



Oil and Source Correlations of Triassic Montney Formation in WCSB: Implication to Shale Gas Resource Potential

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Summary

Recent geochemistry study reveals that there are three different oil families with distinct geochemical signatures within hydrocarbon accumulations of the Triassic Montney Formation and other Triassic reservoirs in the Western Canada Sedimentary Basin. Family A oils are characterized by low ratios of diasterane/regular sterane and Ts/Tm, high ratios of C₂₄ Tetracyclic terpane over C₂₆ tricyclic terpanes and C₂₉/C₃₀ hopanes, a high C₃₅ homohopane index and high sulfur contents. These oils are correlated well with Nordegg extracts, suggesting that they are likely originated from the organic-rich calcareous shale in the Jurassic Nordegg Member. Its contribution to the accumulation in Montney Formation tends to increase where Nordegg Member directly overlies the Montney Formation. Family B oils have a moderate C₂₄ tetracyclic terpane over C₂₆ tricyclic terpane ratio, high abundances of hopanes, a low C₃₅ homohopane index, a high diasterane/regular sterane ratio and relatively low C₂₈ regular steranes. Family B oils are correlated well with rock extracts from Doig Formation and are believed to be originated from source rock in the Doig Formation. Family C oils show abundant extended tricyclic terpanes and almost no hopanes. They are also characterized by higher $\delta^{34}\text{S}$ but lower $\delta^{13}\text{C}$, lower sulfur contents and extremely lower C₂₄ tetracyclic terpane ratios than Family A and B oils. Family C oils in Montney Formation bear striking resemblance to the Montney rock extracts, and their links to the source rocks in the Triassic Doig Formation and Jurassic Nordegg Member are skeptical.

Analysis of well logs and Rock-Eval results indicates that the Montney Formation may contain potential source rock units in deepwater facies and that considerable hydrocarbons may have been expelled from these intervals. Based on available evidence, the Family C oils appear to be originated from Montney Formation. The presence of Montney Formation sourced oils may have important implications for future shale gas exploration in the Montney Formation .