

Depositional Environment and Sequence Architecture of the New Cretaceous Gas Bearing Bougie Sandstone Member, Northeastern British Columbia

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In the Trutch area (94-G-15) of northeastern British Columbia a 150-m thick succession composed of numerous coarsening-upward cycles of mudstones and sandstones has earlier been referred to as the Albian Sikanni Formation. However, log correlations southward to the type sections of the Sikanni and Buckinghorse formations on the Sikanni Chief and Buckinghorse rivers place this sandstone succession within the shales of the Buckinghorse Formation below the Sikanni Formation. In the Trutch area we propose this sandstone succession as the new Bougie member within the Buckinghorse Formation. The well at B-42-F-94-G-15 with a 79-m long core within the member will be designated as the type section.

In the 94-G-15 area the Bougie member is enveloped within marine shales of the Buckinghorse Formation. A 160-m thick shale succession separates the Bougie member from the overlying sandstones of the Sikanni Formation. The Bougie member consists of at least 12 stacked upward coarsening cycles. Individual cycles are commonly 8-20 m thick and grade upward from shale with thin silt and very fine-grained sandstone beds to sandstone interbedded with shale. Sandstone beds are dominated by planar parallel bedding and hummocky cross-stratification with common combined flow ripples and wave ripples within the upper part of the cycles. This together with a trace fossil assemblage of *Planolites*, *Terebellina*, *Skolithos* and *Chondrites* suggest deposition in an open marine, storm dominated shelf setting. Southward and eastward pinchout of the sandstones into marine shales show a northern sediment source. The age of the Bougie member is not yet well constrained. The member could be a southern lateral equivalent of the Scatter Formation of northern BC and southern Yukon and NWT, consistent with the northern sediment source.

Tops of individual upward-coarsening cycles are sharp, overlain by more fine-grained deposits. Cycles are interpreted as para-sequences. The member is characterized by an aggradational to slightly progradational para-sequence set with a retrogradational set within the uppermost part of the member. Despite the predominant aggradational architecture of the member on-lap locally occurs. Sandstones within the uppermost part of the progradational para-sequence set are locally sand rich. In A-85-A/94-G-15 this sandstone interval produced gas at 275 Mcf/d.

Isopach maps of the Bougie member show a rapid thinning to the south and a more gradual thinning to the east. North-south oriented cross-sections reveal this southward thinning to be mainly related to a southward decrease in subsidence and sediment supply rates. This suggests a structural control, probably related to thrusting within this northern area.

The Bougie member is thus a new exploration target within this frontier area. The different sequence architecture and depositional environment of this member compared with the Sikanni Formation warrants re-evaluation of this gas-play.