

GM 10515

REPORT OF EXPLORATION IN THE CORVETTE LAKE - LA GRANDE RIVER AREA

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TYRONE MINES LIMITED
REPORT OF EXPLORATION
IN THE
CORVETTE LAKE - LA GRANDE RIVER AREA
NEW QUEBEC
JUNE - OCTOBER, 1959

PUBLIC

QUEBEC DEPARTMENT OF MINES
MINERAL DEPOSITS BRANCH
No G M- 10515 33

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INTRODUCTION

During the winter of 1958-59 a study was made of New Quebec to locate an area in which reconnaissance prospecting could be done during the summer of 1959. In the course of this study an area in the south-western portion of Ungava was located which was not too remote from civilization and yet had been relatively neglected by prospecting. The area chosen lay generally north of the Eastmain River, east of Hudson and James Bays and south of the La Grande River. Maps by the Geological Survey of Canada indicated the presence of two main greenstone belts. The first, lying close to the Eastmain River, was known to have been explored by another company in 1957 and 1958 but the second, lying immediately south of and parallel to the La Grande River, was found to be unexplored except at the westward end where two companies had done some work. For these reasons the area between $72^{\circ}00'$ and $76^{\circ}30'W$ longitude and between $57^{\circ}15'$ and $53^{\circ}45'$ N. latitude was considered to be most favourable for exploration and a more detailed office investigation was begun in April of 1959.

The office study included the acquisition of government aerial photographs, one inch equal 8 mile geological maps and one inch equals two miles aerial mosaics. A stereoscopic study was made of 592 aerial photographs and topographic evidence of structure and geology was noted on one inch equals two miles base maps traced from the mosaics.

With the completion of the above a working crew of one geologist and three prospectors serviced by a Cessna 180 aircraft on full charter was set in the field on June 17th to begin the

reconnaissance work.

Work on the proposed exploration area included broad aerial reconnaissance, detailed aerial reconnaissance, ground reconnaissance prospecting, detailed ground prospecting, trenching, drilling and mapping. As a result of the initial work, four areas totalling 239 square miles were chosen and applications for Mineral Exploration Permits were made by Tyrone Mines Limited.

Work terminated on October 5th, 1959.

LOCATION AND ACCESS

The area originally under consideration enclosed an eastwest trending band of volcanic and associated sedimentary rocks lying between longitudes $72^{\circ}00'W$ and $76^{\circ}30'W$ and latitudes $53^{\circ}15'N$ and $53^{\circ}45'N$. The centre of this area lies approximately 195 miles east of Fort George on James Bay, 320 miles west-south-west of Schefferville and 250 miles north of Chibougamau, the closest railroad "end - of - steel".

The La Grande River and its main southern tributary, the Sakami River, traverse the ground from east to west with the La Grande at the north and the Sakami at the south but neither of these rivers are suitable for canoe travel from the James Bay coast because of the numerous falls and long violent rapids. At the present time the only reasonable means of access to the area is by float or ski equipped aircraft. Numerous lakes dot the area, many of sizeable proportions, and no problems are encountered in finding suitable lakes for landing aircraft. At the present time the nearest and best outside base of operations is Chibougamau with aircraft, supply, and mail facilities.

TRANSPORTATION AND COMMUNICATION

During the summer season of 1959 a Cessna 180 aircraft was engaged for three and one half months on a full charter basis from Fecteau Transport Aerien. A total of 321 hours and twenty minutes was flown during the season and although the Cessna is limited as to weight of load and size of individual pieces, it was found to be ideally suited to the purpose of camp movement, aerial reconnaissance and resupply.

An Otter aircraft was used three times during the summer for the moves in and out of the field and one flight with aviation fuel. Two Canso flights were made in the spring for the purpose of placing a gas cache at Janette Lake, the point chosen for the beginning of the exploration.

Radio communications were maintained with fair regularity with the Fecteau base at Cache Lake using the 35 watt radio in the Cessna aircraft. A one and a half watt radio was also tried but was found to be generally unsatisfactory for the 250 mile transmission to Chibougamau. The usual radio "blackout" periods were observed at the beginning of July and the end of September, during which radio communication was impossible.

PHYSIOGRAPHY

The topographic relief along the greenstone belt located in the area is generally low with some higher hills protruding up to 500 feet above the general glacial plain where pegmatite and granite have intruded the more easily eroded rocks. Some areas of greenstone appear to be more resistant and do form ridges, especially towards the west, but these are generally lower than the intrusive knobs.

Glaciation has been the prime agent in moulding the land forms. Rock ridges are well rounded, generally bare on the stoss-side and top and quite often till covered on the lee-side. Most of the central region of the area explored is covered by shallow till with numerous small outcrops protruding and very little swamp. However, the eastern end was found to be heavily covered with drift, generally in the form of drumlins, and one section in the west is heavily sand covered from flood-plain or esker outwash action. From drumlin, ridge and striation evidence, glaciation is assumed to have impinged from the east-north-east.

Vegetation includes spruce, jackpine, tamarack, alder, dwarf birch, willow, birch, and poplar in progressively decreasing amounts and Labrador tea grows throughout the whole area. Towards the east much of the tree cover has been burned by recent forest fires but vegetation is seen to increase, as do the hardwoods, towards the west.

WEATHER

The exploration areas lies in a belt of notoriously foul weather and previous figures show an exploration-work lost time average of 40 percent. However, the summer season of 1959 was blessed with exceptional weather and only 25 percent of the time was lost.

Weather had almost no affect on flying time except during the last few days of the operation.

WORK DONE

Work commenced on June 17th when a party of three prospectors and one geologist with a Cessna 180 and pilot set up camp on Janette Lake at $74^{\circ}06'W$ longitude and $53^{\circ}32'N$ latitude and terminated

On October 5th, 1959.

The first stage of the work, broad aerial reconnaissance, was done over a broad area to isolate areas of most interest. These surveys showed that the area east of $73^{\circ}50'W$ longitude was generally overburden covered, underlain by granite gneiss and generally uninteresting and so it was ignored for the rest of 1959 season. West of the above longitude, the most interesting ground was found to lie on a greenstone belt trending in a general eastwest direction.

The second phase of aerial prospecting was then done on the greenstones of the area considered more favourable. This entailed flying traverses at one to two mile intervals across the strike of the greenstones and noting structural features and gossans or rusty weathering formations.

Following the discovery of gossans in any area, ground reconnaissance and prospecting were done. This work was done using two or three men making traverses crossing the features seen from the air and at approximately one mile intervals. Grab samples were taken on showings of possible economic value.

Where interesting mineral occurrences were observed, detailed prospecting was carried out, in four areas, accompanied by trenching, chip sampling and some packsack diamond drilling. Four extra men were employed towards the end of the season to aid in the trenching and drilling. A total of 256 feet of diamond drilling was done.

Little geophysical work was done but dip needles were used in several places to locate iron formation contacts and in one case a portable electromagnetic surveying instrument was used in

an attempt to trace a mineralized zone.

A total of 77 samples were taken and sent out for analysis. The samples ranged from grabs to chips to split core samples.

A small amount of detailed mapping was done by the author on areas where it was considered that a clue to mineralization might be found in this manner.

In all, 507 man days were spent working on the areas with the following division of man days per area:

	<u>Man Days Worked</u>	<u>Percent of Total</u>
Permit 150	100	19.75
Permit 151	160	31.5
Permit 152	80	15.75
Permit 153	167	33.0

This work was spent in the following manner:

Prospecting	419
Trenching	44
Drilling	34
Geological Mapping	10

✓ GENERAL GEOLOGY

The area of interest is cut by a belt of Archean volcanic and sedimentary rocks of Keewatin age. This belt in general separates the two main country rocks found in the region with granite gneiss to the north and sedimentary gneiss to the south. As these rocks grade into one another, the split is not definite and in some cases intrusives occurring on either side of the greenstone have altered the picture slightly.

The volcanic rocks have been lightly to strongly altered and recrystallized with an apparent increase in the alteration from west to east. This feature is particularly noticeable in the pillowed andesites which become increasingly altered until no pillow outlines can be detected at the extreme east end. The series appears to represent at least two periods of vulcanism and sedimentation.

Iron formation was found in the sediments of the series and variations in thickness appear to be caused by depositional and contortional differences. The bands of iron were observed in a single sedimentary band and widths observed ranged from two feet to several hundred feet. The latter figure was seen where repetition by contortion had thickened the iron from a normal width of 150 feet and, although it could be seen that drag folding had played a large part in the thickening, there is evidence that faulting may also have been active on the deposit.

The rest of the sedimentary rocks are generally fine grained clastics and high chert rocks with some well developed basal bands of quartz pebble conglomerate, chert pebble conglomerate and quartzite. Metamorphism of the sediments has been well developed in the east, and they at times approach the appearance of the older sedimentary gneisses and schists which lie to the south of the greenstone belt. In some cases, especially in the outliers of more highly altered volcanics scattered through the granite gneisses, alteration has been carried to an extreme with visual evidence of origin practically obliterated. At times these outliers can only be recognized by the remnant banded iron formation from which all other rocks have been removed by assimilation and

recrystallization.

Volcanic rocks of the belt range from rhyolitic to ultrabasic lavas with some inter-bands of tuff. In some areas the ultrabasics have been serpentized and at one location attain an apparent thickness of almost one thousand feet.

Nickel bearing sulphides appear to be associated with the ultrabasic rocks but no ore concentration was found. The degree of regional alteration of the belt in general seems to have no bearing on the serpentization as it occurs in both lightly and strongly altered rocks.

The gneisses and schists to the south of the belt consist generally of paragneiss and paraschist but do contain occasional bands of granite type gneiss and pegmatite. On the whole the rocks are lacking in sulphides and uninteresting. Some lightly pyritized bands were observed but no other sulphide mineralization was disclosed.

Basic dykes, generally gabbro, ranging from one foot to 300 feet were seen cutting all rock types except the younger granites and pegmatites. In general these dykes exhibit marked cooling at the contacts, and grain size at the center is relative to dyke width. Some gabbros carry grains up to one centimeter. Minor disseminations of pyrite and pyrrhotite were observed scattered through the dyke material with slightly greater amounts observed in the cooled contact phase. At some locations, where the dykes cut the greenstone belt, a nickel reaction with dimethyl glyoxime powder was experienced but only trace amounts were suspected.

The dykes are generally rusty weathering and can be traced for several miles where they cut through contrasting sedimentary

gneisses and schist and the granite gneisses. More assimilation and less uniform contacts were observed where the dyke passes through the more similarly basic greenstone.

The pegmatites vary from normal granite pegmatites to more quartzic types with only scattered feldspar crystals and biotite books, and in some cases carry triangular prismatic tourmaline crystals up to $1\frac{1}{2}$ inches in diameter. These dykes were observed in dimension from a few feet to hundreds of feet with the larger ones being more plug-like than tabular.

The sedimentary phase of the volcanic belt rocks abounds in sulphides of various types and many pyrite and pyrrhotite gossans were observed on zones of sulphide replacement, generally in the quartzite, conglomerate or iron formation. Associated with the iron sulphide minerals are various amounts of copper, nickel, lead, zinc and molybdenite and gold and silver. It seems that most of the massive sulphides contain about 0.03% copper but concentrations of chalcopyrite do occur in various parts of the area.

Besides the sedimentary replacement deposits, sulphides are seen to accompany quartz and carbonate vein material especially towards the western end of the area examined. Minor occurrences of galena and sphalerite were noted in narrow carbonate filled cracks. Larger quartz lenses in the pillow andesites were found carrying massive chalcopyrite in blebs or stringers with associated pyrite, pyrrhotite and carrying gold and silver values. In this area the chalcopyrite was also found as replacements in some of the vesicular pillow tops and disseminated along minute carbonate-filled fractures.

STRUCTURE

Bedding and banding of the rocks of the area appears to be generally uni-directional with the greenstone belt lying in one main east-west trough and numerous outliers indicating the roots of other minor ones.

At 76°00'W there is one major fold system of a northeast plunging anticline and syncline with axes trending northeast. The axes lie approximately eight miles apart. Some drag folding and tension cracks were observed associated with these folds and may well be the structural control of the mineralized quartz lens injection observed. The drag folding may also be the cause for the increased width of the iron formation on the northwestern limb of the anticline. A similar fold of smaller proportions is suspected at the west end of Guyer Lake (75°30'W).

Faults occur in various places in the area, generally striking northsouth, and may be related to the opening that controlled deposition of the gabbro dykes.

Shear zones were observed in several locations, both in the sediments and volcanics, and have been the control for minor pyrite deposition in some cases. Some shears were seen to cut the serpentine rocks and in various instances were found to contain asbestos in minor amounts or minor nickeliferous pyrrhotite mineralization.

PROPERTY ACQUISITIONS

In the course of the detailed air traversing many gossans were observed which were later found to be interesting mineralized occurrences when observed by the reconnaissance prospectors. The

areas enclosing these occurrences were then plotted and applications for mineral exploration permits were tendered to the Quebec Department of Mines.

The permits were granted on November 11th, 1959 to Tyrone Mines Ltd. and are to be in effect for a three year period beginning December 3rd, 1959.

Mineral Exploration Permit No. 150

The area granted by this permit is 31.6 square miles and is bounded by straight lines joining successively the points of intersection of the following latitudes and longitudes.

Latitude North	53°35'	and longitude west	73°50'
"	"	"	"
"	"	"	"
"	"	"	"
"	"	"	"
"	"	"	"

Mineral Exploration Permit No. 151

The area granted by this permit is 41.2 square miles and is bounded by straight lines joining successively the points of intersection of the following latitudes and longitudes:

Latitude North	53°32'	and longitude west	74°00'
"	"	"	"
"	"	"	"
"	"	"	"
"	"	"	"
"	"	"	"

Mineral Exploration Permit No. 152

The area granted by this permit is 118.8 square miles and is bounded by straight lines joining successively the points of intersection of the following latitudes and longitudes:

Latitude	North	53°32'	and longitude west	74°30'
"	"	53°29'	"	74°30'
"	"	53°29'	"	74°20'
"	"	53°32'	"	74°20'
"	"	53°32'	"	74°30'

Mineral Exploration Permit No. 153

The area granted by this permit is 47.4 square miles and is bounded by straight lines joining successively the intersections of the following latitudes and longitudes.

Latitude North	53°41'	longitude west	75°50'
"	53°35'	"	75°50'
"	53°35'	"	76°00'
"	53°41'	"	76°00'
"	53°41'	"	75°50'

The total area granted by the exploration permits is 239.0 square miles.

MINERAL OCCURRENCES

General

Many mineral occurrences were found by ground prospecting at intervals along the greenstone belt. Copper mineralization occurs as replacements in sediments, hydrothermal depositions with quartz in lenses and fracture fillings with carbonate or quartz and is generally associated with other elements, nickel, lead, zinc, gold, and silver in various combinations. Copper minerals include chalcopyrite, bornite and native copper.

Very little interesting mineralization was found outside the areas on which application for exploration licences has been made.

Permit No. 150

Most of the sulphides seen on Permit 150 are pyrite and pyrrhotite, but at some localities small amounts of chalcopyrite were observed. One main sulphide zone passes through the area

trending east-west and was traced for five miles along strike. Quantities of sulphide vary along the zone but in places almost pure massive sulphides with varying ratios of pyrite to pyrrhotite were seen. The mineralization has apparently been introduced along a certain band of the sedimentary gneisses and from the amount of coarse recrystallized magnetite seen at some locations the band may have been an iron formation. It appears from some of the samples taken, #917-920 at Island Lake and #981-82 four miles west along strike, that although little chalcopyrite is ever seen the zone contains 0.03% copper and some silver. Pyrite is also seen to occur in various other gneissic and hornblendite bands but in smaller amounts. The iron occurrences in the area are generally well banded magnetic iron formation but widths are negligible and range from ten to fifty feet.

Permit No. 151

In Permit 151, in the Long Lake area, showings are replacement deposits of chalcopyrite, pyrite, pyrrhotite and some sphalerite in sedimentary gneisses and schists of the volcanic group that have been more highly altered than usual. The main zone of mineralization, lying approximately one quarter mile south and southwest of the western end of Long Lake is a replacement by varying quantities of copper, nickel and zinc sulphides with accompanying silver and gold values along a band of iron formation. The iron formation is an altered, well banded rock composed of interbands one eighth to one quarter of an inch wide of fine grained magnetite and actinolite. Wall rocks are hornblende gneiss, quartz garnet gneiss, quartz mica gneiss and sericite schist. In some places, generally the better mineralized locations,

recrystallization has been extensive, and hornblende and garnet crystals were observed up to two inches in size. Some of the more siliceous bands are quartzitic in texture but in places the silica has been completely recrystallized to milky quartz.

Showings were located along this mineralized zone for approximately six miles and as seen from the assays for showings 1,2,8,9 and 12 there is a great variation in mineral content along the strike. The formation was not traced between the showings because of overburden cover but from similarity of rock types and strike evidence it appeared probable that they do lie on the same sedimentary band. Mineralization is generally erratic in appearance with tongues of waste and sulphide interfingering but the chip samples taken are fairly representative of the sections analysed.

The following is a list of samples taken along the main zone on Permit 151:

<u>Sample</u>	<u>Showing</u>	<u>Width</u>	<u>Au.</u> <u>oz/ton</u>	<u>Ag.</u> <u>oz/ton</u>	<u>Cu.</u> <u>%</u>	<u>Ni.</u> <u>%</u>	<u>Zn.</u> <u>%</u>	<u>Remarks</u>
929	1	6'	-	0.02	0.10			Sparsly mineralized with sphalerite, and chalcopyrite. Iron formation one foot wide.
925	2	3.8'	-	0.06	0.45			More recrystallization and mineralization than above. Narrow I.F.
935	8	4'	-	0.28	0.49			Well mineralized with pyrite and chalcopyrite at footwall side of zone.
936	8	5'	-	0.26	0.11		0.70	Well mineralized with sphalerite in patches. At hanging-wall side of zone.
945	9	7'	0.005	0.27	1.15	0.04	trace	945 & 946 similar to showing #8 with less visible sphalerite;
946	9	5'	-	0.04	0.26	0.06	-	serpentine adjacent to zone may be reason for Ni. content.
970	12	7'	-	0.02	0.02	-	-	Iron formation with strong pyrrhotite replacement. No visible chalcopyrite.

Average values for showings 8 and 9 are as follows:

<u>Sample</u>	<u>Showing</u>	<u>Total Width</u>	<u>Au. oz/ton</u>	<u>Ag. oz/ton</u>	<u>Cu. %</u>	<u>Ni. %</u>	<u>Zn. %</u>
<u>Average</u>							
935 & 936	8	9'	-	0.27	0.28	-	0.39
945 - 946	9	12'	0.003	0.17	0.70	0.05	trace

As can be seen, the deposition of sulphides varies a great deal along the strike of the favourable formation. In general, the group of more easterly showings (#1 to #9) appears to be of higher grade and may indicate more active ore deposition in this sector.

Paralleling this zone are several occurrences of questionable worth. To the north are several occurrences (showings 3,4,5,6 and 7) that were found to contain some copper with nickel generally associated. Mineralization occurs as fracture fillings, some fractures up to 2 inches wide, and as replacements in certain bands of the sedimentary gneisses. The showings are associated with a band of serpentine lying approximately 300 feet north of the iron formation replacement zone and nickel was detected in most of the analyses. Replacements are composed mainly of pyrrhotite and pyrite and are generally limited to narrow bands. At #7 a shear was observed in the serpentinized rock adjacent to the lightly mineralized gneiss in which some stringers of asbestos fibre occur. Some of the fibre was up to 3/4 inches in length but the occurrence is a curiosity rather than an ore deposit.

At Nose Lake (sample #944) the mineralization occurs in a hornblende gneiss with a sedimentary banded appearance but no garnets or iron formation were observed. From observations on the ground, this showing is distinctly separate from the rest of the Long Lake showings and lies north of a wide band of hornblendite separating the two zones. Mineralization is associated with a replacement band of a fairly massive pyrrhotite and is similar to float which was found further east. From this evidence it is expected that, although the mineralization is not continuous, it probably occurs in places along the same general belt to the east.

A group of occurrences not related to the Long Lake-Nose Lake mineralization were found one half mile north of the Legendre Lake camp. Showing #10 is the best of these occurrences, which are generally erratic splashes of chalcopyrite, pyrite and pyrrhotite in sedimentary gneisses. The rocks are highly silicious where the best mineralization occurs and appear to be a belt of sediments lying between two bands of hornblende gneiss of possible volcanic origin. Small quantities of sulphide were also observed in fractures in these gneisses and some native copper was observed. A chip sample across four feet of the mineralized zone returned an assay of 0.56% cu. and 0.19 oz/ton Ag. The surface outcrops show little strike continuity although numerous splashes of mineralization were observed. In some cases the small patches of sulphide were seen to be composed of 50% chalcopyrite as at one location 1000 feet east of showing #10. Mineralization control at this occurrence appears to be a tear opening beside a small fault crossing the strike of the hornblend~~e~~ gneiss.

Showing #11, lying one half mile east of #10, is a two foot massive pyrite replacement seam in sedimentary siliceous gneiss and schist. The sample (#969) returned only 0.02 oz/ton in silver.

Numerous other sulphide occurrences were observed in the area and although small amounts of chalcopyrite were found at some of the locations the quantity was insufficient to warrant further study. Chalcopyrite and copper stain were also found at various places in the gneisses along the contact of the sediments and the pegmatites south of Janette Lake, southwest of Janette Lake and some small specks were seen in the granite gneisses north of Janette Lake. A grab sample taken two miles west-southwest of Janette Lake assayed 0.04 oz/ton Ag., 0.12% Cu. and 0.02% Ni.

Three small occurrences containing nickel mineralization were also found on Permit 151 south of Janette Lake. These are small shears in the serpentine rocks that contained pyrite, pyrrhotite and chalcopyrite. Samples taken from two of the larger of these returned the following assays:

<u>Sample</u>	<u>Width of Shear</u>	<u>Ag Oz/ton</u>	<u>Cu. %</u>	<u>Ni. %</u>	<u>Remarks</u>
#904	2'	0.02	0.22	0.38	Grab sample. Last serpentine outcrop S.E. of Long Lake.
#905	3'	0.14	0.14	0.05	Grab sample - serpentine two miles southwest of Janette Lake.

The sediments contain other bands of magnetic iron formation but these are all of insignificant width. Lying close to the iron formation, stretched quartz pebble conglomerate and quartzite were observed that are fairly heavily mineralized with pyrite. Outcrops of the conglomerate were seen in many parts of the region but in all cases at the east end no economic sulphide minerals were observed.

Permit No. 152

Although large areas of serpentine rocks are exposed on this area no major showings were discovered during the season. North of Lake Trente several small occurrences were noted. The best of these, at the east end of Damn Lake was an occurrence of chalcopyrite, pyrrhotite and pyrite found in angular boulders believed to be pushups. Overburden in the immediate vicinity of the showing made it impossible to reach bedrock. Other occurrences of chalcopyrite and pyrite mineralized gneiss were seen in the area between and east of Trente and Damn Lakes.

The following results were received from grab samples:

<u>Sample</u>	<u>Al.</u> <u>oz/ton</u>	<u>Ag.</u> <u>oz/ton</u>	<u>Cu.</u> <u>%</u>	
#908	0.02	0.05	1.35	-Damn Lake pushups
#975		0.04	0.06	
#976	0.005	0.09	0.09	
#977		0.02	0.14	
#978		0.03	0.36	
#979			0.03	
#980	0.03	0.15	0.19	

Towards the west end of Permit 152, several other occurrences of different kinds were located, but all are of minor interest. Very little copper mineralization was seen but some fairly strong pyrite zones, generally in sheared tuff, were observed. One of these, sample #914, one mile south of Squirrel Lake, assayed 0.01 oz/ton gold and 0.04 oz/ton silver, another, #915, at the west end of Cocombre Lake gave a trace of silver, 0.02% lead and 0.12% zinc. The lead and zinc occurrences seen are small carbonate-filled fractures cutting the pyrite zones with small amounts of galena and sphalerite present. Another lead-zinc occurrence was observed eight miles east of Cocombre Lake but was not sampled.

Magnetic iron formation was observed south of the west end of Guyer Lake. Although the grade appears to be good, widths are generally less than fifty feet and no thickened sections were observed.

→ Permit No. 153 ✓

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Numerous minor copper occurrences were located on Permit 153 east of Biltup Lake and many small quartz lenses carrying blebs or stringers of massive chalcopyrite were seen cutting the pillow andesites. The quartz has a cataclastic texture in many cases and in one case has a banded or zoned appearance created by small amounts of fine molybdenite mineralization introduced in varying amounts across the lens. All of these quartz-lens-chalcopyrite occurrences are small and irregular with very little strike or dip extension. Some fair gold values were received, but the gold appears to follow the copper mineralization and would therefore be limited in size to the same

degree as the copper. Some native copper and bornite were seen at the surface showing.

At least three sets of fracturing or shearing were observed and the fracture filling solution has deposited small amounts of pyrite, pyrrhotite and chalcopyrite throughout the pillow series. At showing #5, the amount is considerably greater. Grab samples from the surface showing indicated fair grade copper but when drilled the assay was negligible. However, the fracturing appears to be confined to the competent brittle andesites and the mineralization does not carry on into the underlying porphyritic flows. The quantities of pyrrhotite present are sufficient to create magnetic deflection up to 23° from normal.

The following is a list of samples taken at the various locations. It should be noted that most of the higher assays were from grab samples and assays of chip samples from the same locations generally show that the actual values are lower.

<u>Showing</u>	<u>Sample</u>	<u>Type</u>	<u>oz/ton</u> <u>Au.</u>	<u>oz/ton</u> <u>Ag.</u>	<u>Cu.</u> <u>%</u>	<u>Width</u>
#1	929	grab	0.07	0.67	5.43	
	930	grab	0.08	0.61	3.75	
	963	chip	0.03	0.33		7½'
#2A	962	chip		0.07		6'
#2	964	DDH B-2		0.03		8.3'
	965	DDH B-2	0.01	0.08		3.0'
	966	DDH B-2	0.005	0.02		3.2'
#3	939	grab		0.04	0.05	
#3A	961	chip	0.005	0.07		6½'
#4			NO SAMPLE			
#5	938	grab	0.09	0.51	0.95	
	940	grab	0.125	0.84	1.98	
	971	DDH B-5		0.02	0.06	4.3'

#5A	960	chip	0.01	0.04		6'
#6	937	grab	0.60	2.61	11.60	
	959	chip	0.02	0.48	2.13	5½'

The erratic patchy highgrade chalcopyrite type mineralization created the sampling errors in the grab samples. Also, as is seen at showings #2 and #5 surface exposures in some cases are only small occurrences and no strike or dip extension of the better mineralization seen on surface was found to carry on to depth when the showings were drilled.

The E.M. survey carried out to find the strike extension of showing #2 met with no success, but 200' north of showing #2 an anomaly was located which was later drilled with the pack-sack drill. No conductor was intersected but a section of scattered mineralization was cut which assayed as follows:

Hole B4 - 16.8' - 20.7'

#967 0.005 oz/ton Au. 0.04 oz/ton Ag.

All the above samples contained chalcopyrite but as the size of some of the occurrences was generally considered too small, they were assayed for only gold and silver.

Other sulphide occurrences in the area ranged from disseminated pyrite in sediments to massive sulphide zones associated with iron formation. One such deposit located one and one quarter miles southeast of Biltup Lake was sampled (#947) and as is usual in these massive pyrite occurrences it assayed at 0.03% Cu. with some silver.

From an occurrence of disseminated pyrite in sediments north east of Moosehorn Lake an assay of 0.02% Cu. and a trace of silver was obtained.

In the southeast corner of Permit 153 approximately one mile southwest of Tupper Lake an exposure of mineralized quartzite and conglomerate was observed. The main sulphide mineral is pyrrhotite with minor pyrite and chalcopyrite. Three grab samples were taken from three different exposures with the following results:

<u>Samples</u>	<u>Ag.</u> <u>oz/ton</u>	<u>%</u> <u>Cu.</u>	<u>%</u> <u>Ni.</u>
921	0.04	0.06	0.05
922	0.04	0.08	0.05
923	0.03	0.08	0.04

Mineralization is fairly continuous along strike but was noted to be wider and more massive at drag folds which occur at frequent intervals.

The iron formation of this area is quite continuous and from 100' to 150' wide in most places, however, at one location approximately 3 miles west of Biltup Lake a pod was found that is in excess of 600 feet wide. This widening occurs close to the nose of the regional anticline and thickening is probably due to drag folding. However, one fault block of broken banded iron formation (BIF) was found in the footwall rocks, and faulting might therefore be expected to play a part in the structural picture. Over a strike length of 3500 feet width of the formation was found to range from 250' at the ends to a width of 695' at the centre.

Three sample sections were taken across the deposit at approximately 700 foot intervals and assayed as follows:

<u>Sample Nos.</u>	<u>Length</u>	<u>Sol. Fe.</u>	<u>Conc. Fe.</u>	<u>% Recovery</u>	<u>Silica</u>
932-934	695'	36.0	64.7	94.9	9.7
949-953	500'	38.1	65.0	96.6	10.2
954-957	575'	38.8	64.1	92.8	10.8

Average Sol. Fe. in crude	37.5%
Average Recoverable Fe. in ore	35.5%
Average Conc. grade	64.7%
Average Recovery	94.7%
Average Silica Conc.	10.2%

Impurities in the crude were not high but the titania content was slightly over the 0.1% allowable. However, with concentration this was reduced to less than 0.03%. Similarly, the sulphur content of the crude was too high but on concentration almost all of the sulphur was lost, leaving the concentrate with only 0.01%. At any rate, sulphur would be removed during agglomeration of the concentrate. A concentrate of this crude would be a high silica, low alumina, premium, Bessemer product.

At *Toronto, Ont.*
This 22 day of *April, 1960*

Respectfully Submitted,

Robert Ekstrom
Robert Ekstrom



CERTIFICATE

I, Robert Lennart Vilhelm Ekstrom, of the Township of East York, County of York, in the Province of Ontario, do hereby certify as follows:

1. That I am a Geological Engineer registered as a member in good standing of the Association of Professional Engineers of the Province of Ontario.

2. That the following is a true statement of my education.

University of Toronto, Toronto

1952-1956 B.A. Sc. 1956 (Applied Geology)

3. That I have worked as a geological engineer since graduation.

4. That I have no direct or indirect interest in any of the shares or securities of Tyrone Mines Ltd. nor do I expect to receive any.

5. That I spent three and one half months between June 16th and October 5th, 1959 on the properties reported herein as project geologist in charge of all work accomplished.

at *Toronto, Ont.*
this 22 day of *April, 1960*

Robert Ekstrom,
P. Eng. Ontario.



DIAMOND DRILL HOLE B-3

PROPERTY: Permit 153

STARTED: Sept. 17, 1959

LOCATION: 200 ft. north of Biltup Lake
Showing #2

COMPLETED: Sept. 20, 1959

BEARING: North

ULTIMATE DEPTH: 55 feet

DIP: 37°

DEPTH FEET

0-1.7 Andesite, some quartz and carbonate filled fractures.

1.7-2.7 Hornblende - chlorite shear with minor quartz injection and minor disseminated chalcopyrite.

2.7-22.0 Andesite, carbonate filled fractures and some small shears. Minor chalcopyrite.

22.0-24.5 Andesite - more fractured and more quartz than above. Minor chalcopyrite in epidote band (pillow outline?) 1" quartz stringer at bottom.

24.5-28.7 Andesite more massive than above.

28.7-30.2 Fine grained hornblende, chlorite, biotite shear.

30.2-38.3 Massive andesite - minor fractures with quartz and disseminated chalcopyrite.

38.3-39.3 Andesite with quartz vein parallel to core. Some chalcopyrite and pyrrhotite.

39.3-48.2 Andesite - well fractured. Minor fine disseminated chalcopyrite throughout with more in fractures. More biotite.

48.2-55.0 Sheared andesite with some massive sections. Minor chalcopyrite and pyrite throughout, more in sheared portions and quartz stringers and more than above.

END OF HOLE 55'



Logged by:

Robert Ekstrom
Robert Ekstrom.

- 42.9-46.4 Calcite, pink feldspar vein with some scattered chalcopyrite. Higher carbonate, less feldspar towards bottom. Vein may be parallel to D.D.H. as andesite parallel 44.0-44.5'.
- 46.4-47.0 Broken and sheared andesite with some cataclastic quartz with chalcopyrite.
- 47.0-52.0 Andesite with minor chalcopyrite in fine fractures.

END OF HOLE - 52 feet

ASSAYS

<u>Sample</u>	<u>Footage</u>	<u>Feet</u>	<u>Au.</u> <u>Oz/ton</u>	<u>Ag.</u> <u>Oz/ton</u>
964	11.3-19.6	8.3	-	0.03
965	23.8-26.8	3.0	0.01	0.03
966	42.9-47.0	4.1	0.005	0.02



Logged by:

Robert Ekstrom
Robert Ekstrom.

















DIAMOND DRILL HOLE B-2

PROPERTY:	Permit 153	STARTED:	Sept. 14, 1959
LOCATION:	Biltup Lake Showing #2	COMPLETED:	Sept. 16, 1959
BEARING:	South	ULTIMATE DEPTH:	52 feet
DIP:	34°		

<u>DEPTH FEET</u>	<u>DESCRIPTION</u>
0-9.0	Fairly coarse recrystallized andesite-hornblende, biotite and chlorite present. Minor chalcopyrite in quartz filled fractures.
9.0-11.3	Finer more laminar green recrystallized volcanic. Predominately hornblende. Minor chalcopyrite as above.
11.3-19.0	Grey-brown biotite schist shear with concentration of biotite giving gneissic appearance. Chalcopyrite in quartz filled fractures and schist planes increasing to bottom.
19.0-19.6	Quartz vein (milky quartz) with massive bleb of chalcopyrite and some bornite at top.
19.6-23.8	Darker grey biotite schist similar to above. Minor chalcopyrite and pyrite.
23.8-26.8	Cataclastic quartz vein with some well mineralized biotite schist on both sides. Chalcopyrite and pyrite and some fine molybdenite.
26.8-35.8	Recrystallized volcanics similar to start of hole-coarse hornblende, biotite and chlorite. Scattered chalcopyrite disseminated and in blebs. One quartz stringer 1" at 34' with more massive chalcopyrite and pyrrhotite.
35.8-37.3	Massive andesite with some narrow seams of biotite schist. Minor chalcopyrite in quartz filled fractures.
37.3-40.4	Recrystallized volcanics with some cataclastic quartz at bottom. Minor chalcopyrite.
40.4-41.2	Milky quartz with some pink feldspar at bottom.
41.2-42.9	Andesite with replacement of quartz epidote and/or chalcopyrite in blebs with grey alteration auricles.

TYRONNE M.L.

LEGEND

7		Gabbro Dyke		Serpentinized rocks
6		Quartzite		Mineral Occurrence
5		Granite and Pegmatite		Py - Pyrite
4		Granite Gneiss		Po - Pyrrhotite
3		Sedimentary Gneiss and schist		Cp - Chalcopyrite
2		Altered volcanic and associated sedimentary rocks		Zn - Zinc (sphalerite)
1		Volcanic and associated sedimentary rocks		Pb - Lead (galena)
		Strike and Dip		Asp - Arsenopyrite
		Geological Contact		Mo - Molybdenite
		Direction of glacial movement		Au - Gold
		Esker		Ag - Silver
		Showing Number		Asb - Asbestos
		Swamp		Mif - Magnetic iron formation
		Exploration permit boundarie		Fe - Gossan

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