

The Milk River Formation In Southwestern Saskatchewan; A New Stratigraphic Scheme For The Alderson Member.

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ABSTRACT

The giant low-permeability Milk River gas reservoirs in southwestern Saskatchewan are hosted within the Campanian Alderson Member of the Milk River Formation. The Alderson Member consists of a thick stack of very fine-grained sandstones, siltstones and mudstones that were deposited mainly in proximal offshore marine environments. These sediments were derived from a series of deltas that were present along regional shorelines to the south and the west. There is no published internal stratigraphy for the Alderson Member in either Alberta or Saskatchewan, and the unit has not been formally defined. Oil and gas industry terminology has informally divided the Alderson Member into broad upper and lower intervals.

This analysis is based on the correlation and mapping of over 4,000 wells in southwestern Saskatchewan, from T11 to T28, and from R15w3 to the Alberta border. Here, the Alderson Member can be divided into five major stratigraphic units, labelled A to F in descending order. These Alderson Member units resulted from multiple episodes of variable tectonic subsidence and uplift, giving rise to a series of highstand, lowstand, and transgressive systems tracts, which are often truncated by large regional erosion surfaces. The Upper Alderson consists of the A, B, C and D units, while the lower Alderson consists of the E and F units.

During deposition of the lower Alderson a large basinal area was present in the eastern part of the area. The lowermost F unit is a highstand succession that downlaps from west to east into this basin. A series of large incised sand bodies are present at the top of the F unit and the regional unconformity at the top of the unit is marked by an extensive transgressive lag deposit. The overlying E unit is a sandy lowstand deposit containing a series of imbricate sand bodies that prograde from the northwest to the southeast.

By the end of lower Alderson time, basinal subsidence had moved to the northern part of the area. The D unit is a muddy transgressive succession that thickens into this northern basin. The overlying C unit is a sandy highstand systems tract, and the uppermost units, the B and the A are thick muddy transgressive intervals.

Milk River gas production in the mature field areas in the Hatton region is from sands within the F, E and C units. Gas production from the new Milk River fields at Abbey and Lacadena is almost exclusively from the F unit.