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GEOLOGICAL AND GEOCHEMICAL REPORT ON THE MAE, KERRY, PAT AND MIKE GROUPS 49°, 120° SE 18 MILES SOUTHWEST OF PRINCETON, B.C. OF WHIPSAW MINES LIMITED

rk carried out during September 7 to November 15, 1967

By D.K.Mustard, P.Eng.(BC)

GEOLOGICAL AND GEOCHEMICAL REPORT

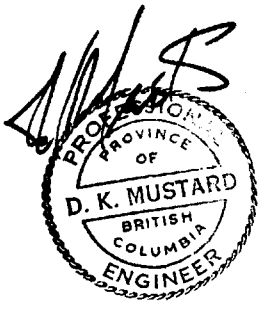
ON THE

MAE, KERRY, PAT and MIKE GROUPS

49°, 120° SE

of

WHIPSAW MINES LIMITED



September 7 - November 15, 1967

D.K. Mustard, P.Eng.(B.C.)

INTRODUCTION

This report embodies the results of work carried out by the author and associates on the Whipsaw Mines Limited property located approximately 18 miles southwest of Princeton, B.C. on the eastern slopes of Skaist Mountain, part of the Cascade Range, between elevations of 4300 - 5300 feet.

Access to this property can be made from a point on the Hope-Princeton Highway, 10 miles south of Princeton. From here 12 miles of logging road leads to the property. The main mineralized zones on the property are accessible by car.

During the period September - November 1967 the following persons carried out mapping and sampling on the property:

D.K. Mustard, Geologist, September 8 - 9th and October 9th, Reconnaissance

C. Bates, Junior Geological Assistant, September 8 - 9th, Geochemical Sampling

P. English, Junior Geological Assistant, September 8 - 9th, Geochemical Sampling

W. Lodder, Geologist, October 16 - 19th, Mapping

J. McCawley, Geological Assistant, October 16 - 19th, Mapping

B. Fenwick-Wilson, Prospector, September 7 - 9th and November 10 - 15th, Geochemical Sampling

B. Munday, Labourer, November 10 - 15th, Geochemical Sampling

Snow conditions during October and November limited the work that could be done on higher ground.

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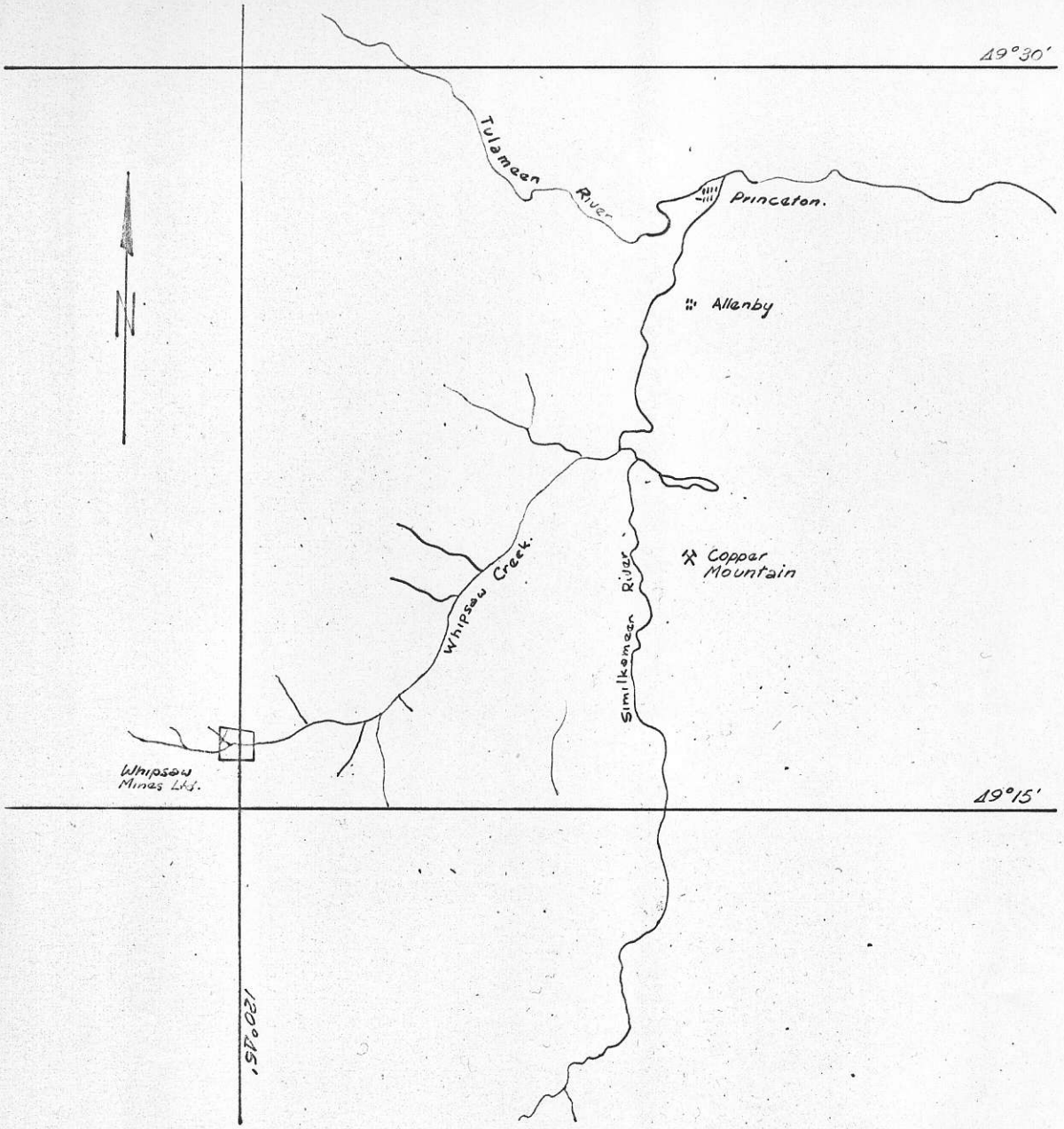
ILLUSTRATIONS

Fig. 1.



AMAX EXPLORATION, INC.

Location Map. Whipsaw Mines Ltd.

Scale : 1" = 4 Miles.

Property

The Whipsaw Mines Limited property comprises the following recorded claims:

Mae	# 1 - 47
Kerry	# 1 - 10
Pat	# 1 - 24
Mike	# 1 - 2

The accompanying map shows the claims and their relation to the surveyed Crown Grant leases, the Texas Gulf ground (Whip Saw) and the ground held by the Huff Bros. (OK, Silvertip).

During the examination several claim posts were encountered in the field and plotted as accurate as possible on the base map (derived from air photo's). The final claim situation as presented on the maps was obtained by construction using the known locations of claim posts. However, the ground situation is rather confused and these maps are not held to be an accurate representation of the claims.

GENERAL GEOLOGY

The area west of Princeton is mostly underlain by rocks of the Nicola series. The Nicola series, here, comprise a roughly north-west striking, 16 miles wide, belt of volcanics and sediments, which lie between the city of Princeton and the "Coast Range" Eagle intrusion.

The rocks of the Nicola series consist of vari-colored lava's, pyroclastics, fine-grained argillic sediments and limestones.

Apart from strong contact metamorphism along the contact

with the Eagle granodiorite, most of the rocks of the Nicola series are metamorphosed in the green-schist facies and mainly transformed into chlorite-sericite and quartz-mica schists.

The Nicola series is intruded by "Coast Range" Eagle granodiorite and by younger igneous rocks. The igneous rocks are mostly controlled by regional features, viz., faults, regional fracture pattern in the Nicola.

The most favourable conditions for ore deposition in the Nicola series are found in a zone along the younger intrusive contacts especially the quartz-porphyry. Within these zones the main mineralization is encountered along fracture systems.

GEOLOGY OF THE PROPERTY

The Whipsaw Mines Limited showings are in the Nicola series, on either side of Whipsaw Creek, along the east-side of the Eagle granodiorite "Coast Range" intrusion.

The northwest trending contact between the Nicola series and the Eagle granodiorite body is gradational, showing in between, a northwest striking belt of Nicola rocks heavily intruded by granodiorite dykes with widths up to 150 feet (Interbedded Series). All these granodioritic dykes and probably the main granodioritic body were intruded along the main fracturing direction in the Nicola Series (N 300 - 340 E, dip 40 - 60 SW).

The granodioritic rocks show a considerable variation in grain size and their amounts of biotite. They are characterized by a pronounced, northwest, gneissic structure and a N 300 -

340 E fracture system. The Eagle granodiorite caused a considerable contact metamorphism in the Nicola series giving rise to crystalline limestones, amphibole schists and talc schists. No ore deposition in the area appears to be associated with this igneous cycle.

The Nicola series of volcanics and sediments are thought to be of upper Triassic age. As mentioned before the rocks in the series are mainly vari-colored lavas, pyroclastics, argillic shale, argillites and limestones. All of the rocks are metamorphosed in the green-schist facies.

The rocks of the series are heavily fractured and faulted. Three main directions of fracturing and faulting can be recognized:

i) N300-340E - West dipping

ii) N 80-100E - Nearly vertical or flat dip

iii) N 40-60 E - Nearly vertical or flat dip

The first direction of fracturing and faulting is by far the most outstanding and can be traced throughout the entire area west of Princeton.

Along these systems the Nicola series are intruded by a number of different acid intrusions. The most prominent of these intrusions is a quartz-porphyry, exposed within the Texas Gulf claim group. The rock is characterized by plagioclase phenocrysts (up to five mm) and quartz eyes (up to three mm) in a brownish aphanitic matrix.

Towards the south of this porphyry several northwest

trending dyke-like intrusive bodies, up to 200 feet in width, are exposed (Acid intrusions on map). Microscopically they differ strongly from the above described porphyry, being holo-crystalline rocks with a strong variation in grain-size and their amounts of mafics. Plagioclase, (?) K-feldspar, biotite and (?) amphibole can be recognized with the naked eye and the dykes appear to be granodioritic in composition.

Scattered over the property, northwest striking feldspar porphyry dykes are found. They are often heavily stained and show plagioclase phenocrysts (up to 6 mm) embedded in a gray aphanitic groundmass in which biotite is sometimes recognized.

All the younger intrusions caused a contact metamorphism in the Nicola series (graphite schists, amphibole schists, etc.)

The Nicola series show a different metamorphic character in the northeast corner of the claim group where coarse-grained chloritoid schists were encountered.

STRUCTURAL GEOLOGY

As mentioned previously in the geology of the property, three main directions of fracturing and faulting can be recognized in the Nicola series. In the Eagle granodiorite only the N 300 - 340 E fracturing and faulting direction is present.

Shearing and brecciation along all mentioned directions is common.

A roughly east-west striking major fault zone with accompanying parallel faults was recognized near Whipsaw Creek.

The relative horizontal displacement along this fault zone is at least in the order of 2500 - 3000 feet. In this fault zone and immediately south of it, younger east-west striking flatly south dipping thrust faults are found. Neither the amount of displacement along these faults nor their relation to the major fault, if there is any, was established.

MINERALIZATION

Locally all tectonic phenomena in the area show discontinuous mineralization. Most of the mineral showings on the property show sheared and/or brecciated fissures, fractures and faults. This type of mineralization is patchy and very limited in width showing almost massive pyrite, galena and sphalerite with minor amounts of chalcopyrite, Ag, Cu and some molybdenite.

Zones up to 8 feet in width comprising several discontinuous mineralized fissures are locally present (Five Fissures, Metastoffer Zone, Night and Day, and Marion). The economic significance of these zones is very restricted, due to the very limited mineralized width of the fissures (up to 5 inches) together with their spacing 1.5 feet apart) and discontinuous mineralization.

No definite relation between the mineralized tectonic features and the igneous activity as encountered on the property has been established, however, it has to be noticed that pyritized feldspar porphyry dykes are always close to the showings. A certain degree of mineral zoning is indicated by the analyses given in the previous reports on the property, showing an increase

in chalcopyrite (Cu-values) going northwards and an increase in sphalerite (Zn-values) going southwards. The most intriguing part of the property lies north of Whipsaw Creek. Here occurs, apart from the mineralization described, mineralization more closely associated with the younger intrusions, especially the quartz porphyry. The intrusions caused a strong pyritization with minor amounts of chalcopyrite in the host rock.

In several localities the intrusive rock itself shows strong silicification together with dispersed pyrite and some chalcopyrite. Although these features are almost completely confined to the quartz porphyry and acid dyke-like intrusion, they are also noticed around and in the most northerly feldspar porphyry dyke.

The extent of the mineralization as described above is not known at present due to lack of outcrop.

GEOCHEMISTRY

A total of 155 geochemical samples were collected on the Whipsaw Mines property and analysed at the Burnaby Geochemical Laboratory of Amax Exploration, Inc.

Sample types were as follows:

Silt	4
Soil	143
Water	3
Rock chip	5
	155

Where possible these were collected from the B_1 horizon.

These samples were tested for the presence of molybdenum, copper, Total Heavy Metals and pH by the procedures outlined (See Burnaby Geochemical Laboratory Sample Handling Procedure).

Sample locations and values (ppm) in molybdenum and copper are shown in Figure 3 (In Pocket).

A further 800 pulps were analysed for the presence of molybdenum and copper. These samples were collected by Whipsaw Mines Limited and, on a prior occasion, tested for zinc. The objective in rerunning these samples was to compare distribution of copper and molybdenum in soil collected from the property, south of Whipsaw Creek with that in soil from north of the creek.

Of these, a total of 566 sample locations and values were plotted on grid locations supplied by Whipsaw Mines Limited (See plans 4 and 5).

The results of geochemical sampling to date suggest that in the portion of the property south of Whipsaw Creek, values in copper and molybdenum are not strongly anomalous. However, north of the Creek, especially towards the northwestern edges of the claims (Kerry 1 and Mae 37 and to the south Mae 38 - 40) anomalous values in copper and molybdenum would justify further investigation.

APPENDIX

BURNABY GEOCHEMICAL LABORATORY SAMPLE HANDLING PROCEDURE

STATEMENT OF COSTS

Property	Whipsaw Mines Limited	
Mining Division	Similkameen	
Location	Princeton, B.C.	
Coordinates	120°W 49°N SE	
Work Supervised By	D.K.Mustard, P.Eng. (British Columbia)	
Personnel Employed and Salaries		
D.K. Mustard, P.Eng.	1430 - 9th St.,West Vancouver, B.C. 3 days @ $49.00/day	$147.00
W. Lodder	887 Westview Crescent,North Vancouver,B.C. 4 days @ $49.00/day	$196.00
J. McCawley	805 - 1122 Gilford Street,Vancouver,B.C. 4 days @ $18.91/day	$ 75.64
B. Fenwick-Wilson	R.R. #1, Osoyoos, B.C. 9 days @ $18.81/day	$169.29
B. Munday	General Delivery, Smithers, B.C. 6 days @ $17.10/day	$102.60
C. Bates	Bella Vista Cottage, Gibraltar 2 days @ $12.82/day	$ 25.64
P. English	1775 Boundary Rd., R.R. #2, Whiterock,B.C. 2 days @ $12.82/day	$ 25.64
Board	30 man days @ $5.00/day	$150.00
Geochemical Samples	155 samples @ $2.00/sample	$310.00
	566 pulps @ $1.00/sample	$566.00
Report Preparation	Writing, drafting and typing	$100.00
	Totals	$1867.81

PROVINCE OF BRITISH COLUMBIA
D. K. MUSTARD
ENGINEER

BURNABY GEOCHEMICAL LABORATORY

SAMPLE HANDLING PROCEDURE

Vancouver Office

August 1967

I. Rokus

STREAM SEDIMENTS AND SOILS

Drying and Sieving

Sample boxes should be opened as soon as they arrive in the laboratory. If dryer is full, spread samples to air dry. As soon as possible, samples should be placed in dryer.

After drying, samples are to be sieved to minus 35 mesh. As much -35 material as possible is recovered from sample. Dump the -35 mesh material on a square of brown paper and mix by rolling several times. Place mixed -35 mesh material in a coin envelope and place envelope in original sample bag. Arrange samples in units of 40, if possible, and in numerical order.

ROCK AND CORE SAMPLES

General Handling

Rock or core samples need, usually, to be only air dried. If samples seem particularly wet they may be force dried by placing in numbered pans in the drying oven. No attempt is made to completely dry rock samples, that is, expel all the water from the pores of the rock. The samples are ready to crush when the outside surfaces are dry.

Crushing and Pulverizing

Rock and core samples are to be processed in such a manner that a representative 1/2 gram sample can be obtained. The entire amount of each sample is to be passed through the jaw crusher. At jaw crusher size the smallest sample that can be split out is 5 pounds. If sample is five pounds or less in size, pass the entire sample through pulverizer with plates set to

produce material of a maximum 8 mesh size. If sample is larger than 5 pounds then pass sample through Jones splitter to produce a sample of approximately 5 pounds. Pass this sample through pulverizer to produce -8 mesh material as above.

When the approximate 5 pound split has been pulverized to -8 mesh, then sample can be split to smaller size for final pulverizing. Using the Jones splitter, split sample down until a portion weighing 100 - 200 grams is obtained. This portion is then passed through the pulverizer, with plates pulled up tight so that product will pass 100 mesh screen. Regular checks, by screening, should be made to be sure the pulverizer, with plates pulled up tight, is producing a product 95% of which will pass a 100 mesh screen. After pulverizing, the sample should be mixed by rolling on brown paper or rubberized cloth. Rejects should be saved according to instruction from sampler.

WEIGHING FOR COPPER AND MOLYBDENUM

Digestion tubes (100 x 16 mm) should be marked at 5 ml level. Using diamond pencil, mark each tube carefully at bottom of meniscus.

Samples for digestion and analysis should be handled in units of 40 where possible. Prepare a laboratory data sheet for each batch of 40 samples.

Weigh accurately on balance 1/2 gram sample and put in marked test tube.

DIGESTION AND DILUTION FOR COPPER AND MOLYBDENUM

To each of the samples prepared above add 1:1 HNO_3 to the 5 ml mark. Place samples in the digestion racks in order. Adjust heat so that samples are gently boiling. Digest for three hours at this gently boiling rate. Remove from digestion rack and bring volume back to 5 ml with demineralized water. Mix well and then centrifuge for 1 minute. Use clear upper layer for copper and molybdenum determination.

MOLYBDENUM TEST

Procedure for Silt, Soil and Rock

1. Transfer a 1 ml aliquot of digested solution from above into clean test tube for determination.
2. Add 1.0 mls KSCN shaking gently - 5%
3. Add 1.0 mls $SnCl_2$ shaking gently - 15% in 2NHCl
4. Make up to 10 mls with water.
5. Add 1 ml isopropyl ether, add stopper and shake for 45 seconds.
6. Match colour of ether layer with standards against a white background and record ppm.

Standard Molybdenum Solutions

Stock Standard Solution (100 γ/ml) - Dissolve .015 gms of MoO_3 in 5 ml conc. NaOH and make up to 100 ml with demineralized H_2O. This solution must be made up bi-monthly.

Working Standard Solution (10 γ/ml) - Pipette 10 ml of 100 gamma/ml stock solution in a 100 ml volumetric flask and make up to 100 ml with demineralized H_2O.

Molybdenum Standards for Soil, Silt and Rock Chip - based on 1/2 gm sample aliquot.

1. Take 15 clean 100 x 16 test tubes which are calibrated to 5.0 ml mark by a diamond pencil.
2. Pipette the following aliquots;

	10 γ/ml	gammas	Factor Used	ppm
a)	0.2 ml	2 γ		4
b)	0.4 ml	4 γ		8
c)	0.6 ml	6 γ	X 2	12
d)	0.8 ml	8 γ		16
e)	1.0 ml	10 γ		20
	100 γ/ml			
f)	0.125 ml	12.5 γ		25
g)	0.150 ml	15 γ		30
h)	0.20 ml	20 γ		40
i)	0.30 ml	30 γ		60
j)	0.40 ml	40 γ	X 2	80
k)	0.50 ml	50 γ		100
l)	0.75 ml	75 γ		150
m)	1.00 ml	100 γ		200
n)	1.50 ml	150 γ		300
o)	2.00 ml	200 γ		400

3. Make up to 5 ml mark with distilled water.
4. Now take 15 clean 150 x 16 test tubes calibrated to the 10 ml mark. With a pipette take 1 ml out of each of the previous test tubes and pipette them into the new set of test tubes.
5. (A) To the set of 16 x 150 mm test tubes then add the following:
   a) 1 ml HCl 6N
   b) 1 ml 1% $FeCl_3$ - add more if color development is poor
   c) 1 ml 5% KSCN
   d) 1 ml 15% $SnCl_2$
   e) Make up to 10 ml mark with demineralized water.
   f) 1 ml iso-propyl ether.
   g) Shake for 20 - 30 seconds.
   h) Allow to settle and read.

   (B) Save the original 16 x 100 test tubes with the remaining solutions in them. Stopper them by corks on which the respective concentrations are marked in ppm. Use these in future preparations.

BIQUINOLINE COPPER TEST FOR SILT, SOIL AND ROCK CHIP

This test is selective for copper and is not subject to any metal interferences. Reference: U.S.G.S. Bulletin 1152.

Reagents

1. Buffer solution: dissolve 400 gms sodium acetate and 100 gms sodium tartrate and 20 gms of hydroxylamine hydrochloride in 1 litre of water. Adjust to pH 6.5.
2. Biquinoline solution: add .2 gms 2,2' biquinoline in 900 mls isoamyl alcohol. Heat on hot plate to dissolve. Cool and make to 1 litre with isoamyl alcohol.

Procedure

1. Take a 1 ml aliquot from digestion solution above and transfer to large test tube for determination.
2. Add 10 mls copper buffer.
3. Add 2 mls biquinoline-isoamyl alcohol solution.
4. Stopper tube and shake vigorously for 45 seconds.
5. Allow phases to separate, then compare colour to standards against a white background and record ppm.

Standards

Stock Standard Solution (100 γ/ml) - Dissolve .2 gms blue $CuSO_4$ in 400 mls H_2O. Add 5 mls conc. HCl and H_2O to 500 mls.

Working Standard Solution (10 γ/ml) - Dilute 10 mls stock standard and 1 ml conc. HCl to exactly 100 mls with H_2O

Preparation of Standards

This procedure is the same as the preparation for molybdenum standards except for 5 (A). The section 5 (A) which applies to the preparation for standards of copper is as follows:

5 (A) To a set of 16 x 150 mm test tubes then add 1 ml 1:1 HNO_3, 10 ml copper buffer, 2 ml 2,2' - Biquinoline in isoamyl alcohol. Shake for 5 minutes vigorously. Allow to settle, then read.

THM (Total Heavy Metals) TEST

Test mainly sensitive to zinc, copper and lead (especially zinc). Reference: Bloom, H., Economic Geology, Volume 50-1955.

Reagents

1. Demineralized H_2O

2. Dithizone (diphenylthiocarbazone) Reagent grade.
3. Dithizone/chloroform 0.1% solution, dissolve 0.147 gm dithizone in 100 mls chloroform. (Dithizone is more soluble in $CHCl_3$ than in Benzene).
4. Dithizone stock solution .01% - Dilute 10 mls of 0.1% solution to 100 mls with Benzene.
5. Dithizone working solution .001%: dilute 10 ml of stock solution to 100 ml with benzene; should be made daily; yellow hue indicates breakdown of dithizone.
6. Buffer solution: take 50 gms of ammonium citrate and 8 gms hydroxylamine hydrochloride, making up to 1000 mls with water; adjust pH to 8.5 w/conc. NH_4OH; purify w/dithizone solution if necessary.

Procedure

1. Measure out with volumetric scoop .5 gm of sample into a test tube.
2. Add 5 mls buffer then 5 mls .001% dithizone solution.
3. Shake for 30 seconds.
4. Observe color against a white background and record ppm from standard chart.

pH MEASUREMENTS

Soil and Silt Samples

The soil and silt samples should be dampened with demineralized water to a pasty consistency. Demineralized water should be used for this purpose because it is thought that water deprived from its ionic content has a low buffer capacity and thus will not influence the pH of the sample.

Experience has borne out the fact that 30 seconds time is sufficient for the meter to come to a reasonable stability. The meter needle will keep on drifting slowly but this will be much slower than at the beginning and therefore can be ignored.

Store electrodes in buffer overnight. When starting in the morning allow 15 minutes warm up for the instrument.

Water Samples

You may use either a sample aliquot from the bottle or simply measure pH right in the bottle by using a combination electrode. If the latter method is chosen, take care that samples have already been analyzed for Mo to avoid contaminations by the

electrode. Use 30 second intervals here as well as between each consecutive measurement.

MOLYBDENUM IN WATER

1. Transfer 50 mls. of sample into 125 ml separatory funnel.
2. Add 10 mls dilute (1:1) HCl
3. Add 1 ml 1% ferric ammonium sulphate or $FeCl_3$
4. Add 3 ml 10% KSCN and shake.
5. Add 3 ml 15% $SnCl_2$ in 2NHCl
6. Add 2 ml isopropyl ether, shake for 30 seconds and allow phases to settle.
7. Drain off water layer, retaining organic ether layer in funnel with a little of the aqueous layer remaining.
8. Drain small amount of water plus organic layer into 16 x 150 mm test tube. Compare with standards against white background.

Molybdenum Standards - label 12 clean test tubes 0, 2, 4, 10, 16, 20, 30, 40, 50, 60, 70 and 80 ppb. To the respective tubes pipette the following volumes of 1 γ /ml Mo work solution.

mls of 1 γ /ml Mo Solution	ppb
.20	4
.50	10
.80	16
1.00	20
1.50	30
2.00	40
2.50	50
3.00	60
3.50	70
4.00	80

After the standard solutions have been added, make up to 50 ml mark with demineralized water then add the following:

1. 10 ml 1:1 HCl solution.
2. 1 ml of 1% $FeCl_3$
3. 1 ml of 10% KSCN solution.
4. 1 ml of 15% $SnCl_2$ solution.
5. 2 ml of isopropyl ether.
6. Stopper and shake for 45 seconds.

Standards must be made up at least three times a week.

inches
0 1
0 1 2
centimetres

This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.

42W 32W 22W 12W 2W 8E

±26W

±10E

HON GON FON EON DON CON

GBN G6N G4N G2N F8N F6N F4N F2N E8N E6N E4N E2N D8N D6N D4N D2N C8N C6N C4N C2N

AXE 6 AXE 5 AXE 4 AXE 3 AXE 2 AXE 1

PICK 6 PICK 5 PICK 4 PICK 3 PICK 2 PICK 1

ANOMALY I ANOMALY II

1000 ppm. 500 ppm. 100 m.s. 150 m.s. 50 m.s.

5500' 5600' 5700' 5400' 5300'

620 ppm Cu, 8 ppm Mo, 80 ppm Zn

424 ppm Cu, 10 ppm Mo, 65 ppm Zn

2640 ppm Cu, 8 ppm Mo, 100 ppm Zn

2880 ppm Cu, 38 ppm Mo, 176 ppm Zn

134 ppm Cu, 28 ppm Zn

SKAIST MINES

WHIP 8 WHIP 7 SAW 8 SAW 7

LEGEND

- EAGLE GRANODIORITE
- FELDSPAR PORPHYRY
- BRECCIA
- NICOLA VOLCANIC

schistosity, outcrop, rubble, float, geological contact (defined, undefined)

claim post, diamond drill hole, trench, road, 50, 100, & 150 m.s. (I.P. contours)

assay / footage, rock geochem, % pyrite observed, 500 & 1000 ppm soil geochem contours (defined, undefined, swamp)

swamp

NEWMONT MINING CORP. OF CANADA LTD.

DATE: DECEMBER, 1971
SCALE: 1 INCH = 200 FEET

GEOLOGY
92H/7
WHIPSAW PROPERTY

FILE: 828-1
DWG. 1

CONTOUR INTERVAL = 100' WITH GEOCHEMICAL AND I.P. ANOMALIES