

# RP 280(A)

PRELIMINARY REPORT ON NIPISSO LAKE AREA, SAGUENAY COUNTY

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PRELIMINARY REPORT  
ON  
NIPISSO LAKE AREA  
SAGUENAY COUNTY

BY

HOWARD R. HOGAN



QUEBEC  
1952

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## PRELIMINARY REPORT

ON

NIPISSO LAKE AREA

SAGUENAY COUNTY

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The Nipisso Lake area, which was mapped during the summer of 1952, is bounded by latitudes  $50^{\circ}45'$  and  $51^{\circ}00'$  and longitudes  $65^{\circ}45'$  and  $66^{\circ}00'$  and comprises about 200 square miles. The southwest corner of the area lies approximately forty miles northeast of Seven Islands, a village on the north shore of the St. Lawrence river.

The Quebec North Shore and Labrador railway, which will join the iron deposits of Burnt Creek with the deep-water port of Seven Islands, follows the Nipissis and Wacouno valleys in the western part of the map-area. During 1952 the railroad was still under construction and could not be used as a means of transportation to the area. A temporary landing strip, used by the Hollinger-Ungava Transport Company, engaged in flying supplies to the various construction companies, has been built at Mile 55, a point fifty-five miles north of Seven Islands along the railroad route. Roads, following the "right-of-way", extend from the airstrip to the north and south boundaries of the area. It is expected that the airstrip and the roads will not be kept in repair following construction of the railroad, but at present they are an excellent means of access to the area.

Nipisso lake may be reached by hydroplane from Seven Islands. Two good portage routes, one at the north end of the lake and the other at the south end, connect the lake respectively to Wacouno and Nipissis rivers.

There is a direct canoe route along Moisie and Nipissis rivers, leading from Moisie village, situated 13 miles east of Seven Islands, to the map-area. With the exception of two portages, one six miles long and the other half a mile long, the rivers are easily navigated by motor-driven canoes in spite of a strong current. That part of Wacouno river which lies within the map-area is too shallow and too swift to permit safe travelling by canoe.

### TOPOGRAPHY

The most striking feature of the topography of the region is the deep dissection of an upland by the parallel valleys of Nipissis and Wacouno rivers and of Nipisso lake. Where Nipissis river cuts through the augen gneiss in the southern part of the area, near-vertical cliffs of 1500 to 1800 feet are present; north of the augen gneiss the valley walls are less steep. Above its junction with Wacouno river, the Nipissis flows through a crooked gorge in which there is a nearly-uninterrupted series of rapids and falls.

Approximate elevations of 250 feet and 560 feet were recorded for the river level at the south and north boundaries respectively of the area. The elevation of the upland ranges between 1600 and 2400 feet. Nipisso lake is approximately 1200 feet above sea level.

The local relief of the upland depends mainly on the uniformity and structure of the underlying rocks. A relatively low, rolling relief of 300 to 400 feet characterizes the southern portion of the area underlain by augen gneiss. In this part, small lakes are abundant, and the location of many of them is apparently controlled by the overall joint pattern of the rock formations. In the rest of the region, where the nature and structure of the bed-rock vary considerably, local relief ranges between 600 and 800 feet. The rock structures and glacial deposits are the main factors controlling the topography. In the southeast corner of the area a strongly developed rectilinear valley system coincides with the orientations of joints found in the underlying meta-diabase.

Ground moraines and sandy outwash plains are more abundant in the northern part of the area than in the southern; extensive deposits are restricted to low-lying valleys. Poorly-sorted sand and gravel banks along Waccouno river give way downstream to the well-sorted and stratified terrace deposits of the Nipissis valley. East of the junction of Nipissis and Waccouno rivers there is a small cluster of drumlinoid ridges whose long axes trend S.10°E. This direction coincides with that of the movement of the ice sheet as determined by crescentic gouges and glacial striae.

The map-area lies in the drainage basin of the Moisie river which flows into the gulf of St. Lawrence.

#### GENERAL GEOLOGY

The rocks of the area are of Precambrian age. Listed in order of abundance they consist of granitic intrusives, paragneisses with amphibolite, gabbroic intrusives, migmatites, and various minor dykes. The granitic bodies form separate units, whereas the other rock types are intimately associated with each other in a zone that occupies the greater part of the northern two-thirds of the area.

Age relationships have been determined as much as possible from contact features and, where these were not available, from the comparative degree of deformation and/or recrystallization of the various lithologic units.

TABLE OF FORMATIONS

Cenozoic	Recent and Pleistocene	Sand, gravel, and boulder clay
Precambrian	Post-Grenville (?) intrusives	Lamprophyre dykes (not shown on map) Pegmatite dykes (not shown on map) Pink biotite granite Pink hornblende granite Gneissic granite (locally garnetiferous) Ultrabasic rocks Gabbroic rocks (locally amphibolitic) Augen gneiss
		Migmatites
	Grenville (?) metasedimentary rocks and associated igneous rocks	Metadiabase  Biotite gneiss, hornblende gneiss, amphibolites (para-and ortho-), biotite-plagioclase schist, sillimanite gneiss, graphite gneiss, biotite schist, hornblende schist, muscovite gneiss, diopside gneiss, quartzite, cummingtonite gneiss.

GRENVILLE (?) METASEDIMENTARY ROCKS  
AND  
ASSOCIATED IGNEOUS ROCKS

Sedimentary gneisses, schists, and amphibolites, which might be of Grenville age, underlie a considerable part of the northern two-thirds of the map-area. Interlayered with the metasedimentary rocks is a group of ortho-amphibolites derived from the metamorphism of basic sills, some of which also may be of Grenville age. In order of abundance, these sedimentary and, possibly, igneous rocks (hereafter referred to as Grenville) consist of biotite gneiss, hornblende gneiss, amphibolite, biotite-plagioclase schist, sillimanite gneiss, graphite gneiss, biotite schist, hornblende schist, muscovite gneiss, diopside gneiss, quartzite, and cummingtonite gneiss. Garnet has been observed in all types with the exception of the biotite and hornblende schists.

A strongly layered structure characterizes the paragneisses of the area. The layers range from one-sixteenth of an inch to several inches in thickness and in the majority of cases may be traced without change in thickness or composition for distances measuring tens of feet.

Individual outcrops are composed usually of two or more rock units and it is impossible to divide the Grenville, on the accompanying map, into separate zones. Biotite gneisses predominate in the southern part of the Grenville belt, whereas hornblende rocks are more prevalent in the northern part. Sillimanite and graphite gneisses outcrop along a narrow zone immediately north of the augen gneiss that occupies most of the southern two-thirds of the area and this narrow zone can be traced continuously across the map-area. Paragneisses with abundant red garnets (almandine?) are well exposed along the shore of Nipisso lake, northwest of Yodel island.

At least one-half of the sedimentary rocks in the area are biotite gneiss. This rock is fine- to medium-grained and has a well-developed layering. The layers are one thirty-second of an inch to one inch thick and the colour of the individual layers varies from light to dark grey, depending on the biotite content. The essential minerals are biotite (10 to 30 per cent), plagioclase, and quartz, the latter two minerals being present usually in about equal amounts. Additional minerals include pink garnet, hornblende, graphite, and muscovite.

The presence of hornblende in amounts equal to or greater than biotite is the basis of separating the hornblende gneiss from the biotite gneiss. The hornblende gneiss is well banded, fine- to medium-grained and has a light to dark greenish-grey colour. Essential minerals in addition to hornblende and biotite include quartz and plagioclase with garnet rarely present.

Para-amphibolites (of sedimentary origin) and ortho-amphibolites (of igneous origin) are abundant in the Grenville belt, especially in the north-eastern part. Both rocks have identical mineral assemblages, with the average composition being hornblende 60 per cent and plagioclase 40 per cent. Biotite and garnet are frequently present.

Some of the ortho-amphibolites have been definitely traced into gabbros that are believed to be younger than the augen gneiss. Whether all

the ortho-amphibolites are of the same age is unknown and it is possible that some may be of Grenville age.

Biotite-plagioclase schist is found as narrow bands in the biotite and hornblende gneisses. The percentage of the two minerals is variable and either biotite or plagioclase may make up 70 per cent of the schist. Garnet, up to one-quarter of an inch, is a common constituent and hornblende is rarely present. The rock is usually dark coloured with a strong schistose or, occasionally, gneissic structure.

Sillimanite-bearing rocks are found immediately north of the augen gneiss. These are grey, fine-grained, well-layered paragneisses composed mainly of quartz, plagioclase, and biotite. Garnet is an abundant accessory, especially along the western side of Nipisso lake. Associated with the sillimanite gneiss are rusty-weathering graphite gneisses. These rocks are fine- to medium-grained, schistose, and light grey on fresh surfaces. The main minerals are quartz, plagioclase, and biotite. Oxidation of finely disseminated pyrite gives the characteristic rusty-weathering to the graphite gneisses.

The biotite schist, hornblende schist, muscovite gneiss, diopside gneiss, quartzite and cummingtonite gneiss all together make up less than five per cent of the Grenville rocks outcropping in the area. They occur as narrow bands or lenses within the previously described rocks.

A large mass of metadiabase, part of which outcrops in the south-east corner of the area, may be of Grenville age. It appears to be older than the augen gneiss as it is intruded by sill-like bodies that have mineralogical and textural characteristics similar to those of the main augen gneiss body. The rock is fine- to very fine-grained and has a dark grey colour. Generally it is granular and sheared, but locally it may be ophitic and massive. Plagioclase and hornblende, or pyroxene, are the main mineral components.

Two of the main characteristics of the metadiabase are its strong jointing, easily seen on aerial photographs, and the numerous dark veinlets, one-sixteenth of an inch thick, that criss-cross every outcrop.

Migmatites are widely distributed throughout the Grenville rocks of the area. They are especially abundant around granitic bodies, but they are found also far from any exposed granite masses. The migmatites consist of two parts: introduced granitic material, and host rock which is generally paragneiss. In well layered rocks such as the biotite gneiss the granitic material is present usually as narrow bands parallel to the gneissic banding of the enclosed rock. Where the host rock is not layered, the introduced material occurs as narrow dykes, sills, or veinlets and rarely as disseminated porphyroblasts of feldspar. Pink potassic feldspar and quartz are the only definitely introduced minerals. Biotite and hornblende are present in some veins, but it is unknown whether they are relict or new minerals.

#### POST-GRENVILLE (?) INTRUSIVES

##### Augen Gneiss

A large mass of augen gneiss with an outcrop width of approximately eight miles extends across most of the southern part of the area. The

margins of the mass, as well as the internal gneissic structure, are parallel to the gneissosity or schistosity of the intruded rocks. The augen gneiss is remarkably uniform in mineral composition and texture. Potassic feldspar augen, up to one inch in diameter, are enveloped in a medium-grained groundmass of quartz, feldspar, and biotite. Garnet and hornblende are present in the gneiss along the northern and southern margins respectively. The augen show a parallelism of their long axes giving a strong gneissic structure to the rock.

#### Gabbroic Rocks

Gabbroic sills, ranging from a few feet to half a mile wide, are abundant in the Grenville belt of paragneisses. Only the larger bodies have been outlined on the accompanying map. On the basis of mineral composition the gabbroic rocks may be divided into three groups: gabbro, norite, and anorthositic gabbro.

Of the three, gabbro is the most abundant and also the most varied. The massive variety has a granitic, ophitic, or rarely porphyritic texture and is composed of feldspar and pyroxene. The grain size is predominantly coarse and the colour is greenish-grey. Sheared gabbros are common and many thick sills with massive cores can be traced, across the strike, through sheared gabbro into gneissic ortho-amphibolite. Hornblende replaces pyroxene in the sheared varieties and occasionally biotite and garnet are present.

Several gabbroic sills, and one dyke, containing pyroxene with a bronzy lustre have been tentatively classified as norites. The norite is coarse-grained, dark brown, and has a granitic or occasionally an ophitic texture. Massive varieties predominate. Plagioclase occurs as dark grey lath-like grains and in one sill, in the northeast corner of the area, it has a light bluish-green colour. Several bodies contain a yellowish-green mineral, which may be olivine.

Anorthositic gabbro was observed at the south end of Nipisso lake and on the long point that projects from the east side of the lake, north-east of Yodel island. The rock consists of white plagioclase with about 25 per cent dark green hornblende. Accessory minerals are garnet and ilmenite. The hornblende occurs in streaks and lenses that are strongly lineated.

The degree of deformation and recrystallization of the various sills suggests that there may be at least two ages of gabbro. Exposed contacts of the two gabbros, one with the other or with other rocks, are very scarce and consequently conclusive proof of two or more ages is lacking.

#### Ultrabasic Rocks

Medium-grained, dark green hornblendite forms a needle-like peak about one mile north of the Nipissis-Wacouno junction. Two miles west of the same junction, bronzitite is found as a layer, 10 feet thick, in gabbro. The rock is coarse-grained, dark brownish-green, and slightly sheared.

### Gneissic granite

Pink gneissic granite is found as layers in the paragneisses and as dykes cutting the augen gneiss. It is believed to be of the same age as the pink hornblende and biotite granites. Good exposures with ortho-amphibolite inclusions may be seen on the two small islands north of Yodel Island. The rock is fine- to medium-grained and is composed of potassic feldspar, quartz, and hornblende or biotite. The quartz grains occur as flattened lenticles parallel to the well-developed gneissic structure. Locally red garnet crystals may be present.

The dykes which cut the augen gneiss are similar to the gneissic granite layers, except that they lack the strongly stretched quartz lenticles, and that garnet is never found in them.

### Hornblende Granite

Two bodies of pink hornblende granite occur in the area. The larger extends from the north shore of Nipisso lake for an unknown distance beyond the north boundary of the area. The other is along the east boundary, east of Yodel island, and also extends beyond the map-area.

The granite is medium- to coarse-grained, usually strongly lineated, and has a gneissic structure. The mineral composition is potassic feldspar, quartz, plagioclase, hornblende and biotite.

The hornblende and biotite granites are believed to be genetically related, but the gneissic hornblende granite is considered to be slightly older than the biotite granite.

### Biotite Granite

Two bodies of pink biotite granite outcrop in the area. The larger is in the northwest corner and extends beyond the limits of the map-area. The other, about one square mile, cuts the augen gneiss, near the eastern margin of the area, southeast of Yodel island.

The rock is medium- to coarse-grained. It has a massive structure, but locally it may be slightly gneissic. Essential minerals are potassic feldspar, plagioclase, quartz, and biotite.

### Pegmatite Dykes

Pegmatite dykes have been found cutting all the previously described rocks. They are composed of pink potassic feldspar, plagioclase, quartz, biotite, and hornblende. The last two minerals rarely occur together in the same dyke. Nodules of magnetite grains, up to one inch in diameter, are occasionally present.

Gabbroic pegmatites, containing plagioclase and hornblende, were found in several places in the northeast part of the area. Coarse sulphide minerals are associated with one dyke, as is described in more detail in the Economic Geology section.

### Lamprophyre Dykes

Fine-grained, dark grey dykes, tentatively classified as lamprophyres, outcrop in the area. Hornblende, biotite, and plagioclase may be recognized in most hand-specimens; quartz may be present also. Several dykes with a massive structure cut pegmatites and for this reason they are believed to be the youngest rock type in the area. Both strongly sheared and massive varieties were seen and there may be more than one age of lamprophyre dykes.

### STRUCTURAL GEOLOGY

The variety of rock units in the Grenville series appears to be due to difference of chemical composition in the original sedimentary beds. As the schistosity and gneissic structure of the rocks parallel the general trends of the various rock units, these structures may be used to interpret the general structure of the area.

From the west boundary of the area to Nipisso lake, the general strike is east and the dip is usually less than 45 degrees south. East of the lake the strike is northeast and the dip is southeast. The smooth pattern of the rock units is disrupted by numerous small open folds whose axial lines trend S.15° E. Drag folding usually occurs along the crest of these folds.

The majority of the lineations trend between S.25° E. and south, with the greatest number around S.5° E. The plunge of the lineation is also variable with the average about 35 degrees. The similarity between the trend of the axial line of folds and the trend of lineation suggests that the two structures are genetically related.

### ECONOMIC GEOLOGY

#### Sulphides

Finely-disseminated pyrite, pyrrhotite, and some chalcopyrite were found in nearly every outcrop of the graphite gneiss that lies along the north border of the augen gneiss. An assay of a specimen from the rusty-weathering cliff a quarter of a mile east of the airstrip showed 0.02 per cent nickel and 0.08 per cent copper.

Approximately one mile southeast of Albany lake and half a mile east of the boundary of the area, a coarse-grained gabbroic pegmatite dyke contains pyrrhotite, pyrite, and chalcopyrite. The dyke, four feet wide and exposed over 25 feet, outcrops in the bed of a stream that drains into Albany lake. Two assays of the mineralized rock showed 1.29 per cent and 0.17 per cent copper and traces of nickel and silver.

#### Ilmenite

The anorthositic gabbro outcropping on the long point on the east side of Nipisso lake contains small amounts of ilmenite. A dip-needle survey of the point and adjacent mainland failed to show any indications of ilmenite concentrations.

