

Preliminary Report
on the
Swift River Property
of
Boswell River Mines Ltd.
in
Yukon Territory
by
MacDonald Consultants Ltd.
H. Wober, P.Eng.

MACDONALD CONSULTANTS LTD.

S U I T E 1 2 4 2 5 H O W E S T R E E T , V A N C O U V E R 1 , B . C .

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Vancouver, B.C.

December 9, 1970

TABLE OF CONTENTS

	<u>Page</u>
Introduction	1
Property	1
Location and Access	2
General Geology	2
Economic Geology and Mineralization	4
Exploration 1970	
1.) Exploration Work on the Ground	6
2.) Airborne Mag and EM Survey	8
Recommendations	14
Cost Estimate	15
Summary and Conclusions	16

INTRODUCTION

MacDonald Consultants Ltd. became acquainted with the Swift River Property of Boswell River Mines in July 1970. At this time the writer visited the property in order to evaluate the work already in progress and to make recommendations regarding the continuation of the program.

At the time of the writer's visit work concentrated on the north-facing slopes of Swift River valley from Crescent Lake to the northwest to the camp and the "Burnt Hill" area to the southeast.

The showings at the head of Drumlin Valley and the southern flank of the two intrusives south of Swift River were not visited.

During the following months Mr. George Phelps of MacDonald Consultants Ltd. has carried out detailed geological mapping in the area of activity. The writer visited the property again in August 1970.

All other work was done or supervised by D. Parent, P.Eng. for Boswell River Mines Ltd..

PROPERTY

The writer did not research the status of the property. During the 1970 exploration season some 300 additional claims were staked by Boswell River Mines, mainly in the eastern extension of the property in the direction and up to the Pine Lake Airstrip. The attached claim map shows the area of the claims held by Boswell shaded in. In areas of overlapping staking the ownership is uncertain.

LOCATION AND ACCESS

The property is located at Swift River, Yukon Territory in the area north of Mile 722 on the Alaska Highway.

Access is by tote-road from Milepost 722 past the Pine Lake Airstrip for a distance of 12 miles.

The distance to Whitehorse, the nearest railhead is 200 miles, the distance to Watson Lake, the nearest commercial airport is 60 miles, both on the Alaska Highway.

GENERAL GEOLOGY

The area of the property is predominantly underlain by formations which were classified by the GSC (Map 10-1960) to be of Upper Devonian to Lower Mississippian age.

Map unit 8 (GSC map 10-1060) occupies the greater part of the property. Lithologically it consists of chert, hornfels, argillite, slate, phyllite, quartzite, limestone, skarn, tremolitic marble and dolomite. The series are estimated to be about 14,000 feet thick, west of the Pine Lake Airstrip.

Unit 8 overlies conformably the greenstone-bearing assemblage of unit 7 which is present in the eastern part of the property.

Unit 8 is intruded by two prominent stocks of diorite of Jurassic (?) age.

Two branches of a regional northwest fault-trend separate the northern edge of the property from the somewhat younger intrusive assemblage of the Cassiar Batholith.

The sedimentary units between the fault branches are Lower Cambrian to Silurian intruded by a small stock of Upper Cretaceous or Tertiary quartz monzonite (unit 16).

During the fieldmapping work by G.B. Phelps, the stratigraphically lower part of unit 8 could be separated from the rest as a distinct black argillite. No other distinctive unit could be singled out in the sedimentary sequence. The black argillite was traced from Crescent Lake on the southern side of the Swift River fault system to the eastern boundary of the Dan 1-10 claims. Deep glacial overburden to the east makes it impossible to trace the argillite any further.

Units 7 and 8 of the Wolf Lake map sheet (10-1960) show some resemblance to the sequence housing the stratiform deposits of the Anvil Range. Both were originally classified as Mississippian. However, the more volcanic (greenstone) formation in the Swift River area underlies the sedimentary sequence. In the Anvil Range the sedimentary sequence grades upward into a more volcanic assemblage.

The (formerly) Mississippian hostrock to the orebodies of the Anvil Range has been reclassified as possibly Cambrian or even earlier in recent years (D.J. Templeman-Kluit, GSC papers 68-1, pt. A, 69-1, pt. A).

Age relationships of the sub-units in the Anvil Range are still uncertain, as are controls of emplacement of the mineralization.

D.J. Templeman-Kluit gives the following description of the geological setting of the Faro, Vangorda and Swim Lake deposits in the Anvil Range (GSC paper 68-1, pt. A, p.49):

"Cambrian phyllitic rocks of unit 3 are host rocks for the three economically important sulphide masses and are also host to several smaller, presently non-economic deposits in the area. The Faro body occurs close to the contact between units 2 and 3,"..(new classification) .."but the Vangorda and Swim deposits do not. There is no apparent relation of the deposits to a particular stratigraphic horizon within unit 3 and the phyllitic host rocks near the deposits are the same as those elsewhere. The regional (?) metamorphic grade of the host rocks varies from moderate (biotite, andalusite) grade at Faro through intermediate (chlorite) grade at Vangorda to low (sericite) grade at Swim. Chloritic tuffaceous greenstone outcrops close to all three deposits, but is nowhere immediately against ore. Graphite is present in phyllites around all three deposits, but it is far more important around the Swim body than near the Vangorda or Faro deposits.

Local controls for emplacement of sulphides are yet unknown. There is no evidence that graphite content of host rocks, proximity to granitic rocks, and relationship to the Tintina fault or northeast striking faults, cited elsewhere as possible controls, are significant."

ECONOMIC GEOLOGY AND MINERALIZATION

The occurrence of sphalerite on the Swift River property has been known for some time. A silver-lead-zinc showing at the head of Drumlin Creek was worked on by Boswell in previous years, but was not visited by the writer.

The sphalerite occurs together with pyrrhotite in what has been called skarn zones, yet no connection with the intrusives or the proximity to their contacts could be established. Whereas pyrrhotite occurs also as fine disseminations in the phyllites and hornfels, sphalerite occurs with pyrrhotite in banded zones alternating conformably with the bedding of the host rock in the form of massive banded sulphides and as disseminations.

Magnetite-pyrite mineralization occurs in zones along the same trends and sometimes close together. Its nature and mode of emplacement and its relationship to the sphalerite-pyrrhotite mineralization, if any, is not clearly established.

Both types of mineralization are accompanied by copper mineralization in the form of chalcopyrite. The copper content varies greatly from showing to showing. Chalcopyrite occurs in blebs and small granular aggregates, on fractures and veinlets within and cutting the banded sphalerite-pyrrhotite mineralization. It appears to be younger than the sphalerite-pyrrhotite, which may have acted as a precipitant for younger solutions activated by (regional?) metamorphism or magmatic activity.

To date no structural or lithological controls for the mineralization could be established. A bed of crystalline limestone on the footwall of the zone drilled in 1970 is mineralized in parts by the same sphalerite-pyrrhotite mineralization, but is not particularly enriched and the mineralization occurs more in irregular blebs rather than in banded zones.

All mineralization of the type described above has to date been found in the steeply dipping parts between the Swift River fault and the intrusive plugs to the south.

EXPLORATION 1970

1) Exploration work on the ground

Prior to the writer's involvement in the property work concentrated on the Dan 1-10 group of claims and the southeastern extension of the grid into the "Burnt Hill" area.

The work consisted of line cutting, ground magnetometer surveys, trenching and diamond drilling.

Several magnetic highs were trenched and the parts showing sphalerite and chalcopyrite accompanying the pyrrhotite mineralization were tested by diamond drilling. The writer is not familiar with the drilling-and-work statistics of this program. However, the core was examined and as the assays proved later, no intersections of economic significance were obtained. Nevertheless, the zones of mineralization are several tens of feet wide and seem to be persistent along strike.

The drilling was stopped on the writer's suggestion that targets should be delineated by using geochemical survey results as a second parameter, rather than magnetic data alone.

Subsequently, the Crescent Lake grid between Drumlin Valley and Crescent Lake was cut at 400' line spacing and soil samples taken every 200'. Selected areas were also covered by a ground magnetometer survey.

A gossan zone on the Crescent Lake grid between lines 28W and 48W and above the 4750 feet elevation contour is visible in abundant outcrop above timberline. The outcrop contains an abundance of disseminated pyrrhotite. The gossan zone is accompanied by a geochemical anomaly immediately below it which features high values in zinc. The geochemical anomaly extends from line 4E to 48W. The part of the geochemical anomaly sloping towards Drumlin Valley, i.e. lines 28W to about 40W contains a fair amount of float of sphalerite and some chalcopyrite which is not visible in the outcrop of the gossan zone above.

The ground magnetometer survey on the Dan 1-10 group and its southeastern extension, the Burnt Hill area, outlined a broad magnetic high which coincides with the showings in the trenches and extends to the southeast in the strike direction of the sediments. The Burnt Hill grid, however, was not soilsampled because of the deep cover of glacial debris. The coincident magnetic and geochemical anomalies on the Dan grid have been tested by trenching and drilling. The extension of the magnetic anomaly does not appear to constitute a priority target for follow-up work for the lack of a second parameter to indicate that the mineralization would be of better grade than the one exposed in the trenches. Encouragement from other targets on the property may change this picture.

Reconnaissance soilsampling was carried out along the following claim location lines: SAM #9-16, Dan #11-16, Max #49,50, Wet #1-21 from Crescent Lake to Hidden Lake, Dan 136-141, 135-136 (on disputed ground). The sampling was carried out in conjunction with tagging of claimposts.

Further sampling, the results of which have not been received yet, was carried out on the Max and OMO location lines to the east. The ground magnetometer survey on the "Crescent Lake Grid" was confined to selected lines only.

2) Airborne Mag and EM Survey

During the month of October 1970, Seigel Associates carried out an airborne EM and Mag survey on the property consisting of about 250 linemiles. The survey also covered the newly acquired ground to the east to the Pine Lake Airstrip.

The purpose of the survey was to locate surface near (200') bodies of massive or near massive sulphide replacement mineralization. In the eastern and southern parts of the property the dips are considerably flatter (35°) and any replacement type sulphide mineralization would respond more readily to an airborne survey.

Results:

The combined airborne magnetometer and EM survey established five target areas which require further work on the ground by ground geophysical methods and subsequent diamond drilling.

These target areas are in sequence from the northwestern to the southeastern part of the property:

- 1) The Gossan Lake Zone
- 2) The Burnt Hill Area
- 3) The area west of Daughney Lake, Pine Lake and north of the access road.

- 4) The area west of Pine Lake Airstrip and Swift River along the contact between map units 7 and 8.
- 5) Conductor on flight line L42 near fiducial 2755
- 6) Other areas of interest

1) The Gossan Lake Zone

This target is represented by a pronounced magnetic high on flight line L5A, flanked to the immediate north by an EM anomaly on the same line with an in-phase peak of 102 ppm and an in-phase to out of phase ratio of 0.9. The magnetic high, somewhat less pronounced on lines L3 and L6 extends over a strike length of approximately 3,000 feet. It is geologically marked by the underlying contact between Mississippian quartzites and the western diorite stock.

A skarn zone, mineralized by pyrrhotite and sphalerite was discovered and trenched on earlier about 1,000 feet northwest of the conductor peak. Follow-up work by ground magnetometer and diamond drilling is recommended on this target.

2) The Burnt Hill Area

A southeasterly trend of magnetic highs lies in the direct extension of the broadening magnetic high located by ground surveys on the Burnt Hill grid during the summer of 1970. No associated conductors are indicated by the airborne survey. The drainages cutting this trend were streamsilt sampled by earlier programs (P. Sevensma's report dated July 7, 1969.) and were found to be slightly anomalous in the vicinity of the now established magnetic high. Further mapping and prospecting

and if possible an estimate of the depth of glacial debris is recommended in order to determine what further methods should be used for a ground follow-up.

3) The Area West of Daughney Lake, Pine Lake and North
of the Access Road

This area along the north edge of the airborne survey extends from flight line L40 to L54 north of Swift River and mostly north of the access road leading from Pine Lake Airstrip into the property. It trends in an east-westerly direction over a distance of approximately 2 miles.

The target is geophysically represented by three magnetic ridges with slight offsets but all more or less aligning along a northwesterly to westerly trend. A number of conductors either coincide with the magnetic high or lie in flanking positions immediately to the north or south of the magnetic peaks. Some of the more prominent conductors starting from the west end of the zone show the following characteristics:

Flight Line	Anomaly	Peak In-Phase PPM	In-Phase Out of Phase	Magnetic Amplitude C:Coincident F:Flanking
L-40	D	80	2.66	20F
L-41	E	80	2.0	115C
L-41	F	85	2.83	100C
L-44	M	60	4.00	340C
L-45	G	65	2.6	390F

Flight Line	Anomaly	Peak In-Phase PPM	In-Phase Out of Phase	Magnetic Amplitude C:Coincident F:Flanking
L-46	F	70	2.33	390C
L-47	H	30	6.0	330C
L-49	H	164	2.4	50C
L-50	K	120	2.4	190F
L-53	G	100	2.5	320F
L-54	L	110	2.44	320F

The above listed anomalies were distinguished from the many others of the survey for their in-phase peak, high in-phase to out of phase ratio, accompanying magnetic amplitude or the combination of two or three.

The target area lies between two prominent branches of the Swift River Fault System. Lower Cambrian grey limestone, minor dolomite, slate and phyllite underlie the area between the two faults. Its southern half is covered by a layer of glacial debris of unknown thickness. The northern fault branch also marks the contact to the biotite quartz monzonite and granodiorite of the Cassiar Batholith. Upper Devonian and Lower Mississippian rocks (units 7, 8, GSC Map 10-1960) are down faulted to the south against the older, Lower Cambrian, rocks between the two fault branches.

It is difficult to quantitatively interpret the EM response in view of the glacial coverage along the southern edge of

the target area. The response, however, is significant in itself especially where coincident with magnetic peaks. The geological configuration described above, the limestone representing a favourable host rock and the geophysical indications contribute to a high priority for this target, which could be the locus of replacement type mineralization of economic significance.

In order to pinpoint the best drilling targets in this extensive target area it is recommended to carry out a program of line cutting for a ground magnetometer and ground EM survey using Turam type equipment for the latter to ensure sufficient depth penetration.

4) The Area West of Pine Lake Airstrip and Swift River
Along The Contact Between Map Units 7 and 8

A government airborne magnetometer survey depicted a northwest trending high in the area immediately south of the inferred contact between the lower greenstone-chlorite schist assemblage of unit 7 and the upper chert-hornfels-argillite assemblage of unit 8 with the magnetic high lying on the sedimentary side of the contact. The government survey was flown at a mean terrain clearance of about 1,000 feet. The low level (250 foot clearance) helicopter survey by Seigel and Associates dissolved this trend into several individual features:

A north-northwest trending high extends from flight lines L56 to L61. This trend is paralleled by a high on lines

L55 and L56 about 2,000 feet to the north.

About one mile west of the northwest end of these trends there is a pronounced double peak magnetic high on flight line L51 between fiducials 830 and 860. This double peak is to a lesser degree also reflected on lines L50 and L52.

Weak conductors are flanking the magnetic highs.

It is recommended that the double peak magnetic anomaly on flight lines L50 to L52 be covered by a line grid 3,200 feet by 3,500 feet in preparation for a ground magnetometer and geochemical survey.

Prospecting, geological mapping, reconnaissance ground magnetometer work and soil sampling along three to four widely spaced traverses is recommended on the north-northwesterly trending magnetic high between flight lines L56 and L61.

5) Conductor on Flight Line L42 Near Fiducial 2755

This is a single point EM anomaly with an in-phase peak of 100 ppm, an in-phase to out of phase ratio of 2.38. The correlating magnetic amplitude is weak and flanking. This area should be prospected on the ground and reconnaissance soil sampling should be carried out.

6) Other Areas of Interest

- a) A strong magnetic trend on flight lines L31 to L36 associated with class 1 and class 2 conductors lies immediately south of the main course of Swift River and north of a parallel flowing tributary. The area is in the centre of the wide Swift River Valley and covered by glacial and fluvial debris. It is re-

commended that this area be left dormant for the time being until drilling of the zone to the east and north of Swift River has given some information on the geological conditions between the two main fault branches of the Swift River Fault System and on their geophysical response.

- b) A number of other geophysical features which resulted from the program but which are not listed in detail are to be examined on the ground.

RECOMMENDATIONS

- 1.) It is recommended that the area in the northwest corner of the property, area #3, be given first priority for ground follow-up. A base line 13,600 feet long with cross lines every 400 feet is to be cut. The base line should be cut to the ground, the cross lines are to be established by blazing and flagging with picket stations every 100 feet.

The total line grid comprises 17 line miles. The cross lines extend 1,800 feet north and 400 to 600 feet south of the base line. A ground magnetometer survey and Turam-EM survey is to be carried out over the entire line grid.

It is estimated that approximately 2,500 feet of BQ wire-line drilling will be required to investigate targets established by this work.

2.) A limited amount of ground magnetometer work only will be required to establish a drill target at the Gossan Lake Zone. About 600 feet of diamond drilling will be required for this target.

3.) Line cutting, a ground magnetometer survey, mapping and soil sampling are recommended for the double peak mag anomaly on the western part of target area #4.

A 3,200 foot base line with 3,500 foot cross lines at 400 foot spacing should be cut in the same manner as described above for a total of 6 miles of cross lines.

4.) Geological mapping, prospecting, reconnaissance ground magnetometer work and reconnaissance soil sampling can be carried out by a two to three man team consisting of a geologist, a geophysical operator and one helper.

COST ESTIMATE

1.) Line Cutting

Base lines, approximately 3 miles @ \$250.00/mile	\$ 750.00
Cross lines, 23 miles @ \$150.00/mile	3,450.00

2.) Ground Geophysical Surveys

17 miles of Magnetometer and Turam-EM Survey @ \$300.00/mile	5,100.00
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3.) Diamond Drilling

3,100 feet BQ Wireline Drilling under winter conditions	
All Inclusive - \$15.00/foot	46,500.00
Mobilization and Demobilization	6,000.00

4.) <u>Geological Mapping and Prospecting, Geological Supervision, Core Logging</u>	\$ 4,000.00
5.) <u>Reconnaissance Ground Geophysics</u>	1,500.00
6.) <u>Soil Sampling</u>	1,500.00
7.) <u>Assaying</u>	2,000.00
8.) <u>Transportation, Air Fares, Communication, Freight, Truck Rental and Operating Costs</u>	6,000.00
9.) <u>Camp and Food, Heating, etc.</u>	
16 men for an average of 2 months	10,000.00
10.) <u>Consultant's Fees and Expenses</u>	4,000.00
11.) <u>Contingencies @ 10%</u>	<u>9,000.00</u>
	<u>\$99,800.00</u>
Approximately	<u>\$100,000.00</u>

SUMMARY AND CONCLUSIONS

Extensive exploration work was carried out on the Swift River Property of Boswell River Mines Ltd. during the year of 1970.

The ground exploration work carried out earlier in the season, consisting of geological mapping, line cutting, magnetometer surveys, soil sampling and diamond drilling indicated the presence of stratiform mineralization of pyrrhotite, magnetite, sphalerite and chalcopryrite in a Mississippian sedimentary assemblage.

A combined Mag and EM airborne survey over about 250 line miles on, for the most part, newly acquired ground delineated several

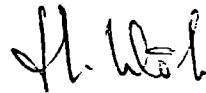
promising new target areas the most prominent of which is a 2 mile zone of magnetic highs associated with significant conductors. This area is underlain by Lower Cambrian limestone and dolomite. Two branches of the Swift River Fault System separate the target area from the Cassiar Batholith to the north and the Mississippian greenstone and sedimentary rocks to the south.

A follow-up program, consisting of line cutting, ground geophysical surveys, geological mapping, soil sampling and diamond drilling is recommended on the various targets which resulted from the airborne survey.

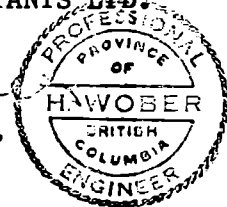
Funds in the order of \$100,000.00 are required for the program outlined.

Respectfully submitted,

MACDONALD CONSULTANTS LTD.



H. Wober, P. Eng.



HW/bd

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SUITE 12 425 HOWE STREET VANCOUVER 1. B. C.

December 9, 1970

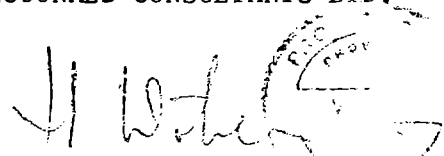
CERTIFICATE

I, Helmut Wober, with business and residential address in Vancouver, B.C. do hereby declare:

- 1.) I am a consulting mining engineer.
- 2.) I am a graduate of the Montanistische Hochschule, Austria, 1963.
- 3.) I am a registered professional engineer in Yukon and British Columbia.
- 4.) I have gained experience in mining and exploration geology in positions of responsibility with Nordisk Mineselskab A/S in East Greenland in 1961 and 1962, with United Keno Hill Mines from 1964 to 1966. I held the position of Chief Mine Geologist with United Keno Hill Mines when I resigned to join MacDonald Consultants Ltd. in May, 1966. I have practiced my profession as a consulting engineer since then.
- 5.) I have personally examined the property described in this report and studied all available information on the geology of the area described.
- 6.) I do not have, nor do I expect to have or beneficially own any interest, direct or indirect, in the properties or securities of Boswell River Mines Ltd. or any of its affiliates.

Respectfully submitted,

MACDONALD CONSULTANTS LTD.

A handwritten signature in dark ink, appearing to read "H. Wober", is written over a circular professional seal. The seal contains the text "P. Eng." and "B.C." around its perimeter.

H. Wober, P.Eng.