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 krasting, 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 the 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.