DESCRIPTIVE NOTES

The Mega River map area (NTS 84 M/SW) is located in northwest Alberta, adjacent to the British Columbia border. The southern third of the map lies within the Fort Nelson Lowlands physiographic region (Bostock, 1970), and comprises the generally flat, low-lying (360–545 metres above sea level (asl)) area that drains southwards into the Hay River drainage basin. The northern two-thirds of the map is situated within the Alberta Plateau physiographic region (Bostock, 1970), and includes the conspicuous Bootis Hill, considered to be a bedrock remnant, that rises to 771 metres asl. The map area is blanketed by Boreal forest (white and black spruce, aspen, lodgepole pine) and extensive bogs and fens. Soils are generally poorly drained, commonly with shallow water tables, reflecting the high clay content of the tills and glacial lake sediments (10–40%) in which they have formed. In raised areas, where soil development is more advanced, gray luvisols predominate. Static and turbic cryosols are found in regions of sporadic discontinuous permafrost.

The surficial geology of the Mega River map area was interpreted from 1:60 000 scale airphotos (Alberta Sustainable Resource Development, 1994). Prior to the field season, preliminary surficial geology interpretations were drawn on the airphotos, and then subsequently ground truthed in the field. Aspects of the regional surficial geology were also interpreted from shuttle radar topography mission (SRTM) imagery (3-arc second, 90 meter resolution). Fieldwork was conducted in summer 2004. Field activities included: 1) inspection, logging and characterization of surficial geology from truck, foot traverse and helicopter field surveys of exposures along roadcuts, cutbanks, borrow and sump pits, as well as from hand-dug and augered holes; 2) sampling of till at a reconnaissance scale (1 sample per 25 km^2) for geochemistry, base metal concentrations, particle-size, carbonate content, and kimberlite indicator minerals; 3) measurement of clast fabrics from tills.

The bedrock in the map area consists of horizontally bedded, poorly indurated Shaftesbury Formation shale (Green et al., 1970; Okulitch, 2006). Only a single bedrock outcrop was observed in the map area. This occurred at the east-central margin of the map, near the top of the regional bench dividing the Fort Nelson Lowlands and Alberta Plateau physiographic regions, along a shallow, road-side drainage ditch. Borrow and sump pits situated throughout the eastern and southern regions of the map area reveal a minimum of 3–5 m of glacial drift cover (till and/or lake sediments). The only other region in the map area considered likely to exhibit bedrock close to, or at surface, was along incised stream channels around the periphery of Bootis Hill. However, dense forest cover and an absence of helicopter landing sites negated their possible inspection.

Till within the Mega River map area has a high clay content (10–40 %), reflecting glacial erosion and entrainment of shale-rich bedrock and reworking of advance-phase glaciolacustrine sediment. During glacial advance, eastward draining regional rivers would have been impounded, leading to development of large proglacial lakes. In some localities, a second thinner and distinctly sandier till (30–45% sand in the < 2 mm size fraction of the matrix) overlies this basal clay-rich till. Fabrics in the two tills tend to be very similar, and contacts between them are often diffuse suggesting that it is a second facies relating to deposition of a greater component of more far travelled (Canadian Shield-derived) coarser englacial sediment, rather than a different trajectory of ice. Clast content of the regional till deposits tends to be very low, generally between 1 and 10%, and are dominantly Canadian Shield derived material (e.g., granites and gneisses), but also include local shale and sandstone erratics, as well as limestones, dolomites, quartzites, Athabasca sandstones, and ironstones. Thicknesses of till in excess of 5 m have been observed in the Mega River map area and > 15 m elsewhere in the northwest Alberta study area. A more detailed reconstruction of the regional drift thickness and bedrock topography in the 84M map area is provided by Pawlowicz et al. (2007a, b). Tills in the area are largely considered to have been deposited through basal lodgement processes. In the southwest part of the map area, a checker-board pattern of "islands" of hummocky till separated by rectilinear bog and fen deposits that parallel deglacial ice margins and what may have been linear and transverse crevasse patterns, suggests that ice here may have stagnated during retreat, allowing the uppermost till deposits to largely accumulate by meltout processes.

Rare occurrences of a generally thin (< 1 m), pink to maroon coloured till were observed in the Mega River map area. This same uniquely coloured till has been found elsewhere in the northwest Alberta and northeast British Columbia study area. It has been observed in various stratigraphic positions, including at the till bedrock contact, but was most frequently observed within upper till deposits. Clasts within this till are largely Shield-derived, and though somewhat sandier, it is not broadly dissimilar from the regional tills, other than its striking colour. It is speculated that this pink/maroon till represents glacial rafts of till derived from unknown deposits northeast (up-ice) of the study area.

The southwest-advancing Laurentide Ice Sheet inundated northwest Alberta during the Late Wisconsinan glaciation. Ice-flow direction is recorded in the broader study area by large southwest trending flutings across upland regions as well as by a subsequent set of smaller superimposed and cross-cutting flutings that trend south-southwest. Chronological constraint on the advance of ice is provided by a radiocarbon date of 24400 ± 150 C^{14} yr BP on wood recovered from gravel underlying Late Wisconsinan till in the adjacent region of northeastern British Columbia (Levson et al., 2004). Retreat of ice from the area largely occurred between 11.5 and 11 C^{14} ka BP (Mathews, 1980; Lemmen et al., 1994; Dyke, 2004).

The pattern of moraines and meltwater channels in the Mega River map area indicates that ice retreated as a series of lobes that were at times topographically confined, and were also punctuated by discrete readvances and/or surges. A spectacular, dense network of > 150 recessional moraines (up to 12 m of relief between ridges and spaced tens to several hundreds of metres apart; Figure 1) plot the retreat of a southward flowing ice lobe across much of central and northwest Bootis Hill. Individual recessional moraines, and regional ice marginal positions can be traced from the valley west of Bootis Hill (~ 580 m asl) obliquely up the western Bootis Hill slope, across its flat upper surface (~ 760 m asl), and then obliquely down its eastern and northern slopes (Figure 2). As the ice retreat pattern does not mirror the ~ 180 m of local topography, it is considered to indicate a period of buttressing by ice to the south, and thus represents the earliest phase of deglaciation in the region when ice began to separate and retreat both north and south around the Cameron Hills.

On the southern slope of Bootis Hill, a series of northwest-trending flutings record a divergent flow from the full-glacial west-southwest trending ice-flow direction. As these flutings occur perpendicular to a well defined series of moraines recording retreat of a northwards flowing ice lobe southwards down the Shekilie River valley (west of the Mega River map area; (Figure 2), it is considered that they relate to a deglacial ice configuration, rather than an early phase of Late Wisconsinan ice advance. Reconstructions of ice-flow history from adjoining map areas suggest that during deglaciation, ice centered in the Hay—Zama lowlands split into two lobes, one flowing west-southwest towards the Fontas River drainage system, and a second, abutting the Etsho Plateau to the west, and flowing northwards up the Shekilie River valley towards the Petitot River drainage system (Figure 2). This northward flowing Shekilie lobe cross-cuts the southernmost set of recessional moraines discussed above. The Shekilie lobe then retreated radially, in a topographically-conformable pattern, southwards off of Bootis Hill while maintaining a somewhat static ice-front position in the upper Shekilie River valley. On the east side of Bootis Hill, drainage channeled between the retreating ice margin and the regional slope led to the creation of a series of kame terraces. Directly east of here, a complex of ice-contact terrace and outwash fan deposits are associated with a prominent moraine deposited along the northern margin of Wally Lake (Figure 2). Northward-trending meltwater channels, and an absence of glacial lake sediments, indicates that ice retreating to the north (linked to the dense network of recessional moraines) must have retreated sufficiently northwards to have allowed free drainage from these ice margins, north and then westward down the Petitot River system. Ice continued to retreat from the low-lying regions south and east of Bootis Hill while continuing to occupy the Hay and Shekilie river valleys to the south and west. This suggests a period of general ice thinning, rather than pronounced marginal retreat. A tightly nested series of moraines, descending westward across the regional slope and up the Shekilie River valley, record a subsequent, progressive, southward lobate retreat of ice. Because the regional drainage is eastward in the Hay River area south of the Mega River map sheet, the retreating ice impounded proglacial Lake Hay, in which was deposited a discontinuous veneer of silty-clay glacial lake sediments. Thicker accumulations of glacial lake sediments and ice contact depositional features are found south of the Mega River map sheet, and elsewhere in the broader study area (cf., Paulen et al. 2005b; Smith et al., 2005).

Continued retreat of ice eastward through the Hay River valley and continuous impoundment of glacial Lake Hay, was punctuated by at least one readvance, possibly a surge event. Sub-parallel sets of flutings in the Mega River map area and surrounding regions record these discrete flow directions. Evidence of the surge event was found immediately to the southwest of the Mega River map area, in a sump pit dug within a prominent fluting. Here, coupled till and overlying lake sediments were intensely deformed into an overturned fold and diapiric structures (oriented down-flow, in a fluting-parallel direction) to a depth of at least 3.5 m (base of pit). Conformably overlying these sediments is a veneer (< 1 m) of horizontally laminated glacial lake sediments. This section thus depicts a sequence of ice advance (till), retreat and impoundment of glacial Lake Hay (lower lake sediments), surge/readvance (deformation of the till and lake sediments; creation of fluting), and final retreat (upper veneer of glacial Lake Hay sediments). The dynamic nature of the retreating ice front and the ice-contact glacial Lake Hay is also demonstrated by the abundance of iceberg scours in the southeast part of the Mega River map.

One of the primary objectives of the Shallow Gas and Diamond Opportunities study has been an assessment of the nature and genesis of known aggregate deposits, and the identification and characterization of new and/or potential aggregate deposits (Smith et al., 2005). Field observations reveal that till, dug from borrow pits, is the most abundantly used form of aggregate in the map area and is employed to build well pads and most petroleum development and access roads. The high clay content of local tills presents both problems and advantages. When wet, roads constructed from till are treacherously slippery. Areas of high traffic and other roads of importance are top-dressed with gravel, providing an all weather surface. The high clay content of tills is an asset where roads traverse bogs and fens as it inhibits water infiltration upwards into the roadbed. This results in the reduction of frost heaving and formation of segregated ice, particularly in areas overlying permafrost. Roads constructed with less clay-rich material quickly become deformed and ridged, requiring constant upgrading. The size and density of borrow pits appears to be largely a function of groundwater seepage (rate of flooding) and logistics (relative travel time for hauling material versus establishing a new pit further down the road). Borrow pits are generally situated in direct proximity to roads being constructed and range in size from 50–150 m x 30–100 m, and 3–10 m deep.

There are no known gravel pits situated within the Mega River map area. The only potential granular aggregate resources identified by the current mapping project pertain to the kame terraces (identified as units Gitk and Git the map) along the eastern margin of Bootis Hill and in the Wally Lake area. Preliminary investigations of the terraces along Bootis Hill, however, suggest they have only thin veneers (< 1 m) of gravely-sand, and are thus likely to be considered unsuitable, and/or uneconomic for development. The kame/glacial outwash deposits (unit Git on map) east of Wally Lake, are a series of 2–5 m high ridges of open-work sandy-gravel. The gravel is largely 1–4 cm sized, angular Shield material. As this site is presently bisected by an existing dirt road, it is likely worthy of more detailed study and assessment.

Given the generally flat-lying terrain, thick till blanket and extensive bog/fen cover in the region, other surface and sub-surface (ice advance) granular aggregate deposits in the map area may well exist, but are obscured from detection. Methods such as those described by Levson et al. (2004) involving the systematic inspection of seismic shothole driller's log records (see also, Smith et al., 2006), auger drilling and even airborne electromagnetic surveys (cf. Best et al., 2004), would be required to identify their existence.

Another central component of the Shallow Gas and Diamond Opportunities study was the sampling and analysis of glacial sediments for the presence of kimberlite indicator minerals (KIMs). Twenty samples of mostly bulk till (25 kg) were submitted for analysis. No significant positive KIM samples were recovered from the Mega River map area. Detailed analytical results of these and other samples from the broader study area are presented in (Plouffe et al., 2006a, 2007). Coincident with the analysis for KIMs, samples were also processed for heavy mineral contents. In addition, the 20 large samples, along with 6 additional smaller grab samples were also subjected to various geochemical analyses. Isolation of the heavy mineral fraction revealed anomalous concentrations of sphalerite grains (> 1000) in the 0.25–2 mm sand-sized fraction from one sample collected in the southeast part of the Mega River map area. Additional samples collected in the vicinity of this sample in adjacent map areas also contained high concentrations of sphalerite grains and secondary galena grains. Results and analysis of this data is presented in Plouffe et al. (2006a), and is considered to record evidence of the glacial dispersal of an unknown, local Cretaceous bedrock-hosted Pb–Zn deposit(s).

ACKNOWLEGMENTS

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REFERENCES

Best, M.E., Levson, V., and McConnell, D.
2004: Sand and gravel mapping in northeast British Columbia using airborne electromagnetic surveying methods; *in* Summary of Activities, British Columbia Ministry of Energy and Mines, Resource Development and Geoscience Branch, p. 1–6.

Bostock, H.S.
1970: Physiographic regions of Canada; Geological Survey of Canada, Map 1254A, scale 1:5 000 000.

Dyke, A.S.
2004: An outline of North American deglaciation with emphasis on central and northern Canada; *in* Quaternary Glaciations-Extent and Chronology, Part II: North America, (ed.) J. Ehlers and P.L. Gibbard; Development in Quaternary Science Series, Elsevier B.V., p. 373–424.

Green, R., Mellon, G.B., and Carrigy, M.A.
1970: Bedrock geology of northern Alberta; Alberta Research Council, map scale 1:500 000.

Kowalchuk, C.J., Ward, B.C., Paulen, R.C., and Plouffe, A.
2006: Surficial geology, Moody Creek (84 M/02), Alberta; Geological Survey of Canada, Open File 5283; Alberta Energy and Utilities Board, EUB/AGS Map 397, scale 1:50 000.

Lemmen, D.S., Duk-Rodkin, A., and Bednarski, J.
1994: Late glacial drainage systems along the northwestern margin of the Laurentide ice sheet; Quaternary Science Reviews, v. 13, p. 805–828.

Levson, V.M., Ferbey, T., Kerr, B., Johnsen, T., Bednarski, J., Smith, I.R., Blackwell, J., and Jonnes, S.
2004: Quaternary geology and aggregate mapping in northeast British Columbia: application for oil and gas exploration and development; *in* Summary of Activities, British Columbia Ministry of Energy and Mines, Resource Development and Geoscience Branch, p. 29–40.

Mathews, W.H.
1980: Retreat of the last ice sheets in northeastern British Columbia and adjacent Alberta; Geological Survey of Canada, Bulletin 331, 22 pages

Okulitch, A.
2006: Bedrock geology, Peace River, Alberta; Geological Survey of Canada, Open File 5282, scale 1:100 000.

Paulen, R.C., Fenton, M.M., Pawlowicz, J.G., Smith, I.R., and Plouffe, A.
2005a: Surficial geology of the Zama Lake area (NTS 84L/NW), Alberta Energy and Utilities Board, EUB/AGS Map 315, scale 1:100 000.

Paulen, R.C., Fenton, M.M., Weiss, J.A., Pawlowicz, J.G., Plouffe, A., and Smith, I.R.
2005b: Surficial geology of the Hay Lake area (NTS 84L/NE), Alberta Energy and Utilities Board, EUB/AGS Map 316, scale 1:100 000.

Paulen, R.C., Plouffe, A., and Smith, I.R.
2006a: Surficial geology of the Beatty Lake area, Alberta (NTS 84 M/NE); Alberta Energy and Utilities Board, EUB/AGS Map 360; Geological Survey of Canada, Open File 5183, scale 1:100 000.

Paulen, R.C., Kowalchuck, C.J., Plouffe, A., Ward, B.C., and Smith, I.R.
2006b: Surficial geology of the Zama City area, Alberta (NTS 84 M/SE); Alberta Energy and Utilities Board, EUB/AGS Map 361; Geological Survey of Canada, Open File 5184, scale 1:100 000.

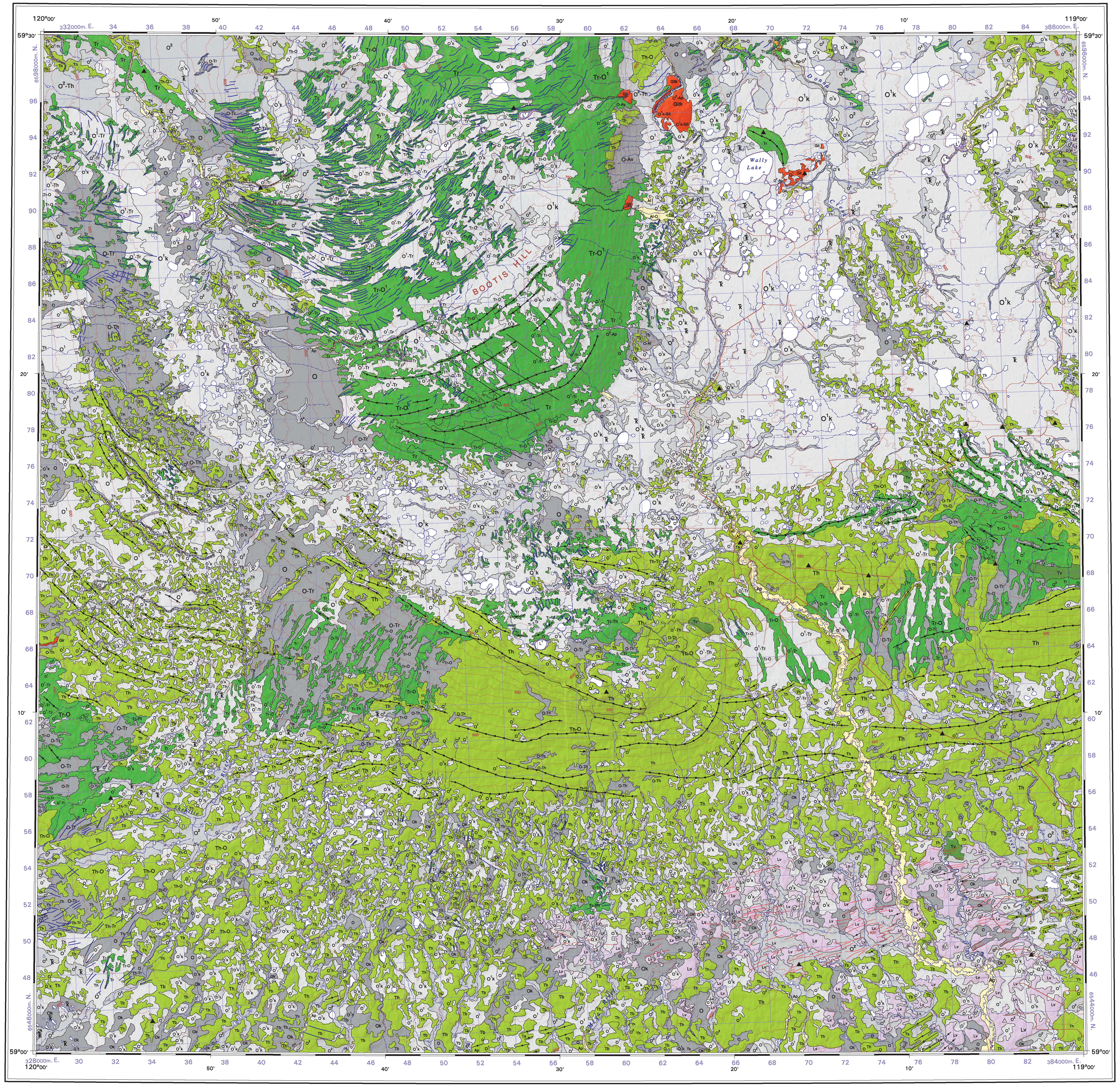
Pawlowicz, J. G., Nicoll, T. J., and Sciarra, J. N.
2007a: Bedrock topography of Bistcho Lake area (NTS 84 M), Alberta; Alberta Energy and Utilities Board, EUB/AGS Map 416, scale 1:250 000.
2007b: Drift thickness of Bistcho Lake area (NTS 84 M), Alberta; Alberta Energy and Utilities Board, EUB/AGS Map 417, scale 1:250 000.

Plouffe, A., Paulen, R.C., and Smith, I.R.
2006a: Indicator mineral content and geochemistry of glacial sediments from northwest Alberta (NTS 84L, M): new opportunities for mineral exploration; Geological Survey of Canada, Open File 5121; Alberta Energy and Utilities Board, EUB/AGS Special Report 77, 1 CD-ROM.
2006b: Surficial geology, Thinahtea Creek, Alberta (NTS 84 M/NW); Geological Survey of Canada, Open File 5070; Alberta Energy and Utilities Board, EUB/AGS Map 395, scale 1:100 000.

Plouffe, A., Paulen, R.C., Smith, I.R., and Kjarsgaard, I.M.
2007: Chemistry of kimberlite indicator minerals and sphalerite derived from glacial sediments of northwest Alberta; Geological Survey of Canada, Open File 5545; Alberta Energy and Utilities Board, EUB/AGS Special Report 87, 1 CD-ROM.

Smith, I.R., Lesk-Winfield, K., Huntley, D.H., Sidwell, C.F., Liu, Y., and MacDonald, L.E.
2006: Potential granular aggregate occurrences, Camsell Bend (NTS 95 J), Northwest Territories; Geological Survey of Canada, Open File 5315, 1 map, scale 1:250 000.

Smith, I.R., Paulen, R, Plouffe, A., Kowalchuk, C., and Peterson, R.
2005: Surficial mapping and granular aggregate resource assessment in northwest Alberta; *in* Summary of Activities , 2005, British Columbia Ministry of Energy and Mines, Resource Development and Geoscience Branch, p. 80–95.



LEGEND

This legend is common to GSC Open File maps produced for NTS sheets 84 L, 84 M, 94-I, and 94 P. Not all map units in the common legend appear on this map

***Note:** In areas where the surficial cover forms a complex pattern, the area is coloured according to the dominant unit and labelled in descending order of cover (e.g., O-Tr). Where buried aggregate deposits (sand and gravel - commonly associated with Gt or Gd surficial units) are known, or suspected, areas are coloured according to the overlying unit and labelled in the following manner:* Lv/Gd.

QUATERNARY
SURFICIAL DEPOSITS
POST LAST GLACIATION

NONGLACIAL ENVIRONMENTS

AN — ***ANTHROPOGENIC DEPOSITS:*** *culturally-made or modified geological materials such that their physical properties (e.g., structure, cohesion, compaction) have been drastically altered; >2 m thick.*

ORGANIC DEPOSITS: *peat and muck; 1 to 3 m thick on average; formed by the accumulation of plant material in various stages of decomposition; generally occurs as flat, wet terrain (swamps and bogs) over poorly drained substrates.*

O^1 — ***Bog peat:*** *sphagnum or forest peat formed in an ombrotrophic environment; wet terrain; may be treed or treeless;* O^1h, *hummocky, mounds and plateaus; area may be underlain by ground ice or shallow permafrost conditions;* O^1k, *thermokarst terrain related to melting ground ice.*

O^2 — ***Fen peat:*** *peat derived from sedges and partially decayed shrubs in a eutrophic environment; forms relatively open peatlands with a mineral-rich water table that persists seasonally near the surface; generally covered with low shrubs and an occasional sparse layer of trees.*

O — ***Undifferentiated bog and fen deposits:*** Oh, *undifferentiated hummocky bog and fen deposits; area may be underlain by ground ice or shallow permafrost conditions;* Ok, *undifferentiated bog and fen deposits with thermokarst terrain related to melting of ground ice;* Oc, *undifferentiated bog and fen deposits cut by numerous subparallel channels on gentle slopes.*

COLLUVIAL DEPOSITS: *mass wasting debris; poorly sorted, massive to stratified debris deposited by direct, gravity-induced movement; composition dependant on source material.*

Ch — ***Landslide and slump debris:*** *active and inactive landslides; hummocky topography; diamicton, generally 1 to 10 m thick, but may exceed 10 m near the toe of large landslides.*

Cv — ***Colluvial veneer:*** *thin and discontinuous cover of slumped and/or solifluncted material <1 m thick; overlies bedrock or till.*

C — *Undifferentiated colluvial deposits.*

ALLUVIAL DEPOSITS: *sorted gravel, sand, minor silt and organic detritus deposited by streams; commonly stratified.*

Ap — ***Floodplain deposits:*** *sorted gravel, sand, silt and organic detritus >1 m thick; forming active floodplains close to river level with meander channels and scroll marks.*

At — ***Fluvial terrace deposits:*** *inactive terraces above modern floodplain; >2 m thick; represents a potential aggregate source.*

Ad — ***Deltaic sediments:*** *stratified sand and gravel underlain by silt and clay; generally 2 to 15 m thick; occuring at the mouths of streams entering lakes.*

Af — ***Alluvial fan deposits:*** *poorly sorted gravel, sand and organic detritus >1 m thick.*

Av — ***Alluvium veneer:*** *< 1 m thick; primarily as uniform sheets of slope wash on gentle slopes.*

A — *Undifferentiated fluvial deposits.*

L^1 — ***LACUSTRINE DEPOSITS:*** *sand, silt and minor clay deposited in a former lake; >1 m thick; generally overlain by organic deposits; exposed by recent fluctuations in lake levels.*

POSTGLACIAL OR LATE WISCONSINAN

PROGLACIAL AND GLACIAL ENVIRONMENTS

GLACIOLACUSTRINE DEPOSITS: *fine sand, silt, and clay, with minor debris-flow diamicton, deposited in glacier-dammed lakes in valleys and along the margin of the retreating Laurentide Ice Sheet; usually overlain by organic deposits in lowlands.*

Lb — ***Glaciolacustrine blanket:*** *>1 m thick.*

Lv — ***Glaciolacustrine veneer:*** *thin and discontinuous; <1 m thick.*

GLACIOFLUVIAL DEPOSITS: *well to poorly stratified sand and gravel; minor diamicton; deposited behind, at or in front of the ice margin by glacial meltwater; represents a potential aggregate source.*

G — ***Proglacial outwash:*** *cross-stratified gravel and sand deposited in front of the ice margin;* Gp, *outwash plain deposits, generally 1 to 5 m thick, generally mantle valley floors and surfaces adjacent to glacial meltwater channel margins;* Gt, *outwash terrace deposits, often associated with meltwater channels and canyons; 1 to 10 m thick;* Gd, *glaciofluvial delta deposits; 1 to >30 m thick.*

Gi — ***Ice-contact stratified drift:*** *poorly-sorted sand and gravel with minor diamictons; deposited in contact with the retreating glacier; 1 to >20 m thick;* Gih, *hummocky topography relating to melting of underlying ice;* Gik, *surface marked by kettle holes;* Gir, *esker ridges;* Git, *kame terraces;* Gid, *ice-contact glaciofluvial delta deposits; 1 to >30 m thick, surface marked by kettles.*

TILL: *diamicton deposited directly by the Laurentide Ice Sheet; sandy to clayey matrix with striated clasts of various lithologies, including many Canadian Shield, carbonate and sandstone erratics; clast content is typically low (<10 %).*

Tb — ***Till blanket:*** *>1 m thick, continous till cover forming undulating topography that locally obscures underlying units.*

Ts — ***Streamlined and fluted till:*** *>1 m thick, till surface marked by streamlined landforms including flutes and drumlins.*

Th — ***Hummocky till:*** *>1m thick; hummocky till surface.*

Tr — ***Ridged till deposits:*** *>1 m thick, moraines or crevasse fillings forming a ridged topography.*

Tv — ***Till veneer:*** *<1 m thick, discontinuous till cover, underlying bedrock topography is discernible.*

PRE-QUATERNARY
BEDROCK

R — *Sedimentary bedrock, Cretaceous Fort St. John Group shales (including the Shaftesbury Formation) and Dunvegan Formation sandstone exposed in highlands and along meltwater channel and canyon walls.*

Geological boundary (defined)
Meltwater channel or underfit channel, small (paleoflow direction known, unknown)
Major moraine
Minor moraine and crevasse filling
Fluting parallel to ice flow (direction unknown)
Drumlin parallel to ice flow (flow direction unknown)
Iceberg scour
Thermokarst
Till clast fabric
Spring
Field observation site (with, without sample)

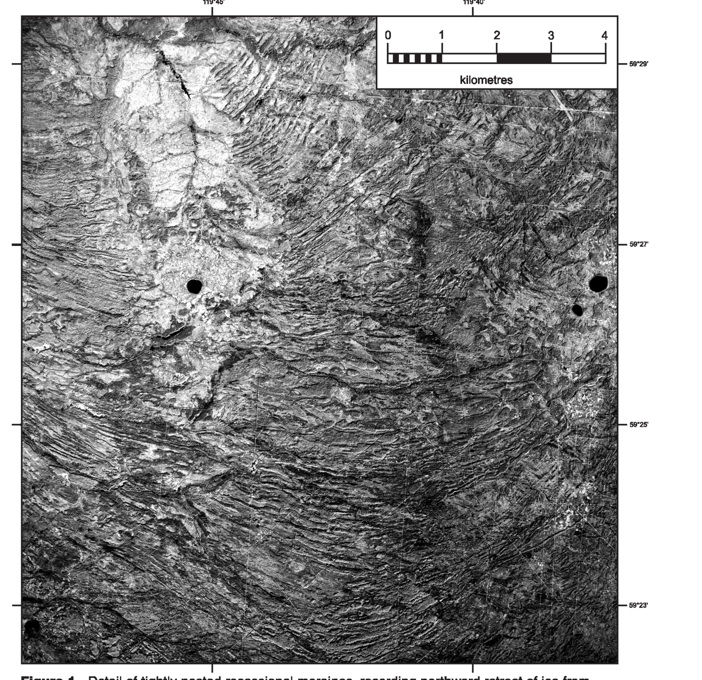


Figure 1. Detail of tightly-nested recessional moraines, recording northward retreat of ice from northwest Bootis Hill. Airphoto AS4517_136 reproduced with permission from Alberta Sustainable Resource Development, Air Photo Distribution, Government of Alberta.

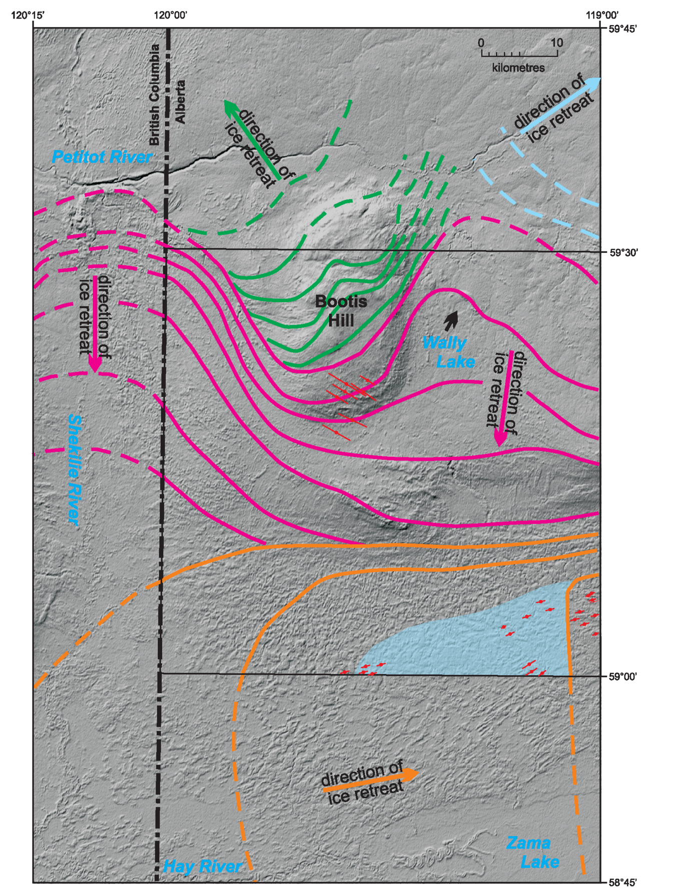


Figure 2. Cartoon sketch of Late Wisconsinan ice retreat patterns, illustrating the separation and initial north and south retreat of ice lobes (variably coloured) in the 84 M/SW map area. Final retreat of ice from the map area was by an eastward retreating lobe of ice centered within the Hay River valley. Northwest-oriented flutings (red lines with central dots) on southern Bootis Hill record northwest flowing ice, prior to the regional lobate retreat. Flutings in the southeastern part of 84 M/SW may record readvances/surges of ice into glacial Lake Hay during the period of general ice retreat. The extent of glacial Lake Hay is shown in blue.

EUB/AGS Map 395 GSC OF5070 Thinahtea Creek	EUB/AGS Map 360 GSC OF5183 Beatty Lake Area
EUB/AGS MAP 396 GSC OF5237 Mega River	EUB/AGS MAP 361 GSC OF5184 Zama City Area

Figure 3. NTS 84 M showing EUB/AGS (Alberta Energy and Utilities Board/Alberta Geological Survey) and GSC (Geological Survey of Canada) maps.

Authors: I.R. Smith, R.C. Paulen, and A. Plouffe

Geology by I.R. Smith, R.C. Paulen (Alberta Geological Survey), A. Plouffe, 2004–2006

Airphoto and Space Shuttle radar imagery (SRTM 3-arc second) interpretation by A. Plouffe, 2004–2006

Digitizing and digital cartography by Géotech

Digital map compilation by L. Robertson, GSC, Northern Canada Division, 2006

Digital cartography by J.D. Narraway, Data Dissemination Division (DDD)

This map was produced from processes that conform to the Scientific and Technical Publishing Services Subdivision (DDD) Quality Management System, registered to the ISO 9001: 2000 standard

GSC OPEN FILE 5237
EUB/AGS MAP 396

SURFICIAL GEOLOGY

MEGA RIVER

ALBERTA

Scale 1:100 000/Échelle 1/100 000

kilometres 2 0 2 4 6 8 kilomètres

Universal Transverse Mercator Projection
North American Datum 1983

Projection transverse universelle de Mercator
Système de référence géodésique nord-américain, 1983

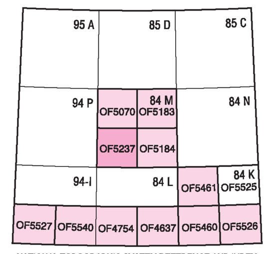
Any revisions or additional geological information known to the user would be welcomed by the Geological Survey of Canada

Digital base map from data compiled by Alberta Sustainable Resource Development, modified by DDD

The digital elevation model suppied by I.R. Smith, based on 3arc_second SRTM imagery. Illumination: azimuth 315°, altitude 45°, vertical factor 2x

Mean magnetic declination 2007, 21°25'E, decreasing 23.3' annually. Readings vary from 21°44'E in the NW corner to 21°06'E in the SE corner of the map

Elevations in metres above sea level



NATIONAL TOPOGRAPHIC SYSTEM REFERENCE AND INDEX TO ADJOINING GEOLOGICAL SURVEY OF CANADA MAPS

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5237
GEOLOGICAL SURVEY OF CANADA
COMMISSION GÉOLOGIQUE DU CANADA
2007
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Les dossiers publics sont des produits qui n'ont pas été soumis au processus officiel de publication de la CGC.

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2007: Surficial geology, Mega River, Alberta; Geological Survey of Canada, Open File 5237; Alberta Energy and Utilities Board, Alberta Geological Survey, Map 396, scale 1:100 000.