

A New Stratigraphic Framework for the Upper Colorado Group in southern Alberta and southwestern Saskatchewan, Canada

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Extensive marine shales and shallow-marine sandstones of the Cretaceous upper Colorado Group are one of the last informally-named strata in the southern part of the Western Canada Sedimentary Basin. This talk introduces two regionally-mappable formations within this interval in southern Alberta and southwestern Saskatchewan: the older Carlile Formation overlying the Second White Specks Formation and the younger Niobrara Formation underlying the Milk River Formation. Both names are taken from lithologically similar and laterally equivalent strata in adjacent parts of the Interior Seaway in Canada and the United States. The boundary between the formations is recognized by a distinctive zone of bentonites. The age of the formations is determined by foraminiferal zones and bentonite dating.

Variations in lithology, petrophysics and geochemistry of the sediments make it possible to further subdivide these two new formations. The Late Turonian Carlile Formation is subdivided into lower, middle and upper units. The latest Turonian to Campanian Niobrara Formation is formally subdivided into three mappable members: the shaly non-calcareous Verger Member, the sandy Medicine Hat Member and the calcareous First White Specks Member.

Biogenic gas from the Medicine Hat Member has been produced for more than 90 years with an estimated 7.736 Bcf initial gas in place, and the remaining 2.060 Bcf gas reserves (The Canadian Gas Potential Committee report, 1997). The upper part of the Carlile Formation also has potential for gas reserves within shaly Bowdoin sandstones, which are the major gas producer in northern Montana.

An outcrop reference section of the Carlile Formation is chosen from Deer Creek east of West Butte in the Sweetgrass Hills of Montana. The only core cut from the Carlile Formation in southern Alberta and southwestern Saskatchewan, is located at 13-20-17-7W4 and includes twelve meters of the upper part of the formation. It is used as a reference boundary section between the Carlile and Niobrara formations. A reference core-section of the Niobrara Formation is located at 4-16-22-15W4, which also makes the type section of the Verger, Medicine Hat and First White Specks members. An outcrop section at the Ghost River Spillway, west of Calgary, serves as the outcrop reference section for the Medicine Hat Member and is correlated directly to the subsurface using wire-line logs and biostratigraphy.