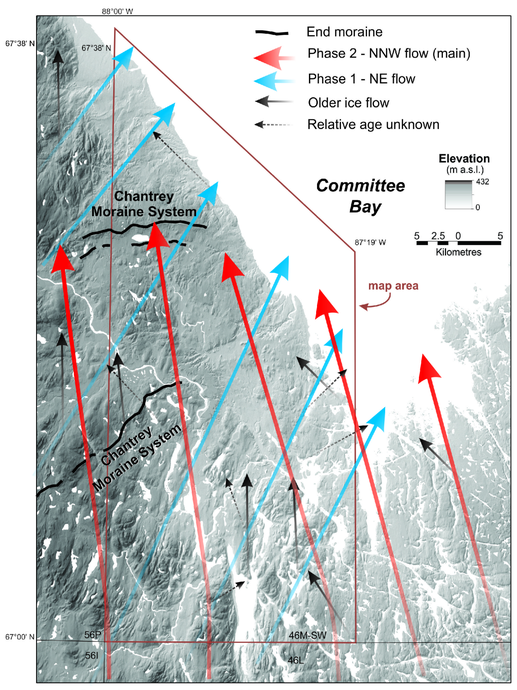


Figure 1. Relative ice flow chronology. Phase 2 flow, which terminates at the Chantrey Moraine System, represents the main ice flow direction over the map area during deglaciation (Little, 2006; McMartin et al., 2013).

Table 1. AMS radiocarbon (^{14}C) ages for two sites east of a large marine delta at 130 m above sea level (a.s.l.). They suggest the inner part of Committee Bay was deglaciated by at least ^{14}C 6.8 ka BP. These ages are comparable to deglacial ages on the eastern side of Rae Isthmus (Dredge, 2002).

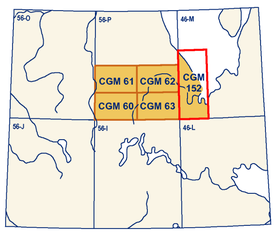
Map ID	Sample ID	Latitude	Longitude	Elevation (m a.s.l.)	Mollusc Species	Conventional ^{14}C Age (corrected for $^{13}C/^{12}C$)	Environment
A	10MOB-I038A02	67.21637	-87.49609	44	Hiatella arctica	6750 +/- 40 BP	Surface of reworked till below small beach; complete shells
B	10MOB-I063A01	67.25639	-87.64787	50	Hiatella arctica	6150 +/- 40 BP	Surface of marine silts; complete shells in living position

Abstract

Diverse Quaternary sediments and depositional environments with notable landforms characterise the map area. Till blankets and till veneers are scattered through the area but are dominant above the marine limit. Sand and gravel deposits above the marine limit mainly occur in pro-glacial outwash trains, glaciofluvial aprons/deltas and ice-contact landforms (eskers, kames) concentrated in valleys. The marine sequence includes, from the limit of marine incursion to the present-day coastline, thick deposits of deltaic sands and gravels, extensive areas of exposed and gullied clayey silts, marine offlap sands and silts, and sand and gravel littoral sediments. Sand veneers and patches of wave-washed tills are present below the marine limit. Extensive areas of exposed bedrock occur south of Committee Bay. Multiple ice-flow directions indicate a north to northwest flow that predates the dominant northeast then northward flows. Major end moraines (part of the Chantrey Moraine System) are present in the map area with divergent ice-flow directions on either side (northeast versus north). Marine limit elevation drops significantly from ~ 240 m a.s.l. north of the moraine (Giangioppi et al. 2003) to ~170 m a.s.l. in the south map area suggesting a major stillstand at the Chantrey Moraines during deglaciation.

Résumé

Divers sédiments quaternaires et milieux sédimentaires avec des formes du relief notables caractérisent la région de la carte. Des nappes et des placages de till sont dispersés dans toute la zone mais ils sont dominants au-dessus de la limite marine. Au-dessus de cette limite, les dépôts de sable et gravier se retrouvent surtout dans les traînées proglaciaires, les plaines et deltas fluvioglaciaires et les sédiments de contact glaciaire (eskers, kames) concentrés dans les vallées. Depuis la limite de l'incursion marine jusqu'à la côte actuelle, la séquence marine se compose de dépôts épais de sables et de graviers deltaïques, de grandes zones exposées et ravinées de silts argileux, du sable et du silt laissés par la régression de la mer et des sédiments littoraux sableux et graveleux. Des placages de sables et des zones de tills délavés par les vagues sont présents sous la limite marine. De grandes zones d'affleurements rocheux sont visibles au sud de baie Comité. Les multiples directions de l'écoulement glaciaire indiquent qu'un écoulement nord à nord-ouest a précédé les derniers écoulements vers le nord (nord-est puis nord). De grandes moraines frontales (faisant partie du système de la Moraine de Chantrey) sont présentes dans la région et montrent des directions divergentes de l'écoulement glaciaire de part et d'autre du système (vers le nord-est et vers le nord). L'élévation de la limite marine baisse considérablement de 240 m au-dessus du niveau de la mer au nord du système morainique (Giangioppi et al. 2003) à environ 170 m dans la partie sud de la carte, ce qui suggère que le front glaciaire est resté longtemps stationnaire dans les environs du système pendant la déglaciation.



National Topographic System reference and index to adjoining published Geological Survey of Canada Canadian Geoscience maps

Cover illustration
Extensive marine plains composed of thick deposits of offshore marine silts and clays capped by nearshore sands are exposed in spectacular gully networks, west of Committee Bay, Nunavut. Photograph by J.E. Campbell. 2014-069

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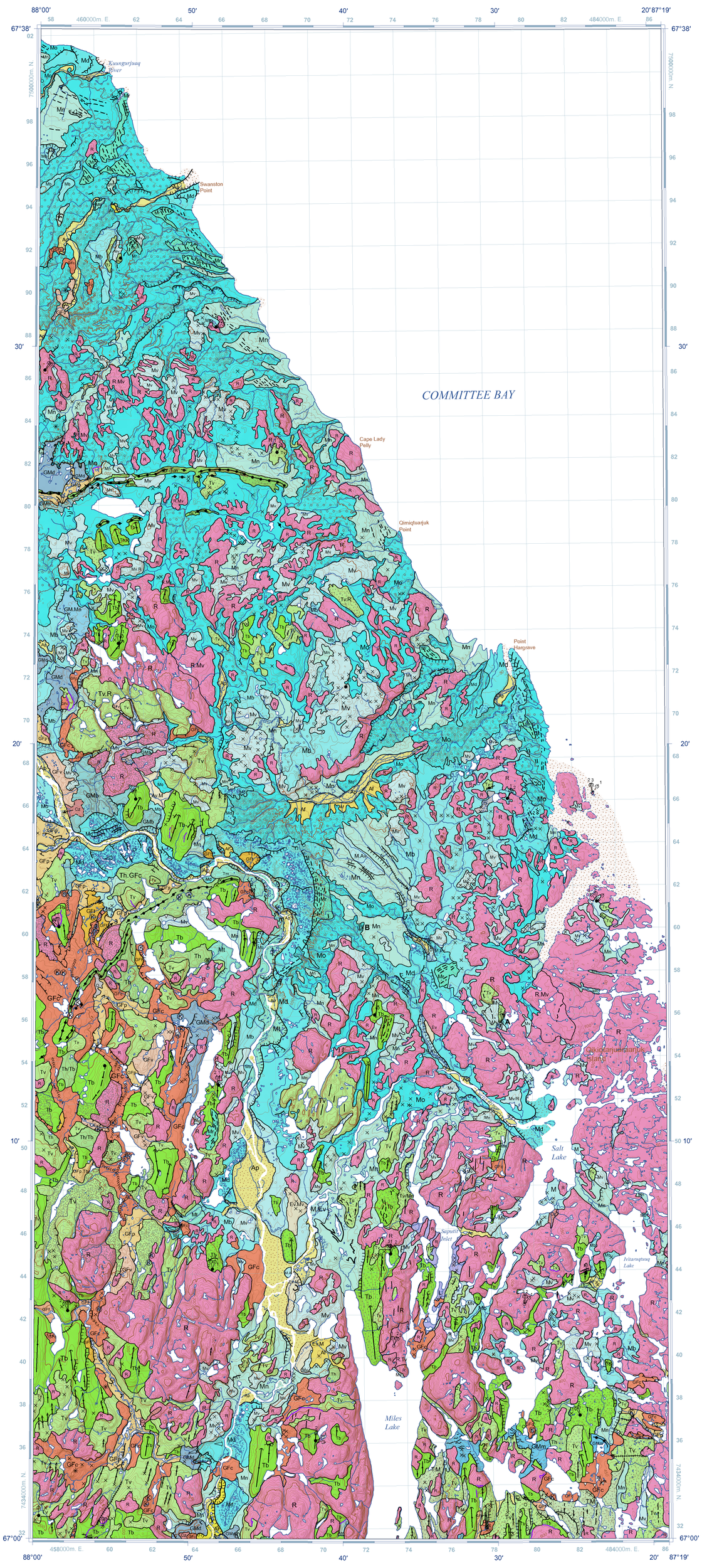
Natural Resources Canada Ressources naturelles du Canada

CANADIAN GEOSCIENCE MAP 152
SURFICIAL GEOLOGY
LEFROY BAY (SOUTHWEST)
Nunavut
NTS 46-M southwest
1:100 000



SURFICIAL DEPOSITS

QUATERNARY

HOLOCENE

O — **ORGANIC DEPOSITS:** undifferentiated peat and muck; commonly less than 30 cm thick; generally occur as flat, wet terrain over poorly drained marine deposits. Permafrost is present as evidenced by ice wedge polygons and tundra ponds.

EOLIAN DEPOSITS: well-sorted medium- to fine-grained sand and minor silt (loess); derived from and commonly overlying marine, glaciofluvial and/or alluvial sands and silts; includes both unvegetated (active) and vegetated (stable) surfaces. Primarily restricted to the marine plains and fluvial valleys. Parabolic dunes (line symbol) indicate sediment transport to the southeast.

Ev — **Eolian veneer:** medium- to fine-grained sand and minor silt forming a thin cover generally less than 1 m thick.

COLLUVIAL DEPOSITS: poorly sorted unconsolidated debris (diamicton) and rubble derived from bedrock or glacial parent materials and deposited on valley slopes and floors by direct gravity-induced movement; massive to stratified.

Cz — **Landslide deposits:** massive to stratified diamicton and/or poorly sorted sand and gravel; up to 10 m thick but thins at head and toe of deposit; forms a fan, hourglass-, or wedge-shaped flow with slope-toe complex at base of steep slopes; primarily comprised of retrogressive thaw and mud flows with minor debris avalanches.

ALLUVIAL DEPOSITS: sorted sand, silt and clay with minor gravel and organic detritus; commonly stratified/ laminated; deposited along and/or within modern rivers and streams.

Av — **Alluvial veneer:** undifferentiated sand, silt, and clay; less than 1 m thick forming a thin discontinuous cover over existing sediments within valleys.

Af — **Fan sediments:** gravel, sand, and gravelly diamicton; stratified, poorly to moderately sorted; 1 to 10 m thick; form fan-shaped deposits where streams enter larger valleys.

Ap — **Floodplain sediments (alluvium):** moderately to well sorted sand, silt, clay, minor gravel and organic detritus; greater than 2 m thick; form active channel, and floodplain deposits close to modern river and stream levels; include abandoned channels and bars. Ice-wedge polygons, tundra ponds and beaded streams may be present on larger floodplain surfaces.

At — **Terraced sediments:** moderately to well sorted sand and gravel with minor overbank silt and organic detritus; massive to stratified; greater than 2 m thick; occur as a series of large inactive erosional fluvial terraces several meters above modern floodplain formed by incision into alluvial sediments due to postglacial uplift and stream degradation.

L — **LACUSTRINE DEPOSITS:** undifferentiated sediments comprised of sand, silt, and/or clay with minor organics; variable thickness; deposited in and adjacent to modern lakes.

MARINE DEPOSITS: sediments deposited in postglacial paleo-Committee Bay and in contemporary marine environments as coastline is still emerging due to postglacial isostatic rebound; 1 to several 10s of metres thick; primarily derived from reworking of glacial and glaciofluvial deposits by wave and current action. May include glaciomarine sediments where they cannot be differentiated, or small patches of wave-reworked or winnowed till. Postglacial marine limit in this map area increases from approximately 160–170 m a.s.l. in the south to 240 m a.s.l. in the north.

Mv — **Marine veneer:** sand, silt, clay, and/or gravel; massive to laminated; less than 2 m thick; commonly occurs as patches of littoral to offshore sediments interspersed with bedrock or less commonly, reworked till and esker segments; mimics surface of underlying materials.

Mb — **Marine blanket:** sand, silt, clay, and gravel; 2 to greater than 10 m thick; forms a continuous cover of littoral to offshore sediments that generally masks underlying sediments and bedrock.

Mr — **Littoral sediments:** sand and gravel; generally well sorted; 1 to 5 m thick; form flights of beach ridges, bars, spits, and terraces commonly strewn with boulder lags; locally includes pockets of washed till. Derived from reworking of upland surficial deposits (till, esker sediments); commonly found on slopes of topographic highs or sloping plains. Surfaces characterised by sparse vegetation and orthogonal frost cracks.

Mt — **Terraced sediments:** well sorted silt, clay, and sand; up to 5 m thick; occur as erosional remnants or as a series of large inactive erosional terraces several meters above modern river floodplain formed by incision into marine sediments due to postglacial uplift and stream degradation.

Md — **Deltaic sediments:** sand, gravel, and silt; planar to cross-stratified; up to 10 m thick; form planar surfaces with depositional faces along the delta front; where a fluvial system enters the sea. Includes raised deltas with terraces and strandlines formed by stream incision or marine wave-action; tundra ponds and ice wedge polygons are common. The main deltas occur at 160–150, 140–135, 100–120 m a.s.l. and at or near above present sea level.

Mn — **Nearshore sediments:** sand to silty-sand, silt and minor clay; moderately to well sorted; massive to stratified/laminated; 1 to 5 m thick. Occur as a thin sheet overlying thick offshore sediments, as valley in-fill, or till on gentle slopes of glacial landforms. Derived from reworking of upland surficial deposits. Locally, unit may include intertidal deposits, De Geer moraines and reworked till and esker ridges.

Mo — **Offshore sediments:** well sorted silt, clay, and fine sand; may be capped by up to several metres of offlapping nearshore sands; massive to rhythmically laminated/stratified; thickness ranges from 2 to greater than 20 m; generally form thick sequences masking the underlying topography and forming extensive plains (e.g. along Committee Bay). Surfaces may be littered with ice-rafted gravel to boulders, particularly inland; locally fossiliferous.

M — **Marine undifferentiated:** undifferentiated marine sediments; variable thickness; may be interspersed with pockets of other surficial deposits too small to be represented as separate units at the scale of mapping. Unit includes tidal sediments along the shores of Salt Lake that may be interspersed with lacustrine sediments.

GLACIOMARINE DEPOSITS: sediments deposited in a glaciomarine environment within a proglacial sea adjacent to the ice margin and near marine limit; deposited primarily from suspension and submarine gravity debris flows; ice-rafted debris are common and iceberg scours may be present. Surfaces are generally covered with scattered boulders. Largest deposits occur where the Curtis River emptied into a high, proglacial paleo-Committee Bay.

GMd — **Deltaic sediments:** sands and gravels, and minor diamictons; planar to cross-stratified; up to 5 m thick. Deposited near the marine limit at the distal end of glaciofluvial channels/corridors; form planar surfaces with depositional faces along the delta front. Delta surfaces commonly exhibit ice-contact features and sediments such as kettles, and flow diamictons. The main deposits occur at approximately 210 m a.s.l. in front of the northernmost Chantrey Moraine segment, at 170 to 180 m a.s.l. south of this moraine, and at 130–140 m a.s.l. west of Miles Lake.

GMb — **Glaciomarine blanket:** sand, silt, clay, and minor gravel; 2 to greater than10 m thick; forms a continuous cover of littoral to offshore sediments deposited near the marine limit. Surfaces are generally covered with scattered boulders.

GMm — **Submarine moraine sediments:** glacial diamicton, sand, and gravel; poorly to moderately sorted; form thin deposits 1 to 3 m thick ; deposited beneath or in front of the ice margin in a glaciomarine environment by grounding (DeGeer moraines), subaqueous debris flows and iceberg rafting; may include marine littoral sediments, and reworked glacial detritus. Main deposits occur east of Miles Lake.

GM — **Sediments undifferentiated:** undifferentiated glaciomarine sediments; variable thickness; may be interspersed with pockets of other surficial deposits too small to be represented as separate units at the scale of mapping.

HOLOCENE - LATE PLEISTOCENE

GLACIOFLUVIAL DEPOSITS: sand, gravel, and minor silt; massive to stratified; well to poorly sorted; deposited by meltwater, from or in contact with glacial ice in either a sub-glacial, sub-aerial, or subaqueous environment. Deposits may show evidence of slumping (flow diamictons, slump structures).

GFv — **Glaciofluvial veneer:** sand, gravel, and silt; massive to stratified; moderately to well sorted; forms a discontinuous cover less than 2 m thick of undefined glaciofluvial origin; may occur as gravel lag over bedrock. Commonly interspersed with bedrock, till and/or marine sediments.

GFc — **Ice-contact sediments:** gravel, sand, and minor silt (locally till); poor to moderately-well sorted; massive to stratified; 1 m to 20 m thick; deposited in either ice marginal (kame terraces), englacial, subglacial (sharp or flat-crested eskers, kames, crevasse-fill ridges), and/or stagnant ice environments. Predominantly found in, but not restricted to, subglacial meltwater corridors.

GFf — **Fan sediments:** sand, gravel, and minor boulders; well sorted; stratified; 1 to 5 m thick; form low-relief fans deposited either subaerially within meltwater drainage system or at the ice margin portal of subglacial meltwater conduits in paleo Committee Bay.

GFp — **Outwash sediments:** sand and gravel; moderately to well sorted; planar and cross-stratified; 2 to 10 m thick; form low-relief plains commonly with kettles and/or channel scars on the surface; represent the distal facies of ice-contact stratified drift deposited in a proglacial, sub-aerial environment as valley trains, terraces, and fans within meltwater channels or corridors.

GFt — **Terraced outwash sediments:** sand and gravel; 2 to 10 m thick; form incised outwash plain with numerous erosional terraces, and scarps due to down-cutting related to base level adjustment in response to glacio-isostatic uplift.

GLACIAL DEPOSITS: diamicton (till); unsorted to poorly sorted; generally massive; thickness can exceed 20 m in buried depressions and streamlined landforms but is generally less than 3 m; deposited beneath active or stagnant ice. Surface till is commonly silty sand to sandy; greyish brown, permeable, and non-calcareous. Surface boulder abundance is variable, related to either glacial deposition or subsequent winnowing and removal of the fines by glacial meltwater or marine wave action. Clasts are predominantly locally derived felsic intrusives with minor supracrustals lithologies.

Tv — **Till veneer:** bouldery, silty sand to sandy diamicton; less than 1 m thick; forms a discontinuous cover over bedrock and interspersed with rock outcrops; deposits are thin enough to reveal details of underlying rock structure; mudboils, sorted circles, and frost-heaved bedrock slabs are common.

Tb — **Till blanket:** silty sand diamicton; 1 m to greater than 20 m thick; forms a continuous cover that generally masks underlying bedrock topography; occurs as till plains or streamlined forms such as drumlins and crag-and-tails indicating ice flows towards the northeast, north, and northwest; non-sorted and sorted circles with mudboils are common; sorted stripes and/or solifluction lines locally occur on landform slopes.

Th — **Hummocky till:** sandy and silty sand diamicton; typically with bouldery surfaces; may contain variable amounts of ice-contact glaciofluvial sediments; poor to moderate sorting; massive to crudely stratified; generally greater than 2 m thick; may exhibit syndepositional deformation features caused by gravity flows, slumping or ice meltout. Forms ridges and chaotic hummocky terrain associated with in situ melt of recessional ice.

Tm — **Moraine complex:** sandy glacial diamicton, sand, and gravel; unsorted to fair sorting; massive to stratified; 2–20 m thick; may exhibit syndepositional deformation features caused by gravity flows, slumping or ice meltout; forms an end moraine in front of the ice margin during a stillstand in the ice retreat.

T — **Till undifferentiated:** undifferentiated glacial diamictons of variable thickness interspersed with pockets of other surficial deposits too small to be represented as separate units at the scale of mapping.

PRE-QUATERNARY

R — **BEDROCK:** Archean to Paleoproterozoic; primarily metamorphosed granitic to intermediate intrusive, igneous and minor supracrustal rocks. Major dykes trend NW-SE. Curving, multigenerational folds and faults form prominent topographic features.

Bedrock, undifferentiated: intact and frost-riven outcrop of various lithologies variously modified by glacial erosion (i.e. roches moutonnées); flat to hilly topography; surfaces range from rough and weathered to glacially polished and striated. Felsenmeer commonly ring low-relief outcrops. Locally may include patches of till, glaciofluvial, glaciomarine, and/or marine sediments.

Stratigraphic relationship: where observed or can be confidently inferred, a map unit stratigraphic sequence is shown with a maximum of two map unit designators separated by a slash ("/") (e.g. Th/Tb designates hummocky moraine overlying till blanket).

Complex units: where the surficial cover forms a complex and the map units are too small to be mapped individually, yet constitute a significant component of the total polygon, a dot (".") separates the first dominant map unit designator from the less abundant secondary unit (e.g. T.M designates an area of undifferentiated till interspersed with marine sediments).

Extensive gullied terrain: gully networks developed predominantly in thick deposits of marine offshore fine-grained sediments. Exposed eroded sediments, arêtes, table tops, and hoodoos are common.

Scour and/or lag deposits: exposed bedrock and/or eroded till with surface boulder lags and scattered glaciofluvial sand and gravel deposits related to meltwater drainage; locally includes scoured marine sediments eroded by fluvial and/or eolian processes.

Winnowed and/or reworked sediments due to marine wave and current action: occur below marine limit; interspersed with littoral deposits such as beaches, berms, spits, and sandy patches. Reworked till generally forms a less than 1 m thick veneer over unmodified till. Locally where sediments are thicker the deposits may be notched, flat-topped, and/or terraced.

- Geological boundary (defined)
- Geological boundary (approximate)
- Landslide (inactive; debris flow indicated)
- Dune crest
- Limit of marine submergence (confidence defined; environment marine or glaciomarine)
- Beach crest
- Delta (direction of flow indicated)
- Terrace scarp
- Ice-contact delta (direction of flow indicated)
- Ice-contact terrace scarp
- Minor meltwater channel (proglacial or subglacial; sense unknown)
- Minor meltwater channel (proglacial or subglacial; sense known)
- Major meltwater corridor (well-defined lateral limit)
- Kettle
- Minor moraine ridge (De Geer, recessional)
- Major moraine ridge (end)
- Kame
- Esker ridge (sense unknown)
- Esker ridge (sense known or inferred)
- Buried or weakly defined drumlinoid ridge
- Drumlinoid ridge
- Drumlin
- Crag-and-tail; pre-crag rampart where symbol is on the down-ice side (south) of an upland or crag (see accompanying database); sense indicated
- Fluted or streamlined bedrock ridge (sense unknown or unspecified)
- Fluted bedrock (sense known)
- Roche moutonnée
- Striation (well defined; sense unknown)
- Striation (well defined; sense known)
- Striation (poorly defined; sense unknown)
- Striation (poorly defined; sense known)
- Crossed striations (number indicates relative age, 1 being the oldest)
- Small outcrop
- Radiocarbon date (See Table1)
- Observation site
- Sample site

NOTE

Stippled pattern overlying map units within modern fluvial and marine systems indicates intermittent water bodies.

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Base map at the scale of 1:50 000 from Natural Resources Canada, with modifications.

Elevations above mean sea level are expressed in metres (NTS 46-M/4,5,12) and feet (NTS 46-M/3,6)

Shaded relief image derived from the digital elevation model supplied by the Mapping Information Branch / GeoData Acquisition & Management Division, Natural Resources Canada
Illumination: azimuth 315°, altitude 45°, vertical factor 1x

Proximity to the North Magnetic Pole causes the magnetic compass to be erratic in this area. Mean magnetic declination 2014, 19°53'W, decreasing 16.1' annually. Readings vary from 18°53'W in the SW corner to 20°55'W in the NE corner of the map.

The Geological Survey of Canada welcomes corrections or additional information from users.

Data may include additional observations not portrayed on this map. *See* documentation accompanying the data.

This publication is available for free download through GEOSCAN (http://geoscan.nrcan.gc.ca/).

This map is not to be used for navigation purposes.

Recommended citation
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Canadian Geoscience Maps

Canada

CANADIAN GEOSCIENCE MAP 152
SURFICIAL GEOLOGY
LEFROY BAY (SOUTHWEST)
Nunavut
NTS 46-M southwest
1:100 000

2 0 2 4 6 8 km

Authors: J.E. Campbell and I. McMartin

Geology based on aerial photograph interpretation by J.E. Campbell and fieldwork during summers 2010, 2011, and 2012 by J.E. Campbell and I. McMartin. Field assistance was provided by U. Wityk (2010, 2011), F. Humber (2011), and K. Robillard (2012).

Field site information, sample descriptions, and analytical results are available in GSC Open File 7288 (*see* References McMartin et al. 2013).

Geomatics and cartography by L. Robertson

Initiative of the Geological Survey of Canada, conducted under the auspices of the Wager Bay surficial mapping activity, Multiple Metals-Melville Peninsula project as part of Natural Resources Canada's Geo-mapping for Energy and Minerals (GEM) program.

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Map projection Universal Transverse Mercator, zone 16. North American Datum 1983

Preliminary publications in this series have not been scientifically edited.

CANADIAN GEOSCIENCE MAP 152
SURFICIAL GEOLOGY
LEFROY BAY (SOUTHWEST)
Nunavut
NTS 46-M southwest