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**Dolomitization and Cyclicity: Implications for Reservoir Distribution and Quality in Mississippian Livingstone Formation, Waterton Complex, Southwest Alberta**

In the Waterton Complex, some of the Mississippian gas reservoirs occur in dolomitic strata from the Livingstone Formation. We analyzed the dolomite distribution along the succession in order to improve the prediction of reservoir occurrence.

Detailed study of the Livingstone allowed recognition of high and low frequency cycles (HFCs & LFCs), which exert a strong control on dolomite distribution. HFCs comprise two sections; 1) a lower, mud-rich, lagoonal hemicycle formed during a stage of increasing accommodation space (transgressive phase), and 2) an upper, grain-rich hemicycle formed in shoal settings during a period of decreasing accommodation (regressive phase). Three to ten HFCs (< 4 m) bundle to form LFCs (< 24 m). Pervasive dolomitization characterizes the transgressive intervals of the HFCs, whereas partial to absent dolomite occurs in the regressive ones. However, some entirely dolomitized regressive hemicycles have been recognized, preferentially in the transgressive portions of LFCs. High frequency transgressive dolostones vary from tight to porous, with fine intercrystalline porosity and regular reservoir quality. High frequency regressive limestones are tight, but their dolostone counterparts are highly porous and show excellent reservoir quality. Therefore, transgressive intervals of LFCs are the best sites for the development of reservoir quality dolomite within the Livingstone Formation.

We conclude that recognition and characterization of HFCs and LFCs is essential to predict the occurrence of porous intervals in the Livingstone Formation. Moreover, the methodology and results may be applied to other dolomitized shallow subtidal carbonate reservoirs.