

Intrastratal Depositional Breaks in the Mississippian Midale Beds of Southern Saskatchewan; Their Roles in Reservoir Rock Creation and Hydrocarbon Accumulation

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The Midale Beds have always been considered to represent of one depositional cycle. However, core studies of the Tatagwa, Bromhead, Elswick, Bryant, Benson and Steelman areas, have revealed the existence of three transgressive/regressive events within these strata. Flooding of the sabkha deposits of the Frobisher Evaporite initiated the earliest transgression. The cycle was terminated by a depositional break that shows evidence of weathering, small-scale karsting and in places, such as Bromhead, relief of several metres within the lower Midale (Vuggy). The second transgression was comparable to the first, occurring under shallow water conditions, at-or-slightly below fair weather wave base. Evidence for the second regression is revealed through a surface emphasized by thick solution seams, small-scale karsting, and low paleotopographic relief. Burrowed dolomicrites separated by a fossiliferous limestone that is rich in disseminated organic material suggest that somewhat deeper water conditions existed for the upper Midale (Marly), which marks the third transgression. Midale sedimentation ended with a loss of accommodation space that resulted in poor circulation, and the subaqueous precipitation of the calcium sulfate rocks of the Midale Evaporite. The exposure surfaces within and at the top of the lower Midale produced vadose conditions that played a role in creating the vuggy facies in the fields extending from Tatagwa to Steelman. In addition, the depressions on the earliest depositional break helped to trap coarser-grained sediments that formed the Lower Midale reservoir rocks at Bromhead, Skeletal lime mudstones with disseminated organic material commonly fill depressions on the youngest exposure surface creating seal for Vuggy facies reservoirs.