

Oil to source rock correlation and implications for petroleum system analysis

M Schwangler^a, NB Harris^a, and JF Waldron^a

^a *Earth and Atmospheric Sciences, University of Alberta, AB, Canada*

The presence of natural oil-seeps and old, accessible well sites along the coast of western Newfoundland have refocused the interest on Late Cambrian to Ordovician Cow Head and Northern Head Group. Part of the Humber Arm Allochthon, these groups contain viable source rocks for petroleum exploration. Most oil seeps and old wells containing light oil are concentrated around the Parson's Pond area, an inlet located in the thrust belt of the northeastern Canadian Appalachians. During compressional events westward thrusting imbricated continental slope and rise deposits of the Humber Arm Allochthon forming thrust sheets of repeated early Paleozoic strata. The former passive continental margin is represented by deep marine organic rich argillaceous rocks as well as carbonate deposits containing potential source and reservoir rocks.

Substantial total organic content (TOC) concentrations of up to 10.35% and high hydrogen index (HI) values of over 840 [mg HC/g TOC] demarcate the Green Point Formation of the Cow Head Group and the Middle Arm Point Formation of the Northern Head Group as viable sources. Although extensive studies on the sedimentology of those deposits have been conducted, the connectivity between these source rocks and produced hydrocarbons and oil seeps is not well understood. Here, we present a systematic source rock analysis of the Cow Head and Northern Head Group in conjunction with detailed biomarker analysis to identify specific characteristics of the source rock as well as live oil and oil seep samples. This will be utilized to establish oil families, which will be used for oil-to-source correlation and thermal maturity models for the expelled hydrocarbons. The results will give further input for a complete basin model and a better understanding of the petroleum system.

Corresponding author: schwangl@ualberta.ca