

The Upper Cretaceous Medicine Hat and Milk River formations in southeastern Alberta: Stratigraphy, Sedimentology and Ichnology of a Shallow Gas Interval

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The Santonian Medicine Hat Formation and Campanian Milk River Formation in southeastern Alberta (Tp. 19-24, Rge. 3-9W4) have produced 550 Bcf cumulative gas since November 1969. The Second White Speckled Shale, Medicine Hat and Milk River Formations are estimated to contain 9.8 Tcf of Alberta's initial established gas reserves. Subsurface maps, cross-sections and logs and photographs of representative cores have been assembled to graphically illustrate the stratigraphic and sedimentological nature of these units.

The reservoir unit of the Medicine Hat Formation is composed of interlaminated sandstones, siltstones and shales and is distinguished from vertically adjacent lithologies by a coarsening-upward character in core and log signatures and by its light to moderate bioturbation. The Milk River Formation is typically muddier than the Medicine Hat reservoir unit and displays a series of stacked, coarsening-upward sequences on gamma-ray log profiles, the most prominent (least radioactive) of which is a common gas producer in southeastern Alberta.

Trace fossils identified in core include *Planolites*, *Terebellina*, *Chondrites*, *Teichichnus*, *Asterosoma*, *Cylindrichnus* and *Rhizocorallium*. These traces characterize the *Cruziana* ichnofacies and place rocks of the Medicine Hat/Milk River interval within a shallow marine, lower shoreface to upper shoreface depositional environment. The coarsening-upward nature, light to moderate bioturbation, interbedded sandstone/shale lithology and lobate plan geometry of the Medicine Hat reservoir unit suggests a deltaic distal outer platform/prodelta slope depositional model. Subsequent transgression resulted in drowning and reworking of deltaic deposits into northwest-southeast trending shorefaces and barrier bars of the Milk River Formation.