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Geology of the Nemiscau lake area, Mistassini Territory

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ET MINÉRALE

NEMISCAU LAKE AREA

J. Wallach

1973

DP-146
GM-28585

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OPEN-FILE REPORT

Gouvernement du Québec

DEPARTMENT OF NATURAL RESOURCES

Mines Branch

Geological Exploration Service

Geology of the

NEMISCAU LAKE AREA

Mistassini Territory

Preliminary Report

by

Joseph Wallach

Québec
1973

INTRODUCTION

The 500 square mile area forms an irregularly shaped, rectangular block bounded by latitudes $51^{o}15'$ and $51^{o}34'$ and longitudes $76^{o}15'$ and $77^{o}00'$. It is covered by aeromagnetic maps 5641 G, 5656 G and 5657 G and topographic map 32 N (1:250,000). The map area is about 115 miles north-northeast of Matagami and a road, presently under construction, from Matagami to the Rupert River will cross the western part.

Topographically the map-area consists of very gently rolling terrain. Generally the relief is less than 200 feet though the difference in elevation between the lowest and highest points is nearly 450 feet.

GENERAL GEOLOGY

All rocks of the area lie in the Superior Geological Province of the Canadian Shield and are Archean (early Precambrian) in age. The lithology is dominated by acidic to intermediate intrusive rocks, the most prominent of which are pink and white granites. In addition to the granites, trondhjemite and quartz monzonite bodies were also found. Trondhjemite, along with associated minor amounts of diorite and quartz diorite, occurs throughout most of the area whereas quartz monzonite is restricted to the southeastern corner.

Metasedimentary and metavolcanic rocks, both of which show primary features, are also part of the geological picture. The metasedimentary rocks are not confined to any part of the area, however, the volcanic suite is largely restricted to two northeast trending belts in the northern part of the area.

Metamorphism ranges from the greenschist facies in the northeastern part of the area (e.g. tremolite and actinolite are stable phases in ultramafic assemblages) to the granulite facies in the southwest corner (e.g. hypersthene is stable in trondhjemite, white granite and paragneiss). Coexisting with the mineralogical indicators are textural features, such as Carlsbad twinning in plagioclase, which preclude the possibility of regional retrograde metamorphism of a formerly uniformly high grade metamorphic terrain.

Diabase

A series of 4 undeformed diabase dikes occurs in the central part of the map-area. They trend north-northwest and cut across the structures established by the earlier Kenoran orogeny. This completely unaltered rock is fine to coarse grained and consists of nearly equal amounts of clinopyroxene and plagioclase.

Granites

Pink granite occurs in the north and central portions of the map area. It is a medium to coarse grained rock with some pegmatitic phases. For the most part it is weakly foliated to massive, except near the margins where it is much more severely deformed. Dikes of this rock cut most rock types in this area, and it is considered to represent the last major intrusive phase of the Kenoran orogeny. It consists of nearly 30% each of quartz, plagioclase and microcline with biotite and chlorite dominating the remaining 10%.

The white granite is a medium to coarse grained rock commonly, though not uniquely, associated with the paragneiss. It contains nearly the same percentages of quartz, plagioclase and microcline as the pink granite and where associated with garnetiferous paragneiss it, too, is generally garnet-bearing. In the eastern part of the area it contains tourmaline. In the western part of the area it appears to have been anatectically derived from the paragneiss. However, in the south-central and eastern portions, where the mineral assemblages in surrounding rocks indicate greenschist facies metamorphism, it appears less likely that it is of anatectic origin unless, of course, one appeals to deep seated anatexis.

Quartz Syenite

This body, found in the western part of the area, contains two feldspar phases, hornblende and 5-10% quartz. Hornblende defines a lineation which is probably related to the F_2 phase of deformation.

Diorite, quartz diorite and trondhjemite

All three rock types are medium to coarse grained and foliated with the two leucocratic phases commonly containing amphibolite or metabasalt inclusions. The diorite consists principally of plagioclase and 15-30% hornblende plus biotite, whereas the quartz diorite to trondhjemite contain 10-25% quartz, about 70% plagioclase, 5-10% hornblende plus biotite and generally little or no potash feldspar. In the interior of the map area the trondhjemite contains plagioclase phenocrysts.

Table of Formations

PRECAMBRIAN	Post orogenic intrusion	diabase dikes
	Syn-orogenic intrusion	pink granite
	Early orogenic intrusions	quartz syenite monzonite and quartz monzonite quartz diorite and trondhjemite white granite and pegmatite migmatite: paragneiss and pink granite migmatite: paragneiss and white granite
	Metasedimentary, metavolcanic and associated ultrabasic rocks	biotite and biotite-garnet paragneiss interlayered paragneiss and volcanics intermediate volcanics ultrabasic rocks; actinolite-tremolite schist, serpentinite and metapyroxenite metabasalt and amphibolite

Monzonite and quartz monzonite

These are medium to coarse grained, foliated, porphyritic rocks with euhedral microcline phenocrysts.

Migmatites

Paragneiss and nearly equal amounts of white granite and pegmatite have been mapped as migmatite (map unit 6). At this early stage in the study it is suggested that the white granitic material was derived by partial fusion of the paragneiss. Near the north-central part of the area, pink granite and paragneiss are nearly equally abundant and thus have also been mapped as migmatite (map unit 7). Unlike the granitic portion of map unit 6, the granite in map unit 7 is not considered to be an anatectic derivative of the paragneiss.

Paragneisses

There are two distinct paragneisses. The first, which is found throughout the map area, is a fine-grained, gray rock in which the composition is dominated by plagioclase (about 60%) with 15-20% each of biotite and quartz and up to 5% cordierite. Locally it is garnet-bearing. This paragneiss is part of a continuous band mapped by Remick (1963) and Gillain (1965) to the west and Valiquette (1963) to the east. The second type is also a fine-grained, gray rock, distinguished from the first by the presence of magnetite layers which are up to 1 inch thick. The magnetite-bearing paragneiss was observed both in the northeastern and central parts of the area.

Ultrabasic suite

Most of the ultrabasic rocks are greenish gray to gray serpentinites which are intimately associated with coarse-grained metapyroxenite and gabbro.

These rocks are sandwiched between metabasalt and magnetite-bearing paragneisses and are locally cut by magnetite veins.

Volcanic rocks

These are fine to medium grained, black to dark gray rocks consisting principally of hornblende and plagioclase. They occur predominantly in northeast-trending belts in the northern part of the area and are locally intercalated with paragneiss layers which are too thin to be represented at the map scale. Tremolitic and actinolitic schists, as well as serpentinites and metapyroxenites, are locally associated with the volcanics, principally in the eastern part of the area, and are believed to be part of the volcanic sequence. The dark, fine-grained, hornblende-plagioclase rocks have been classed as metabasalts, whereas the coarser grained, mineralogically equivalent rocks have been mapped as amphibolites, though they too are presumably recrystallized basalts. These are believed to be the oldest exposed rocks in the area.

GEOLOGICAL HISTORY

Briefly, the generalized sequence of events is interpreted as follows, with the earliest listed first:

1) Vulcanism and minor sedimentation

   Sedimentation with minor vulcanism

   Plutonism resulting in intrusive masses of diorite, quartz diorite, monzonite and quartz monzonite

First phase of deformation (F_1) (?)

Anatexis of supracrustal rocks

Second phase of deformation (F_2)

Granitic plutonism probably commencing near the later stages of F_2

Third phase of deformation (F_3).

ECONOMIC GEOLOGY

Small hand specimens of metabasalt containing about 5% disseminated pyrite were found at an abandoned Hydro-Québec camp at the west end of Némiscau Lake, however the outcrops were not seen. Paragneiss containing approximately 10% pyrite with minor pyrrhotite occurs about 2 miles inland from the south shore of Némiscau Lake, directly across from the abandoned Némiscau Hudson Bay Company post, and is apparently responsible for the high magnetic values seen in the southwestern corner of the Némiscau aeromagnetic sheet (5641 G).

A magnetic anomaly 5 miles long and $\frac{1}{2}$ mile wide, produced by both magnetite-bearing paragneiss and ultrabasic rocks, crosses Caumont Lake. In the paragneiss, magnetite occurs in layers nearly 1 inch thick, whereas in the ultrabasic rocks it appears as both disseminated crystals and in very thin veinlets.

Along the Rupert River in the eastern part of the area a series of magnetic highs has been interpreted as representing magnetite-bearing paragneiss

despite the absence of outcrops. This inference is based on the presence of one outcrop of magnetite-bearing paragneiss occurring within the area delimited by the aeromagnetic highs.

Between 1962 and 1965, in the eastern part of the area, Canadian Nickel Company Limited drilled 19 holes ranging in depth from 66 to 483 feet. The highest assays obtained were 0.24% copper, 0.16% nickel, 0.07% zinc and minor amounts of gold and palladium.

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