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Preliminary report on north shore of the Saint-Lawrence, Mingan to Aguanish

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Division of Geological Surveys

PRELIMINARY REPORT

ON

NORTH SHORE OF THE SAINT-LAWRENCE

MINGAN TO AGUANISH

by

W.W. Longley

QUEBEC
1944

M-854 P.R. 184

NORTH SHORE OF THE SAINT-LAWRENCE

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INTRODUCTION

The present report describes the section of the north shore of the lower Saint-Lawrence from Mingan eastward to Aguanish. It is based on work carried out by the writer during the summer of 1943.

Boats of the Clarke Steamship Company, sailing from Montreal and Quebec, ply along the shore at regular intervals during the summer and autumn months. During 1943 the western part of the district could also be readily reached by aeroplane, Mingan being at that time the terminus of a Canadian Pacific Airlines service from Quebec City. For transportation between points along the shore, a large motor-driven fishing boat (or barge, as it is locally termed), such as was used during the present investigation, is most convenient.

Havre St-Pierre, about nineteen miles east of Mingan and four hundred miles below Quebec city, served as a supply base throughout the

period of this investigation. It has a population of about 1,500 and is the principal settlement along this section of the coast. There are others at Mingan, Baie Johan Beetz (or simply "Johan Beetz", as it is most frequently called), and Aguanish. The village of Natashquan is twelve miles east of Aguanish.

For long stretches between Mingan and Sauvage (Indian) point, a distance of forty miles, the shore is devoid of exposures, and where such occur they are Ordovician sedimentary rocks of similar type. As a consequence, this section of the shore was not examined in the same detail as that from Sauvage point of Aguanish, where rocks of various types outcrop almost continuously along the highly serrated shore line.

TOPOGRAPHY

Away from the shore, the country rises gradually to a height that, with the exception of a few hills, is probably not more than two hundred feet above sea-level at a distance of five miles from the shore. Mount Ste-Geneviève, which is a mile inland from Sauvage point, has an elevation of three hundred and thirty feet and is the highest of the hills. A good view in all directions may be obtained from the top of Watshishou knoll, which 156 feet above the sea, is half a mile east of the mouth of Watshishou river.

From Mingan to Sauvage point, the shore is sheltered by the off-lying Mingan islands. Rock is exposed on most of the headlands along this section, but, in general, the bays are occupied by sand, which in places forms cliffs of considerable height.

Eastward from Sauvage point to Nabesipi river, the shore, facing the open water of the gulf, has a rather direct easterly trend with few large bays, but, as already noted, it is highly serrated and rocky. Also, off-shore, there are numerable small islets and reefs. Beyond this, the six-mile stretch eastward to Aguanus river is essentially a continuous sand beach.

GENERAL GEOLOGY

As indicated on the accompanying map, Ordovician sedimentary rocks occupy all the islands of the Mingan group. On the adjacent mainland, they outcrop at vatious points, and presumably underlie the whole stretch, between the mouth of Romaine river and Sauvage point. Eastward from Sauvage point, the rocks along and adjacent to the shore inlands both sedimentary and igneous types, all of Precambrian age. The few outcrops along the shore from Romaine river westward to Mingan are of Precambrien granitic rocks.

PRECAMBRIAN

Sedimentary Rocks

Recrystallized sedimentary rocks, which are believed to be of Grenville age, are exposed along the shore for a distance of a little more than four miles across the head of Appititatte bay, and again for six miles from Johan Beetz eastward to a short distance east of Watshishou river. In the latter area, they are known to extend for several miles north of the coastal section (1). Farther eastward there are many small

(1) CLAVEAU, J., Report on the Area from Forgues Lake to Johan Beetz, Que. Dept. Mines, P.R. No 180, 1943.

patches - such as the one forming Pashashibou point - and bands of the recrystallized sedimentary rocks interbanded with the granitic gneisses.

These sedimentary rocks are characterized by prominent bedding. They consist predominantly of grey quartzites and siliceous, grey, biotite schists. In some places the quartzite is almost pure and is white, or pinkish-white, in colour. There are also some quartz-hornblende schists and, west of Watshishou river narrow exposures of conglomerate.

Many concordant basic dykes are intruded into these sedimentary rocks and, in places, it is difficult in the field to distinguish them from the latter. Pegmatite dykes also are common.

Igneous Rocks

Except for the occurrences of sedimentary rocks referred to above, the rocks exposed along the coast from Sauvage point to Aguanish are for the most part banded granitic gneisses. It is quite probable that similar gneisses of intrusive origin underlie at no great depth the Palaeozoic rocks that are exposed at various points along the shore westward from Sauvage point to Mingan.

It is possible that some of these well-banded gneisses which, on casual examination, might be classed as metamorphosed granite, may have resulted from recrystallization of sedimentary gneiss, accompanied by infiltration of much pegmatitic material. If this interpretation be correct, the strong banding that characterizes much of the gneissic rock may have been inherited from former sedimentary structures.

There are, however, some unquestionably intrusive granites of massive character which cut the gneissic rocks.

Dykes of gabbro are common along this eastern section of the coast. They are most abundant cutting the Precambrian sedimentary rocks, but they also intrude the granite gneisses. They tend to be concordant with the sedimentary beds and, individually, to maintain a uniform width, which in different dyles ranges from a few feet up to a hundred feet. The wider dykes are much coarser grained than the narrower ones. Because of this concordiance with the adjacent sedimentary rocks, it is difficult, im some occurrences, to determine whether these bands of basic rock are of igneous or sedimentary origin, and this is particularly true where the rock has been sheared and altered.

Large pegmatite dykes are common in many parts of the area, and are particularly abundant in the sedimentary belt between Johan Beetz and Watshishou river. There are also many irregular zones of pegmatite, innumerable small pegmatite dykes, and much infiltrated pegmatitic material in the banded gneisses. The larger dykes of pegmatite, and some of the small ones, pinch and swell to a marked degree. In some places, the pegmatite is several hundred feet in width.

The majority of the pegmatites of the area are composed predominantly of feldspar. However, on Watshishou knoll and on a series of ridges extending to the northeast of it, pegmatite dykes at the contact between the sedimentary and granitic rocks contain a large amount of opaque, milky quartz. Although much of this fills fractures and irregular openings in the

pegmatite, it is believed that the quartz is genetically related to the pegmatite. A small amount of similar quartz occurs also in the quartzite - which has undergone considerable alteration due to contact action - and in the intruding granite in the immediate vicinity of the contact.

The southern margin of what is known to be an extensive body of anorthosite lies from two to three miles north of the shore in the western part of the area and is about nine miles north of Havre St-Pierre (1)

PALAEOZOCI (ORDOVICIAN)

The rocks exposed at points along the shore between the mouth of Romaine river, and Sauvage point and on all of the Mingan islands that parallel and are adjacent to this section of the shore, are of sedimentary origin and Palaeozoic in age. Mount Ste-Geneviève, about a mile inland from Sauvage point, is composed of these rocks, and it is quite probable that they underlie much of the area south of the east-west portion of Romaine river where, for long stretches, there are no coastal exposures.

Twenhofel (2) has divided these rocks into the "Romaine" and "Mingan" formations and correlated them with the Ordovician. The basal member is a fine-grained, rather uniform, white sandstone, which is seen in places to rest unconformably on the eroded, but little decom-

(1) RETTY, J. A., Lower Romaine River Area, Saguenay County; Que, Dept. Mines, 1942, P.R. 171.

(2) Twenhofel, W.H., Geology and Paleontology of the Mingan Islands; Geol.Soc.Am.Spec. Paper No. 11, 1938.

posed, surface of Precambrian rocks. Above this basal member the beds consist chiefly of impure grey limestones and calcareous grey shales. No outcrops of these Palaeozoic sedimentary rocks were observed along the shore east of Sauvage point, but narrow sandstone "dykes" were seen as much as twenty miles to the east, suggesting that the present rock surface is not far below the pre-Ordovician erosional surface.

STRUCTURE

The strike of the bedding and banding and of other major structural features in the Precambrian rocks changes from an east-west direction in the western part of the coastal region to northeast-southwest in the part between Johan Beetz and Watshishou river. East of this river, the structural trends are generally north-south. The configuration of the shore-line tends to be influenced by these rock structures, as is illustrated by the parallelism of the strike of the formations and the northeast-southwest trend of the narrow bays and long points between Johan Beetz and Watshishou river. The dip of the bedding and banding is steep, being northward near Appititttte bay, northwestward in the section of coast lying east of Johan Beetz, and toward the west where the strikes are north-south.

Inland, the trend of the sedimentary formations and gabbro dykes is generally north-south to northwest-southeast, as it is, for example, in the belt of these rocks which extends north and northwest from Quétachou bay for a distance of more than thirty-five miles (1)

(1) CLAVEAU, J., Report on the Area from Fargues Lake to Johan Beetz: Que.Dept.Mines, P.R. No. 180.

The same general trend is seen also in the valleys and chains of lakes in the region north of the coastal section here described.

ECONOMIC GEOLOGY

Copper

There are many small pyrite-bearing quartz veins and shear zones in the assemblage of metamorphosed sedimentary rocks and gabbro along the north side of Appititatte bay. Some of these contain chalcopyrite.

Two miles east of the southeastern point of Appititatte bay, on the southern part of an off-shore island, several "pockets" of disseminated chalcopyrite were observed along a narrow zone in banded gneiss. A sample taken from one of these pockets assayed approximately 3 per cent copper and 0.01 oz. gold per ton. As the rock in the vicinity is well exposed, there is little possibility that the occurrence is of greater extent than actually observed.

A mile southwest of Johan Beetz, in gneiss that is cut by small pegmatite dykes, there are a few small fissure veins containing calcite, some specks of chalcopyrite, and a small mount of clear green fluorite.

Massive bornite occurs in small irregular fissures and disseminated patches in a pegmatite gneiss that outcrops three-quarters of a mile west of the mouth of Watshishou river, on the northeastern corner of a small island. The zone of mineralization, which has been the scene of some prospecting, trends northeast and is vertical. It is less than two feet wide, about

fifteen feet long, and is exposed over a vertical height of about six feet. It does not continue to the northeast, and probably does not extend to the southwest. A selected sample assayed 6 per cent copper.

A thousand feet to the southwest, on the southern tip of this island, a small amount of massive chalcopyrite occurs along the contact of a gabbro inclusion in feldspar porphyry.

On the mainland, about two hundred feet to the east of the island referred to above, a small fissure vein was seen cutting feldspar porphyry. Mineralized with chalcopyrite, it averages about an inch in width for a length of twenty feet, and can be traced farther eastward, but for only a short distance. In places, it contains massive chalcopyrite up to half an inch in width.

The rocks exposed just east of the mouth of Watshishou river, along the southeastern side of Watshishou knoll, contain many small, irregular spots of chalcopyrite. The majority of these spots are only an inch or so across, but they extend along a zone for at least half a mile. The zone is in recrystallized sedimentary rocks that have been cut and altered by pegmatites, and are veined by opaque milky quartz along innumerable fractures. This complex has been intruded by a fine grained pink granite. The mineralized zone is along the highly altered contact between the sedimentary rocks and a body of intrusive granite lying to the east. The greater part of the mineralization is in the granite adjacent to the contact. This contact zone extends northeastward for at least six miles, to Petit Watshishou river.

A small amount of chalcopyrite is present

in calcite vugs in Ordovician limestone on Havre de Mingan (Harbour) island, near Mingan.

Ilmenite

Surface exploration work has been done on ilmenite deposits bordering Allard Lake, which lies about twenty miles north of Havre St-Pierre. These deposits were first described by J.A. Retty (1). Three groups of claims have been staked.

A well defined zone of ilmenite mineralization, following along the western crest of a northerly trending ridge of anorthosite, passes through claims bearing the numbers 4 and 3-3927, 5-3928, and 4-3930. By trenching, the zone has been explosed at intervals over a length of 2,800 feet. Judging from the work completed to date, it seems likely that the ilmenite occurs within this zone as discontinuous lenses, which may be expected to pinch and swell. Structural determinations suggest that the lenses have a general trend that ranges from north to slightly east of north, and a dip of from 25° to 40° eastward. A preliminary estimate of "inferred" ore in this zone, based on present exposures and the results of dip-needle traverses, gives a total of 2,750,000 tons. By assuming reasonable extensions in length and deth, the "probable" ore may be estimated at 7,000,000 tons, and further exploration might well prove an even larger tonnage. A systematic dip-needle survey would afford a valuable guide to such further exploration.

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(1) RETTY, J.A., Lower Romaine River Area; Que. Dept. Mines. P.R. No. 171, 1942; and report in press.

In claim 2-4275, ilmenite has been exposed in six strippings across a zone extending approximately N.30°E. for a distance of 750 feet. The maximum exposed width of the ilmenite is fourteen feet, but the full width of the zone is not exposed at any place.

Ilmenite occurs also at a lake, about half a mile in length, which lies three-quarters of a mile north of the central part of Allard lake, both along its western shore and on the southern side of a point that juts out from its eastern side. Considerable work will be required to determine the extent of these occurrences.

In assays of five samples of the Allard lake ilmenite, taken by Retty, the iron content ranged from 41 to 45 per cent and the titanium dioxide (TiO_2) content from 32 to 38 per cent.

Iron

Magnetite and hematite are present in noticeable quantity in some of the pegmatite dykes, particularly in the vicinity of Appititatte bay. Although none of the observed occurrences in themselves are of economic value, they are sufficiently rich in iron to suggest that commercial deposits of this metal might be found related to pegmatites somewhere in this region.

Molybdenite

Small amounts of molybdenite were observed in pegmatite dykes at three localities: (1) on the southern side of Victor bay, which forms a western fork of Appititatte bay; (2) one mile southwest of Johan Beetx, on the western side of a long narrow bay; and (3) just east of

the mouth of Quétachou bay, on the southeast side of the point on which the Thelminia feldspar deposit, referred to below, is situated. Here, a dyke of fine- grained white pegmatite is cut by a schistose gabbro dyke. It is exposed for a length of 225 feet and ranges in width for the most part from six inches to twelve inches. The pegmatite contains many small, irregularly scattered aggregates of molybdenite flakes, most abundantly along the marigins of the dyke and in small fractures. Although, in patches, there is as much as five to ten per cent molybdenite, the dyke as a whole probably contains less than one per cent of that mineral. Molybdenite was seen in a small loose fragment of pegmatite lying on the dump at the northern end of the pit at the Thelminia feldspar deposit, but none was observed elsewhere on the dump or at the margin of the pit nearby. In the course of a rapid examination of exposures along the shore as far east as St-Augustin bay, about 180 miles beyond the area mapped for the present report, the writer noted similar occurrences of molybdenite at a number of points. The widespread distribution of the mineral suggests that it might be worthwhile searching for larger deposits somewhere along or near this coastal region.

Pyrite

A small zone of pyrite occurs in the Ordovician limestone on the southern side on the western Île à la Chasse (Hunting island), nearly twenty miles east of Havre St-Pierre. The occurrence is along the beach, just at high-water line, in a small bay known as MacLeod harbour. The pyrite zone, trending slightly east of north, is very irregular, with a maximum width of four feet and a length somewhat less than fifty feet.

The pyrite is massive, finely granular, somewhat spongy in character, and rather free of impurities. In its immediate vicinity, the limestone has been rendered cherty, suggesting replacement by the iron sulphide and silica, precipitated from siliceous solutions. Possible structures controlling the passage of the solution and deposition of their metal content, however, are not evident.

A little prospecting work has been done here. A shallow trench, with its length across the line of strike of the mineralized zone, just north of the exposed pyrite, shows the limestone but no pyrite mineralization. There is no evidence of a search having been made, at least by trenching, to determine whether there may be other mineralized sections in the rock farther northward along the strike of the zone, though a picketline has been cut in this general direction through the woods which lie immediately north of the narrow beach and which cover most of the island.

It is probable that the contact of these Ordovician rocks with the underlying Precambrian lies at a depth of not more than a hundred and fifty feet below the present surface. This eliminates all hope of any considerable depth to the pyrite mineralization, but the possibility of a bedding-plane replacement along or near the contact should not be overlooked.

This occurrence, and also the chalcopyrite on Harbour island, affords evidence of post-Ordovician sulphide mineralization in the area.

Sphalerite and Cassiterite

A small quantity of the zinc sulphide, sphalerite, and one fragment of the oxide of tin,

cassiterite, were shown to the writer by two prospectors who said they found these minerals in some loose transported rock, a few miles north of the head of Quétachou bay.

Beryl

Although the abundant presence of pegmatite dykes in the area might well encourage a search for beryl, careful observation resulted in the finding of only a few crystals of this mineral. Three were found in pegmatite on the island which lies off the point on the south-east side of the entrance to Quétachou bay. The largest of these crystals was less than one inch in diameter. Four crystals were found in pegmatite at water-level on a small island near the west side of the bay which forms the mouth of Watshishou river; they were from two to six inches in length and ranged up to one inch in diameter. At the tip of the long point that forms the eastern side of the same bay, a few crystals of beryl, averaging half an inch in diameter, were observed along the border of a muscovite band in a muscovite-rich pegmatite.

Calcite

De Puyjalon (1) reported the presence of large crystals of clear calcite in the Ordovician rocks on the south side of Île à la Chasse (Hunting island). The present writer, however, after an exhaustive search of the southern side of the island, only succeeded in finding clear crystals that were all less than half an inch in diameter,

(1) de Puyjalon, H., in Report of the Commissioner of Colonisation and Mines, Quebec, 1898, p. 265.

and some scattered pockets of opaque white calcite.

Feldspar

In the area examined, tha largest pegmatites dykes occur along the section of the shore from Johan Beetz east to Watshishou river, and have, also, they are particularly abundant.

Attempts have been made to operate feldspare quarries in two of these dykes. One of these quarries is on a small point of land a mile and a quarter east-northeast of Johan Beetz, and the other, known as Thelminia mines, is near the western shore of the point that forms the southeastern side of Quetachou bay. A considerable amount of work was done at the latter place, but the operation apparently was not successful, probably due to the high percentage of quartz graphically intergrown with the feldspar. Much less work has been done at the other quarry, in which the feldspar is of no better quality.

No pegmatite dykes which might yield feldspar of a better quality than the two mentioned where observed during the course of the investigation.

Fluorite

A small amount of clear green fluorite was observed in veins cutting gneiss one mile southwest of the village of Johan Beetz. The mineral occurs in a zone of gash veins which is some thirty feet wide and exposed for a length of about one hundred feet. The fluorite veins, which are generally about ten feet apart, do not exceed a length of twenty feet and a width of four inches. In most of these gash veins, however, the vein

material is calcite, with clear quartz crystals lining the walls. As already mentioned, some specks of chalcopyrite are also present. The veins are drusy in character, indicating deposition at shallow depth. No other occurrences of fluorite were observed.

Mica

Locally, the pegmatites contain some muscovite, but the flakes are usually too small and too much broken by shearing to be of commercial interest. Flakes as much as an inch in diameter were rarely seen, and no splittings over two inches in diameter were obtained during the present investigation.

Quartz Crystals

Although small quartz crystals were observed in several places, no crytal of clear quartz with a diameter of more than a quarter of an inch was seen. The largest crystal obtained, an inch and a half in diameter and three inches long, is too opaque for optical use and not suitable for electrical use.

Silica (1)

Trending northeastward from the head of the bay which lies east of Watshishou bluff is a ridge composed of pegmatite. The southwestern part consists of feldspar and quartz, with a few inclusions of altered gabbro. The percentage of quartz increases rapidly toward the northeast

(1) Description taken from notes made by J. Claveau for Que. Dept. Mines, 1942.

until, half a mile from the shore, the pegmatite is composed entirely of milky, fine-grained quartz, and as such it continuous for a distance of at least a third of a mile with a width of about 400 feet. Evidently, there is here available large tonnage of silica, and the occurrence warrants further investigation by parties interested in obtaining this material.

Summary and Conclusions

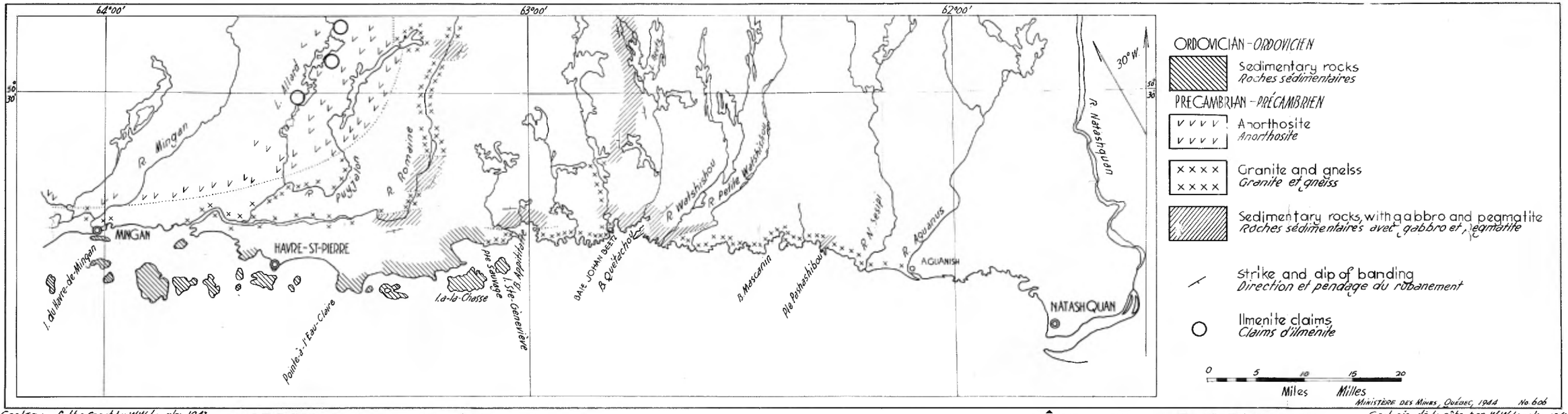
No commercially interesting deposits of quartz crystals, calcite crystals, berly, fluorite, or muscovite were observed in the coastal section here described. Also, the deposits of feldspar, while large, unfortunately contain considerable quartz. It is not intended, however, by these remarks, to discourage further search for these minerals elsewhere along the north shore of the Saint-Lawrence or in the region lying north of the narrow coastal strip which has been described in this report.

The large body of silica, in the form of quartz, on the ridge northeast of Watshishou bluff may have commercial possibilities.

Occurrences of iron oxides and of molybdenite, genetically related to pegmatite, are of sufficient interest to warrant further search for commercial deposits of these substances. Additional search for pyrite on île à la Chasse (Hunting island) is also suggested.

Further prospecting and development work should be done on the large ilmenite deposits bordering Allard lake.

Copper-bearing minerals have been found in several places and a search for larger deposits is recommended, especially in the belts of Precambrian sedimentary rocks and associated gabbro dykes. The altered zone along the contact between the sedimentary and granite belts east of Watshishou river is considered as being favourable ground for prospecting for copper deposits.



Geology of the Coast by W.W. Longley, 1943

M-M-29

NORTH-SHORE OF ST-LAWRENCE

MINGAN TO AGUANISH

(PRELIMINARY)

CÔTE-NORD DU ST-LAURENT

MINGAN À AGUANISH

(PRÉLIMINAIRE)

MINISTÈRE DES MINES, QUÉBEC, 1944 No. 606

Geologie de la côte par W.W. Longley, 1943