

2005 Reconnaissance Program: Regional Geoscience Studies and Petroleum Potential, Peel Plateau and Plain

Pyle, L. J.¹, Jones, A. L.², Gal, L. P.², and Abbott, J. G.³

1. Geological Survey of Canada – Pacific, Sidney, BC; lpyle@nrca.gc.ca
2. Northwest Territories Geoscience Office, Yellowknife, NT; Adrienne_Jones@gov.nt.ca, Len_Gal@gov.nt.ca
3. Yukon Geological Survey, Whitehorse, YT, grant.abbott@yk.gc.ca

Peel Plateau and Plain (Peel Region) lies along the northern Mackenzie Corridor. Peel Region has widespread hydrocarbon potential, but is under-explored and its geological history is poorly understood. Much of the bedrock mapping and exploration drilling in the area dates back to the 1960's. More than 70 exploratory wells have been drilled in Peel Region. Some wells had encouraging hydrocarbon shows, yet no major discoveries. The primary objective of this new multidisciplinary, collaborative four-year project is to improve knowledge of regional geology, including stratigraphy and correlation, depositional and tectonic histories, basin evolution, and petroleum geology and potential. The project is seamless across the NWT-YT border and utilizes the expertise of partners in the Geological Survey of Canada, Northwest Territories Geoscience Office, Yukon Geological Survey, universities, northern communities, and industry. New geological knowledge in Peel Region is necessary to stimulate petroleum exploration, industry investment, and economic development for the benefit of Northerners.

A reconnaissance program in the summer of 2005 focused on geology along the Dempster Highway, as well as remote regions of the Richardson Mountains and northern Mackenzie Mountains. The Dempster Highway from Inuvik, NWT to Eagle Plains, YT transects the northwest corner of Peel Region and exposes strata spanning the Proterozoic to Quaternary. Geological data were collected at 25 stops in order to update a now out-of-print roadside geological guide for the Dempster Highway. Helicopter reconnaissance work took place along river exposures in Peel Region and along the deformation fronts that flank the western and southern edges of Peel Plateau (Richardson and Mackenzie Mountains, respectively). Parts of Trail River (NTS 106L), Snake River (NTS 106F), Ramparts River (NTS 106G), and Sans Sault Rapids (NTS 106H) map areas were covered. In total, 17 stratigraphic sections containing 16 different formations of Neoproterozoic to Cretaceous age (900 to 100 Ma) were examined. Six of the sites represent type localities. Preliminary collections from key sections included: 1) representative lithological samples for sedimentology; 2) Paleozoic carbonate rock for conodont microfossil analysis; and 3) Paleozoic and Mesozoic black shale for organic geochemistry analysis (Rock-Eval/TOC pyrolysis). Reconnaissance data provide a framework for further evaluating prospective stratigraphic horizons (source and reservoir facies), dating formations using biostratigraphy, and assessing hydrocarbon potential of various formations.

Reconnaissance work in Peel Region suggests an east-west transect along the deformation front of the Mackenzie Mountains will improve stratigraphic correlation between exposures at surface and existing well and subsurface data of Paleozoic Mackenzie-Peel Shelf and Mesozoic Peel Trough. Study of correlative strata in the Richardson Mountains (Richardson Trough) that flank Peel Region to the west will give a more complete picture of the basin, its deformation history, and tectonic evolution. Both regions require detailed investigations of sedimentology, stratigraphy, biostratigraphy, sequence stratigraphy, structure, and regional thermal maturity.

Visit www.nwtgeoscience.ca/petroleum/PeelPlateau.html for project updates, products, and participant information.