GEOLOGICAL, GEOCHEMICAL, AND GEOPHYSICAL REPORT

ON THE REX CLAIMS, SHINGLE CREEK

LOCATED 9 MILES SOUTHWEST OF PORT ALBERNI, B.C.

BY P.E. FOX, Ph.D AND J.F. ALLAN, P.Eng.(BC)

FOR

AMAX EXPLORATION, INC.

WORK DONE BETWEEN APRIL 29 - MAY 19, 1968

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ON THE

REX CLAIMS, SHINGLE CREEK

ALBERNI MINING DIVISION

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P.E. FOX Ph.D.

AND

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AMAX EXPLORATION, INC.

APRIL 29 - MAY 21, 1968

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## SUMMARY & CONCLUSIONS

Twenty-eight Rex Claims were staked on the Shingle Creek prospect on July 25, 1967. The prospect was discovered by Amax crews during a routine prospecting of the area in 1966 and claims were staked after follow-up work in 1967. The property is situated 9 miles southwest of Port Alberni on Vancouver Island.

The Rex claims are underlain by basic flows of the Karmutsen volcanics and swarms of quartz feldspar porphyry dykes. Molybdenite and chalcopyrite-bearing float was traced to a large pyritic stain zone in Shingle Creek composed of intensely pyritized and altered quartz feldspar porphyry dykes and basic volcanics. The pyritic zone was determined to be about 800 feet wide and at least 4500 feet long. Molybdenite was found in 1/2 inch quartz stringers in outcrops and loose blocks of porphyry in the creek bed for 200 feet. Grade is low, estimated to be 0.02% MoS2. Copper occurrences proved to be too widely scattered to be of interest.

#### INTRODUCTION

Twenty-eight claims were located on the Shingle Creek Cu-Mo prospect on July 25, 1967 and recorded in Port Alberni on July 27, 1967. The prospect was discovered during routine prospecting of the Cous Creek drainage in 1966 and staked after follow-up work in the following year. Assessment work was done on the claims in the spring of 1968.

## Location and Access

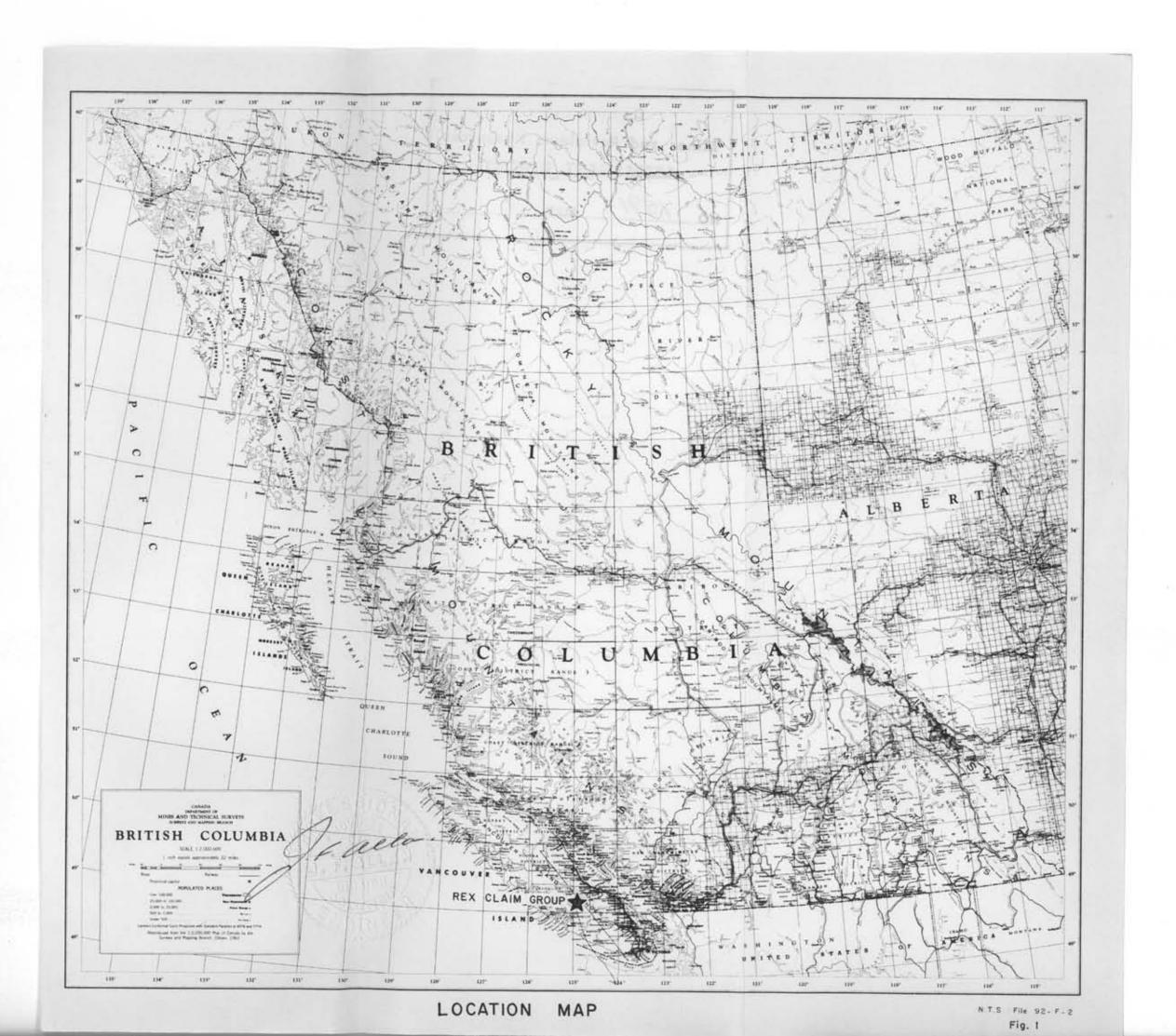
The Rex claims are situated 9 miles southwest of Port Alberni on the crest and northerly slope of a prominent ridge separating Cous Creek to the north and MacTush Creek to the south. The claims are readily reached via Branch 404 of the Cous Creek logging road of MacMillan Bloedel Ltd. (Sproat Lake Division). An access trail is followed from the end of Branch 404 to the main showing on the west fork of Shingle Creek (local name only).

#### Physical Features

Shingle Creek drains a broad summit or ridge forming the water shed between Cous Creek and MacTush Creek. The summit elevation is about 2300 feet and is characterized by a dense growth of fir, cedar, hemlock, and a thick underbrush of salal and labrador tea that frequently proves arduous and frustrating to penetrate. Shingle Creek meanders through thick glacial gravels at the summit but becomes a fast eroding stream north of the water shed where it has carved a relatively deep V-shaped valley.

Outcrops are difficult to find and rarely free of moss and debris.

Reasonably good exposures were found in Shingle Creek and on higher ridges
east of the west fork.



Sixty to seventy inches of rainfall are recorded in this area annually and upper slopes are snow covered from December to early May.

Past and Present Work

No evidence of early work could be found on this prospect. Amax work consisted of:

- (1) blazing a 400-foot grid over the claim group,
- (2) soil sampling on 400-foot centers
- (3) stream sediment sampling
- (4) geological mapping
- (5) magnetometer survey.

Work was done in May, 1968. Geochemical samples were analyzed in the Amax Laboratory, Burnaby, B.C., and a Sharpe Model MF-1 fluxgate magnetometer was used for the magnetic survey.

## REGIONAL GEOLOGY

The Rex claims are underlain by basic flows and breccias of the Karmutsen or Vancouver Group. The Karmutsen makes up most of the terrain west of Alberni Inlet and is faulted against a large body of quartz diorite on the east side of the Inlet. Limestone and volcanic breccia overlie the Karmutsen volcanics near Sproat Lake (Fig. 2). A linear body of quartz diorite outcrops west of Alberni Inlet. The Rex claims are situated close to the west contact of this mass. The quartz diorite is a massive, medium grained rock consisting of 5% biotite, 10 to 15% hornblende, white plagioclase and variable amounts of quartz. Dark, rounded mafic inclusions are common features.

Small high grade copper prospects are common east of Alberni Inlet, and Noranda's Corrigan Creek Cu-Mo prospect is situated 15 miles southeast of the Rex claims.

## LITHOLOGY

The Karmutsen volcanic rocks at the property were mapped as amygdular basalt (unit 1) and a closely associated fine grained feldsparrich andesite or basalt (unit 2). Both units are grey holocrystalline rocks frequently veined by small calcite stringers. Vesicles where present are lined with fibrous silica (crystabolite?) and filled with radiating bundles of chlorite. Texture is typically sub-ophitic. Plagioclase microlites up to 0.5mm in length compose 40% of the rock and are embedded in anhedral augite and reddish chlorophaeite. Chlorite is a common alteration product of olivine, a few remnant grains of which can still be found.

Karmutsen rocks within the pyrite zone (Fig. 3) are altered and highly pyritized. Plagioclase microlites are altered to sericite and intergrown with large amounts of chlorite and lesser quantities of epidote, carbonate and pyrite. Narrow stringers and fractures filled with quartz, epidote and pyrite are common features of the altered rocks. Much of the rock has a fine grained hornfels appearance.

Hornblende diorite is confined to a few outcrops in Rex 26, 27 and 28. The rock here consists of 20% anhedral hornblende and anhedral plagioclase with numerous dark mafic-rich inclusions.

Feldspar and quartz feldspar porphyry form tabular bodies intruding the Karmutsen rocks and are hosts for molybdenite-bearing quartz stringers in Shingle Creek east of the initial post for Rex 5 and 6. All of the porphyries contain phenocrysts of quartz and feldspar set in an aphanitic matrix of quartz and feldspar, but quartz is not always visible in hand specimens. Most of the dykes are grey, hard siliceous rocks rich in pyrite. Quartz forms 10% or less and is seen as irregular partially

resorbed phenocrysts and as minute anhedral grains in the groundmass. Plagioclase phenocrysts are albitic, poorly twinned, up to 3 mm in length and intensely altered to sericite and carbonate. Irregular flakes of chlorite are occasionally visible in hand specimen and are most likely alteration products of biotite. The groundmass is usually an equigranular mosaic of quartz and feldspar and lesser quantities of sericite, carbonate and pyrite.

Quartz feldspar porphyry exposed in a steep gully 200 feet east of the initial post for Rex 5 and 6 is somewhat different than the grey dykes described above. The porphyry here consists of 10% euhedral quartz phenocrysts, 30% intricately zoned plagioclase phenocrysts (An 40) set in a dense unaltered aphanitic matrix of quartz and feldspar. Thin chlorite blades up to 3 mm in length crowded with inclusions of epidote appear to be alteration products of hornblende. Pyrite is frequently seen embedded in chlorite or disseminated in the groundmass. Plagioclase phenocrysts and groundmass are only weakly altered to sericite, the rock as a whole having a fresh unaltered appearance.

A small post-mineral trachyte dyke is exposed in Rex 5 on the 08+00 E line. The dyke has intruded a pyrite-bearing feldspar porphyry and is chilled against it. The rock is dark grey, composed of fine grained plagioclase microlites in an aphanitic matrix.

the Hyritic and attered rocks form a linear zone roughty atoms the west fork of Shingle Creek. The east boundary of this zone is shown on Fig. 3. The west boundary is largely obscured by thick glacial overburden. Weathering of the intensely pyritized rocks has produced thick gossans noted on the map.

## GEOCHEMISTRY

Results of the geochemical work are shown in Fig. 4. The property was discovered by routine stream sediment sampling in 1966. Sediment samples were taken from the active part of the stream or from recently active bars slightly above summer water level. Soils were sampled on a grid and samples collected every 400 feet or closer where detail was desired. Soils here are developed on stony till and usually possess a distinct 'B' layer and occasionally a well developed 'A2' layer 2 to 6 inches thick. One to two foot pits were usually required to penetrate a thick humus layer composed of forest litter. All samples were analyzed for Mo and Cu (see Appendix I for Methods and Handling Procedure). pH measurements were made on water, soil and silt samples.

Anomalous amounts of Mo and Cu were found in Shingle Creek silts from the junction of the east and west forks to the headwaters of the west branch. Mo and Cu content of the small tributary draining Rex 2 reflects a chalcopyrite-pyrite showing in altered Karmutsen rocks at the head of the creek (Fig. 3). High copper content was also found in nearby soils. Generally, however, the soil sampling program was unsuccessful in locating targets for further exploration.

#### MAGNETIC SURVEY

The object of the magnetic work was to identify the pyritic zone in Shingle Creek and trace its westward extension in the overburden area. It was presumed that the pyrite and oxide-rich area would contrast well magnetically with the unaltered Karmutsen rocks on the east side of the property.

ments were made every 200 feet or closer in areas of high magnetic gradient. Base stations were established on lines 16+00E, 40+00E, and 64+00E. Readings were taken generally during morning hours and early afternoon of May 11 to May 16. Results of the survey are given in Fig. 5. An area of low magnetic intensity occurs along Shingle Creek and extends southwards to its headwaters. This zone corresponds to the pyritic and altered rocks shown in Fig. 3, particularly to the eastern boundary of the pyrite zone. It is concluded that the west edge of the magnetic low corresponds roughly to the western limit of the pyritic and altered rocks. Deep magnetic lows at the southwest limit of the claims, Rex 7 and 9, occur in an area over thick overburden and are probably a reflection of this condition.

#### ECONOMIC GEOLOGY

Molybdenite and chalcopyrite bearing float was discovered in Shingle Creek and was traced to a large pyritic stain zone in the west fork of Shingle Creek 2000 feet upstream from the confluence of the east and west forks. The stain zone is developed on intensely pyritized Karmutsen volcanic rocks and swarms of quartz feldspar porphyry dykes and can be followed for 4000 feet to the summit area in Rex 10. Molybdenite and chalcopyrite

occurrences are shown in Fig. 3. Molybdenite was found in 1/2-inch quartz stringers in feldspar porphyry and volcanic rocks in Shingle Creek east of the initial post for Rex 5 and 6,3600 feet upstream from the junction of east and west forks. Molybdenite forms minute rosettes and bands in quartz stringers 1/2 to 1/8 inch thick. The veins are widely scattered in exposures along the creek and in loose blocks in the creek bed. Most of the mineralized material was found for about 200 feet along the creek near 36+00N in highly fractured and altered quartz feldspar porphyry. Grade is decidedly low (less 0.02% MoS<sub>2</sub> Estimated).

P. E. Fox Ph.D.

July, 1968

J. F. Allan P.Eng. (B.C.)

# APPENDIX I

SAMPLE HANDLING PROCEDURE

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  $\times$  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<sub>3</sub> 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<sub>2</sub> 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 ( $100 \, \text{M/ml}$ ) - Dissolve .015 gms of MoO<sub>3</sub> in 5 ml conc. NaOH and make up to 100 ml with demineralized H<sub>2</sub>O. This solution must be made up bimonthly.

Working Standard Solution (10  $\delta$ /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<sub>2</sub>O.

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

- 3. Make up to 5 ml mark with distilled water.
- 4. Now take 15 clean 150  $\times$  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<sub>3</sub> add more if color development is poor
  - c) 1 ml 5% KSCN
  - d) 1 ml 15% SnCl2
  - 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  $16 \times 100$  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 biguinoline-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%/ml) - Dissolve .2 gms blue CuSO<sub>4</sub> in 400 mls H<sub>2</sub>O. Add 5 mls conc. HCl and H<sub>2</sub>O to 500 mls.

Working Standard Solution (10%/ml) - Dilute 10 mls stock standard and 1 ml conc. HCl to exactly 100 mls with H<sub>2</sub>O

## 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<sub>3</sub>, 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 H20

- 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<sub>3</sub> 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<sub>4</sub>OH; purify w/dithizone solution if necessary.

#### Procedure

- 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 FeCl3
- 4. Add 3 ml 10% KSCN and shake.
- 5. Add 3 ml 15% SnCl2 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%/ml Mo work solution.

mls of 18 /ml Mo Solution	dqq
.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% FeCl3
- 3. 1 ml of 10% KSCN solution.
- 4. 1 ml of 15% SnCl<sub>2</sub> 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.

## APPENDIX II

ASSESSMENT WORK	- SHINGLE CREE	K - APRIL 2	29 - MAY 19, 19	68		
Geological Work Geochemical Work Geophysical Work	3 1/2 sq.mi 3 1/2 sq.mi 3 1/2 sq.mi	les				
R. Condrashoff - C K. Carter - C R.E. Wood - S W.W. Deans - H	Geological Assi Sr. Geological Prospector Geologist	stant - 1278 stant - 247 Asst 1143 - P.O. - 1721	84-64th Ave., N W. Balmoral Rd 80 Turner Rd., Box 619, Lake 1 Oughton Drive	. Surrey,B.C North Vancouve Edmonton, Alta. Cowichan,B.C Port Coquitlam		
SALARIES						
F. Ferguson - A	Apr.29-May 19	(21 days @ \$	317.26/day)	= \$ 362.46		
F. Ferguson - R. Condrashoff - P.	May 1-May 19	(19 days @ \$		= 280.63		
R. Carter - A	Apr. 29 - May 19	(21 days @ \$		= 327.60		
M. Fenwick-Wilson-		(19 days @ \$		= 345.80		
	Apr.29-May 19	(21 days @ \$		= 473.97		
W.W. Deans - 1		(19 days @ \$		= 361.57		
P.E. Fox - 1	May 9-May 19	(10 days @ \$	354.00/day)	= 540.00		
			TOTA	L 2692.03		
BOARD - 128 man days @ \$5.00/day 640.0						
GEOCHEMICAL ANALYSES	S - Amax Explor	ration,Inc. I	Laboratory			
450 samples (Cu 8	& Mo) @ \$2.00/s	ample		900.00		
MAGNETOMETER RENTAL	- Siegel Asso	ciates Ltd.	Vancouver B.C.			
5 days @ \$13.00/c	day			65.00		
PREPARATION OF REPORT						
Typing and Draughting 45.				45.00		
				\$4342.03		

Deules.

#### APPENDIX III

# STATEMENT OF QUALIFICATIONS

Marc E. Fenwick Wilson - Magnetometer Operator

- Practical Experience
  - Magnetometer Operator for Amax Exploration, Inc. summer months 1966 & 1967 under supervision of Company Geophysicist W.W. Shaw
  - 2 day instruction course on Sharpe Model MF-1 fluxgate magnetometer May 1968, Siegel Associates Ltd.

Parla.

