

Mapping the Battle Formation in the Subsurface: Late Maastrichtian Paleovalley Systems in West-central Alberta

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The Maastrichtian Battle Formation forms an important stratigraphic marker in the non-marine Upper Cretaceous succession across a wide area of west-central Alberta. It is distinctive both at outcrop, consisting of dark mauve mudstone overlying leached, white sandstone or siltstone of the uppermost Horseshoe Canyon or Wapiti formations, and in the subsurface, where it has a characteristic low-resistivity log response. Its base is marked by a third-order sequence boundary associated with a significant stratigraphic hiatus (early Late Maastrichtian time gap; Catuneanu et al., 2000; Hamblin 2004). Its upper contact with the overlying Scollard Formation is interpreted as a fourth-order sequence boundary (Catuneanu et al., 2000).

As part of ongoing AGS regional mapping with the aim of producing a digital atlas of the near-surface geology of Alberta, new down-hole pick datasets have been generated for the top and bottom of the Battle Formation. To provide a new zero edge, the base of the formation has been mapped at the surface using a combination of fieldwork and high-resolution orthorectified colour air photo interpretation.

Detailed correlation along closely spaced well-log cross sections allows sharp delineation of a series of major paleovalleys incised into the Battle Formation and filled by sandy fluvial deposits of the Scollard Formation. Locally within these paleovalleys the Battle Formation mudstone has been completely removed and Scollard sandstones rest directly on the upper Horseshoe Canyon or Wapiti formations. At a first-order scale the late Maastrichtian paleodrainage appears to have been similar to that of today. In the Calgary to Red Deer area two paleovalley systems trend from NW to SE broadly along the present trends of the Bow and Red Deer rivers. Farther north, more deeply incised paleovalleys trend from SSW to NNE in the area of the McLeod River.

References

Catuneanu, O., Sweet, A.R., and Miall, A.D., 2000. Reciprocal stratigraphy of the Campanian-Paleocene Western Interior of North America: *Sedimentary Geology*, 134, 235-255.

Hamblin, A.P., 2004. The Horseshoe Canyon Formation in southern Alberta: surface and subsurface stratigraphic architecture, sedimentology, and resource potential: *Geological Survey of Canada, Bulletin 578*, 180 pp.