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KEEVIL MINING GROUP LTD.

SUMMARY REPORT

ON THE

GEOLOGY AND GEOCHEMISTRY

OF THE

"GM" CLAIM GROUP

McCleese Lake area, Cariboo Mining Division, British Columbia

93B 19E & 9W

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LIST OF ILLUSTRATIONS

GEOLOGY AND GEOCHEMISTRY OF THE "GM" CLAIM GROUP

SUMMARY

The 108 "GM" claims were staked to cover a large block of ground on the Granite Mountain pluton of quartz diorite which is considered favourable for the occurrence of copper. Extensive epidotic and chloritic alteration is found throughout, but there is no other indication of a porphyry copper type ore body. A pronounced geochemical anomaly for copper having a length of nearly three miles and a maximum width of 2600 feet is superimposed on an extensive, but weak, sheared zone in the quartz diorite. The sheared zone is sparsely mineralized with pyrite and occasional flecks of malachite. More extensive exploration is definitely required and it is recommended that (1) a detailed geochemical survey be made of the sheared zone and its accompanying geochemical anomaly; and that (2) fresh rock be exposed by trenches or pits or by diamond drilling since there is a good possibility that surface leaching of the copper minerals has occurred.

INTRODUCTION

Keevil Mining Group Ltd. had, in previous years, explored several copper occurrences and adjacent areas along the west flank of the Granite Mountain batholith. Although these mineralized areas were thought to have little potential, the intrusive in general was considered to be favourable for the occurrence of a porphyry copper type ore body. It was, therefore, decided to check the intrusive for signs of it being a zoned intrusion and for signs of alteration haloes that commonly occur around porphyry copper type ore deposits. Accordingly, in conjunction with the staking of the "TK" claim group to the south, 102 claims were staked along the summit of Granite Mountain during the latter part of February, 1964. During the following

summer it was found that open ground occurred between the GM claims and the GG claims to the west and an additional six claims were staked in August, 1964 to cover this open ground. The GG claim posts were difficult to locate and only one of them was found. It is therefore probable that a considerable overlap of the GM claims on the GG claims occurs.

The GM claims were numbered consecutively from 1 to 108. Those numbered from 1 to 102 were staked between February 25 and 29, 1964, and were recorded at Prince George on March 2, 1964. Those numbered from 103 to 108 were staked on August 17 and 19, 1964, and were recorded at Quesnel on August 21, 1964. Their tag and record numbers were:

CLAIM NAME	TAG NUMBER	RECORD NUMBER
GM 1 - GM 100	510901-511000	27280 - 27379
GM 101 - GM 102	469709-469710	27380 - 27381
GM 103 - GM 108	424290-424295	28797 - 28802

All the claims were transferred to Peter W. Butler to be held in trust for Keevil Mining Group Ltd.

The geological and geochemical mapping of the claims began on July 3, 1964 and continued until August 25, 1964 with some time being taken for other projects. Upon completion of this work, nine days were spent on a geochemical reconnaissance of the areas east of and north of Granite Mountain and of the Dragon Mountain area near Quesnel. This latter work is not included in this report. Following receipt of the geochemical results, two days in October were spent on the GM claims making further investigations of the sheared zone that gave rise to the geochemical anomaly.

LOCATION, ACCESS AND PHYSIOGRAPHY

The GM claims are located along the crest of the ridge named Granite Mountain. They are near McCleese Lake in the Cariboo Mining Division in Central British Columbia and are at 52°30' north latitude and 122°15' west longitude.

The main north-south highway of British Columbia, the Cariboo Highway, and the main line of the Pacific Great Eastern railway pass through the area and are several miles west of the claim group. Secondary roads are found in the valleys of Cuisson Lake to the west and of Sheridan Creek to the south. From these, jeep trails lead up Granite Mountain. One trail, from the Cuisson Lake road, follows up the north side of Granite Creek to the Polyanna prospect, a short distance west of the GM claims. The other trail leaves the Likely road at the junction of Big Camp Creek with Sheridan Creek and leads to the triangulation station on the summit of Granite Mountain. A forestry lookout tower is being constructed at this location and the trail will, undoubtedly, be improved. Due to the very wet summer experience this year, both trails were almost impassable and a four wheel drive vehicle with a winch was required to negotiate them.

West of the north-south base line which passes through the triangulation station, the bush is fairly open and does not impede movement. The area east of the base line is, for the most part, a difficult one in which to work. It is an old burn in which the new growth of about 20 years age has been knocked down by snow and winds. As a result, it required three to four hours to walk from the end of the trail to the northeast corner of the claim group.

Granite Mountain is one of several hills which occasionally rise above the Interior Plateau of British Columbia. The plateau has a rolling surface varying in elevation from 3000 to 3500 feet. Streams and rivers have cut valleys with precipitous slopes as much as 2000 feet below the plateau and a few hills, such as Granite Mountain, rise as much as 1000 feet above it. Granite Mountain is the southern end of a ridge extending northward for 30 miles to Dragon Mountain near Quesnel and having a width of about ten miles. The ridge has a maximum elevation of 4850 feet, but Granite Mountain itself is little more than 4600 feet.

GEOLOGY

In general, the rocks of the Interior Plateau are deformed Permian (Cache Creek Group) and Triassic (Nicola and Takla Groups) volcanics and sediments overlain by less deformed Jurassic to Cretaceous (Hazelton and Bowser Groups) volcanics and sediments, all of which are intruded by a complex of Jurassic to Cretaceous acidic rocks (Coast Intrusions). These older rocks are capped by nearly flat lying Tertiary volcanics and some sediments. Erosion has cut numerous windows in the plateau basalts but unconsolidated Recent glacial and fluviotile deposits frequently blanket the underlying rocks, sometimes to great depths. Consequently, outcrop is seldom found in the valley bottoms and lower slopes of the hills. At Granite Mountain rock outcrop is seldom found below an elevation of 4000 feet, but exceeds 50% of the area above that elevation.

Swarms of northwestward trending faults (parallel to the Cordillera) have sliced through the Cretaceous and older rocks and appear to have been the control for much of the mineralization, especially in or near the outlying plutons of the Coast Intrusions. The Coast Intrusions are most commonly diorites or quartz diorites.

The geologic setting of the GM claims follows this general pattern. The claims are on a quartz diorite pluton intruding Cache Creek sediments and adjacent to northwestward trending faults. One such fault occurs in Beaver Valley on the east side of Granite Mountain and another may occur in the valley of Cuisson Lake on the west. Tertiary basalts cap the lower nearby hills but are not found on Granite Mountain. Numerous copper prospects (e.g. - the Sunset Adit, the Polyanna showing, the Iron Mountain prospect) have been found on the lower slopes of the mountain and, if it were not for the heavy overburden, there would probably be more. The GM claims are, thus, in a favourable location and it was for this reason that they were staked.

The only rock type encountered on the claims is quartz diorite and, to a lesser extent, diorite. These rocks are light

coloured, medium-grained (1/8 inch), equigranular rocks composed mainly of plagioclase and up to 10% quartz with minor amounts of ferromagnesian minerals. The bulk of the rock is quartz diorite. In the southwest corner of the claim group diorite is predominant and in the northeast corner the grain size increases to one-quarter inch and a few flakes of biotite are present. This suggests a trend from diorite on the southwest through quartz diorite and a more potassic quartz diorite to, possibly, a monzonite or granodiorite off to the northeast.

Epidotic alteration is universal and is sufficiently advanced to give the rocks a distinct pistachio tinge. Most of the ferromagnesian minerals are partially altered to chlorite. Although both types of alteration occur everywhere in the GM claims, neither is present in that portion of the pluton occurring south of Sheridan Creek. The two areas are separated by five and one-half miles of ground in which there is no outcrop; but again there is a suggestion of porphyry copper type conditions being present to the north or northeast.

It is possible, though unlikely, that the Granite Mountain pluton and the one east of the Quesnel River near Dragon Mountain are part of the same batholith and that the area of extensive overburden between the two is underlain by quartz diorite. Thus, if the centre of zoning and of alteration lies to the northeast as suggested, it would occur beneath the heavy drift. A geochemical reconnaissance of the stream sediments in this area found no anomalous conditions; neither did the airborne magnetomer. Indeed the magnetics indicate that a large body of ultramafic material bounds the Granite Mountain batholith on the north and that the ultramafic mass is separated from the Dragon Mountain batholith by several miles of Cadhe Creek sediments, the two being in contact along one of the major northwest trending faults.

Numerous strong linears can be seen on the air photos and some are sufficiently strong to be seen on the ground. The

photogeologist called many of them faults and one in particular, in the northern claims, he called a major fault. Due to the homogeneity of the rocks, no offsets can be demonstrated and it is not possible to prove the existence of faults; but many undoubtedly occur. It is safe to assume that the rocks have been disturbed and are therefore more likely to have been mineralized.

A zone of weak shearing, or strong jointing, having a steep dip cuts diagonally across the property from the southeast to the northwest. The sheared rocks are rusty and display an occasional fleck of malachite, but only sparsely disseminated fine-grained pyrite can be seen. A strong geochemical anomaly for copper coincides with the sheared zone which therefore cannot be ignored. Surface leaching of copper has been demonstrated in several localities in the Canadian Cordillera and so must be suspect here. The importance of exposing fresh rock is apparent. Deep pits or diamond drill holes are needed. At Babine Lake surface leaching has been encountered to a depth of 25 to 30 feet and secondary (?) chalcocite as deep as 250 to 300 feet. Trenching to a depth of 30 feet is not feasible, and diamond drilling is, accordingly, preferred to trenching.

In claim GM 92 there is an area of sparse and erratic pyrite mineralization having an occasional splash of azurite and malachite. Grab samples of the best material assayed 0.75% and 0.76% copper. The occurrence is not considered significant.

Mapping was done on air photographs and the data was later transferred to a base map obtained from the British Columbia Department of Lands and Forests. It was their manuscript map, at a scale of one-quarter mile to one inch, for the standard national topographic map of the area. All location lines were traversed and most of the outcrops were examined. Stereoscopic examinations of the air photos were frequently made.

GEOCHEMISTRY

Stream sediment samples were collected from all streams encountered during mapping as well as from those originating on Granite Mountain. Most of the samples were moderately high in both copper and molybdenum and little could be learned from them. Soil samples were taken at 200 foot intervals (paced) along all location lines and in this way 324 soil samples were collected and twelve and one-half line-miles were sampled. There were six lines at 3000 foot spacings. One strong anomaly for copper and one weak one were indicated.

The stream sediment samples were gathered from the finest material in the streams. Organic matter could not be excluded from some. Soil samples were obtained by digging through the organic podzol and sampling the material beneath which was assumed to be the "B" layer. Care was taken to exclude all organic material. In some localities, the swampy areas, the "B" layer could not be reached and no samples were taken; in other areas of near-outcrop there was no "B" layer and no samples were taken. All sample locations were marked with red plastic tape bearing the sample number.

All analyses were hot extractions and were made by the Biogeochemical Laboratory of the University of British Columbia. The samples were dried and screened and the fines were analyzed for both copper and molybdenum. The samples were first subjected to a hot sulphuric acid attack. Copper was measured with a biquinoline extraction, and molybdenum with an isopropyl ether extraction from a thiocyanate complex in the presence of stannous chloride. The results were given in parts per million and are plotted on the accompanying map beside the sample location. The first number plotted is copper in ppm and the second is molybdenum in ppm.

The molybdenum content of the soils varied from nil to 100 ppm with 85% of the samples being less than four ppm. The threshold or background value is thus three ppm. The high values were erratic in both their statistical and areal distributions.

This, combined with the fact that the molybdenum highs could not be corelated with the copper highs, resulted in molybdenum being of little value in evaluating the metal content of the underlying rocks. It did indicate that no significant amounts of molybdenum are present.

The copper values varied from three to 400 ppm. The statistical distribution of the values was somewhat erratic but, in a broad sense, followed the normal bell curve of distribution with an apparent peak in the range of 10 to 20 ppm. 85% of the values were less than 80 ppm and this figure can be accepted as the background, or threshold, value. To be on the safe side, the mean was taken to be 50 ppm and the standard deviation for the 324 samples was calculated using the formula:

$$\sigma = h \sqrt{\frac{\Sigma fd^2}{N} - \left(\frac{\Sigma fd}{N}\right)^2}$$

where: σ = standard deviation
h = interval (here 10)
f = frequency
d = deviation from the mean
N = number of samples

Thus it was found that the standard deviation was 37 ppm and that the assumed mean of 50 ppm was probably correct since the calculated threshold value of 87 ppm was close to the assumed threshold of 80 ppm. Therefore a possible anomaly exists at 125 ppm and a probable anomaly at 160 ppm.

Using these values, a pronounced and strong copper anomaly having a length of 14,500 feet and a maximum width of 2,600 feet becomes apparent. The anomaly coincides with the weakly sheared zone previously described and, undoubtedly, results from mineralization in the sheared zone. Parallel to this anomaly, and 4000 feet to the northeast is a much weaker anomaly. Both anomalies require a more detailed investigation.

It is suggested that a base line be cut and chained in a northwesterly direction from the initial post of GM 83 to the

initial post of GM 40 and that soil sample lines be run normal to the base line at frequent intervals, with some of the lines being extended northeastward to explore the weaker anomaly. The sample lines need be only chain and compass lines. This work would involve 16,400 feet of base line, about 112,000 feet of chain and compass line, and about 1,600 soil samples if taken at 100 foot intervals. Two men should be able to do this work in three weeks at a cost of about $3000 including analyses and wages but not including costs for mobilization and transportation to the property.

An estimate of the cost and time required for rock excavations cannot be made since the locations and amount of excavations will depend on the results of the detailed soil sampling. Deep pits will be very expensive and their cost will be close to that of diamond drilling; thus drilling is preferred. 2000 feet of drilling will give an adequate test to the shear zone - four drill set-ups with a 200 foot 30° hole and a 300 foot 45° hole at each set-up. The cost for 2000 feet of "A" core should not exceed $10,000.

CONCLUSIONS AND RECOMMENDATIONS

The GM claims cover part of a quartz diorite pluton which is believed to be copper rich. The geologic setting is considered to be favourable for the occurrence of porphyry copper type ores. Within the claim group itself, there is a trend from diorite through quartz diorite to a potassic quartz diorite suggesting, possibly, a continuation northeastward into a monzonite or similar rock. Extensive epidotic alteration is present. Numerous strong linears occur, many of which are probably faults but none of which can be proved to have offsets. A zone of weak shearing mineralized with pyrite and possibly chalcopyrite occurs and has a known length of three miles. There is a good possibility that surface leaching has removed any copper minerals from the outcropping rocks. A strong geochemical anomaly coincides with the sheared zone. A second, but much weaker, anomaly occurs parallel to and northeast of the main anomaly.

The sheared zone with its accompanying geochemical anomaly is an interesting feature and requires a more detailed investigation. It is recommended that a detailed soil sample survey be made of the strong geochemical anomaly and that the weaker anomaly be further investigated. Since surface leaching of the copper minerals is a definite possibility, it is further recommended that deep pits or trenches be excavated or that several drill holes be drilled, their locations being governed by the results of the detailed geochemical survey.

Diamond drilling is preferable to trenching since the drill holes will penetrate to greater depths. The total cost for soil sampling and for 2000 feet of "A" core drilling should not exceed $15,000.

Kenneth C. Rose, P. Eng.

November 18, 1964.

KCR:s

STATEMENT OF QUALIFICATIONS

I, Kenneth C. Rose, of the Municipality of Saanich, in the Province of British Columbia, do hereby certify that:

1. I am a geological engineer and reside at 4454 Narvaez Crescent, Victoria, B. C.

2. I am a registered Professional Engineer in the Province of British Columbia.

3. I received the degrees of B.Sc. in Engineering Geology and M.Sc. in Economic Geology from Queen's University in 1945 and 1947 respectively and that I have practised my profession as a geologist since that time.

4. I have had extensive experience in both geological and geochemical surveys in various parts of Canada.

5. This report is based exclusively on work conducted by myself or under my personal supervision.

Kenneth C. Rose, P. Eng.

November 13, 1964.

PROVINCE OF ONTARIO)
)
COUNTY OF YORK)
)
TO WIT:)

IN THE MATTER OF the Mineral Act, Chapter 244 Revised Statutes of British Columbia, 1960, and in the matter of the application of Geophysical Engineering & Surveys Limited for the recording of certain assessment work as required under the provisions of the said Mineral Act with respect to certain claims located in the vicinity of McLeese Lake, British Columbia and designated as the "GM" claims.

I, JOSEPH CONRAD FRANTZ, of the City of Toronto, in the County of York, Geologist, MAKE OATH AND SAY THAT:

1. I am Vice-President of Geophysical Engineering & Surveys Limited and as such have knowledge of the matters hereinafter set forth.

2. In Exhibit "A" hereto is set out particulars respecting the number of days worked by every man employed on the said "GM" claims and the dates, wage paid and total amount paid to each man employed thereon.

3. In Exhibit "B" hereto is set out a statement of costs for work performed on the said "GM" claims.

4. This affidavit is made by me in good faith.

SWORN before me at the)
City of Toronto, in the)
County of York, this 20th)
day of January, 1965.)

R. N. Granger
Notary Public, Province of Ontario

STATEMENT OF EMPLOYMENT - 'GM' CLAIMS

NAME	OCCUPATION	WAGE	PERIOD ENDING	TIME EMPLOYED	WAGES PAID
Kenneth C. Rose 4454 Narvaez Cres. Victoria, B. C.	Geologist	$800/Month	April 1 - May 31, 1964 July 4 - Aug 25, 1964 Sept 15 - Nov 30, 1964	12 days 29 days 21 days	$2,642.00
Myles Bradford Box 781 Kimberley, B. C.	Student	$350/Month	July 4 - Aug 25, 1964	54 days	$ 632.00
Ralph Beguin McCleese Lake, B. C.	Labourer	$ 20/Day	Aug 11, 1964	1 day	$ 20.00
Robert McGee McCleese Lake, B. C.	Labourer	$ 15/Day	Aug 13,- Aug 20, 1964	7 days	$ 109.20
Ward H. Austin, Jr. P. O. Box 368 Larkspur, California	Photogeologist	$ 90/Day	July, 1964, August, 1964	8-3/4 days	$ 873.60
					$4,276.80

This is Exhibit "A"
referred to in the
Affidavit of Joseph
Conrad Frantz.

SWORN before me this
20th day of January, 1965.

Notary Public, Province of Ontario

GEOPHYSICAL ENGINEERING & SURVEYS LIMITED

J. C. Frantz, Vice-President

January 18, 1965

GEOPHYSICAL ENGINEERING & SURVEYS LIMITED

Statement of costs of Work Performed on McLeese Lake, British Columbia 'GM' Claims

Project Number 681

1)	Professional engineering services		$ 360.00
2)	Professional engineering services and other labour:-		
	Prospecting and general reconnaissance	270.16	
	Geology	1,366.01	
	Geo-chemistry	841.41	
	Photogeology	873.60	
	Drafting	496.50	
	Reports	268.74	
	Miscellaneous	127.92	4,244.34
3)	Field supplies and expenses -		2,487.01
4)	Truck rental		617.50
			$7,708.85

GEOPHYSICAL ENGINEERING & SURVEYS LIMITED

J. C. Frantz, Vice-President

This is Exhibit "B" referred to in the Affidavit of Joseph Conrad Frantz.

SWORN before me this 20th day of January, 1965.

Notary Public, Province of Ontario

N

Lake

Cuisson Creek

INDIAN RESERVE

Granite Creek

SUNSET ADIT

POLYANNA x TRENCHES

"GG" CLAIMS

"HC" CLAIMS

Granite Lake

Mostly glacial debris & few small outcrops

Small outcrops

CLAIMS UNCERTAIN POSITION

"GG"

Lake

Cuisson Lake

Lake

Pierce Creek

122° 15'

52° 30'

0.75 oz/ton GRAB

0.76 oz/ton GRAB

4587' Δ

19 17 15 13 11 9 7 5 3 1
20 18 16 14 12 10 8 6 4 2
39 37 35 33 31 29 27 25 23 21
40 38 36 34 32 30 28 26 24 22
103 51 49 47 45 43 41
104 52 50 48 46 44 42
105 63 61 59 57 55 53
106 64 62 60 58 56 54
107 75 73 71 69 67 65
81 79 108 77 76 74 72 70 68 66
82 80 78
99 97 95 93 91 89 87 85 83
101
102 100 98 96 94 92 90 88 86 84

To Accompany Geological and Geochemical Report

By: Kenneth C. Rose, P. Eng.

"GM" GROUP

on Granite Mountain
Cariboo Mining Division

Dated: November 18, 1964.

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Prince George
Fraser River
McBride
Quesnel
GM Claims
Williams Lake

JURASSIC - ?

DIORITE, QUARTZ DIORITE

Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 597 MAP 1

SCHISTOSITY - STRIKE AND DIP

STREAM SEDIMENT SAMPLE — LOCATION — 0 40 12 Cu Mo in ppm

SOIL SAMPLE — LOCATION — 120 16 Cu Mo in ppm

ASSAY % Cu / WIDTH

ROAD OR TRAIL

CLAIM POST - LOCATION DETERMINED
- LOCATION ASSUMED

KEEVIL MINING GROUP LTD.

GEOLOGY
"GM" CLAIMS
McCLEESE LAKE, B.C.

Geology: K.C. Rose
Geochemistry: K.C. Rose
Drawn: K.C. Rose

SCALE: 1" = 1320'
Date: Oct. 1964

K.C. ROSE BRITISH COLUMBIA ENGINEER

N

LATERAL MORAINES

SWAMPY

BRULÉ

CLAIMS UNCERTAIN POSITION

POLYANNA x TRENCHES

"GG" CLAIMS

"HC" CLAIMS

GLACIAL DEBRIS

TERMINAL MORAINES

Lake

Granite Creek

SUNSET ADIT

INDIAN RESERVE

Cuisson Creek

Cuisson Lake

Pierce Creek

52°30'

0.76 GRAB

0.76 GRAB

597

To Accompany Geological and Geochemical Report
By: Kenneth C. Rose, P. Eng.

"GM" GROUP

on Granite Mountain
Cariboo Mining Division

Dated: November 18, 1964.

Prince George
Fraser River
McBride
Quesnel
GM Claims
Williams Lake

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 597 MAP 2

CLAIM POST - LOCATION DETERMINED
- LOCATION ASSUMED

ROAD OR TRAIL

STREAM SEDIMENT SAMPLE LOCATION Cu Mo in ppm

SOIL SAMPLE LOCATION Cu Mo in ppm

ASSAY % Cu / WIDTH

GEOCHEMICAL ANOMALY
(VALUES IN EXCESS OF THREE STANDARD DEVIATIONS)

KEEVIL MINING GROUP LTD.

GEOCHEMISTRY
"GM" CLAIMS
McCLEESE LAKE, B.C.

Geology: K.C. Rose
Geochemistry: K.C. Rose
Drawn: K.C. Rose

SCALE: 1" = 1320'

Date: Oct. 1964