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CHIBOUGAMAU, ITS MINING POSSIBILITIES

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CHIBOUGAMAU

Its Mining Possibilities

by R. Bruce Graham

Geologist, Department of Mines, Quebec

The heart of the Chibougamau district lies in the northeast corner of Abitibi County, about 320 miles north of Montreal. Indications of gold, copper and iron have led prospectors into the country since the turn of the century. The first mining company to explore the district was formed 47 years ago, and today, there are over 50 companies holding ground in the Chibougamau area.

Interest in the area had become so marked by 1909 that considerable pressure was brought to bear on the Quebec Government to build a railway into the region. It was finally decided to have an authoritative opinion on its economic possibilities and the Chibougamau Commission was appointed for this purpose. It was comprised of A.E. Barlow, E.R. Faribault and J.C. Gwillim. They examined the district in 1910 and concluded that, at that time, a railway was not warranted. Nevertheless, the country continued its call to the prospector. The number of finds kept increasing, Merrill Island, 1920; Campbell Chibougamau, 1922; Obalski, 1928; Norbeau, 1930, and so on. It was realized that difficulty of transportation was a severe detriment to the development of this country, which was showing more and more promise as the years went by. Consequently the Quebec Department of Mines built a road into Chibougamau which was completed in the fall of 1949. A townsite was laid out and lots were sold the following year. As a result of these added facilities, exploration was carried out at a much accelerated pace.

That the exploration work has achieved success is evidenced by the results obtained. New mineral deposits have been discovered and those previously known have been enlarged. Not including the recent and promising gold discovery of Chibougamau Explorers, the estimated tonnage of potential ore in Chibougamau has been increased from 4.4 million tons to 7 million tons - an increase of over 150% since the fall of 1949. This potential ore is divided among 8 properties and may be evaluated from current metal prices at \$103,823 or \$14.00 per ton. Three of the 8 deposits were found by exploration carried out in the past year and a half.

It must be kept in mind that his evaluation refers to the ultimate price of the product and not the price received by the mine owners which is somewhat less.

ECONOMIC GEOLOGY

In the general region enclosed by McKenzie, Roy, Obalski and the western part of McCorkill township, concentrations of gold, copper, zinc, iron and asbestos have been found. Small amounts of silver also occur, mainly associated with the gold and the zinc. Not all the known occurrences were visited, as property examinations were confined mainly to the active properties. The asbestos occurrences in McKenzie Bay, Lake Chibougamau were not visited.

The metallic deposits may be divided into three types - segregation, vein and replacement type deposits.

Segregation Type Deposits

Magnetite deposits have been found in gabbro where they occur adjacent to the rim of the sill-like body of anorthosite which extends east from Scott township, through Obalski, McKenzie, Roy and McCorkill townships. A second sub-parallel sill-like body of anorthosite occurs in Lemoine township. Little is at present known regarding the detailed distribution of this anorthosite, but according to Longley (1), the two bands join in McCorkill township. Thus the

(1) Longley, W.W.: Preliminary Report on Rinfret Area, Abitibi-East and Roberval Counties, Que. Dept. Mines, P.R. No. 251, p.3.

two belts are part of the same formation, apparently folded around the granite mass which separates them west of McGorkill township. It is known that where gabbro occurs adjacent to this anorthosite, magnetite deposits are to be found.

The magnetite occurs mainly as disseminations in gabbro which is generally characterized by banding. Only one deposit has been examined in detail. This deposit occurs between Lac Caché and Lac aux Dorés. Here it lies along the contact between anorthosite and gabbro. The contact of the magnetite rich gabbro with the transition phase which separates the gabbro from the anorthosite is sharp. However, the magnetite content gradually decreases in the gabbro as the distance from the contact is increased. Stringers of massive magnetite 2 to 3 inches wide may be found in the disseminated zones and in the nearby country rock. A more detailed description is given by the writer in P.R. No. 259. Similar features were observed in other disseminated magnetite deposits visited.

Disseminated magnetite in gabbro occurs between Lac Caché and Lac aux Dorés, on the tractor road 3300 feet north and 1800 feet west of mile post IV on the south boundary of McKenzie township, on the south shore of Gouin peninsula 700 feet west of the McKenzie-Roy township line and extending northeast to the outlet of lake Chibougamau; from  $\frac{1}{2}$  mile south of Bear bay west to Bag bay (approximately 3 miles); in McGorkill township (1) and two occurrences in Lemoine township respectively 5 miles north and 1 mile west, and 1 mile north and 6 miles west of the southeast corner of the township.

Two types of magnetite deposits are known. One type contains from 1 to 10% metallic titanium contained in ilmenite and probably to some extent in solid solution in the magnetite and the other contains from 0.07 to 1.5% metallic titanium. These results are based on 11 analyses for the former and 11 for the latter. The iron content is about the same in both instances as 25-30% iron is about the indicated grade for bodies of sufficient tonnage to be regarded as potential ore.

Ten chip samples over widths up to 200 feet were collected along a 2-mile length of the magnetite deposit between Lac Caché and Lac aux Dorés.

The average content of these specimens is as follows:

Fe	Ti	SiO <sub>2</sub>	S	Mn	P <sub>2</sub> O <sub>5</sub>
%	%	%	%	%	%
32.5	5.3	29.9	0.12	0.73	0.01

A  $3\frac{1}{2}$  lb. specimen of disseminated magnetite in gabbro from near the anorthosite in the east part of Scott township was submitted to the writer for assay by Joe Sharp, prospector. This sample assayed as follows:

Fe	Ti	SiO <sub>2</sub>	S	Mn	P <sub>2</sub> O <sub>5</sub>
%	%	%	%	%	%
24.80	3.13	34.46	0.18	0.32	0.47

A 45-foot drill intersection of disseminated magnetite in gabbro from the Gouin peninsula deposit was sampled and submitted for assay by the writer. The hole was drilled by L.M. Wilson. The average of 9 consecutive 5-foot samples is as follows:

Fe	Ti	SiO <sub>2</sub>	S	Mn	P <sub>2</sub> O <sub>5</sub>
%	%	%	%	%	%
32.2	0.96	24.5	0.04	0.08	0.09

Two samples were collected by the writer from a point  $\frac{3}{4}$  of a mile west of mile post III on the east boundary of Roy township. Here magnetite occurs as disseminations in gabbro over widths up to 200 feet. Also present are intersecting veinlets of massive magnetite up to 1 inch wide.

A representative sample of the disseminated magnetite weighing 3 lbs. gave the following results:

Fe	Ti	SiO <sub>2</sub>	S	Mn	P <sub>2</sub> O <sub>5</sub>
%	%	%	%	%	%
31.89	0.978	19.74	0.02	0.06	0.05

(1) Op. Cit. p. 6.

A sample of massive magnetite weighing  $\frac{1}{2}$  lb. from a veinlet gave the following results:

Fe	Ti	SiO <sub>2</sub>	S	Mn	P <sub>2</sub> O <sub>5</sub>
%	%	%	%	%	%
68.03	0.07	1.83	0.01	0.03	0.06

Similarly appearing material is reported from  $\frac{1}{2}$  mile north of Magnetite bay. The Chibougamau Commission reports (p. 215) as follows from this locality:

"From the face of a prominent outcrop, on the hillside, sample No. 70 was taken; this is a chip sample carefully taken from every foot across 80 feet of the exposure; it assays: iron, 35.7%; insol. residue, 23.3%; sulphur, 0.25%; titanium, 0.86%; phosphorus, 0.017%.

Directly northeast of it, another sample, No. 77, was taken across 500 feet; in this case, some of the ground was covered, but the ribs of rock and ore, which appear to cross this direction, occupied most of the distance. This sample No. 77 assayed: iron, 23.8%, insol. residue, 33.54%; sulphur, 0.18%; titanium, 0.69%; phosphorus, 0.022%."

The sample of magnetite from McCorkill township is reported by Longley (1) to yield

Fe	Ti
%	%
53	7.5

No assay results from the two occurrences in Lemoine township are available, but it is reported that they are of the type high in titanium.

#### Vein Type Deposits

Quartz veins of economic importance have not been found to date within the map-area. However, the Galski, Campbell Chibougamau Cedar bay property and Horbeau are vein type deposits of merit.

Knoll Island, off the southwest end of Merrill Island, is cut by an irregular body of quartz. Good values in gold have been obtained from this vein but the gold is erratically distributed.

The veins strike in various directions but most commonly between east and southeast.

#### Replacement Type Deposits

Replacement deposits are the most widespread type of metallic sulphide concentration in the district. Within the Doré Lake sector, they are confined to the anorthosite breccia and the general description of their characteristics will be confined to this area. Pyrrhotite, pyrite, chalcopyrite and sphalerite is the typical mineral association in that order of abundance. Gold is also present and its distribution is erratic. These sulphides occur as disseminations, stringers and lenses in sheared anorthosite breccia. The pyrite, pyrrhotite and chalcopyrite occurs both as medium-fine grained and very fine grained in texture. Both textural types may exist side by side. There appears to be more than one generation of these minerals. In general, the chalcopyrite is later than the pyrrhotite and the pyrite is between the two in age. The sphalerite occurs along fractures filled with white carbonate and / or quartz along the outer fringes of the sulphide zones and within the zones, particularly where they are silicified. The sphalerite appears to be later than the chalcopyrite and hence the youngest sulphide present. However, these observations must stand the test of microscopic observation.

The anorthosite breccia along the sulphide bearing zones has been sheared and altered both hydrothermally and also from the dynamic action of the faulting which produced the shearing. Fragments of the anorthosite breccia have been replaced by silica and by talcose and sericitic material. In many instances, hydrothermal alteration has been so intense that large portions of shear zones

(1) Op. cit. p. 6.

have been replaced to varying degrees by the above products as well as brown and white carbonate and green mica. In the extreme, this results in a soft structureless rock with very little trace of the shearing or of the fragments remaining. That post sulphide and post alteration movements took place along these zones is evidenced by the fact that the sulphide minerals have been slickensided and the replaced portions of shear zones have, in some places, been fractured and re-sheared.

The alteration extends some distance into the country rock from the sulphide zones. The chloritic material which normally comprises the matrix of the anorthosite breccia is replaced by talcy minerals, by quartz, by white and brown carbonate and by green mica. The proportions and variety of these minerals imparts considerable heterogeneity in the appearance of the matrix of the anorthosite breccia. A classification of the various matrix types is best carried out in the field on a colour basis and the following types were recognized:

Blue-grey matrix is talcose but may contain some silica replacement and carbonate. It replaces fragments in the anorthosite breccia and shear zones. It occurs as stringer-like forms in anorthosite breccia and as nuclear growths in other types of matrix found in the anorthosite breccia.

Smoky grey, dark grey, grey and light grey matrix appears to be closely allied to the blue grey type in composition and mode of occurrence; the colour being modified by the amount of silica, carbonate and to a lesser degree sericite present.

Carbonate, in some instances, replaces the original matrix of the anorthosite breccia imparting a buff and yellowish brown colour to the matrix.

Yellow and yellowish green varieties of matrix are due to a predominance of sericite which generally contains some talcose minerals. This type commonly occurs along and adjacent to shear zones.

Bright green mica in a few localities comprises most of the matrix of the breccia but is not a common variety of matrix.

Chlorite green matrix is characteristic of the regional matrix of the anorthosite breccia.

Field evidence indicates that chlorite and related minerals are characteristic of the regional anorthosite. The matrix characterized by an intimate mixture of chlorite and sericite, which imparts a pale yellow, yellowish grey, and yellowish green colour to the matrix is characteristic of dynamic metamorphism. It is consequently found along the numerous shear zones in the anorthosite. The blue grey, dark grey, grey, light grey, bright green, buff and yellowish brown types of matrix are due to hydrothermal replacement which occurs in places along the shear zones. There is evidence that blue grey, dark grey, smoky grey and siliceous types of alteration are closely allied with the sulphide mineralization. A more detailed study in the field and laboratory is required to confirm this. There is a definite relationship at least in the case of quartz replacement as the gangue in much of the sulphide zones is highly siliceous. The amount of quartz present has in places reached the degree where it could be classified as a quartz vein impregnated with sulphides.

The deposits in the vicinity of Lac aux Dorés all occur on either side of and within a mile of the McKenzie Narrows fault. These include the properties on the Kayrand, Merrill Island, Quebec Chibougamau Goldfields and Campbell Chibougamau properties on or adjacent to Merrill Island; the Kokko Creek section of Merrill Island Mining Corporation, Kokko Creek Mines Ltd., Campbell Chibougamau and Jaculet on the northeast shore of Lac aux Dorés. With the exception of the Cedar Bay property of Campbell Chibougamau Mines, which has a complex structural setting, the sulphide bearing zones are related to shear zones which have a southeast strike. These relationships would suggest that the McKenzie Narrows fault acted as the major structural control, while the southwest striking shear zones acted, where conditions were favourable, as traps for the localizing of mineralizing solutions.

There is some evidence, in the vicinity of Merrill Island, that curvatures in both dip and strike of the McKenzie Narrows fault is one of the favourable conditions requisite for the localizing of mineralizing solutions in the southeastward striking shear zones. Curvatures in dip and strike of the southeastward striking sulphide zones also impose an important control on sulphide deposition. An example of this is the east zone of Merrill Island Mining

Corporation. This zone is arcuate in outline and is richer in copper than the straight main Merrill Island zone. Another example is the Quebec Chibougamau Goldfields deposit. The richest and widest portion of this deposit lies in that part of the ore structure that is arcuate.

A further controlling factor in the localization of the mineralizing solutions is the presence of fine grained grey dykes. Some of these dykes contain feldspar phenocrysts and others are massive. They attain widths up to 40 or 50 feet. There are at least 2 ages of grey feldspar porphyry dykes and the grey massive variety is younger than some of the porphyry dykes. These dykes are all cut by dioritic and gabbroic dykes. The three varieties have a regional southeast strike and, in many places, lie along southeastwardly striking shear zones. Dyke contacts with the shear zones are both sharp, with chilled contacts, and sheared. In some cases, the whole dyke is weakly schistose indicating minor post dyke movements along shear zones predating the dykes. The fact that there are several ages of dykes complicates the shearing-dyke relationships.

The replacement sulphide deposits are found along zones which contain swarms of these dykes. While the sulphides generally lie within the sheared and altered anorthosite breccia, they are also found in the grey dykes, extending across the contact and into the schistose portions of the dykes. The distribution of these dykes with respect to the shear zones and sulphide deposits would suggest that they had a supporting or ribbing effect on the anorthosite breccia during post dyke but pre-ore movements, providing support for low pressure zones in areas where an arcuate structural configuration would tend to produce such zones, and provide favourable local for sulphide deposition. A further supplementary control by these dykes is suggested on the Campbell body. In this section, a grey dyke or dykes in many places form the hanging wall of the sulphide zone suggesting that these dykes had a damming effect on the mineralizing solutions.

#### MINING PROPERTIES

##### Kayrand Mining and Development Co.

The Kayrand deposit occurs on the northwest side of Merrill Island. All but the southern part is underlain by anorthosite. The latter is underlain by granite.

The copper bearing zone was discovered in the spring of 1950 by drilling a geophysical anomaly. The zone lies in schistose anorthosite and contains chalcopyrite, pyrrhotite, pyrite and a little sphalerite. Small amounts of gold and silver are associated with the sulphide mineralization. It is comprised essentially of a central core of relatively higher copper content and a lower grade envelope. Sphalerite bearing fractures fringe this zone. On surface, a grey massive dyke lies on the footwall side of the ore. It approaches the ore zone with depth and locally the ore lies within and underneath the dyke.

The mineralized zone strikes north 60° west, dips 70° northeast and plunges from 30 to 50° to the northwest. This zone has been traced for 1600 feet and tested to a depth of 300 feet. It has an average width of 20 feet. Company reports indicate that there is 250,000 tons containing approximately 2% copper with small amounts of gold, silver and zinc. Prospects of extension with depth of this body are regarded as favourable as drill intersections of average grade have been obtained down to 800 feet.

##### Merrill Island Mines Ltd.

A copper deposit on this property has been known since 1920 when an iron-stained outcrop was discovered on the lake shore at the west side of the entrance to the large bay on the north side of Merrill Island.

The mineralization occurs in schistose anorthosite which has locally been silicified and here and there contains lensey quartz stringers. The mineralization consists of chalcopyrite, pyrite and pyrrhotite as disseminations, as stringers and as massive lenses replacing the schistose anorthosite. Locally, small amounts of sphalerite are present along with some gold and silver. The amount of sulphides and their proportions relative to one another varies considerably from place to place both in the surface showings and in the drill core. Grey massive and grey feldspar porphyry dykes occur within the sulphide zone.

The sulphide mineralization occurs along a series of southwestwardly striking parallel and sub-parallel zones. The contacts with the country rock are gradational and hence the chalcopyrite bodies are outlined by assay limits. The degree of sulphide replacement, because it varies from place, is lense-like. Consequently, sulphide bodies of probable ore grade do not reach surface and others pinch out at a shallow depth.

There is some evidence that sulphide-bearing structures obliquely link some of these parallel zones.

Exploration to date has been concentrated mainly along two zones; the main zone and the east zone.

The main zone, which strikes approximately north 50° west, contains persistent sulphide mineralization over widths up to 50 or 60 feet. It apparently dips steeply to the south. This zone may be divided into 2 bodies in which copper mineralization is concentrated to the greatest degree. The first occurs from the lake shore southeast for 500 feet with an ore width of 29 feet and the second from 900 to 1900 feet back from the lake shore with an ore width of 21 feet. Recent drilling at depths below 1000 feet has indicated that the low grade section between the above two zones improves in grade with depth.

The east zone lies about 300 feet northeast of the southeastern end of the main zone. It has a general trend of north 30° west but is more sinuous than the main zone. It has been drilled for a length of about 1000 feet. Its average width is about 50 to 60 feet.

It is estimated from the diamond drill holes that there is 2,900,000 tons average 2.16% copper from these two zones down to the 750-foot horizon. Deep drilling has established continuity below the 1000-foot horizon.

#### Campbell Chibougamau Mines Ltd.

##### Merrill Island Section

The Merrill Island Section of Campbell Chibougamau Mines contains the extension into the lake of the main zone of Merrill Island Mines Ltd. The lake shore forms the boundary between the two properties at this point. This part of the sulphide zone was drilled first in 1929 when 20 drill holes were put down by Chibougamau Prospectors Ltd. and again in 1935, Consolidated Chibougamau Goldfields Ltd. drilled 12 more holes. A drilling campaign was carried out last winter and shaft sinking is now in progress on Merrill Island.

The extension of the main zone of Merrill Island has been traced for 330 feet into the lake. This section is estimated by the company to contain about 1,000,000 tons averaging 3.5% copper and 0.15 oz. gold per ton.

A second, but only partially explored sulphide lense, has been found 200 feet northwest along the strike of the main zone. The copper and gold content is about the same as the main zone.

It is believed that a dip extension of the Kayrand ore zone enters the property adjacent to Kayrand at a vertical depth of about 800 feet. Three drill intersections gave core lengths of 5 to 18 feet of 1.67 to 3% copper, 0.8 to 3.42% zinc and some silver.

#### Quebec Chibougamau Goldfields

This company has a copper bearing zone located on the northeast tip of Merrill Island. It strikes approximately north 38° west and dips steeply to the northeast. This zone is not exposed on surface, but has been traced for 400 feet by diamond drilling. It apparently pinches out to the northwest and has been faulted away to the southeast. The faulted extension of this zone has not yet been found.

The best values and the widest sections of sulphide mineralization (up to 25 feet) occur along the southeastern 200 feet where it curves sharply towards the east just before the fault is reached. Towards the northwest it splits into two narrow tongues.

Many grey dykes - both massive and porphyritic - lie along this zone

and a diorite dyke 30 feet wide parallels the sulphide zone about 160 feet out on the hangingwall side. The dykes dip steeply to the southwest while the ore dips steeply to the northeast.

The sulphide mineralization consists of pyrrhotite and pyrite with coarse chalcopyrite and locally sphalerite. It occurs as stringers, massive lenses and disseminations replacing schistose anorthosite.

The company reports that the sulphide zone contains 500,000 tons averaging 2.2% copper and 1.2% zinc.

#### Kokko Creek Section of Merrill Island Mining Corporation

The Kokko Creek Showing was discovered by John Kokko while prospecting during the summer of 1906 and 1907. Work was done on the property by Northern Investment and Mining Company in 1920. The present company has drilled 16 holes and traced the mineralized zone for 1450 feet. The mineralization is similar to that found on the Merrill Island and Campbell zones. It is associated with a grey dyke containing porphyritic phases. The dyke is between 30 and 50 feet wide, strikes north 50° west and dips nearly vertically. Several dykes branch away from the main one. The main dyke lies along a shear zone and the mineralization lies within the dyke along its edges and along oblique branch shears trending away from the main zone. Three northeasterly trending cross faults are known to cut this zone. Two of them have apparent horizontal displacements of 30 and 40 feet respectively. The offset on the third is not yet known. The copper values are low towards the northwest but improve towards the southeast. The most southwesterly hole intersected 30 feet of sulphides assaying between 2 and 7% copper.

#### Campbell Chibougamau Mines Ltd.

##### Cedar Bay Section

On this section, at the head of Cedar Bay, during 1935 to 1937, a 3-compartment shaft was sunk to 522 feet by Consolidated Chibougamau Goldfields. Lateral development was carried out on the 250 and 500-foot levels. The property is traversed by converging fault zones. Subsidiary fractures with a general east-west and southeast trend carry quartz and carbonate and are mineralized with chalcopyrite, pyrite, pyrrhotite and gold. These furnish the ore zones. They vary in width from 1.5 feet to 8.5 feet and attain a maximum length of 435 feet. It is estimated that the zones of this type contain 170,000 tons of 1.95% copper and 0.23 oz. gold per ton.

A second differing type of mineralization is exposed on the 500-foot level and is known as flat orebody. It is of the replacement type, contains chalcopyrite and is approximately 50 feet thick. It is estimated to contain 300,000 tons averaging 1.5% copper and 0.02 oz. gold per ton.

#### Jaculet Mines Ltd.

This property lies on and around Cedar Bay. The northern part of the property is underlain by volcanics and the part to the south by anorthosite. A carbonate zone lies along the contact between the volcanics and anorthosite. A strong carbonatized shear zone, striking slightly south of east and with a vertical dip, passes centrally through the property.

The exploration campaign carried out has been successful in finding two zones of copper-gold mineralization.

The north zone lies along the strong shear zone where it enters the lake. It has been traced for a length of 1000 feet. It apparently pinches out inland but is still open under the lake. It has an average width of 55 feet, dips steeply north and strikes slightly south of east. The mineralization is mainly chalcopyrite and pyrite. It is estimated that there is 1,000,000 tons containing 1.5% copper along this zone. Metallic content of up to 1.2 oz. Au per ton, 2.4 oz. Ag per ton, 19.4% Cu have been obtained from individual samples.

The south zone is 1900 feet south of the north zone and lies under the lake in Cedar Bay. This zone consists of a number of lenticular deposits of variable copper content and locally of good gold content. There is not as yet sufficient work done to determine if there are definite ore shoots present.

Quebec Smelting & Refining Ltd.

This group lies to the north of Cedar Bay and the sulphide mineralization occurs in the carbonate zone which occurs between the anorthosite and volcanics.

Two zones have possible importance. One strikes slightly east of north. It consists of five sulphide lenses consisting of nearly massive pyrite and chalcopyrite strung out along a zone 175 feet long.

The second zone lies 170 feet east of the first zone. It has been traced for a length of 300 feet and a width of 120 feet. This area contains numerous chalcopyrite-pyrite lenses ranging from a few inches up to 27 feet wide. The zone strikes E.20°S. and dips 70°N. Copper content ranges up to 3% and traces of gold and silver are present.

Obalski (1945) Ltd.

The property lies around and to the north of Caché Bay and is a good representative of the vein type gold deposit. It has been dormant since 1946.

The work done on the property dates back to 1928 and has included stripping, trenching, diamond drilling, geophysical surveys, construction of tractor roads and buildings; 277 feet of shaft sinking and some 1176 feet of underground development work. Levels have been established on the 150 and 250-foot horizons.

The most promising gold occurrences lie along three quartz veins known as the A, C and D veins. The veins vary in strike from east-west to southeast and lie along narrow, somewhat discontinuous shear zones. These shear zones represent horsetails which branch away from the northeast side of a southeastwardly trending fault.

The veins lie for the most part in fine grained gabbro, but where they leave the gabbro and lie in other types of rock, the gold content of the vein decreases considerably. The veins have been traced for distances of from 900 to 1600 feet. They vary in width from a few inches to 7 feet and dip from vertical to 60° south or southwest.

The D vein is narrow and high grade, containing \$38.15 per ton gold for a length of 528 feet and a width of 15.9 inches.

The A vein is wider, lower grade, but contains considerable copper. It is reported to contain \$9.95 per ton of gold, 2.76% copper for a length of 256 feet and a width of 50 inches.

The C vein is narrow and lensey and contains four high grade shoots which vary from \$17 to \$27 in gold per ton over lengths of 25 to 75 feet and widths of 12 to 40 inches.

The company reports 150,000 tons averaging 0.404 oz. Au per ton and 1.18% copper from the A, C and D veins.

Taché Lake Mines Ltd., Antoinette Group

This group was formerly controlled by O'Leary Malartic Mines Limited. Work was carried out on the property in 1950 by Noranda. Taché Lake Mines Limited is currently carrying on exploration work by diamond drilling.

Two sulphide zones are known. These are called respectively the North Zone and the Berrigan Zone. The sulphide consists predominantly of pyrrhotite with which is associated sphalerite, galena, and a minor amount of chalcopyrite.

The North Zone varies from 4 feet to 20 feet in width. The south hundred feet of the North Zone strikes north-south. North beyond this point, it splits into two branches, one branch curving to an east-west strike and the other branch curving to a north-northeast strike. The maximum width of 20 feet occurs at the junction of the two branches. It has an overall length of 300 feet, but is still open towards the south.

The Berrigan Zone strikes east-west, has been traced for 1500 feet

and is open at each end. The width varies from 20 to 150 feet. It consists of a breccia zone in peridotite. Pyrrhotite, sphalerite, galena and chalcopryrite occur as replacement, mainly in the matrix of the breccia. Values in excess of 7% zinc and some copper and gold have been obtained, but no high grade body has as yet been outlined. Mr. H.E. Corbett is consulting engineer, and Mr. Nelson Bidgood is resident manager.

#### Belle Chibougamau Mines Ltd.

The property is situated at the west end of Bourbeau lake. The first mineral find was made prior to 1930.

Numerous stringers and lenses of sulphides in serpentine and pyroxenite were found last summer by prospecting on different parts of the property. The most promising occur in the vicinity of the original discovery on the north shore of the lake at the west end. They consist of four sulphide lenses replacing the country rock. They strike approximately north-south and occur along a north-south zone 200 feet long. They are between 12 and 20 feet long and up to 5 feet wide.

The mineralization consists mainly of fine grained massive pyrrhotite containing stringers and disseminations of chalcopryrite. Some fine disseminated grains of sphalerite are locally present. Gold up to 1 oz. per ton, 1 to 2% zinc and 2 to 3% copper have been obtained in different samples.

#### Norbeau Mines Ltd.

It is located on the south central shore of Bourbeau lake. Gold was discovered here in 1931. Noranda Mines has done considerable drilling and trenching along a quartz vein striking N. 30°E. It has a known length of 1400 feet and average width of 4.5 feet. It dips 45° to 60° southeast. The quartz contains pyrite, arsenopyrite, chalcopryrite and a little visible gold.

It is estimated that there is 360,000 tons averaging 0.35 oz. gold per ton outlined to date on this property.

Other gold bearing veins are present, but not so extensive as the main vein.

#### Opemiska Copper Mines

This favourable deposit is located in Levy township. A shaft has been sunk to 550 feet with workings on three levels. The main structure consists of three east-west striking zones, 150 to 600 feet long, two of which are linked by a northwest trending zone. The mineralization occurs along altered shear zones which are locally silicified. They dip to the north. The mineralization consists of chalcopryrite, arsenopyrite and pyrite. It is reported that ore shoots along these zones contain to date 283,000 tons containing 7.4% copper and 0.13 oz. per ton Au.