

# **Sedimentology, Ichnology and Biogenic Permeability of the upper Montney Formation, NE British Columbia**

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The upper Montney Formation is a tight gas reservoir that consists of silt and very fine-grained sandstone in its entirety. Despite its limited grain size variation, this formation is highly heterogeneous and the distribution of facies is complex both vertically and laterally. Subtle changes in characteristics affect reservoir properties resulting in the compartmentalization in resources. These changes refer to rapid changing facies and the sporadic distribution of bioturbation. A detailed analysis of the subsurface reservoir was conducted in order to provide insight into these subtle heterogeneities.

Fourteen cores within the upper Montney of northeast British Columbia were studied in order to interpret depositional processes and assess bioturbated fabrics and their relationship with permeability and porosity. Five facies were identified representing deposition within the distal offshore to offshore transition zone. Sediment was sourced from low-density turbidity currents and varying velocity within the boundary layer of turbulent flow was likely the mechanism for the physical separation of coarser silt grain. This mechanical separation resulted in the development of pinstripe laminae that dominates the formation. Bioturbation within this interval is characterized as sporadic and its distribution vertically and laterally remains unclear.

Permeability was assessed with a pressure decay profile permeameter (PDPK-400) to characterize the effects of bioturbation on permeability. This study provides a detailed examination of spot-permeametry on fine-grained reservoir and evaluates its utility. Spot-permeability was measured in a 1 x 1 centimetre grid across the surface of various core samples. The samples represent a range in pinstripes, ripples and bioturbation intensities. Permeability anisotropy was evaluated using a matrix scoring technique that revealed isotropy in the vertical direction however limitations in the permeameter affect the results.

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