata comprise Cambrian siliciclastic and evaporite rocks deposited in an epicratonic sea and uppermost Cambrian to Silurian carbonate rocks deposited on a passive continental margin. Platform carbonate deposition continued through the early and middle Devonian, with a transition to basinal shale at the west side of the Peel area. Finally, Middle to Upper Devonian shale was deposited in a deep marine basin.

A sample of Cambrian Mount Cap Formation sandstone had a porosity of 4.4 %. Two shale samples from the same formation had a maximum of 0.21 % total organic carbon (TOC), but higher values have been obtained in the region. Cambrian to Silurian Franklin Mountain and Mount Kindle formations contain locally coarse and vuggy dolostone (maximum porosity of samples 9.4 % and 5.1 %, respectively). Potential source rocks did not occur within this platformal succession. The age equivalent (Cambrian to Devonian) Road River Group basinal shale occurs in the western part of Peel area. Samples collected from this unit yielded values of 1.46 and 2.49 % TOC.

Lower Devonian Arnica Formation dolostone is sucrosic in some sections, with porosity up to 6.1 %. No potential source rocks were collected from within Arnica Formation, nor from underlying Delorme Group and overlying Landry Formation. Bear Rock Formation, which is stratigraphic equivalent to Arnica and Landry formations in eastern Peel area, however was locally oil stained at Powell Creek.

Middle Devonian Ramparts Formation includes a reefal member that is present in eastern Peel area. One sample from northeast Peel area yielded porosity of 10.6 %. Locally black shale (Carcajou marker) beds underlie the reefal member and have high TOC values to 12.4 %. Ramparts Formation is underlain by Hare Indian Formation shale, which includes a basal member that is a rich source rock (up to 10.1 % TOC). Overlying Ramparts Formation is Upper Devonian Canol Formation, with up to 8.3 % TOC.

Future work will focus on describing petroleum systems and plays in Peel area. At the outset, it seems that possible carbonate reservoirs (with the exception of Ramparts Formation) are stratigraphically isolated from prolific source rocks. This suggests that structural traps would be important.