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W. D. SAVAGE PROPERTIES  
REPORT ON  
MARMOT GROUP - SUSTUT AREA  
OMINECA MINING DIVISION, B.C.

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February 18th, 1965

G. L. Holbrooke

## CONCLUSION

From prospecting and a very limited amount of shallow surface trenching a series of six strong vein zones carrying a medium to strong copper sulphide mineralization has been indicated across an 1,800 foot wide pattern of fracturing bordering a regional shear zone.

The mineralized zones vary in width from 2.5 to 15.0 feet and are indicated for lengths up to 3,000 feet. Sampling of the more or less heavily oxidized vein material exposed on surface and in the trenches shows copper values in excess of 3%, low values in gold in the order of \$1.00 per ton, and silver up to 9 ounces per ton.

Two of the mineralized zones intersect at right angles a zone of narrow quartz stringers carrying gold values from 0.72 to 1.84 ounces per ton. These stringers could materially increase the value of the main veins in the intersection area.

From the above it is obvious that the vein zones on the property warrant serious preliminary investigation as recommended below.

## RECOMMENDATIONS

It is recommended that a camp for at least six men be established in the Menard Creek basin near the timber line and as close to the vein showings as possible. The cost of this, using lumber purchased from the McConnell Creek operation some 10 miles to the northeast, is estimated at \$3,500.

It is recommended that the first step in the exploration of the property be a thorough and detailed geologic mapping

of the ground. This is estimated to cost \$5,000.

In conjunction with the mapping it is recommended that the projection of the 1,800 foot width containing the six mineralized zones be covered for the full length of the property by an electromagnetic survey to outline any areas of stronger mineralization. Any such areas would then become the targets for detailed exploration by diamond drilling. The survey should cover a 1/2 mile wide strip centred on the main shear zone and should be run along a series of N70°W picket lines 300 feet apart. It will require 50 line-miles of work and as there is little necessity for line cutting this is estimated to cost \$6,000.

When the geological and electromagnetic surveys have been completed any areas of possibly important mineralization so indicated will have to be tested by diamond drilling. It is impossible at this point to estimate the amount of such drilling which may be necessary but an allowance should be made for up to 10,000 feet. It should be noted that drilling will be expensive in this remote locality and because of the water problem. The estimate of an overall cost of \$8.00 per foot for AXF core does not seem unreasonable.

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LOCATION, TOPOGRAPHY, ACCESSIBILITY ETC.

The area surrounding the property lies in northern British Columbia between latitudes  $56^{\circ}30'$  and  $56^{\circ}50'N$  and longitudes  $125^{\circ}20'$  and  $125^{\circ}45'W$ . It covers the southern end of the McConnell Range which crosses the centre of the area. Sustut Peak lies in the southwest corner and the Wrede Range crosses the northeast corner.

The upper parts of the McConnell and Wrede Ranges vary in elevation from 6,000 to 7,000 feet while Sustut Peak reaches 8,100 feet. The McConnell Range is separated from the Sustut Peak Range by 5 to 6 mile wide Moose Valley, which trends southeast across the area, and from the Wrede Range by the upper valley of the Ingenika River. Both valleys are about 4,000 feet above sea level and the slopes are covered by overburden to about the 5,000 foot contour. The southern part of the McConnell Range is broken by cross valleys into a series of relatively small mountain masses and these too, below the 5,000 foot level are covered by overburden.

The area is remote and is located about 250 air miles northwest of Prince George and 110 air miles  $N15^{\circ}E$  of Smithers, both on the Prince Rupert branch of the Canadian National Railways. It is best reached by float-equipped aircraft to Sustut Lake in the south-central part of the area, to Thorne Lake in the northwest corner, to McConnell Lake in the north-central part, or to Johanson Lake some 10 miles east of Sustut Lake. The nearest sea-plane bases are at Port St. James, 180 miles, or Prince George, 250 miles.

Prince George is the transportation centre and principal source of supplies for this section of British Columbia. It lies on the Prince Rupert branch of the Canadian National Railways and forms the northern terminus of the Pacific Great Eastern railway. It is reached from Vancouver by the 505 mile long Cariboo Highway and is connected to the Alaska Highway at Dawson Creek by the 259 mile long Hart Highway. It is also connected westward to Prince Rupert by a 490 mile long highway which follows the railroad and 70 miles west of Prince George passes through the town of Vanderhoof.

From Vanderhoof an all weather gravel highway runs 178 miles north and northwestward through Port St. James and Gormansen Landing to Oslinka Lake. From Oslinka Lake a cat road continues some 40 miles westward to Aiken Lake and from there a rough cat trail runs across upland meadows through Ingenika Summit and enters McConnell Creek Valley via Jensen Creek. The distance from Aiken Lake to the area is approximately 65 miles.

The climate of the area is relatively mild. Winter temperatures in the valleys seldom fall below zero Fahrenheit and are usually in the  $10^{\circ}$  to  $20^{\circ}$  range. Summers are cool, usually between  $60^{\circ}$  and  $70^{\circ}$  with rare, short hot periods up to  $90^{\circ}$ . Precipitation consists of from  $2\frac{1}{2}$  to 5 feet of snow in the winter and almost daily showers the rest of the year. In the valleys winter usually starts about the end of October and lasts until mid-April but in the higher elevations is about three weeks earlier and lasts about a month longer.

The Mamot property lies in the north-central part of the general area, on the west side of the southern end of the main McConnell Range, at approximate latitude 56°45' north, longitude 126°35' west. It consists of a block of 101 contiguous mineral claims covering approximately 5,200 acres and the claims are known as Mamot Nos. 1 to 101 inclusive with serial numbers of 25935 to 26035 inclusive.

The property varies in elevation from 4,500 feet to over 6,500 feet. A broad glacial cirque with precipitous walls trends westerly across the extreme northern part of the property and is drained in that direction by a small creek flowing into Moosevale Creek and thence southward into the Sustut River. Other small creeks drain the western and southern sections of the property westward down a steeply sloping valley into Moosevale Creek. In the northeastern part of the property Menard Creek rises near the 6,000 foot contour and flows eastward through a broad, gently sloping cirque into the Ingenika River about 4 miles east of the property.

The rocks on the northern part of the property are well exposed above an elevation of about 5,500 feet while the lower slopes of the mountains and the neighbouring valleys are covered by a thick mantle of overburden. In the central and southern parts of the ground the overburden retreats to below the 5,000 foot contour while the Menard Creek cirque is covered below 5,500 feet.

The tree line in this area is marked approximately by the 5,000 foot contour and there is thus practically no timber on the property. Some stunted jackpine in the Menard cirque about a mile east of the property would provide a possible campsite at an elevation of about 4,800 feet. Either of the creeks on the property would supply a limited amount of water for preliminary exploration but any larger supply would have to be pumped approximately 4 miles from either the Ingenika River or Moosevale Creek against a 2,000 foot head.

Other than by helicopter access to the property is from the cat trail between Aiken Lake and McConnell Creek which passes along the Ingenika River about 4 miles to the east. A four mile long cat road could be built relatively cheaply from this trail up Menard Creek to the main showings near the head of Menard Creek.

#### MINERALIZATION

The property has been prospected in considerable detail but the only development consists of several shallow trenches across the main veins which trend northwest along the ridge west of the Menard Creek basin. They are lost to the northwest under the overburden in the large cirque at the north end of the property and are lightly covered by shallow detritus to the southeast.

## GEOLOGY OF THE AREA

The area is underlain by a thick, folded sequence of andesitic and basaltic lavas, tuffs, and fragmentals with minor interbedded sedimentary material belonging to the Tokia Group of early Mesozoic age. A narrow belt of late Paleozoic sediments and acid lavas is exposed along an anticlinal axis which strikes N45°W across the southwestern section of the area.

The anticlinal axis along which the Paleozoic rocks are exposed is the southeastern continuation across this area of the regional, Yukon geanticline. The companion, parallel, Wolf Lake geosyncline crosses the area about 15 miles to the northeast and the bedded rocks of the area are locally contorted in minor, subsidiary folds developed on the limbs of these major, regional structures.

The bedded rocks are intruded by a number of plutons and small batholiths of granitic rock varying in composition from diorite to granite. These minor intrusions lie just off the northwestern nose of the major Omineca batholith which stretches south-eastward for over a hundred miles from a point 16 miles southeast of Sustut Lake. It is probable that the minor granitic bodies represent exposed spires or cupolas of the main batholithic mass which in this area has not yet been uncovered by erosion.

Extensive faulting is indicated in the area but is largely masked by the overburden in the valleys. The northwestern continuation of the Omineca-Carruthers fault crosses the southwest corner of the area with a N50°W strike and the continuation of the north-striking Cenlyd branch of the Omineca fault probably underlies the upper Ingenika Valley and McConnell Creek and lakes. In the southern part of the area cross faulting in a northeast direction is also indicated. A strong, steeply dipping, shear zone can be traced for over 10 miles in a S45°E direction from near the head of Menard Creek and corresponds to the strong shear traversing the small mountain mass at the headwaters of the Ingenika River. A second strong vertical shear zone strikes S21°E from just west of the head of Menard Creek and apparently continues in that direction for approximately 10 miles to the foot of Sustut Lake.

## GEOLOGY OF THE PROPERTY

The Marnot property is underlain by the andesitic and basaltic lavas, tuffs, and fragmentals of the lower Tokia series of early Mesozoic age intruded to the northeast by a small batholith of granodiorite.

The bedded rocks are folded locally but have a general northwest trend across the property with flat dips of from 20° to 30° southwest. They are lying on the northeast limb of a northwest trending synclinal fold which is itself a minor structure on the northeast flank of the major, Yukon geanticline which crosses the area about 6 miles to the southwest.

The granodiorite underlies the extreme northeast corner of the property and the contact in this vicinity trends N30°W. This contact is the southwestern edge of a small batholith having a length of about 5 miles and a width of 2 miles.

A strong, vertical shear zone, from 10 to 20 feet wide, is found striking N21°W about 2,000 feet southwest of the granodiorite contact across the eastern claims of the group. This structure has been traced for over 5,000 feet across the property and probably continues under the overburden of Moose Valley for a further 10 miles to the foot of Sustut Lake where its course is marked by a strong lineation on the aerial photographs.

MINERALOGIC GEOLOGY

On the Marmot property a pattern of strong mineralized zones up to 15 feet wide is found along the ridge above the head of Menard Creek on Marmot claims Nos. 1, 2, 4 and 6. These zones all strike N21°W and are well exposed on the steep wall forming the southern edge of the west trending cirque at the northern end of the property. They lie in dark green volcanics near the strong, vertical shear zone described above and about 2,000 feet southwest of the granodiorite contact. The zones consist of chloritized and carbonatized basic volcanics mineralized by medium to strong disseminated pyrite and chalcopyrite with some bornite, tetrahedrite, and chalcocite across widths of from 2.5 to 15.0 feet. Where exposed on surface the zones are now more or less oxidized and one in particular is essentially a rusty mass of limonite carrying azurite and malachite with only remnants of the original sulphide mineralization.

Six zones are known forming a pattern across an 1,800 foot width, five on the southwest side of the strong shear zone and one to the northeast. The zones all strike parallel to the shear zone at N21°W. They differ in dip however with four of the veins having a vertical to 85° southwest attitude while the remaining two dip 40° to the northeast. Only a limited amount of shallow surface trenching has been done on the zones, mostly on Marmot claims Nos. 1 and 2 near the top of the steep south face of the northern cirque. The zones are described individually below.

a) No. 1 Vein

Vein No. 1 is a six foot wide vertical mineralized zone lying some 50 feet southwest of the shear zone. It has been opened for a length of about 150 feet by two shallow trenches near the top of the cirque wall. The mineralized material is relatively fresh and a number of chip samples across 6.0 feet returned the following values.

<u>Sample No.</u>	<u>% Copper</u>	<u>Ounces Per Ton</u>	
		<u>Gold</u>	<u>Silver</u>
102	3.33	0.02	0.90
105	6.31	0.02	2.00
5008	4.55	0.05	1.45
5009	3.65	0.06	3.15
5011	3.48	0.03	2.20
S-2	2.85	0.01	1.09

b) No. 2 Vein

Vein No. 2 is one of the strongest zones on the property and lies approximately 300 feet southwest of Vein No. 1. It is vertical, approximately 15 feet wide, and has been traced for some 300 feet by shallow trenching and stripping on Marmot claim No. 2. It can be followed along its strike to the southeast by means of fragments in the shallow skin of overburden for approximately 3,000 feet to where it is again exposed on Marmot claim No. 6. The material in this zone is heavily oxidized and now consists of massive limonite with some areas showing considerable azurite and a few remnants of chalcopyrite and chalcocite. The following samples were taken across the 15.0 foot width of the zone from the trenches on Marmot claim No. 2. They are generally low grade but extensive leaching is indicated and it is probable that samples of fresh material would assay considerably higher.

<u>Sample No.</u>	<u>% Copper</u>	<u>Ounces Per Ton</u>	
		<u>Gold</u>	<u>Silver</u>
103	0.35	0.02	0.20
5012	1.60	Tr	1.10
S-1	0.31	0.02	0.51
S-3	0.43	0.01	0.85
5013	1.80	0.14	1.20

c) No. 3 Vein

Vein No. 3 is a vertical zone lying approximately 15 feet southwest of Vein No. 2. It is 2.5 feet wide and has been traced for approximately 150 feet near the top of the cirque wall. The mineralization in this zone is comparatively fresh. The following samples were taken across the 2.5 foot width of the zone.

<u>Sample No.</u>	<u>% Copper</u>	<u>Ounces Per Ton</u>	
		<u>Gold</u>	<u>Silver</u>
S-4	3.43	0.04	1.40
101	3.81	0.02	1.10



d) Nos. 2 and 3 Veins

Near the top of the cirque wall the rock bordering the Nos. 2 and 3 veins on their northeast sides is broken by a series of vertical fractures at right angles to the mineralized zones and these fractures are filled by a number of narrow quartz stringers from 1/4 to 3/4 inches wide. The stringers are mineralized by pyrite and chalcopyrite for lengths of several feet from the zones and as they carry appreciable gold values they could provide an important addition to the values in these two veins. The following samples across widths of from 1.0 to 1.5 feet of these stringers indicate the possibilities.

<u>Sample No.</u>	<u>% Copper</u>	<u>Ounces Per Ton</u>	
		<u>Gold</u>	<u>Silver</u>
5014	3.70	1.84	2.16
5015	3.30	0.72	1.50
5016	0.50	0.01	1.60

e) Nos. 4 and 5 Veins

Veins Nos. 4 and 5 lie 400 and 450 feet respectively southwest of No. 2 vein and are 9 and 14 feet wide. They belong to the 40° northeast dipping zones of the pattern and have been traced for about 100 feet near the top of the cirque wall. They are relatively fresh but are not well exposed and only one sample from No. 4 vein was taken across 14.0 feet. This assayed as follows:

<u>Sample No.</u>	<u>% Copper</u>	<u>Ounces Per Ton</u>	
		<u>Gold</u>	<u>Silver</u>
100	3.21	0.02	0.80

f) No. 6 Vein

Vein No. 6 lies 800 feet northeast of the shear zone and is a similar, vertical, mineralized zone. It has been opened by only one trench across a width of 6 feet but the mineralization continues beyond the trench for an unknown additional width. The zone can be traced for a length of approximately 200 feet by float in the shallow overburden. The following character samples of the stronger mineralization were taken by Mr. W. D. Savage in 1964. The higher than normal silver content would seem to indicate considerable tetrahedrite.

<u>Sample No.</u>	<u>% Copper</u>	<u>Ounces Per Ton</u>	
		<u>Gold</u>	<u>Silver</u>
M-101	24.39	0.04	5.10
M-102	12.74	0.04	1.40
164	18.66	0.04	9.32
264	10.64	0.04	5.76

In view of the strength and continuity of the pattern of mineralized zones on this property and the copper, gold and silver values indicated by preliminary trenching and sampling detailed exploration of various zones is definitely warranted.

*G. L. Holbrooke*

February 18th, 1965

G. L. Holbrooke

CERTIFICATE

I, G. L. Holbrooke, of 160 Bay Street, in the City of Toronto, in the Province of Ontario, do hereby certify as follows:

1. That I am a consulting geologist and a member of the Association of Professional Engineers of Ontario.
2. That I am a graduate of McGill University with degrees of B. Sc. and M. Sc. in 1927 and 1928 and have been practising my profession continuously since graduation.
3. That the accompanying report is based on Geological Survey of Canada Memoir 251 entitled McConnell Creek Map Area, Cassiar District, British Columbia; on personal communications from W. D. Savage; on a personal knowledge of the area; and on an examination and sketch mapping of the property between October 1st and 10th, 1962.
4. That I have no direct or indirect interest whatsoever in the properties or securities of the company, nor do I expect to receive any such interest.

*G. L. Holbrooke*

G. L. Holbrooke,  
Consulting Geologist.

Dated this 13th day of February, 1965