GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS

PRELIMINARY SERIES

SHEET 63 K/16 (PART OF)

100°10′ 54°52′ 100°05′ 54°52′

54°49′ 100°10′ 54°49′ 100°05′

LEGEND

PRECAMBRIAN

9-12	9. Meta-peridotite 10. Meta-gabbro (more than 80% green amphibole) 11. Meta-gabbro; green amphibole-plagioclase rock 12. Meta-diorite
8	'Quartz-eye' granite-gneiss
7	Granitized rocks derived from Amisk group
6	AMISK GROUP (1-6) 'Older shallow intrusions': intermediate to basic; may include some flows
5	Pyroclastic rocks: includes agglomerates, tuffs, and finer ash beds
4	Exceedingly garnetiferous amphibolite and related rocks, derived from Amisk volcanic rocks
3	Staurolite-garnet schist
2	Massive amphibolite flow rocks
1	Basalt, pillowed or amygdaloidal

Drift-covered area
Outcrop area
Geological boundary (defined, assumed)
Bedding (horizontal, inclined, vertical, dip unknown)
Schistosity (inclined, vertical, dip unknown)
Gneissosity (inclined, vertical, dip unknown)
Lineation
Fault (defined, assumed)
Fault zone
Glacial striae (direction of ice movement known)
Ore zone
Introduced tremolite-carbonate material of ore zone
Mine, zinc . . . Zn
Shaft

Geology by H. Williams, 1958, 1959

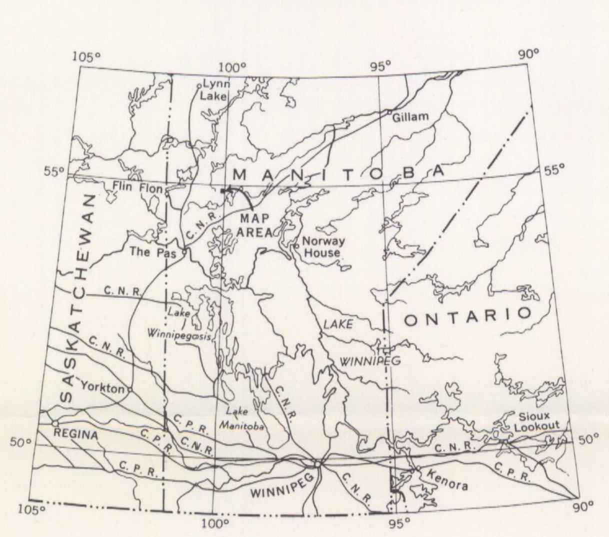
Gravel road
Railway
Power transmission line
Muskeg

Cartography by the Geological Survey of Canada, 1960

Approximate magnetic declination, 14° 02' East

Air photographs covering this area may be obtained through the National Air Photographic Library, Topographical Survey, Ottawa

In response to public demand for earlier publication, Preliminary Series maps are issued in this simplified form and will be clearer to read if all or some of the map-units are hand-coloured



INDEX MAP

DESCRIPTIVE NOTES

The map-area is accessible by road from Wekusko on the Canadian National railway to Churchill. Air transportation is available from Flin Flon to Snow Lake which is approximately 5 miles northeast of Chisel Lake. A road connects Chisel Lake with Snow Lake. The map-area displays the typical hummocky surface of low relief characteristic of this part of the Canadian Shield. The highest hills are less than 100 feet above the water level of nearby lakes. The lakes are generally shallow, rarely exceeding depths of 15 feet. Flat, swampy country occurs between areas of exposed bedrock.

Chisel Lake area is structurally situated on the western limb of the Threehouse syncline[1]. The outcrop pattern of the layered rocks generally conforms with this larger structure although many minor deviations are apparent.

All rocks within the area have been regionally metamorphosed. The Amisk group (1-6), consisting mainly of basic volcanic rocks, is similar to other assemblages of basic volcanics that occur throughout the general region. The true basalts (1) are now represented by black, fine- to medium-grained amphibolites. Quartz amygdules are common and in places pillow structure has been preserved. Massive amphibolites (2) derived from flow rocks are abundant to the east of Chisel Lake. These rocks are fine to medium grained and commonly garnetiferous. In places they contain green or yellowish green epidote clots or nodules giving the rocks a pyroclastic appearance. Garnetiferous staurolite schists (3) occur interbedded with the Amisk pyroclastic rocks (5). Their main occurrence is in a band running northwest of Tent Lake where they form a very distinctive rock type. Staurolite porphyroblasts exceeding 2 inches in length are abundant and garnets up to 1 inch in diameter are present. Other constituents are quartz, biotite, and feldspar.

Exceedingly garnetiferous amphibolite and related rocks (4) occur associated with the basalt (1) and pyroclastic rocks (5) of the Amisk group. These rocks are coarsely crystalline and the percentage of amphibole present is extremely variable. It is generally impossible to deduce their original nature. Fine-grained amphibolitized pyroclastic rocks (5) are for the most part well bedded, whereas bedding is rare in the coarser agglomeratic layers. The agglomerates contain fragments and amygdaloidal bombs up to 1 foot in diameter. Invariably, the fragments are poorly sorted, angular to elongate in shape, and more acidic than the matrix. Commonly, the fragments and the matrix are pseudo-porphyritic--a term applied to rocks exhibiting irregular, white-weathering, chalky feldspar porphyroblasts. This texture, best seen on a weathered surface, is common to many of the flows (1), pyroclastic rocks (5), and the older intrusive rocks (6). Rocks mapped as the 'older shallow intrusions' (6) are related to the volcanic rocks of the Amisk group. In places similar rocks display amygdules and other flow characteristics. However, these rocks are generally massive and have been seen to truncate structures in the pyroclastic rocks (5). It is suggested that they represent shallow intrusions, such as sills, plugs, and feeders associated with the volcanism.

Throughout the area, rocks most conveniently mapped as granitized derivatives (7) of the Amisk group are common. Where the 'quartz-eye' granite-gneiss (8) occurs in contact with these rocks, as in the northeast corner of the map-area, the distinction between the two is based on the absence or presence of blue or grey quartz eyes and not on compositional, textural, or field relationships. The solution of detailed structure is commonly handicapped by the presence of these quartz feldspar rocks (7) commingled with and gradational into the other types.

The 'quartz-eye' granite-gneiss (8), more commonly known as the 'quartz-eye' granite, displays a schistosity or lineation in most places. The rocks shows many compositional variations and gradational contacts. In places it is garnetiferous. Conformable patches of amphibolite occur throughout the granite-gneiss and are gradational into it.

The differentiated basic intrusion (9-12) to the west of Chisel Lake is a lopolithic structure. The individual rock types have been recrystallized due to metamorphism, but a sequence from meta-peridotite (9) to meta-diorite (12) is readily discernible. The meta-peridotite (9) is reddish brown on the weathered surface and intensely serpentinized. Amphibole porphyroblasts are now a major constituent of the rock. Above the meta-peridotite (9) and in sharp planar contact with it is a meta-gabbro (10) consisting of more than 80 per cent green amphibole. This rock is in turn followed by a meta-gabbro (11) containing less green amphibole, and finally by meta-diorite (12), with both contacts gradational. Within the meta-diorite (12), the most acidic member of the differentiated intrusion, quartz is identifiable. Localized in this member are quartz masses approximately 20 square feet in area. These are interpreted as a product of the differentiation of the intrusion.

Except in rocks that are massive and undoubtedly intrusions, three distinct metamorphic fabrics can be detected in most rocks of the area. These are: (a) gneissosity and/or schistosity parallel with the bedding or outcrop pattern of the layered rocks, (b) a regional schistosity bearing northeast, and (c) a regional lineation plunging northeast and generally located in the plane of the regional schistosity. This regional lineation includes the alignment of prismatic minerals, the elongation of fragments in the pyroclastic rocks, the elongation of amygdules or pillows in the flow rocks, and the axis of drag-folds in deformed rocks. In the coarsely crystalline staurolite-bearing schists (3) interbedded with the Amisk pyroclastics (5), all three fabrics may occur together.

Faults are not abundant in Chisel Lake area but minor shears are common. In the northwest corner, diorite (12) occurs in fault contact with highly garnetiferous amphibolite (4) and basalt (1). This fault, striking north and dipping steeply east, is immediately south of the Varnson Lake fault which extends $6\frac{1}{2}$ miles to the north.

Diamond-drilling, encouraged by an electromagnetic anomaly, has indicated a large base-metal orebody hidden beneath the southern end of Chisel Lake, and a smaller one 1,500 feet northeast of Lost Lake, A 50-mile railway is presently being constructed, connecting the Chisel Lake property, owned by the Hudson Bay Mining & Smelting Company, with Cranberry Portage on the Canadian National Railway's Lynn Lake line. Development on the Chisel Lake orebody is well advanced. Surface installations and an exploration and production shaft are near completion, and drifts are being advanced on all levels to a depth of 1,050 feet.

The orebody occurs along a structural discontinuity that strikes northwest and runs from Lost Lake to Chisel Lake, presumably extending beneath the latter. Immediately north of the discontinuity the pyroclastic rocks (5) and flow rocks (2) form the nose and east limb of a syncline whose axis lies to the west and plunges toward the north. South of the discontinuity, on the southern shore of Chisel Lake, is a thick sequence of pyroclastic rocks (5) with interlayered flows (2) and minor discontinuous staurolite-bearing layers (3). This sequence strikes northwest and dips fairly steeply to the northeast, conformable with the regional structure of the Threehouse syncline. These structural trends are truncated to the west by the differentiated intrusive lopolith.

The ore zone is sheet like in form, striking northwest and dipping approximately 45°NE. The southeast end of the orebody appears to rake to the northwest. A meta-diorite intrusion (12) cuts off the ore zone to the northwest before it reaches the meta-peridotite (9) on the west shore of Chisel Lake. The foot-wall rocks of the ore zone consist of siliceous schists (3) that are commonly staurolite bearing; the hanging-wall rocks are also garnet- or staurolite-bearing schists succeeded outward by massive amphibolite (2) presumably of flow origin. Chisel Lake has been drained sufficiently to expose the lake-bottom sediments above the ore zone, although up to 10 feet of water is still present in the northern part of the lake. The orebody is covered by approximately 100 feet of glacial drift consisting of coarse boulder till immediately above the orebody, grading upwards through sand, clay, and finally mud.

Within the main ore zone there is a close relationship between the ore minerals and a coarse massive green tremolite-carbonate rock. It is in this introduced material that the widest and highest grade-intersections of massive sulphide were obtained. Disseminated sulphides and stringers of more massive sulphides occur in the foot-wall rocks, in places extensive enough to bring the siliceous schists up to ore grade.

The main ore mineral is sphalerite, but pyrite, pyrrhotite, chalcopyrite, galena, and arsenopyrite are also present. Gold values encountered in the massive tremolite rocks of the ore zone are probably due to a gold telluride disseminated through them. The siliceous rocks of the hanging-wall are commonly sericitized. Carbonate is a common gangue mineral in the granular sulphide ore. Other minerals of lesser importance, but of academic interest, are tourmaline, gahnite, and apatite.

Around the eastern shore of Chisel Lake, surrounding the orebody, a limonitic(?) coating occurs on the rocks below the former water level and above the mud level of the bottom sediments. This coating is generally 1/8 inch thick, colloform, and varies from brownish to steel blue. The relationship of this coating to the orebody, if any, is not known.

[1]Harrison, J.M.: Geology and Mineral Deposits of File-Tramping Lakes Area, Manitoba; Geol. Surv., Canada, Mem. 250, 1949

PUBLISHED, 1960
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MAP 27-1960
GEOLOGY
CHISEL LAKE
WEST OF PRINCIPAL MERIDIAN
MANITOBA

Scale: One Inch to 1,000 Feet = $\frac{1}{12,000}$

Feet
1000 0 1000 2000 3000

Longitude and latitude are approximate
Geographical names subject to revision.

MAP 27-1960
CHISEL LAKE
MANITOBA
SHEET 63 K/16 (PART OF)