RP 272(A)

PRELIMINARY REPORT ON NIPISSIS RIVER AREA, SAGUENAY COUNTY

Documents complémentaires

Additional Files

Licence

License

Énergie et Ressources naturelles
Québec

PROVINCE OF QUEBEC, CANADA

DEPARTMENT OF MINES

GEOLOGICAL SURVEYS BRANCH

PRELIMINARY REPORT

ON

NIPISSIS RIVER AREA

SAGUENAY COUNTY

BY

PAUL E. GRENIER

QUEBEC
1952

P. R. No. 272

M-2998

PRELIMINARY REPORT

ON

NIPISSIS RIVER AREA*

SAGUENAY COUNTY

by

Paul E. Grenier

INTRODUCTION

The Nipissis River area was studied during the course of the summer of 1951. It is located between longitudes 50°30'N. and 50°45'N. and latitudes 65°52'W. and 66°07'W. Its southwest extremity is twenty-four miles to the northeast of Seven Islands, a village on the north shore of the St. Lawrence.

Means of Access

The railroad that is being constructed from Seven Islands to reach the iron deposits of Ungava traverses the area from south to north. In 1951, however, the air-route was still the easiest way to reach the area on leaving from the vicinity of Seven Islands where there is an airport and a seaplane base. In the eastern half of the area, numerous lakes are available for water-landings. Irene lake also allows water-landings in the northwest part of the area. As it is practically impossible to land on that part of Nipissis river lying in the area, seaplanes could not be used along the river. However, the Hollinger-Ungava Transport Company, Ltd., which transports material and employees of the Hollinger North Shore Exploration Company and its associated companies, uses temporary landing strips at Mile 28 and Mile 36, two points situated 28 and 36 miles, respectively, from Seven Islands, along the route of the railroad planned between Seven Islands and Knob lake.

The area may also be reached by canoe from Moisie, a little village situated at the mouth of the river of the same name, thirteen miles due east of Seven Islands. These two villages are joined by a dirt road and by a telephone line. From Moisie village, the traveller ascends the river as far as the falls where the Adams Fishing Club is located, about fifteen miles upstream. Above this point there is a series of falls and rapids which necessitates a portage of about six miles. North of the portage the river is easily travelled in spite of a strong current, provided that the water is not too low. For a distance of twelve and three-quarter miles the river is travelled in this manner before reaching the junction of Nipissis river. The junction of the two rivers is half a mile south of the southern limit of the map-area.

During the summer of 1951 it was possible to avoid the six-mile portage along the Moisie by proceeding in the following manner. From Seven Islands to a point situated on the west bank of Moisie river, some two miles north of the Adams Club, a road, twelve miles long, can be used for transportation of equipment by truck. This point is the site of the bridge on which the railroad must cross Moisie river. From there the equipment may be transported on another road by tractor as far as the mouth of Daigle river which is almost opposite the northern end of the Adams portage but on the west side of Moisie river. From Daigle river the area is easily reached by canoe. These roads have been opened for the transportation of material necessary for the construction of the railroad and it is not known if they will be maintained when the railroad is completed.

---

* Translated from French.

Description of the Area

The region east of Nipissis and Nipisso rivers is characterized by a very rugged relief. The surface is cut by numerous valleys that are aligned in three principal directions, N.E., N., or N.W. In certain localities the valleys are very rectilinear and on aerial photographs the region has a checker pattern. The directions of the valleys coincide partly with the directions of a system of diagonal joints and partly with the orientations of the formations.

The region west of Nipissis and Nipisso rivers is characterized by a moderate relief. This surface rises to an elevation varying between 1,500 and 2,000 feet above the level of Nipissis river. The lakes are distributed haphazardly and their form seems to be due more to the influence of joints than to the influence of foliation which is found everywhere in the granite gneiss in this region.

The whole area drains into the Gulf of St. Lawrence through the drainage basin of Moisie river, which cuts the southwest corner of the area, and that of Tchinicaman river, which is in the southeast corner of the region.

Nipissis river, a tributary of Moisie river, traverses the length of the area from north to south. The river flows on a bed of gravel and is bordered by banks composed of sand, clay, and gravel, and in certain places of rock outcrops. If the river is left behind in order to climb the valley walls, a succession of terraces composed of unconsolidated material is crossed. These give way abruptly to rock walls whose inclination does not decrease until near the summit. The elevation between the river surface and the summits which border it varies between 1,000 and 1,700 feet, if it is measured from the place where the gentle slope gives way to a steep slope, but if the climb is continued from there to the top an elevation of around 2,100 feet may be reached. Nipissis river has not finished cleaning out the unconsolidated Pleistocene deposits in its valley.

Nipisso river, a tributary of the Nipissis, drains the northeast part of the area. It flows generally on bare rock along a course nearly uninterrupted by rapids, falls, and cascades.

The waters of the southeast corner of the area drain into Tchinicaman and Tchinicamas lakes which form the source of Tchinicaman river. This river flows east from Tchinicamas lake as far as the eastern boundary of the area, whence it turns toward the south.

GENERAL GEOLOGY

General Statement

All the consolidated rocks of the area are of Precambrian age. They consist of metasedimentary rocks, injection gneiss, and hybrid and intrusive rocks.

Among the metasedimentary rocks the most abundant types are a biotite paragneiss, and impure quartzite, a biotite schist, and a grey biotite gneiss. These rocks are the oldest in the area and are found interstratified with amphibolite and associated rocks and with a hornblende schist, all of which are also considered to be metamorphosed sediments, although their sedimentary origin is not definitely established. These rocks of doubtful sedimentary origin are present in greater quantities than the other type of metamorphosed sediments.

With the metasedimentary rocks are found injection gneisses resulting from the lit-par-lit injection of granite material into rocks known to be of sedimentary origin and into other rocks of which a sedimentary origin is not definite. In most cases the percentage of granitic material contained in these rocks is not very high and the rock has the aspect of an augen gneiss of mixed origin. Also found are hybrid rocks resulting from the contamination of basic intrusives by an intrusive granite. The injection gneiss exposures are generally located in the contact zones between granite and metasedimentary rocks, but isolated outcrops are found far from the contacts. This last observation indicates that the granitic rocks probably occur as projections in the metasedimentary basement of the area. This is confirmed by the presence of granitic masses that pierce the cover of metasedimentary rocks in the vicinity of Cacaoni lake and also at a place two miles northwest of Tchinicamas lake. The hybrid rocks are found in the neighbourhood of the contacts between the basic and the granitic rocks.

Acidic and basic intrusives are found in the region. The former are represented by a pink granite, a biotite gneiss, and an augen gneiss, the latter by a diorite and a gabbro.

Not one observation was found that definitely indicated whether the granitic rocks are derived from the same magma or from different magmas. Megascopically the rocks differ in their structure and texture but these differences are not sufficient to state whether the rocks come from different magmas.

The coarse-grained pink granite cuts biotite gneiss four and three-quarter miles south of Irene lake. The granitic rocks cut metamorphosed sedimentary rocks and the pink granite cuts the gabbro. No contacts were observed between the diorite and the granitic massifs. However, diorite is cut by pegmatite dykes which are presumed to be related to the granitic intrusions.

Both the diorite and the gabbro are injected across the metasedimentary rocks, but no contact was observed between the two intrusives.

Numerous pegmatite and aplite dykes cut all the rocks mentioned above.

Narrow basic dykes of unknown length, whose width varies between two and fifteen inches, are found in all the principal rocks of the region except the pink granite. They cut all the rocks where they are found including the pegmatites. However, at one place, pegmatite cuts a basic dyke. Two altered lamprophyre dykes were seen; one cuts biotite gneiss and the other cuts granite.

Table of Formations

Cenozoic (Pleistocene and recent)		Clay, sand, gravel, erratic boulders
Great unconformity		
Precambrian	Intrusive rocks	Basic dykes (not indicated on the map) Lamprophyre, pegmatite, and aplite dykes (not indicated on the map) Pink granite Biotite gneiss, augen gneiss, diorite, and gabbro
	Injection gneiss and hybrid rocks	Granitic rocks injected lit-par-lit in various rocks of sedimentary origin Contamination of basic intrusives by one or several granitic intrusions
	Metasedimentary rocks (?)	Amphibolite and associated rocks, hornblende schist, amphibole rocks
	Metasedimentary rocks	Biotite paragneiss, impure quartzite, biotite schist, grey biotite gneiss

Precambrian

Metasedimentary Rocks

Metasedimentary rocks form the basement rock of a part of the region situated to the east of Nipissis and Nipisso rivers. This region covers an expanse slightly less than one-half of the area. Several exposures of these rocks are also found in a band composed mostly of injection gneisses and situated immediately to the west of Nipisso river.

A biotite paragneiss, an impure quartzite, a biotite, schist and a grey biotite gneiss are among the metasedimentary rocks.

The biotite paragneiss is a rock in which the colour varies from dark grey, almost black, to pale grey. In several places the surfaces, subjected to the action of atmospheric agents, take on a rusty tint, whereas in other places they are often dark brown. The rock is fine grained. The schistose or gneissic structure passes through all gradational phases. At certain places the rock is very schistose, whereas at others a poorly-developed gneissic structure may be distinguished with difficulty on the fresh surface although easily enough on the weathered surface. The surface part of the schistose member of the biotite paragneiss breaks into flakes and crumbles easily from a hammer blow. Where the gneissic structure is well developed, pale grey bands alternate with dark bands. The thickness of the bands may vary from one thirty-second of an inch to two inches but the grain size is always fine. Locally the rock is massive and gneissosity is invisible to the naked eye. In this latter case the rock is generally dark grey.

The essential minerals of the biotite paragneiss are biotite, feldspar (in variable quantities), and quartz which is everywhere present in large amount. The schistose member nearly everywhere contains graphite whose proportion may reach 10 per cent In these cases the biotite paragneiss may be called a graphite schist. The schist also contains yellow minerals with a metallic lustre, probably pyrite and pyrrhotite. Graphite was obseved in certain gneissic members and also in members of massive structure. In several places, near granite, the gneissic members contain tiny garnets.

Impure quartzite is not found in abundance in the area. It occurs as narrow beds interstratified with the other metasedimentary rocks. It was not seen in contact with the amphibolite but exposures are found in the districts where the latter forms the greatest part of the bedrock. Generally it is pale grey, fine-grained, hard, and has a gritty feeling. It is characterized by a high percentage of quartz and a fairly high percentage of mica flakes. At a point approximately seven miles south of Irene lake and a mile west of Nipissis river, there is an exposure where pink granite is in contact with an impure quartzite that is dark grey, slightly glassy, and coarse-grained, and in which garnet porphyroblasts up to one inch in diameter are found. This quartzite is composed of feldspar, biotite, opaque minerals, and sillimanite.

The mica schist, found in limited amount, is a schistose, blackish rock that breaks into thin plates. It is fine grained and is composed mainly of quartz and biotite, the latter in a slightly lower proportion than quartz. The mica schist and the biotite paragneiss are probably two members of the same formation.

Under the term ' grey biotite gneiss' are grouped several rock types that probably do not have a common origin. All the varieties have a grey colour varying from dark to light. All are composed of a large percentage of quartz accompanied by variable proportions of biotite and feldspar. The megascopic differences among the varieties lie in their texture and structure. In effect, some of these rocks are fine-grained and show a very good gneissosity resulting from the alternation of leucocratic and melanocratic bands of about one thirty-second of an inch in thickness. Others are coarser-grained and the gneissosity is less noticeable. Lastly, certain medium-grained types possess only slight foliation. It is possible that the majority of these varieties of grey biotite gneiss may be metasedimentary rocks which have been injected by narrow layers of granitic material. The less gneissic varieties are perhaps facies of the granite contaminated by the metasedimentary rocks that they intrude.

Metasedimentary Rocks (?)

The origin of the amphibolite and associated rocks as well as that of the hornblende schist has not been definitely established. These rocks form the bedrock of the greatest part of the area lying east of Nipissis and Nipisso rivers. Their structure is conformable with that of the metasedimentary rocks described above and which are found in the same region.

The amphibolite is a black or dark grey rock. For the most part it is fine-grained but outcrops with a medium grain are also found. The structure is massive and at several places the weathered surface is traversed by black bands, up to one-eighth of an inch thick, that stand out in relief. These bands are in part nearly parallel to one another but some are cross-cutting.

Among the essential minerals that compose the amphibolite are plagioclase, hornblende, pyroxene, and a little biotite. The relative proportions of the different minerals are variable. There are types which contain pyroxene but no hornblende and vice-versa. The rocks associated with the amphibolite possess the same characteristics as the latter except that the massive structure gives way to a slight foliation. Furthermore, they do not seem to contain pyroxene. Some hornblende schist is found throughout the paragneiss area but it outcrops mainly in the vicinity of contacts between the granitic rocks and the metamorphosed sedimentary rocks. It is a dark rock, fine-grained, schistose, and composed of plagioclase, hornblende, and biotite. The amphibolite, the associated rocks, and the hornblende schist are metamorphic rocks that are probably derived from the same rock.

At two places in the region - one a mile and three-quarters west of Pollock lake, the other one-quarter of a mile east of the northern extremity of the principal diorite mass - there are rocks very rich in amphibole. The available information about this rock is not sufficient to allow us to say if it is an intrusive associated with the other basic intrusives of the region or if it is a part of the amphibolite that has been subjected to intense metasomatism. It is a dark green rock, heavy, massive, and very coarse-grained. It is composed of a high percentage of amphibole with some pyroxene, chlorite, and also a black mineral with a metallic lustre.

Injection Gneiss and Hybrid Rocks

Injection gneisses predominate in a contact zone between granite gneiss and metamorphosed sedimentary rocks. This zone straddles Nipisso river and extends from the northeast corner of the area to a point about a mile from the mouth of the river. At this point the band splits up; one branch continues toward the southwest for a distance of two and a half miles, whereas the other, only three-quarters of a mile long, curves slightly to south of west. Injection gneisses are also found in the vicinity of other contacts between granitic rocks and metasedimentary rocks, such as to the east of Nipissis river and in the vicinity of the granitic massifs of Cacaoni and Hogan lakes. Several isolated exposures of injection gneisses were found throughout the area of paragneiss rocks far from the granitic masses.

Hybrid rocks are found in the districts around Cacaoni and Pollock lakes, where basic intrusive rocks outcrop. The basic rocks are cut by granite at Cacaoni lake, whereas at Pollock lake pegmatite dykes are found in the diorite, and granite crops out less than half a mile west of the basic mass.

The appearance of the injection gneiss depends on the quantity of introduced granitic material and also on the nature of the metasedimentary rocks into which the material has been introduced. The predominant type is an augen gneiss of mixed origin in which narrow black bands composed largely of biotite alternate with

grey or pink bands of quartz and feldspar. Occasionally, garnets are found at the contact between the light and dark bands. The thickness is variable even in the same leucocratic band; this gives the band the appearance of a chain of lenses joined to each other by narrower portions. The rock as a whole resembles an augen gneiss in which the augens are composed of individual crystals of feldspar and occasionally of quartz or, again, an agglomeration of feldspar and quartz crystals. In certain places the long axis of the lenses may reach three-quarters of an inch. Locally, a fine-grained rock is found in which the dark and light bands are narrow and of uniform thickness, and if the percentage of granitic material increases then a true migmatite is formed.

The hornblende schist described above is, in places, injected along its schistosity planes by fine-grained granitic material rich in quartz. These regular granitic layers have a thickness of one thirty-second of an inch and give a gneissic aspect to the rock.

The hybrid rocks are the result mainly of the contamination of basic intrusives by one or more granitic intrusions. In certain places it is very difficult to say if the hybrid rock is a basic intrusive altered by the granite, or if it is the amphibolite altered by the granite. The hybrid rocks are dark, heavy, and granular. At certain places a relic ophitic texture is seen on the weathered surface. They are composed of feldspar, amphibole, and biotite.

Intrusive Rocks

Among the intrusive rocks of the area are a gabbro, a diorite, an augen gneiss, a biotite gneiss, and a granite. There are also many pegmatite and aplite dykes, as well as a considerably smaller number of lamprophyre and basic dykes.

Gabbro cuts the metasedimentary rocks in the vicinity of Cacaoni lake where it is itself cut by granite. It outcrops in a slightly irregular form on account of the granite intrusion and underlies an area of about four square miles. It is a heavy, dark-coloured rock in which a high percentage of milky feldspar, amphibole, pyroxene, and, in places, biotite can be distinguished. It has a granular texture and in certain cases an ophitic texture may be seen. The fine-grained gabbroic facies may be confused in the field with the amphibolite in which the grain size is greater than medium.

The diorite occupies an area of about six square miles in the vicinity of Pollock lake, It also cuts the metamorphosed sedimentary rocks in several places of which only a few have been indicated on the accompanying map.

The diorite does not everywhere have the same appearance. At certain places it is a dark grey, almost black, medium-grained, hard, granular rock in which may be distinguished with difficulty a large quantity of feldspar grains, pyroxene, and sometimes a very small amount of quartz. Elsewhere it has a rusty tint on the surface and easily disintegrates from the action of atmospheric agents. It is massive, medium- to coarse- grained, and possesses a granular texture. This type of diorite, which is the more common, has the same composition as the preceding type except that it has more biotite which occurs in large flakes; this is a characteristic feature of the rock.

The augen gneiss and the biotite gneiss occupy nearly all of that part of the area situated to the west of Nipissis and Nipisso rivers. The biotite gneiss is found, also, to the east of the junction of these two rivers, to the east of the junction of Nipissis and Moisie rivers, one mile south of Lorna lake, and in the

vicinity of Hogan lake. These two rock types have nearly the same composition. They differ mainly in their structure which appears to grade from one into the other. It may be that these two gneisses are derived from the same granite magma.

The augen gneiss is a pink, sometimes whitish, rock in which the grain size varies from medium to coarse. It is composed partly of discontinuous layers of biotite which wrap around augen which are as much as an inch long. The lenses are composed either of individual crystals of feldspar or of agglomerations of feldspar and quartz crystals. Certain lenses may be composed of individual crystals of quartz but they are less numerous than the lenses composed of single feldspar crystals. The various lenses are connected to each other by narrow segments with a granitic texture composed of quartz and feldspar.

The biotite gneiss is a pink rock whose grain size varies from fine to medium. It has a very strong gneissosity due to the narrow discontinuous bands of biotite with some amphibole being separated by thicker layers of feldspar and quartz. The biotite bands have, on the average, a thickness of 1/64 of an inch, whereas the feldspar and quartz bands may reach a quarter of an inch. At certain places feldspar crystals, up to three-quarters of an inch, are found scattered throughout the rock. These form eyes around which the biotite layers are moulded. This last observation suggests that the biotite gneiss may be a facies of the augen gneiss in which the augen structure is poorly developed or lacking.

West of Nipissis river there is a granite stock whose centre is five and one-quarter miles south of Irene lake. The granite stock cuts the biotite gneiss. East of Nipissis river there is another granite mass a part of whose western boundary is in contact with unconsolidated material. This mass cuts the paragneisses, and it is probably joined beneath the unconsolidated material to the stock on the west side of the river. These two areas, where the underlying rock is composed of granite, have a surface exposure of less than ten square miles. The granite outcrops also in the vicinity of Cacaoni lake where it cuts the metasedimentary rocks and the gabbro. Numerous granite dykes are found also in all the rocks described above.

West of Nipissis river, the granite is pale pink and very coarse grained. At certain places the texture is equigranular, whereas at others it is porphyritic, the phenocrysts being feldspar crystals. The granite near the east bank of Nipissis river is also coarse grained but at places where it has thrust tongue-like masses into the paragneisses it is generally medium grained.

In the Cacaoni lake district the granite of the large bodies has an equigranular texture and a coarse grain but the average diameter of the grains is less than in the Nipissis River stock. In the narrow dykes and small masses the granite is medium grained. Again, there are places where the granite is porphyritic.

The granite seems to have the same mineralogical composition at the several places and the essential minerals are: a potassic feldspar, some quartz, and some biotite. Feldspar is the most abundant mineral, then quartz and biotite; the percentages of the last two minerals vary. Four and a half miles southeast of Irene lake, in the contact zone between pink granite and biotite gneiss, the granite is cut by numerous quartz veins, and thin hematite zones, up to an inch thick, are found disseminated in the granite.

Numerous dykes of pegmatite and aplite cut all the rocks described above. The pink pegmatite is composed of a high percentage of feldspar, a little lower proportion of quartz, and some biotite and magnetite. The feldspar and quartz form graphic intergrowths at certain places and the feldspar crystals may reach a diameter

of two inches. The aplite is a very fine-grained pink rock which, in certain cases, has narrow dark bands. With the aid of a binocular it is seen that it is composed of a high percentage of quartz and feldspar, with a little biotite and magnetite.

Two lamprophyre dykes were seen. One cuts the biotite gneiss on the south shore of Irene lake, the other cuts the granite at a point seven miles to the south of the same lake. It is a medium-grained, dark grey, blackish rock, composed of feldspar and a high percentage of biotite with some amphibole.

Numerous little basic dykes were seen in all the principal rocks of the area except in the main masses of granite rocks. However, on the south shore of the west bay of Tchinicaman lake, there is an outcrop, 100 square feet in area, composed of medium-grained pink granite which has a very weak foliation. The granite is cut by a four-inch basic dyke that branches out into several small irregular dykes.

The rock that forms the basic dykes is black and very heavy, and fractures into sharp-edged blocks from a blow of the hammer. It is composed of an aphanitic groundmass in which some tiny phenocrysts of dark plagioclase may be distinguished in some cases.

CENOZOIC

Pleistocene glaciers covered the region. Their passage is proven by the presence of large erratic blocks, some of which reach a diameter of 25 feet, which are perched on the mountain summits. Among other proofs of their passage are magnificent furrows cut into the rock walls of certain valleys that have a general north-south trend. There are also some polished surfaces and friction marks, and some poorly-preserved glacial striae. The chatter-marks and striae indicate a movement in a north-south direction.

As mentioned previously, there are in the Nipissis river-valley, and also to the west of this valley in the southwest part of the area, great thicknesses of unconsolidated material of which certain individual sections occasionally reach 75 feet. This material does not have a uniform composition. At certain places very well-stratified, pale grey clay is found; the thickness of the beds ranges between a fraction of an inch and four inches. Sometimes the colour of the clay is not uniform and there is an alternation of pale grey and dark grey bands. At some places the unconsolidated material is composed of stratified sand in which cross-bedding may be seen. Some sections show an alternation of sandy beds and fine gravel beds of variable thickness. Finally, at one place there is a section where the gently-inclined sand beds are truncated and covered by a sort of 'till', five feet thick, composed of sand and cobbles with an average diameter of three inches and occasionally up to six inches. The bed of Nipissis river is composed of pebbles and cobbles whose diameter rarely exceeds ten inches. Also, here and there, erratic blocks up to five feet in diameter are found. Some of the unconsolidated material of the Nipissis river-valley seems to be the result of deposition in quiet and relatively-deep water, whereas others have the characteristics of deposits transported and deposited by a river. Finally, some have the appearance of glacial deposits.

STRUCTURE

It is impossible to have a clear and definite idea of the structure of the metasedimentary rocks based on the present available information.

Not one primary structure was observed that would allow the determination of the position of the tops of the beds. The schistosity and the gneissosity developed in several of the rocks seem parallel to the stratification planes preserved in the impure quartzite. These secondary structures may then be used to interpret the major structure. In general, the trend of the formation is nearly north-south except along Nipisso river and in the vicinity of intrusions. The trend of the beds is northeast along Nipisso river, whereas in the vicinity of intrusive masses it has a tendency to follow the contacts.

If a section is drawn in an east-west direction it is noted that the majority of the beds dip east but it is also noticed that at certain places there is an alternation of dips toward the east and toward the west with a predominance of dips toward the east. The average angle of the latter is less steep than that of the westward dips. In the neighborhood of intrusive masses the beds dip either toward the interior of the masses or in a direction away from the intrusive masses.

The biotite gneiss and the augen gneiss have a very well-developed foliation. In the batholith situated to the west of Nipissis and Nipisso rivers, the strike of the foliation is generally northeast and the dip, toward the southeast, except in the vicinity of Irene lake and also near the contact with the granite stock. In the vicinity of Irene lake the strike of the foliation is very close to north and the dip is generally toward the west, but there are some eastward dips in the region south of the lake. In the vicinity of the contact between the granite and the biotite gneiss the foliation of the gneiss follows the contact and dips toward the interior of the stock along the north contact, whereas it dips in a direction away from the stock along the southeast contact. In the other small intrusions of biotite gneiss the foliation follows the contact and dips towards the exterior of the masses.

The other intrusive masses of the area generally have a massive structure but a slight foliation may be seen at several places in the pink granite as well as a slight schistosity at some places in the gabbro.

Numerous joints are found in all the rocks of the area. They seem to have had a great influence in fashioning the topographic surface.

There is a shear zone striking nearly north-south at the top of the rapids at the discharge of Tchinicaman lake. This zone is visible on the south shore of the discharge and on the point west of it. A rusty-weathering graphite schist that contains very fine-grained sulphides is found there. On an island in the northeast bay of Tchinicaman lake there is a very pronounced cataclastic structure in the amphibolite. The strike of this structure is slightly west of south and this outcrop is nearly on the extension of the shear zone mentioned above. Probably the same shear zone passes through these two points.

ECONOMIC GEOLOGY

Nickel

Two miles northeast of the junction of Nipissis and Nipisso rivers there is a rusty cliff facing southeast. The rock forming this cliff is black, very fine grained, and generally schistose. At one place the rock is massive, fine-grained, and impregnated with sulphides. An analysis of this rock made by the Quebec Department of Mines revealed a 0.02% nickel content.

About ten miles north of the area, along the east side of Nipissis river, there is also a rusty cliff. A six-inch vein of massive pyrrhotite with a little chalcopyrite was found in a block, four feet in diameter, that had fallen from the cliff. The analysis of this rock showed a 0.02% nickel content.

South of the area the presence of pyrrhotite, chalcopyrite, and pentlandite, a mineral containing nickel, has been reported by Greig (1). It seems therefore, that nickel has been found distributed throughout a large area, and it is possible that there are places where it may be economically concentrated.

Chalcopyrite, Pyrite and Pyrrhotite

These various sulphides have been found at the places described above where the analysis of the rock revealed the presence of nickel. These analysis also indicated that at the first place the rock contained 0.02% copper whereas at the second it contained 0.08% copper.

Sulphides are also found in the graphite schist of the Lake Tchinicaman shear zone and also at several other places.

Graphite

At certain places the graphite schist contains 10% by volume of graphite. However, no estimate was made of the possible graphite tonnage at the various places.

Gypsum

At several places the surface of the graphite schist is covered by a thin coating of gypsum powder whose colour varies from a lovely sulphur yellow to a yellowish white. Ten miles north of the map-area, where one of the specimens that contained nickel was found, there is an overhanging cliff the lower face of which is covered by an irregular coating of gypsum about two inches thick. The origin of this gypsum is due to the action of weathering on the sulphides. Sulphuric acid, which is one of the products of this reaction, attacks the calcium-bearing silicates forming gypsum, which is precipitated.

The gypsum of the region has no economis value on account of the small amount present but it is mentioned here because of its yellow colour which has fooled more than one prospector who believed that it was an alteration product of radioactive minerals.

Radioactive Minerals

The writer did not have a Geiger counter during the work in the area but all the specimens collected during the season were tested in the laboratory with one of these instruments and not one revealed any radioactivity.

However, some sixteen miles south of the area, along the route of the railroad, at least two pegmatite dykes containing radioactive minerals have been found by prospectors. The pegmatite is a grey rock whose average grain size is about a quarter of an inch although some grains may reach half an inch in diameter. It is composed of plagioclase, quartz, and biotite. A black, radioactive mineral is found in microscopic grains scattered throughout the rock, and a second, yellow, radioactive mineral is found along the structures. This mineral is probably an alteration product of the first.

---

(1) Greig, E.W., Matamec Lake Map-area, Saguenay County; Quebec Dept. Mines, G.R. 22, 1945.

Greig (1) also mentioned the presence of a radioactive mineral in some of the pegmatites that he studied.

It is seen that certain pegmatites of the regions adjacent to the area described in this report contain radioactive minerals and it is not impossible that they will be found in more than minor amount in this area. Without wishing to discourage prospecting for radioactive minerals in the present area, it is well to note, however, that up to the present very few pegmatites containing radioactive minerals have been found to be economic deposits.

(1) Greig, E.W., Op. cit.