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PRELIMINARY REPORT, GEOLOGY OF ROMANET LAKE AREA, NEW QUEBEC

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Énergie et Ressources naturelles
Québec

DEPARTMENT OF NATURAL RESOURCES

RENÉ LÉVESQUE, MINISTER

P.-E. AUGER, DEPUTY MINISTER

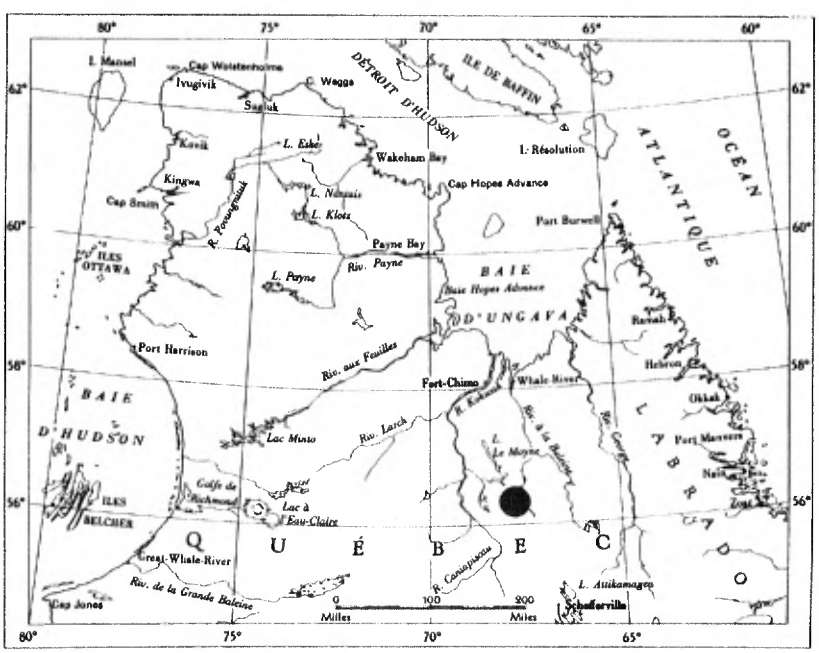
Geology of ROMANET LAKE AREA

NEW QUEBEC

PRELIMINARY REPORT

by

Erich Dimroth



QUEBEC

1964

P.R. NO. 523

DEPARTMENT OF NATURAL RESOURCES

RENÉ LÉVESQUE, MINISTER P.-E. AUGER, DEPUTY MINISTER

GEOLOGICAL EXPLORATION SERVICE

H.W. MCGERRIGLE, CHIEF

Geology of ROMANET LAKE AREA

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INTRODUCTION

Location and Access

The Romanet Lake area is in east-central New Quebec approximately 120 miles north of Schefferville and 800 miles northeast of Quebec. It is bounded by latitudes 56°15' and 56°30' and by longitudes 67°30' and 68°00', and comprises approximately 340 square miles.

The area is easily accessible by floatplane or skiplane, with Romanet lake and all the larger lakes of the area being suitable for landings. Access to the area during the break-up or freeze-up periods is possible only by helicopter.

Romanet lake, Romanet river, and parts of Wheeler river are the only convenient waterways within the area, and approximately half of the area is accessible from them. Overland travel between the waterways is easy.

Topography and Drainage

The northeastern and southwestern parts of the area are dominated by a number of high cuestas, and the maximum relief here is 800 feet. The surface of the central and eastern parts forms a low, rolling plain. Most of the topographic features of the area are controlled by lithology and structure. Outcrop is abundant where the bedrock is basalt, and is good to fair in the rest of the area, except for a strip south of Romanet river, along Wheeler river and northeast of Romanet lake.

All of the area, except for the eastern quarter, drains into Caniapiscau river by way of Romanet river. Wheeler river, in the east, is a tributary of Baleine river.

Climate

The climate of the region is subarctic. In 1963, break-up occurred in the third week of June. Temperatures in July and August generally ranged from 40° to 70° with a minimum of 28° and a maximum of 85°. The weather was fairly good in July. Overcast skies and rainy weather prevailed through August and the first two weeks of September. Only four days between August 6 and September 13 were completely free of rainfall. Hard frost and snow began in the second week of September.

Fauna, Flora, and Natural Resources

Most of the area is covered by subarctic woodland. Alder and willow thickets cover the talus slopes and some places along the streams. The hilltops are generally bare.

The rapids of Wheeler river are the only sizeable source of hydro-electric energy. Wildlife is not abundant. Birds and small mammals (porcupine, squirrels) are fairly common. Two bears and one caribou were sighted during the summer. Grey trout abounds and speckled trout is present.

Field Work

Field work was done from June 27 to September 12, 1963. An enlargement of the 1:50,000 National Topographic Series map, to a scale of ½ mile to the inch served as base map. Traverses were located on RCAF aerial photographs at an approximate scale of ½ mile to the inch. Every outcrop was visited in some complicated sections.

GENERAL GEOLOGY

General Statement

The Romanet Lake area is at the eastern boundary of the Labrador Trough. Gneisses are exposed along the eastern boundary of the area and are believed to be the oldest rocks. The major part of the area is underlain by Labrador Trough rocks.

The Labrador Trough rocks can be subdivided into two groups: a group of predominantly sedimentary rocks (slates, argillite, dolomites, quartzites, arkose and conglomerate) with basalt; and a group of basalt flows separated by thin beds of slate and quartzites. Andesite, basalt breccia, and agglomerate are included with the basalt group.

The Labrador Trough rocks are only slightly metamorphosed in the western and central parts of the area. However, their metamorphism increases markedly towards the northeastern corner of the area, where garnetiferous biotite micaschists and amphibolites are present. It is everywhere possible to recognize the primary materials of the metamorphosed sedimentary rocks and these are described together with analogous non-metamorphic rocks. The primary materials of the amphibolites, however, are unknown, and they are described separately.

GNEISSES

Gneisses are exposed along the eastern margin of the area and probably are the oldest rocks present. They are perhaps of sedimentary origin, although a few lenses of amphibolites and of pegmatoidal gneisses may be derived from intrusive rocks.

The gneisses belong to two different metamorphic zones: a zone characterized by biotite-amphibole-gneisses occupies the northern part of the gneissic area and a zone characterized by muscovite- and sericite-bearing rocks is present in the southeastern corner. The muscovite- and sericite-bearing gneisses are probably derived from biotite-amphibole gneisses by retrograde metamorphism.

Biotite-amphibole gneiss is the most abundant rock in the northern part of the gneissic area. It is a medium-grained well-foliated rock, containing approximately 10% biotite and amphibole, and quartz and feldspar in equal proportion. Black or greenish black lenses and layers 1 inch to 12 inches thick of biotite schist and biotite-amphibole-schist occur throughout the biotite-amphibole gneiss.

Fine-grained, grey biotite-plagioclase gneiss is associated with the biotite-amphibole gneiss. This is a layered rock, containing fine-grained, dark grey, biotite-amphibole-quartzitic gneisses and pegmatitic veins. A coarse-grained, white or light grey quartzitic gneiss is in contact with biotite-plagioclase gneiss near Wheeler river, in the east-central part of the area.

Two rock types that may have been derived from intrusive rocks are present. A large lens of pegmatoid gneiss is exposed near the middle of the eastern boundary of the area. Smaller lenses of the same material are common within the biotite-amphibole gneisses. Another possible intrusive is a greenish black, medium-grained plagioclase amphibolite. This rock is partly granitized and contains numerous pegmatitic segregations and veins.

TABLE OF FORMATIONS

PLEISTOCENE AND RECENT			Sand, gravel	
	Unconformity			
PRECAMBRIAN	UPPER		Non-metamorphic rocks	Metamorphic rocks
		VOLCANIC GROUP	quartz diorite agglomerate basalt basalt breccia andesite slate and black quartzite	amphibolites chlorite schist biotite phyllite biotite micaschist
		SEDIMENTARY GROUP (with subordinate volcanics) — Pelites	slate, argillite and black quartzite	phyllite biotite-phyllite biotite micaschist
		SEDIMENTARY GROUP (with subordinate volcanics) — Quartzite	white quartzite quartz-sericite schist	meta-quartzite quartz-muscovite schist
		SEDIMENTARY GROUP (with subordinate volcanics) — Dolomitic Rocks	layered dolomite dolomite-slate sequence dolomitic pseudo-conglomerate dolomitic conglomerate dolomite-chert breccia	
		SEDIMENTARY GROUP (with subordinate volcanics)	arkose and conglomerate	meta-arkose, meta-conglomerate, quartz-albite sericite schist, quartz-sericite schist, meta-quartzite
	LOWER	Unconformity (?) Folding (?) Metamorphism		
			biotite-amphibole gneiss biotite gneiss biotite-plagioclase gneiss quartzitic gneiss	
			plagioclase amphibolite pegmatoidal gneiss	
			biotite-muscovite gneiss quartzitic biotite-muscovite gneiss	

The "muscovite-biotite gneiss" exposed in the south-eastern corner of the area comprises light-coloured muscovite-biotite gneisses, dark greenish grey muscovite-biotite-chlorite-sericite gneisses, muscovite-bearing quartzitic rocks, pegmatites, and scattered chlorite-bearing amphibolites. These rocks are interlayered on a small and large scale.

The retrograde metamorphism of the muscovite- and sericite-bearing gneisses appears to be correlative with the progressive metamorphism of the Labrador Trough rocks.

SEDIMENTARY GROUP

Arkose and Conglomerate

Arkose and conglomerate underlie the area north of Ronsin lake and east of Bertin lake. The two types could not be shown separately on the accompanying map.

The arkoses contain 20-40% feldspar. They are light greenish grey on the fresh surface and weather pink. The grain size varies from 0.5 mm. upwards. The thickness of the beds increases from 5 mm. to 3 cm. with increasing grain size. Bedding planes are marked by gradation in grain size, by thin sericite films, or by dark grey magnetite-bearing layers. Crossbedding is common.

The arkoses grade into arkosic conglomerates. The latter consist of quartz pebbles up to 4 cm. diameter set in an arkosic matrix with a grain size of less than 5 mm. The conglomerates weather to a light pinkish brown. Bedding is poorly developed.

The clastic texture of both arkose and conglomerate is well preserved. The arkoses are cleaved locally.

The contact relations between the arkose conglomerate unit and the surrounding rocks are clearly exposed south of Ronsin lake where the arkose is overlain by slate and dolomite. The contacts elsewhere in the area are probably faults.

Along Wheeler river a group of quartz-sericite rocks are exposed which have been partly derived from arkose and arkosic conglomerate. Some rocks of this sequence, however, bear close relations to the white quartzites described below. The quartz-sericite rocks include grey and white, locally green and pink weathering quartz-feldspar-sericite schists and quartz-sericite schists interlayered with white massive beds of meta-quartzite. A little carbonate is present at some localities. The schistosity of these rocks is generally folded. This sequence has been mapped as meta-arkose, meta-conglomerate and meta-quartzite.

One outcrop of white meta-quartzite and another of quartz-muscovite schist are exposed farther north on Wheeler river and are believed to belong to the same sequence as the above and to be its more highly metamorphosed equivalent.

Dolomitic Rock

Dolomitic rocks are the most abundant of the sedimentary rocks in the area. They are interlayered with quartzitic slates, and the proportion of the two rocks is the basis for their subdivision. Layered dolomite contains only a little slaty material, whereas the dolomite slate sequence is composed of approximately equal proportions of dolomitic and slaty material.

The layered dolomite consists of bluish grey, more or less sandy layers of dolomite 1 foot thick alternating with 1-inch-thick layers of grey or purplish quartzitic slate.

The dolomites weather buff or brown. The buff varieties predominate around Chambon lake and south of Ronsin lake, whereas the brown weathering dolomites predominate farther north.

Stromatolites appear to be common in the dolomites. They are, however, obscured by quartz stringers spaced a few millimeters to a centimeter apart. The quartz stringers form sets parallel to the cleavages of the slates

Dolomites with a "conglomeratic" texture were observed here and there, and consist of dolomite "pebbles" 2 to 5 inches in diameter set in a fine-grained dolomitic matrix. They occur only in strongly deformed zones and appear to be products of brecciation and mylonitization of the dolomites.

Dolomitic conglomerate and dolomite-chert breccia occur at contacts between dolomite and slates. A dolomitic conglomerate exposed north of Chambon lake consists of rounded pebbles of dolomite and quartzite up to 1 inch in diameter and angular fragments of slate in a dolomitic matrix. A dolomite-chert breccia is exposed at Romanet lake, near the southern boundary of the area.

The dolomite-slate sequence consists of layers a foot thick, lenses, and boudins of dolomite associated with quartzitic slate in equal proportions. The dolomite layers generally weather brown, except for the dolomite-slate sequence south of Ronsin lake which weathers buff. They are much more disrupted than the layered dolomites. In many places, the bedding has been destroyed and 2- to 3-foot-long boudins of dolomite are included in a matrix of quartzitic slate.

The dolomitic pseudoconglomerate is a tectonic variety of the dolomite-slate sequence. The rock consists of subrounded bodies 1 inch to 12 inches in diameter of dolomite in

a quartz-sericite schist matrix. Traces of bedding remain locally in the dolomite bodies. The proportion of dolomite and quartz-sericite schist varies considerably.

The aspect of the dolomitic rocks changes little with increasing metamorphism. Some phlogopite is present in the meta-dolomites north of Villandré lake. The quartzitic slates interlayered with the dolomitic rocks, however, become coarser grained with increasing metamorphism and biotite and muscovite flakes are visible in the biotite zone of metamorphism.

Two (possibly three) thick and stratigraphically distinct layers of dolomite have been found within the area. South of Ronsin lake buff dolomites overlie, and are interbedded at,the contact with slates that overlie arkose.

At Duvic bay on Romanet lake the succession shown is as follows, in descending order:

4. Brown weathering dolomites, dolomite-slate sequence, or dolomite-bearing slates;
3. White quartzite;
2. Slates (50') (may be local);
1. Brown weathering dolomites.

White Quartzites and Quartz-sericite Schist

A sequence of white quartzites and quartz-sericite schists is interlayered with the dolomites or occurs at the contact between dolomites and pelitic rocks. The predominant rock in this sequence is a white or light grey quartz-sericite schist locally containing a little feldspar. Layers 1 foot to 3 feet thick of white or grey massive quartzite are common in this sequence. A few lenses of dolomite occur.

The layering of the massive quartzites is produced by thin schistose layers and does not correspond to the original bedding. The massive quartzites are slightly dolomitic at many localities and weather rusty brown. The iron oxides producing the rust color are dissolved after continued exposure and the rocks become white.

The quartzites are not strongly metamorphosed. Muscovite and biotite flakes are visible on schistose surfaces within the biotite zone.

Pelitic Rocks

Pelitic rocks occur at several stratigraphic levels within the area. Grey and black slates are the most abundant rocks of this unit. Grey argillites are present, and slates and argillites are locally interlayered with black quartzites or with dolomite.

Some of the grey slates contain as much as 50% of quartz. In the darker, graphitic varieties quartz is as low as 10%. Well bedded slates are rare. One or two fracture cleavages are commonly developed besides the slaty cleavage, producing coarse lineations.

The argillites are quartz-rich and somewhat cherty in appearance, dark grey on the fresh surface, weather light greenish grey, and show rhythmic bedding at a scale of 1 mm. to 2 cm. They are confined to slate horizons which are in contact with basalts.

Black, grey weathering, somewhat graphitic quartzites in beds 1 inch to 2 feet thick are interbedded with the slates at many localities. They contain well-rounded quartz grains approximately 1 mm. in diameter in a finer-grained, black matrix. The black quartzites grade into black slates. Only a few thick zones of this rock are shown on the map.

A few dolomite layers or boudins are present locally in grey slates. Dolomites and black quartzites do not occur together. The slates grade into phyllites in the centre of the area, and graphitic slates tend to retain their slaty appearance better than quartz-rich varieties.

Individual flakes of muscovite and biotite are visible on the schistose surfaces of the phyllites northeast of Romanet lake. These rocks were mapped as biotite phyllites.

Black, fine-grained and somewhat porphyroblastic biotite schists are interlayered with amphibolites north of Villandré lake. These schists are probably derived from black quartzites and are mapped with the biotite phyllites.

Black, medium-grained, biotite micaschists and light grey quartzitic, biotite gneisses are interlayered with amphibolites northeast of Préville lake. Garnet porphyroblasts 5 mm. in diameter were observed in some of these rocks, and so the biotite micaschists probably belong to the garnet zone of métamorphism.

VOLCANIC GROUP

Basalts

A few dozen thick basalt flows with interlayered sedimentary rocks underlie the northwestern and southwestern parts of the area. All these flows have a fine-grained border facies at top and bottom and a grain size that increases gradually towards the centre. Some flows or flow groups contain exceptionally coarse-grained central facies and others are unusually fine grained. Such differences in grain size have no relation to thicknesses.

The basalts are dark grey or greenish grey or greenish black and massive. Rocks with grain sizes of approximately 1-3 mm. have been classified as medium grained, and those with grain sizes larger than 5 mm., as coarse grained. Grain sizes are always below 10 mm. The coarser-grained varieties contain approximately 50% of mafic minerals. Most of the medium-grained flows are granular in texture, and some coarse-grained basalts are ophitic. Pillows occur in some of the fine-grained flows and are apparently restricted to three stratigraphic levels.

Schistose basalts occur at the base of some of the flows, especially north of Romanet river.

The basaltic rocks within the sedimentary sequence are more strongly altered and vary considerably in texture and composition. Normal basalts, coarse-grained amphibole-rich rocks, and fine-grained rocks rich in epidote may be present in one and the same body. The border facies of these basalt bodies generally is schistose. Some of the rocks contain biotite. In a few places green, carbonate-bearing, chloritic schists are present which possibly were derived from tuffs.

The contacts between basalts and sedimentary rocks within the sedimentary sequence are not well exposed but, with one exception, they are concordant. The exception is north of the lower rapids of Romanet river, at latitude 56°21'30" and longitude 67°57'30", and here basalt breccia occurs at the contact.

Two basalt flows within the sedimentary group interfinger with slates. One south of Ronsin lake interfingers with the slate band between arkose and buff dolomite. The other, on the southwestern shore of Romanet lake, overlies slates which, in turn, overlie buff dolomite.

A small andesite body that occurs north of Romanet river is greenish grey, medium grained, and contains approximately 25% mafic minerals. It apparently grades into normal basalts.

Basalt breccias are exposed all along Romanet river, especially to the west. They contain numerous, subrounded, strongly altered inclusions up to 2 inches long of fine-grained, grey, biotite-bearing, quartzitic rocks. At the lower rapids of Romanet river breccia occurs at the contact between a basalt dyke and argillites. The basalt dyke has cut a fault separating argillites and dolomite, and, at the contact, the argillites have been chloritized and biotitized. The basalt breccia, as well as the argillite, was impregnated by pegmatitic veins. All these rocks, including the pegmatitic veins, are sheared.

Amphibolites and Chlorite Schists

Amphibolites underlie most of the northeastern portion of the area. Composition and texture of the amphibolites

vary considerably over short distances, the variations of grain size apparently reflecting primary variations.

The amphibolites around Préville lake and north of Villandré lake are generally green or dark green, chlorite-bearing, epidote amphibolites carrying pegmatitic and aplitic segregations. Fine-grained, green, chloritic amphibolites containing magnetite porphyroblasts predominate northeast of Préville lake.

Dark green or black, plagioclase amphibolites underlie the northeastern corner of the area and a zone west of Wheeler river. Garnetiferous amphibolites are associated in places with plagioclase amphibolites.

A mottled amphibolite occurs north of Villandré lake and has been mapped separately. This rock contains grey, rounded aggregates of plagioclase up to 1 inch diameter in a fine-grained matrix.

Several layers and lenses of folded chlorite schist have been mapped. These are light green, and consist mainly of chlorite.

The amphibolites are thrusted over the basalts southeast of Préville lake. North of Villandré lake, however, basalts are still preserved east of this overthrust and grade into the amphibolites. The conversion of basalt to amphibolite begins at the top and bottom of the flows and at faults. In the intermediate stage of amphibolitization the contact zones of the basalts are amphibolitic and their centres, basaltic. Pegmatitic and aplitic segregations are present in both amphibolitic and basaltic portions of the flows.

Agglomerates

Agglomerates, exposed in the southwestern part of the area, consist of grey rounded to angular fragments of fine-grained basalt in a fine-grained matrix of black basalt.

Quartz Diorite

One outcrop of a medium- to coarse-grained quartz-diorite was mapped northeast of Romanet river at latitude 56°23', longitude 67°45'. It contains approximately 20% of mafic minerals (mainly biotite), with quartz and feldspar.

Pleistocene and Recent

Much of the area is thinly mantled by glacial deposits. Most of these are unsorted and contain huge boulders and fragments of all sizes in a sandy matrix. Boulder fields

occur where the sandy matrix of these deposits has been washed away. Some eskers are present.

Most of the boulders are of local origin and many are derived from underlying bedrock. Thus, the composition of boulder fields may give valuable information on the bedrock where outcrops are rare. Some boulders, however, have been transported for long distances. Towards the south, boulders of red arkose and siltstone were observed which must have derived from areas beyond the basalt ranges approximately 20 miles to the south, thus indicating ice movement from south to north. Two directions of glacial striae were observed: one to the north-northeast, the other to the north.

A strip approximately a mile wide along Wheeler river is a sand terrace. Swamp deposits cover numerous small depressions.

STRUCTURAL GEOLOGY

Stratigraphic Relationships

The arkoses and conglomerates between Ronsin lake and Romanet lake appear to be the oldest Labrador Trough rocks exposed in the area. They are conformably overlain by slates which interfinger with a basalt flow and are overlain by buff-weathering dolomite.

The stratigraphic relations between the buff- and the brown-weathering dolomite are unknown. The latter apparently is overlain by white quartzite. A second zone of brown-weathering dolomite, of dolomite and slate, or of dolomite-bearing slates follows the white quartzite and grades upwards into slates with black quartzites.

At no place was a normal stratigraphic contact between the group of volcanic rocks and the group of predominantly sedimentary rocks exposed, and the contact between the groups apparently is everywhere faulted. Structural arguments favour a younger age for the volcanic group.

Folds, Lineations, Breccias

All the rocks of the area have been affected by the same deformations and contain analogous structures. The style of these structures, however, depends largely on the facies of the rocks and on their grade of metamorphism. Within the non-metamorphic zone west of longitude 67°45' there are four blocks separated by faults and characterized by contrasting tectonic styles.

The two blocks made up mainly of basalt, situated to the north of the Romanet river zone and to the south of the Bertin Lake fault, are only slightly folded.

The central block consists of slates, white quartzites, and dolomites, and has been intensely folded. The axes and the axial planes of the major folds trend southeast. The folds are steep and slightly overturned to the north or south and plunge gently southeast.

The block of arkose and conglomerates between Bertin lake and Romanet lake is in recumbent folds, the axes of which trend southeast, but whose axial planes trend southwest. Thus, these folds are independent of the folds in the dolomitic rocks.

The small-scale structures present in all these blocks are perfectly analogous. Two lineations are everywhere present, one plunging northeast and the other plunging gently southeast. The latter lineation normally is produced by a fracture cleavage and is younger than the lineation plunging northeast, although this age relation may be locally reversed. The small-scale folds are generally parallel to the intersection between bedding and fracture cleavage. At a few localities the small folds are parallel to the intersection between bedding and slaty cleavage, and the fracture cleavage produces only wrinkles.

A younger fracture cleavage trending north is present locally and produces a lineation on the slaty cleavage.

The small-scale structures become increasingly complex within the metamorphic zone of the area east of longitude 67°45'. Lineations and folds trending northeast, southeast, and south are superposed in this zone and produce complicated fold patterns.

Breccia zones are present at several localities, notably along the Romanet River zone, and along the Bertin Lake fault. The breccias along Romanet river appear to be intrusive, whereas those at the Bertin Lake fault zone are probably due to the faulting.

ECONOMIC GEOLOGY

Although copper mineralization is widespread in the area, there appears to be particular concentration in three zones. One zone follows Romanet river, and was the site of considerable exploration work during 1962 and 1963. The mineralization consists of sulphides found mainly in brecciated cherty zones within laves. A number of mining companies, including Mid-Chibougamau Mines Limited, Delhi Pacific Mines Limited, and Taché Lake Mines Limited, did detailed prospecting and mapping as well as some packsack and standard drilling on this zone. The second zone is on the southwest shore of Romanet lake north of the Bertin Lake fault, at latitude 56°16' - longitude 67°48'. This locality was claimed by Labrador Mining and Exploration Limited. Here, sulphides (pyrite, pyrrhotite, chalcocite) are dispersed in dolomite and dolomite breccia. The third zone is northeast of Préville lake near latitude 56°29' - longitude 67°41' and does

not appear to have been prospected. It features green, chloritic amphibolite that has been brecciated and then cemented by calcite and sulphides (pyrite, chalcopyrite).

In general, ore minerals in the area are dispersed in slate, black quartzite, basalt, and especially in chert and dolomite, in small veins in these rocks, and in breccia zones.

The two principal mineral zones are related to fault zones of regional importance, the faults being active during the main folding and metamorphism of the Labrador Trough. The mineralization has no apparent connection with the later normal faults.

It appears probable that much of the mineralization took place during metamorphism. Its primary source is unknown, but might have been mineralization dispersed in the basalts.

Considering all these factors, the following locations appear to be the most favourable for prospecting; 1) breccia zones; 2) locations near breccia zones or at or near faults and shear zones connected with the main folding; 3) all upper stratigraphic contacts of basalts.