Manitoba
Energy and Mines
Geological Services
Geological Compilation Map Series
Northern Indian Lake, NTS 64H
1:250000

MARGINAL NOTES

The Northern Indian Lake region (NTS 64H) lies in the Churchill structural Province and is underlain by Early Proterozoic rocks. The region includes parts of two geological domains (key map below):

(1) the northeastern margin of the Southern Indian domain, and

(2) the southeastern margin of the Chipewyan domain.

The Southern Indian domain comprises dominantly intrusive rocks with a wide range of compositions (granite to gabbro) and minor supracrustal rocks. The Chipewyan domain consists of more uniform intrusive rocks of granite to quartz monzonite composition.

In the **Southern Indian domain**[1] the most common intrusive rocks are coarse grained, grey, foliated to gneissic granodiorite to tonalite (**T**, **Tn**). Granodiorite is intruded by diorite, quartz diorite, diorite to tonalite intrusion breccia (**D**), schlieric leucogranite (**Gn**), massive grey homogeneous granite (**Gl**), minor pegmatite and at least two ages of mafic dykes (**B**).

The supracrustal rocks of the Partridge Breast Lake-Gauer Lake block represent the eastward continuation of the Southern Indian Lake metasedimentary gneiss belt (McRitchie, 1977). Within the belt three distinct lithologic suites have been identified (Lenton and Corkery, 1981).

(1) The Arkosic suite comprises polymictic metaconglomerate (A**C**), meta-arkose (A**S**) and feldspathic metagreywacke (A**W**). These magnetiferous or hematitic metasedimentary rocks are the youngest units in the metasedimentary gneiss section.

(2) The Partridge Breast Lake suite comprises a mixed section of metavolcanic and metasedimentary rocks. Sillimanite-muscovite-rich metagreywacke (P**W**) is the predominant rock type, with interlayers of metabasalt, meta-andesite, (P**V**), hornblende-rich metasedimentary rocks and oligomictic and polymictic conglomerates (P**W**). Quartzite and protoquartzite (P**Q**) with minor muscovite-andalusite schist occur near the base of the metasedimentary section.

(3) A section of garnetiferous graphite-bearing metagreywacke underlies the Partridge Breast Lake suite. It differs from the metagreywacke of the overlying suite which has less garnet, is not graphitic and commonly contains magnetite.

The Partridge Breast Lake-Gauer Lake block represents a down dropped block of well preserved metavolcanic and metasedimentary rocks. The stratigraphic sequence is homoclinal with predominantly metasedimentary rocks in the north and metavolcanic rocks to the south. This section may represent limbs of a large recumbent fold, possibly with repeated sections due to thrusting.

Metamorphic grade decreases southwards from upper amphibolite facies at Partridge Breast Lake to upper greenschist facies in northwestern Gauer Lake.

A Rb-Sr whole rock age of 1975 ± 90 Ma (initial $^{87}Sr/^{86}Sr$ ratio = 0.7075) was determined by Clark (unpublished data) for pelitic and psammitic gneisses (P**W**) of the Partridge Breast Lake suite from the south shore of Partridge Breast Lake.

The Partridge Breast Lake-Gauer Lake block is intruded by two granite types:

(1) Thorsteinson granite, a coarse grained to locally pegmatitic fluorite-bearing sodic granite, shows chemical and textural characteristics of an advanced level of granitic differentiation. Geochemical characteristics of the granite suggest an anorogenic origin (Pearce et al., 1984; Halden et al., in prep.). This granite yielded a Rb-Sr whole rock isochron age of 1713 ± 19 Ma (initial $^{87}Sr/^{86}Sr$ ratio = 0.7046) (Halden et al., in prep.), and a K-Ar biotite age of 1740 Ma (Moore et al., 1960), and

(2) Gauer Lake megacrystic granite, a weakly foliated leucocratic biotite granite that intrudes the low metamorphic grade area of Gauer Lake.

In the Northern Indian Lake area zones of paragneiss are included within the granitoid terrain. Arkosic gneiss and metatexite with associated amphibolites, diorites and gabbros are common in the central region of Northern Indian Lake. These represent remnant xenolith trains within the tonalite gneiss complex (**T**).

The **Chipewyan domain** underlying the northern and eastern portion of the Northern Indian Lake area, is a batholithic intrusive complex comprising three major phases and at least two minor phases:

(1) magnetiferous biotite granite (c**Gp**) characterized by variable proportions of microcline megacrysts,

(2) hornblende ± biotite megacrystic syenogranite to quartz monzonite (c**Zp**), similar to the granite but with less quartz and more hornblende, magnetite, sphene and fluorite.

(3) seriate biotite granite (c**Gr**), with a Rb-Sr age of 1816 ± 30 Ma (initial $^{87}Sr/^{86}Sr$ ratio = 0.7020) (Halden et al., in prep.), is similar in texture to the megacrystic granite (c**Gp**) which it intrudes,

(4) abundant dykes of pink leucocratic aplitic to fine grained porphyritic granite possibly associated with the seriate granite (c**Gr**), and

(5) dykes of grey aplitic granite that are the youngest intrusive phase in the region.

U-Pb zircon age determinations from the western portion of the Chipewyan batholith indicate an age of 1855 Ma (Zwanzig et al., 1985 and Van Schmus and Schledewitz, 1986). A U-Pb age of 1857 ± 9 Ma was determined for megacrystic granite in the Big Sand Lake area (NTS 64G) that is probably correlative with megacrystic granite (c**Gp**) in the Northern Indian Lake area. A Rb-Sr age of 1802 ± 50 Ma (initial $^{87}Sr/^{86}Sr$ ratio = 0.7028) for Chipewyan rocks in the Northern Indian Lake area (Halden et al., in prep.) may represent a post-magmatic metamorphic event. The Rb-Sr data show a remarkable uniformity of isotopic composition and initial ratio for the entire Chipewyan domain.

Geochemical discrimination using the methods of Pearce et al. (1984) indicates a collision granite origin for the Chipewyan batholith; however, this interpretation is preliminary as the tectonic setting of the batholith is not fully understood (Halden et al., In prep.).

Aeromagnetic contours shown on the map give an additional level of information. These have been used in areas of sparse outcrop to extrapolate major units or groups of units with similar, known magnetic signatures. In the southwest, intrusive and gneissic rocks in the Northern Indian Lake area have a distinctive pattern of low magnetic response. Similar rocks on North Knife Lake may be more extensive to the northwest as indicated by a broad zone of low magnetic response. Within the Chipewyan batholith megacrystic granite (c**Gp**) has a medium level flat magnetic signature in contrast to high irregular signature over megacrystic syenogranite to quartz monzonite (c**Zp**) and seriate granite (c**Gr**). Three small oval magnetic highs up to 11 000 gammas, east of Pisew Lake, southeast of Buckland Lake and north of Freeman Lake, occur in areas of no outcrop. A more detailed ground magnetometer survey of the Pisew high suggests a layered structure of unknown rock type (Lenton and Corkery, 1981).

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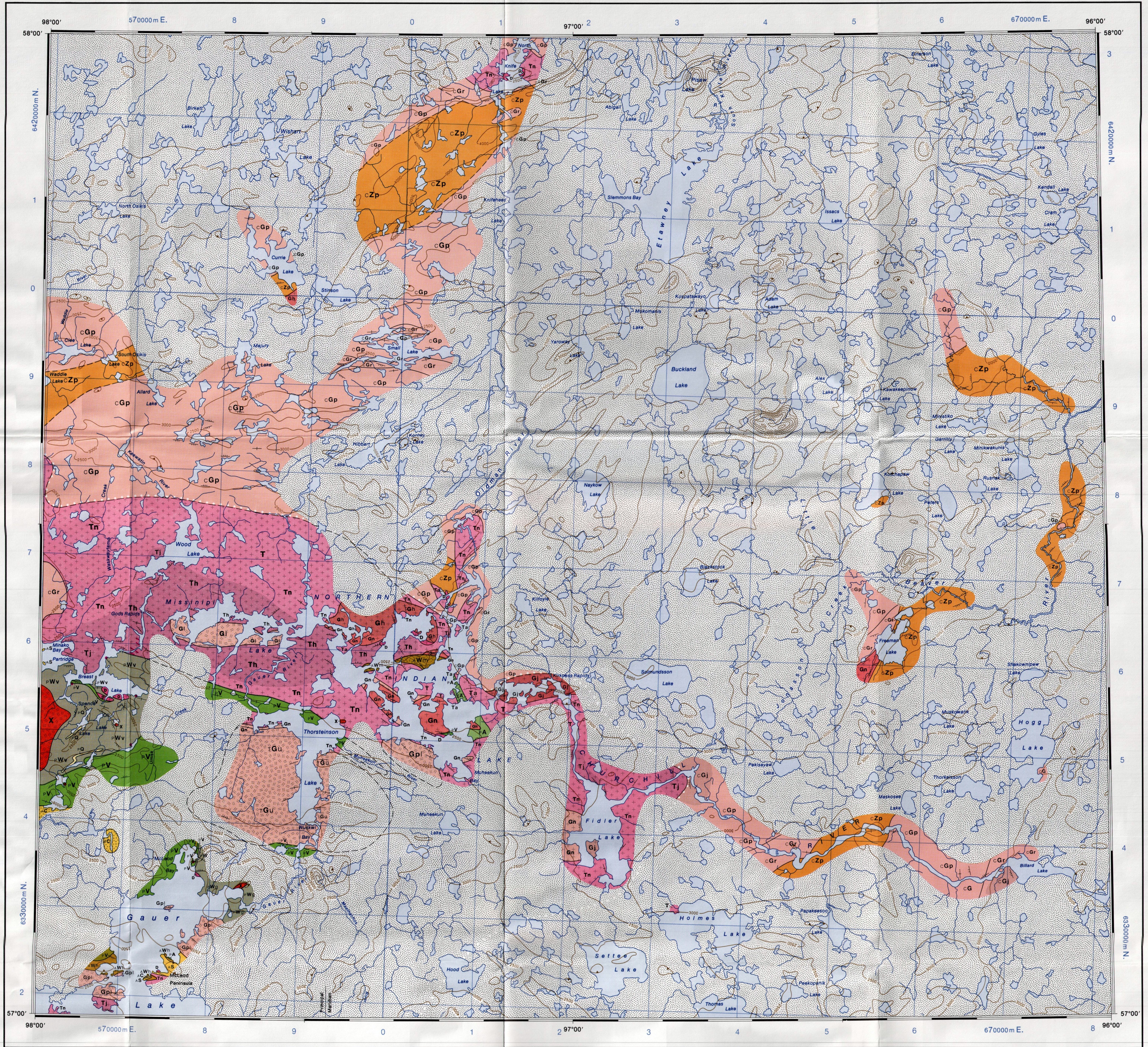
[1] Unless otherwise noted, domain descriptions are only applicable to the Northern Indian Lake map sheet (NTS 64H).



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LEGEND

PRECAMBRIAN

Early Proterozoic

Younger Plutonic Rocks

X	Pegmatite
Gl	Leucocratic granite; **Gp**l - megacrystic leucogranite - Gauer Lake granite; T**Gu** - fluorite-bearing sodic granite - Thorsteinson granite
	Diabase dykes

CHIPEWYAN DOMAIN

Chipewyan Intrusive Complex

c**G** / c**Gj**	Granite-syenogranite; c**Gr** - seriate granite; c**Gp** - megacrystic granite; c**Gj** - megacrystic granite with abundant inclusions of supracrustal rocks
c**Zp**	Megacrystic syenogranite-quartz monzonite

Plutonic Rocks of Uncertain Age

Gn	Gneissic granite-granodiorite

SOUTHERN INDIAN DOMAIN

Arkosic Suite

A**Wh** / A**Wm**	Psammitic and pelitic metagreywacke, hornblende-magnetite-bearing; A**W**m - migmatite derived from meta-arenite and magnetiferous feldspathic metagreywacke
A**S**	Quartzose meta-arenite, quartzite
A**C**	Polymictic metaconglomerate

Partridge Breast Lake Suite

P**Q**	Quartzite
P**A**	Amphibolite derived from mafic volcanic rocks
P**V**	Intermediate and felsic metavolcanic rocks and associated quartz-feldspar porphyry
P**V**	Metabasalt
P**W**	Pelitic to psammitic metagreywacke, magnetite-muscovite-sillimanite-bearing; P**W**g - garnetiferous metagreywacke and oligomictic metaconglomerate; P**Wv** - pelitic to psammitic metagreywacke with minor felsic to mafic volcanic interlayers

Gn / **Gh, Gj**	Gneissic granodiorite-granite; **Gh** - hybrid orthogneiss; **Gj** - gneissic granodiorite-granite with abundant inclusions of supracrustal rocks
T / **Th, Tj**	Tonalite; **Tn** - gneissic to foliated tonalite-granodiorite; **Ta** - augen tonalite; **Th** - hybrid tonalitic gneiss; **Tj** - foliated to gneissic tonalite with abundant inclusions of supracrustal rocks
D	Diorite, quartz diorite, gabbro, tonalite
•	Ultramafic rocks

STRATIGRAPHIC NOTE

The map units within the major stratigraphic divisions are in approximate stratigraphic order.

SYMBOLS

Geological boundary (approximate)

Geological boundary (inferred from aeromagnetic and airborne radiometric surveys)

Bedding (inclined)

Domain boundary

Area of little or no outcrop

Foliation, or foliation and parallel layering (dip unknown, 0°-29°, 30°-59°, 60°-79°, 80°-90°)

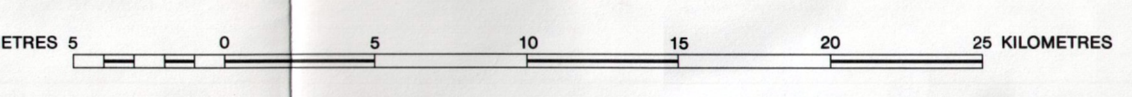
Aeromagnetic contours (in gammas)

BEDROCK GEOLOGY COMPILATION MAP SERIES

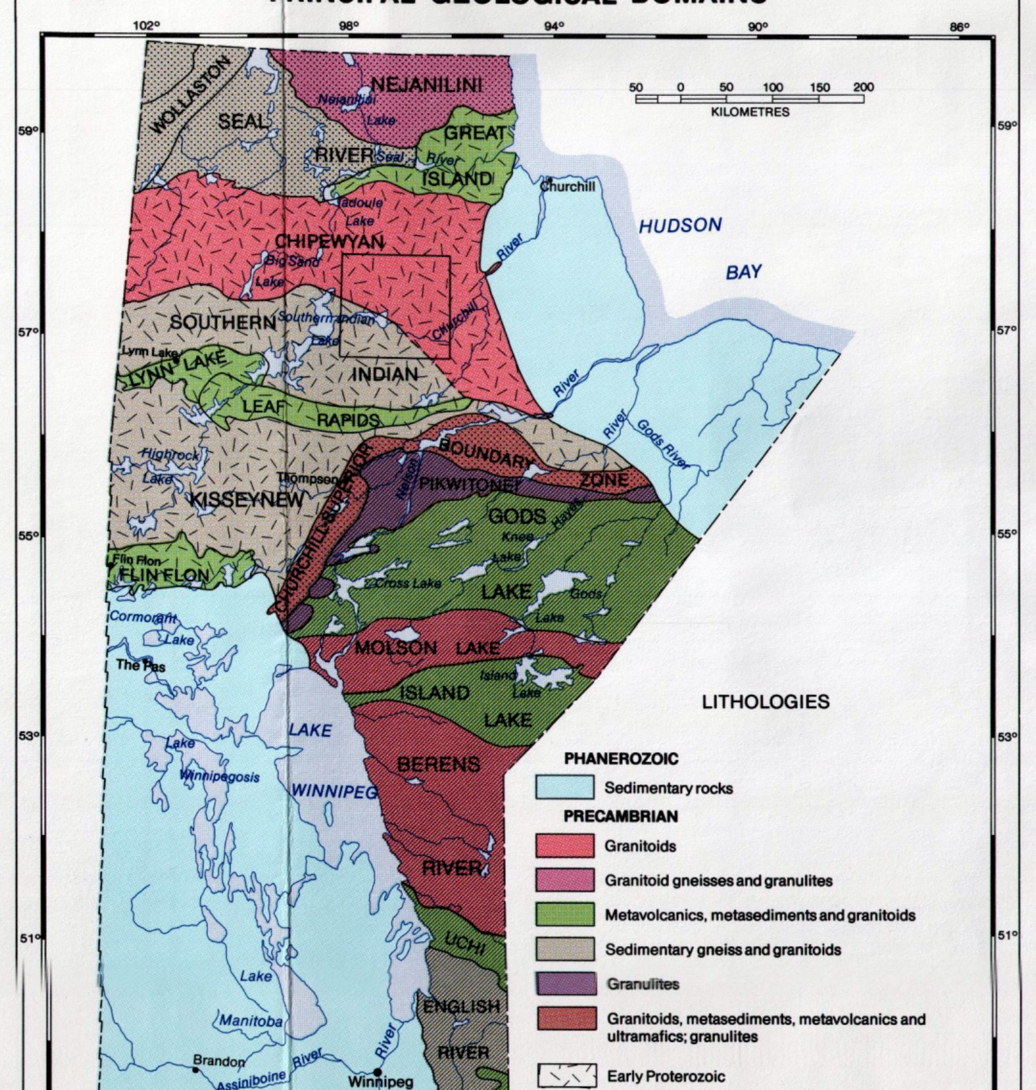
NORTHERN INDIAN LAKE

NTS 64H

Scale 1:250 000



PRINCIPAL GEOLOGICAL DOMAINS



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Additional references for Northern Indian Lake, NTS 64H, are available in Manitoba Energy and Mines, Open File Report OF86-1.

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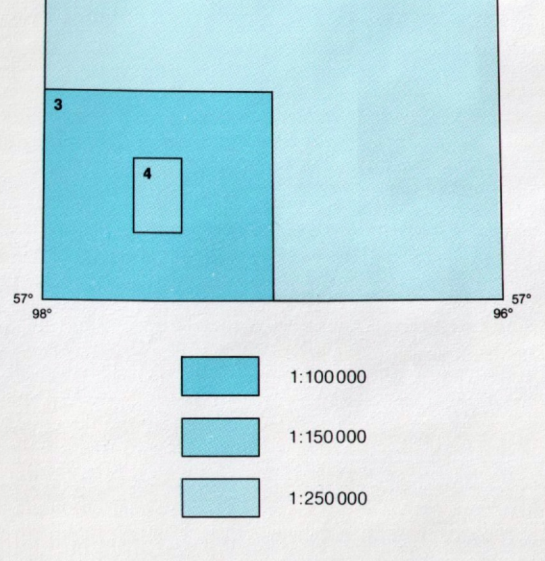
[1] Mineral Resources Division

SOURCES OF INFORMATION



1 McRitchie, W.D. and Peters, J., 1978: Northern Indian Lake area; Manitoba MRD[1], Preliminary Map 1978 M-1; 1:250000.

2 Corkery, M.T. and Lenton, P.G., 1979-80: Northern Indian Lake, Map OF81-3-1; Manitoba MRD Open File Report OF81-3; 1:250000.

3 Corkery, M.T. and Lenton, P.G., 1979-80: Northern Indian Lake, Southwest, Map OF81-3-3; Manitoba MRD, Open File Report OF81-3; 1:100000.

4 Lenton, P.G., 1982: Granite-pegmatite studies, Lynn Lake region; **in** Manitoba MRD, Report of Field Activities, 1982, p. 19; 1:150000.

In addition, recent unpublished data have been incorporated.

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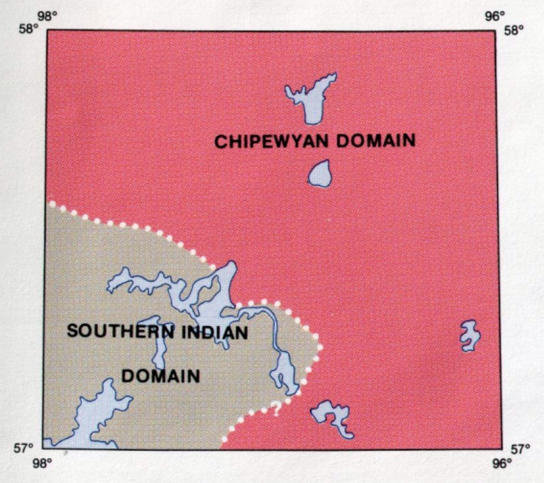
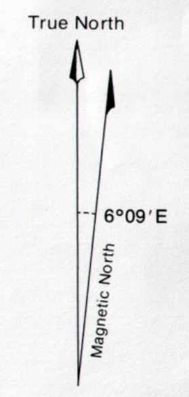
[1] Mineral Resources Division

MAJOR DOMAINS





Approximate mean declination (1988) for centre of map.
Decreasing 11.8' annually.

Synoptic geology by M.T. Corkery and P.G. Lenton

Compilation by D. Kowerchuk

Cartography by D.L. McShane

Suggested reference to this publication:
Manitoba Energy and Mines, 1987; Bedrock Geology Compilation Map Series, Northern Indian Lake, NTS 64H, 1:250000.

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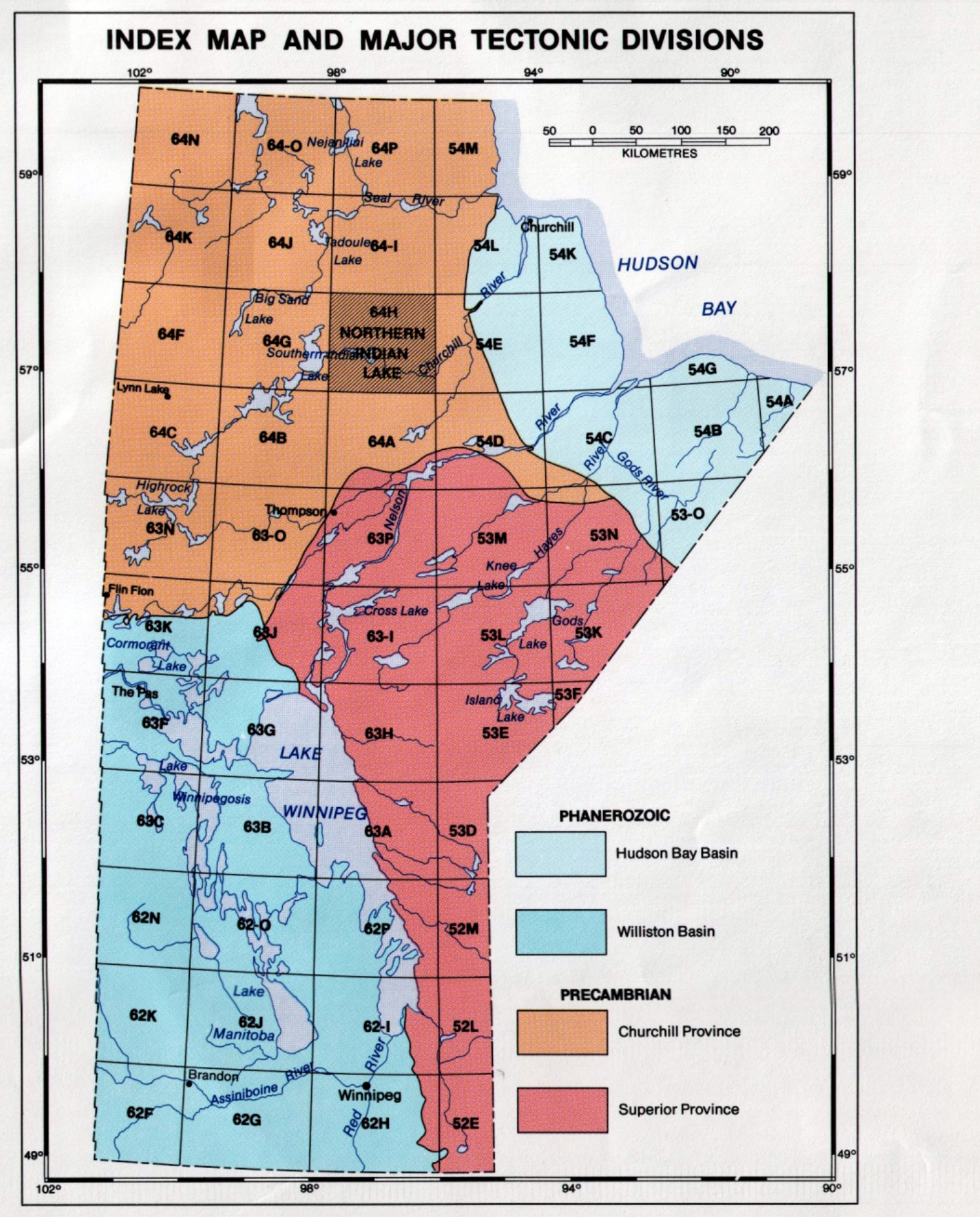
INDEX MAP AND MAJOR TECTONIC DIVISIONS



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