GEOLOGICAL SURVEY OF CANADA COMMISSION GÉOLOGIQUE DU CANADA

DEPARTMENT OF ENERGY, MINES AND RESOURCES
MINISTÈRE DE L'ÉNERGIE, DES MINES ET DES RESSOURCES

LEGEND

QUATERNARY

HOLOCENE

ORGANIC DEPOSITS (MUSKEG): peat containing ice; up to 4 m thick; covers extensive areas; produces flat, wet terrain

8c *Tundra peat: thin deposit or veneer of mossy, fibrous peat with ice-wedge polygons; derived from tundra (lichen-heath-moss) vegetation*

8b *Fen peat: wet, dense, amorphous sedge peat, minor moss peat; includes string fen, palsas, and floating vegetation mats on lakes; occurs as infillings in relict and modern drainageways; derived from sedge and moss vegetation*

8a *Forested bog peat: spongy, stratified amorphous, fibrous, and woody peat with some charcoal layers; characterized by raised bog with irregular thermokarst depressions up to 3 m deep; derived from spruce forest vegetation; contains some areas of fen peat*

7 *FLUVIAL DEPOSITS (modern alluvium); cross-stratified sand and rounded gravel, deposited by running water in modern streams; commonly less than 3 m thick; occurs as floodplains, point bars, river islands, and deltas. Older alluvium is exposed in section along North Knife River and Seal River*

MARINE and GLACIOMARINE DEPOSITS: well sorted, stratified sand to massive stony silt, deposited into Tyrrell Sea; forms a patchy blanket several metres thick which is commonly overlain by muskeg

6c *Undifferentiated marine offlap deposits: littoral sands fining downwards to nearshore sandy silt, deep water silty clay, or stony pelite; forms a veneer overlying till and lacustrine deposits near the upper limit of postglacial marine submergence (160 to 180 m); thickens eastwards; sparsely fossiliferous*

6b *Littoral and sublittoral sands: stratified sand with minor gravel; occurs as a blanket up to 3 m thick*

6a *Stony marine pelite: soft, poorly sorted, commonly massive but locally plane-bedded, stony to gritty silt; grey; calcareous; 2 to 6 m thick; mainly a marine or glaciomarine sediment containing large amounts of ice-rafted debris originating from ice shelves or drifting pack ice. Where deposits are thin, stony material may be derived from frost churning of marine pelite with underlying till*

LACUSTRINE and GLACIOLACUSTRINE DEPOSITS: clayey silt and sand deposited in glacial Lake Agassiz and in smaller isolated proglacial lakes

5c *Sandy deposits: well sorted, horizontally stratified sand; commonly forms a blanket, 1 to 3 m thick, over rock and till, which is overlain by muskeg. Beach ridges composed of sand, gravel, and rounded cobbles are widespread between 300 and 400 m elevation. Most sandy deposits are derived from subwash from drift of Keewatin provenance (sandy and bouldery till)*

5b *Pelite: silt-clay with clay granules and dropstones; generally massive but locally rhythmically bedded with beds thinning upwards; in places intercalated with till; 2 to 4 m thick; forms a blanket grooved by drifting icebergs. Red brown, calcareous clayey silt occurs in the east where deposits are thickest; weakly calcareous grey silt occurs in the west. Lacustrine pelite derives primarily from drift of Hudsonian provenance (silty till), deposited into deep water either beyond the ice margin or beneath an ice shelf; locally contains diatoms. Unit is mantled by muskeg*

5a *Glaciolacustrine deposits: silt and stratified sand intercalated with till; occurs as de Geer moraines, each about 5 m high and 1 km long, and as intervening blanket deposits*

GLACIOFLUVIAL DEPOSITS: proglacial and ice-contact sediments, deposited by flowing water associated with the melting of glacial ice

4c *Outwash deposits: cross-stratified sand and gravel, broken by braided channels and kettle depressions; occurs primarily as valley bottom deposits in meltwater channels, but unit includes some terrace deposits and isolated fans*

PLEISTOCENE AND HOLOCENE

4b *Kame and esker deposits: sorted, stratified sand with some gravel; occurs as (1) hummocky arcuate interlobate kame moraine, 10 to 30 m thick, consisting of sand, some till, and minor amounts of gravel; marks the zone of convergence between the Keewatin and Hudsonian ice sheets; (2) radial moraines and (3) eskers, both consisting of stratified well sorted sands in prominent ridges 10 to 20 m high, interspersed with flat-topped delta pads; (4) lateral, ice-marginal kame moraine, consisting of substratified sand, associated with radial moraines and eskers; (5) isolated kames occurring as irregular mounds of gravelly sand. Sedimentation occurred predominantly where channelled subglacial meltwater debouched into glacial lakes*

4a *Crevasse fillings: sand and gravel, 4-5 m thick; occurs as elongated belts of reticulated ridges in areas of ribbed moraine, or as nodes along eskers; network marks fracture patterns in a thinning ice mass*

TILL: chiefly unsorted debris deposited beneath or at the front of moving glaciers and beneath ice shelves. Sandy and bouldery till (unit 2) were deposited by ice flowing southwards from a centre in Keewatin, whereas silty till (unit 3) was deposited by ice flowing westwards from a centre over Hudson Basin or the Quebec Plateau.

3 *Silty till: till with a calcareous clay-silt matrix; contains both carbonate and granitic clasts; locally includes shell fragments; hard to compact, jointed; ranging from olive grey to black; occurs as a blanket up to 30 m thick consisting of 1 to 4 sheets, and as end moraine; deposited by grounded active ice and by ice shelves*

2c *Till veneer: thin (less than 2 m thick) sandy and bouldery till overlying rock and interspersed with thick till and rock outcrop; underlying rock structure is visible on air photographs*

2b *Sandy till: partially sorted, sandy textured debris derived from granitic and metamorphic rocks; olive grey; 2 to 10 m thick; loose to moderately compact; contains many sedimentary bedding structures associated with subglacial melting of active ice; occurs as an irregular blanket, fluted terrain, small end moraines, till plateaus, and de Geer moraines (within unit 5a)*

2a *Bouldery till: boulder-rich till with a sandy matrix; olive grey; moderately compact; 2 to 5 m thick; some deposits have openwork or sedimentary bedding structures indicative of both subglacial and supraglacial syngenetic water sorting; occurs mainly as belts of ribbed moraine, but also occurs as a blanket deposit where large amounts of frost-shattered rock have been incorporated*

QUATERNARY AND PRE-QUATERNARY

RESIDUUM: mechanically broken and chemically altered (decomposed) bedrock

1b *Felsenmeer: frost-shattered rock composed of quartz monzonite, alaskite, and gneiss, occurring as stacked angular blocks, 0.5 to 2 m across, with unweathered surfaces; occurs as felsenmeer and as boulder patches in small wet depressions*

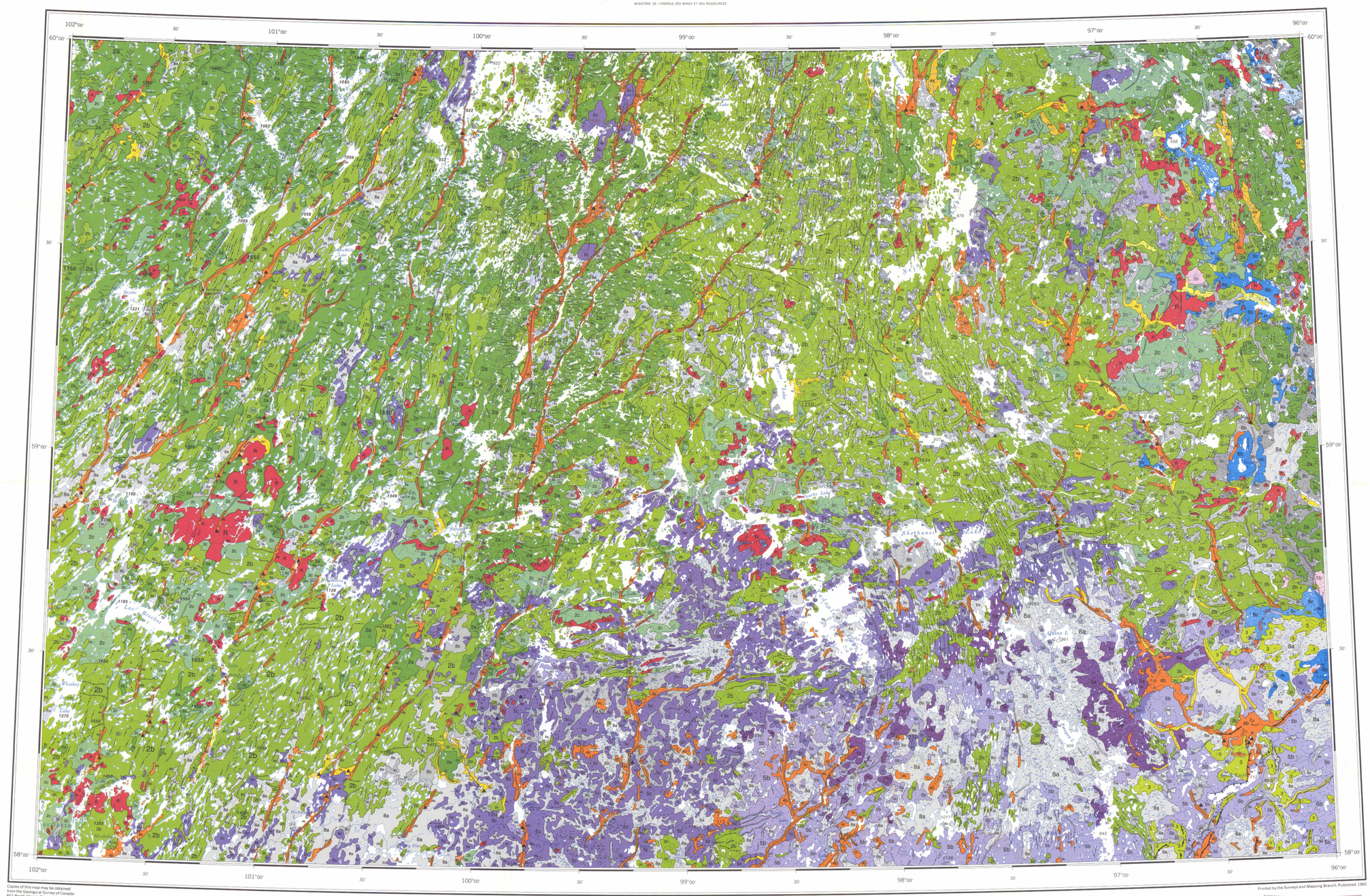
1a *Saprolite: kaolinized diorite, decomposed to sand- and pebble-size fragments; altered during a pre-Quaternary period of intense weathering; occurs in section along North Knife River*

PRE-QUATERNARY

BEDROCK: bare or vegetated igneous and metamorphic (metasedimentary and metavolcanic) bedrock of Precambrian age; rocks are commonly medium textured, and are source materials for sandy and bouldery till

R *Rock: mainly gneissic rock, some granite and metavolcanics; surfaces are spalled and commonly pitted to depths of 1 to 4 mm, but glacially polished surfaces and striae are preserved locally; occurs as small knobs and as hilly uplands which include undifferentiated patches of till*

Geological boundary (defined, gradational or assumed)
Small bedrock outcrop
Small patch of frost-shattered rock
Drumlin and fluting
Striation
Lineation created by floating ice
De Geer moraine
Ribbed moraine
Major interlobate moraine
End moraine
Esker or radial moraine
Esker (ice-contact) delta
Abandoned meltwater channel (large, small)
Beach ridge
Till plateau
Dune field
Marine fossil locality (F)



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INDEX MAP

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

MAP 1608A

SURFICIAL GEOLOGY

NORTHWESTERN MANITOBA

Scale 1:500 000

Kilometres 10 0 10 20 30 40 Kilometres

Transverse Mercator Projection
CM 100° Scale Factor 0.9994

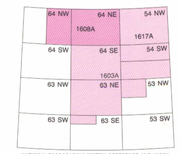
Base map assembled by the Geological Survey of Canada from maps published at the same scale by the Department of Energy, Mines and Resources in 1975, 1980

Copies of the topographical editions covering this map area may be obtained from the Canada Map Office, Department of Energy, Mines and Resources, Ottawa, Ontario, K1A 0E9

Mean magnetic declination 1984, 9°43.6' East, decreasing 17.4' annually. Readings vary from 3°55.2' in the SE corner to 15°32.0' in the NW corner of the map area

Elevations in feet above mean sea level

Printed by the Surveys and Mapping Branch. Published 1985



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NORTHWESTERN MANITOBA