GeoConvention 2015
GEOSCIENCE
new horizons
Telus Convention Centre • 4-8 May 2015 • Calgary, AB Canada

Rock-Eval/TOC data for the Canol Formation from wells in Mackenzie Plain and Peel Plain, Northwest Territories

Jonathan Rocheleau
Northwest Territories Geoscience Office,
Leanne J. Pyle
VI Geoscience Services Ltd.
and
Kathryn M. Fiess
Northwest Territories Geoscience Office,

Summary

The Canol Formation is a major exploration target in central Mackenzie Plain for shale-hosted hydrocarbons. Using historical data and results from the Regional Geoscience Studies & Petroleum Potential of Mackenzie Plain Area, Central NWT, thermal maturity trends have been defined (Pyle et al., 2014). The Northwest Territories Geoscience Office initiated a new study called Shale Basin Evolution in Central NWT in 2014. One of the main objectives of the project is to characterize the source rock potential of Devonian and Cretaceous age shales to the north and south of Mackenzie Plain using both new outcrop and subsurface data.

The first year of the new study focused on identifying gaps in the surface and subsurface data sets in both the Peel Plain and Mackenzie Plain exploration areas of the Northwest Territories. A total of eight wells were sampled in the Canol Formation for Rock-Eval/TOC, vitrinite reflectance and whole rock geochemistry (Figure 1). Well cuttings were sampled at 3 to 6 metre intervals, washed, and picked at the Geological Survey of Canada in Calgary. Results of analyses will be used to: 1) refine formation tops picks within the wells sampled; 2) integrate data with existing data to track organic-rich fairways and extend thermal maturity trends into the Peel Plain, southern Mackenzie Plain, and Franklin Mountains.

Introduction

The Devonian Horn River Group, consisting of the Hare Indian, Ramparts and Canol formations have been sampled extensively and described within the Mackenzie Plain over the past several years (Pyle et al., 2014). Through a combination of outcrop and subsurface data, the Canol Formation was determined to be in the oil window throughout much of the Mackenzie Plain region (Pyle et al., 2014). The Canol Formation is comprised mostly of siliceous shale and mudstone with minor limestone. It is informally divided into three units in surface outcrops: lower recessive, middle resistant and upper recessive. At its Mountain River Tributary reference section, the lower recessive is a unit of black shale with minor limestone, the middle resistant consists of mudstone and shale, and the upper recessive is shale and mudstone (Pyle et al., 2013).

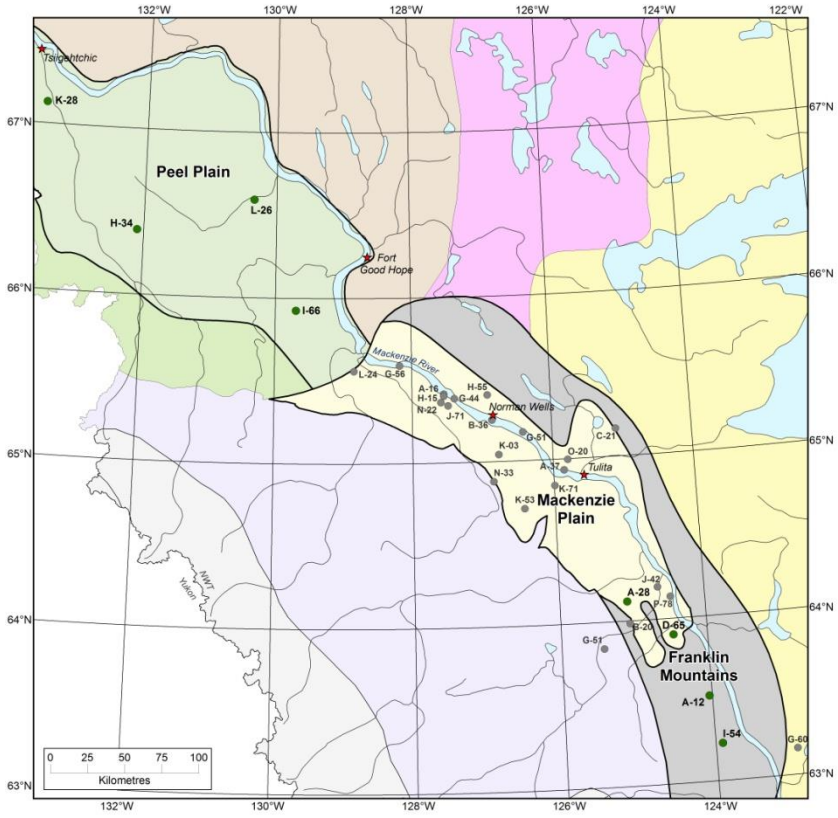

Figure 1: Locations of wells sampled in 2014 (in green) and previously sampled (in grey).

Methods

Eight wells were sampled in October 2014, four in Peel Plain and four in southern Mackenzie Plain and Franklin Mountains (Table 1). Approximately fifteen grams of cuttings were removed from each sampling interval at GSC Calgary. The cuttings were washed and then examined and described. The samples were analyzed for whole rock geochemistry at Acme Laboratories in Vancouver. Split samples were sent to GSC Calgary for Rock-Eval/TOC and vitrinite reflectance analyses to determine source rock potential and organic content.

Table 1: Sampled wells and sampling interval.

Well Name	UWI	Interval	Sample Interval
Keele S. A-28	300/A-28-6410-12500	2251.3m – 2301.2m	3m – 6m
Dahadinni D-65	300/D-65-6400-12415	1286.0m – 1364.3m	3m – 6m
Johnson A-12	300/A-12-6340-12400	609.6m – 647.4m	6m
Wrigley I-54	300/I-54-6320-12345	103.6m – 186.5m	3m – 6m
Hume River I-66	300/I-66-6600-12930	666.7m – 687.0m	5m
Grandview L-26	300/L-26-6640-13015	152.1m – 178.9m	3m – 6m
Swan lake K-28	300/K-28-6710-13330	1348.7m – 1418.2m	5m
Ontaratue H-34	300/H-34-6630-13200	887.6m – 971.1m	5m

Results

The Canol Formation in the four Peel Plain wells is comprised of dark gray shale to silty shale with a varying abundance of pyrite, bitumen, carbonate and chert. Generally, the abundance of pyrite and bitumen decreases northwards while carbonate abundance appears to increase. The shales are siliceous, with silica content consistently ranging from approximately 55 to 75 weight percent, based on preliminary whole rock geochemical results.

In the four southern Mackenzie Plain/Franklin Mountains wells, the Canol Formation is dark gray shale to silty shale with rare to trace pyrite, trace carbonate and traces of bitumen. Lithologies in the cuttings suggest a southward increase in the abundance of silt and chert. Generally, silica content ranges from approximately 50 to 70 weight percent.

In comparison with the reference section at Mountain River (Pyle et al., 2013), the Canol Formation in both the northern and southern wells is less SiO_2-rich on average. Preliminary geochemical data may allow the identification of the three informal surface divisions in subsurface. For example, the barium anomaly in the middle resistant unit appears to be present in three of the sampled wells: D-65, I-54 and H-34.

Data from Rock/Eval, TOC and vitrinite reflectance analyses will be forthcoming later in the year. Detailed comparisons between the Canol Formation within Mackenzie Plain and new well data are also forthcoming.

Acknowledgements

Facilities were provided by the Geological Survey of Canada for sampling and initial sample processing.

References

Pyle, L.J., Gal, L.P., and Fiess, K.M., 2014. Devonian Horn River Group: A Reference Section, Lithogeochemical Characterization, Correlation of Measured Sections and Wells, and Petroleum-Potential Data, Mackenzie Plain area (NTS 95M, 95N, 96C, 96D, 96E, 106H, and 106I), NWT; Northwest Territories Geoscience Office, NWT Open File 2014-06, 70p.

Pyle, L.J., Gal, L.P, and Fiess, K.M., 2013. Correlation of Devonian Horn River Group in Mackenzie Plain, Central Mackenzie Corridor, Northwest Territories; GeoConvention 2013 Poster Presentation, Calgary, May 2013.