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LA TUQUE (EAST HALF): WAYAGAMACK LAKE AREA (COMTE DE LAVIOLETTE)

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LA TUQUE AREA (east half)

by

MARCEL TIPHANE

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LA TUQUE (EAST HALF)
LAVIOLETTE COUNTY
by MARCEL TIPHANE

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WAYAGAMACK LAKE AREA

LAVIOLETTE COUNTY

QUEBEC

INTRODUCTION

The Wayagamack Lake area, mapped during the summer of 1953, is bounded by latitudes $47^{\circ}15'N.$ and $47^{\circ}30'N.$, the St-Maurice river to the west, and longitude $72^{\circ}30'W$ as the eastern boundary. It comprises an area of approximately 240 square miles, and includes Mailhot Township, parts of Bourgeoys, Charest, Pothier and Carignan townships.

The town of LaTuque (fig. 1), with about 10,000 inhabitants, is near the northwest corner of the map-area, on the east shore of the St-Maurice river. This town is built near falls which are used to supply hydro-electric power; the head at the power-house is 114 feet and furnishes power to LaTuque, the Brown Corporation and the Shawinigan System. The main industry (in 1953) is a pulp and paper mill employing actually about 900 men. The Canadian International Paper is hiring several hundred men for the cutting within their timber limits.

LaTuque can be reached by the C.N.R. trains; it is on the Transcontinental line, a distance of 131 miles from Quebec, and 176 miles from Montreal. It can also be reached by the newly paved highway No. 19, (not quite finished in 1953) through Shawinigan Falls and Grand-Mère; it is about 85 miles



Fig. 1 - Ville de LaTuque. Vue prise de l'est, regardant vers l'ouest.
City of LaTuque. Picture taken from the east, looking west.

from Shawinigan Falls.

An airplane base is on a sand-beach, about two miles south of LaTuque, on the east shore of the St-Maurice; and a sea-plane base is also within the area, about ten miles south of LaTuque, at Lac à Beauce; the latter is used only by smaller types of planes. The closest base for planes of the Norseman type is at Lac à la Tortue, near Grand-Mère.

Within the area, highway 19 follows the western boundary all along. A gravel road, on both sides of the Bostonnais river, helps in reaching the northwest part of the area. All other roads are private roads which can be used with permission. The old railway line from LaTuque to Linton Junction is now gravelled and maintained by the Canadian International Paper which is cutting the timber of their concession in the area. One branch of this road reaches lake Lockhart to the northeast, another one follows the east of lake Wayagamack and reaches lake Thomas to the south. All these roads can be travelled by car with careful driving.

Geologically, the Wayagamack Lake area is well within the Grenville province. All the bedrock exposed is of Precambrian age.

PREVIOUS WORK

The earliest geological work in the area was done in 1891 by A.P. Low (1) who has traversed our area through

(1) Low, A.P., Summary Report for the year 1891, pp. 46-47, G.S.C. Vol. V, part 1, 1890-91.

the two Wayagamack lakes westward to the St-Maurice river and then southward along that river. On the westward traverse, Low does not mention anything of geological interest. He says: "These two lakes are fine bodies of water, the smaller having a shoreline of nine miles, the larger of twenty-six miles; both lakes are surrounded by fine wooded hills, and their clear water is full of large trout". From LaTuque, he descended the St-Maurice river to Grandes Piles and says: "Numerous bands of white crystalline limestone were noted at different points along the river occurring in a basic ferruginous gneiss". As none of these bands was found in our area, the author gathers that they were observed closer to Grandes Piles.

Following Low's, the next geological work in the area was done in 1907 by O. O'Sullivan (2) who was instructed

(2) O'Sullivan, O., Summary Report for the year 1907, pp. 67-68, G.S.C. Ottawa, 1908.

by the Geological Survey of Canada to explore the area along the National Transcontinental Railway from LaTuque westward. O'Sullivan mentions that the area from LaTuque northward is "very rough and hilly with sand plains and swamps between

the hills". "The rocks throughout the whole country explored are gneisses, granites and schists". "The gneisses strike east and west". These strike must have been measured to the north-west of our area, since here they are closer to north-south.

Bancroft in 1916 (3) did a reconnaissance survey

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- (3) Bancroft, J.A., Geology and Mineral Resources along the National Transcontinental Railway in the Province of Quebec.
Report on Mining Operations for 1916,
Dept. of Colonization, Quebec, pp.128-168.
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along the National Transcontinental Railway from Hervey Junction to Doucet. He noted that "the scenery is more varied than that of any other portion of the Laurentian plateau along the railway" ...it "passes through the broken topography of its eastern border where the lower courses of the rivers and streams have sunk themselves deeply into its surface". Along that course, the St-Maurice river valley is the deepest met by the railway. He also mentions that sandy drift of glacial origin is thick in the deeply incised portions of the valleys; there are excellent examples of kames and drumlins. Some slopes of hills are irregularly cloaked with boulder clay, but the soils are mainly stratified sand and unstratified sandy till. The waters of lakes are generally clear on account of this sand. He mentions also the terraces along the St-Maurice river and tributaries which were found to be at an altitude up to 700 feet above the present sea level, but does not conclude at anything about the Champlain sea level.

In general, he says that the bed-rock consists mostly of gneissoid plutonic igneous rocks and an immense number of narrow bands of metamorphic sedimentary rocks of the "Grenville Series". These rocks are intersected by small bodies and dykes of granite and pegmatites. He also mentions widely separated dykes, dark, massive and finer grained, cutting all other rock-types.

Glacial geology was studied in 1928-29 by I. B. Crosby (4). Some of his results will be discussed under the paragraph on Pleistocene Geology.

(4) Crosby, I.B., Drainage changes and their causes in the St-Maurice Valley. Journal of Geology, Vol. 40, pp. 140-153, 1932.

Fieldwork

The mapping was done during the field season of 1953 as part of the program conducted by the Geological Surveys Branch of the Quebec Department of Mines, Quebec.

The base map is an enlargement to two inches to one mile of a part of the Sheet 31 P7 E (LaTuque) of the Topographical Survey of Canada. Certain features were modified from aerial photographs supplied by the Royal Canadian Air Force. These photographs were found to be of little use in wooded areas.

The fieldwork consisted of systematic pace and compass traverses spaced half a mile apart.

ACKNOWLEDGEMENTS

The author is here grateful to Dr. F.F. Osborne for the several suggestions offered during the fieldwork.

I am also very grateful to the people of LaTuque who facilitated access to parts of the area and gratefully allowed the author to use their fish and game cabins when needed.

The Richelieu Club of LaTuque has been particularly helpful by allowing the author to meet several people at the beginning of the season.

PHYSIOGRAPHY

The Wayagamack Lake map-area belongs to the Laurentian Uplands. It is a hilly area with a maximum relief of about nine hundred feet between the St-Maurice river and the forestry towers. Locally, this relief averages between four and five hundred feet. The center of the area, north of lake Wayagamack, is mostly flat; it is a sand plain with few peaks of rocks piercing through. The rugged area is formed of hills with steep south-facing scarps generally and a gentle north-facing slope. Exceptions are found like along the St-Maurice river where we find west-facing river-cut scarps.

The St-Maurice River valley is broad at LaTuque, but gets narrower south of Lac à Beauce forks. The river, north of LaTuque, is at 500 feet elevation above sea-level;

below the dam, it is 385 feet above the same level. The valley, in the area, is an old preglacial valley which has been intrenching itself through the gneisses. During the glacial period, the valley has been partly filled with sand on which the town of LaTuque rests. Immediately after, the river began to meander over the sand plain and, with down-cutting, left a few terraces (mentioned later). The falls, at LaTuque, are apparently due to a rock ridge (4) buried on the west side of the valley which produced a retardation in erosion above

(4) op. cit.

the falls while, below them, the sand is easily removed. The thickness of the sand is still great, since an electrical test, made below LaTuque, showed bedrock to be close to sea level.

That part of the old St-Maurice valley, between Fitzpatrick and Lac à Beauce forks, is fairly straight and, since a fault striking parallel to that part of the valley has been located in the cut at the power-house of LaTuque, the author thinks that the fault might have been the structural control leading the river to flow in that direction.

Lakes and creeks are numerous in the area. The largest of these, Wayagamack Lake, is 687 feet above sea-level. To the south-west, lake Clair (Carignan) is 964 feet above the same level, and lake Bourgeois (des Iles) is certainly several feet over the thousand above sea-level. Several of

these lakes are surrounded by hills two to three hundred feet higher than their level which would make a total denivellation between the St-Maurice River valley and the top of the average hills of about 900 feet.

In the eastern section, these lakes and creeks show a trend which reflects the trend of the jointing of the rocks, v.g. the chain of lakes along the Epervier river; westward, those showing an elongation reflect the trend of the banding of the gneisses, v.g. Lac à Beauce, lake Clair. Some of the smaller lakes are dammed lakes: these dams are either beaver dams or have been built by the paper companies who are working in the area.

Drainage

Most of the area is drained by the St-Maurice river either directly or through lake Wayagamack or the Bostonnais river. The southeast section drains southward through lake Mekinac.

This drainage is typical of most of the Laurentian Uplands; it consists of small lakes draining into one another by short streams full of rapids.

Terraces

Terraces made of sand, gravel and clay are visible along the St-Maurice river and the Bostonnais river. The lowest can be seen below the dam. The golf course seems to be on that terrace which is about forty feet above the river, i.e. 425 feet above sea-level. The next higher terrace, on

which the town of LaTuque is built and also the airport, is approximately at 575 feet above sea-level; this terrace is traceable all the way from the northern boundary to at least Lac à Beauce forks. A third one still higher can be seen at the east end of the town; it is about 610 feet above sea-level. Finally, a coarse gravel deposit can be seen east of the last; it is in a meander-like cut and could be classified as a terrace. This one is at 670 feet above sea-level. It is the highest terrace observed in the area. The elevation of 670 feet, here mentioned, agrees fairly well with the general idea of a maximum level of submergence of about 650 feet.

RESOURCES

The main industry of the area is the cutting of pulpwood. The Canadian International Paper is actually working the area. Several stands of "hardwood" are also being cut for building purposes.

Fish and game is also important. Several clubs have the rights on determined areas. Lakes seem to contain much trout. Moose and deer are also plentiful. Few bears, and also yellow foxes were seen. Partridges are abundant.

GENERAL GEOLOGY

The area is underlain by rocks of Precambrian age. These rocks are covered by various thicknesses of sand and gravel with few patches of argillaceous material.

The Precambrian rocks belong to the Grenville series and associated intrusive rocks. They include hornblende and/or biotite oligoclase gneisses, pyroxene or biotite hornblende andesine granite. A pink microcline oligoclase granite is found injected through the first type. Granite pegmatite dykes and sills are numerous through the gneisses. There is also a coarse hornblende granite on the east shore of lake Wayagamack.

The hornblende and/or biotite oligoclase gneisses cover the western part of the map, and may be observed at several places along highway 19. The pyroxene andesine granite is a rock usually coarse grained, grey colored, massive in the center of the mass and gneissic for some distance close to contacts. This type covers a good deal of the northern section of the map and also the southeast portion. It may easily be observed along the private road to Lac à La Ligne or better on the portage to lake Bourgeoys.

An intrusive, which seems smaller in size, is a coarse pinkish hornblende granite containing more or less chlorite; epidote is abundant along joints in this rock. It may well be observed along the shore of lake Wayagamack; similar exposures were observed east of the area, along the road leading to lumber camps northeast of Little Wayagamack lake.

No crystalline limestone of the Grenville series was observed in the area; it is quite possible that some low-ground area could be underlain by that type of rock, but no exposure as well as no floats have been observed. Bancroft (3)

(3) op. cit.

mentions the occurrence of a narrow band of crystalline limestone along the railroad about two miles south of our southern boundary; this band could not be traced within the limits of this map-area. Bancroft also mentions that limestone and amphibolites are usually associated. Several bands of amphibolitic gneiss were observed throughout the hornblende-biotite gneiss and the author has paid a particular attention to these bands in the look for limestone, but there again, this criterion has failed to localize limestone.

The rocks in the area are largely covered with Pleistocene and Recent unconsolidated deposits. The Pleistocene deposits are mostly sand and gravel; several patches of bouldery gravel were also found and also some clay in the St-Maurice river valley. This clay is in thin layers interbedded with sandy material which may indicate variations in the level of the sea or else several advances of the sea.

The boulders of the coarse gravel and bouldery gravel are granite, granite-gneiss and granite pegmatite. The succession of the rocks above outlined is presented in the table below:

Table of Formations

Pleistocene and Recent	Sand, Gravel, Bouldery gravel some clay
G r e a t U n c o n f o r m i t y	
Precambrian	Pegmatites Gabbro Coarse pink hornblende granite Microcline oligoclase pink granite Pyroxene or biotite hornblende andesine granite Hornblende and/or biotite oligoclase gneiss

Hornblende and/or biotite oligoclase gneisses

The hornblende and/or biotite oligoclase gneisses underly the west half of the area. They are dark, fine to coarse grained, rocks made up essentially of hornblende, orthoclase, a plagioclase, varying proportions of quartz and biotite. The ratio of the ferromagnesian to feldspars varies with localities, giving the gneiss a darker color with an increase in the ratio. A red garnet is also present in some places.

The plagioclase varies normally from An₂₅ to An₃₀; some of it is partly sericitized. Biotite varies from nil to about 15 per cent in the more basic bands; it is always brown in thin section and has a pleochroism varying from yellow to

dark brown; some sections show bending of the flakes. The hornblende is green, also with strong pleochroism varying from yellow to dark green; some crystals are partly altered to biotite; the content of hornblende varies from about 15 per cent to over 50 per cent in the darker bands. Quartz in the thin-sections studied is always in smaller amount than figured on the hand specimen where it seems to go up to 20 per cent in places; in thin-section, no more than 10 per cent has been found to be quartz.

Opaque minerals are always in minor amounts, no more than 5 per cent; grinding of samples, showed these minerals to be slightly titaniferous magnetite; this mineral is usually associated with hornblende.

Apatite is the common accessory mineral.

The gneissosity of the rock is well marked by the segregation of the dark minerals in bands separated by "whiter" bands, i.e. richer in feldspars. Gneissosity is also marked by the orientation of biotite and hornblende. Where the gneiss is interlayered with the pink granite, again gneissosity is easy to follow. Where the pink granite is in greater amount, we may observe pink feldspar through the gneiss to some distance indicating metasomatism.

In a few places, lenticles resembling augen were observed; these augen are composed of either feldspar or quartz and feldspar. What appears to be a migmatite has been observed at two places, one of which is along highway 19, north of the Lac à Beauce forks.

These gneisses are locally highly injected by a pink granite which is interbanded with them. Typical areas of highly injected gneisses are to the north-west of lake Clair and west of lake Wayagamack. In these areas, the granite occupies a greater volume than the gneisses, but the author believes that, for interpretation, the rock should be classified among these gneisses with indication of the amount of injection. This injection may hide some peculiarities which would make the interpretation easier; nevertheless, the layered structure, the presence of garnet and a few minor details induce the author towards a sedimentary origin.

Microcline oligoclase pink granite

The gneisses above described are usually injected by a pinkish granite; this injection is parallel to the banding and the amount of injection varies from 10 to 75 per cent with localities.

This granite is usually medium grained, but locally may be very coarse and become pegmatitic in grain size. It consists essentially of quartz, microcline, orthoclase and a plagioclase. Accessories are apatite, iron oxide and a chloritized amphibole. Carbonate is present in one section.

The amount of quartz varies from 5 to 40 per cent. Potash feldspars average between 30 and 50 per cent; in some sections, it is mostly microcline, in others mostly orthoclase. Orthoclase may be absent, but there is always some microcline. Orthoclase is usually altered and sometimes clouded. The plagioclase is an oligoclase varying from An₂₅ to An₃₀, about

the same calcicity as that of the accompanying gneisses; the amount in the rock varies from 20 to 40 percent.

The pegmatitic facies have been observed at several places, but the coarsest one has been seen on the east shore of a lake, two miles to the north-west of lake Clair (Carignan) in Carignan township; this pegmatite has an unusually high content in hornblende and some of the crystals are up to 4 and 5 inches in size.

As to the age relationship, it is evident that this granite is younger than the hornblende oligoclase gneisses, but its relation to any other rock mass discussed below is purely speculative, since no cutting relationship nor any contact of any kind have been observed.

Pyroxene or biotite hornblende andesine granite

The pyroxene or biotite hornblende andesine granite is a coarse grey rock made up essentially of hornblende, a plagioclase, orthoclase and quartz with either a pyroxene or biotite. Garnet is present near the zone of contact with the gneisses. The ratio of dark minerals to feldspars varies with localities, but between certain limits: it usually stays between 1/2 and 1/1.

The plagioclase ranges from An₃₀ to An₄₅; the pyroxene facies has a more calcic plagioclase than the biotitic facies. The plagioclase content of the rock varies usually between 1/3 and 1/2.

Orthoclase is present, but in smaller amounts, up to 20 per cent of the rock. Quartz averages 5 to 10 per cent,

but may be as high as 25 percent in some samples.

Hornblende is always present and the rock content varies from 10 to 25 per cent; it is green in thin-section, the pleochroism ranges from yellow to deep green, the 2V angle is large (greater than 80°).

Biotite and pyroxene usually vary from 5 to 15 per cent; in the sections studied, wherever there is pyroxene, biotite is absent and vice-versa. One exceptional section showed 40 per cent pyroxene, but this should not be considered as average. Biotite is brown with strong pleochroism ranging from yellow to deep brown and is always uniaxial. Pyroxene is very lightly tinted, non pleochroic, with a 2V angle of approximately 60° , the extinction angle is around 40 degrees.

A red garnet may be present near the margin of this granite; it is probably due to the influence of the metasediments with which it is in contact.

The area is underlain by two big masses of this rock; one covering the northeast and the other, the southeast of the area. The rock is usually massive, but as we get closer to the contact with the gneisses, it may get gneissic and then it becomes harder to distinguish the two types. In the northeast mass, garnet is frequently present in this gneissic type or along the contact zone. In the same zone, large fragments of the gneiss, pillow-like in shape were observed; these fragments may be partly assimilated by this grey granite. Good exposures of these may be seen along the portage from lake Bourgeois to the private road leading to lac La Ligne.

In both masses, the contact with the gneisses is hard to define since, near it, the granite may become gneissic or, as seen in other places, we have alternate bands of the grey granite with the gneisses more or less injected by the pink granite. It may then seem to be a sill-like body as shown on hills where the dips are low; at those places, we may find at the bottom an exposure of gneiss and higher up the grey granite, and on the other slope, we would find again the gneisses near the bottom. On the other hand, the fragments seen in the northeast mass do not indicate a sill-like body. Strikes and dips of the gneissosity show that the gneisses dip into this granite.

Hornblende Granite

Along the east shore of lake Wayagamack, a few exposures of a coarse pinkish hornblende granite were found. It is made essentially of quartz, orthoclase, a plagioclase, and an amphibole.

Quartz may constitute up to 10 per cent of the rock. The **feldspars** are both altered in the sections studied, but orthoclase was recognized and also a plagioclase of a composition of about An20. Some exsolution and mixing of feldspars can be observed. The feldspars make up from 50 to 70 per cent of the rock. The amphibole is hornblende in one section, but it is altered and changed to chlorite in others. Biotite is usually present, but in smaller quantities not exceeding 5 per cent. Accessories are apatite and opaque minerals (iron oxyde).

At one place, where the granite is much jointed, the joints are coated with epidote which may reach also within the rock itself. One section contains almost 20 per cent epidote which is probably an alteration of the feldspars, since that rock shows a lower content in those minerals. It is also mentioned in the literature that epidote may be derived from the contact effects of granite with limestone: if it is so here, it would then mean that the limestone is probably located in lake Wayagamack.

This granite seems to be a small mass. It is usually massive though one exposure is fairly schistose; in this exposure, the hornblende is all chloritized.

Contact relations were observed only near the south end of the mass; this contact is not definite since we find alternate bands of the gneisses and this granite.

Pegmatites

Pegmatites in the area are granitic: they occur in dykes, sills and lenses, and they are numerous. They are found in most of the rock-types described above.

Within the gneisses, pegmatites of these three types occur: sill-like bodies, parallel to the gneissosity of the rocks, are most often met; they form lit-par-lit injections which may narrow down and form lenses in places. The thickness of these sills varies from a few inches to over twenty feet; they are usually not big enough to be mappable. A few exceptions are noted on the map, like on both shores of that lake

located at about two miles northwest of lake Clair (Carignan). The exposure on the east shore is worth mentioning because of the huge crystals of hornblende which it contains; these crystals may be 4 to 5 inches in size. Usually, the pegmatites are made up essentially of quartz and feldspars; this last occurrence is an exception.

One dyke was found to contain a few crystals of fluorite; this was observed at the top of a cut along highway 19.

Some of these pegmatites may be only a coarse facies of the microcline pink granite, like that coarse hornblende pegmatite, but others are definitely not; those occurring as dykes cut the gneisses and the pink granite showing a later origin.

Pegmatites are also abundant in the hornblende andesine granite; they transgress the mass in all directions though where this granite is gneissic a parallelism usually exists between the two. One of those pegmatites, located on the west shore of lake Bourgeois (des Iles), shows a peculiar structure. One side of it is mostly quartz, the other mostly feldspar, with a gradual change in between. This segregation is over a width of about three feet.

A few quartz veins were observed through the gneisses; they are of the pure white quartz type, are narrow and could never be traced over long distances.

Gabbro

A few isolated small masses of a gabbro occur in the south-east quarter of the area. They seem to be sill-like bodies associated with the hornblende andesine granite. No definite structure was observed on these few exposures: no layering, no contact with the adjacent rock. Thin-section study gives a gabbroic composition: two pyroxenes are usually present, the plagioclase is An60 to An70, and hornblende is also present.

These small masses are mapped separately from the hornblende andesine granite mainly to show their location, because the author thinks that they probably are differentiated sections of the granite.

Fleistocene and Recent

The unconsolidated deposits of the area are of Fleistocene age or younger. They are mostly sand and gravel deposits. Silt and clay deposits are few.

Most of those have been left by the Pleistocene glaciers which have crossed the area in a general south-south-east direction as shown by striae and plucking. Striations strike about S-25°-E and plucking shows a southward movement.

These deposits partly filled the St-Maurice river valley and great thicknesses also cover large areas around lake Wayagamack. The Bostonnais river valley is also covered with glacial deposits through which several kettle-holes have been formed (fig. 2).



Fig.2 : The Bostonnais river valley; looking southward.
Kettle-hole in the middle of a field.

The drift supports a good growth of pine, spruce and fir trees as well as maple and few other hard wood varieties; it supports also other deciduous trees like birch, especially in burnt areas.

Drumlin-like ridges are fairly numerous in the south-half of the area.

The St-Maurice River valley has been carved through the gneisses and is now partly filled with sand, gravels and some clayish material. The town of LaTuque rests on a sand beach.

Gravel Deposits

Several gravel deposits have been encountered over the area. Those around lake Wayagamack and especially along the road going south on its east side, goes through several of these. They are fairly well bedded, and cross-bedded; they are probably the result of glacial outwash.

Some cuts made, when building the actual highway 19, show coarse gravels towards the south end of the area; bedding, if any, has been obliterated in those by the rolling down of boulders over a steep slope.

Some thin gravel beds can be seen along the St-Maurice river valley in pits where they are interbedded with sand (fig. 3). They may grade into sand or the contact may be sharp. These must be due to changes in the velocity of the waters.



Fig.3 : Pit along highway 19, near Fitzpatrick, showing interbedded sand and gravel.

Sand Deposits

Sand covers a good deal of the north shore of lake Wayagamack and also all along the St-Maurice River valley.

The thickness of these deposits varies along lake Wayagamack; it seems to be great in places, since small streams have been cutting through the sands good V-shaped valleys. At other places, exposures stick out through them

like monadnocks. The greatest thicknesses have been observed along the St-Maurice valley. Denivellation between the actual river and the town of LaTuque is close to 200 feet and it seems to be all sand with little gravel, and as previously mentioned (p. 8), bedrock in the valley seems to be close to sea-level which would mean probably more sand under the actual level. This sand is usually well bedded; cross-bedding is well defined (fig. 4) in fresh cuts.

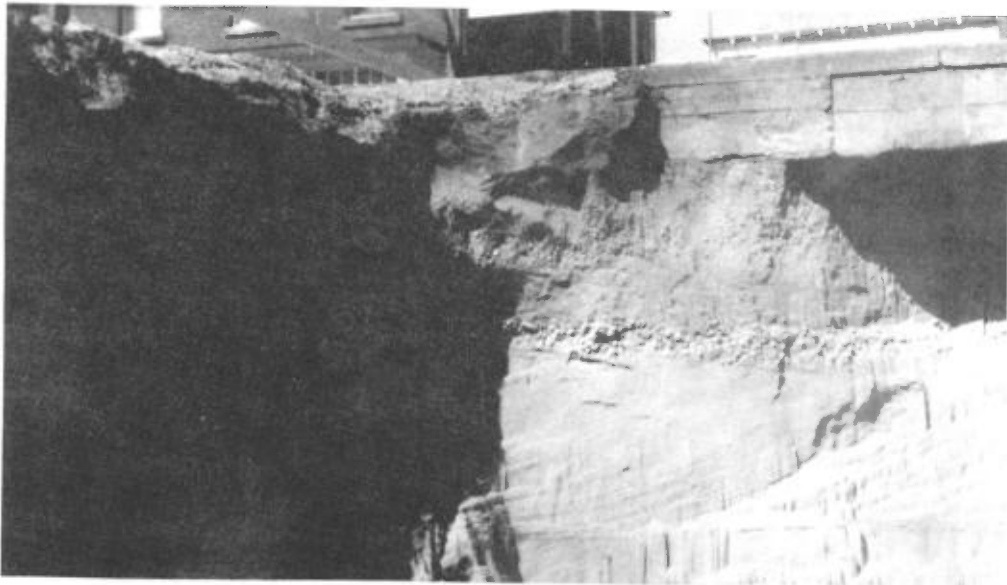


Fig. 4: Excavation showing bedding and cross-bedding of the sand. Also thin gravel seams and a darker recent soil on top.

Recent Deposits

On top of the Pleistocene sand and gravel deposits, a varying thickness of sandy soil, some gravel and silt has been laid down; it is darker in colour than the underlying deposits, and does not show bedding.

STRUCTURE

The general trend of the gneissosity as well as of the injections through the gneisses is a few degrees west of north in the northwest quarter of the area. The same applies to the southwest quarter. Along lake Clair (Carignan) in the southwest section, disturbances have changed that trend locally, but the average remains the same. West of lake Wayagamack, this trend of the gneissosity is closer to east-west, and east of the lake, it is parallel to the shore, i.e. closer to north-east. Near the granite, it is parallel to the zone of contact. Along the north shore of lake Wayagamack, sharp folds are indicated by the quick changes in the strike of the exposures.

Dips, in the gneisses, are to the east for the north-south striking sections and the angle is usually less than 50 degrees, though locally they may be very steep, like in the south-west section. West of lake Wayagamack (trend east-west), dips are low and to the south with few exceptions dipping to the north also at a low angle. East of lake Wayagamack (trend north-east), dips are usually steeper, 60 degrees or more, and to the south-east. Along the zone of contact with the granite, dips are toward the granite and the angles of dip vary between 20 and 70 degrees.

Within the area, the gneisses are more or less injected by the pink granite; this injection is parallel to the gneissosity and the amount varies considerably from exposures where no or little injection is observed to others

where mostly granite shows up. The main areas where injection constitutes more than 50 per cent of the exposures have been shaded in green on the map. This granite does not show any preferred orientation of the minerals: contacts only show the parallelism with the gneissic structure.

The pyroxene-hornblende granite away from the contact zone is normally massive; closer to the contacts, it usually shows a schistosity, orientation of the ferromagnesian minerals parallel to that of the gneisses. Where fragments of the gneisses were observed within this granite, the schistosity goes around them.

The coarse hornblende granite on lake Wayagamack seems to have pushed aside the gneisses; these are very contorted around this mass as shown by the sharp variations of strikes and dips on the north shore of the lake.

Jointing has been observed at several places; some areas have three sets of joints like to the south-west where the main jointing strikes north-east, the others being east-west and few degrees west of north. North of Little Wayagamack lake, the north-east jointing is prominent and controls the topography; a chain of lakes is parallel to it. The north-east set of joints is considered as tension joints, the north-south set as shear fractures as shown by the fault on the shore of the St-Maurice at LaTuque: the other set is of doubtful origin. From this, an ellipsoid can be made which would show the long axis in a north-west direction, the short axis in a north-east direction. If compression produced these

structures in the area, it would have to have come from the north-east or the south-west. If shearing produced the same structures, it would have to be from north or south, and the orientation of the ellipsoid indicated that the movement is of the right hand type, or that the horizontal component of the movement is that the east moved southward relatively to the west. As will be seen later in this chapter, the surroundings of the fault seem to indicate an upward movement of the east block relatively to the west block.

Lineation was measured in a few places and has an average east-west trend with a plunge eastward.

The general structure of the gneisses which occupy the west half of the map-area seems to be an east-dipping limb of a fold with a few cross-folds plunging also eastward; which would explain the changes in strike and dips near the center.

The structure of the pyroxene-hornblende granite would be sill-like, at least near its contact with the gneisses, and that of the coarse hornblende granite would be stock-like since it pushed aside the gneisses.

A clean-cut fault is exposed in the cut near the power-house on the east shore of the St-Maurice river at LaTuque. This fault cuts the gneisses at a low angle; the strike of the fault is N-5°-E with a dip of 45 degrees east and the gneisses strike N-10°-W with a dip of 30 degrees east (fig. 5 and 6).



Fig.5 : Fault near the power-house at LaTuque.
Looking south.



Fig.6 : Fault near the power-house at LaTuque.
Taken from same place as above, but looking
north.

Along the fault plane, there is a zone of about two inches of chlorite; below it, narrow hematite bands are interbanded with chlorite schist, and above it, brecciated pink granite is found in a fine grained black matrix.

A few hundred feet north of that fault, an exposure of the gneisses belonging to the hanging wall, shows folding: dips are eastward, and these get lower as we go

westward. If it is related to faulting, the movement would then be an upthrust of the east over the west.

ECONOMIC GEOLOGY

Very little prospection has been done in the area with the result that nothing of any interest has been found.

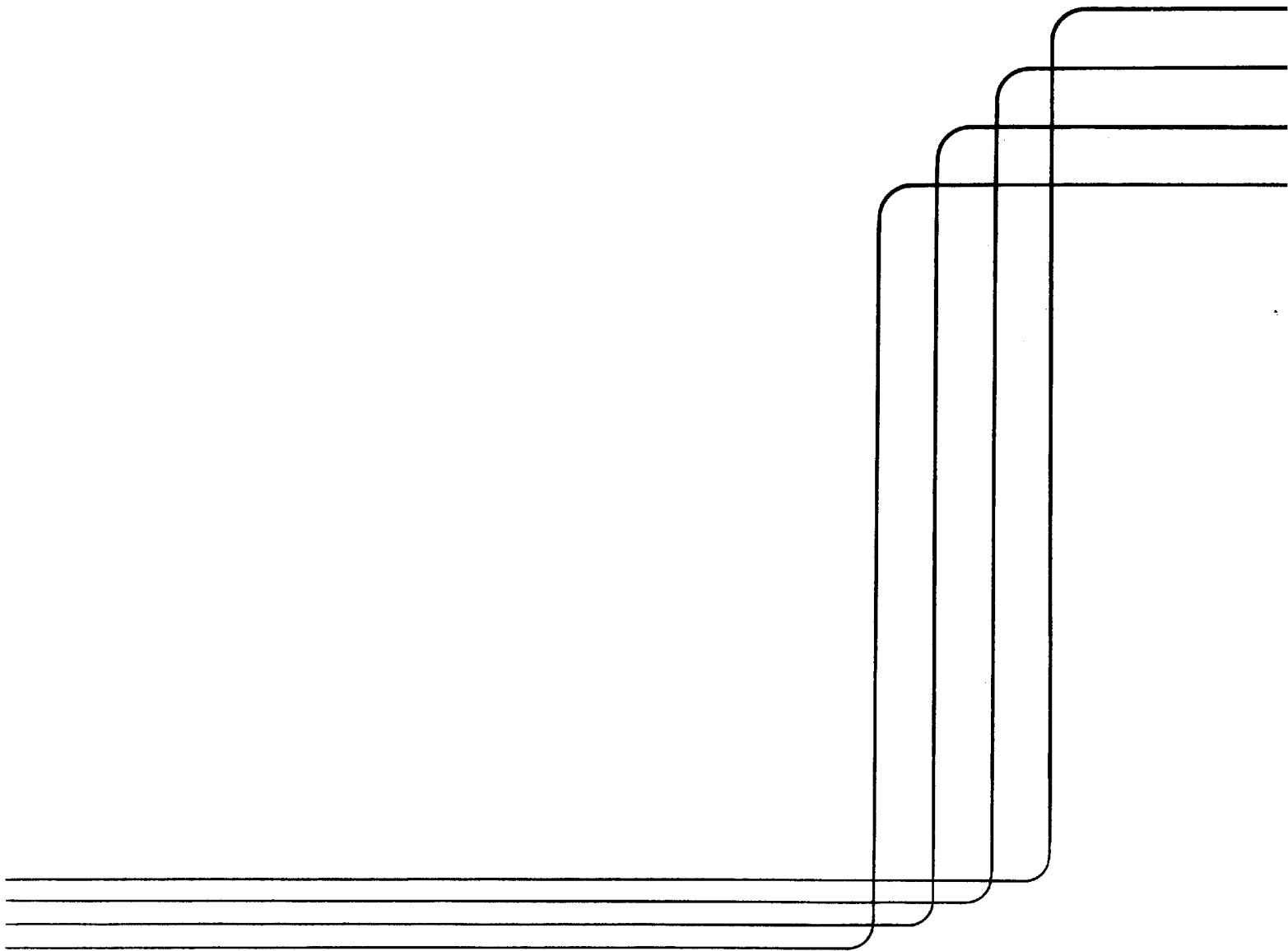
Mineralization in the gneisses consists of disseminated pyrite in certain places. Few crystals of fluorite were observed in a narrow pegmatitic seam at the top of a cut along highway 19, and what **seems** to be a uranium mineral has been located also on a cut along the railroad to the south of LaTuque; this mineral is black with a reddish aureole around it: it did not act on the Geiger counter, and the author found so little of it, that it does not seem to be of any interest.

Magnetite is disseminated throughout the gneisses, but no concentration of it was found, and no magnetic anomaly was encountered.

A few quartz veins were observed, but they are of the pure white quartz type and do not show any sign of mineralization whatsoever. The same applies to the pegmatites.

Thin bands of hematite were found along the fault at the power-house; they are along a narrow zone and are considered of no economic importance.

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