

The Lower Triassic Petroleum System in West-Central Alberta

Rory C. Hankel*
ExxonMobil Corporation

and

Cynthia L. Riediger
University of Calgary

Oil and gas occur in fine-grained sandstones within the Lower Member of the Lower Triassic Montney Formation at Valhalla field (T.75, R.9W6). However, the relationship of the Valhalla oils to other Triassic oils, or to potential hydrocarbon source rocks, has not been reported.

This study examines the geochemistry of the Lower Montney petroleum system in west-central Alberta (T. 65-85, R. 20W5 to 12W6). Rock-Eval/TOC analyses of 70 Lower Montney core samples indicate poor to good, Type II to Type II/III marine source rocks, with TOC values ranging from 0.4 up to 4.1 wt. %. Tmax values indicate increasing thermal maturity from east to west, with a 40 km wide "oil-window" trending northwest-southeast across the study area.

Five Triassic oils were analyzed to determine their (1) stable C- and S-isotope ratios, and (2) saturate fraction biomarker signatures. The isotopic and biomarker results suggest the presence of 3 oil groups. The oil from Cecil field was derived from the Jurassic Nordegg Member. Oils from Wembley, Valhalla 4-27 and Rycroft are consistent with a Middle Triassic Doig "Phosphate Zone" source. The oil from Valhalla 14-34 yields highly depleted $\delta^{13}\text{C}$ values, and may have been derived from a different Triassic source rock (Lower Montney member?) than those proposed for the other 4 oils. Saturate and aromatic biomarker analyses of potential source rock intervals within the Lower Montney are required to test this hypothesis.

* This paper is presented in memory of Rory Hankel, who passed away on May 17, 2001.