GEOLOGICAL SURVEY OF CANADA — COMMISSION GÉOLOGIQUE DU CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES
MINISTÈRE DE L'ÉNERGIE, DES MINES ET DES RESSOURCES

DESCRIPTION OF TERRAIN UNITS

SYMBOL	NAME	MATERIALS AND THICKNESS	PERMAFROST DISTRIBUTION[1] AND ICE CONTENTS	GEOMORPHOLOGY[2] AND DRAINAGE	ORIGIN AND AGE
cCv / Rn	Clayey colluvium over bedrock	Clay and silty clay (weathered shale) containing some cobbles and boulders; 1-2 m thick. Swales contain peat 2-5 m thick.	Continuous permafrost; moderate to low ice contents.	Upland with gentle to moderate slopes and integrated drainage network. Moderately well drained with small pools along ice-wedge networks and beaded streams. Undisturbed slopes relatively stable.	Colluvium formed through weathering of bedrock and downslope movement.
sEvr / sGp	Sand dune on glaciofluvial plain	Fine to medium sand, in places silty, isolated peaty layers. Local veneer of silt and few surface patches of thin peat present. Windblown sand up to 7 m thick, generally 1.5-3 m thick; glaciofluvial sand, 3-10 m thick.	Continuous permafrost. Sand generally has low ice contents. Silt and peat have medium to high ice contents due to abundance of ice lenses.	Broad crescentic and linear sand dunes range from 1.5-3 m in height, rarely to 7 m. Variable drainage with small thaw pools common on extensive flat areas. Active blowouts common along banks of streams and lakes.	Dunes formed subsequent to outwash deposition during early Wisconsin(?) glaciation. Dunes presently stable, except where blowouts form.
fAp	Alluvial plain	Silt, fine sand, and clayey silt, commonly organic; generally more than 6 m thick. Thin local accumulations of peat present.	Irregular distribution of permafrost; medium ice contents in frozen sediment due to presence of ice lenses.	Flat floodplains and low terraces near sea or stream level; thaw pools, lakes, and marshy areas common; low surfaces occasionally inundated.	Alluvium deposited by streams in recent past.
fAp-A	Alluvial plain; actively forming	Silt, fine sand, and clayey silt, commonly organic; coarse sand and gravel possibly underlie fine alluvium in some areas. Fine alluvium is 2 to more than 6 m thick.	Isolated islands of permafrost within unit; medium ice contents in frozen sediments due to presence of ice lenses.	Flat floodplain with many marshy areas on poorly drained surface; inundated annually.	Floodplain alluvium presently being deposited.
fAd-A	Alluvial delta; actively forming	Silt, fine sand, and clayey silt, commonly organic; coarse sand and gravel possibly underlie fine alluvium in some areas. Fine alluvium is 2 to more than 6 m thick.	Permafrost present under part of delta; many irregularly shaped taliks. Medium ice contents probable in frozen sediments.	Flat surface marked by numerous distributaries, islands, lakes, and marshes. Poorly drained and subject to flooding by sea or river water. Some lakes expanding due to thermokarst.	Alluvium primarily deposited by streams, with minor silt and clay being deposited after storm tides. Deltas graded to present sea level.
fAf	Alluvial fan	Silty clay and sand with isolated pebbly layers; up to 10 m thick.	Rare taliks in continuous permafrost; moderate ice contents due to presence of ice lenses.	Sediment is periodically deposited on surface of alluvial fans by ephemeral streams; moderately well drained except near base of fans.	Alluvial fans formed by small streams eroding scarps formed by meltwater and stream erosion.
fMp-A	Tidal flats	Interbedded silt, clayey silt, and sand; 1-8 m thick.	Irregular distribution of permafrost; ice lenses in frozen sediments.	Flat; poorly drained and marshy surface; frequently inundated by sea water.	Deposition continuing at present. Most of underlying marine sediment deposited during last 5000 years.
fMv / fLp -A	Intertidal lagoons	Interbedded silt, clayey silt, and sand; predominantly sand on northern edge of Tuktoyaktuk Peninsula. Marine veneer generally 1-3 m thick.	Irregularly shaped taliks present within permafrost; ice contents probably low in sandy sediments, medium to high in fine sediments.	Flat basins; poorly drained and marshy; frequently inundated by sea water.	Lagoons are lake basins whose seaward edges have been breached during the postglacial rise in sea level; deposition has continued subsequently, mainly during last 5000 years.
sMr-A, aMr-A	Beaches, spits and bars	Sand (sM) or gravel and sand (aM), 0.5-3 m thick; mainly sand features along northern edge of Tuktoyaktuk Peninsula.	Irregular distribution of thin permafrost; low ice contents in frozen sediment.	Low broad ridges rising up to 3 m a.s.l.	Ridges formed and continuously modified by wave action.
fLp	Lacustrine plain and pond	Interbedded silt, clayey silt, and silty sand with peaty layers. Silty sand and sand dominate unit on Tuktoyaktuk Peninsula; clayey silt and clay with few pebbles dominate unit south of Eskimo Lakes and Liverpool Bay. Sediments 1.5-8 m thick; surface patches of peat 1.5-3 m thick.	Rare isolated taliks present within continuous permafrost; ice contents generally low to medium in sandy sediments and medium to high in silty and clayey sediments due to presence of ice lenses; massive ice under pingos and domes.	Flat to gently sloping; in places benches separated by small scarps. Surface commonly marshy with many thaw pools. Pingos and small domes, both inactive and presently forming, within unit.	Lake basins formed by thermokarst mainly during last 10 000 years and subsequently infilled and drained through normal stream development. Pingos and domes formed during aggradation of permafrost in drained lake basins. Lacustrine plain lying below mapped strandline in Eskimo Lakes basin formed during blockage of outlet to Liverpool Bay by late Wisconsin glaciofluvial deposition along Kugaluk River estuary.
f/sGp, sGp, aGp	Outwash plain	Silty sand over sand (f/sG), sand (sG), and interbedded sand and gravel (aG); sand forming outwash plain on Tuktoyaktuk Peninsula is finer grained towards northern edge. Local veneer of windblown sand and silt and surface patches of thin peat. Outwash generally 3-10 m thick.	Continuous permafrost; ice contents of sand and gravel generally low, but silt has high ice content; massive ice may be present in underlying sediments at depths of 7-70 m.	Flat plain with some relief due to terracing, inset channels, and thermokarst basins; drainage moderately good to good, but imperfect to poor in channel traces and on extensive broad flat areas where ice-thaw pools are common. Dunes and active blowouts common around lake basins.	Outwash plain making up major part of Tuktoyaktuk Peninsula formed when early Wisconsin(?) glacier covered the southern part of the peninsula. Outwash along Kugaluk estuary and in Eskimo Lakes basin deposited during late Wisconsin time. Oriented lakes of Tuktoyaktuk Peninsula formed subsequent to deglaciation through the effect of wind on thermokarst.
sGp-K	Outwash plain; modified by thermokarst	Sand with few pebbly beds and channels of gravel; generally 10-30 m thick. Depressions contain 2-5 m of sandy lacustrine sediment and peat.	Rare taliks in depressions within continuous permafrost; ice contents in near-surface outwash low, but massive ice may be present at depths of 7-70 m.	Rolling to hummocky surface with local relief to 50 m; summits of hills are generally flat and accordant; well drained.	Outwash plains formed when early Wisconsin(?) glacier covered southern part of the peninsula. Most ground ice formed concurrent with deglaciation; relief results from thermokarst, mainly during last 10 000 years.
sGm-K, aGm-K	Hummocky thermokarst-modified outwash	Sand (sG) or interbedded sand and gravel (aG); extensive unmapped areas of morainal deposits may be present in unit. Outwash generally 10-30 m thick; depressions contain 2-5 m of lacustrine sediment and peat.	Rare taliks in depressions within continuous permafrost; ice contents in near surface low, but morainal deposits have higher ice contents, and massive ice may be present at depths of 7-70 m, especially under hills and ridges.	Hummocky with local relief to 50 m; well drained, but depressions imperfectly to moderately well drained.	Outwash deposited when early Wisconsin(?) glacier covered southern part of Tuktoyaktuk Peninsula. Most ground ice formed concurrent with deglaciation; thermokarst, modifying unit morphology, mainly during last 10 000 years.
Mm-K	Rolling and hummocky moraine; modified by thermokarst	Clayey diamicton containing pockets of sorted silty and clayey material; diamicton is 4-12 m thick; depressions contain 2-8 m of lacustrine sediment and peat; isolated areas of unmapped outwash within unit.	Rare taliks in depressions within continuous permafrost; ice content of diamicton low to medium due to presence of ice lenses (commonly having reticulate pattern); massive ice common at base of till and at depths of 7-70 m, especially under hills and ridges.	Hummocky to rolling with local relief between 30 and 50 m; hills and slopes moderately well drained, depressions and broad surfaces on hill crests imperfectly drained. Inactive and active retrogressive thaw flow slides common along steep slopes.	Till deposited during maximum extent of Laurentide glaciers during early Wisconsin(?) time. Most ground ice formed concurrent with deglaciation; thermokarst, modifying unit morphology, mainly during last 10 000 years.
Mv / sMp -K, Mv / sAp -K, Mv / sXp -K	Hummocky till-veneered sand; modified by thermokarst	Clayey diamicton or poorly sorted gravel over fine grained marine sand (sM), medium grained fluvial (glaciofluvial?) sand (sA), or interbedded marine and fluvial sand (sX). Diamicton extremely variable in thickness, generally 1-5 m, but thin or absent in belt adjacent to south edge of Liverpool Bay where sand is commonly capped by thin poorly sorted gravel; sands generally 10-20 m thick. Isolated unmapped outwash in unit. Depressions contain 2-8 m of lacustrine sediment and peat.	Rare taliks in depressions within continuous permafrost; ice content of diamicton low to medium due to presence of ice lenses; near-surface sands have low to medium ice contents, but massive ice may be present at depths of 7-70 m, especially at base of till and in sediments under hills and ridges.	Hummocky to rolling with local relief between 30 and 70 m; hills and slopes moderately well drained, depressions imperfectly drained. Stabilized retrogressive thaw flow slides on slopes where till is thick; active retrogressive thaw flow slides on recently steepened slopes. Cliff-top dunes and blowouts common along eroding coast lines where till is thin.	Deposition of thick marine sands in deltaic foresets appears to have been preceded and followed by the deposition of fluvial sand, apparently in proglacial outwash plains. Upper outwash sands possibly correlate with units formed on Tuktoyaktuk Peninsula during early Wisconsin(?) time. Till deposited during maximum extent of Laurentide glaciers during early Wisconsin(?) time. Most ground ice formed concurrent with deglaciation; thermokarst, modifying unit morphology, mainly during last 10 000 years.
Mv / fMp -K	Hummocky till-veneered marine deposits; modified by thermokarst	Clayey diamicton over marine clay, silt, and fine sand. Diamicton generally varies from 0.5-2.5 m thick, rarely to 6 m. Depressions contain 1.5-8 m of lacustrine deposits and peat.	Rare isolated taliks present under depressions within continuous permafrost. Ice contents variable in diamicton; massive ice present in places near base of diamicton. Marine sediments have low to high ice contents; ice lenses commonly form reticulate network; isolated layers of massive ice.	Rolling topography with 10-30 m local relief; hills and slopes moderately well drained; depressions imperfectly to poorly drained and marshy.	Till deposited during maximum extent of Laurentide glaciers during early Wisconsin(?). Most ground ice formed concurrent with deglaciation. Thermokarst, modifying unit morphology, occurred mainly during last 10 000 years.
Mv / fM	Hummocky till-veneered marine deposits	Clayey diamicton over marine clay, silt, and fine sand. Diamicton generally is from 0.5-2.5 m thick, rarely to 6 m. Depressions contain 1.5-8 m of lacustrine deposits and peat.	Rare isolated taliks present under depressions within continuous permafrost. Ice contents variable in diamicton, massive ice present in places near base of diamicton. Marine sediments have low to high ice contents; ice lenses commonly form reticulate network; isolated layers of massive ice.	Rolling topography with 10-30 m local relief; hills and slopes moderately well drained; depressions imperfectly to poorly drained and marshy. Stabilized retrogressive thaw flow slides on slopes where till is thick; active slides on recently steepened slopes.	Till deposited during maximum extent of Laurentide glaciers during early Wisconsin(?). Most ground ice formed concurrent with deglaciation. Thermokarst, modifying unit morphology, mainly during last 10 000 years.
Mv / Rn	Till veneer on bedrock	Clayey diamicton over Cretaceous shale; marine sediments may underlie diamicton in bedrock lows; diamicton up to 5 m thick. Low areas may contain 2-8 m of lacustrine sediment and peat.	Rare isolated taliks present under depressions within continuous permafrost; ice contents variable in diamicton; massive ice present in places near base of diamicton and in underlying sands.	Rolling broad hills with 10-30 m local relief; hills and slopes moderately well drained; depressions imperfectly drained. Few stabilized retrogressive thaw flow slides on slopes where till is thick.	Till deposited during maximum extent of Laurentide glaciers during early Wisconsin(?). Most ground ice formed concurrent with deglaciation. Thermokarst, modifying unit morphology, occurred mainly during last 10 000 years.
s,cXr-G,V	Ice-thrust unconsolidated sediments	Clay and silty fine grained marine sand; medium grained fluvial sand with rare layers of woody detritus; individual units are 2-8 m thick; total complex exceeds 20 m in thickness.	Continuous permafrost. Sands have low ice contents, but clays may have medium to high ice contents and isolated layers of massive ice.	Parallel ridges are cut by gullies giving unit up to 40 m local relief; well drained. Slopes underlain by sand are stable, whereas those underlain by clay are subject to slumping and sloughing.	Ridges pushed up by Laurentide glaciers advancing northeast along Liverpool Bay during early Wisconsin(?) time. Strata strongly folded and faulted during deformation.

1 See Mackay (1962) for distribution of pingos.

2 See Mackay (1966a) for distribution of retrogressive thaw flow slides.

SELECTED REFERENCES

Fyles, J.G., Heginbottom, J.A., and Rampton, V.N.
1972: Quaternary geology and geomorphology, Mackenzie Delta to Hudson Bay; 24th International Geological Congress (Montreal), Guidebook, Excursion A-30, 23 p.

Mackay, J.R.
1956: Notes on oriented lakes of the Liverpool Bay area, Northwest Territories; Revue canadienne de géographie, v. 10, no. 4, p. 169-173.
1956: Deformation by glacier-ice at Nicholson Peninsula, N.W.T., Canada; Arctic, v. 9, p. 219-228.
1962: Pingos of the Pleistocene Mackenzie Delta area; Geographical Bulletin, no. 18, p. 21-63.
1963: The Mackenzie Delta area, N.W.T.; Geographical Branch, Memoir 8, 202 p.
1966a: Segregated epigenetic ice and slumps in permafrost, Mackenzie Delta area, N.W.T.; Geographical Bulletin, v. 8, p. 59-80.
1966b: Thick tilted beds of segregated ice, Mackenzie Delta area, N.W.T.; Biuletyn Peryglacjalny, no. 15, p. 39-43.
1971: The origin of massive icy beds in permafrost, western Arctic Coast, Canada; Canadian Journal of Earth Sciences, v. 8, p. 397-422.
1974: Reticulate ice veins in permafrost, northern Canada; Canadian Geotechnical Journal, v. 11, p. 230-237.

Mackay, J.R., Rampton, V.N., and Fyles, J.G.
1972: Relic Pleistocene permafrost, western Arctic, Canada; Science, v. 176, p. 1321-1323.

Rampton, V.N.
1972: Quaternary geology, Arctic coastal plain, District of Mackenzie and Herschel Island, Yukon Territory; in Report of Activities, Part A; Geological Survey of Canada, Paper 72-1A, p. 171-175.
1973: The influence of ground ice and thermokarst upon the geomorphology of the Mackenzie-Beaufort region, Northwest Territories, Canada; ed. B.D. Fahey and R.D. Thompson; Proceedings, 3rd Guelph Symposium on Geomorphology, p. 43-59.
1974: Surficial geology, Mackenzie Delta, Stanton, Cape Dalhousie, and Malloch Hill; Geological Survey of Canada, Open File 96.
1974: Terrain evaluation with respect to pipeline construction, Mackenzie transportation corridor northern part, Lat. 68°N to coast; Environmental-Social Program, Northern Pipelines, Report 73-47.

Rampton, V.N. and Mackay, J.R.
1971: Massive ice and icy sediments throughout the Tuktoyaktuk Peninsula, Richards Island, and nearby areas District of Mackenzie; Geological Survey of Canada, Paper 71-21, 16 p.

Rampton, V.N. and Dugal, J.B.
1974: Quaternary stratigraphy and geomorphic processes on the Arctic coastal plain and adjacent areas, Demarcation Point, Yukon Territory, to Malloch Hill, District of Mackenzie; in Report of Activities, Part A; Geological Survey of Canada, Paper 74-1A, p. 283.

Geology by V.N. Rampton 1974

Linework by Terrain Analysis and Mapping Services Ltd., Carp, Ontario

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

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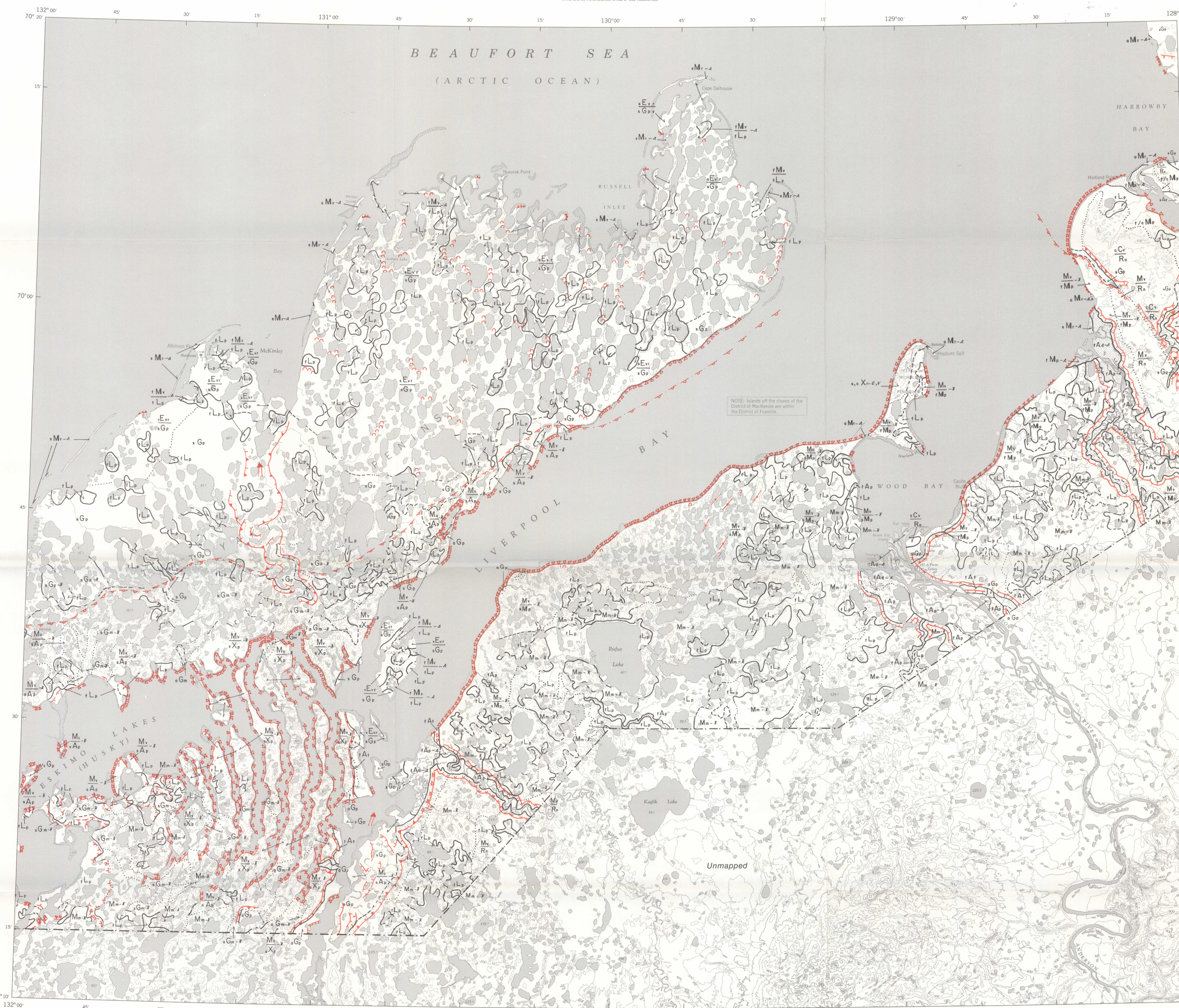
Mean magnetic declination 1980, 40°45' East, decreasing 10.5' annually. Readings vary fron 39°45.5' in the SW corner to 41°44.6' in the NE corner of the map area

Elevations in feet above mean sea level



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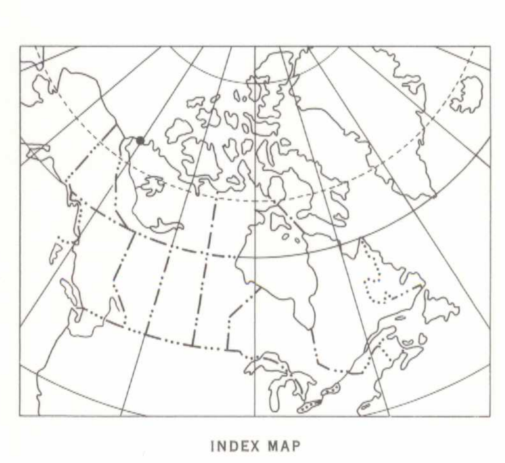


INDEX MAP

REFERENCE

- Geological boundary (defined, approximate, assumed)
- Glacial fluting
- Early Wisconsin(?) glacial limit (defined, approximate, assumed)
- Major lake strandline
- Marine beach, bar or spit (sand)
- Periodically active coastal escarpment more than 8 m high (unconsolidated material)
- Inactive coastal escarpment more than 8 m high (unconsolidated material)
- Sand dunes (active)
- Stream-trimmed scarp, periodically undercut (unconsolidated material, bedrock in part)
- Stream-trimmed scarp (unconsolidated material, bedrock in part)
- Meltwater-trimmed scarp (unconsolidated material, bedrock in part)
- Direction of meltwater flow

MAP 33-1979
SURFICIAL GEOLOGY
STANTON
DISTRICT OF MACKENZIE

Scale 1:250 000

Kilometres 6 0 6 12 18 Kilometres

Miles 4 0 4 8 Miles

Universal Transverse Mercator Projection

EXPLANATION OF LETTER NOTATION

A combination of letters is used to designate each map unit or component of compound map units, e.g. gAf. The upper case letter indicates the broad compositional-genetic class. The lower case letter(s) that generally follows indicates morphology. The lower case letter(s) preceding the central upper case letter describes texture. This specific texture term is used where it is possible to specify the texture more precisely than is indicated by the compositional-genetic term. A comma separating two textural symbols (s,c) indicates that both textural types are present but that the first is predominant; a diagonal (f/c) indicates that material of the first texture overlies material of the second.

In certain cases the map unit designator ends with an italicized letter(s) that is separated from the other letters by a dash, e.g. Mp-A. This final letter indicates that the area has been modified or eroded in a specific way. One term placed above another, e.g. sEvr / sGp, indicates a stratigraphic succession within the unit.

TEXTURAL MODIFIERS

- a - gravelly or sandy
- c - clayey
- f - clay, silt, and fine sand
- g - gravelly
- s - sandy
- x - complex mixture

COMPOSITIONAL-GENETIC CLASSES

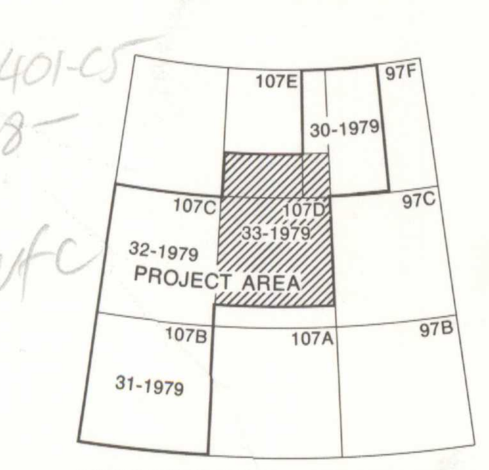
- A - Alluvium: silt, sand, gravel
- C - Colluvium: various materials
- E - Eolian deposit: silt, sand
- G - Glaciofluvial deposit: sand, gravel
- L - Lacustrine deposit: clay, silt, sand
- M - Moraine: clayey till
- M - Marine deposit: clay, silt
- O - Organic deposit: peat
- R - Bedrock
- X - Complex deposit

MORPHOLOGIC MODIFIERS

- d - delta
- f - fan
- h - hummocky
- m - undulating
- n - moderately sloping
- p - plain
- r - ridged
- s - steeply sloping
- t - terraced
- v - veneer (generally 0.5-1.5 m thick)

PROCESS OR FORM MODIFIERS

- A - active alluviation
- G - glacially ice thrust
- K - thermokarst
- V - gullied



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