

## Volumetric Method to Determine the Contribution of Montney Sourced Hydrocarbons to the Doig and Montney Petroleum System

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### Introduction

Montney is one of the most liquid prolific formations in WCSB, with gigantic marketable unconventional oil and gas resources. Despite its large resources and strong economic interest to the industry, fine grained shaly siltstones in the Montney Formation have not been considered as a significant contributor to the resources (Mathieu Ducros et al, 2012). A study by Maria-Fernanda Romero-Sarmientoa et al., (2016) suggests that the Montney Formation may contain potential source rock beds. However its thickness, spatial distribution and generation potential require further investigation. This study attempts to define the spatial distribution of source rock beds, their thickness and hydrocarbon generation potential so that their relative contribution as compared with those from Doig Formation to the hydrocarbon resources in the Montney Formation can be indicated.

### Method

Volumetric Method will be used for calculation of potential hydrocarbon resources of both Montney and Doig formations based on mass balance and kerogen kinetics, in which three parameters are of great significance: source rock thickness, initial hydrocarbon generation potential, and hydrocarbon transformation ratio.

- (1) To identify potential source rock beds in Montney formation, analytical results of samples from identified potential source rock beds of Montney Formation are used to establish an empirical relationship between TOC and well log GR readings. The Gamma ray curves along with other well log curves are then used for qualifying potential source rocks and estimating its thickness;
- (2) Hydrocarbon generation potential is calculated by the difference between initial and remaining hydrocarbon potentials as indicated by the hydrogen indices from Rock-Eval analysis;
- (3) Transformation ratio is estimated using a quantitative expression by Chen and Jiang (2016) and employing a generalized Tmax-HI plot based on Rock-Eval pyrolysis;

The hydrocarbon generation potential and its relative contribution to the resources within Montney Formation will be discussed along with geological and geochemical supporting evidence showing the spatial distribution of the potential source rock beds and their quality.

### References

Mathieu Ducros, Tristan Euzen, Roland Vially and William Sassi, 2014. 2-D basin modeling of the WCSB across the Montney-Doig system: implications for hydrocarbon migration pathways and unconventional resources potential, GeoConvention 2014

Maria-Fernanda Romero-Sarmientoa, Tristan Euzenb, Sébastien Rohaisa, Chunqing Jiang and Ralf Littked, 2016. Artificial thermal maturation of source rocks at different thermal maturity levels: Application to the Triassic Montney and Doig formations in the Western Canada Sedimentary Basin. *Organic Geochemistry*, Volume 97, Pages 148–162

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