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NEWMONT MINING CORPORATION OF CANADA LIMITED

VANCOUVER, B. C.

GEOLOGICAL, GEOCHEMICAL, AND GEOPHYSICAL

PROGRESS REPORT

WHIPSAW CREEK PROPERTY

SIMILKAMEEN MINING DIVISION

Latitude 49° 17' Longitude 120° 45'

N.T.S. 92 H/7 E

Report by: T. N. Macauley

and

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September - October, 1971

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SUMMARY AND RECOMMENDATIONS

The Whipsaw Creek property, located 16 miles southwest of Princeton, B.C., was staked by Texas Gulf Sulphur Company in 1959. Exploration by them and others took place intermittently up to 1969, and in July, 1971, an option agreement was made between Newmont and TGS. Newmont staff then carried out an I.P.-resistivity survey, geological mapping, and some geochemical soil sampling.

Previous work has revealed a porphyry intrusive 3000 feet in diameter in volcanic rocks of the Nicola Group. Granodiorite of the Coast Range bounds the porphyry and the volcanics to the west. Widespread disseminated pyrite, accompanied by minor chalcopyrite and molybdenite, has been found in the margins of the porphyry and in the adjacent volcanics. Eight of the nine holes drilled to date tested the southern contact of the stock. The one hole to test the north contact intersected 0.26% Cu for 125 feet in the volcanics before entering the intrusive, with similar values in a trench above this drill hole.

Exploration work by Newmont has further explored this northern contact area, with the results compiled in the accompanying map. The main area of interest is a block of ground, about 4000' long by 1300' wide, underlain by Nicola volcanics and covered with glacial till and swamps. The I.P. survey yielded high chargeabilities (> 50 ms) over the Nicola rocks, with a peak area 1200x700' in size having more than 150 ms. Soil sampling shows sizeable areas having over 500 ppm Cu, and although the picture is complicated by transported anomalies in the swamps, a source area to the west and southwest is indicated. This is confirmed by the observed mineralization in the drill hole and rubble. Further investigation by diamond drilling and bulldozer trenching is required.

INTRODUCTION

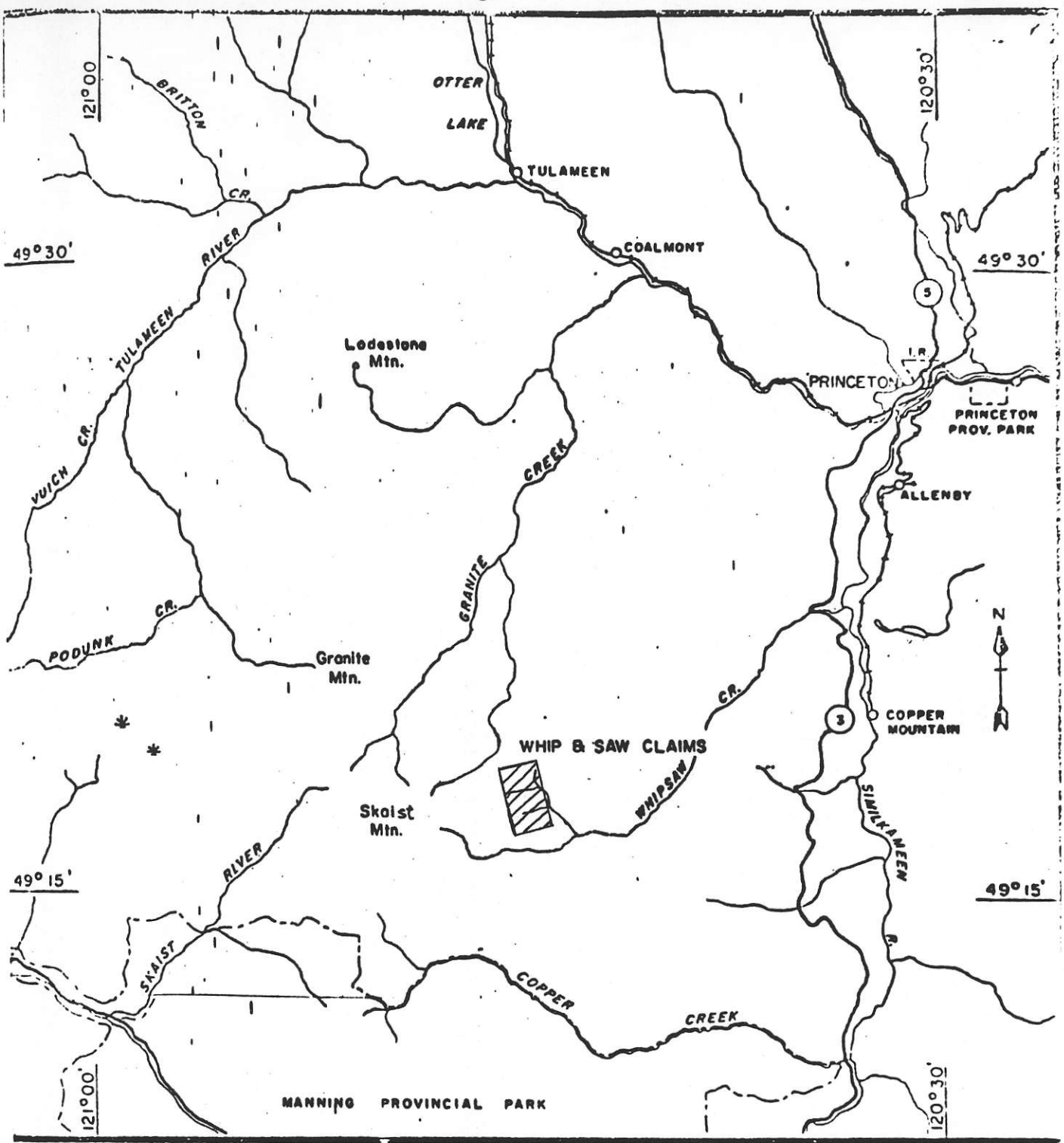
The purpose of this report is to record the work done by Newmont during 1971.

The property is located 10 miles SW of Similkameen Mining Company's mill and 16 miles SW of Princeton, B.C. (Fig. 1). Access is by 13 miles of unimproved road along Whipsaw Creek from Highway 3. The property measures 5,700 x 10,000 feet, and consists of 28 claims named Whip 1-8, Saw 1-8, Pick 1-6, and Axe 1-6.

HISTORY

Texas Gulf Sulphur Company discovered this property through regional geochemical work and recorded the claims on July 21, 1959. In 1960-62 they did soil sampling, geological mapping, EM, mag., and I.P. surveys, and drilled 3 holes. Moneta Porcupine, Dome, and Tennessee Corp. optioned the property in 1963-64 and did I.P., geochem and drilled 2 more holes. In 1968 Amax had a loose agreement under which they did soil sampling, mapping, and trenching. Texas Gulf drilled 4 holes in 1969 based on the Amax work.

Newmont's interest in the area dates from 1967, when a stream sediment survey indicated a strong anomaly, but as all the ground was staked nothing was done. In 1969 the property of Whipsaw Mines was submitted to Newmont. It borders the TGS claims to the east and south. A thorough examination of the work done to that time was made, and a program of further exploration was proposed (Macauley, 1969). Nothing further was done until July, 1971, when TGS intimated to Newmont that their property could be



NEWMONT MINING CORPORATION LTD.

LOCATION MAP

WHIPSAW CREEK PROPERTY

92 H / 7E

4 0 4 8

SCALE IN MILES

FIGURE 1

obtained on reasonable terms. An option agreement was made, and during the fall we conducted an I.P.-resistivity survey, geological mapping, and some geochemical sampling.

Contact was again made with Whipsaw Mines, Skaist Mines, and Silvertip Exploration, who hold the adjoining claims. Their recent work was reviewed and it was decided to concentrate our efforts on the TGS property.

TOPOGRAPHY AND OVERBURDEN

This property is situated on a height of land between the Whipsaw and Granite Creek drainages. Elevations range from 5000 to 5700 feet. The higher ground is gently rounded, while side-hill slopes are moderate. Drainage is via two valleys which open to the east and form Forty-seven Mile Creek, a tributary to Whipsaw Creek.

All of the property is forested, with small jack pine in the old burn on the SW portion, and larger spruce and fir on the lower elevations.

Overburden is thin and rubbly on the high ground. On the side hills and in the valley glacial till occurs. Thicknesses of it in the valleys may be appreciable (e.g., 40' in DDH 69-W-3). Some swamp or muskeg deposits are also found in the valleys.

This claim group is not usually free of snow until early June.

GEOLOGY

REGIONAL GEOLOGY

The Whipsaw Creek Property covers the Whipsaw porphyry, an Upper Cretaceous or Tertiary intrusive into Upper Triassic Nicola rocks, on the eastern contact of the Eagle Batholith. The Nicola Group is a varied assemblage of volcanic rocks ranging from porphyritic to non-porphyritic dacite to basalt. Along the eastern margin of the Eagle Batholith the Nicola rocks are strongly foliated, parallel the contact, and show an increase of metamorphic grade towards the contact (Anderson, 1971). The Eagle Batholith is a Jurassic to Cretaceous granodiorite that is foliated, parallel to the elongation of the batholith. The Whipsaw porphyry is a feldspar porphyry similar to others that occur, 25 miles NNW between Law's Camp and the Independence Camp, along the Eagle-Nicola contact.

Most mineral occurrences in the area are related to intrusives into Nicola rocks. The Ingerbelle-Copper Mountain deposits are the most important, but in this case the intrusions are nearly the same age as the volcanics (Upper Triassic). Low grade chalcopyrite and molybdenite mineralization is associated with Upper Cretaceous or Tertiary intrusives along the Nicola-Eagle contact, but to date none of these occurrences has proved to be economic.

PROPERTY GEOLOGY

Geological mapping was restricted to the northern portion of the Whipsaw Creek Property, north of the Whipsaw porphyry intrusive. Mapping was carried out between September 17-October 1, and October 15-19. The grid laid out for the Induced Polarization Survey, combined with the grid

established by TGS and additional fill-in lines by Amax, was used for control.

Rock exposure is poor. The majority of the exposure is on the ridges as rubble and outcrop. In areas of moderate overburden geological mapping was supplemented by rubble and float encountered in holes dug during the checking of anomalous geochemical values.

A distinction between outcrop, rubble, and float was made for rocks mapped and was plotted on the Geology Map (Map 1 in pocket). Outcrop is bedrock. Rubble is large angular pieces of rock overlying or near their place of origin. Float is smaller angular pieces that have been moved from their place of origin.

Petrology

Rock types observed were:

	Rock Type	Age
4.	Breccia	Upper Cretaceous or Tertiary
3.	Whipsaw Porphyry	Upper Cretaceous or Tertiary
2.	Eagle Batholith	Upper Jurassic
1.	Nicola Group	Upper Triassic

Nicola Group

The Nicola Group is composed of dark green to light grey, banded, schistose rocks that were originally andesitic volcanics. They are composed of 50% plagioclase and 50% amphibole. Amphibole is often altered to chlorite. The rocks are strongly foliated with foliation striking at an azimuth of 150°-160° and dipping moderately to steeply to the west. Minor magnetite is disseminated in the Nicola rocks but appears to be concentrated towards the contact of the Whipsaw porphyry.

Eagle Batholith

The Eagle Batholith is considered to be part of the Coast Range intrusives. It is a light grey, coarse grained biotite granodiorite. It is composed of plagioclase, potassium feldspar, quartz, and biotite.

Whipsaw Porphyry-Breccia

The Whipsaw porphyry occurs at the contact of the Nicola Group and the Eagle Batholith. The porphyry is multiphased, with the different phases being defined by the amounts of biotite and/or quartz present. These mineralogical phases were mapped by Mustard (1968), but in the present mapping they were combined under the Whipsaw porphyry. An intrusive breccia believed to be related to the Whipsaw porphyry was mapped.

The Whipsaw porphyry is a feldspar porphyry. It is composed of euhedral plagioclase phenocrysts (1-3 mm), various percentages up to 10% of hornblende phenocrysts (1-2 mm), and sometimes anhedral quartz (1-2 mm). The matrix varies from 60% to 80%, is fine grained and composed of plagioclase and mafics. Accessory minerals usually present--although not always--are hematite, magnetite, epidote, chalcopyrite, and up to 2% pyrite.

Portions of the margin of the porphyry and an area 1000' east of the NE corner of the porphyry are breccia. Fragments of Nicola rock and Eagle granodiorite occur in a feldspar porphyry matrix. Fragments are from 1/8" to 3" in size. Eagle fragments predominate to the west margin of the porphyry while Nicola fragments predominate to the east. The isolated area of breccia to the east of the porphyry may indicate the presence of porphyry nearby.

The porphyry intrudes the Nicola rocks parallel the foliation on the southern contact, whereas on the northern contact the porphyry cuts the

foliation. The northern contact between Whipsaw porphyry and Nicola was observed in a trench and in a diamond drill hole (69-W-1). From this information the northern contact of the porphyry is interpreted to dip at approximately 45° north. Geophysical data which will be discussed later confirms that the northern contact of the Whipsaw porphyry crosscuts the trend of the foliation.

Structure

A major fault was observed in the trench on Whip 8. It was interpreted to extend northeast along the topographic depression.

Intense fracturing was observed in the trench on Axe 1 above the diamond drill hole. The Nicola schist crumbled along small fracture planes into pieces 1/4" in size. Fracture surfaces were limonite and malachite stained.

Mineralization

Mineralization was observed in the following rock types:

1. Whipsaw porphyry and breccia
2. Eagle Batholith
3. Nicola Group

1. Mineralization in the Whipsaw porphyry and breccia consists of disseminated pyrite and chalcopyrite, occurring mainly near the margins of the intrusive. Assays of feldspar porphyry in the diamond drill holes show 0.01% to 0.17% Cu and .003 to .017% MoS_2 over 10 foot lengths. Mineralization is too low grade to recommend further work here.

2. Chalcopyrite and molybdenite occur with pyrite and quartz in fractures within the Eagle granodiorite. Skaist Mines trenched and diamond drilled (three holes) a geochemically anomalous area. Assays in core show .02% to .14% Cu and a trace to .063% MoS_2 over 5 foot lengths. Mineralization is too low grade

to warrant further work.

3. Mineralization in Nicola rocks consists of 0 to 5% pyrite irregularly distributed as disseminations and fracture-fillings. Accompanying the pyrite, a speck or two of chalcopyrite can often be seen. Near the Whipsaw porphyry chalcopyrite increases, occurring as disseminations and in fractures with quartz and pyrite. On the northern contact a diamond drill hole (W-69-1) encountered 125 feet of 0.26% Cu. Trenching showed 80 feet of 0.25% Cu, and grab samples of float collected 1200 feet west of the trench and the diamond drill hole assayed 0.26% and 0.28% Cu. The effect the porphyry has on controlling mineralization is unknown. The area of mineralization is interpreted to cover at least 1200 feet along the northern contact of the porphyry and although the grade is low there are possibilities of it being increased. Copper mineralization appears to favour Nicola rocks near the margin of the porphyry.

GEOCHEMISTRY

INTRODUCTION

Field Procedure

A total of 126 soil samples were collected between October 15th and 19th. Amax (Mustard, 1968) carried out a geochemical soil survey of the property on a 200' spacing. The present geochemical work was done to check and complete Amax's work. Work consisted of:

a) Resampling and sampling at closer intervals two areas on the northern portion of the property in which Amax had anomalous results. In the area centering on G4N - 18W (Anomaly I) 33 samples were collected, and in the area centering along

Line EON (Anomaly II) 23 samples were collected.

b) Completing sampling at a 200 foot interval on two lines on the southern portion of the property omitted in Amax's survey. 63 samples were collected.

c) Two soil profiles taken south of the property at the Whipsaw Mines trench (3 samples) and in the shear zone above Silver Tip adit (4 samples).

The majority of the samples were colleoted between a depth of 14-18". In swampy areas sample depths would be as deep as 30" and in areas of talus and outcrop depths would be shallower. Holes were dug with a spade and samples were taken with a stainless steel trowel. Samples were placed in a Kraft paper geochemical envelope and were marked with grid co-ordinates.

Laboratory Procedure

The samples were analyzed by Chemex Labs Ltd. of North Vancouver. Samples were dried, sieved in stainless steel sieves, and the -80 mesh material was digested with hot perchloric acid ($HClO_4$ + HNO_3). Distilled water was added to the residue which was then analyzed for Cu by atomic absorbtion.

RESULTS

Background

The threshold value established by Mustard (1968) was used to keep the work consistent. The following breakdown of results by Mustard was made on the basis of plots of frequency of copper values:

0 - 350 ppm Cu	Background
351 - 525 ppm Cu	Positive 1
526 - 700 ppm Cu	Positive 2
> 700 ppm Cu	Anomalous

These contour intervals were used for the two lines on the southern portion of the property.

Contours of 500 ppm Cu and 1000 ppm Cu were used in the northern portion of the grid (Map 1 in pocket). These contour values were established by Coope (1971).

Soil Profiles

Two soil profiles were taken south of the Whipsaw property (Fig. 2). A 92" profile was taken (Fig. 3) in the Whipsaw Mines trench on the Mae 36 claim, 300 feet south of the TGS property boundary. The trench was dug to check an area of anomalous geochemical results (Anderson & Stokes, 1970), and it shows that the area is deeply weathered and lacks an A horizon. Surface geochem values vary little from values just above bedrock. Thus soil sampling of the B horizon indicates mineralization in bedrock. A rock geochem analysis made on samples from bedrock gave half the soil values, which suggests an enrichment of copper in the soils.

A 96" profile was sampled in a road cut on the OK 2 claim, 2200 feet SE of the TGS boundary (Fig. 4). This is about 50' above the adit being driven by Silver Tip Exploration (Huff brothers) on the old S & M showing. Lead, silver, zinc, and copper sulphide mineralization was observed in veins up to 4" wide associated with shearing in the adit. There has been deep weathering and crumbling in the shear zone and two C horizons exist, covered by a B and an A. Copper, lead, and silver values are high in the C horizon, increasing from C_2 to C_1, but decrease in the B and A horizons. Zinc values are constant in C_1 and C_2, then increase in B and decrease in A. Low values in the A horizon are due to leaching. Soil sampling of the B horizon will show bedrock mineralization.

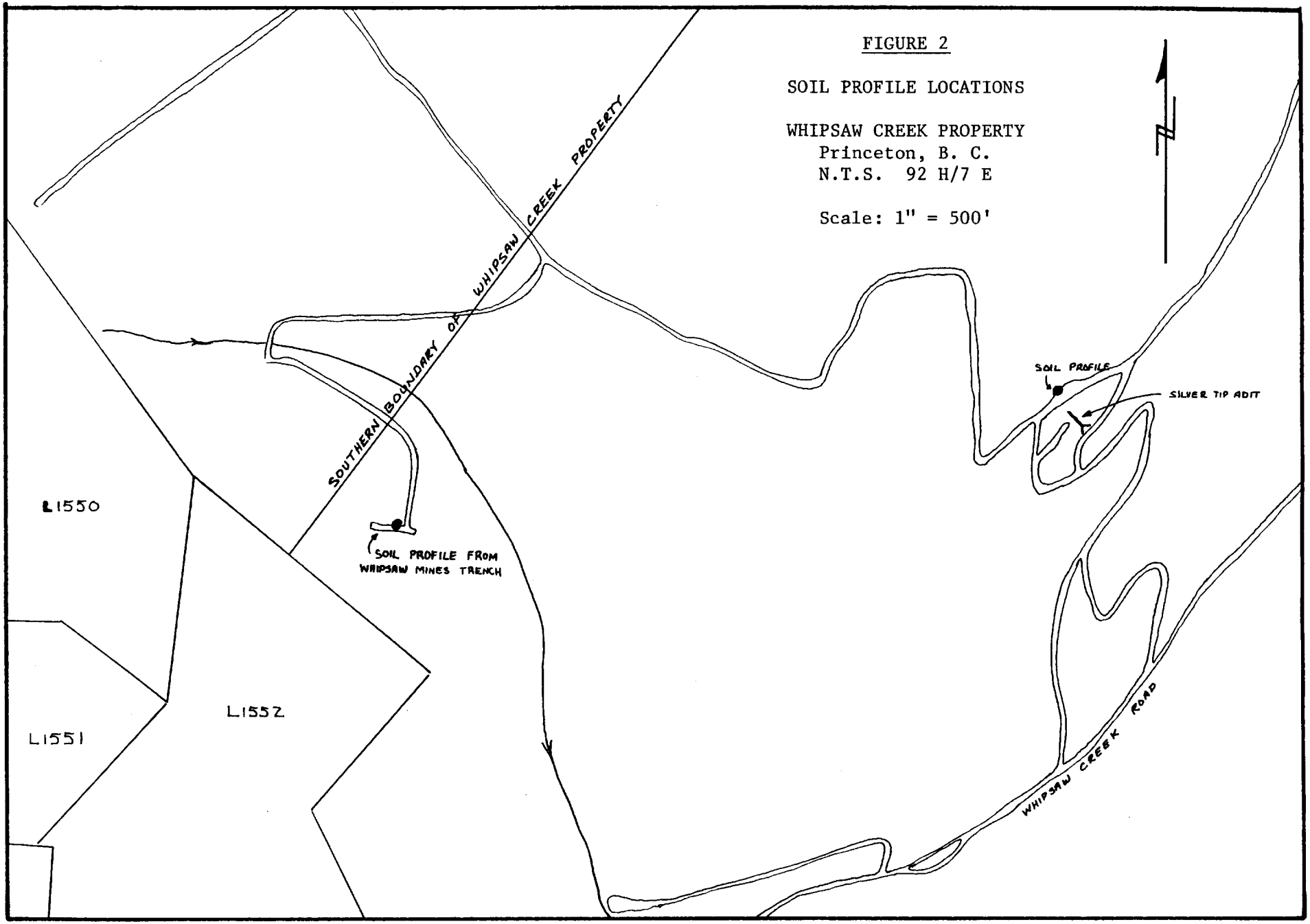
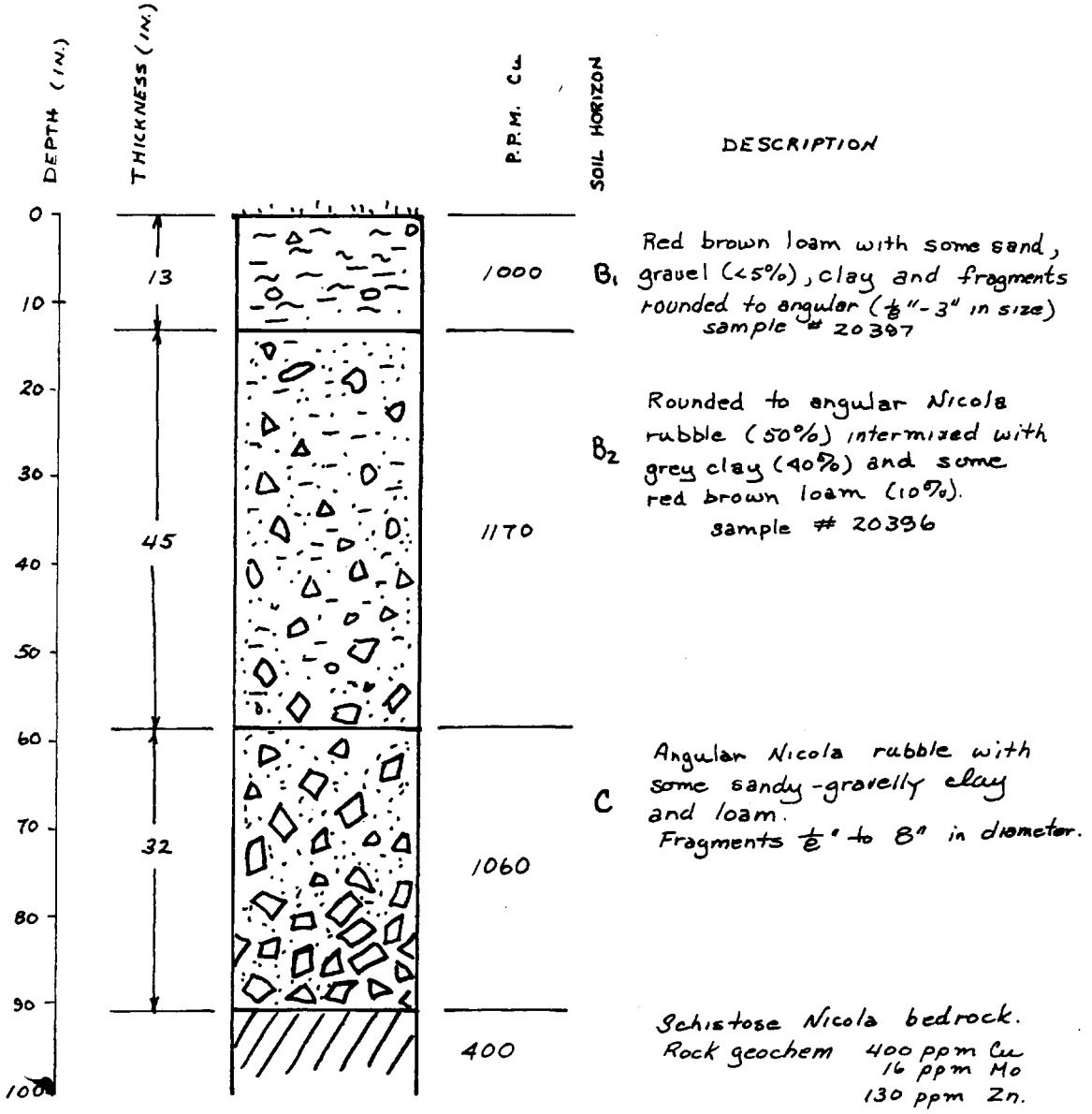


FIGURE 2
SOIL PROFILE LOCATIONS
WHIPSAW CREEK PROPERTY
Princeton, B. C.
N.T.S. 92 H/7 E
Scale: 1" = 500'
N
SOUTHERN BOUNDARY OF WHIPSAW CREEK PROPERTY
SOIL PROFILE
SILVER TIP ADIT
L1550
SOIL PROFILE FROM WHIPSAW MINES TRENCH
L1552
L1551
WHIPSAW CREEK ROAD

FIGURE 3



SOIL PROFILE OF WHIPSAW MINES TRENCH.
Scale: 1" = 20"

WHIPSAW CREEK PROPERTY
Princeton, B. C.

N.T.S. 92 H/7 E

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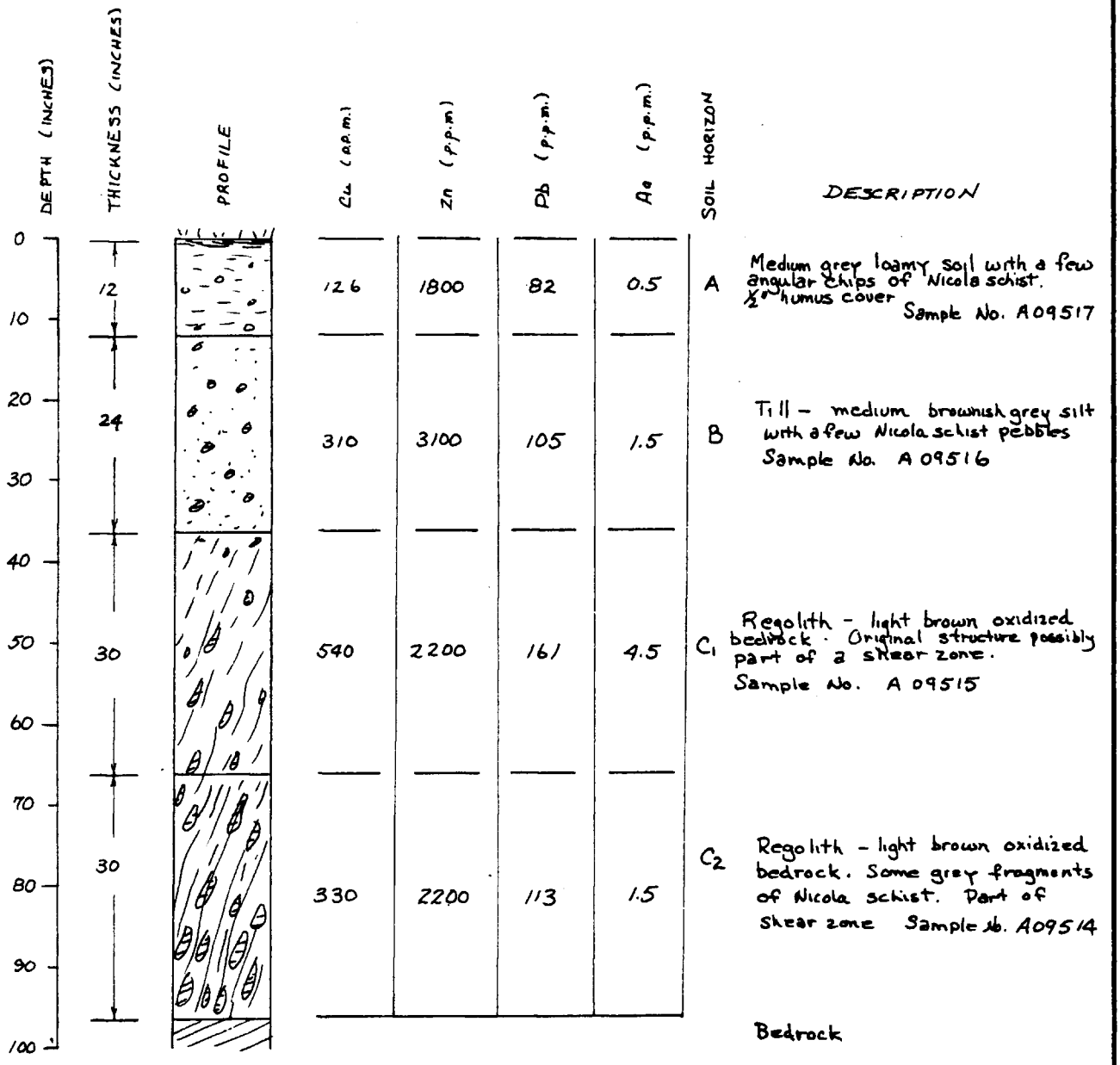
FIGURE 4



WHIPSAW CREEK PROPERTY
Princeton, B. C.

N.T.S. 92 H/7 E

SOIL PROFILE

from

Road Cut Above Adit Of
Silver Tip Exploration

Scale: 1" = 20"

Southern Portion of Property

Soil sampling on lines YON and X5N filled in a gap left in Amax's soil survey. The results ranged in value from 14 ppm Cu to 1140 ppm Cu with an estimated average of 200 ppm Cu. The results correlate well with Amax's results, as well as those of Whipsaw Mines to the south.

An anomalous zone 1200' long and extending 1000' south onto Whipsaw Mines property is centered on a south-southeast flowing creek. Chalcopyrite associated with pyrite was observed in the Whipsaw Mines trench and in float on a road crossing the anomalous zone. The grades were not high, both being less than 0.1% Cu. The anomaly is attributed to low grade copper in the Nicola schists which is concentrated by seepage towards the creek. Further work, consisting of mapping and anomaly checks, is recommended.

Northern Portion of Property

Two areas were resampled and sampled at closer intervals on the northern portion of the property. Anomaly I is centered on G4N-18W and Anomaly II is centered on E4N-30W (Map 1 in pocket).

Comparison of results of resampling follows:

	Location	Amax, 1968 ppm Cu	Newmont, 1971 ppm Cu
ANOMALY I	G2N - 12W	4000	1920
	G2N - 14W	110	341
	G2N - 16W	970	2000
	G2N - 18W	74	500
	G2N - 20W	165	562
	G2N - 22W	150	320
	G6N - 20W	480	620

	Location	Amax, 1968 ppm Cu	Newmont, 1971 ppm Cu
ANOMALY II	D8N - 26W	1400	800
	D8N - 28W	1900	3220
	D8N - 30W	640	1235
	D8N - 36W	1200	695
	EON - 24W	580	760
	EON - 26W	650	975
	EON - 28W	500	800
	E2N - 30W	620	620
	E2N - 34W	1000	1000
	E4N - 30W	650	680
	E6N - 30W	880	680

Results of resampling by Newmont (1971) generally show higher copper values than those of Amax (1968). In Area I all samples except G2N-12W are higher, and in Area II all samples except D8N-26W and D8N-36W are higher or the same. The higher values are believed to have resulted because of the increased depth of samples taken to insure a B horizon.

Float rock collected in holes dug for soil sampling was geochemically analyzed. Only those rock samples in which copper was observed were sent for analysis. Rock geochem results compared to soil geochem results follow:

Location	Rock Sample ppm Cu	Soil Sample ppm Cu
E2N - 34W	134	1000
E4N - 30W	2880	680
E5N - 29W	2640	740
E8N - 28W	86	292
GON - 20W	620	562
G2N - 12W	424	1920

The comparison of the above results show that 3 soil samples (E2N-34W, E8N-28W, and G2N-12W) have results higher than the float rock; 2 samples (E4N-30W and E5N-29W) are less, and one soil sample (GON-20W) is the same.

Anomaly I covers an area of 1000' x 500' centered on a swamp. Minor chalcopyrite mineralization was observed in rubble and float found in soil sample holes. Coope (1971) attributes the anomaly to leaching of the surrounding Nicola rocks and to transportation and concentration of copper ions in the swamp.

Anomaly II covers a swampy area along the north contact of the Whipsaw porphyry. Coope (1971) suggests that copper build-ups occur in seepage and swamp areas downslope from mineralization in place. The lack of copper concentrated in the swamp east of line 10W suggests an eastern limit to the copper mineralization. A weakening of mineralization to the west is indicated by a drop of values around line 34W. Chalcopyrite mineralization is noted in place in a trench and diamond drill hole on line 22W, and in float at E4N-30W and E5N-29W. Assays average about 0.25% Cu but are as high as 1%. The length of the anomaly (2400') and the observed mineralization makes the area worthy of further exploration.

GEOCHEMICAL CONCLUSIONS

1. The B horizon best indicates bedrock mineralization.
2. The anomaly on the southern portion of the grid is due to seepage and low grade copper mineralization.
3. In the majority of cases resampling to a greater depth gave higher values.
4. Values of rock geochemical analyses usually differ from values in overlying soils.
5. Anomaly I on the northern portion of the property is due to low grade mineralization and concentration of copper ions in swamps.

6. Anomaly II on the northern portion of the property is due to mineralization in place and concentration in swamps and seepage downslope from mineralization.

GEOPHYSICS

INTRODUCTION

An induced potential (I.P.) and resistivity survey of the northern contact of the Whipsaw porphyry between lines 10E and 26W was carried out between September 23 and October 1, 1971. A total of 4.7 miles of picket lines spaced 400' apart were surveyed. The I.P. and resistivity survey was conducted using Newmont-designed and manufactured equipment. Ballantyne (1971) describes equipment used and the field procedures. Chargeability contours of 50, 100, and 150 mv-sec/V (ms.) are plotted on Map 1 (in pocket).

A magnetometer survey, using a Sharpe PMF-3 magnetometer, was carried out between lines 10E and 26W in conjunction with the I.P. survey. Like copper, magnetite was noted to have increased in Nicola rocks towards the Whipsaw porphyry contact, which suggested that a magnetometer survey would indicate the position of the intrusive contact and possibly an area of better copper mineralization. Unfortunately, the results of the survey showed little or no variation. The data was not plotted.

DISCUSSION

The contact of the Whipsaw porphyry and Nicola rocks is clearly indicated by both chargeability and resistivity. Chargeabilities in the porphyry are <50 ms. while in the Nicola they are >100 ms. Similarly the resistivity in the porphyry is >400 ohm-meters and in the Nicola is <300 ohm-meters. The contact on both sets of data appears as a sharp gradient

cutting across the foliation in the Nicola rocks.

The Nicola rocks are all anomalous due to disseminated pyrite, but an area on line EON between 10W and 2W has extremely high chargeabilities (150 ms.) and low resistivities (200 ohm-meters). This difference may be, in part although not entirely, due to the effect of the swamp. In addition, a geochem anomaly (Anomaly II) coincides with this area and low grade mineralization has been found nearby. The area warrants drilling.

The area west of line 26W was not surveyed. It has good geochem values and should not be eliminated because of the lack of geophysical data.

GEOPHYSICAL CONCLUSIONS

1. The Nicola-Whipsaw porphyry contact is clearly defined.
2. An I.P. anomaly coinciding with a geochemical anomaly and nearby copper mineralization occurs in Nicola rocks north of the Whipsaw porphyry contact.

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REFERENCES

Anderson, P. and Stokes, R.B. 1970 — Summary Geochemical and Geological Report on the Property of Whipsaw Mines, Princeton, B.C., for Whipsaw Mines; Newmont Vancouver file 878, 27 pp.

Anderson, P. 1971 — Geology, Petrology, Origin, and Metamorphic History of the Eagle Granodiorite and Nicola Group, Whipsaw Creek, Princeton area, southern B.C.; Unpublished B.Sc. thesis, University of British Columbia, 201 pp.

Ballantyne, E.J., Jr. 1971 — Geophysical Report on Whipsaw Creek Property, B.C.; Newmont Vancouver file 828-1, 3 pp.

Coope, J.A. 1971 — Geochemical Anomalies - Whipsaw Creek Memorandum; Newmont Vancouver file 828-1, 1 p.

Elliott, I.L. and Horsnail, R.F. 1971 — Some Environmental Influences on the Secondary Dispersion of Molybdenum and Copper in Western Canada; Geochemical Exploration, C.I.M. Special Volume II, pp. 166-175.

Forsythe, J.R. 1970 — Diamond Drill Report on Whipsaw Creek Property for Texas Gulf Sulphur Co.; Newmont Vancouver file 828-1, 9 pp.

Holyk, W. 1961 — Geological and Geochemical Report on the Whip and Saw Groups, Whipsaw Creek, for Texas Gulf Sulphur Co.; Newmont Vancouver file 828-1, 8 pp.

Leighton, D.G. and Stokes, R.B. 1970 — M.J. Group of Mineral Claims, Similkameen Mining Division, B.C., for Skaist Mines; Newmont Vancouver file 828-2, 19 pp.

Macauley, T.N. 1969 — Report on the Whipsaw area; Newmont Vancouver file 828, 7 pp.

Mustard, D.K. 1968 — Whipsaw Creek Property for Amax; Newmont Vancouver file 828-1, 55 pp.

Seraphim, R. 1963 — Geophysics, Geochemistry, and Diamond Drilling on the Whip, Axe, Pick, Saw, Bill, and Pete Groups, Whipsaw Creek, Similkameen Mining Division, B.C., for Moneta Porcupine Mines Ltd.; Newmont Vancouver file 828-1, 7 pp.