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DEPARTMENT OF ENERGY, MINES AND RESOURCES

PRELIMINARY SERIES

64 P

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LEGEND

PRECAMBRIAN

7 — GREAT ISLAND GROUP (7)
Quartzite, siltstone, shale, slate, greywacke; minor dolomite, limestone, iron-formation, arkose, diabase

6 — Massive to layered volcanic rocks: andesite, basalt, dacite, tuff; greenstone; minor shale, greywacke, gabbro, feldspar porphyry

5 — Grey to pink granite, in part gneissic; 5a, porphyritic granite

4 — Granite-gneiss; undivided granite and metasedimentary gneiss; minor plagioclase amphibolite, migmatite; in part older than 2

3 — Metasedimentary gneiss: biotite-quartz-feldspar gneiss, biotite-quartz gneiss quartzite, hornblende gneiss, garnet-biotite gneiss; includes much granitic material; minor conglomerate

2 — Quartzite, biotite-quartz schist, garnet-biotite schist, sandstone, phyllite; minor conglomerate; 2a, pink to red, massive to faintly bedded arkose; 2b, white, massive to faintly bedded quartzite, minor derived breccia

1 — Brown hypersthene-bearing granulite; minor pyroxene granulite, amphibolite; minor granite, granite-gneiss, breccia; 1a, porphyroblastic granulite; 1b, pyroxene granulite and pyroxene-bearing amphibolite

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A — Hornblende schist, amphibolite, metagabbro, magnetite gneiss; commonly layered; probably of several ages

Rock outcrop (observed on ground, from air) . . . . × ^

Geological boundary (approximate or inferred) . . . .

Bedding, flow surface, tops unknown (inclined, vertical, dip unknown) . . . .

Schistosity, gneissosity (horizontal, inclined, vertical, dip unknown) . . . .

Lineation (horizontal, inclined, inclined but plunge unknown, vertical) 0-90

Glacial striae (direction of ice movement known, unknown) . . . . . .

Esker . . . .

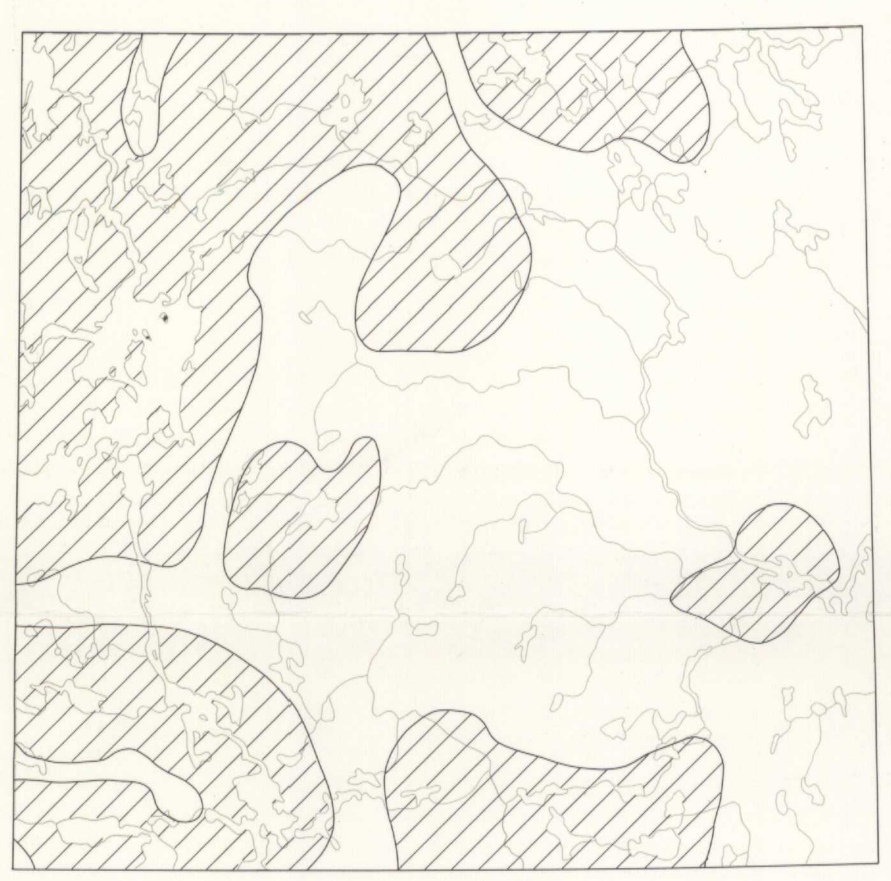
Geology by W. L. Davison, 1964, 1965

Geological cartography by the Geological Survey of Canada, 1967

Elevation in feet above mean sea-level

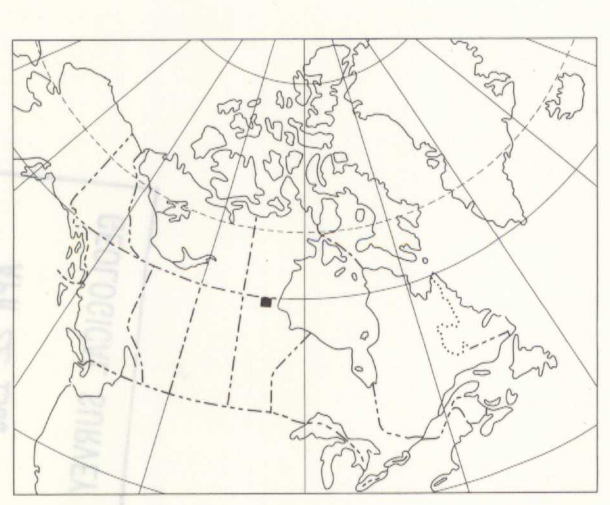
Base-map compiled and drawn by the Surveys and Mapping Branch, 1962

Magnetic declination 1967 varies from 07°43' easterly at centre of east edge to 09°41' easterly at centre of west edge. Mean annual change: 1.3' easterly



Areas covered by canoe and ground traverses . . .

Scale 1: 1,000,000



INDEX MAP

MAP 14-1967

GEOLOGY

NEJANILINI LAKE

MANITOBA

Scale 1:253,440
1 inch to 4 miles

Miles 4 0 4 8 12 Miles

Kilometres 6 0 6 12 18 Kilometres

DESCRIPTIVE NOTES

The area can be reached by aircraft from Lynn Lake, Thompson, Ilford, or Churchill. Relief is subdued for the most part, but the tops of some eskers are as much as 150 feet above adjacent terrain. Drift ridges are common and near the eastern boundary there are several strips of washboard moraine. A narrow strip along the eastern side of the map-area lies below the marine limit, and raised beaches reach elevations of about 600 feet. Peat is widely distributed and is especially well-developed south of Nejanilini Lake, where 25-foot sections may be seen. Outcrop is scarce and comprises less than five per cent of the land surface. Previous geological mapping was done by Russell[1] along the major rivers.

The area lies within the Churchill Structural Province. The basement complex, consisting of highly metamorphosed and deformed rocks (1), is probably Archaean. In this assemblage, well-banded metasedimentary granulite and more massive granitoid granulite are equally prominent, and both are accompanied by abundant pegmatoid granulite. The colour ranges from grey to dark brown and red-brown; an olive tinge is characteristic. The chief constituents are quartz, perthite, plagioclase, diopside, hypersthene, and amphibole; biotite, and less commonly garnet, may occur locally. Much of the metasedimentary granulite is quartz-rich, but the abundance of quartz is highly variable; minor interlayers of mafic rocks occur here and there. Both fresh and weathered surfaces of granitoid granulite are commonly darker than those of metasedimentary granulite, and the rock is comparatively homogeneous. However, close inspection of the most massive-looking varieties usually reveals one or more lineations and/or a faint foliation. Porphyritic granulite (1a) is distinguished by the presence of twinned orthoclase crystals, up to one inch or more in length, which for the most part are randomly oriented. As in the map-area to the east[2], this type of granulite is restricted to the vicinity of porphyritic granite (5a) that contains similar orthoclase.

Included with rocks of map-unit 1 are several minor bodies of red granite and granodiorite. Near these, dykes of medium-grained to pegmatitic granite cut granulite. A few elongate zones of red granite-gneiss are also present. Evidence of shearing in the granite-gneiss suggests that these zones were formed during late movements along lines of weakness in the basement, and that the red gneiss is actually reworked granulite. Red granite and granite-gneiss are also prominent in the vicinity of mafic rocks (1b), but concentrations of the latter are too few to establish this as a constant association. Where not bordered by granite, pyroxene granulite (1b) grades into, or is locally intercalated with, metasedimentary granulite. Mafic rocks near the northern boundary, consisting chiefly of norite-like pyroxene-granulite and pyroxene-bearing amphibolite, are intruded by successive dykes of pale brown granitoid granulite, red gneissic granite, and grey to pink pegmatite. Zones of abundant mafic inclusions occur elsewhere in the granulites.

Poorly exposed, slightly to moderately metamorphosed sedimentary rocks (2) are commonly dark, thinly bedded, folded, and cut by pegmatite dykes. The presence of quartzite cobbles in rare conglomerate suggests that sedimentary rocks of several ages are present. East of Big Spruce River, quartzite, with interbedded biotite-quartz schist, lies unconformably on granitic gneiss, and is itself cut by granite pegmatite. Well-indurated, in part pebbly, grey-pink to dull red arkose (2a) is typically exposed in cliffs that have formed along joint planes. Neither upper nor lower contacts are exposed. Prominent white-weathering quartzite (2b) is massive except for widely spaced, thin, micaceous beds and minor ripple-marked partings; below the weathered layer the rock is colourless to amber, and comprises nearly pure quartz, with scattered flakes of pale mica. At the western boundary, a deposit of crumbly breccia is made up of fragments of identical material.

Rocks of unit 2 are gradational into corresponding gneiss (3). The boundary is drawn where schist typical of unit 2 gives way to a granular equivalent, even though other metasediments may be relatively little changed at this stage. Much of unit 3, however, comprises grey, less commonly brownish or pink, medium- to coarse-grained biotite-quartz-feldspar gneiss, with intercalated biotite-quartz gneiss and sporadic hornblende gneiss. In the west, remnants of less metamorphosed arkose and sandstone grade within short distances into coarsely crystalline granitic-looking gneiss. With increase in granitic material, metasedimentary gneiss (3) grades into mixed gneiss and granite gneiss (4).

Granite gneiss (4) is a predominantly red or pink, medium- to coarse-grained granitoid rock, composed essentially of quartz and feldspar, but typically showing streaks, clots, and lenticles of biotite, amphibole, and/or chlorite. Veins and streaks of quartz, as well as masses of pegmatite, are common in this granite gneiss. Other rocks of unit 4 comprise a heterogeneous mixture of metasediments and granite, which are inseparable in mapping on the present scale. Some parts of this unit may represent reworked basement rocks (1).

Granite (5), probably of several ages, intrudes rocks of units 1-4. It is medium- to coarse-grained, more commonly gneissic than massive, and larger bodies commonly grade through broad gneissic zones into rocks of units 1, 3, and 4. Microcline and orthoclase are the most abundant feldspars, and biotite is present nearly everywhere. Grey to pink porphyritic granite (5a) contains phenocrysts of twinned potash feldspar, which may make up one-half to two-thirds of the rock. In the northeast part of the map-area, large blocks of amphibolite, and patches of partly granitized metasedimentary gneiss and granulite, are present in porphyritic granite.

Fine-grained, grey to greenish black volcanic and associated rocks (6) are massive or faintly layered for the most part. Exposures are generally poor, although several relatively extensive outcrops occur near the eastern limit of this assemblage. Contacts with other rocks are nowhere exposed. In the absence of evidence to the contrary, granite (5) is considered to be older. Very fine-grained black basalt, in part with indistinct pillows and flow-structures, locally contains patches of gabbro. Elsewhere, massive basalt may in part be intrusive although direct evidence of intrusion was not observed. Andesite, with phenocrysts of plagioclase and hornblende, and dacite (?), with amygdules of quartz, can be distinguished but, for the most part, the rocks are too fine-grained for individual minerals to be determined, and alteration is widespread. Minor quartz and quartz-carbonate veinlets are commonly present.

Sedimentary rocks of the Great Island Group (7) are mainly dark grey to black, fine-grained, and faintly bedded to massive. Quartzite, with scattered shale members, is most abundant in peripheral parts of the group; although mainly dark grey to black and fine grained, it is locally pale grey, pink, purplish, or dull red, and some beds are pebbly. Towards the central part, greywacke, shale, slate, and siltstone become more prominent. Finely bedded siltstone contains concentrations of magnetite in a narrow zone. Dolomite, which Taylor[3] traced to the boundary of this map-area, does not outcrop in marshes along the projected strike, but a few carbonate beds are exposed several miles to the northwest. A single outcrop of fine-grained diabase near the central part of the group may be a late dyke.

Mafic rocks (A) are poorly exposed in discontinuous narrow belts. In several places, sill-like bodies of gabbro and diorite are interlayered with hornblende schist and gneissic amphibolite, which may represent earlier basic intrusions. West of Nejanilini Lake, mafic gneiss contains much magnetite adjacent to meta-gabbro, although the latter contains little magnetite. Several minor occurrences of gabbro and meta-gabbro are present in the south near Big Spruce River, but are too small to show on the map.

Minor structures in granulite (1) are complex; large structures are obscured by drift, but northwest and northeast trends seem to be most prominent. In younger rocks (2-4) easterly to northeasterly folds prevail. Major folds in the southern and central parts of the Great Island Group trend northerly[3], but folds in the northern part appear to conform approximately to the contact with volcanic rocks (6). Shear zones are present here and there, but cannot be traced across drift-covered areas.

Great Island sediments and nearby rocks have received much attention from prospectors, but to date, no deposits of economic importance have been reported. A high magnetic anomaly[4], near the eastern limit of the Great Island Group, was shown to be caused by iron-formation when drilled by Jellicoe Mines Limited. Zinc and silver mineralization has been reported from the same general area[5].

[1]Russell, G. A.: A geological reconnaissance of the Wolverine and Caribou Rivers, northern Manitoba; Manitoba Mines Br., Publ. 52-2 (1953).

[2]Davison, W. L.: Caribou River map-area, Manitoba; Geol. Surv. Can., Paper 65-25 (1966).

[3]Taylor, F. C.: Shethanei Lake, Manitoba; Geol. Surv. Can., Paper 58-7 (1958).

[4]Geological Survey of Canada: Magnetic anomaly north of Seal River, Manitoba; Map 550G (1957).

[5]Davies, J. F., Bannatyne, B. B., Barry, G. S., and McCabe, H. R.: Geology and mineral resources of Manitoba; Manitoba Mines Br. (1962).

MAP 14-1967
NEJANILINI LAKE
MANITOBA
64 P