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REPORT COVERING PROPERTY LOCATED IN SHEFFORD DISTRICT

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REPORT COVERING PROPERTY LOCATED IN

SHEFFORD DISTRICT QUEBEC

BY

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CONSULTING GEOLOGIST

LENNOXVILLE, QUEBEC.

February 19, 1955.

SHEFFORD COPPER MINES LIMITED
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REPORT COVERING PROPERTY LOCATED IN

SHEFFORD DISTRICT, QUEBEC

SUMMARY & CONCLUSIONS:

A copper-bearing band of dolomite has been outlined by surface exploration and twenty-four diamond drill holes for a length of over 1000 feet. The band has been found to be continuous for the length explored with copper contents concentrated across 5 to 6 foot widths close to the footwall side of the zone.

The copper content consists of the rich mineral chalcocite and in view of metallurgical tests a medium grade head will produce a high-grade concentrate very readily.

The property has been mapped during the past summer with the result that a length of at least 1600 feet immediately adjacent to prior drilling offers excellent chances of outlining ore within the same zone.

The writer has no hesitation in recommending additional diamond drilling to explore the possibilities of the abovementioned length. The results of this drilling will determine whether underground development is warranted.

PROPERTY - LOCATION, ETC.:

The property consists of 629.07 acres in Ranges VI and VII, South Ely Township, electoral district of Shefford and adjoining the Town of Valcourt, Province of Quebec. Base metal rights were acquired from the land owners and precious metal rights acquired by staking from the Crown. More specifically the property is described as follows:

1. Miner's Certificate No. 51250 and Development License No. 20447 covers claims Q-64728 to Q-64730 incl., claims 1,2 and 3 of 100, 25 and 75 acres respectively and being on the east part of Lot No. 596

corresponding to the east half of block 3 primitive; the east half of Lot No. 595 corresponding to the north part of the east half of Lot 2 primitive. The east part of Lot 593 corresponding to the south part of the east half of Lot 2 primitive, Range VII, Township of Ely, electoral district of Shefford.

2. Miner's certificate No. 52001 and Development License No. 20446 covering claims Q-64724 to Q-64727 incl., claims 1 to 4, of 27, 25, 53 and 105 acres respectively. On that part of Lot 527 to the west of the road, corresponding to the north half of the north half of the west half of Lot 4, Range VI primitive; that part of Lot 526 to the west of the road corresponding to the south half of the north half of the west half of Lot 4, Range VI primitive; that part of Lot 523 to the west of the road, corresponding to the west half of Lot 3, Range VI primitive, Township of Ely, electoral district of Shefford, Quebec.

3. Miner's certificate No. 58298 covering claims Q-72216 and Q-72217 for 106.57 and 112.50 acres respectively for Claims 2 and 3, on Lot 591 of Cadastral Lot, being the central part of Lot 1 of primitive Lot; and on Lot 601 of Cadastral Lot, being the east half of Lot 4 of primitive Lot; Range VII in the Township of South Ely, electoral district of Shefford, Quebec.

ACCESSIBILITY:

A network of improved gravel roads traverses the area and connect from several directions with a motor road extending to the shaft and surface workings on the property. The town of Valcourt is approximately two miles distant. Highway No. 35 leads directly to either Richmond or Waterloo on Highways 5 and 1 respectively extending between Montreal and Quebec City. The City of Sherbrooke lies to the northeast.

HISTRICAL REVIEW:

There is recorded discovery of copper on Lot 3, Range VII, Ely Township in 1865, at which time a shaft was sunk to a depth of 25 feet.

Record of an assay of chalcocite in a gangue of dolomite and quartz showing 46.14% copper and 1.094 oz. of silver per ton is mentioned in the G.S.C., 1879-80 Report, pp. 17H and 19H as coming from the Ely Mine. In 1881 the shaft was deepened to 55 feet and 3.07 tons of 9.2%, 6.88 tons of 8% and 0.55 tons of 5.6% copper ore were taken by team to Acton Vale station, 18 miles distant, and shipped to Orford Copper and Sulphur Company operating a smelter at Capelton. In 1901, the shaft was extended to a depth of 75 feet. Mr. J. R. Woodward, previous owner, states that in that year he sent to Mr. Herbert Carmichael, of Boston, a very rich mass of grey copper ore (chalcocite) weighing 1156 pounds which contained 57.84% copper and 535 pounds containing 26.77%. Cobbed dumps still exist near the old shaft as evidence of these early shipments. The property was idle until 1952 and the shaft is now filled with debris, old timbers and water.

Early in 1952 a series of test pits and cross trenches traced the mineralized zone for a length of over 400 feet and fresh exposures were blasted to enable representative samples to be taken. Preliminary metallurgical research showed that good recovery of highgrade concentrate could be obtained from comparatively low grade heads. Twenty-four diamond drill holes probed a length of over one thousand feet during 1952 with all holes showing varying quantities of disseminated chalcocite in the footwall portion of the dolomite zone. The property has been mapped geologically during the past summer and new structural data assembled shows that additional diamond drilling is warranted.

GENERAL GEOLOGY:

The favourable band of dolomite in which the copper occurs strikes northeasterly in conformity to the ranges of the Appalachian uplift and dips at 50 to 65 degrees in a westerly direction more or less in conformity to the slope of the ridge along which it extends. The hanging wall consists of a considerable thicknessof argillaceous slates that are highly schisted,

contorted and in places sericitic. A thin band of slate occupying the footwall of the dolomite zone is underlain by a varying thickness of impure quartzite which in turn is underlain by a considerable thickness of argillaceous slates. Thus a cross section of the sedimentary assemblage for at least a half mile thickness shows the dolomite zone to be the favourable host rock for the mineralizing solutions responsible for the chalcocite.

The dolomite zone pinches and swells along strike with maximum width of 35 feet exposed in a cross trench 300 feet north of the shaft. There is disseminated chalcocite across most of this width with the higher grade streaks following schistose bands. Malachite stain prevails on weathered surfaces and some secondary cuprite has been noted under the microscope.

Sampling of fresh exposures in the two most northerly trenches respectively showed 1.73% and 1.27% copper contents and 0.24 and 0.52 oz. of silver per ton. The higher grade streaks of chalcocite, sampled separately, showed 8.91% copper content which confirms the grade of cobbed ore that was hauled by teams in the early days of the property.

Diamond drilling to varying depths to below 300 feet confirms the dissemination of chalcocite in the footwall portion of the dolomite zone. One length of 300 feet in the shaft area shows an average of 0.83% copper across an average width of 6.1 feet along the footwall of the zone. In view of the metallurgical discussion that follows this material can be classed as possible ore.

South of the area previously drilled, along strike of the dolomite zone, there is a scarcity of outcrops for 1000 feet in length. At the southern limit of this length, near the boundary between lots 595 & 506, there are very noticeable variations in the strike and dip of thefootwall sediments which suggest contortions of the dolomite zone. It is quite possible that there could be concentrations of chalcocite where these variations occur. The northeasterly projection of the zone extends into low ground devoid of outcrops.

MINERALOGY & METALLURGY:

Mineralogical Examination

The gangue consists of pure white calcite high in magnesium content. Chalcocite is the only sulphide visible to the naked eye and displays some variation in color due to slight alteration.

Under the microscope, polished sections show chalcocite as the only sulphide present. The size of the chalcocite particles vary from coarse grains to very small disseminations throughout the gangue.

Metallurgical Tests

Metallurgical tests were conducted in July, 1952 by Metallurgical Engineer Guy Pare as follows:

The sample submitted was passed twice through a laboratory jaw crusher, then screened dry through a ten mesh screen. The plus 10 mesh was tested for sink and float process and the minus 10 mesh was weighed, quartered for assay purposes and the remainder taken for a flotation test.

Sink and Float Test:

The plus ten mesh sample was tested in heavy liquids to ascertain reaction of the ore to a sink and float process. After determining the specific gravity of the rock as being 2.71 it appeared that liquids having specific gravities of 2.95 - 2.84 - 2.77 and 2.72 would give the desired products. No particles would sink when specific gravity liquids of 2.95 and 2.84 were used. The other solutions gave the following results:

Product	Weight (grams)	% Weight	% Copper	Distribution
Sink 2.77 sp. gr.	257	7.5	1.53	19.4
Float 2.77 - Sink 2.72	265	7.8	0.41	5.4
Float 2.72	1590	46.8	0.46	36.4
Minus 10 Mesh	1285	37.9	0.61	39.0

From the above results if the lowest possible specific gravity were taken as a media (2.72) the highest recovery of copper is only 63.6%.

Due to the low recovery the sink and float process does not appear to be economical for this ore.

Floatation Tests:

The head sample for this test was the minus ten mesh material which assayed 0.61% copper. The sample was ground for 25 minutes with 600 cc of water, 1 lb per ton of lime and 2° Reagent Z-105. The material was then floated for 5 minutes in a Geco cell with 0.1 lbs per ton Reagent 208 as a promoter and 2° Pine Oil as a frother. The concentrate obtained was cleaned with 2° Reagent 242.

Product	Weight (grams)	% Weight	% Copper	Distribution
Heads	1191	100	0.61	100%
Cleaner Concentrate	11	1.0	34.05	60.3
Cleaner Tailing	150	12.6	0.76	16.9
Final Tailing	1030	86.4	0.15	22.8

A grade of concentrate was obtained showing 34.05% copper from a single cleaning stage with a recovery of 77.2% starting with a head sample containing only 0.61% copper.

Another sample containing considerably more chalcocite was crushed and prepared until the entire sample was minus ten mesh. The procedure was the same as in the last test except for the higher head and Reagent 325 (sodium ethyl xanthate) replaced the reagent 208 as promoter.

Product	Weight (grams)	% Weight	% Copper	Distribution
Heads	1055	100	9.90	100.00%
Cleaner Concentrate	65	6.2	73.81	46.4
Cleaner Tail	90	8.5	58.64	50.4
Final Tailing	900	85.3	0.41	3.2

A grade of concentrate of 73.81% copper was obtained with a recovery of 96.8% starting with a head of 9.90% copper.

METALLURGICAL CONCLUSIONS:

The following conclusions apply for the samples that were tested:

1. The only sulphide present in the ore is chalcocite which shows a little surface alteration.

2. The gangue is mainly white calcite.

3. The size of the grains varies from coarse grains to tiny particles disseminated in the ore.

4. From the results obtained in the sink and float process it appears non economical to use this process but other tests can be made.

5. The results obtained from flotation tests are very good. Grade and recovery of concentrate are excellent. It would appear that the ore would be easy to treat, the flow sheet would be simple, and the costs of reagents would be at a minimum.

6. The grade of concentrate obtained would probably call for a premium from a smelter thus cutting down smelter charges.

RECOMMENDATIONS:

1. Diamond drill sections at 100 foot intervals should be drilled to test the unexplored length south of prior drilling where variations in strike and dip prevail. There is nearly 3000 feet of unexplored length to the south boundary of the property. Only AXT equipment ($1\frac{1}{4}$" core) should be used.

2. A deeper series of holes is warranted beneath holes V-3-5-7-9.

3. Holes should be inclined and directed from west to east. It will be wise to continue a few holes through the footwall slate band into the quartzite in the hope of locating contact mineralization.

4. Dependent upon the results obtained from a minimum of 5000 lineal feet of AXT diamond drilling the next stage of exploration can be planned.

5. Metallurgical and mineralogical research should continue.

6. A minimum of $30,000.00 should be made available for exploration.

CAPITAL REQUIREMENTS:

For Exploration

Diamond Drilling - including supervision	$25,000.00
Sampling, assaying and metallurgical research	8,000.00
Equipment & Supplies	2,000.00
Road Repairs, Addition to present buildin	2,000.00
Contingencies	13,000.00

For Development

Additional Buildings	25,000.00
Mining Plant & Mining Equipment	60,000.00
Power & Electrical Installations	40,000.00
Shaft (300') and Underground Work (1500')	60,000.00
Management, Engineering & General Expense	15,000.00
Contingencies & Working Capital	25,000.00
Total Preproduction Capital Required	$275,000.00

It should be noted that the Capital Requirements of work already done during the program of 1952 has been deducted from the above tabulation and certain revisions in estimates are possible as a result of the work carried out.

GENERAL SUMMARY:

It suffices to state that the chalcocite deposits on the Ely Township property of Shefford Copper Mines Limited are unique and the only known such deposits in the Province of Quebec. To date there is every reason to believe the mineralization is a primary constituent of the dolomite zone. There is also a very good chance that economic bodies of ore can be located within the confines of the zone.

Respectfully submitted,

Dated at Lennoxville, P.Q.
February 19, 1953.

Harold G. Way, Ph.D.
Consulting Geologist.

CERTIFICATION

TO WHOM IT MAY CONCERN:

I, Harold G. Way, Sherbrooke County, in the Province of Quebec, do hereby certify as follows:

1. THAT I am a geologist, residing at 31 Atto Street, Lennoxville, Quebec.

2. THAT I hold the following degrees in Geology;

Bachelor of Science - University of Michigan - 1931

Master of Arts - University of Toronto - 1933

Doctor of Philosophy - University of Toronto - 1936

I have been practising my profession as a Geologist for over 20 years. I am presently retained as Consulting Geologist for Ascot Metals Corporation Limited and subsidiary Companies and do private consulting work. I am a member of the Canadian Institute of Mining & Metallurgy and a fellow of the Canadian Geological Association.

3. THAT I have no direct or indirect interest in the mining properties of Shefford Copper Mines Limited refered to in the accompanying report nor in the securities of that Company nor do I expect to receive any interest save for remuneration for services rendered as Consulting Geologist in supervision of the work done and preparation of this report.

4. THAT the accompanying report is based upon personal knowledge of the property herein described and personal supervision of the work carried out to date.

Dated at Lennoxville, Quebec this 19th day of February, 1955.

Harold G. Way

Harold G. Way, Ph.D.
Consulting Geologist.

HGW/w