GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES

SURFICIAL GEOLOGY AND GEOMORPHOLOGY NORTH-CENTRAL KEEWATIN

EXTENDED LEGEND

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GENESIS (Note A)	UNIT (Note A)	MATERIAL (Note B)	ORIGIN	THICKNESS (Note C)	TOPOGRAPHY	RELIEF (Note D)	SLOPE (Note E)	PERMEABILITY/DRAINAGE	ACTIVE LAYER THICKNESS (Note F)	GROUND ICE (Note G)	PATTERNED GROUND (Note H)	OCCURRENCE	ASSOCIATION (Note I)	VEGETATION (Note J)	COMMENTS
E	(s) Ev	Laminated, silty fine sand with medium sand forming some dunes. Coarse sand and larger material uncommon except as a surface lag. Compact U.S.C.: SP.	Formed by eolian activity. Eolian processes have been active throughout postglacial time but should have been most active immediately after retreat of the ice, drainage of lakes, or recession of the sea. E deposits are stable and vegeted; E are active and unvegetated.	0.5 (0.3-2)	Reflects topography of underlying material. Dunes are low arcuate features of the blow-out type.	(0.1-2) (1-30)	D.U.M.	Permeability moderate to high. Deposits well drained. Dunes well drained but depressions between arms of dunes poorly drained and may contain pond. Drainage patterns not developed.	In all cases where measured, the base of the active layer was below the base of the eolian sediments.	Not applicable. See active layer thickness.	Periglacial patterned ground features not present in E areas. In E areas, the patterned ground features probably are a reflection of the underlying material. Striping was noted at one locality. Vegetation hummocks, ripple marks of various types, stoss-and-lee forms are generally present.	Deposits are thin and of small areal extent, but are common throughout area.	Commonly derived from I, F, and A units with which it is most commonly associated.	*Large portions of E are unvegetated. Locally colonizing herbs occur (less than 20%). Species may include *Hierochloe alpina, Triseteum spicatum, Poa* sp. *Festuca brachyphylla, Agropyron boreale, Cerastium alpinum, Papaver lapponicum, Epilobium latifolium, Armeria maritima, Saxifraga* sp. *Draba* sp. Mosses rare. Plants often adopt a tussock form. Well vegetated E-similar to adjacent stable material.	1. Present and past E units indicate westerly or northwesterly winds.
A	(s)Ab (gs)Ab (s)Ae	Stratified sand; in places silt or pebble gravel. May contain peat or other organic material. Loose to compact. U.S.C.: SP or SW.	Deposited by present rivers and streams. A deposits are active and unvegetated.	2 (1-5)	Flat-topped deposits in valleys. In places marked by channel scars and other alluvial forms.	1 (0-3) (0-30)	(0-3)	Permeability generally high but may be low in silt facies. Deposits poorly drained. Where raised above river level (Ab) well drained. Drainage patterns not developed.	Only one measurement of 55 cm was made on sAp.	Not studied.	Ā do not show periglacial patterned ground features. Polygons: Polygons and isolated ice wedges are common on A deposits. Polygons are up to 10 m across (average 5 m); ice wedge troughs are 30 cm deep and 1 m across. Other: Alluvial forms (ripple marks, etc.) are common; other permafrost patterned ground features are rare.	Deposits found in bottoms of all river valleys and along major streams.	Most commonly associated with I and F in valleys or with E where unvegetated. Since rivers transect all other deposits, A may be associated with any other unit.	*Large portions of A are unvegetated. Locally scattered grasses may colonize recently deposited alluvium. Most common early successional grasses include *Alopecurus alpinus, Colpodium vahlianum,* and *Festuca brachyphylla.* Forbs are scarce in early stages and restricted to Caryophyllaceae. Well vegetated A-similar to communities on marine deposits.	
	(s)Af			3 (1-5)	Fan-shaped deposits at breaks in slope. In places slightly dissected.	5 (0-10) (0-30)	(0-3)								
	(s)Av			(0-1)	Reflects topography of underlying material.	D.U.M.	D.U.M.								
L	(s)Lb (s)Lp	Poorly stratified silty sand to gravelly coarse sand. Beaches may be coarse sand to fine gravel. May contain incorporated colluvium and organic detritus. Loose and crumbly. U.S.C.: SW.	Deposited in standing freshwater; includes material transported to the lake by rivers or reworked by wave action. The proglacial lakes formed by isostatic tilt or by damming of the drainage systems by ice.	3 (1-10)	Slightly undulating to flat confined to depressions.	1 (0-3) 12 (3-50)	2 (0.5-3)	Permeability moderate to low. Beaches have moderate to high permeability. Deposits poorly drained. Standing water common. Beaches and veneer units on slopes are better drained. Drainage patterns are complex to deranged, characterized by many shallow lakes and ponds.	Thicknesses from 35-85 cm with average of 50 cm. Low values obtained where deposits covered by peat. Measurements tended to be made near periphery of unit as middle often contained ponds.	From few observations, 30% Vs, Vx, and ice with soil inclusions occurred just below the active layer. At greater depths, Nb, Nbn, and minor amounts of Vx.	Circles: Poorly developed nonsorted and occassionally sorted circles occur at most sites. Diameters up to 3 m, average 40 cm. Polygons: Best formed on recently drained deposits. Ice wedges commonly form orthogonal pattern 5-30 m across, with one set of wedges radial to centre of basin and other parallel to former shoreline. Stripes: Nonsorted stripes characteristic of Lv over M; sorted stripes noted at many sites.	Deposits occur in previous lake basins as Lb and Lt often lapping up the sides of the basin as Lv. Extent of former lake basins were controlled by isostatic depression and position of the ice front. In rare instances, lakes were formed behind barriers (e.g. moraines) which were later dissected. Most lakes were short-lived.	Generally associated with Mb, Mv, and R. Due to washing action of waves, it may also be associated with MvW, MbW, and IhW. Also an association with Mr where retreating ice front is in contact with standing water forming DeGeer moraines. Many deposits are overlain by peat and colluvium.	*Dense Cryptogam-monocot tundra-on moderately and imperfectly drained materials. Cryptogams include *Rhacomitrium, Aulacomnium, Tomenthypnum, Drepanocladus, Hylocomium* sp., *Cladonia rangiferina, C. mitis, C. alpestris,* and *Cetraria* sp. Sparse monocots *Carex bigelowii* and *luzula confusa*. At lower elevations erect shrubs *Salix phyllifolia* and *Betula* occur. Well drained L: Lichen-*Hierochloe* tundra. Poorly drained L: Poorly developed sedge wet meadow.	
	(s)Lt (gs)LΔ			3 (1-10)	Flat-topped deposits not confined to depressions.	1 (0-3) 12 (3-50)	2 (0.5-3)								
	(s)Lv			(0-1)	Reflects topography of underlying material.	D.U.M.	D.U.M.								
m	(s6)mbde) (s)mp (s)me	Laminated to thickly bedded clay to fine sand; gravel rare except in beaches or fluvial cappings. Clay facies is dark grey, fissile, tough, plastic, stiff, and very sticky; U.S.C.: CH. Silt-fine sand facies is light brown; very hard and compact when dry; U.S.C.: ML or MH (rarely SW or SP). Peat layers or blebs are rare. Shells (whole or fragments) are very rare except along Murchison River.	Deep water sediments deposited in marine or brackish water. These deposits are of large areal extent and thickness.	6 (2-75)	Gently undulating to flat. Along Hayes and Murchison river systems incised or dissected by gullying and streams.	6 (1-10) 5 (0-10) Incision: 20 (0-75)	3 (0-10) Incisions (20-30)	Permeability moderate to poor except in coarse sand or gravel (mr) where high. Deposits are poorly drained and may have ponds on surface. Deeply dissected areas may be moderately well drained. Gullies commonly in trellis or parallel patterns. On horizontal sites, drainage pattern is deranged with many shallow lakes and ponds.	Thicknesses typically from 10-80 cm though up to 2 m were recorded. Thicknesses less than 35 cm were in areas of peat cover up to 10 cm thick. Thicknesses greater than 1 m occurred at the tops of high sections along the Hayes River where dry permafrost may be present.	Extensive, massive ground ice not encountered in drill-holes. Ice with soil inclusions often encountered in 1-5 cm bands in zones up to 20 cm thick, just below the active layer. Typically ground ice occurs as Vs, in places as Vx or Vr, and rarely as Nbn. Ice content 2-10%; isolated zones up to 20% Vs. Ice rich areas in depressions and in colluvium at the base of slopes. Two m of ice were encountered in one drill-hole beneath colluvium and on top of marine clays.	Polygons: Nonsorted are common; sorted occur on some mv units. Most pronounced on extensive areas of m in northern part of area. Both low and high centred occur. Diameters up to 25 m, average 10 m. Circles: Nonsorted circles and nets common; best developed on mt and well drained silty mb. Sorted circles and nets found on mv or other units with pebble lag. Diameter 20-40 cm. Stripes: Nonsorted and sorted common on steep slopes. Particularly evident on and characteristic of mv over Mb. Other: Desiccation cracks, 5 cm diameter, common on unvegetated surfaces. Hummocks (30-50 cm in diameter, up to 40 cm high) occur on low lying, poorly drained deposits.	Thickest and most widespread in northwestern part of map area; thinner and confined to valleys towards southeast; absent from southeastern half of area. Thickest deposits along Hayes and Murchison rivers and their tributaries. Clay facies was found in sections along these two rivers.	May overlie any type of older deposit. Most common association with R, Mv(e,W), MbW, MrW, MhW, Ih(W), IΔ, Ft and FΔ. Also association with Mr where retreating ice in contact with sea formed DeGeer Moraines.	*Actively eroding silts not vegetated. Moderately to imperfectly drained silts have a dense *Eriophorum vaginatum* tussock meadow. Dom. sp. is *E. vaginatum* (75%); Erect *Salix phyllifolia* present to 10%. Mod. drained sands have dwarf shrub-monocot tundra with *Salix* sp. and *Dryas* dominant; *Alopecurus, Carex,* and *Eriophorum* sp. common; well developed lower stratum. Wetlands on both sands and silts have well developed sedge wet meadow tundra. *Carex aquatilis* var. *stans* dominant; *Eriophorum angustifolium* co-dominant. Carices, *Eriophorum* sp., and a variety of grasses common associates; shrubs are absent; dense bryophytic mat includes *Drepanocladus, Calliergon, Aulacomnium* and *Sphagnum* species. Shallow marsh emergents around ponds may include: *Arctophila fulva, Hippuris vulgaris* and *Pleuropogon sabinei*; bryophytic mat may be absent.	1. Erosion of bluffs along Hayes River is by gullying and by slumping of large blocks caused by undercutting. Due to hard, compact nature of desiccated material, erosion by other agents is slow. Wind and/or sheetwash has produced differential erosion up to 5 cm. 2. Clay facies is recessive; overlying silt-fine sand facies maintain a steep face; contact between facies often is coincident with top of colluvial cone at base of sections.
	(gs)mtde)			10 (2-20)	Flat-topped terrace with steep side-slopes; often deep incision by gullying.	1 (0-4) 5 (0-10) Incision: 10 (0-30)	2 (0-5) Incisions sideslopes foreslopes: (20-30)								
	(gs)mAle)		Same as mb but modified by later fluvial activity often resulting in the formation of a surface gravel lag.												
	(gs)mAle)		Fluvial or glaciofluvial material that has been deposited in a marine environment but which cannot be directly related to a particular fluvial source.		Flat-topped with steep foreslope.										
	(gs)mvle)		Thin deposit of marine or brackish water sediments; usually deep water facies but may include some nearshore facies.	(0-1)	Reflects topography of underlying material.	D.U.M.	D.U.M.								
	(gs)mr		Beaches; nearshore marine or brackish water environment; may be represented on the map by a symbol ( ).	(0-2)	Low ridges.	0.5 (0-1) 10 (0-20)	3 (0-5)								
F	(gs)Fsck) (gs)Fe	Massive to well stratified, medium to coarse sand and gravel. Loose and granular (cohesionless). U.S.C.: SP (less commonly SW, GP, or SM).	Proglacial outwash; deposited from glacial meltwater as a valley fill.	30 (10-70)	Flat-topped terrace; commonly dissected	1 (0-3) 30 (5-200) Incision: 20 (0-75)	Top: (0-3) Sides: (20-30)	Permeability high. High areas are well drained, lower areas are poorly drained. Some depressions in flatter areas may contain standing water. Where formed, gullies in trellis pattern.	Although in lowlands with peat covers, thicknesses as low as 6 cm occur; typical values on higher sites are from 45-83 cm and may be over 2 m. This unit may have areas of dry permafrost.	Vs and Nbn are common. At one site 40% Vs at the frost table; at depth the material was not ice rich.	Polygons: Both sorted and nonsorted polygons are common. Generally 3 - 5 m across but may be up to 10 m; rectangular to square; covering 30 - 100% of most deposits where bare sand due to eolian activity is not present. Ice wedge troughs are up to 1 m deep, commonly 20 cm deep. Polygons on high features are high centred; high and low centred polygons occur on lower areas. Circles: Sorted and nonsorted circles 50 - 100 cm in diameter are rare.	Most common along sides of modern river valleys and in meltwater channels. Surface material on raised terraces along river valleys is usually Ft. Fv is found as a scattering of sand on floors of meltwater channels which have been cut down to bedrock. Most FΔ are below marine limit.	Often associated with I, A, Mvc, Mbc, and meltwater channels ( ) Where unvegetated, wind erodes F to form E units. Since rivers that formed F units transected the terrain, there is an association with all other deposits.	*Well drained F: *Alectoria-Hierochloe* tundra; Lichen 95%, grass less than 5%. *Alectoria*-heath tundra occurs on bouldery terrain. Heaths include *Cassiope tetragona* and *Ledum palustre* most common on high plateau. At lower elevations *Arctostaphylos, Rhododendron* and *Vaccinium* occur as well; and *Betula* and erect *Salix* are found in sheltered locations. *Moderately drained F: Cryptogam-monocot tundra as in L. Poorly drained F: poorly developed sedge wet meadows. Emergents not common. *Carex aquatilis* var. *stans* most common sedge. Bryophytic mat imperfectly developed.	1. Slumping may occur on steep slopes, especially where the base of slope is being undercut.
	(gs)Fsck)														
	(gs)FA														
	(gs)Ft(e)														
	(gs)Fb (gs)Fp(k)		Proglacial outwash; deposited from glacial meltwater filling valley bottoms; not often incised.	10 (2-30)	Flat-topped valley fill; not commonly dissected.	2 (0-4) 30 (5-200)	3 (0-7)								
	(gs)Fv		Proglacial outwash as above but not sufficiently thick to exhibit its own morphology.	(0-1)	Relects topography of underlying material.	D.U.M.	D.U.M.								
I	(gs)In(t)(W) (gs)Ir(W)	Coarsely stratified to finely laminated, medium to coarse sand and gravel. Fine sand commonly occurs along flanks of some eskers. Loose and granular (cohesionless). U.S.C.: GW, GP, SP, or SW.	Ice contact stratified drift; includes eskers, kames, and other irregular ridges and hummocks.	10 (2-30)	Hummocky; flat to sharp crested hills and ridges.	10 (3-30) (5-200)	20 (5-30)	Permeability high. High deposits well drained. Units in lowlands or depressions are poorly drained, with up to 40 cm water above frost table and often ponds. Most drainage by active layer seepage; rill and gullies rare.	Depth to frost was often difficult to determine due to the coarseness of the material and/or the presence of dry permafrost. Frost table is commonly at depths of 60-90 cm; where surface was unvegetated, depths up to 1.5 m; where peat cover is present, 10-30 cm.	Excess ice not usually present except in lowlands and closed depressions. Normal occurrence is as Vx and Vc in silty sand, and as Nbn and Nf in coarse material. Dry permafrost is common.	Polygons: Nonsorted polygons occur on almost every deposit of I. Poorly sorted polygons occur on gravels. The furrow at the border of the polygons appeared to be larger for larger sized material being 10 - 30 cm deep in sand and up to 1.5 m deep in cobble gravels. Polygons are 3 - 50 m in diameter, commonly 10 - 20 m. In dry areas the polygons are high centred; in very wet areas they are low centred. Other: Sorted circles up to 2 m in diameter were noted at several sites; nonsorted circles and stripes are much rarer and are probably related to specific conditions.	Found along bottoms of valleys in north or northwest trending bands, 1-5 km wide by several km long. Most noticeable above marine limit.	Since I units transect the terrain, they may be associated with any other unit, commonly with Mbc, Mbe, Mve, Mvc, Mr, R, F, and A. Where unvegetated, I units are prone to deflation yielding E units.	Dry crests and terraces of I have *Alectoria- Hierochloe* tundra. **Alectoria*-heath tundra occurs on well to moderately drained materials; *Rhacomitrium lanuginosum, Cassiope tetragona* and *Ledum* dominant heaths (10-25%). Species diversity increases at lower elevations. Poorly drained I: rare; poorly developed sedge wet meadows. Emergents generally absent. Eolian activity local on driest materials (see E).	1. Eskers too narrow to outline as a unit are shown by a symbol indicating the position of the crest. Properties are identical to Ih. 2. IΔ are fed directly by eskers with no intervening F. Esker in front and often esker behind deltas are lower than top of delta.
	(gs)Ib(W)		Ice contact stratified drift; commonly blanket of sand abutting eskers.	5 (1-10)	Rolling to flat.	2 (1-3) (0.5-1)	5 (0-15)								
	(gs)Iv(c)		Ice contact stratified drift; thin deposit at sides of eskers.	(0-1)	Reflects topography of underlying material.	D.U.M.	D.U.M.								
	(gs)It (gs)IΔ		Ice contact stratified drift; IΔ deposited in sea or lake; It, river or wave-cut into other I.	20 (2-30)	Flat-topped; may be dissected.	2 (1-3) (1-200)	Sides: (20-30)								
	(gs)Ik(W)		Kettled ice contact stratified drift, formed by melting of buried ice after I deposited.	N/A	Oval depressions; may be closed containing lakes.	10 (5-30) (0-100)	(20-30)								
M	Mb(e)(W)	Till; massive, pebbly, silty sand with boulders; where washed (W) surface material may contain less fines. When dry surface material is compact forming a hard carapace; with high moisture content, material is dense but thixotropic. U.S.C.: GP, GM, SP, or SM.	Ground moraine; mainly from basal load of glacier; lodgement till.	7 (2-20)	Irregular to rolling to flat. May be dissected.	10 (1-35) 30 (10-50)	5 (0-20)	Permeability moderate. High areas well drained, low areas poorly drained with occasionally standing water. Mv is less well drained due to proximity of bedrock beneath. Gullies and streams in dendritic pattern; other drainage patterns may occur due to influence of particular landforms.	Generally frost table is at depths of 40-70 cm; total range of depths from 20-130 cm were recorded.	Ice content generally less than 5%. Layers of almost pure ice up to 5 cm thick were encountered just below the frost table in low areas. Ice types are Vc, Vx, Vs, Nbn, and pure ice.	Circles: Nonsorted (mudboils), up to 2 m long, average 40 cm, circular to oval in plan, very common. Sorted, up to 10 m (average 2 - 4 m) in diameter are less common. Debris islands were occasionally noted. Polygons: Sorted and nonsorted, average diameter 5 m (maximum 50 m), on Mb and Mv. Other: Nonsorted stripes prevalent in washed (W) areas. Sorted stripes in areas of abundant boulders and moderate slopes. Steps rarely present; on moderate to steep slopes.	Mv and Mb may occur anywhere in area but are not a common surface unit in areas of thick marine sediments. Mh and Mr generally occur in areas of low relief.	May be associated with any other unit, most commonly R. Mr and Mh are often associated with L, mt, and to a lesser extent with I.	*Moderately to well drained bouldery M: *Alectoria*-heath tundra. *Cassiope tetragona* and *Ledum palustre* dominant vasc. plants (5-25%). *Vaccinium* present; *Alectoria* sp. dominant (75%). *Cetraria, Cladonia* and *Cornicularia* lichens common associates. Shrub heat-lichen tundra in southwestern corner. Imperfectly drained M: Cryptogam-monocot tundra with an erect shrub component (*Salix* and *Betula*) present at low elevations, absent on higher. Poorly drained M: poorly developed sedge wet meadow at high elevations, well developed at lower; *Carex aquatilis* dominant; heath species occur on raised moss hummocks (at lower elevations). Emergents present at lower elevations; absent at highest.	1. All M deposits are formed of till; a material designator would be redundant.
	Mv(ce)(W)		Ground moraine as above; many rock fragments derived from underlying bedrock or nearby outcrops by frost action and downslope movement.	0.5 (0-2)	Reflects topography of underlying material.	D.U.M. 30 (10-50)	D.U.M.								
	Mh(W) Mr(W)		Mainly ground moraine (lodgement till) and/or ablation till. Often difficult to differentiate on airphotos from Mv. Includes minor and major moraines and associated landforms (some Ih or Ir).	7 (2-20)	Hummocky to ridged. Crests mostly rounded.	Moraines: minor 2-10 major 8-30 Hummocks: 2-20 30 (10-50)	Crests: (0-10) Sides: (3-30)								
R	R(e)	For description of rock types, see bedrock reports (note K). Most outcrops have been frost shattered and vary from accumulations of blocks to being intact.	Precambrian in age. For genesis see bedrock reports (note K).	N/A	Chantrey and Hurwitz Groups occur as high ridges. Otherwise topography is variable, generally not strongly ridged.	Depends on rock type. Relief may be over 100 m in some areas	Flat to very steep depending on rock type.	Not studied.	Not studied.	Not studied.	Bedrock structures visible on airphotos are depicted as "lineaments following structural features". Most are due to primary bedding, joints and faults but other structures have been included; none are differentiated. Many lakeshores are joint controlled.	Bedrock occurs throughout the area and may crop out in any unit. Most commonly found in areas above marine limit and where bedrock relief is high.	May be found in all other units; has been mapped only where contributing significantly to the composition of the unit. Most common association is with Mv.	*Crustose and foliose lichens tightly adhere to exposed bedrock and boulder surfaces. Species include *Lecanora, Lecidea, Parmelia, Physeia, Rhizocarpon, Rinodina,* and *Umbilicaria*. Thick *Rhacomitrium* moss mats occur locally in shallow depressions and crevasses. *Alectoria nigricans* and *A. ochroleuca, Cetraria nivalis* and *C. cucullata,* and *Thamnolia* sp. are usually established in the moss mat. Vascular plants generally absent. Tufts of *Hierochloe, Festuca* and *Luzula* are rare.	1. Frost heaving has moved $1m^3$ blocks over 40 cm. 2. Since all felsenmeer has been derived from outcrops, it has been mapped as rock.

LEGEND NOTES

A. Meaning of symbols is given in the legend at the side of each map sheet.

B. Materials are described firstly according to their physical characteristics as observed in the field, and secondly according to their performance characteristics based on limited laboratory analyses. This latter classification is based on the Unified Soil Classification System and is noted after the letters U.S.C.; giving the standard notation. Other terminology is based on either National Research Council of Canada, Associate Committee on Soil and Snow Mechanics, (1955): "Guide to the Field Description of Soils for Engineering Purposes"; N.R.C. Technical Memorandum 37, or other standard geological usage.

C. First figure is average; figures in paranthesis, range in thickness of units in metres. These are estimates from field observations. Veneers are thin deposits such that the topography, and to some extent other properties, of the underlying materials are ascertainable on airphotos; blankets completely mask the underlying materials.

D. First line is total relief in metres; second line is micro-relief in centimetres; determined from field measurements. Other figures are as specified. In all cases, first number is average and figures in parenthesis, range. D.U.M. indicates that relief is inherited from and dependent on the underlying material.

E. Slope is given in degrees, first figure indicating average and figures in parenthesis, range. Unless otherwise specified, they refer to the whole unit as determined from field observations.

F. Active layer thicknesses were measured during July and August 1976 and 1977. The active layer appeared to have reached close to its maximum thickness by the beginning of July as there was no significant increase in thickness as the summers progressed. Values may not be typical on a long-term basis as the months of July both years had particularly good weather.

G. Ground ice is classified according to Pihlainen, J.A., and Johnson, G.H., 1963: "Guide to a field description of permafrost for engineering purposes"; Associate Committee on Soil and Snow Mechanics, National Research Council of Canada, Technical Memorandum 79.

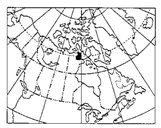
H. Patterned ground is described using the terminology of Washburn, A.L., 1973: "Periglacial processes and environments"; Edward Arnold Ltd., London.

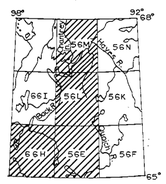
I. All units may contain up to 10% of any other unit. Some idea as to the nature of these constituents may be obtained from the associated column.

J. In the vegetation column, an asterisk (*) indicates the dominant community.

K. For bedrock information see:

Heywood, W.W.
1961: Geological notes, northern District of Keewatin; Geological Survey of Canada, Paper 61-18.
1977: Geology of the Amer Lake map-area, District of Keewatin; in Report of Activities, Part A, Geological Survey of Canada, Paper 77-1A, p. 409-410.
------ and Schau, Mikkel,
1978: A subdivision of the northern Churchill Structural Province; in: Current Research, Part A, Geological Survey of Canada, Paper 78-1A, p. 139-143.
Schau, Mikkel
1974: Volcanic rocks of the Prince Albert Group, District of Keewatin; in: Report of Activities, Part A, Geological Survey of Canada, Paper 74-1A, p. 187-188.
1975: Komatiitic and other ultramafic rocks in the Prince Albert Group, Hayes River Region, N.W.T.; in: Report of Activities, Part A, Geological Survey of Canada, Paper 75-1A, p. 363-367.
1975: Gneiss distinction in the Hayes River Region: magnetic and geochemical parameters; in: Report of Activities, Part B, Geological Survey of Canada, Paper 75-1B, p. 89-96.
Wright, G.M.
1967: Geology of the southeastern Barren Grounds, parts of the Districts of Mackenzie and Keewatin; Geological Survey of Canada, Memoir 350.





LOCATION MAP

GENERAL NOTES

Because of the similarities of lacustrine and marine sediments, and because of the lack of depositional environmental indicators, much difficulty was encountered in differentiating marine and lacustrine units, particularly where thin. Moreover since the transgressive marine water was shallow and often confined to narrow valley-systems, it is questionable whether the water would have been marine, brackish or even fresh; also the discharge of glacial meltwater would have had a pronounced effect on the salinity. As a result there are some materials that have been mapped as lacustrine which were probably deposited below sea level. Present determination of marine limit is at 800 feet (275 m) in 56 M, 500-700 feet (175-225 m) in 56 L, and 400-500 feet (125-175 m) in 66 H. Further work will be done on this problem.

Most of the proglacial lakes were formed due to isostatic tilting and damming of the natural drainage by the ice. These lakes were low and probably short-lived. Most modern lakes in the area are shallow with gentle slopes down to them.

The difference between sm v or sLv over Mb and MbW is arbitrary and is based on the photo-interpreters' assessment. There is a continuous range of units from thick sand through thin sand over till through washed till to normal till. The best striping is on thin sand over till and hence was the prime criterion for the recognition of this unit; washed till is often poorly striped.

Shell material was found in great abundance along the Murchison River system; the only other shell localities were on the west side of Franklin Lake, the mouth of the Hermann River (probably non-marine), and two pin-head sized fragments along the Hayes River. Diatoms and foraminifera were obtained in a drill hole in frozen silts on the west side of Franklin Lake; these indicate a brackish environment (S. Lichti-Federovich, pers. comm.). The paucity of fossils may be the result of post-depositional leaching of the active layer (most pH determinations are slightly acidic (C. Tarnocai, pers. comm.) or of a scarcity of life at the time of deposition.

Colluvium was not mapped as a separate unit. Most low areas have 10-50 cm accumulations of colluvium mixed with organics, often forming fens. At the base of steep slopes, up to 1 m of very ice-rich colluvium is common.

Solifluction is the most common and most active process of erosion within the region. It is probably active to some degree on all slopes and unconsolidated materials.

Except where noted, data was obtained from pits dug into the active layer or from surface observations, not from laboratory analyses.

The base maps for the accompanying surficial geology maps were prepared by photographic enlargement of the 1:250 000 series of the National Topographic System.

The accompanying surficial maps are undergoing extensive revision and will be published at a later date at a scale of 1:250 000 with a revised legend. For further information concerning the surficial geology of the region see:

Craig, B.G.
1961: Surficial geology of northern District of Keewatin, Northwest Territories; Geological Survey of Canada, Paper 61-5, 8 p.
Edlund, S.A.
1977: Vegetation types of north-central Keewatin; in: Report of Activities, Part B, Geological Survey of Canada, Paper 77-1A, p. 385-386.
Thomas, R.D.
1977: A brief description of the surficial materials of north-central Keewatin, Northwest Territories; in: Report of Activities, Part B, Geological Survey of Canada, Paper 77-1B, p. 315-317.
Wright, G.M.
1967: Geology of the southeastern Barren Grounds, parts of the Districts of Mackenzie and Keewatin; Geological Survey of Canada, Memoir 350.

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