# Correlating the Subsurface Nikanassin Group to an Outcrop Near Grande Cache, Alberta

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## Summary

The regional subsurface lithostratigraphic architecture of the Jurassic – Early Cretaceous Nikanassin Group in northwest Alberta has been established (Stott, 1998; Miles et al., 2009). An outcrop exposure of the equivalent stratigraphic interval ~5 km north of Grande Cache, Alberta (Fig. 1) has been examined in order to compare sedimentologic and stratigraphic characteristics. Comparison between the subsurface and outcrop exposure, through lithologic descriptions, gamma-ray profiles and petrographic analysis, provides insight into the regional and local depositional environment and stratigraphic architecture (Fig. 2 and 3). The primary objective of the study is to use outcrop observations in order to gain a more developed understanding of tight gas sandstone reservoirs of the Nikanassin Group in the subsurface of northwestern Alberta and northeastern British Columbia.

From regional subsurface mapping, the uppermost shale of the Fernie Group is known to conformably underlie the Nikanassin Group, which is unconformably overlain by the Cadomin Formation. The Nikanassin Group is subdivided into three formations, which from oldest to youngest, include the Monteith, Beattie Peaks, and Monach. The Monteith Formation is characterized by at least three widely correlated allomembers (Upper, Middle and Lower) (Miles et al. 2009). Cored intervals of each formation of the Nikanassin Group, chosen for proximity to the outcrop and stratigraphic continuity, were described with a focus on grainsize, lithology, and sedimentary structures (Figs. 1 and 2).

The lithostratigraphic arrangement of units observed in the outcrop belt is broadly comparable to the strata observed in the subsurface (Fig. 2), although the Fernie Group is not exposed in the outcrop succession. The Monteith Formation is characterized by a series of upwards-coarsening packages (20-35 m thick) attributed to progradational, marginal marine sedimentation (Fig. 3) (Miles and Hubbard, 2009). Overlying the Monteith Formation is 140-175 m of interbedded sandstone, siltstone and coal of the Beattie Peaks Formation interpreted to have been deposited in a coastal plain setting. Although the uppermost unit in the Alberta subsurface, the Monach Formation, is variably eroded due to regional incision of the pre-Cadomin unconformity, 4-12 m is present in outcrops in the vicinity of Grande Cache. These fluviatile units are characterized by moderately well-sorted medium-grained trough cross-stratified sandstone. The overall depositional framework of the Nikanassin Group records the transition from marine sedimentation (Fernie Group), marginal marine sedimentation (Monteith Formation), to coastal plain and fluvial deposits (Beattie Peaks and Monach formations).

## References


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Stott, D.F. 1998. Fernie Formation and Minnes Group (Jurassic and Lowermost Cretaceous), Northern Rocky Mountain Foothills, Alberta and British Columbia. Geological Survey of Canada Bulletin 516.


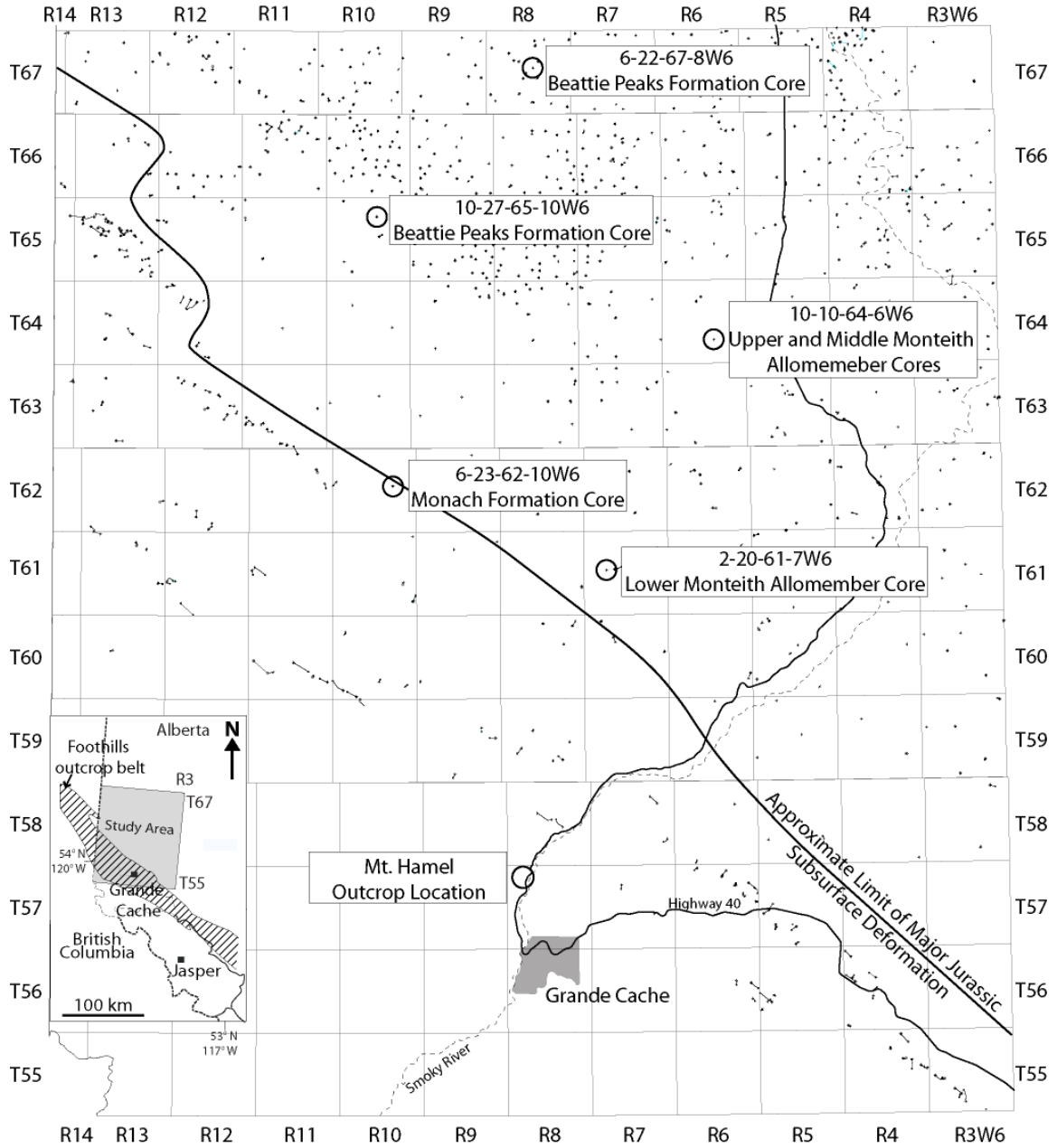


Figure 1. Map identifying the location of core and outcrop examined in this study. Wells with Nikanassin Group penetrations shown. Core was chosen for stratigraphic continuity and proximity to the outcrop. The outcrop studied is approximately 5 km north of Grande Cache on Mount Hamel and is partially exposed on the Highway 40 road cut.

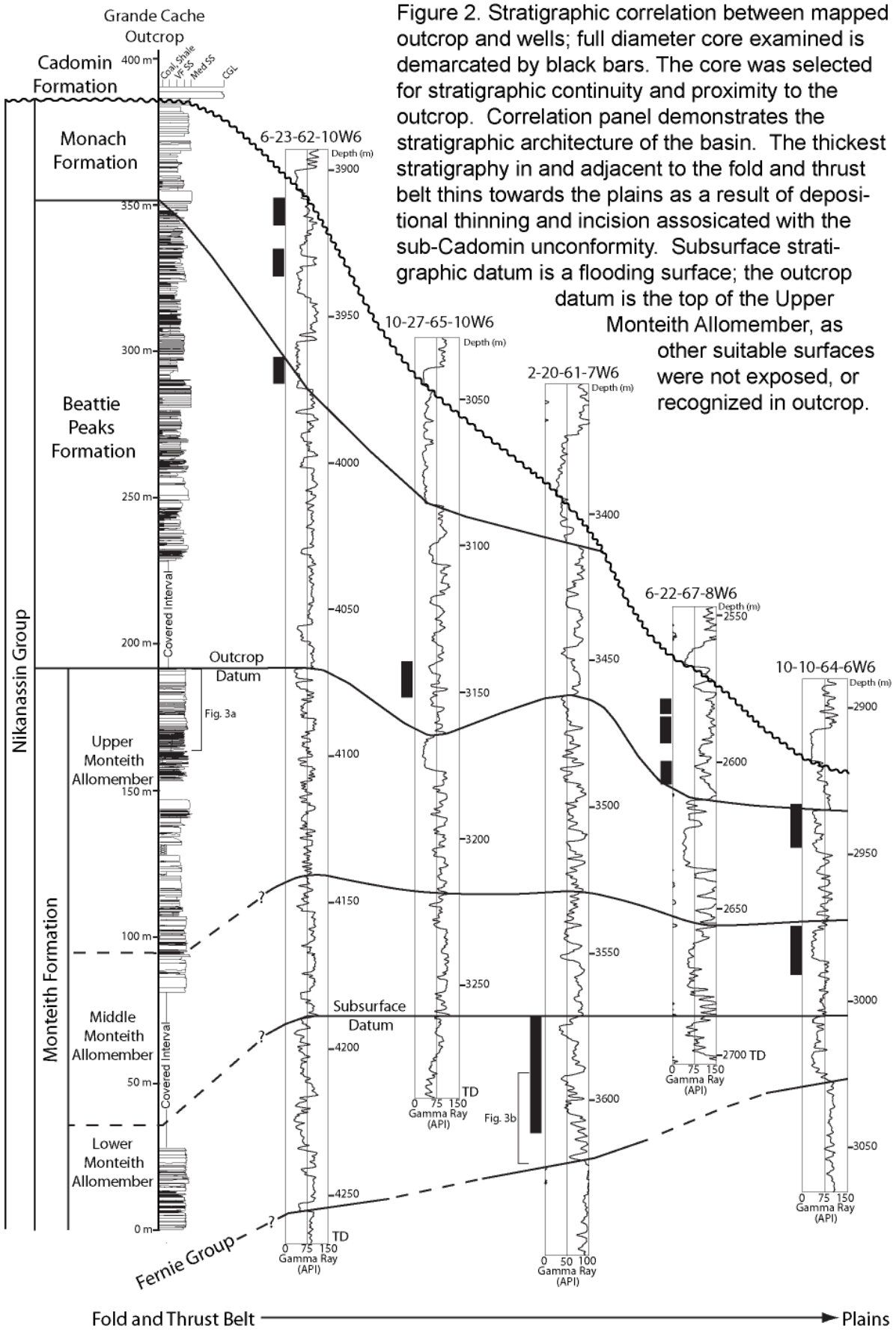


Figure 2. Stratigraphic correlation between mapped outcrop and wells; full diameter core examined is demarcated by black bars. The core was selected for stratigraphic continuity and proximity to the outcrop. Correlation panel demonstrates the stratigraphic architecture of the basin. The thickest stratigraphy in and adjacent to the fold and thrust belt thins towards the plains as a result of depositional thinning and incision assosicated with the sub-Cadomin unconformity. Subsurface stratigraphic datum is a flooding surface; the outcrop datum is the top of the Upper Monteith Allomember, as other suitable surfaces were not exposed, or recognized in outcrop.

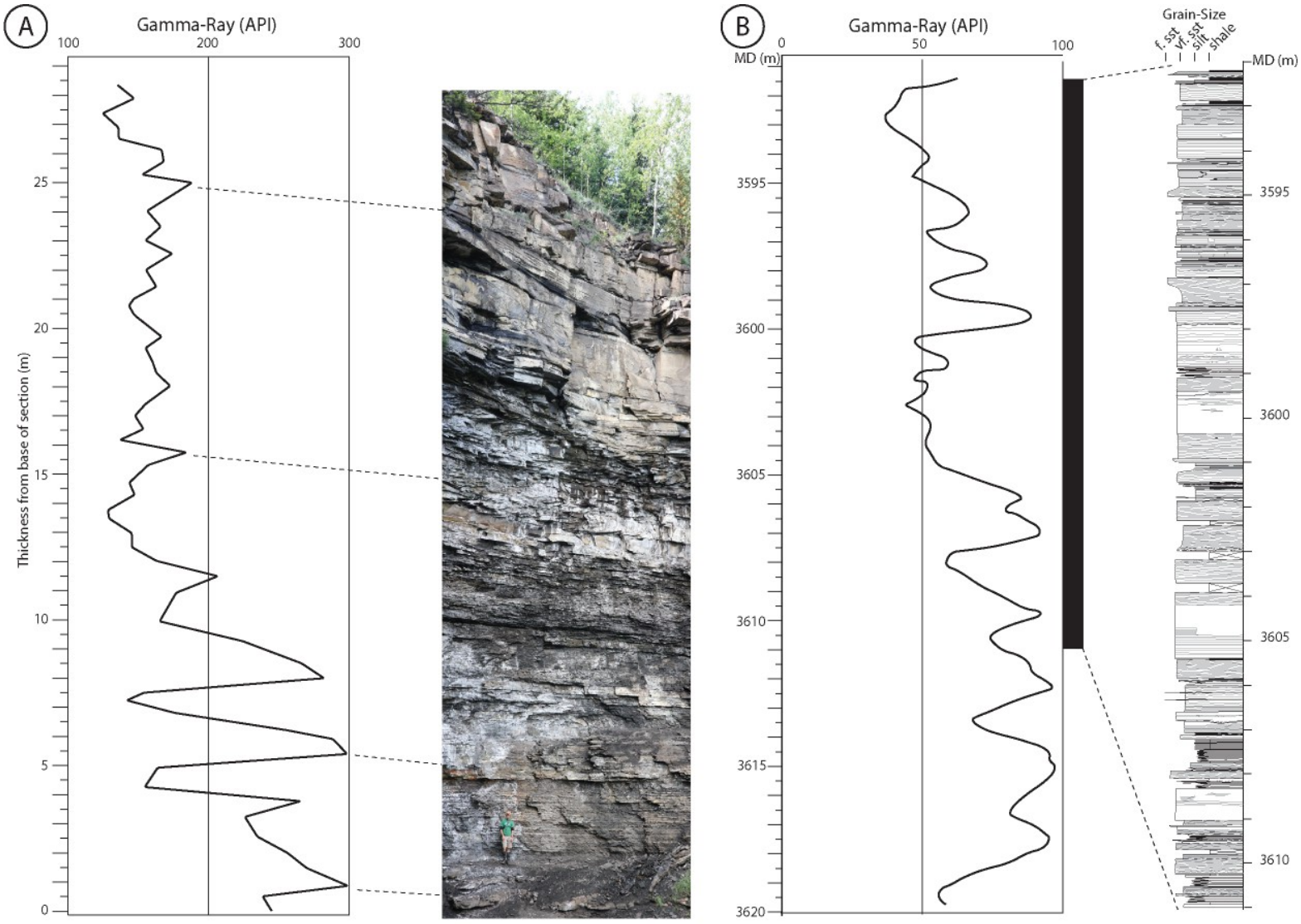


Figure 3. Stratigraphic profiles through upwards coarsening packages in the Monteith Formation. (A) Outcrop gamma-radiation profile and corresponding photograph of stratigraphic section. (B) Gamma-radiation log and corresponding core description from the Monteith Formation in the Alberta subsurface (location: 02-20-61-7W6).