

## **Geochemical Variations of Exshaw-derived Oils in Southern Alberta**

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Oils in the Lower Cretaceous Mannville reservoirs in southern Alberta (Township 1-40, Range 1W4- 27W4) are derived from at least five different source rocks. From oldest to youngest they are: the Devonian Duvernay Formation, the Devonian-Mississippian Exshaw Formation, an unknown Upper Paleozoic marine carbonate, an unknown Mesozoic shale, and the Ostracod Zone. The Exshaw Formation source rock is the most significant contributor of hydrocarbons to the Lower Cretaceous Mannville reservoirs. This study examines the different factors influencing the quality of the Exshaw-derived oils produced in southern Alberta. These include biodegradation, the mixing of oils from different source rocks and possibly facies changes within the source potential of the Exshaw Formation.

South of the Vulcan structure, the Exshaw-derived oils are generally low quality oils ( $API < 25^\circ$ ;  $S > 2.0$  wt %) and show no geochemical evidence of mixing with oils from other source rocks. A significant proportion of these oils is affected by biodegradation. However, Exshaw-derived oils north of the Vulcan structure are higher quality oils and, with the exception of oils from the Provost region, are not significantly biodegraded. The saturated biomarkers for these oils indicate a mixture of oils derived from both the Exshaw and Ostracod source rocks. A few Mannville reservoirs north of the Vulcan structure contain Exshaw oils that are not mixed Ostracod-derived oils. The geochemical characteristics of these oils are similar to the mixed oils.