The Grand Rapids map sheet (NTS 63G) is underlain by Paleozoic carbonate formations, with the exception of minor Precambrian bedrock exposures in the northeast corner. The Paleozoic strata represent a portion of the northeastern flank of the Williston Basin and dip gently to the southwest. Recent glaciation has modified the exposed Paleozoic bedrock. The rocks outcrop in a region known as the Interlake, and the Grand Rapids area is where many of Manitoba's caves and karst features are located. The map sheet is blanketed by up to 60 m of glacial till, lake sediments and glacial outwash deposits (see 'Surficial Geology' and 'Overburden Thickness' inset maps). The north basin of Lake Winnipeg occupies a significant portion of the sheet. Stratigraphic coreholes, mineral-exploration drillholes, Water Resources Branch testholes and Manitoba Hydro testholes provide data sufficient to estimate the regional structure of the sedimentary strata. Using these data, formation contacts were extrapolated from known well locations to their intersection with the buried bedrock surface (see 'Bedrock Topography' inset

Large expanses of Paleozoic bedrock are exposed, or partially covered, in the Grand Rapids Uplands due to thin or scattered surficial deposits. Frequent forest fires that have swept through this area have resulted in excellent bedrock exposures. Bedrock exposures also occur as shoreline outcrops along the many lakes in the area. Sub-Phanerozoic mineral-exploration drilling for Ni-Cu mineralization along the Superior Boundary Zone (SBZ) in NTS 63G has provided abundant Phanerozoic drill core for stratigraphic evaluation. Core logging of these drillholes revealed the existence of numerous outliers of Cretaceous age and unknown

extent. Many shoreline exposures are now flooded in the Cedar Lake area due to the Grand Rapids The Phanerozoic rock sequence overlies the Precambrian and the SBZ. The SBZ is the juncture of the Superior and Churchill Precambrian cratonic blocks, and is the site of the Thompson Nickel Belt (TNB).

Bedrock topography in the Grand Rapids map area (see 'Bedrock Topography' inset map) exhibits considerable irregularity. The main upland area consists of dolomite pavement and is bounded to the east by the north-trending Silurian escarpment. The escarpment trends parallel to the east side of Provincial Highway 6 (see the map and cross-section A-A' for the location of the escarpment). Using seismic reflection data obtained in the Lake Winnipeg study, Todd et al. (1998) identified the Lower Paleozoic section (Winnipeg and Red River formations) as a prominent, buried escarpment, up to 40 m high, within Lake Winnipeg. This escarpment represents the Precambrian-Paleozoic boundary (G. Matile, pers. comm., 2002; see cross-section B-B') The 'Bedrock Topography' inset map shows an irregular surface characterized by erosional lows more than 50 m in depth. These lows may be the result of karst topography (i.e., sinkholes), channel erosion or structural faulting. Some of these deeply incised topographic lows in the Paleozoic bedrock have been infilled by Cretaceous outliers. These outliers occur throughout the area of the map sheet; eighteen are known to exist. At one time, the area may have been covered by Mesozoic sediments that were

The 'Bedrock Topography' inset map reflects regional trends in the rock surface and does not necessarily account for local fluctuations. In areas with Paleozoic bedrock, local fluctuations commonly occur as karst depressions, resulting in anomalous depth to bedrock values. Alternatively, in areas underlain by Precambrian bedrock, east and north of Lake Winnipeg, local relief on the bedrock surface can be as much as 20 m and the depressions are commonly filled with Quaternary sediments (see cross-section B-

PRECAMBRIAN UNCONFORMITY

BEDROCK TOPOGRAPHY

The Precambrian strata are unconformably overlain by basal Paleozoic sandstone of the Middle Ordovician Winniped Formation. The Precambrian surface is interpreted to have been peneplaned, but numerous irregularities are present in this area (see 'Precambrian Topography' inset map; Bezys and In the William Lake area, mineral-exploration drilling by Falconbridge Ltd. encountered topographic highs over the Precambrian surface as great as 35 m, between holes less than 1 km apart. Their drilling targeted the Precambrian along the SBZ, and such extreme variations on top of the Precambrian suggest the existence of faulting or tectonic reactivation of faults affecting the Paleozoic strata (Bezys, 1996a). Near Bracken Lake (Twp. 54, Rge. 16, W 1st Mer.), Falconbridge Ltd. drillhole BL-94-77 indicated a Precambrian structural low of approximately 145 m below the normal structural elevations. This low consisted of 85 m of possible Cambrian Deadwood Formation, which overlies weathered Precambrian granitic fault breccia. Since the Deadwood Formation is present only in southwestern Manitoba, the Bracken Lake low may be a graben structure that sheltered the strata from erosion. The Norris Lake anomaly is a Precambrian structural high located in 19-51-15-W1, 8 km south of Norris Lake. This 61 m high was encountered in drillhole MXD-72-1 by Amax Exploration Ltd. Two metres of extensive brecciation and carbonate-quartz-pyrite veinlets were intersected between the overlying Paleozoic sediments and the Precambrian (B. Bannatyne, internal government document, 1981).

The Denby structure is situated in 46-16-W1, south of the village of Easterville. The Precambrian surface

is 107 m above the normal structural elevations and coincides with the outline of a strong aeromagnetic high. The Cominco Denby number 2 drillhole, drilled in 1971, intersected 91.4 m of red, blue and grey clay containing a thick layer of uniformly sorted, fine-grained sand with abundant marcasite nodules. Between 91.4 and 114.0 m, a sequence of sand-clay-limestone was encountered. Paleozoic dolomite was present between 114.0 and 130.1 m, and Precambrian serpentine was intersected at 130.1 m. Winnipeg Formation was absent in this hole. These data are interpreted to indicate that 80 to 105 m of local, post-Ordovician, probably pre-Mesozoic structural uplift occurred (McCabe, 1978). Thirteen kilometres northwest of the Denby structure is Cominco's drillhole RP-96-21, which intersected Cretaceous accretionary lapilli in a pre-Mesozoic channel (Bezys et al., 1996). Micropaleolontology data from the sedimentary rocks indicate they are of Mesozoic age (A.R. Sweet, internal government report, 4 ARS-1997). The lapilli occur at the base of a channel cut into the Paleozoic and infilled with strata of Mesozoic age. The Mesozoic infill consists of light brown and tan to white (some red), very fine grained. consolidated and unconsolidated sand, silt and clay. Interbedded with these sediment types are minor amounts of black shale and sand. The interval 133.1 to 136.6 m contains a light brownish tan lapilli tuff with small accretionary lapilli, 0.1 to 2 cm in size. Thin sections indicate that the lapilli beds are composed of fresh, intermediate volcanic and pyroclastic rocks. Accretionary lapilli usually fall within a few kilometres of the eruptive vent and are rare at distances greater than 20 km (Bezys et al., 1996). There are no known eruptive volcanoes in the vicinity of Denbeigh PointEasterville. The Paleozoic strata adjacent to this erosional channel do not appear to be otherwise disturbed. zone, approximately 100 m wide, contains sideritized carbonate breccia, abundant clay (ochre-like) and siliceous boulders. The East Arm Formation dolomite beds are extremely jointed and discoloured (Bezy 1996b). All of the above anomalous structures occur within the Paleozoic along strike with the SBZ. Structural cross-section A-A' indicates a relatively flat topped Precambrian surface, with a slight flexure at the extreme western end of the section. Again, this part of the section lies on top of the SBZ. Datum for this

cross-section is hung on the 'T-zone' marker bed. PALEOZOIC

REGIONAL STRUCTURAL GEOLOGY Regional strike of the sedimentary strata is approximately north-south, with the exception of a slight northwesterly strike adjacent to the north edge of the map sheet. The regional structural dip increases gradually and uniformly from about 1.0 m/km at the western shore of Lake Winnipeg to 1.5 m/km in the western part of the map sheet. Despite the regional structural dip to the west, isopachs of the Winnipeg to Stonewall formations generally trend east (see Winnipeg, Red River, Stony Mountain and Stonewall isopach inset maps), and thicken to the south. This indicates a major change in tectonic framework subsequent to early Paleozoic time. The current north-striking structural trend probably developed during the late Paleozoic to early Mesozoic, due to uplift with associated erosion and eventual exposure of Precambrian bedrock in eastern Manitoba (the Severn Arch). See Bezys and McCabe (1996) for further

Deadwood Formation The Deadwood Formation occurs in this map sheet as outliers in two localities. In both localities, it was

intersected in a drillhole below a sequence of Silurian and Ordovician rocks. The Deadwood Formation in these holes consists of a complex sequence of dark grey, micaceous, argillaceous siltstone to sandstone. In places, the unit is crossbedded, with intervals of disrupted laminations. At Bracken Lake, the Falconbridge Ltd. drillhole BL-94-77 encountered 85 m of Deadwood Formation and the Precambrian is structurally low, at 145 m. The other occurrence is at the Denby structure and has not been clearly identified as Deadwood Formation. The presence of this stratum so far removed from the actual Deadwood Formation subcrop indicates that the formation was regionally present in this area but subsequently eroded. It is suggested that the intersected Deadwood Formation represents remnants preserved in a graben-like structure.

ORDOVICIAN Winnipeg Formation

The Winnipeg Formation in this map sheet consists of interbedded sandstone, siltstone and minor shale. Regionally, the formation thins and becomes increasingly sandy to the north, in comparison to southern map sheets (McCabe, 1978). The sand is poorly consolidated, medium grained, mature, well rounded and quartzose; the shale is commonly light olive-grey and kaolinitic, with variable sand and silt content. The maximum thickness of the Winnipeg Formation in NTS 63G is 27 m (averaging 9 m; see Winnipeg Formation isopach inset map). Red River Formation

Winnipeg Formation sandstone and shale are overlain conformably and transitionally by mottled dolomitic limestone of the Red River Formation, 11 to 97 m in thickness (averaging 51 m; see Red River Formation isopach inset map). The transition zone consists of a thin sequence of interbedded limestone and shale, termed the 'Hecla Beds' (Porter and Fuller, 1959). The Red River Formation consists of two principal subunits, the lower Red River and upper Red River, which can be distinguished in this map sheet. The lower Red River is approximately equivalent to the Yeoman Formation in Saskatchewan. Lower Red River strata consist of light grey to yellowish and brownish buff, prominently mottled, ossiliferous, commonly cherty dolomite. The unit cannot be subdivided into its constituent members (Dog Head, Cat Head and Selkirk, in ascending stratigraphic sequence) in this map sheet, since they occur in southern Manitoba only. The upper part of this unit, equivalent to the Selkirk 'Tyndall Stone™', is extensively quarried at Garson in southern Manitoba.

The upper Red River strata, consisting of dolomite and argillaceous cherty dolomite, is designated the Fort Garry Member, These beds are approximately equivalent to the Herald Formation in Saskatchewan. Thin argillaceous breccia zones are believed to represent zones where evaporites have been dissolved by subsurface dissolution. Stony Mountain Formation

The Red River Formation is overlain sharply, and possibly with slight disconformity, by shaly beds of the Stony Mountain Formation. In NTS 63G, the Stony Mountain Formation ranges in thickness from 11 to 40 m (averaging 29 m; see Stony Mountain Formation isopach inset map). In Manitoba, this formation is subdivided into three members, in ascending stratigraphic order, the Gunn, Penitentiary and Gunton members. In NTS 63G, this subdivision in not present and the entire unit is Gunton-like, specifically a buff. finely crystalline, sparsely fossiliferous, nodular-bedded dolomite. In southern Manitoba, the Gunton Member is extensively used for crushed stone, extracted from quarries in the Stonewall area.

ORDOVICIAN/LOWER SILURIAN Stonewall Formation The Williams Member, herein placed as the basal unit of the Stonewall Formation, represents the oldest

SILURIAN

Interlake Group

in a series of so-called 'paratime-stratigraphic' markers: thin sand and/or argillaceous beds that can be traced for many hundreds of kilometres, throughout most of the Williston Basin area. These marker beds provide the primary means for stratigraphic subdivision of Upper Ordovician and Silurian strata, and probably represent deposits related to brief periods of shoaling or even slight uplift and erosion (i.e., nonsequences; Porter and Fuller, 1959). The lower Stonewall beds, above the Williams Member, consist of approximately 7 m of pale yellowish grey to yellowish brown, faintly mottled, medium- to thin-bedded, finely crystalline dolomite with sparse, poorly preserved fossils. These beds are separated by a sandy argillaceous marker bed, the 'T-zone', from the upper Stonewall Formation (Porter and Fuller, 1959). The upper Stonewall beds consist of approximately 6 m of light brown to grey, laminated to thin-bedded, sparsely fossiliferous microcrystalline dolomite. The formation is capped by a thin, argillaceous marker bed, called the 'Upper Stonewall Member'. In this map area, the Stonewall Formation can reach a thickness of 35 m (averaging 20 m; see Stonewall Formation isopach inset map). The Ordovician-Silurian boundary occurs within the upper part of the Stonewall sequence, associated with the T-zone (Bezys, 1991; Haidl, 1991).

The Interlake Group in this map area comprises a 0 to 76 m (averaging 30 m) sequence of dolomite, ranging from variably fossiliferous and stromatolitic to predominantly finely crystalline and dense to

sublithographic. The Silurian occurs as exposed bedrock over large expanses of this map sheet and is severely eroded in places. Minor lithological variations, along with the occurrence of several thin, sandy, argillaceous marker beds, are used to subdivide the Interlake Group into the following members (in ascending stratigraphic order): Fisher Branch, Moose Lake, Atikameg, East Arm and Cedar Lake.

Outliers of Mesozoic age are abundant in NTS 63G as channel infill within the Paleozoic bedrock. There are 18 known occurrences in the map area, all but one having been identified in mineral-exploration drillholes; the exception is the outcrop exposure at Ochre Lake. The rocks range from varicoloured shale and siltstone to sandstone, and may contain lignite fragments, bentonite seams and accretionary lapilli (as discussed above). Preliminary micropaleolontological work on the sediments indicate a Barremian to Middle Albian age (Cretaceous; A.R. Sweet, internal government report, 4-ARS-1997).

Pervasive glacial erosion carved the Grand Rapids area into an outcrop-dominated landscape. Sediment cover is restricted to the south along The Pas Moraine and most likely to the area north of Lake Winnipeg, where peatlands dominate. No information is available within the area regarding preLate Wisconsinan glaciation, although multiple glacial striations and discontinuous older sediments may be McMartin (2000) documented two late Wisconsinan glacial advances in the Flin Flon area, first towards the south-southeast (315°) and then towards the southwest (045°). The interlobate position between these ice lobes fluctuated greatly from east to west, and the first of these advances extended to an unknown position to the east, with little or no evidence of the advance in the Grand Rapids area. The second advance terminated at The Pas Moraine and deposited the uppermost till, the calcareous silt-rich Clearwater till in this area (Nielsen and Groom, 1987). The till surface is commonly streamlined (McMartin, 2000). McMartin (2000) suggested that the Clearwater till may be partly derived from the

Hudson Bay Lowlands, with a greater amount of locally derived constituents in areas of high rock plateaus of Paleozoic age. The Pas Moraine is the most prominent glacial feature in the area. It extends more than 300 km from Clearwater Lake, in the north, to Long Point on Lake Winnipeg, in the east. The moraine is a thick wedge of Clearwater till (McMartin, 2000), up to 20 km wide, that rises as much as 60 m above the surrounding terrain. The proximal, northeastward-facing slope of the moraine is a gentle ramp (~3 m/km) with streamlined features, perpendicular to the moraine trend, which curve to merge with the lobe-shaped crest, whereas the distal slope is relatively steep (>20 m/km; Matile and Keller, 2002). The process that led to the formation of The Pas Moraine may have been similar to the model proposed for ice streams, past and present, in Antarctica. Seismic studies on the Antarctic ice stream B show that the glacier is riding on a 6 m layer of saturated glacial debris (Alley et al., 1987). It was concluded that most of this deformation till is derived from an up-ice source and not locally. The deformation till is continuously being carried toward the ice margin and, if the ice-marginal position was maintained in the vicinity of The Pas Moraine for some time, deformation till would accumulate at the ice margin and eventually avalanche down the distal slope (Fig. 1). This process would have generated a stratigraphic

record similar to that of a delta, but composed of unsorted debris: what could be referred to as a till delta.

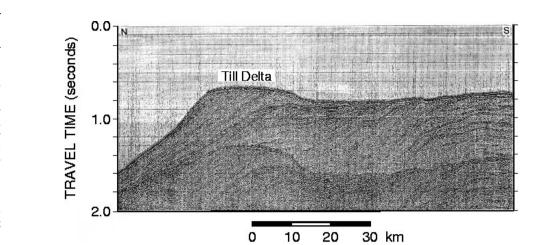
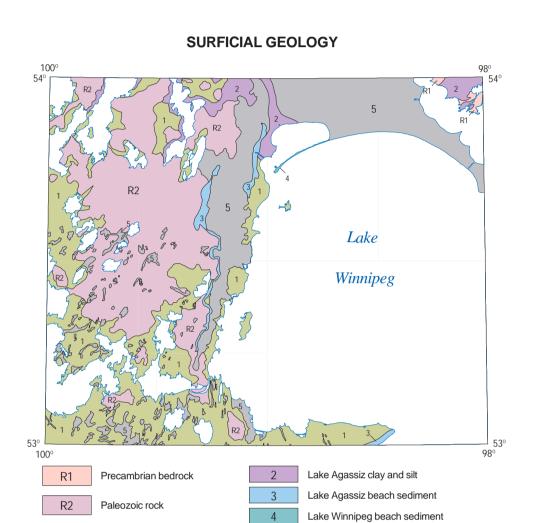


Figure 1: Seismic profile from the bed of the Ross Sea, Antarctica, showing stratigraphic relationships ed to the formation of a till delta (West Antarctic Ice Sheet Working Group, 1994). his process may also explain the formation of the curvilinear streamlined landforms up ice from The Pas Moraine and to the south. In a proglacial lake environment (see description of Lake Agassiz, below) where the majority of the ablation is a result of iceberg calving, the subglacial morphology of the deformation till may have been left undisturbed As these glaciers retreated to the north and northeast, Lake Agassiz inundated the area. Clay and silt attributed to Lake Agassiz were deposited in deep water and are found in the low areas, including the area underlying the extensive fen north of Lake Winnipeg. Littoral sand and gravel, deposited in shallow water along the Lake Agassiz shoreline, occur along the Silurian rock escarpment west of Lake Winnipeg. McMartin (2000) documented six well-defined Lake Agassiz strandlines (from oldest to youngest Stonewall, The Pas, Gimli, Grand Rapids, Drunken Point and Ponton), which were formed in the period from about 8300 to 7800 years before present (BP). During that period, this area would have vely emerged from Lake Agassiz, first appearing as islands along The Pas Moraine, and then as ock plateaus (McMartin, 2000). During this time, Lake Agassiz drained into the Atlantic Ocean, first through Lake Superior and then through Lake Ojibway-Barlow and the Ottawa River, before finally disappearing about 7700 years BP (Thorleifson, 1996).



5 Organic deposits

ECONOMIC GEOLOGY This area has received considerable attention from the mineral-exploration community, since it underlies the inferred southern extension of the Thompson Nickel Belt (TNB). Exploration was initiated in the late 1960s with a follow-up on the results of a federal-provincial aeromagnetic survey. Freeport Canadian Exploration Ltd. undertook geophysical surveys and diamond drilling. This work was followed up by Amax xploration Ltd. and continued with a joint venture of Amax and Granges Exploration Ltd. from 1969 until 1987. In 1971, Cominco Ltd. initiated exploration of the Lake Winnipegosis komatiite belt, including deeppenetrating geophysical surveys (UTEM) and diamond drilling. This program lasted until 1999. Falconbridge Ltd., however, concentrated on the southern extension of the Thompson Nickel belt in a currently active exploration campaign that began in 1988. The Winnipegosis komatiite belt (Hulbert et al., 1994) occurs to the east of the TNB. It consists of komatiitic flows and ultramafic intrusive bodies interlayered with massive and pillowed tholeiitic basalt, sulphide-bearing argillite, calcareous mudstone and dolomite. Cominco focused its attention on the potential of this rock assemblage for komatiite-hosted Ni-Cu deposits. Mineral exploration in this map area is challenging, since it is largely covered by Phanerozoic sedimentary rocks that, in places, are 235m thick. Geophysical surveys must not only overcome this

depth but also compensate for geophysical anomalies caused by saline karst-borne water.

1 Calcareous till

of crushed stone required for its construction.

With the exception of the small area of Precambrian-dominated terrain in the extreme northeastern part of the map area, the entire Precambrian surface in NTS 63G is overlain by Paleozoic and/or Quaternary sediments. The geological map of the sub-Phanerozoic Precambrian basement is based on petrographic data from coreholes drilled by the government and mining companies (largely in the western half of the area). In addition, this compilation used interpretations from the aeromagnetic map, as well as information from exposed Precambrian outcrops in the adjacent NTS areas 63J (Manitoba Energy and Mines, 1993) and 63H (Manitoba Energy and Mines, 1999). Distinctive magnetic patterns, as seen in the Magnetic Anomaly Map (see inset map), have been used to subdivide the Precambrian basement into Archean Superior Province, Superior Boundary Zone and Proterozoic Trans-Hudson Orogen (see 'Sub-Phanerozoic Precambrian Geology' inset map).

Crushed stone (dolomite) from the Silurian bedrock is used intermittently for local highway construction

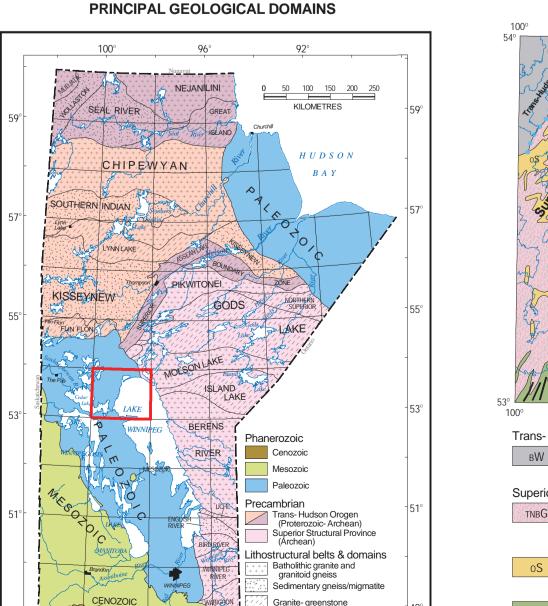
projects. Abandoned dolomite quarries around the Grand Rapids Hydro Dam provided the large amounts

The Superior Province has been subdivided into the Berens River Domain and the Molson Lake Domain using potential field data (Pilkington and Thomas, 2000). Further subdivision into various lithological units has been accomplished by extending units from adjacent map sheets based on rable aeromagnetic signatures and rare diamond-drill hole (DDH) information. Broad, moderate magnetic highs in the Berens River Domain are interpreted to be caused by granodioritic to tonalitic batholiths (unit **Gd**). This has been confirmed by one drillhole. The plutons generate a series of linear magnetic anomalies that trend southwest. A drillhole confirmed that these nomalies occur over mafic dikes of the Molson Dike swarm, as described by Scoates and Macek (1978). Broad areas of low magnetic values are attributed to intermediate gneiss with granitoid phases (unit Ns) Within this gneiss, areas of slightly higher magnetic signatures are interpreted to occur over metavolcanic-metasedimentary rocks (unit **V**), with small, concentric magnetic highs characteristically related to ultramafic rocks (unit UM). Areas of 'mottled' low and high magnetic anomalies are interpreted to be caused by granitoid gneiss, probably containing supracrustal rocks (unit **N**). The moderate to weak linear magnetic anomalies that trend southwesterly indicate that the supracrustal rocks may, in turn, contain mafic intrusions. The Molson Lake Domain is dominated by a large, high-intensity aeromagnetic signature interpreted to be caused by enderbite to enderbitic gneiss (unit **En**). The magnetic anomaly is very similar to that of the Pikwitonei Granulite Domain in NTS area 63P (Manitoba Energy and Mines, 1995); this area may therefore contain a southwestward extension of that domain. The broad, moderate magnetic signature surrounding the enderbite is attributed to rocks ranging in composition from granodiorite to tonalite (unit **Gd**). Linear aeromagnetic signatures within the granitoid rocks also suggest the presence of a few

Superior Boundary Zone Various lithological units belonging to the TNB have been observed in diamond-drill core, and contacts have been interpreted from aeromagnetic signatures. A series of thin, curved, magnetic anomalies in the Group metasedimentary rocks (unit o**S**). These clastic and chemical sedimentary units host Ni-Cu-PGE (platinum group element) deposits such as the William Lake deposit. These sedimentary rocks occur in the reworked basement gneiss and migmatite of the TNB (unit TNBG). The TNB granitoid rocks are characterized by low and flat aeromagnetic signatures. The eastern boundary of the SBZ is marked by a narrow band of Winnipegosis mafic-ultramafic rocks (unit wV; Thompson Nickel Belt Geology Working Group, 2001a, b, c).

Molson dikes with the same northeast trend as in the Berens River Domain

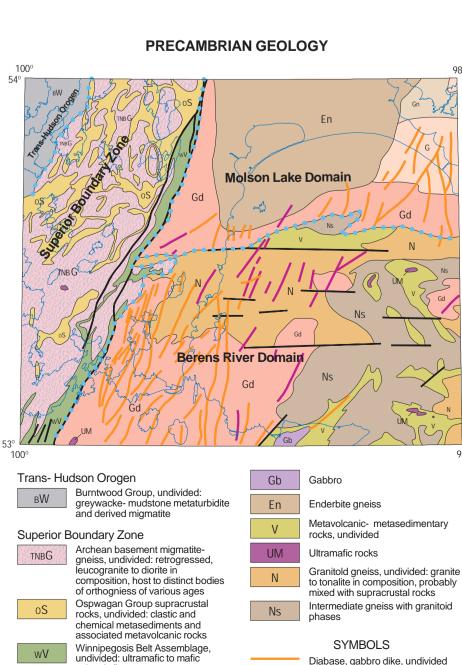
Trans-Hudson Orogen Rocks of the Trans-Hudson Orogen occur only in the extreme northwestern part of the map sheet. The low and flat magnetic signature is attributed to the Burntwood Group metaturbidite and derived migmatite (unit B**W**; Syme et al., 1998) of the Flin Flon Domain (Pilkington and Thomas, 2000).



Every possible effort has been made to ensure that the information presented on this map is accurate. However, the Province of Manitoba and Manitoba Industry, Trade and Mines do not assume liability

for any errors that may occur. References are included for users wishing to verify information

Mosth Dalzata Minnesota



(Molson swarm): based on drill core

aeromagnetic signatures

Fault, inferred

Domain boundary

Mafic intrusion: based on drill core

linear aeromagnetic signatures

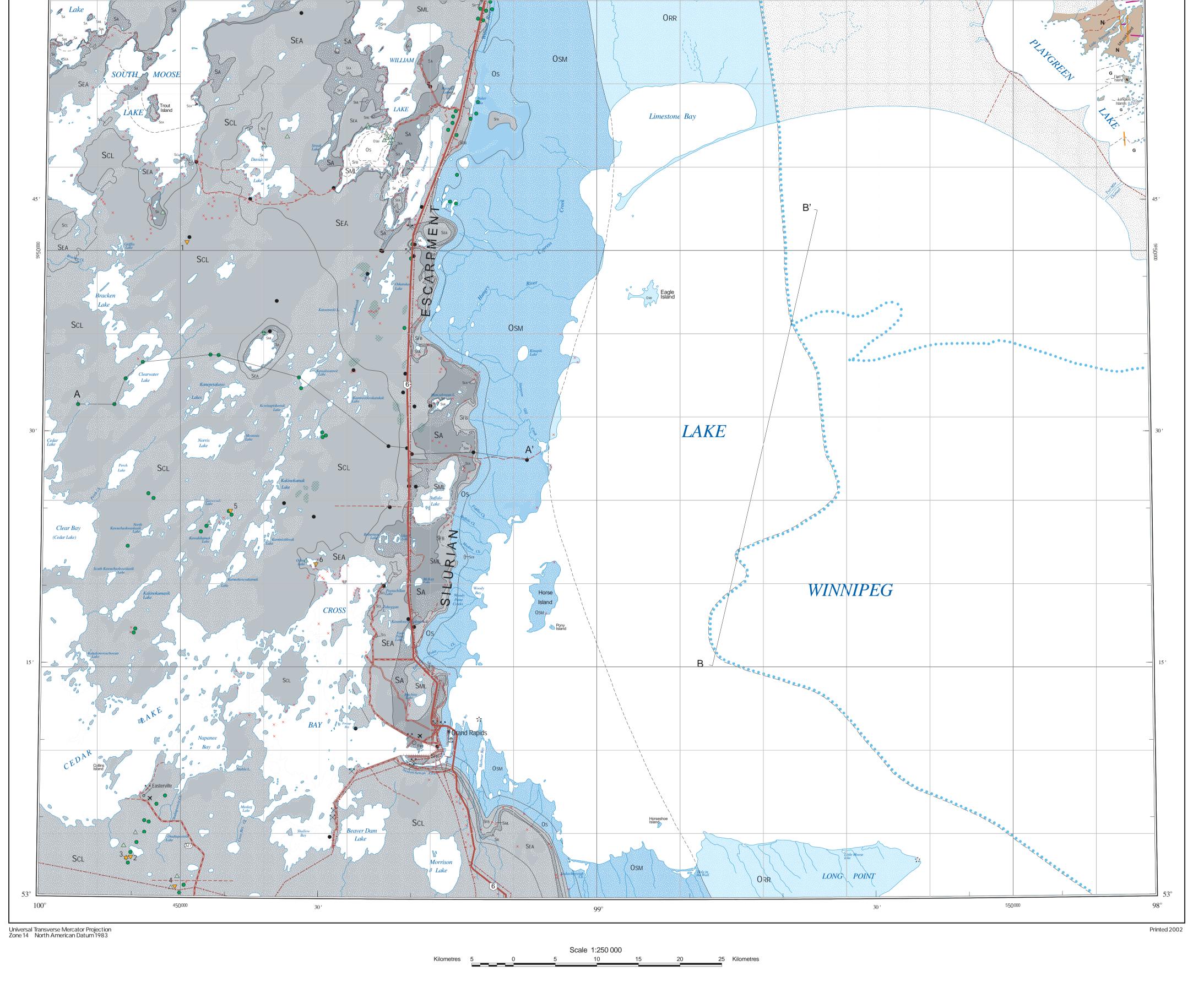
volcanic flows

Granite to granodiorite

Gn Granite to granodiorite gneiss

Granodiorite to tonalite

Superior Province



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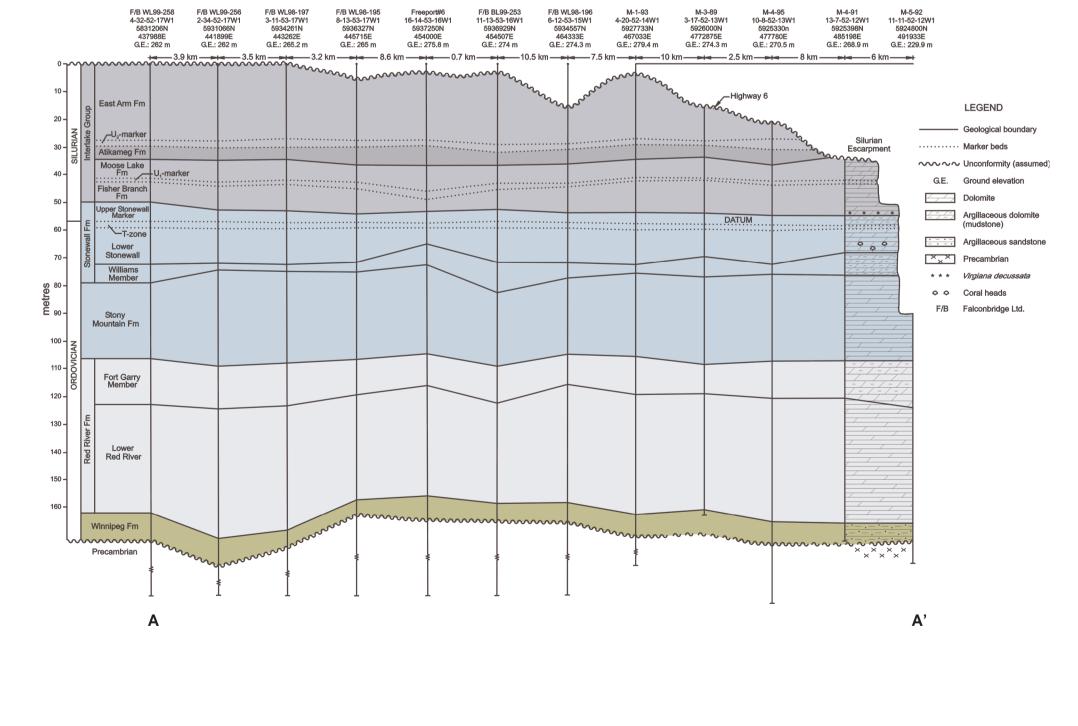
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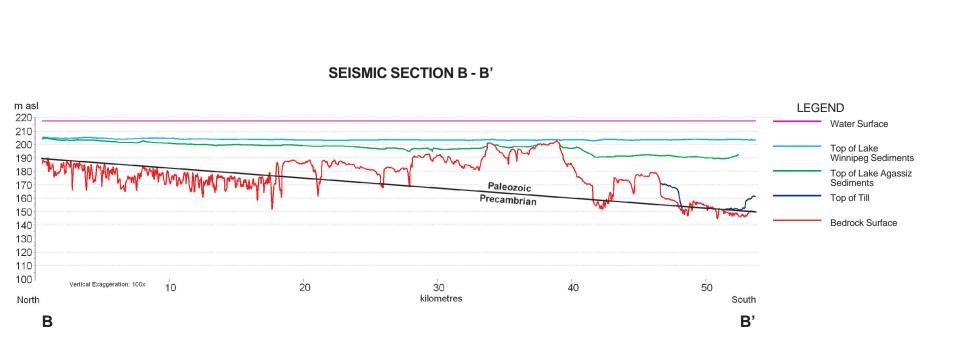
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Bracken Lake Deadwood Formation Deadwood Formation (reported) Denby structure ... Norris Lake anomaly Ochre Lake structure

WESTERN CANADA SEDIMENTARY BASIN

in the Paleozoic outcrop belt

Swan River Formation (0-25m): sandstone to

shale; kaolinitic; minor lignite; presently known

Cedar Lake Formation: dolomite, yellow buff,

finely crystalline, thin bedded, stromatolitic

East Arm Formation (5-8m): dolomite, light to

dark grey, finely crystalline, stromatolitic

argillaceous/arenaceous marker beds

fragmental, micritic, biohermal, biostromal,

fragmental, oolitic, fossiliferous; containing

Atikameg Formation (3-7m): dolomite, buff

orange, massive, vuggy; may contain fossils

Moose Lake Formation (0-10m): dolomite,

Fisher Branch Formation (0-15m): dolomite,

Stonewall Formation (0-20m): dolomite, yellow

grey, finely crystalline, fragmental, sparsely fossiliferous, interrupted by argillaceous zones

and marker beds (T-zone demarcates the

Stony Mountain Formation (0-40m): dolomite,

yellow brown, nodular, colour- mottled in part,

Red River Formation (0-70m): dolomite, in part

interbedded green, waxy shale with sand and silt

Diabase and gabbro dikes, massive (Molson

Granite, leucocratic, biotite bearing, massive to

Diabase dikes, massive to foliated

SYMBOLS

Quarry (crushed stone, dolomite)

Paleozoic outcrop

Domain boundary

ANOMALOUS FEATURES:

3 🔻 . .

4 🔻 . .

5 🔻 . . .

6 🔻 . .

Stratigraphic core hole Mineral exploration drillhole

Caves and/or karst features

Area of little or no Phanerozoic outcrop

Area of little or no Precambrian outcrop

Cretaceous accretionary lapilli

Geological boundary (defined or approximate,

Intermediate layered gneiss with granitoid

phases, derived in part from quartzofeldspathic

fossiliferous, mottled; upper part is Fort Garry

Winnipeg Formation (0-12m): sandstone,

quartzose; rounded, frosted sand grains

dolomite at the base (Williams Member)

vician/Silurian boundary zone); argillaceous

stromatolitic, micritic

mainly as outliers within channel and/or karst fill

Williston Basin

Mesozoic

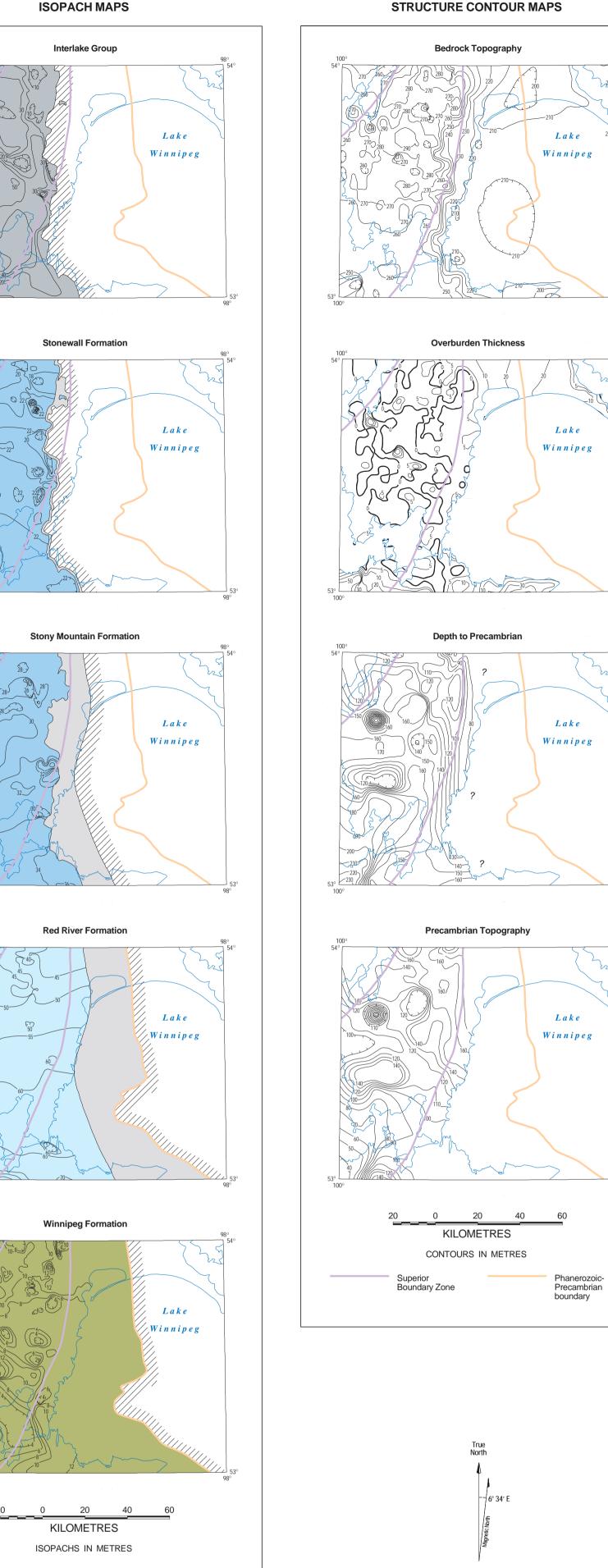
Interlake Group

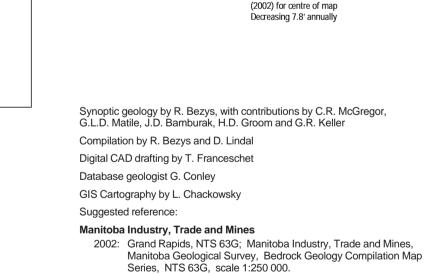
SML

Ordovician and Lower Silurian

MOLSON LAKE DOMAIN

SFB



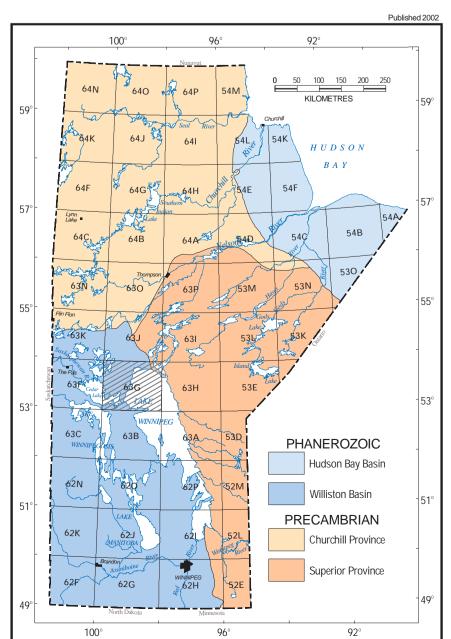




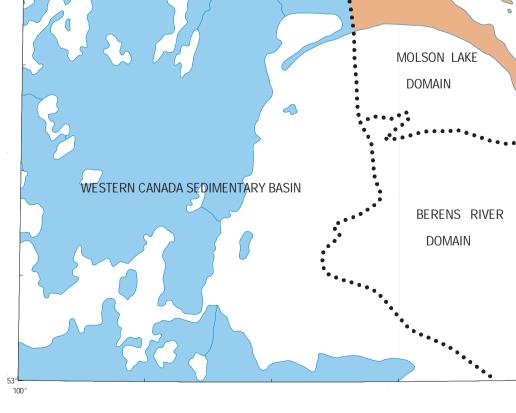
BEDROCK GEOLOGY COMPILATION MAP SERIES **GRAND RAPIDS NTS 63G**

Approximate mean declination

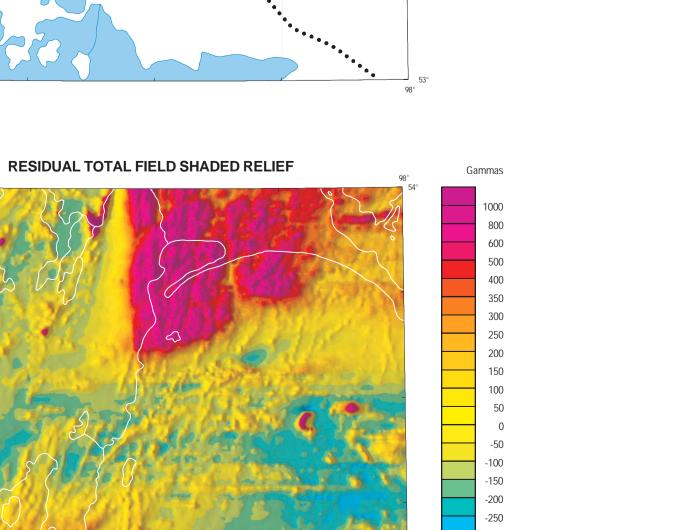
INDEX MAP AND MAJOR TECTONIC DIVISIONS







GEOLOGICAL DOMAINS



Boundary Zone