

Sequence Biostratigraphy and Depositional Systems of the Pennsylvanian-Permian Belloy Formation Peace River Basin, Alberta Canada.

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ABSTRACT

The Pennsylvanian-Permian Belloy Formation within the Peace River Basin (PRB) exhibits excellent reservoir characteristics and includes approximately 2% of the Western Canada Sedimentary Basin's (WCSB) proven oil and gas reserves. The formation has been largely overlooked as a primary WCSB exploration target because of the difficulties with regional correlations and the lack of a basin-wide sedimentological model. Traditional lithostratigraphic and allostratigraphic techniques/applications have proved problematic due to the similarity of lithofacies throughout the succession and a paucity of macrofauna. This presentation seeks to address these shortcomings utilizing conodont biostratigraphy and detailed core analysis.

Six regionally correlatable depositional sequences have now been identified within the Belloy Formation and their bounding surfaces entered into a regional database. These sequences are placed into a high-resolution chronostratigraphic framework through an integration of detailed core logging, wireline log correlations and conodont biostratigraphy (sequence biostratigraphy).

The construction of this framework has necessitated a reassessment of the tectono-stratigraphic evolution of the PRB. This analysis indicates that block faults that disrupted the underlying Mississippian Stoddart Group also caused offset, differential synsedimentary subsidence and/or up doming in the Belloy and were ultimately responsible for sequence development and preservation. Sedimentological analysis of the Permian Belloy sequences indicates somewhat unique mixed siliciclastic to carbonate depositional systems that include barrier bar, braid delta, and subtidal to supratidal. These systems are largely controlled by the physiography of the basin, the arid to semi-arid climate and autocyclic processes.