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Arden Marsh¹, Hairuo Qing¹ (1) University of Regina, Regina, SK

Sedimentology and Stratigraphy of the Mississippian Frobisher Carbonate-Evaporite Sequence, Steelman Field, Southeastern Saskatchewan

Mississippian carbonate rocks are the most important hydrocarbon producers in the northern Williston Basin, accounting for 75% of proven oil reserves in Saskatchewan. The Steelman Field is located on the northeastern flank of the Williston Basin, where the hydrocarbons are being produced from the Midale and Frobisher beds. These reservoirs are characterized by highly variable porosity and permeability due to their complex depositional and diagenetic history.

The Frobisher strata in the Steelman Field consist of cyclic shallowing-upward successions of carbonates and evaporites. Based on core examination and well log analysis, a typical succession includes, in ascending order: oolitic-peloidal grainstone-packstone, fossiliferous-peloidal wackestone-grainstone, argillaceous mudstone, dolomudstone, argillaceous lateritic mudstone, and chicken wire-nodular anhydrite. Other lithofacies includes local pisolite, which overlies oolitic-peloidal grainstones-packstones, and is interpreted to be the result of vadose diagenesis during relative sea-level fall.

The cyclic successions of lithofacies suggest that the Frobisher carbonate-evaporite sequences within the Steelman Field in southeastern Saskatchewan were deposited in shallow subtidal to intertidal and supratidal environments as complex parasequences during several TST and HST cycles, which formed part of the overall shallowing-upward Mission Canyon Formation sequence.