

## **Petrographic analysis of the Lower Triassic Montney Formation, northwestern British Columbia, Canada**

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The Lower Triassic Montney Formation consists of sandstone, siltstone and coquina that were deposited along the western margin of Pangaea. Mineralogically, the Montney Formation contains a low proportion of clay minerals (2 to 8% Illite) and is dominated by quartz, dolomite, potassium feldspar, plagioclase feldspar, mica, calcite and pyrite. Although percentages of minerals (such as quartz) vary, in general, quartz content is 60% or less and dolomite is the most abundant type of lithic fragment. Observable rock types include: dolomitic lithic arkose, dolomitic feldspathic litharenite and dolomitic litharenite. These rock types were noted during this study, which focused on the lithology of the Upper Montney Formation and questions related to the conditions during deposition. To this end, thin section analysis, in addition to SEM and EMP analysis, was conducted on 14 siltstone samples of the Montney Formation from northern British Columbia.

Five distinct microfacies were observed. The analysis of these microfacies reveals a turbiditic origin of deposition. Bioturbation was observed to be sporadic and rare and may reflect doomed pioneers. Body fossils were observed to be dissolved and the overall biological imprint on the Montney is low. Pyrite analysis reveals deposition in a dysoxic environment and dolomite grains eroded by calcite (dedolomite) points to a large detrital dolomite component that may have been sourced by sulphate reducing bacteria. Analysis of these microfacies has produced a diagenetic model for Montney sedimentation which includes: the deposition of detrital grains (quartz, dolomite, feldspar, mica and bioclastic debris) below calcium compensation depth, shallow burial, rapid transport through the sulphate reduction zone, and subsequent calcite cementation and dedolomitization. Kerogen, preserved within pore spaces is a likely source for Montney hydrocarbons.