MARGINAL NOTES

PRECAMBRIAN

The east half of the Herchmer map sheet (NTS 54E) is underlain by Early Proterozoic rocks of the Churchill structural province. This area of limited exposure represents the easternmost extent of the Chipewyan domain (key map below).

The **Chipewyan domain** in this region is a batholithic intrusive complex comprising three major phases and at least two minor phases:

(1) magnetiferous biotite granite (cGp) characterized by variable proportions of microcline megacrysts,

(2) hornblende ± biotite megacrystic syenogranite to quartz monzonite (cZp), similar to the granite but with less quartz and higher contents of hornblende, magnetite, sphene and fluorite,

(3) seriate biotite granite (cGr), similar in texture to the megacrystic granite (cGp) which it intrudes,

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

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

Xenoliths of arkosic paragneiss within the batholith are abundant northeast of the confluence of Churchill River and Little Beaver River. Elsewhere variably assimilated xenoliths of paragneiss and metagabbro (amphibolite) form a small percentage of many outcrops.

A mean U-Pb zircon age of approximately 1855 Ma is indicated for the Chipewyan batholith (Zwanzig et al., 1985; Van Schmus and Schledewitz, 1986). A U-Pb age of 1857 ± 9 Ma was determined for a megacrystic granite in the Big Sand Lake area (NTS 64G) that is probably correlative with megacrystic granite (cGp) in the Herchmer area. Rb-Sr isotope data (Halden et al., in prep.) indicate an age of 1816 ± 19 Ma (I.R. = 0.7028 ± 0.0010) for Chipewyan rocks in the Northern Indian Lake area (NTS 64H) which may represent a post-magmatic metamorphic event.

Fabric in the Chipewyan batholith is highly variable, ranging from strongly foliated to augen-gneiss, in the monzonite (cZp) to weakly foliated in the aplitic and porphyritic dykes. Mylonitic gneisses and cataclastic zones trending 060° occur on Little Beaver River and on Churchill River in the vicinity of Fours Rapids and Portage Chute. These widely spaced breaks parallel the trend of the Owl River shear zone which is indicated by a southwest-trending linear aeromagnetic low along the south margin of the map sheet. Local minor concentrations of sulphides are associated with these shear zones.

Aeromagnetic contours shown on the map give an additional level of information. In general the highest magnetic response occurs over areas of seriate granite (cGr) and monzonite (cZp). Lower, flatter response is characteristic of megacrystic granite (cGp).

PHANEROZOIC

Paleozoic Stratigraphy:

The eastern half of the Herchmer map sheet is underlain by an eastward thickening wedge of Paleozoic carbonates, representing strata deposited on the western flank of the Hudson Bay sedimentary basin. Ordovician strata initially formed a widespread blanket-type deposit extending from the Hudson Bay Basin to the Williston Basin of southwestern Manitoba, and beyond. However, subsequent uplift and erosion in the Precambrian Shield area resulted in removal of Paleozoic sedimentary rocks, leaving only truncated remnants in the Hudson Bay and Williston basins. Regional data suggest that uplift and erosion of the Precambrian Shield occurred in late Paleozoic to early Mesozoic time.

In the Herchmer area, Paleozoic strata range in age from Middle Ordovician at the western erosional edge to early Silurian in the northeastern corner of the map sheet. Regional data indicate that the Paleozoic limestones and dolomites strike approximately 345° and dip gently to the east at about 3 m/km. Maximum thickness of sedimentary rocks in the northeastern corner of the map area is estimated to be about 125 m.

Despite the extent of Paleozoic strata, the only known outcrops occur along Churchill River, where strata of the Portage Chute, Surprise Creek and basal portion of the Caution Creek formations are exposed either along the river channel or along steeply incised creeks feeding into the river. Stratigraphically higher beds of the upper Caution Creek, Chasm Creek, Red Head Rapids and basal Severn River formations occur to the east, beneath thick Quaternary cover, and also outcrop to the north of the Herchmer sheet, along the downstream reaches of Churchill River.

Pre-Paleozoic Erosion Surface:

The limited data available suggest that the Precambrian erosion surface beneath the Paleozoic sedimentary cover is a very low relief, almost uniform surface. Dip on the Precambrian basement differs only slightly from the gradient of Churchill River, so that Precambrian rocks floor the river channel for approximately 20 km downdip from the first occurrence of Paleozoic limestones. Despite the apparent uniformity of the Precambrian erosion surface, a major Precambrian paleotopographic high exists in the Churchill area, 12 km north of the Herchmer sheet, where a series of knobs of resistant Precambrian quartzite protrude through the Paleozoic cover. Relief on this high probably exceeds 100 m.

In the Churchill River outcrop area, Precambrian granitic basement rocks show almost no evidence of weathering, other than a gently rounded spheroidal appearance to the outcrops. This apparent lack of pre-Paleozoic weathering may not be representative; some core holes outside the Herchmer area, and the Kennco No. 4 hole in the extreme southeastern corner of the map sheet, show appreciable thicknesses of highly weathered and altered basement rocks.

Lithology:

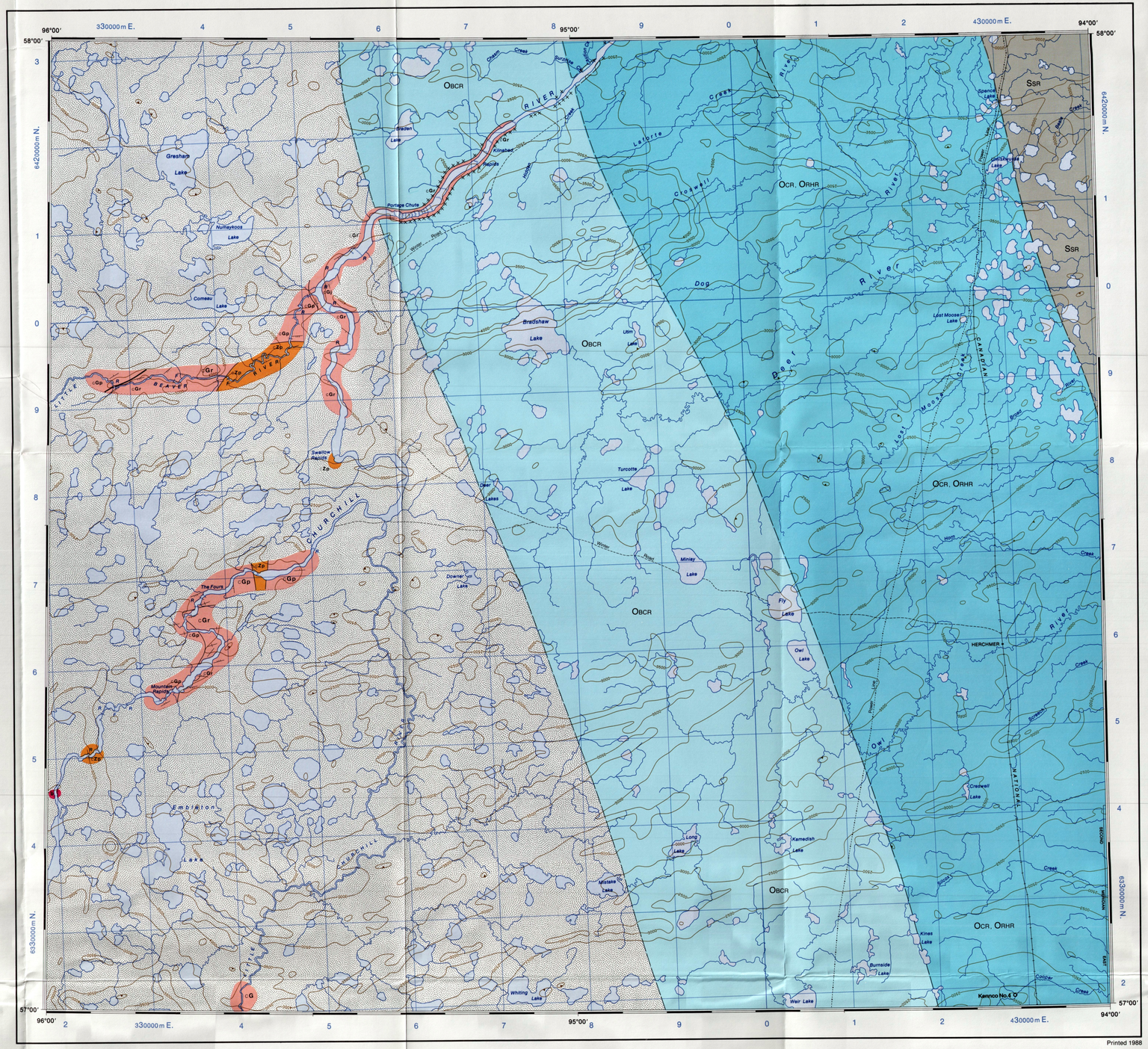
The basal member of the Portage Chute Formation of the Bad Cache Rapids Group, consists of a 1 m sandstone bed. Overlying the sandstone is a ± 21 m sequence of light grey, mottled nodular fossiliferous dolomitic limestone beds. These carbonate strata are identical to, and correlative with, the Lower Red River limestone of southwestern Manitoba. The Surprise Creek Formation, which overlies the Portage Chute and is the upper unit of the Bad Cache Rapids Group, consists of medium to thin bedded, light yellowish grey, very finely crystalline, dense to sublithographic limestone and dolomitic limestone; chert nodules are abundant. The strata are lacking in fossils, but are lithologically similar to, and probably correlative with, the Fort Garry Member (Upper Red River), of southern Manitoba.

The stratigraphically highest beds exposed along Churchill River comprise the lower portion of the Caution Creek Formation of the Churchill River Group. These beds consist of yellowish grey to reddish streaked, massive to thick bedded, highly fossiliferous limestones and dolomitic limestones containing abundant corals, brachiopods, gastropods and cephalopods. These strata are lithologically and stratigraphically correlative with the Gunn and Penitentiary members of the Stony Mountain Formation of southern Manitoba, although the argillaceous content characteristic of those members is lacking.

The lithology of the Upper Caution Creek, Chasm Creek, Red Head Rapids and lower Severn River formations, which occur in the northeastern portion of the map sheet beneath thick Quaternary cover, are summarized in the legend.

Paleozoic Erosion Surface:

The nature of the eroded surface of the Paleozoic strata is uncertain because of the thick cover of Pleistocene drift throughout the area (up to 90 m). However, drill hole data immediately to the southeast (Map 79-2, Manitoba Mineral Resources Division, 1979) show a number of narrow, sharply defined channels where erosion has cut through the entire Paleozoic sequence down to Precambrian basement, giving rise to a series of sinuous windows through the Paleozoic cover. These channels probably result from pre-Pleistocene erosion, and similar channels could be expected in the Herchmer map sheet.

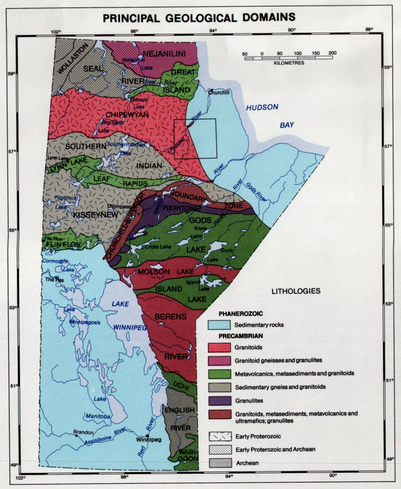


Printed 1988

Scale 1:250 000

KILOMETRES 5 0 5 10 15 20 25 KILOMETRES

PRINCIPAL GEOLOGICAL DOMAINS



Every possible effort has been made to ensure that the information presented on this map is accurate. However, the Province of Manitoba and Manitoba Energy and Mines do not assume liability for any errors that may occur. References are included for users wishing to verify critical information.

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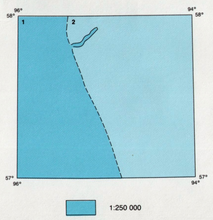
Additional references for Herchmer, NTS 54E, are available in Manitoba Energy and Mines, Open File Report OF86-1.

[1]Mineral Resources Division

SOURCES OF INFORMATION



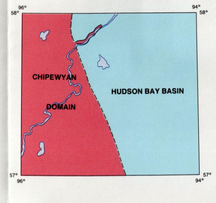
1 Corkery, M.T. and Lenton, P.G., 1979-80: Herchmer, West Half, Map OF81-3-2; Manitoba MRD[1], Open File Report OF81-3, 1:250 000.

2 Geological Services Branch, 1979: Geological Map of Manitoba, Map 79-2; Manitoba MRD; 1:1 000 000.

In addition, recent unpublished data have been incorporated.

[1]Mineral Resources Division

MAJOR SUBDIVISIONS



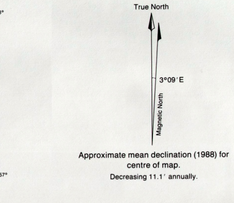
Synoptic geology by M.T. Corkery, P.G. Lenton and H.R. McCabe

Compilation by D. Kowerchuk

Cartography by D.L. McShane

Suggested reference to this publication:
Manitoba Energy and Mines, 1988; Bedrock Geology Compilation Map Series, Herchmer, NTS 54E, 1:250 000.

A contribution by Manitoba Energy and Mines, Geological Services, to programming under the Canada-Manitoba Mineral Development Agreement (MDA), a subsidiary agreement of the Economic and Regional Development Agreement (ERDA).



Manitoba
Energy and Mines
Geological Services
Geological Compilation Map Series
Herchmer, NTS 54E
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LEGEND

PHANEROZOIC

Paleozoic

Silurian

SSR — Severn River Formation (15 m ±): limestone, dolomitic limestone and dolomite, very fine grained, fucoidal; in part algal, bioclastic and pelletal; minor anhydrite and shale

Ordovician

ORHR — Red Head Rapids Formation (15 m ±): dolomite, thin bedded, microcrystalline; in part silty and argillaceous

OCR — Churchill River Group (70 m ±): Caution Creek and Chasm Creek Formations - limestone, slightly to moderately dolomitic and argillaceous, microcrystalline, variably bioclastic; minor shale, dolomite, chert and anhydrite

OBCR — Bad Cache Rapids Group (43 m ±): Portage Chute Formation - thin basal sandstone-shale member; limestone, mottled, slightly dolomitic and argillaceous, variably fossiliferous; considerable nodular chert and siliceous limestone; Surprise Creek Formation - microcrystalline dolomite, slightly bioclastic, prominent bituminous lamination; some anhydrite and salt casts

Note: The Phanerozoic map units comprise sub-unit descriptions that start with the basal sub-unit. Indicated thickness is the estimated maximum thickness in the map area. Lithology, in part, is based on core hole data.

PRECAMBRIAN

Early Proterozoic

CHIPEWYAN DOMAIN

Chipewyan Intrusive-Complex

cG / cGj — Granite to syenogranite; **cGr** - seriate granite; **cGp** - megacrystic granite; **cGj** - seriate granite with numerous inclusions of supracrustal rocks

cZp — Megacrystic syenogranite to quartz monzonite

Plutonic Rocks of Uncertain Age

D — Diorite, melanotonalite, gabbro, tonalite

Note: The Precambrian map units are in approximate chronological order.

SYMBOLS

- Geological boundary (approximate, estimated[1])
- Fault
- Area of little or no Precambrian outcrop
- Foliation or foliation and parallel layering (dip unknown, 0°-29°, 30°-59°, 60°-79°, 80°-90°)
- Drill hole location
- Aeromagnetic contours (in gammas)
- × Paleozoic outcrop

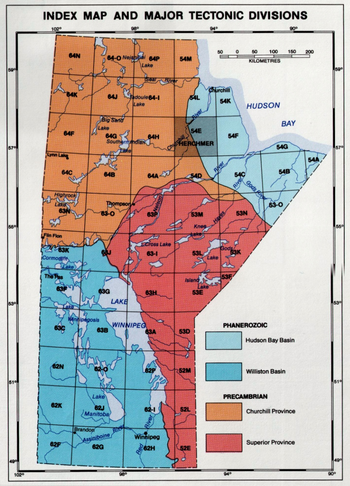
[1]*Paleozoic contacts are almost entirely covered by Pleistocene and Recent sediments; however, contact estimates can be made on the basis of relatively uniform regional dip and average overburden thickness. The units are shown in full color because of their projected widespread extent. Actual geological boundaries beneath overburden will be irregular.*

BEDROCK GEOLOGY COMPILATION MAP SERIES

HERCHMER

NTS 54E

INDEX MAP AND MAJOR TECTONIC DIVISIONS



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