

Ichnological and Sedimentological Indicators of Tidally- influenced, Seasonal Deltaic Sedimentation in the Lower Triassic Montney Formation, Western Alberta

Demian J. C. Robbins* and S. George Pemberton
Ichnology Research Group, University of Alberta
[drobbins@telusplanet.net](mailto:d Robbins@telusplanet.net)

The subsurface Montney Formation (Lower Triassic) in west-central Alberta comprises a westward-dipping wedge of fine-grained siliciclastic sediments truncated in the east by later Mesozoic erosion. The eastern subcrop edge of the Montney is characterized by a mixed assemblage of palaeoshoreline-proximal siltstones, very fine sandstones and bioclastic coquinas of enigmatic origin.

In the vicinity of the Kaybob and Kaybob South hydrocarbon fields, both significant producing Montney reservoirs, the siliciclastic accumulations are dominated by an association of eight lithofacies. Facies Association I (FA1) predominates, and comprises three gradationally interbedded facies characterized by fine lamination, locally abundant pyrite, tidally-associated sedimentary structures and near-rhythmic but intermittent sedimentation. FA1 typically accumulated as 1-3 coarsening upward successions that are poorly defined on logs but very distinctive in cores. Facies Association II (FA2) comprises five facies characterized by rapid deposition, soft-sediment deformation and dewatering, and occurs as isolated accumulations within FA1 successions.

Ichnofossils associated with FA1 comprise a locally abundant but low-diversity assemblage representative of an impoverished *Skolithos* ichnofacies. *Lingulichnus* is predominant. Additional forms include *Teichichnus*, *Thalassinoides*, *Planolites*, *Palaeophycus*, *Skolithos*, and *Diplocraterion*. Ichnofossil preservational styles and distributions define important environmental parameters not apparent from sedimentological observations. These include locally elevated sedimentation rates and significant ecological gradients in salinity, oxygen and food supply.

FA1 deposits represent a seasonally active delta front normally sheltered from the open shelf. Sedimentation was subject to significant tidal influence and penecontemporaneous reworking. FA2 represents mixed allocyclic and autocyclic perturbations of the deltaic setting, including episodic storm deposits and meso- to macroscale slumping events.