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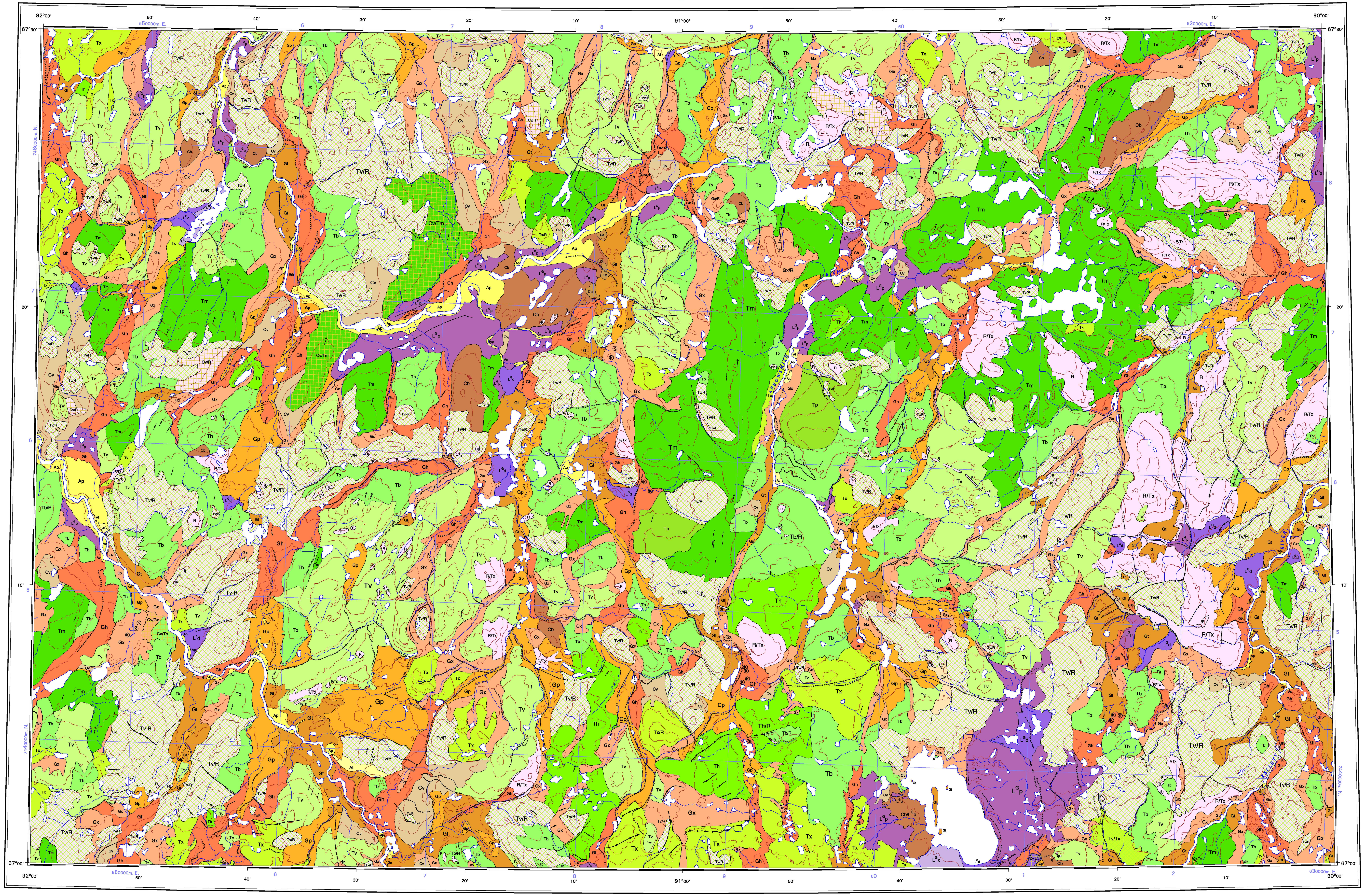
GEOLOGICAL SURVEY OF CANADA | COMMISSION GÉOLOGIQUE DU CANADA



LEGEND

Notes regarding compound units: For those compound units that contain veneers (e.g., Tv/R), only two possibilities have been mapped. Where veneers are observed as a minor component forming patches over another map unit, the "/" is used to allow for representation of the underlying unit. Where veneers are interpreted to stratigraphically overlie a dominant surficial unit (e.g., Cv-Tb), the "-" is used to designate ubiquitous veneer cover overlying the primary unit.

In areas where the surficial units (other than veneers) form complex cover, the area is coloured according to the dominant cover and is labelled in descending order of cover, example Tb/R. The relation of these complex covers are shown with a symbol between the unit letters as follows; there is only one semi-quantitative relationship identified for compound units on this surficial geology map of NTS 56-O (south):
/ approximate 70% to 30%;
Example: Tb/R represents a cover are with an approximate ratio of 70% Tb and 30% R.

In areas where the surficial units (including veneers) form stratigraphic relationships that have been observed in cross-section, the overlying unit is separated from the underlying unit by a hyphen (e.g., Gt-R); this applies to the uppermost two units only.

POST GLACIAL ENVIRONMENT

***ALLUVIUM:** Silt, sand and gravel deposited by streams either within channels or as overbank deposits. Deposits are usually stratified and moderately to well sorted, with the exception of some alluvial fan deposits.*

Ap — ***Alluvial plain:** Predominantly sands and gravels. May be locally overlain by or include lacustrine silt, clay and minor peat and organic silt deposited in abandoned channels and along floodplain margins. Typically forms plains within approximately 1 m of present stream level. Thickness ranges from 1 to 5 m.*

At — ***Alluvial terrace:** Massive to stratified, moderately to well sorted sand and gravel with minor silt. Sediments are of floodplain origin and presently isolated from flooding by stream incision. Thickness ranges from sporadic cover on bedrock to several metres.*

PERIGLACIAL AND GLACIAL ENVIRONMENT

***COLLUVIUM:** Typically less than 1 m thick, but can reach thicknesses up to 2 m; poorly sorted, unconsolidated debris (diamicton) deposited on slopes; derived from bedrock or glacial parent materials. This unit includes frost-rived and heaved stacks of angular joint blocks from granitoid outcrop (felsenmeer); blocks are 0.5 to 2 m across and have unweathered surfaces; occurs in small patches of felsenmeer.*

Cv — ***Colluvial veneer:** Thin (<1 m) or discontinuous sheets of colluviated materials. Hatch-fill is used when colluvial veneer compounded with other units.*

Cb — ***Colluvium blanket:** A mantle of colluviated material with a thickness greater than 1 m.*

Ca — ***Colluvium apron:** Stratified diamicton, and poorly sorted sand and gravel. Deposit forms a wedge-shaped, slope-toe complex of relatively small steep debris flows, avalanche- dominated fans, and soliflucted deposits derived from bedrock and glacial debris. Thickness up to 10 m, thinning at head and toe of deposit.*

Cx — ***Colluvial complex:** Colluvial units too small to be represented at the scale of mapping. Consists primarily of colluvial units but may have relatively small pockets of alluvial, till, glaciolacustrine, and/or glaciofluvial sediments.*

HOLOCENE AND LATE PLEISTOCENE (WISCONSINAN) GLACIAL ENVIRONMENT

PROGLACIAL AND GLACIAL ENVIRONMENT

***GLACIOLACUSTRINE DEPOSITS:** Stratified sand, silt, and clay deposited in lakes dammed by glacier ice. Distally deposited glaciolacustrine sediments typically underlie plains or gently rolling terrain. Proximally deposited glaciolacustrine sediments may underlie ridged, hummocky, or pitted terrain caused by subsequent meltout. Superscripted 'G' for paleo-tidal flats. Thickness ranges from 1 to 10 m.*

L^Gp — ***Glaciolacustrine plain:** Well stratified clay, silt, and sand. Local relief is less than 1 m (plain) and masks the underlying topography. Thickness ranges from 1 to >20 m.*

L^Gd — ***Glaciolacustrine delta:** A scarp or face with a low-relief mantle of cross-stratified sand and rounded gravels associated with glaciofluvial deposition into a glaciolacustrine environment.*

L^Gx — ***Glaciolacustrine complex:** Glaciolacustrine units too small to be represented at the scale of mapping. Consists primarily of glaciolacustrine units, but may have relatively small pockets of alluvial, colluvial, till, and/or glaciofluvial sediments.*

***GLACIOFLUVIAL DEPOSITS:** Well stratified to massive sand, gravel with minor silt and diamicton deposited by streams flowing away from, or in contact with glacier ice. These sediments can range from well to poorly sorted. Strata are commonly deformed due to syndepositional collapse from the meltout of supporting ice.*

Gv — ***Glaciofluvial veneer:** Stratified to massive gravel, sand and silt. May occur in patches or gravel lag over rock; thicknesses are less than 1 m. Hatch-fill is used when glaciofluvial veneer is compounded with other units.*

Gt — ***Glaciofluvial terrace (outwash):** a scarp or face with a low-relief mantle of moderately to well-sorted, cross-stratified sand and rounded gravels elevated above.*

Gp — ***Glaciofluvial plain (outwash):** low-relief mantle of moderately to well-sorted, cross-stratified sand and rounded gravels; 1 to 20 m thick.*

Gh — ***Hummocky glaciofluvial (ice-contact):** Complex arrangement of slopes extending from rounded depressions to irregular conical mounds and includes esker ridges. Composed primarily of poorly sorted sand and gravel from 5 to 15 m thick.*

Gx — ***Glaciofluvial complex:** Glaciofluvial units too small to be represented at the scale of mapping. Consists primarily of glaciofluvial units, but may have relatively small pockets of alluvial, colluvial, till, and/or glaciolacustrine sediments.*

***MORAINAL SEDIMENTS (Till):** Diamicton (granule to boulder size clasts suspended in a poorly sorted clay to sand matrix) deposited directly by glacial ice; redeposition directly from glacial ice is by sediment gravity flow and/or ductile deformation. Contrasting vegetation cover reflecting compositional differences. Thickness ranges from 1 to >20 m.*

***Laurentide Till:** Grey to dark brown stony granitic till with sandy matrix; occurs as veneers, blankets and hummocky deposits.*

Tv — ***Till veneer:** Till less than 1 m thick; occurs in patches over rock and is interspersed with rock outcrop; deposits are thin enough to reveal details of underlying rock structure. Hatch-fill is used when glaciomarine veneer is compounded with other units.*

Tb — ***Till blanket:** Surface morphology conforms to underlying bedrock topography. May exhibit crag-and-tails, flutes, and/or roches moutonées. Some areas have large frost polygons and stone nets. Thickness generally from 1 to 5 m.*

Tp — ***Till plain:** Surface morphology forms a plain with < 2 m of relief. Generally masks underlying topography. Some areas have large frost polygons and stone nets. Thickness is greater than 5 m.*

Tm — ***Rolling till plain:** Surface morphology forms gently rolling plains with 1 to 3 m of relief; may exhibit flutes. Generally masks underlying topography. Some areas have large frost polygons and stone nets. Thickness is greater than 5 m.*

Th — ***Hummocky till:** Stratified to massive diamicton and interstratified glaciofluvial gravel and sand. Stratification often exhibits syndepositional deformation features caused by slumping or ice meltout. May contain variable amounts of ice-walled glaciofluvial and glaciolacustrine sediments. Forms hummocky surface (kame and kettle topography); in places the unit may exhibit prominent ridges marking major recessional ice margins, or diffuse zones marking boundaries between glacial-ice regimes.*

Tx — ***Till complex:** Till units too small to be represented at the scale of mapping. May contain relatively small pockets of alluvial, colluvial, glaciofluvial, and/or glaciolacustrine sediments.*

PRE-QUATERNARY UNITS

R — ***Rock:** Bare, coherent outcrop of various lithologies; locally glacial polished and striated or sculpted by glaciofluvial processes (see Sandeman et al. 2001a, b).*

Geological boundary (defined, approximate, inferred)
Crag-and-tail
Drumlin
Drumlinoid ridge (grooves, fluting, parallel to ice flow)
Kame
Moraine ridges, major
Esker
Abandoned channel, minor
Raised shore

DESCRIPTIVE NOTES

BACKGROUND

Quaternary research in or near the Committee Bay Project study area has proposed numerous theories regarding the glacial history of the Keewatin region, these include (but are not limited to): ice-divide locations, ice-movement chronologies, and general glacial records of ice advance and retreat based on surficial materials distribution (e.g., Dyke and Prest, 1987; Dyke and Dredge, 1989; Little 2001; Ozyer and Hicock, 2002; for a more detailed summary see McMartin et al., 2002 & 2003).

GLACIAL GEOMORPHOLOGY AND GEOLOGY

There are four distinct geomorphic areas within the Arrowsmith River map area (NTS 56-O). The northeast sector is dominated by till veneers, bedrock outcrops and glaciofluvial channels, whereas the southeast sector is host to kame and kettle topography, raised shorelines, glaciolacustrine plains, and eskers. The northward-flowing Kellett River is the dominant drainage system in these two sectors. The southwest sector contains a significant number of large meltwater channels and till veneers, whereas, the northwest is dominated by eskers, thermokarst lakes, and kilometer-wide, sand filled valleys enclosed within glaciolacustrine plains. The northward-flowing Arrowsmith River is the dominant drainage system in central and western NTS 56-O. Numerous moraines (segments of the Chantrey Moraine system) are distributed in a general eastwest configuration within 56-O/1 to 4.

The Committee Bay belt, mainly comprising supracrustal rocks of the Prince Albert group (PAg), underlies the Arrowsmith River map area, and comprises three, northeast-trending lithologic domains (Skulski et al., 2002). The northern subdomain contains high-grade paragneiss, diatexite and metasedimentary rocks that are intruded by garnet-sillimanite-biotite as well as muscovite-biotite granite plutons, and slightly younger biotite-magnetite granodiorite to tonalite plutons. The central subdomain contains supracrustal rocks of the PAg along with cogenetic plutonic units. The PAg is comprised of basalt, komatiite, semipelite, psammite, iron-formation, quartzite, and rhyolite tuffs, all of which are intruded by plutonic units ranging from gabbro to monzogranite. The southeastern subdomain contains the Walker Lake intrusive complex: a 300km long biotite-hornblende-magnetite granodiorite-monzogranite which is commonly K-feldspar megacrystic.

Ice Movement Events Within the Arrowsmith River Study Area

McMartin et al., (2003) provide a regional overview of the systematic mapping of ice-movement indicators within the Committee Bay area (NTS 56 J, K, O, and P). Four main phases of ice-movement have been identified within the Arrowsmith River map area. Ice-movement indicators north of the Chantrey Moraine suggest the oldest-known phase of ice movement was to the NW, followed by N (Last Glacial Maximum), then NE (early deglaciation), and finally NNE (late deglaciation), suggesting ice-movement direction varied by as much as 90° over time. South of the moraine, late stage movement was to the NNW. Shifts in an ice-divide (located to the south of the study area) are likely responsible for the large variations in ice-movement directions.

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The Geological Survey of Canada (TGI Program), Canada-Nunavut Geoscience Office (C-NGO), Polar Continental Shelf Project, and Northern Scientific Training Program (NSTP) provided funding for fieldwork in 2001 and 2002. Boris Kotelewitz (Baker Lake) and Bill Crawford (Repulse Bay) provided logistical support. Special thanks to Edward Little (C-NGO), Isabelle McMartin (GSC-Ottawa), Hamish Sandeman (C-NGO), Tom Skulski (GSC-Ottawa), Stephen Hicock (University of Western Ontario), and Jamie Boles (Custom Helicopters).

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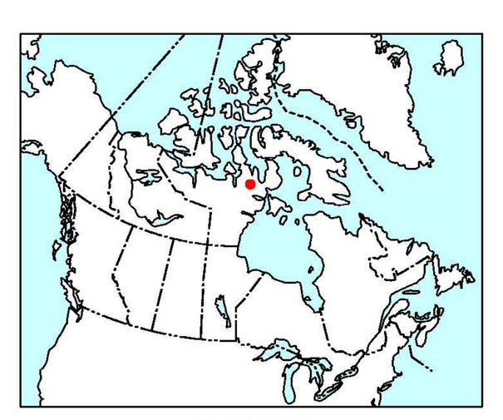

LOCATION MAP

Geology by C.A. Ozyer, 2001–2002

Geological compilation by C.A. Ozyer, 2001–2003

Co-ordinated through the auspices of the Committee Bay TGI Project

Digital data preparation by C. Gilbert, Canada-Nunavut Geoscience Office (C-NGO)

Digital cartography by J.L. Dohar, Earth Sciences Sector Information Division (ESS Info)

This map was produced from processes that conform to the ESS Info Publishing Services Subdivision Quality Management System, registered to the ISO 9001: 2000 standards

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SURFICIAL GEOLOGY

ARROWSMITH RIVER SOUTH

NUNAVUT

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

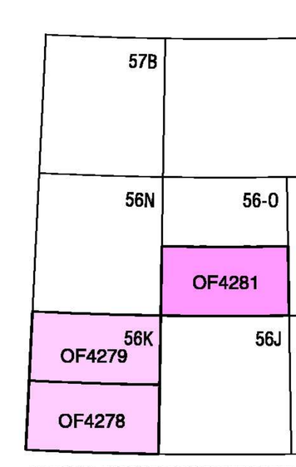
Any revisions or additional geological information known to the user would be welcomed by the Geological Survey of Canada

Digital base at the scale of 1:250 000 from data compiled by Geomatics Canada, modified by ESS Info

Due to the difference between the geological mapping scale and the available digital topographic scale, some inconsistencies between geological units and topographic features may be observed; symbols set is based on 1:250 000 topographical data and may be inconsistent with polygon map units. In such cases, the geological units should be considered accurately georeferenced.

Proximity to the North Magnetic Pole causes the magnetic compass to be erratic in this area. Mean magnetic declination 2004, 15°47'W, decreasing 13.2' annually. Readings vary from 9.4'W in the SW corner to 17.0'W in the NE corner of the map

Elevations in metres above mean sea level



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2004

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