

79-#586-#7695

1979 Assessment Report  
GEOLOGY, GEOCHEMISTRY AND GEOPHYSICS

TITLE DUNCAN RIVER PROPERTY

CLAIMS Fox 1-8, Scot 1-8, Moly 1, Duncan 1-4

COMMODITY Mo, W

LOCATION 125 km north of Kaslo, B.C. at the  
junction of Duncan River and Stevens  
Creek  
Latitude 50°45'N Longitude 117°10'W  
~~Steele~~ Mining Division NTS 82K 14E  
*Duncan*

BY B.W. Kyba, J.L. LeBel and  
C.J. Hodgson, P.Eng. (B.C.)

FOR AMAX OF CANADA LIMITED

WORK PERIOD July 30 - October 9, 1979

AMAX VANCOUVER OFFICE

MINERAL RESOURCES BRANCH  
ASSESSMENT REPORT

**7695**

NO.

## TABLE OF CONTENTS

SUMMARY-----	1
INTRODUCTION	
Location and Access-----	2
Claims-----	2
Physiography-----	3
1979 Exploration Program-----	3
REGIONAL GEOLOGY-----	4
PROPERTY GEOLOGY	
Rock Units-----	4
Structure-----	6
Mineralization-----	6
GEOCHEMISTRY	
Method-----	9
Results and Interpretation-----	9
INDUCED POLARIZATION/RESISTIVITY SURVEY	
Introduction-----	11
Equipment and Procedure-----	11
Presentation of Data-----	11
Results-----	12
Discussion of Results-----	13

## APPENDICES

APPENDIX I - Statement of Costs	
II - Statement of Qualifications	
III - Geochemical Results and Procedures	

## ILLUSTRATIONS

Figure 1 - Location Map-----	1:250,000-After Page 2
2 - Claim Map-----	1:50,000--After Page 2
3 - Geological Map-----	1:5,000---In Pocket
4 - Geological Map-----	1:2,000---In Pocket
5 - Geochemical Map-----	1:5,000---In Pocket
<u>I.P. Pseudosections-----</u>	After Page 12
6a - Line 46E (n=100 m)	
6b - Line 50E (n=100 m)	
6c - Line 54E (n=100 m)	
6d - Line 50E (n=200 m)	

## SUMMARY

This assessment report presents the results of geological mapping, soil sampling and an induced polarization survey conducted on the Duncan River property between July 30 to October 9, 1979.

The property is located approximately 125 km north of Kaslo, B.C. at the junction of Duncan River and Stevens Creek. The property consists of Fox 1-8, Scot 1-8, Moly 1 (4 units), and Duncan 1-4 (50 units) claims staked in 1978. The property was optioned from Sherlynn Mines by AMAX in the spring of 1979.

Property geology was mapped at 1:5000 scale and the main area of interest at 1:2000 scale. An orthogonal set of quartz veins containing molybdenite, scheelite and sphalerite occur in hornfels, skarn and a quartz monzonite stock over an area of 800 x 300 m.

A total of 406 soil samples collected at 100 m intervals on all logging roads on the property and at 50 m intervals on 15 km of flagged grid lines 100 m apart over the main area of interest indicated the presence of anomalous amounts of molybdenum, tungsten, zinc and manganese.

A three line, ten km induced polarization/resistivity survey conducted in August revealed a zone of high resistivity/low frequency effect under Duncan River which may represent the intrusive responsible for the quartz veins and hornfelsing in the area.

## INTRODUCTION

### Location and Access

The Duncan River property is located approximately 125 km north of Kalso, B.C. (Figure 1). The property covers the valley of Duncan River and Stevens Creek.

Access to the property is gained by taking Highway 31 north from Kaslo to Cooper Creek (40 km) and then following the Duncan River logging road to the property (85 km).

Accommodation was provided by Kootenay Forest Products East Creek camp at 65 km on the Duncan River road.

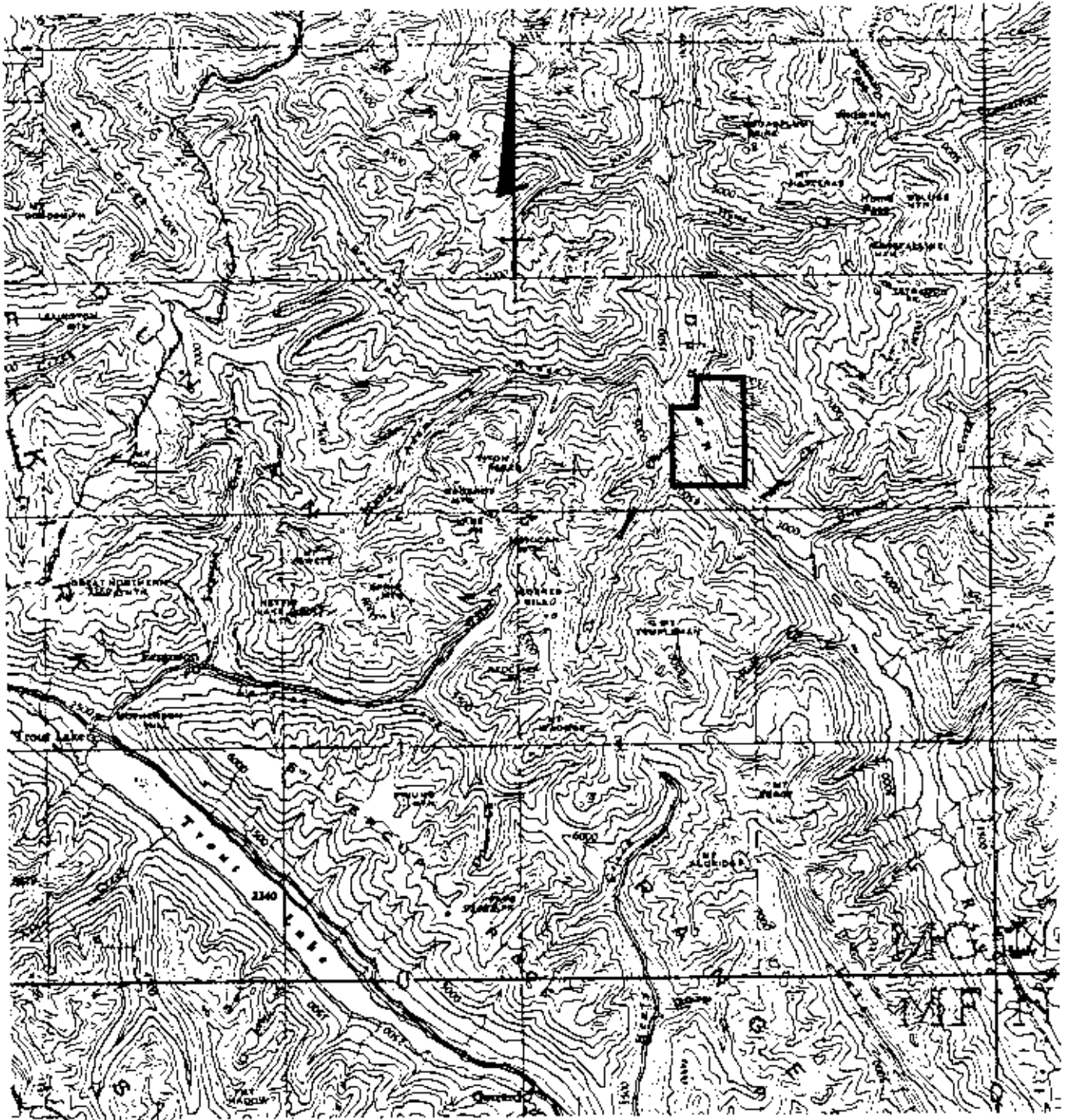
### Claims

The property consists of 21 claims: Fox 1-8, Scot 1-8, Moly 1 and Duncan 1-4 (Figure 2). The claims are held by AMAX under option from Sherlynn Mines through an option agreement dated May 9, 1979.

Pertinent claims data are as follows:

		<u>Recording Date</u>	<u>Expiry Date</u>
Duncan 1	(14 units)	May 10, 1978	May 10, 1980
2	(14 units)	May 10, 1978	May 10, 1980
3	(14 units)	Nov. 21, 1978	Nov. 21, 1979
4	( 8 units)	Nov. 21, 1978	Nov. 21, 1980
Fox 1-8	(2 post claims)	Apr. 12, 1978	Apr. 12, 1980
Scot 1-8	(2 post claims)	Apr. 12, 1978	May 12, 1980
Moly 1	( 4 units)	May 29, 1978	May 29, 1980

Cost of a topographic map prepared for the property in May, 1979 was submitted towards assessment on the Moly claims in May, 1979.



AMAX POTASH LIMITED

DUNCAN RIVER PROPERTY  
 SLOCAN MINING DIVISION - BRITISH COLUMBIA

LOCATION MAP

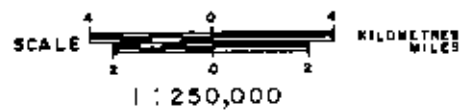
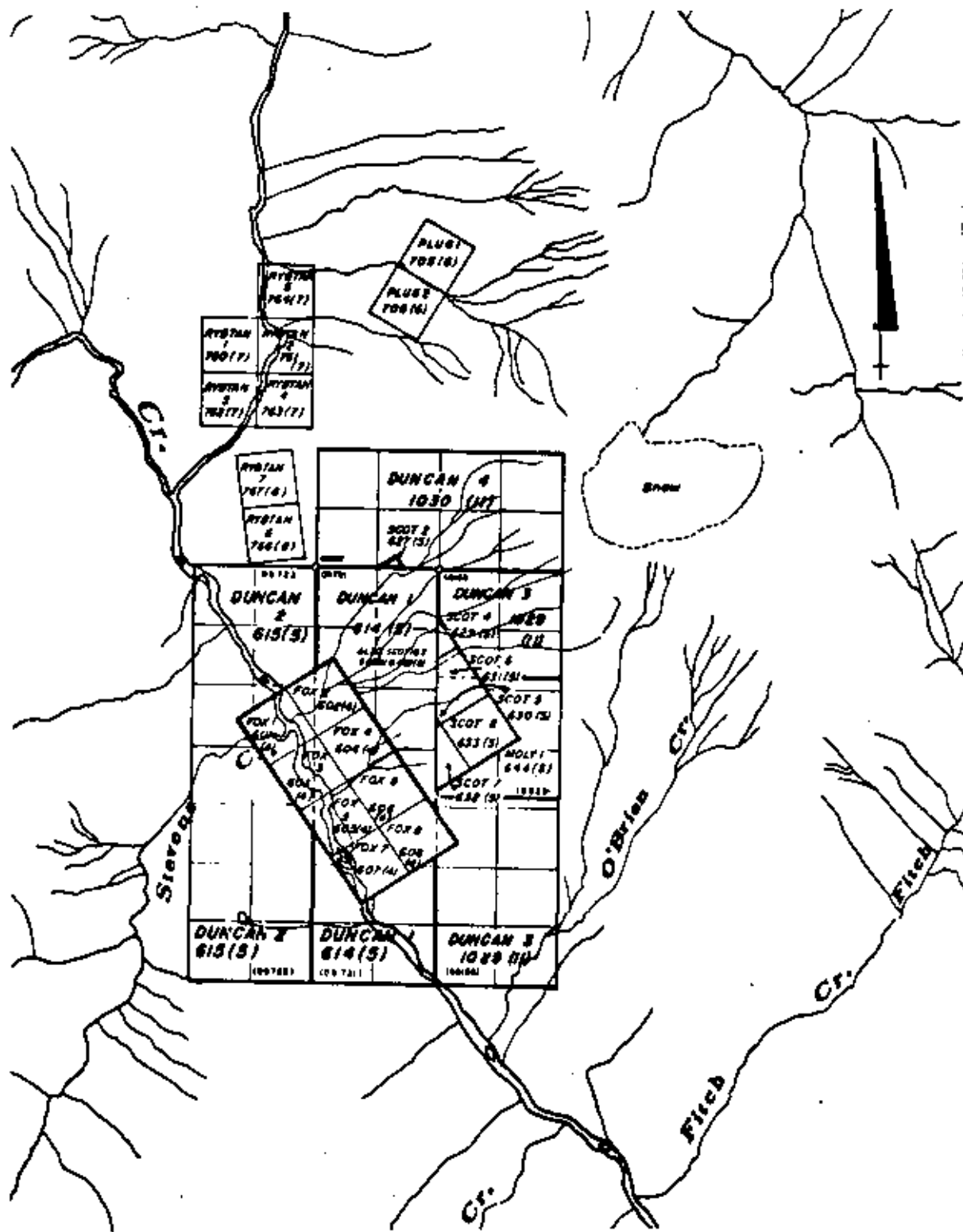


FIG. 1  
 N. T. S. Ref. 82 K 11 and 14



AMAX POTASH LIMITED

DUNCAN RIVER PROPERTY  
SLOCAN MINING DIVISION - BRITISH COLUMBIA

LOCATION MAP



1: 50,000

FIG. 2  
N.T.S. Ref. B2K11 and 14

### Physiography

The property covers the valley and adjacent slopes of Duncan River. Elevations range from 766 m on the river to 1800 m on surrounding ridges. Topography is rugged, typical of northern Purcell Mountains.

Virgin stands of cedar, fir and hemlock on the property are currently being logged by Kootenay Forest Products.

Outcrop on the property is abundant except in Duncan River valley where a 250 m wide zone of glaciofluvial sand and gravel is present.

### 1979 Exploration Program

May - preparation of 1:5000 topographic map.

July 30 - August 3 - geological mapping 1:5000, geochemical survey along logging roads and lines cut for induced polarization survey.

August 12-17 - preparation of 1:2000 topographic map, detailed geological mapping, 12 km flagged grid and geochemical survey.

September 25 - October 9 - detailed geological mapping and 3 km of flagged grid and geochemical sampling.

October 10 - November 3 - diamond drilling.

## REGIONAL GEOLOGY

The property lies on the western margin of the Purcell Anticlinorium, a northerly plunging structure developed in weakly metamorphosed clastic strata of Proterozoic and early Paleozoic age, which lies between Windermere valley on the east and Duncan River on the west (G.S.C. Open File 288, 1975).

Stocks and batholiths of quartz monzonite and granodiorite of Cretaceous age occur throughout the Purcell Anticlinorium.

Newmont-Imperial's Trout Lake Mo deposit is located 35 km southwest of the property, while the AMAX-Noranda Mount Butters Mo property lies 32 km to the northwest.

## PROPERTY GEOLOGY

### Rock Units

Bedrock on the property consists of Hadrynian black fetid limestone and calc-silicate, Lower Cambrian phyllite, biotite schist and phyllitic quartzite, and leuco quartz monzonite of Cretaceous(?) age (Figures 3 and 4).

Pale green calc-silicate and black fetid limestone (Unit 1) forms a 100 m wide north-northwest trending unit which outcrops along the main Duncan River logging road at 25N, 50E and along a spur road near 56N, 54E. The unit is tentatively classified with the Horsethief Creek Group of Hadrynian age.

Phyllite and biotite schist of the Lower Cambrian Marsh Adams Formation (Unit 2) are the most common rocks on the property. Phyllitic quartzite occurs as thin beds and irregular lenses and pods. Bedding within the unit varies from flat lying to vertical in northwesterly plunging isoclinal folds. The strata display a well developed schistosity trending northwesterly and dipping steeply southwesterly.



Phyllite is characteristically pale grey-green with well developed schistosity and platy weathering.

Biotite schist is a pale brown to dark grey rock with 5% euhedral brown or black biotite grains distributed along the foliation. Biotite schist and phyllite commonly occur together and display gradational lateral contacts.

Phyllitic quartzite is a pale green to dark green rock and is generally more massive than surrounding phyllite and schist. Schistosity is generally not well developed in this rock.

Hornfels and skarn occur in a 900 x 500 m area that is asymmetrical to the quartz monzonite stock (Figures 3 and 4). Hornfels constitutes approximately 15% and skarn 5% of the rock within this area. Hornfels occurs as pale green-brown patches and bands in phyllitic quartzite. Where very well developed, it obliterates original rock textures.

Skarn (Unit 2a) occurs as distinct bands up to 10 m wide and over 20 m long. It is conformable to bedding in road exposures on the east side of Duncan River. In hand specimen skarn is a medium to coarse grained, dark green, epidote-garnet rock. Epidote is usually much more abundant than reddish brown garnet, but narrow bands of coarsely crystalline garnet without epidote occur north of Stevens Creek at 51N, 44E. In most outcrops skarn retains the pre-skarn textures of thin banding and well developed foliation.

Two intrusions of assumed Cretaceous age occur on the property: foliated biotite granodiorite and leucocratic quartz monzonite. Foliated biotite granodiorite (Unit 3) occurs as a 60 m wide sill(?) at 41N, 43E south of Stevens Creek. It is a massive, medium grained unmineralized but weakly chloritized intrusion. Adjacent metasediments are distinctly hornfelsed

over 50 m or more. Leucocratic quartz monzonite outcrops in Stevens Creek over an area of 350 m by 300 m; however, the large area of hornfels and skarn east of Duncan River and the subhorizontal attitude of the intrusive contact mapped south of Stevens Creek suggests that exposed stock is the unroofed portion of a much larger intrusive body. The stock margin and peripheral dykes are composed of fine grained equigranular aplite. This outer phase is gradational into fine grained subporphyritic quartz monzonite which in turn is gradational into light grey medium grained equigranular biotite quartz monzonite in the centre of the stock. Biotite in the central phase is euhedral and generally constitutes less than 3 per cent of the rock.

### Structure

The most significant structural feature related to mineralization is uniform jointing. The joints are flat lying and vertical with northeast and northwest strikes. They break the quartz monzonite stock into 1 m x 1 m x 2 m oblong blocks, and contain molybdenite-bearing quartz veins in and peripheral to the stock.

No faults were mapped in outcrops on the property, although a major northwesterly trending fault beneath Duncan River has been confirmed by diamond drilling.

### Mineralization

Quartz veining with a density in excess of 1 vein/metre occurs over an area of 800 x 300 m trending eastward from the quartz monzonite stock on Stevens Creek across Duncan River (Figures 3 and 4). Most veins occur along northeast and northwest trending joints and range in width from 1 cm to 1 m. In two outcrops, northwest veins were seen to off-set northeast veins but generally the two vein sets appear to be

contemporaneous. Vein types include pure quartz, quartz-muscovite, quartz-sericite, and rarely quartz-K-feldspar. Accessories include pyrite, chlorite, and calcite. Pure quartz generally comprises the larger veins, up to 1 m wide. Quartz-muscovite veins are the most common type. Quartz sericite:pyrite veins are most abundant in the quartz monzonite stock. Locally, within the stock, these veins are less than 10 cm apart and sericite pervasively alters the intervening quartz monzonite. Fine to medium grained pale green sericite was distinguished from euhedral coarse grained pale grey muscovite megascopically.

Pyrite is the most common sulphide, occurring as disseminated euhedral grains in metasediments (1%), in small hornfels bands adjacent to skarn ( $\leq 5\%$ ), in skarn and quartz monzonite ( $< 0.5\%$ ), and in quartz veins (0.5-5%).

Sphalerite occurs in amounts up to 3% as scattered grains in quartz pyrite veins. It varies in colour from honey brown to black and is commonly associated with dark green chlorite. Sphalerite-bearing veins are best exposed in the road cut along Line 50E.

Fine to medium grained molybdenite occurs as disseminations and stringers in quartz-pyrite and quartz-sericite-pyrite veins, and as disseminations in epidote garnet pyrite skarn and quartz monzonite. Molybdenite is much more common in veins in hornfels and skarn around the quartz monzonite than in veins within the stock. The best molybdenite mineralization is exposed in several old trenches between Lines 46 and 49N and 50 and 51E. One 50 cm quartz-pyrite-molybdenite vein from a trench at 46N and 50, 50E assayed 0.12%  $\text{MoS}_2$  (79DKT10). Fine grained molybdenite rosettes are disseminated throughout the quartz monzonite; rock chip sample (79DKT20) of subporphyritic quartz monzonite near the margin of the stock assayed 0.07%  $\text{MoS}_2$ . The average  $\text{MoS}_2$  content of quartz monzonite

would be much less. Locally, and usually adjacent to quartz-pyrite veins, skarn bands east of Duncan River contain minor amounts of disseminated molybdenite.

Scheelite is widespread in minor amounts as disseminated grains in hornfels and skarn and as scattered grains and masses along joints and in quartz-calcite veins. The best exposure of scheelite mineralization is in the road-cut along 50E between 48N and 50N.

Minor pyrrhotite occurs as disseminated grains and masses associated with pyrite in veins and hornfels.

Galena occurs in a quartz-pyrite vein at 44, 50N and 50E and in a quartz calcite vein at 39, 75N and 39, 50E. The latter vein is exposed in an old 7 m deep prospect shaft. The vein varies in width from 20-50 cm and has an attitude of 130/60°W. Both veins are outside the defined quartz vein zone.

Stibnite has been found on one quartz-pyrite-molybdenite vein in quartz monzonite and in float of vuggy quartz-sericite at 47N and 45E.

Tetrahedrite has been tentatively identified in one quartz-pyrite-muscovite vein at 50E, 46N.

## GEOCHEMISTRY

### Method

Existing logging roads and chain and compass lines were used to establish a flagged grid over the property. East-west lines were run 100 m and 50 m apart and samples were taken at 50 m intervals along the lines.

Almost all samples were taken at depths of 20-60 cm in the BM or C horizon of podzols which are the prevalent soil type on the property. Samples were collected in numbered Kraft paper bags.

A total of 403 soil samples, 14 silt samples and 7 rock chip samples were analyzed by Rossbacher Laboratory, Burnaby, B.C. for Mo, Cu, Ni, Co, Fe, Mn, Ag, Pb, Zn and W.

### Results and Interpretation

Molybdenum and tungsten geochemical results are plotted on Figure 5 (1:5000). Rock chip assays are plotted on Figure 4 (1:2000). All geochemical results are listed in Appendix III.

Molybdenum values range from 1 to 1200 ppm in soils. The highest values at the base of outcrop along Line 50E between 45N and 49N reflect mineralization in outcrop. Similar local highs occur on Line 49, 50N between 44E and 45E, on Line 48N between 42, 50E and 44E and on Line 48N at 47E. The 10 ppm Mo contour in soils outlines a zone measuring 1100 m x 500 m, slightly larger than the hornfels and skarn zone outlined on Figures 3 and 4.

Tungsten values ranged from 0-900 ppm in soils. Two distinct tungsten populations exist in soils on the property: 0-30 ppm W over unaltered schists and phyllites, and 70-900 ppm

W over quartz monzonite, hornfels and skarn. The highest tungsten values are coincident with skarn bands on Line 50E between 46N and 49N and those north of Stevens Creek bounded by Lines 49N to 52N and 42E to 43, 50E. A narrow northwest trending  $>100$  ppm W anomaly south of Stevens Creek between 42N and 48N may be the southeast extension of the W anomaly related to skarn bands north of Stevens Creek.

Zinc values range from 28 to 2720 ppm in soils. The 500 ppm Zn contour outlines anomalies north and south of Stevens Creek peripheral to the quartz monzonite stock. Scattered high values occur along Line 50E where quartz-pyrite-sphalerite veins cut hornfels and skarn.

Manganese forms a distinct  $+2000$  ppm anomaly around the quartz monzonite stock and around hornfels and skarn east of Duncan River.

Copper values are consistently below the regional threshold value of 100 ppm in soils.

Silver, lead, nickel, cobalt, iron, tin and fluorine are uniformly low in soils over the property.

Rock chip 79DKT27 from a 2 cm quartz-molybdenite vein assayed 1.32%  $\text{MoS}_2$ . Other rock chip samples of mineralized veins contained significantly less  $\text{MoS}_2$ .

## INDUCED POLARIZATION (IP)/RESISTIVITY SURVEY

### Introduction

The IP/resistivity survey was undertaken to investigate for the presence of the intrusion responsible for the zone of northeast and northwest trending quartz veins.

The survey was conducted by Mertens and MacNeil, Geophysical Ground Surveys, 23 Meadow Crescent, Guelph, Ontario.

A total of 10 km of survey was completed on three flagged lines prepared by AMAX personnel. For ease of access lines were laid out parallel to Duncan River. Line direction was oblique to the northeast set of quartz veins but unfavourably disposed parallel to the regional schistosity and northwest vein set.

### Equipment and Procedure

The survey was conducted with a McPhar P660 frequency domain IP system. The equipment recorded frequency effect (FE) between 0.5 and 3.0 hertz and resistivity ( $\rho$ ).

Nominal coverage was provided with the dipole-dipole electrode array with 100 m electrode spacing expanded through 5 separations (n). One line (Line 50E) was resurveyed with a 200 m electrode spacing.

### Presentation of Data

Resistivity in ohm-m and frequency effect in per cent are plotted in standard pseudo-section format (Figures 6a-d). Noisy, very noisy and too noisy readings are indicated by ( ), [ ], and TN respectively. The notation NEG identifies noisy negative readings. Stations where the survey was interrupted

by a logging operation on Line 54E are identified by the notation NR.

The data has been contoured in multiples of intervals 1, 1.5, 2, 3, 5, 7.5, 10. A negative reading at 46E, 50N, N=2 has been ignored for the purposes of contouring.

### Results

Most of the survey data is characterized by narrow alternating bands of high and low resistivity and many noisy to unrecordable frequency effects over the zones of very low resistivities.

On Line 46E (Figure 6a) variations in resistivity are extreme but several well defined zones are evident. A zone of high resistivity (5000 ohm-m) between 46N and 48N draws particular interest.

On Line 54E (Figure 6c), abrupt variations in resistivity and low amplitudes and resultant poor quality frequency effect data make recognition of significant features difficult.

Resistivities recorded on Line 50E (Figures 6b and 6d) are generally higher than on the other two lines. A broad resistivity high (resistivity greater than 1000 ohm-m) south of 50N contains zones between 45N and 46N and at the south end of the line where the resistivity exceeds 10,000 ohm-m. The resistivity high between 45N and 46N may correlate with a similar high resistivity zone on Line 46E.

Frequency effects vary from 2% to 14%. Where reliable and complete data was recorded there is a persistent correlation between low frequency effect/high resistivity and high frequency effect/low resistivity. In particular, on Line 50E zones with resistivity greater than 5,000 ohm-m at the south end of the



line and between 45N-46N have frequency effects less than 3%; zones with resistivity from 1000-3000 ohm-m between 42N-50N and at the north end of the line have frequency effects from 3% - 7%; and a zone of resistivity less than 500 ohm-m centred at 52N has frequency effects which range from 8% - 12%.

### Discussion of Results

Only general features of results will be discussed because of the uncertainty in defining IP/resistivity units and any line to line correlation caused by unfavourable disposition of lines parallel to the regional schistosity.

The amplitude and variations in resistivity on Lines 46E and 54E are typical of metasedimentary environments. The low resistivities and narrow anomalies suggest appreciable graphite content in thin discontinuous lenses. However, the anomalies are not a reliable indication of distribution of graphitic units because of distortions caused by line direction. Frequency effect anomalies associated with resistivity lows are also likely caused by graphite. The observation that frequency effect decreases as resistivity increases is consistent with a decrease in graphite content in the rocks.

The high resistivities recorded on Line 50E indicate a distinct change in lithology. Frequency effects over the high resistivity zone are not appreciably different from other lines indicating that total polarizable material in rocks is unchanged.

A modest resistivity high between 48N and 50N on Line 50E overlies part of the zone of quartz veins exposed between 45N and 50N. However, observed vein density is not great enough to significantly alter the bulk resistivity of the host biotite schist.

The high resistivity anomaly recorded on Line 50N, 45N-47N and 46E, 46N-48N is caused by a 100 m wide body at depths ranging from 50-100 m. The resistivity (10,000 ohm-m) and frequency effect (3%) of the body suggest a sulphide deficient intrusive rock.

\_\_\_\_\_  
B.W. Kyba

*J.L. LeBel Nov 28/79*  
\_\_\_\_\_  
J.L. LeBel

*C.J. Hodgson*  
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C.J. Hodgson, P.Eng. (B.C.)

APPENDIX I - STATEMENT OF COSTS

Summary and Period of Work

Geochemistry - July 30 - August 3, 1979  
 August 12 - August 17, 1979  
 September 25 - October 9, 1979

Induced Polarization Survey - August 15 - August 21, 1979

Personnel

C.J. Hodgson, Geologist, P.Eng., 601-535 Thurlow Street, Vancouver		
July 30-August 3	5 days @ \$177.60	888.00
S.G. Enns, Geologist, 601-535 Thurlow Street, Vancouver		
July 30-August 3	5 days @ \$129.60	648.00
J.R. Candy, Geol. Asst., 2426 Lawson Ave., West Vancouver		
July 30-August 3	5 days @ \$ 45.37	226.85
B.W. Kyba, Geologist, 601-535 Thurlow Street, Vancouver		
Aug. 12-17 & Sept. 25-26	8 days @ \$110.11	880.88
D.J. Cuvelier, Geol. Asst., 883 McArthur Drive, Kamloops		
Aug. 12-17	6 days @ \$ 29.60	177.60
R.G. Kidlark, 972 Birchbrook Place, Coquitlam		
Sept. 25-Oct. 9	14 days @ \$ 61.15	856.10
A.C. Smallwood, 7580 Burriss Street, Burnaby		
Sept. 30-Oct. 9	10 days @ \$ 39.46	394.60
J.L. LeBel, Geophysicist, 3136 West 7th Avenue, Vancouver		
August 17	1 day @ \$122.98	122.98
<u>Room &amp; Board</u>	24 man days @ \$45.00/day	1,080.00
	45 meals @ \$11.25/meal	506.25

Geochemistry Geochemical Analyses - Rossbacher Laboratory, Burnaby

Inv. #9198 132 samples for Mo, Cu, Co, Mn, Zn, Pb, Ag, W			
125 soil and 1 rock preparation			686.00
Inv. #9245 236 samples for Mo, Cu, Ni, Co, Mn, Fe, Ag, Pb, Zn, W			
230 soil and 39 rock preparation, 14 samples for F, 8 samples for Sn and 4 assays for total Mo			1,368.00
44 analyses for Mo,Cu,Ni,Co,Mn,Fe,Ag,Pb,Zn	@ \$3.50	154.00	
45 analyses for W	@ \$2.00	90.00	
45 soil preparations	@ \$ .20	9.00	253.00

Geophysical Induced Polarization Survey - Mertens and MacNeil,  
 Inv. #3 Guelph, Ontario 3,830.00  
 523.99

Transportation 29 vehicle days @ \$20.00/day 580.00

Report Preparation 250.00

TOTAL \$13,272.25

*CJ Hodgson*

APPENDIX II

STATEMENT OF QUALIFICATIONS

NAME J.R. Candy

ADDRESS 2426 Lawson Avenue  
West Vancouver, B.C.

EDUCATION 1st & 2nd year Science leading for a biology major,  
completed in May 1977  
Capilano College

EXPERIENCE —

1976 D.C. Syndicate - geologist assistant  
1977 J.C. Stephens Exploration - prospector/expeditor  
1977 ANAX Potash Limited - core splitter  
1978 ANAX Potash Limited - Geological Assistant  
1979 ANAX Potash Limited - Geological Assistant

STATEMENT OF QUALIFICATIONS

NAME D.J. Cuvelier  
ADDRESS 883 McArthur Drive  
Kamloops, B.C.  
EDUCATION Completed High School 1979  
EXPERIENCE 1978 AMAX Potash Limited - Geological Assistant  
1979 AMAX Potash Limited - Geological Assistant

STATEMENT OF QUALIFICATIONS

NAME S.G. Enns  
ADDRESS 601-535 Thurlow Street  
Vancouver, B.C.  
EDUCATION 4 year BSc (Honours Geology) 1967  
University of Manitoba  
MSc (Ec. Geology) 1971  
University of Manitoba  
EXPERIENCE Geol. Assistant Manitoba Mines Branch 1964(field season)  
Geol. Assistant Sherritt Gordon Mines 1965 "  
Geol. Assistant AMAX Exploration 1966-1970 "  
Staff Geologist Cerro Mining of Can. 1971  
Staff Geologist Hudson's Bay Oil & Gas 1972  
Staff Geologist BP Minerals of Canada 1973-1975  
Staff Geologist BP Alaska Exploration 1975-1979  
Staff Geologist AMAX of Canada 1979-



STATEMENT OF QUALIFICATIONS

NAME: J. LAURENCE LABEL

EDUCATION: B.Sc. (1971) Queen's University - Geological Engineering -  
Geophysics Option

M.Sc (1973) University of Manitoba - Geophysics

EXPERIENCE:

- 5/70-9/70 - Amax Exploration, Inc. Vancouver, B.C.
  - conducting and compiling magnetometer surveys
- 5/71-9/71 - Amax Exploration, Inc. Toronto, Ont.
  - conducting and reporting on IP/resistivity surveys
- 5/72-12/72- Gulf Minerals, Toronto, Ont.
  - senior geophysical operator
  - conducting and reporting on magnetometer  
electromagnetic and scintillometer surveys
- 3/73-12/73- Scintrex Surveys, Concord, Ont.
  - Junior Geophysicist
  - conducting, supervising of and reporting on  
airborne magnetometer and electromagnetic surveys,  
ground electromagnetic and IP/resistivity surveys
- 4/74 - - AMAX Potash Limited, Toronto & Vancouver
  - Staff Geophysicist

STATEMENT OF QUALIFICATIONS

NAME A.C. Smallwood

ADDRESS 7580 Burris Street  
Burnaby, B.C.

EDUCATION 3rd year standing at Simon Fraser University

EXPERIENCE 1977 Newmont Mining - Field Assistant  
1978 AMAX Minerals - Field Assistant  
1979 AMAX Minerals - Field Assistant

APPENDIX III

GEOCHEMICAL RESULTS AND PROCEDURES



# Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

## CERTIFICATE OF ANALYSIS

TO: AMAX MINERALS EXPLORATION  
601 - 535 THURLOW ST.  
VANCOUVER, B.C.

2225 S. SPRINGER AVE.  
BURNABY, B.C.  
CANADA  
TELEPHONE: 299-6910  
AREA CODE: 604  
CERTIFICATE NO. 9304-2

INVOICE NO.  
DATE ANALYSED 79/09/18  
PROJECT DUNCAN RIVER

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Ag	Zn	Pb	No.
01	79 DCL 268		2	32	46	24	440	2.3	.4	96	20	01
02	T 269		1	62	28	30	40	1.3	8.6	356	480	02
03	J 270		1	284	18	32	200	2.1	2.3	310	10	03
04	271		1	20	18	20	180	.2	3.4	58	15,000	04
05												05
06												06
07												07
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Certified by

*J. Rossbacher*

# Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

TO: AMAX MINERALS EXPLORATION  
601 - 535 THURLOW ST.  
VANCOUVER, B.C.

2225 S. SPRING  
BURNABY, B.C.  
CANADA  
TELEPHONE: 299-6910  
AREA CODE: 604  
CERTIFICATE NO. 9210-2

## CERTIFICATE OF ANALYSIS

INVOICE NO.  
DATE ANALYSED 79/08/16

PROJECT 972 DUNCAN RIVER

No.	Sample	pH	Mo	Cu	Mn	Zn	Pb	Ag	W	No.		
01	79 DCS 272		6	64	28	720	196	116	14	0.4	5	01
02	273		4	32	20	280	218	60	8	0.2	0	02
03	274		6	60	24	240	48	72	6	0.2	0	03
04	275		6	42	24	680	14	208	14	0.2	0	04
05	276		6	24	22	280	10	100	10	0.2	0	05
06	277		1	32	20	440	12	108	22	0.2	0.60	06
07	278		1	34	28	480	42	76	8	0.2	0	07
08	L 279		1	20	28	360	44	52	4	0.2	0	08
09	S 280		6	80	24	360	12	200	10	0.6	0	09
10	281		2	38	28	340	68	80	4	0.4	0	10
11	282		2	68	20	520	68	232	22	1.2	0	11
12	283		2	38	20	620	10	68	28	0.2	0	12
13	L 284		2	32	28	1400	42	134	22	0.4	0	13
14	S 285		1	32	32	600	12	74	10	0.2	0	14
15	286		1	44	32	560	44	150	12	0.2	0	15
16	287		1	40	32	640	14	112	12	0.2	0	16
17	288		1	40	36	440	12	112	12	0.2	0	17
18	289		1	28	32	660	40	44	12	0.2	0	18
19	290		1	24	30	420	60	38	24	0.2	0	19
20	S/D 2		6	26	12	440	40	48	14	0.2	0	20
21	L 291		1	28	32	280	46	76	6	0.2	0	21
22	S 292		1	34	28	400	12	78	14	0.2	0	22
23	293		1	18	20	280	40	88	10	0.2	0	23
24	294		1	26	22	320	0.8	60	10	0.2	0	24
25	295		1	20	20	360	0.8	52	10	0.2	0	25
26	296		1	20	18	320	0.8	60	6	0.2	0	26
27	297		4	24	26	160	12	80	12	0.2	5	27
28	298		6	20	18	480	10	88	14	0.2	0	28
29	299		1	12	16	280	0.8	64	6	0.4	0	29
30	300		4	16	20	400	0.8	60	8	0.2	5	30
31	301		2	12	16	280	0.6	44	6	0.2	5	31
32	302		2	36	24	360	0.8	64	12	0.2	5	32
33	303		4	34	24	360	10	68	10	0.2	10	33
34	T 304		4	1040	116	40	52	68	26	2.2	0	34
35	S 305		4	24	24	440	40	80	20	0.2	0	35
36	306		2	18	20	440	1.0	70	10	0.2	0	36
37	307		4	42	24	1200	174	14	0.2	0	37	
38	L 308		8	30	22	960	152	20	0.4	20	38	
39	L 310		6	16	22	460	72	10	0.2	40	39	
40	S/D A		6	24	12	480	44	18	0.2	0	40	

Certified by

*J. Rossbacher*

# Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

## CERTIFICATE OF ANALYSIS

TO: AMAX MINERALS EXPLORATION  
801 - 536 THURLOW ST  
VANCOUVER, B.C.

2725 S SPRINGER AVE  
BURNABY, B.C.  
CANADA  
TELEPHONE 299-6910  
AREA CODE 604  
CERTIFICATE NO. 9210-2

INVOICE NO.  
DATE ANALYSED 7/10/16

PROJECT 972, DUNCAN R.

No.	Sample	pH	Mo	Cu	Co	Mn	Zn	Pb	Ag	W	No.	
01	MZCS 311		4	56	32	440	16	120	8	0.2	10	01
02	312		6	52	32	440	16	120	8	0.4	0	02
03	L 313		2	26	24	320	8	82	6	0.4	5	03
04	S 314		4	44	32	440	16	96	6	0.4	5	04
05	315		4	42	32	480	16	110	10	0.2	20	05
06	316		4	46	36	480	16	110	10	0.2	35	06
07	317		6	62	34	520	16	114	10	0.2	45	07
08	318		2	32	22	520	16	92	24	0.2	15	08
09												09
10												10
11												11
12												12
13												13
14												14
15												15
16												16
17												17
18												18
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29												29
30												30
31												31
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34												34
35												35
36												36
37												37
38												38
39												39
40												40

ANALYSED BY *[Signature]*

# Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

## CERTIFICATE OF ANALYSIS

TO: AMAX MINERALS EXPLORATION  
801 - 536 THURLOW ST  
VANCOUVER, B.C.

2725 S SPRINGER AVE  
BURNABY, B.C.  
CANADA  
TELEPHONE 299-6910  
AREA CODE 604  
CERTIFICATE NO. 9210-3

INVOICE NO.  
DATE ANALYSED 7/10/16

PROJECT 972, DUNCAN R.

No.	Sample	pH	Mo	Cu	Zn	Pb	Ag	W	No.				
01	792 JS 600		2	24	16	22	480	16	76	12	0.4	15	01
02	601		4	20	24	18	360	16	48	14	0.4	15	02
03	602		8	16	44	26	640	16	56	14	0.4	15	03
04	603		4	10	22	16	320	16	40	18	0.4	10	04
05	604		4	16	24	20	320	16	52	28	0.4	10	05
06	605		2	18	24	16	240	16	40	12	0.2	5	06
07	606		2	24	50	32	600	16	60	12	0.4	5	07
08	607		4	24	60	28	520	16	156	10	0.4	5	08
09	608		1	32	50	30	480	16	130	10	0.4	5	09
10	609		1	30	42	28	720	16	172	12	0.4	0	10
11	610		2	32	62	34	400	16	140	10	0.4	0	11
12	611		2	28	30	24	280	16	52	12	0.2	0	12
13	612		1	24	42	28	1380	16	132	12	0.2	0	13
14	613		1	44	46	32	380	16	88	10	0.2	0	14
15	614		1	40	36	24	240	16	84	12	0.2	0	15
16	615		2	36	38	20	240	16	76	12	0.2	0	16
17	616		2	20	34	24	200	16	72	12	0.2	0	17
18	617		1	12	28	16	560	16	60	10	0.2	0	18
19	618		1	38	62	28	400	16	80	10	0.2	0	19
20	SD		18	196	56	14	260	16	124	82	0.6	25	20
21	619		2	20	24	16	200	16	32	12	0.4	0	21
22	620		2	30	60	32	600	16	164	10	0.6	0	22
23	621		2	28	50	30	840	16	150	16	0.4	0	23
24	622		2	24	40	28	1680	16	116	14	0.6	35	24
25	623		2	24	38	26	800	16	100	12	0.6	15	25
26	624		6	44	60	30	1560	16	92	16	0.6	45	26
27	625		1	24	44	26	760	16	118	12	0.4	15	27
28	626		1	22	38	28	680	16	76	8	0.4	2	28
29	627		1	24	52	32	680	16	90	12	0.3	15	29
30	628		1	28	56	32	800	16	92	8	0.2	0	30
31	629		1	28	52	16	480	16	68	12	0.2	0	31
32	630		1	22	44	28	520	16	88	10	0.2	0	32
33	631		1	22	36	24	320	16	70	10	0.2	0	33
34	632		1	36	52	32	600	16	84	10	0.2	0	34
35	633		8	32	76	48	360	16	150	18	0.4	30	35
36	634		4	24	68	38	760	16	136	14	0.2	0	36
37	635		2	28	64	34	480	16	172	14	0.2	0	37
38	636		1	24	48	28	580	16	120	12	0.2	0	38
39	637		18	32	60	34	840	16	130	54	1.5	70	39
40			192	58	16	240	16	132	82	1.5	15	40	40

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# Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

## CERTIFICATE OF ANALYSIS

TO: AMAX MINERALS EXPLORATION  
801 - 536 THURLOW ST  
VANCOUVER, B.C.

2225 S SPRINGER AVE.  
BURNABY, B.C.  
CANADA  
TELEPHONE 799-0910  
AREA CODE 604  
CERTIFICATE NO. 9210

INVOICE NO.  
DATE ANALYSED 79/08/29  
PROJECT 972 DUNCAN RIVER

No.	Sample	pH	Mo	Cu	Sn	F				No.
01	79 DJS 637				0	640				01
02	639				0	1230				02
03	640				0	1210				03
04	641				3	270				04
05	642				2	1250				05
06	643				15	730				06
07	644				12	110				07
08	645				25	600				08
09										09
10										10
11										11
12										12
13										13
14										14
15										15
16										16
17										17
18										18
19										19
20										20
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34										34
35										35
36										36
37										37
38										38
39										39
40										40

Prepared by

*J. Rossbacher*

# Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

## CERTIFICATE OF ANALYSIS

TO: AMAX MINERALS EXPLORATION  
801 - 536 THURLOW ST  
VANCOUVER, B.C.

2225 S SPRINGER AVE.  
BURNABY, B.C.  
CANADA  
TELEPHONE 799-0910  
AREA CODE 604  
CERTIFICATE NO. 9210-4

INVOICE NO.  
DATE ANALYSED 79/08/16  
PROJECT 972 DUNCAN RIVER

No.	Sample	pH	Mo	Cu	Mn	Ag	Zn	Pb <sup>60</sup>	W	No.
01	79 DJS 638		50	28	520	.6	560	28	25	01
02	639		200	76	2040	1.2	560	38	900	02
03	640		1200	90	1240	.4	520	52	80	03
04	641		680	44	520	1.0	272	48	65	04
05	642		290	52	1000	.4	346	34	70	05
06	643		260	72	820	.2	280	24	180	06
07	644		120	28	320	.2	200	28	15	07
08	645		100	28	360	.4	134	26	5	08
09	646		20	26	420	.2	156	16	10	09
10	647		16	20	1000	.2	204	16	120	10
11	648		15	28	480	.2	160	30	50	11
12	649		40	32	600	.2	272	44	15	12
13	650		14	24	720	.2	176	10	15	13
14	651		12	28	1000	.2	188	14	5	14
15	652		4	20	820	.4	168	18	0	15
16	653		26	28	520	.2	80	14	10	16
17	654		8	24	640	.2	160	14	15	17
18	655		4	20	760	.6	94	24	0	18
19	656		4	28	520	.2	220	10	15	19
20	STD B		30	162	160	1.0	156	98	15	20
21	657		4	40	520	.2	166	18	20	21
22	658		2	28	1060	.2	180	10	10	22
23	659		4	24	280	.4	580	14	15	23
24	660		3	28	280	.2	254	14	20	24
25	661		2	16	240	.2	164	14	5	25
26	662		4	36	440	.2	136	16	20	26
27	663		1	26	280	.6	160	16	10	27
28	664		1	22	320	.2	140	10	15	28
29	665		2	24	360	.2	180	10	20	29
30	666		1	28	320	.2	104	12	20	30
31	667		4	48	520	.2	92	16	20	31
32	668		2	22	200	.4	80	12	10	32
33	669		2	44	480	.4	132	14	20	33
34	670		2	20	440	.2	76	22	0	34
35	671		2	32	1320	.2	140	42	0	35
36	672		2	20	440	.2	82	18	0	36
37	673		2	22	3920	.2	80	36	5	37
38	674		2	22	520	.2	84	20	0	38
39	675		2	14	200	.2	60	18	0	39
40	STD B		30	100	100	1.0	160	100	20	40

Prepared by *J. Rossbacher*

# Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

## CERTIFICATE OF ANALYSIS

2225 S SPRINGER AVE  
BURNABY, B.C.  
CANADA  
TELEPHONE 299-8810  
AREA CODE 604  
CERTIFICATE NO. 9210-5

INVOICE NO.  
DATE ANALYSED 79/02/16  
PROJECT 972 DUNCAN RIVER

TO: AMAX MINERALS EXPLORATION  
801 - 535 THURLOW ST  
VANCOUVER, B.C.

No.	Sample	pH	Mo	Cu	Co	Mn	Zn	Pb	Ag	W	No.
01	79 DTS 676		1	26	32	880	122	8	0.2	20	01
02	677		1	32	32	1000	76	12	0.2	15	02
03	678		1	28	22	440	64	10	0.2	15	03
04	679		1	20	18	330	52	8	0.2	0	04
05											05
06											06
07											07
08											08
09											09
10											10
11											11
12											12
13											13

# Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

## CERTIFICATE OF ANALYSIS

2225 S SPRINGER AVE  
BURNABY, B.C.  
CANADA  
TELEPHONE 299-8810  
AREA CODE 604  
CERTIFICATE NO. 9353-3

INVOICE NO.  
DATE ANALYSED OCT 20/79  
PROJECT 972 DUNCAN RIVER

TO: AMAX MINERALS EXPLORATION  
801 - 535 THURLOW ST  
VANCOUVER, B.C.

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Pb	Zn	Pb	W	No.
01	FDGT 1		1	18	24	14	70	61	1.2	86	18	0	01
02	2		20	20	56	16	960	3.5	1.4	80	28	0	02
03	3		16	12	48	16	800	2.9	1.2	72	18	0	03
04	4		1	36	48	16	400	2.7	0.8	110	16	0	04
05													05
06													06
07													07
08													08
09													09
10													10
11													11
12													12
13													13
14													14
15													15

# Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

## CERTIFICATE OF ANALYSIS

BURNABY, B.C.  
CANADA  
TELEPHONE 299-8810  
AREA CODE 604  
CERTIFICATE NO. 9353-1

INVOICE NO.  
DATE ANALYSED OCT 20/79  
PROJECT 972 DUNCAN RIVER

TO: AMAX MINERALS EXPLORATION  
801 - 535 THURLOW ST  
VANCOUVER, B.C.

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Pb	Zn	Pb	W	No.
01	79 DWS 90		1	238	68	8	60	2.0	0.6	90	152	0	01
02	91		4	70	148	68	2400	4.0	1.2	1980	44	320	02
03	92		3	22	44	60	4000	2.2	0.8	234	130	16	03
04	93		6	50	180	96	5200	5.8	1.0	580	34	70	04
05	94		1	24	48	16	2800	0.8	0.2	188	26	0	05
06	95		2	82	228	276	3080	6.1	3.0	140	40	2	06
07	96		2	28	30	16	320	2.9	0.8	62	74	0	07
08	97		1	36	64	28	480	3.0	1.0	640	16	55	08
09	98		3	50	236	90	880	5.3	1.0	460	34	120	09
10	99		3	38	116	78	1000	5.7	1.0	286	34	130	10
11	100		6	128	340	340	3000	4.0	1.2	242	14	15	11
12	101		4	30	80	60	4000	3.5	0.6	192	74	12	12
13	102		2	28	88	68	1040	4.2	0.8	188	24	10	13
14	103		1	26	60	28	2080	7.6	0.8	108	68	0	14
15	104		4	32	108	62	260	4.5	1.2	330	14	60	15
16	105		7	72	140	56	3080	2.7	1.0	250	28	18	16
17	106		8	28	84	32	920	4.5	0.8	310	16	65	17
18	107		2	24	76	36	1420	4.0	0.6	172	22	35	18
19	108		2	40	120	68	1640	4.0	0.8	134	82	0	19
20	STD B		30	150	14	4	140	1.0	1.8	140	104	20	20
21	109		1	74	112	76	1640	4.9	0.8	186	34	12	21
22	110		1	40	72	36	480	5.2	0.6	136	20	0	22
23	111		104	38	40	24	280	4.5	3.6	244	66	180	23
24	112		220	128	60	32	360	7.1	1.6	282	52	230	24
25	113		80	60	92	50	1280	4.3	1.4	264	60	100	25
26	114		62	40	84	40	640	3.8	0.6	228	64	45	26
27	115		94	60	36	24	360	7.0	1.0	200	20	55	27
28	116		16	20	24	24	2360	4.0	0.6	206	24	350	28
29	117		4	16	12	8	200	1.9	0.2	32	8	25	29
30	118		2	10	16	12	380	3.0	0.2	68	10	20	30
31	119		4	18	32	20	400	4.0	0.6	216	18	0	31
32	120		2	10	22	14	1000	2.9	0.4	128	12	20	32
33	121		2	8	8	4	80	1.3	0.6	82	4	30	33
34	122		2	42	40	20	1540	3.2	0.4	152	28	0	34
35	123		2	12	32	16	420	3.0	0.6	312	22	20	35
36	124		2	14	20	16	320	2.1	0.6	70	8	18	36
37	125		1	10	12	10	320	2.1	0.4	48	12	20	37
38	126		1	18	12	10	600	2.2	0.4	62	16	35	38
39	127		38	30	36	16	643	2.6	0.8	162	26	50	39
40	STD B		30	148	16	4	140	1.0	1.2	152	90	20	40

# Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

## CERTIFICATE OF ANALYSIS

TO: AMAX MINERALS EXPLORATION  
801 - 535 THURLOW ST  
VANCOUVER, B.C.

220 S SPRINGER AVE  
BURNABY B.C.  
CANADA  
TELEPHONE 299 8910  
AREA CODE 604  
CERTIFICATE NO. 9353-2

INVOICE NO.  
DATE ANALYSED OCT 20/79  
PROJECT 972 DUNCAN RIVER

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Pb	Zn	As	W	No
01	79 DWS 128		24	40	116	56	2200	3.8	5.4	1940	30	200	01
02	129		52	118	160	172	3240	3.9	1.2	500	54	50	02
03													03
04													04
05													05

## CERTIFICATE OF ANALYSIS

TO: AMAX MINERALS EXPLORATION  
801 - 535 THURLOW ST  
VANCOUVER, B.C.

CERTIFICATE NO. 9257-7  
INVOICE NO.  
DATE ANALYSED 79/08/87  
PROJECT 972 Duncan River

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Pb	As	Zn	W	No
01	79 DWT 1		40	30	40	28	220	4.9	0.2	64	6		01
02	2		14	12	22	4	1640	1.5	0.2	36	16		02
03	3		1	28	44	4	340	2.7	0.2	53	12		03
04	4		30	4	50	52	100	5	0.2	4	2		04
05	5		150	8	58	64	460	9	0.2	40	82		05
06	6		186	26	32	36	82	1.4	0.6	26	22		06
07	7		6000	4	26	14	320	9	3.6	116	180		07
08	8		340	6	26	20	120	4.1	0.6	72	46		08
09	9		340	16	64	74	80	1.1	0.2	8	114		09
10	10		6000	6	60	76	160	1.1	0.2	8	12		10
11	11		24	8	60	64	80	1.1	0.6	32	256		11
12	12		28	12	64	68	80	1.9	0.2	32	18		12
13	13		40	20	32	30	120	1.4	0.2	90	12		13
14	14		28	6	48	52	80	0.6	0.4	28	22		14
15	15		32	8	30	28	80	1.1	0.9	88	40		15
16	16		14	8	20	28	360	1.6	0.4	76	30		16
17	17		38	12	24	22	160	0.8	0.6	112	28		17
18	18		74	40	64	36	520	3.1	0.2	72	8		18
19	19		30	120	104	160	>100	0.2	0.2	28	60		19
20	20		80	42	14	360	3.0	0.2	152	18		20	
21	21		14	48	42	120	1.7	0.2	32	8		21	
22	22		26	84	52	440	2.9	0.2	100	16		22	
23	23		68	8	60	64	80	1.0	0.2	8	20		23
24	24		12	16	48	32	520	2.2	0.2	40	6		24
25	25		20	4	52	60	100	0.6	0.2	100	10		25
26	26		28	22	48	44	8	2.6	0.2	84	44		26
27	27		36	40	36	360	4.0	0.6	232	72		27	
28	28		12	68	72	120	2.0	0.4	12	70		28	
29													29
30													30

# Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

## CERTIFICATE OF ANALYSIS

TO: AMAX MINERALS EXPLORATION  
801 - 535 THURLOW ST  
VANCOUVER, B.C.

BURNABY B.C.  
CANADA  
TELEPHONE 299 8910  
AREA CODE 604  
CERTIFICATE NO. 9057

INVOICE NO.  
DATE ANALYSED 79/10/20  
PROJECT 972 Duncan River

No.	Sample	pH	Mo	Cu									No
01	79 DWT 1												01
02	2												02
03	3												03
04	4												04
05	5												05
06	6												06
07	7												07
08	8												08
09	9												09
10	10												10
11	11												11
12	12												12
13	13												13
14	14												14
15	15												15
16	16												16
17	17												17
18	18												18
19	19												19
20	20												20
21	21												21
22	22												22
23	23												23
24	24												24
25	25												25
26	26												26
27	27												27
28	28												28
29	29												29
30	30												30

Certified by

*P. Rossbacher*

# Rossbacher Laboratory Ltd.

GEOCHEMICAL ANALYSTS & ASSAYERS

AMAX  
3225 S SPRINGER AVE.  
VANCOUVER, B.C.  
V6M 2K7  
TELEPHONE 299-0910  
FAX CODE 804

SEP 5 1979

VANCOUVER OFFICE

ASSAY WORKSHEET

AMAX MINERALS EXPLORATION

601 - 535 THURLOW ST.  
VANCOUVER, B.C. V6E 3C6

CLIENT

PROJECT 972 DUNCAN RIVER

CERTIFICATE  
INVOICE NO 9257  
DATE RECEIVED:  
DATE ANALYZED 79/09/01

No	Sample	%	No
		Tot. Mo. MoS <sub>2</sub>	
01	79DKT 10.	0.120	01
02	79DKT 19	0.460	02
03	79DKT 20	0.270	03
04	79DKT 27	1.32	04
05			05
06			06
07			07
08			08
09			09
10			10
11			11
12			12
13			13
14			14
15			15
16			16
17			17
18			18
19			19
20			20
21			21
22			22
23			23
24			24
25			25
26			26
27			27
28			28
29			29
30			30
31			31
32			32
33			33
34			34
35			35
36			36
37			37
38			38
39			39
40			40

# Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

2725 S SPRING AVE  
BURNABY, B.C.  
CANADA  
TELEPHONE 299-0910  
AREA CODE 604  
CERTIFICATE NO. 9257-1

## CERTIFICATE OF ANALYSIS

TO: AMAX MINERALS EXPLORATION  
801 - 535 THURLOW ST  
VANCOUVER, B.C.

INVOICE NO.  
DATE ANALYZED 79/09/01  
PROJECT 972 Duncan R.

No.	Sample	pH	Mo	Co	Ni	La	Mn	Fe	Al	Zn	Pb	Cu
01	79D05 2	1	22	32	30	420	4.0	0.2	68	14		01
02	2	1	20	30	24	300	3.8	0.2	60	16		02
03	3	1	30	60	40	500	4.4	0.2	72	10		03
04	4	1	8	8	4	60	0.5	0.2	32	20		04
05	6.5	1	24	38	30	360	3.2	0.2	60	12		05
06	5.6	1	36	58	36	480	4.0	0.2	68	20		06
07	7	1	20	38	40	2120	3.9	0.2	116	18		07
08	8	1	16	32	20	160	2.9	0.2	64	16		08
09	9	1	12	22	12	120	2.5	0.2	34	8		09
10	10	2	16	18	16	480	1.7	0.2	64	120		10
11	11	2	28	54	60	480	3.9	0.2	84	18		11
12	12	2	24	52	20	480	3.6	0.2	60	12		12
13	13	2	20	52	32	520	4.0	0.2	94	16		13
14	14	1	24	44	16	480	3.3	0.2	70	12		14
15	6.15	1	20	30	4	280	2.1	0.2	40	6		15
16	5.16	1	20	40	44	2200	4.3	0.2	120	20		16
17	17	1	16	20	16	1280	1.9	0.2	160	36		17
18	18	2	14	24	16	240	3.4	0.2	80	14		18
19	19	2	20	32	20	1440	3.3	0.2	116	20		19
20	STD: A	6	24	14	8	480	0.7	0.2	32	00		20
21	20	1	12	14	8	320	1.1	0.2	92	44		21
22	21	2	38	48	64	1320	5.1	0.2	360	30		22
23	22	2	26	20	8	160	1.4	0.2	56	20		23
24	23	2	32	60	32	420	4.8	0.2	72	12		24
25	24	2	26	42	26	440	3.8	0.2	80	14		25
26	25	18	24	32	36	340	4.0	0.2	136	20		26
27	26	20	12	28	20	320	3.0	0.2	212	18		27
28	27	14	20	36	52	2260	3.8	1.0	368	36		28
29	28	26	32	72	52	200	2.4	0.4	92	12		29
30	29	38	40	42	64	2520	4.5	0.4	124	36		30
31	30	14	16	36	14	166	3.3	0.2	76	12		31
32	31	10	32	18	10	60	2.0	0.4	32	26		32
33	32	6	18	16	14	20	1.9	0.2	52	14		33
34	33	10	12	14	10	140	2.2	0.2	66	16		34
35	34	6.8	8	8	8	400	1.2	0.4	28	12		35
36	35	132	48	36	22	420	6.6	0.4	60	26		36
37	36	10	24	38	18	320	3.5	0.4	96	14		37
38	37	210	44	38	100	3600	3.7	0.6	32	50		38
39	38	46	20	40	52	2400	3.5	0.4	520	36		39
40	STD: A	6	24	14	8	360	0.6	0.2	30	18		40

Certified by *J. Rossbacher*

# Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

## CERTIFICATE OF ANALYSIS

TO: AMAX MINERALS EXPLORATION  
801 - 535 THURLOW ST  
VANCOUVER, B.C.

LABY B C  
TEL: 778-1114  
CALL TOLL FREE 799-4810  
TELETYPE 604  
AREA CODE 604  
CERTIFICATE NO. 9257-1  
INVOICE NO.  
DATE ANALYSED 29/08/77  
PROJECT 972 Duncan, R.

No.	Sample	pH	Mo	Cu	Ni	Co	Fe	Mn	Zn	Pb	Ag
01	79 DJS 2	1	1	22	22	20	420	4.0	0.2		
02	2	1	1	22	26	24	360	3.8	0.2		
03	3	1	1	32	62	42	500	4.0	0.2		
04	4	1	1	8	8	0	60	1.5	0.2		
05	6.5	1	1	24	32	30	360	3.2	0.2		
06	3.6	1	1	32	52	36	460	4.0	0.2		
07	7	1	1	20	32	42	212	3.9	0.2		
08	8	1	1	11	22	22	16	1.9	0.2		
09	9	1	1	12	22	12	12	1.5	0.2		
10	10	2	2	16	16	16	60	1.7	0.2		
11	11	2	2	28	40	60	48	3.9	0.2		
12	12	2	2	24	52	22	430	3.6	0.2		
13	13	2	2	20	52	32	62	4.0	0.2		
14	14	1	1	24	40	16	460	3.9	0.2		
15	6.15	1	1	20	30	4	28	2.1	0.2		
16	5.16	1	1	20	40	40	220	4.3	0.2		
17	17	1	1	16	20	16	120	1.9	0.2		
18	18	2	2	24	24	16	240	3.4	0.2		
19	19	2	2	24	52	22	1040	3.3	0.2		
20	20	2	2	24	16	0	0	0	0.2		
21	20	1	1	12	16	8	600	1.1	0.2		
22	21	2	2	32	48	64	1320	5.1	0.2		
23	22	2	2	20	20	7	160	1.4	0.2		
24	23	2	2	32	60	32	420	4.0	0.2		
25	24	2	2	20	42	36	44	3.8	0.2		
26	25	18	18	24	32	36	340	4.0	0.2		
27	26	20	20	12	28	20	32	3.0	0.2		
28	27	14	14	20	36	57	330	3.8	0.2		
29	28	26	26	32	32	32	200	2.9	0.4		
30	29	38	38	40	42	64	2320	4.5	0.4		
31	30	18	18	16	36	14	160	3.3	0.2		
32	31	10	10	32	18	12	60	2.4	0.4		
33	32	6	6	12	16	10	20	1.9	0.2		
34	33	10	10	12	16	10	140	1.7	0.2		
35	34	16	16	8	8	8	40	1.0	0.4		
36	35	132	48	36	22	42	660	6.6	0.4		
37	36	10	21	38	18	32	320	3.6	0.4		
38	37	210	44	38	100	360	2340	2.3	0.6		
39	38	46	20	40	8	740	240	3.5	0.4		
40	STD-A	6	24	10	8	30	0	0	0.2		

No.	Sample	pH	Mo	Cu	Ni	Co	Fe	Mn	Zn	Pb	Ag
01	16	0									
02	16	0									
03	16	0									
04	16	0									
05	16	15									
06	16	0									
07	16	0									
08	16	5									
09	16	20									
10	16	0									
11	16	15									
12	16	0									
13	16	0									
14	16	0									
15	16	0									
16	16	0									
17	16	0									
18	16	0									
19	16	0									
20	16	0									
21	16	0									
22	16	25									
23	16	0									
24	16	0									
25	16	0									
26	16	12	25								
27	16	45									
28	16	18									
29	16	8									
30	16	105	29								
31	16	8									
32	16	0									
33	16	2	20								
34	16	12									
35	16	0									
36	16	0									
37	16	15									
38	16	0									
39	16	45	30								
40	16	0									

T. Rossbach

# Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

## CERTIFICATE OF ANALYSIS

TO: AMAX MINERALS EXPLORATION  
801 - 535 THURLOW ST  
VANCOUVER, B.C.

2725 5 SPRINGER AVE.  
BURNABY, B.C.  
CANADA  
TELEPHONE 799-6910  
AREA CODE 604  
CERTIFICATE NO. 9257-2  
INVOICE NO.  
DATE ANALYSED 29/08/77  
PROJECT 972 Duncan, R.

No.	Sample	pH	Mo	Cu	Ni	Co	Fe	Mn	Zn	Pb	Ag
01	79 DJS 39	70	24	52	16	200	2.6	0.2	176	16	
02	40	72	14	20	24	1080	3.5	0.2	288	46	
03	41	50	16	24	20	300	3.9	0.4	180	20	
04	42	14	6	8	4	80	1.3	0.2	36	10	
05	43	16	16	28	20	320	3.0	0.2	184	16	
06	44	20	16	76	22	240	3.2	0.2	100	16	
07	45	18	16	38	16	140	3.5	0.2	74	20	
08	46	8	16	32	20	440	2.7	0.2	76	18	
09	47	16	24	36	28	340	2.9	0.2	68	14	
10	48	8	16	26	16	280	2.5	0.2	64	12	
11	49	8	22	20	12	240	2.2	0.2	44	22	
12	50	6	24	36	34	320	2.5	0.2	140	18	
13	51	4	18	22	24	200	1.9	0.2	104	16	
14	52	4	4	20	16	500	1.0	0.2	50	6	
15	53	6	20	34	14	160	1.0	0.2	68	14	
16	54	24	24	56	74	1640	3.8	0.4	196	30	
17	55	7	16	24	12	160	2.2	0.2	60	20	
18	56	18	48	48	30	1680	2.0	0.4	176	52	
19	57	76	12	28	16	160	2.8	0.4	40	12	
20	STD B	70	152	16	10	120	.9	0.2	156	104	
21	58	40	18	36	100	4800	3.5	0.4	248	20	
22	59	4	14	20	12	220	3.1	0.6	104	14	
23	60	46	12	18	18	1320	1.3	0.4	68	10	
24	61	8	8	12	16	240	1.8	0.4	56	10	
25	62	22	16	26	22	280	3.3	0.2	174	16	
26	63	42	14	28	28	2800	1.2	0.6	288	18	
27	64	6	16	32	24	320	2.8	0.2	76	18	
28	65	2	14	32	20	440	2.5	0.2	74	8	
29	66	2	32	36	36	2280	2.5	0.6	184	28	
30	67	2	24	36	24	760	2.7	0.4	112	26	
31	68	2	16	28	16	440	2.2	0.2	76	16	
32	5.67	4	40	50	20	360	3.0	0.2	154	10	
33	6.70	2	20	28	16	320	2.3	0.4	58	8	
34	5.71	2	18	30	24	520	3.0	0.4	76	12	
35	7.2	2	26	32	28	1400	3.2	0.8	136	16	
36	5.77	1	20	30	30	920	2.5	0.2	112	20	
37	7.4	8	8	16	16	340	2.3	0.2	62	20	
38	7.5	6	18	32	32	2720	1.5	0.2	224	20	
39	7.6	14	16	26	20	240	2.0	0.2	84	16	
40	5.73	32	52	14	8	120	.4	1.0	152	10	

T. Rossbach

# Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

## CERTIFICATE OF ANALYSIS

TO: AMAX MINERALS EXPLORATION  
801 - 535 THURLLOW ST  
VANCOUVER B.C.

BURNABY, B.C.  
CANADA  
TELEPHONE 290-0010  
AREA CODE 604  
CERTIFICATE NO. 9257-2

INVOICE NO.  
DATE ANALYSED 7/9/07  
PROJECT 977 Duncan River

No.	Sample	pH	Mo	Co	Ni	Ca	Mg	F	Al	Fe	Zn	Cu	Pb	Ag	As	Se	Mo
01	79 DDS 39	✓	70	14	52	16	800	3.6	0.2	126	16	10	0	0	0	0	0
02	41	✓	72	14	20	20	1080	3.5	0.2	208	40	10	0	0	0	0	0
03	41	✓	50	16	20	20	300	3.9	0.4	180	20	45	0	0	0	0	0
04	42	✓	14	6	8	8	80	1.3	0.2	26	10	0	0	0	0	0	0
05	43	✓	16	16	28	20	220	3.0	0.2	184	16	8	0	0	0	0	0
06	44	✓	20	16	16	17	240	3.3	0.2	200	16	2	0	0	0	0	0
07	45	✓	18	16	38	10	140	3.5	0.2	70	20	12	0	0	0	0	0
08	46	✓	8	16	32	20	440	2.7	0.2	36	12	0	0	0	0	0	0
09	47	✓	16	24	30	21	340	2.9	0.2	12	14	0	0	0	0	0	0
10	48	✓	8	16	20	10	200	2.5	0.2	12	12	0	0	0	0	0	0
11	49	✓	8	22	20	12	240	2.2	0.2	44	22	0	0	0	0	0	0
12	50	✓	6	24	30	20	920	2.5	0.2	100	12	5	0	0	0	0	0
13	51	✓	4	14	22	20	220	1.3	0.2	104	16	0	0	0	0	0	0
14	52	✓	4	4	20	16	200	1.0	0.2	32	6	0	0	0	0	0	0
15	53	✓	6	20	34	14	110	1.0	0.2	68	14	2	0	0	0	0	0
16	54	✓	34	14	54	74	1140	3.0	0.4	174	30	0	0	0	0	0	0
17	55	✓	7	16	24	12	140	2.2	0.2	60	20	12	0	0	0	0	0
18	56	✓	18	48	68	30	1180	2.0	0.4	176	52	0	0	0	0	0	0
19	57	✓	76	12	28	16	110	2.3	0.4	40	12	0	0	0	0	0	0
20	STD 0	✓	70	152	16	10	120	.9	0.8	136	104	12	0	0	0	0	0
21	58	✓	40	18	30	100	480	2.5	0.4	298	30	15	0	0	0	0	0
22	59	✓	4	14	20	12	220	3.1	0.6	104	14	30	0	0	0	0	0
23	60	✓	8	12	18	18	1320	1.3	0.4	62	10	0	0	0	0	0	0
24	61	✓	8	8	12	16	240	1.3	0.4	56	10	0	0	0	0	0	0
25	62	✓	22	16	36	22	280	3.3	0.2	174	16	2	0	0	0	0	0
26	63	✓	42	14	28	28	220	1.2	0.6	224	102	10	0	0	0	0	0
27	64	✓	6	16	32	24	320	2.3	0.2	76	18	0	0	0	0	0	0
28	65	✓	2	14	32	20	440	2.2	0.2	74	8	0	0	0	0	0	0
29	66	✓	2	22	30	36	2220	2.5	0.6	154	28	0	0	0	0	0	0
30	67	✓	4	24	36	24	760	2.7	0.4	112	26	0	0	0	0	0	0
31	68	✓	2	16	28	16	440	2.3	0.2	76	16	0	0	0	0	0	0
32	S 69	✓	4	40	50	20	300	3.0	0.2	104	12	12	0	0	0	0	0
33	L 70	✓	2	20	28	16	520	2.3	0.4	86	8	40	0	0	0	0	0
34	S 71	✓	2	18	30	24	520	3.0	0.4	76	14	0	0	0	0	0	0
35	72	✓	2	26	22	20	1400	3.2	0.8	136	16	0	0	0	0	0	0
36	73	✓	1	20	30	30	920	2.5	0.2	112	10	0	0	0	0	0	0
37	74	✓	8	8	16	10	500	2.3	0.2	62	20	35	0	0	0	0	0
38	75	✓	6	18	22	32	2720	1.8	0.2	224	20	0	0	0	0	0	0
39	76	✓	14	14	20	20	20	2.0	0.2	44	10	0	0	0	0	0	0
40	77	✓	32	152	16	8	14	.9	1.8	152	100	15	0	0	0	0	0

P. Rossbacher

# Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

## CERTIFICATE OF ANALYSIS

TO: AMAX MINERALS EXPLORATION  
801 - 535 THURLLOW ST  
VANCOUVER, B.C.

2225 S SPRINGER AVE  
BURNABY, B.C.  
CANADA  
TELEPHONE 799-0010  
AREA CODE 604  
CERTIFICATE NO. 9257-3

INVOICE NO.  
DATE ANALYSED 7/9/07  
PROJECT 977 Duncan River

No.	Sample	pH	Mo	Co	Al	Ca	Mn	Fe	Ag	As	Se	Mo	Ag	As	Se	Mo
01	79 DDS 77	✓	4	12	8	2	200	.7	0.2	40	18	0	0	0	0	0
02	78	✓	2	20	24	20	1000	2.6	0.2	156	22	0	0	0	0	0
03	79	✓	6	28	30	30	1120	2.4	0.2	100	24	0	0	0	0	0
04	80	✓	10	12	16	20	480	.8	0.2	160	24	0	0	0	0	0
05	81	✓	8	12	20	14	200	2.0	0.2	40	16	0	0	0	0	0
06	82	✓	20	16	24	28	1880	3.5	0.2	272	24	0	0	0	0	0
07	83	✓	14	16	24	16	300	2.3	0.2	64	16	0	0	0	0	0
08	84	✓	16	16	26	20	320	2.4	0.2	124	16	0	0	0	0	0
09	85	✓	6	8	4	4	120	1.0	0.2	40	14	0	0	0	0	0
10	86	✓	8	10	8	8	120	3.0	0.4	76	20	0	0	0	0	0
11	87	✓	4	12	20	14	160	2.1	0.2	104	6	0	0	0	0	0
12	88	✓	2	8	10	4	40	3.3	0.2	36	14	0	0	0	0	0
13	89	✓	60	28	32	16	240	3.6	1.4	236	82	0	0	0	0	0
14	90	✓	76	16	16	12	200	2.6	1.8	106	68	0	0	0	0	0
15	91	✓	2	36	46	16	400	3.2	0.2	112	20	0	0	0	0	0
16	92	✓	2	22	32	12	440	3.4	0.2	90	28	0	0	0	0	0
17	93	✓	450	40	20	12	240	7.3	5.6	680	408	0	0	0	0	0
18	94	✓	114	16	20	4	120	3.2	2.0	180	118	0	0	0	0	0
19	95	✓	8	8	10	2	80	1.7	0.6	40	22	0	0	0	0	0
20	96	✓	2	120	4	2	60	1.0	4.0	520	106	0	0	0	0	0
21	97	✓	16	8	8	2	80	1.5	0.4	36	12	0	0	0	0	0
22	98	✓	8	32	42	14	480	3.1	0.6	124	28	0	0	0	0	0
23	99	✓	1	24	36	12	440	3.2	0.2	68	22	0	0	0	0	0
24	100	✓	68	60	68	40	1100	5.3	0.6	310	34	0	0	0	0	0
25	101	✓	22	32	54	34	400	3.5	0.6	176	14	0	0	0	0	0
26	102	✓	42	64	124	64	960	4.9	0.4	700	24	0	0	0	0	0
27	103	✓	24	38	80	54	960	5.0	0.4	480	20	0	0	0	0	0
28	104	✓	30	88	164	560	4000	6.0	0.4	1200	38	0	0	0	0	0
29	105	✓	30	40	60	44	720	6.3	1.0	1400	76	0	0	0	0	0
30	106	✓	6	12	20	12	160	2.0	0.4	98	12	0	0	0	0	0
31	107	✓	14	14	22	12	320	2.9	0.4	92	8	0	0	0	0	0
32	108	✓	16	32	32	20	300	4.1	0.2	150	10	0	0	0	0	0
33	109	✓	22	76	32	22	200	6.5	0.4	84	14	0	0	0	0	0
34	110	✓	46	32	60	24	200	3.2	0.2	100	12	0	0	0	0	0
35	111	✓	4	20	32	16	200	2.4	0.2	74	10	0	0	0	0	0
36	112	✓	32	28	62	48	1200	3.4	0.6	500	54	0	0	0	0	0
37	113	✓	26	28	64	30	840	3.6	0.6	820	28	0	0	0	0	0
38	114	✓	22	28	44	30	1400	3.0	0.4	412	26	0	0	0	0	0
39	115	✓	12	64	36	24	800	3.8	0.8	132	20	0	0	0	0	0
40	116	✓	2	20	4	4	40	1.0	0.2	520	100	0	0	0	0	0

P. Rossbacher



# Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

## CERTIFICATE OF ANALYSIS

BURNABY, B.C.  
CANADA  
TELEPHONE 799-8910  
AREA CODE 604  
CERTIFICATE NO. 9257-3

INVOICE NO.  
DATE ANALYSED 7/16/27  
PROJECT 977 Duncan River

TO: AMAX MINERALS EXPLORATION  
601 - 535 THURLOW ST.  
VANCOUVER, B.C.

No.	Sample	wt	Mo	Co	Ni	Cr	Mn	Fe	Al	Zn	Cu	Pb	W	No.
01	79 D05 77	4	12	8	2	200	0.7	0.2	40	18	0		01	
02	78	2	20	24	20	1000	2.6	0.2	150	27	0		02	
03	79	6	24	30	30	1120	2.4	0.2	100	24	0		03	
04	80	10	12	16	20	4000	0.8	0.2	16	24	0		04	
05	81	8	12	20	14	200	2.0	0.2	41	16	10		05	
06	82	20	16	24	33	1830	2.5	0.2	272	24	20		06	
07	83	14	16	24	16	6	2.3	0.2	24	16	2		07	
08	84	16	16	20	20	32	2.4	0.2	124	16	15		08	
09	85	6	8	4	4	12	1.0	0.2	4	14	0		09	
10	86	8	10	8	2	4	2.0	0.4	76	20	10		10	
11	87	4	12	20	10	140	2.1	0.2	104	6	12		11	
12	88	2	8	10	4	4	2.3	0.2	36	14	15		12	
13	89	70	28	22	16	24	2.6	1.4	232	82	20		13	
14	90	76	16	16	12	240	2.6	1.8	106	62	20		14	
15	91	2	36	46	16	400	2.2	0.2	12	20	0		15	
16	92	4	22	32	12	40	2.0	0.2	90	22	5		16	
17	93	4450	4	20	11	24	2.3	5.6	640	408	125		17	
18	94	114	14	20	4	120	2.2	2.0	180	18	20		18	
19	95	8	9	10	2	80	1.7	0.6	40	22	12		19	
20	D	2	10	0	2	60	1.0	4.0	520	106	15		20	
21	96	16	8	8	2	80	1.5	0.4	36	12	18		21	
22	97	8	32	42	16	450	2.1	0.6	122	28	0		22	
23	98	1	24	36	12	440	2.2	0.2	22	10	0		23	
24	99	68	6	60	10	1000	5.3	0.6	2	30	210		24	
25	100	22	30	54	30	40	2.5	0.6	176	14	50		25	
26	101	46	64	120	60	900	4.9	0.4	700	24	165		26	
27	102	24	30	50	36	900	5.0	0.4	450	20	100		27	
28	103	30	33	105	40	1000	6.0	0.4	1200	38	110		28	
29	104	30	40	60	44	700	6.3	1.0	1400	76	700		29	
30	105	6	12	20	12	160	2.0	0.4	82	12	12		30	
31	106	14	14	30	12	220	2.9	0.4	42	8	20		31	
32	107	16	22	20	20	300	4.1	0.2	150	10	45		32	
33	108	22	26	32	22	20	6.5	0.4	84	14	100		33	
34	109	46	32	60	24	260	3.2	0.2	100	12	10		34	
35	110	4	20	22	16	20	2.9	0.2	72	10	80		35	
36	111	32	28	62	46	1300	2.0	0.6	500	54	600		36	
37	112	16	20	60	30	800	2.6	0.6	80	22	185		37	
38	113	22	10	40	30	1400	2.1	0.4	90	20	45		38	
39	114	12	64	30	40	1100	0.8	0.2	11	20	50		39	
40	D	2	10	4	4	6	0.9	4.0	520	104	15		40	

Certified by

*P. Rossbacher*

# Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

## CERTIFICATE OF ANALYSIS

2295 S SPRINGER AVE  
BURNABY, B.C.  
CANADA  
TELEPHONE 799-8910  
AREA CODE 604  
CERTIFICATE NO. 9257-4

INVOICE NO.  
DATE ANALYSED 7/16/27  
PROJECT 977 Duncan River

TO: AMAX MINERALS EXPLORATION  
601 - 535 THURLOW ST  
VANCOUVER, B.C.

No.	Sample	wt	Mo	Co	Ni	Cr	Mn	Fe	Al	Zn	Cu	Pb	W	No.
01	79 D05 115	32	22	32	16	160	2.8	0.2	104	14			01	
02	116	102	20	24	20	180	3.2	0.2	64	58			02	
03	117	36	28	12	12	80	1.5	0.2	42	50			03	
04	118	38	20	32	20	120	3.3	0.2	100	14			04	
05	119	24	16	26	16	160	3.2	0.2	124	16			05	
06	120	38	12	12	12	280	1.8	0.2	98	24			06	
07	121	4	20	32	14	160	2.8	0.2	204	10			07	
08	122	2	16	30	36	1600	2.6	0.2	188	16			08	
09	123	8	46	64	80	2200	4.7	0.4	800	24			09	
10	124	2	12	28	16	250	3.6	0.2	98	16			10	
11	125	2	10	8	8	140	1.1	0.2	40	20			11	
12	126	2	30	54	24	280	3.2	0.2	80	14			12	
13	127	30	24	20	24	560	2.7	0.2	40	12			13	
14	128	16	42	22	10	1000	1.8	0.2	40	68			14	
15	129	24	20	20	16	280	3.6	0.2	40	20			15	
16	130	2	8	6	4	40	1.0	0.2	24	18			16	
17	131	6	12	24	10	160	4.0	0.2	48	18			17	
18	132	10	16	14	8	160	1.7	0.2	56	60			18	
19	133	22	36	22	10	240	4.2	0.2	90	24			19	
20	134	6	26	12	12	400	2.7	0.2	32	20			20	
21	135	4	8	8	4	40	1.3	0.2	20	14			21	
22	136	6	9	18	8	120	2.9	0.2	30	16			22	
23	137	22	148	32	20	2040	0.8	0.2	128	42			23	
24	138	4	24	60	62	660	5.1	0.2	560	30			24	
25	139	4	40	76	120	1300	>10.0	0.2	740	20			25	
26	140	2	12	16	12	280	2.0	0.2	24	16			26	
27	141	4	16	32	20	160	4.2	0.2	106	14			27	
28	142	4	16	28	20	260	4.5	0.2	152	20			28	
29	143	4	16	12	12	320	3.0	0.2	56	46			29	
30	144	6	56	22	8	60	3.5	0.4	28	16			30	
31	145	8	14	12	4	140	2.0	0.2	32	24			31	
32	146	12	8	12	20	440	1.4	0.6	152	20			32	
33	147	1	10	4	12	80	0.8	0.4	20	16			33	
34	148	6	16	14	14	120	2.8	0.2	88	18			34	
35	149	6	18	30	30	2280	3.1	0.2	232	40			35	
36	150	2	24	64	36	260	3.3	0.2	116	20			36	
37	151	2	12	20	12	220	3.4	0.2	64	16			37	
38	152	6	40	30	44	480	6.3	0.2	76	20			38	
39	153	2	4	10	12	200	2.0	0.2	26	6			39	
40	154	6	24	12	12	60	2.4	0.2	40	12			40	

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*P. Rossbacher*

# Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

## CERTIFICATE OF ANALYSIS

4112 A ST. - 1000 AVE.  
BURNABY, B.C.  
CANADA  
TELEPHONE 766-4010  
AREA CODE 604  
CERTIFICATE NO. 9257-4

INVOICE NO.  
DATE ANALYSED 79/08/27  
PROJECT 772 Duncan River

TO: AMAX MINERALS EXPLORATION  
601 - 535 THURLOW ST.  
VANCOUVER, B.C.

No.	Sample	PH	Mo	Co	Ni	Ca	Mg	Fe	Al	Zn	Cu	Pb	W	No.
01	79D05115	32	22	32	14	180	2.8	0.2	107	14	15		01	
02	116	102	20	24	20	150	3.3	0.2	64	52	12		02	
03	117	36	28	12	12	80	1.5	0.2	42	50	12		03	
04	118	38	20	32	20	120	3.3	0.2	100	14	14.5		04	
05	119	24	12	24	14	110	3.2	0.2	124	16	20		05	
06	120	36	12	12	12	240	1.2	0.2	48	24	0		06	
07	121	4	2	22	14	160	2.8	0.2	210	10	0		07	
08	122	2	11	30	20	1600	2.6	0.2	182	10	0		08	
09	123	4	46	64	20	320	4.7	0.4	200	24	15		09	
10	124	2	12	28	10	20	3.4	0.2	92	16	5		10	
11	125	2	40	5	8	140	1.1	0.2	4	30	0		11	
12	126	2	30	24	24	280	1.2	0.2	90	14	10		12	
13	127	30	24	20	24	540	1.7	0.2	40	12	0		13	
14	128	16	52	22	10	100	1.8	0.2	40	62	5		14	
15	129	24	24	20	16	280	3.4	0.2	40	20	4		15	
16	130	2	8	4	4	40	1.0	0.2	20	10	0		16	
17	131	6	12	24	10	160	4.0	0.2	48	14	0		17	
18	132	10	14	14	8	160	1.7	0.2	58	12	0		18	
19	133	22	36	22	16	240	4.2	0.2	4	24	35		19	
20	134	6	20	12	12	400	1.7	0.2	32	20	0		20	
21	135	4	12	8	4	40	1.5	0.2	20	14	0		21	
22	136	6	8	18	8	120	2.9	0.2	30	16	0		22	
23	137	22	14	22	20	240	2	0.2	118	42	0		23	
24	138	4	24	60	52	460	1	0.2	50	30	0		24	
25	139	4	40	76	120	800	210.0	0.2	24	24	0		25	
26	140	2	12	14	12	280	2.0	0.2	24	16	0		26	
27	141	4	16	22	20	160	4.2	0.2	106	14	0		27	
28	142	4	16	28	20	40	4.5	0.2	152	20	0		28	
29	143	4	16	16	12	320	3.0	0.2	56	46	0		29	
30	144	6	56	22	8	60	3.5	0.4	28	16	0		30	
31	145	8	14	12	4	160	2.0	0.2	32	24	0		31	
32	146	12	8	12	20	440	1.4	0.6	152	20	0		32	
33	147	1	10	4	12	80	1.8	0.4	20	16	0		33	
34	148	6	16	14	14	120	2.8	0.2	82	18	0		34	
35	149	6	28	32	30	220	3.1	0.2	232	40	0		35	
36	150	2	24	64	36	200	3.3	0.2	14	20	0		36	
37	151	2	12	12	12	200	3.4	0.2	64	16	0		37	
38	152	6	40	32	40	600	6.8	0.2	76	20	0		38	
39	153	2	4	10	12	20	2.0	0.2	26	6	0		39	
40	154	6	20	12	12	40	2.7	0.2	4	16	0		40	

17 Rossbacher

# Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

## CERTIFICATE OF ANALYSIS

2225 SPRINGER AVE  
BURNABY, B.C.  
CANADA  
TELEPHONE 298-0010  
AREA CODE 604  
CERTIFICATE NO. 9257-5

TO: AMAX MINERALS EXPLORATION  
601 - 535 THURLOW ST.  
VANCOUVER, B.C.

INVOICE NO.  
DATE ANALYSED 79/08/27  
PROJECT 972 Duncan River

No.	Sample	PH	Mo	Co	Ni	Ca	Mg	Fe	Al	Zn	Cu	Pb	W	No.
01	79D05153	62	64	36	40	360	3.9	3.0	1240	140			01	
02	154	2	16	16	20	320	3.0	0.2	60	36			02	
03	155	2	16	14	28	1240	3.4	0.2	60	36			03	
04	156	16	16	18	28	440	2.7	0.4	164	20			04	
05	157	38	20	28	40	920	3.6	0.6	172	40			05	
06	158	16	6	10	12	100	3.0	0.6	68	12			06	
07	159	32	16	28	30	480	3.5	0.4	252	32			07	
08	160	18	40	48	44	860	4.2	0.2	128	18			08	
09	161	14	14	26	20	160	3.4	0.2	80	26			09	
10	162	22	16	28	28	400	2.6	0.4	224	28			10	
11	163	30	22	20	20	180	3.6	0.6	86	12			11	
12	164	4	20	40	28	280	3.5	0.2	60	16			12	
13	165	2	16	24	24	340	3.0	0.2	180	12			13	
14	166	6	20	28	48	600	3.6	0.2	920	18			14	
15	167	8	20	80	60	2300	3.5	0.2	1440	28			15	
16	168	6	24	60	52	1200	3.6	0.2	1800	18			16	
17	169	20	16	32	28	300	2.9	0.4	440	12			17	
18	170	36	22	40	20	180	3.0	0.4	232	14			18	
19	171	8	20	40	32	340	5.0	0.4	440	14			19	
20	172	18	180	48	20	160	1.2	0.2	116	90			20	
21	173	10	24	28	16	280	1.9	0.4	224	26			21	
22	174	6	32	26	12	320	1.8	0.4	320	32			22	
23	175	23	96	168	400	3820	6.4	0.6	2200	78			23	
24	176	4	24	100	76	2040	4.8	0.4	880	50			24	
25	177	2	16	16	12	100	3.6	0.4	56	32			25	
26	178	2	14	98	90	2400	2.0	0.8	500	82			26	
27	179	4	16	30	32	880	3.4	0.4	164	14			27	
28	180	4	28	92	60	640	4.0	0.2	196	20			28	
29	181	2	48	120	92	2440	6.8	0.4	224	20			29	
30	182	2	64	96	48	320	5.8	0.2	132	28			30	
31	183	2	24	108	60	4800	3.3	0.2	520	72			31	
32	184	2	60	82	64	2600	3.9	0.2	360	34			32	
33	185	20	16	24	22	440	3.8	0.2	240	16			33	
34	186	52	12	40	24	1200	2.8	0.2	60	42			34	
35	187	1	12	14	12	480	1.8	0.4	72	40			35	
36	188	250	216	140	80	1900	2.6	0.6	270	40			36	
37	189	4	12	4	100	110	1.0	0.2	30	30			37	
38	190	16	170	52	16	100	1.3	0.8	12	5			38	

Certified by Rossbacher

# Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

## CERTIFICATE OF ANALYSIS

TO: AMAX MINERALS EXPLORATION  
801 - 535 THURLOW ST.  
VANCOUVER, B.C.

1000 - 10000000  
BURNABY B.C.  
CANADA  
TELEPHONE 299-0070  
AREA CODE 604  
CERTIFICATE NO. 98575

INVOICE NO.

DATE ANALYSED

PROJECT

7/10/67

722, Duncan River

No.	Sample	pH	Mo	Cu	Al	Fe	Mn	Zn	Pb	Ag	As	Bi	W	Mo
01	153	✓	6.8	64	26	40	300	3.2	3.0	1040	100	50	01	
02	154	✓	4	16	16	20	30	3.0	0.2	60	20	10	02	
03	155	✓	2	16	10	28	1240	3.4	0.4	60	18	10	03	
04	156	✓	16	16	18	28	40	2.7	0.4	11.4	20	10	04	
05	157	✓	3.8	20	28	40	920	3.4	0.6	172	40	20	05	
06	158	✓	16	6	10	12	100	2.0	0.6	150	12	15	06	
07	159	✓	2.2	16	28	30	480	3.5	0.4	252	20	12	07	
08	160	✓	1.8	42	48	40	360	4.2	0.2	120	18	18	08	
09	161	✓	14	14	16	20	160	3.4	0.2	80	20	20	09	
10	162	✓	2.2	16	22	22	400	3.6	0.4	224	20	20	10	
11	163	✓	2.0	20	20	20	180	3.4	0.6	40	10	10	11	
12	164	✓	4	20	40	28	250	3.5	0.2	200	16	12	12	
13	165	✓	2	16	20	20	200	3.0	0.2	180	12	25	13	
14	166	✓	6	20	42	40	600	3.6	0.2	920	18	105	14	
15	167	✓	8	60	30	60	2200	3.5	0.2	1020	28	205	15	
16	168	✓	6	24	60	52	1200	2.6	0.2	1200	18	90	16	
17	169	✓	2.0	16	52	28	300	2.9	0.4	40	18	12	17	
18	170	✓	3.6	22	40	20	130	3.0	0.4	220	10	20	18	
19	171	✓	8	20	40	32	440	5.0	0.4	60	10	45	19	
20	172	✓	1.8	180	48	20	160	1.2	0.8	110	90	18	20	
21	173	✓	10	24	28	16	280	1.9	0.4	220	16	12	21	
22	174	✓	6	32	26	12	320	1.2	0.4	220	32	90	22	
23	175	✓	2.2	96	168	400	2020	6.4	0.6	200	78	120	23	
24	176	✓	4	24	100	26	240	4.2	0.4	500	50	200	24	
25	177	✓	2	16	10	12	100	3.6	0.4	50	32	135	25	
26	178	✓	2	64	28	40	100	2.0	0.8	80	40	30	26	
27	179	✓	4	16	30	32	600	3.4	0.4	160	10	30	27	
28	180	✓	4	28	50	60	440	4.0	0.2	100	20	25	28	
29	181	✓	2	48	120	92	2400	6.8	0.4	324	20	210	29	
30	182	✓	2	40	96	48	320	5.8	0.2	132	28	12	30	
31	183	✓	2	30	128	40	100	3.2	0.2	520	22	75	31	
32	184	✓	2	30	82	64	260	2.9	0.2	320	190	15	32	
33	185	✓	2.0	16	20	20	440	3.8	0.2	240	30	15	33	
34	186	✓	5.2	12	40	20	1200	2.8	0.2	40	40	50	34	
35	187	✓	1	12	12	12	450	1.8	0.4	220	40	70	35	
36	188	✓	2.50	216	140	20	100	1.5	0.6	270	40	12	36	
37	189	✓	4	8	12	4	140	1.0	0.2	30	6	15	37	
38	190	✓	16	176	52	16	110	1.3	0.8	100	24	15	38	
39													39	
40													40	

Certified by

*T. Rossbacher*

Procedures for Collection and Processing  
of Geochemical Samples

Analytical Methods for Ag, Mo, Cu, Pb, Zn,  
Fe, Mn, Ni, Co and W in sediments and soils;  
Mo, Cu, Zn, Ni and  $\text{SO}_4^{--}$  in waters.

Amax Exploration, Inc.  
Vancouver Office.

September 1970

## SAMPLE COLLECTION

### Soil

B horizon material is sampled and thus organic rich topsoil and leached upper subsoil are avoided. Occasionally organic rich samples have to be taken in swampy depressions.

Samples are taken by hand from a small excavation made with a cast iron mattock. Approximately 200 gms of finer grained material is taken and placed in a numbered, high wet-strength, Kraft paper bag. The bags are closed by folding and do not have metal tabs.

Observations as to the nature of the sample and the environment of the sample site are made in the field.

### Drainage Sediments

Active sediments are taken by hand from tributary drainages which are generally of five square miles catchment or less. Composite samples are taken of the finest material available from as near as possible to the centre of the drainage channel thus avoiding collapsed banks. More than one sample is taken if marked mineralogical or textural segregation of the sediments is evident.

Some 200 gm of finer material is collected unless the sediment is unusually coarse in which case the weight is increased to 1 kg. Samples are placed in the same type of Kraft paper bag as are employed in soil sampling. Water samples are taken at all appropriate sites. Approximately 100 ml are sampled and placed in a clean, screw sealed, polythene bottle. Observations are made at each site regarding the environment and nature of the sample.

### Rock Chips

Composite rock chip samples generally consist of some ten small fragments broken from unweathered outcrop with a steel hammer. Each fragment weighs some 50 gms. Samples are placed in strong polythene bags and sealed with non-contaminating wire tabs. Samples are restricted to a single rock type and obvious mineralization is avoided.

Soil, sediment and rock samples are packed securely in cardboard boxes or canvas sacks and dispatched by road or air.

# Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

2225 S. SPRINGER AVE.,  
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AREA CODE: 604

iii

April 30, 1974

## SUMMARY OF SOME ANALYTICAL TECHNIQUES CURRENTLY IN USE AT ROSSBACHER LABORATORY

### A ANALYTICAL TECHNIQUES FOR GEOCHEMICAL SAMPLES

#### SAMPLE PREPARATION

Packages of samples are opened as soon as they arrive at the laboratory and the bags placed in numerical sequence in an electrically heated sample drier (maximum temperature 70°C).

After drying soil and sediment samples they are lightly pounded with a wooden block to break up aggregates of fine particles and are then passed through a 35 mesh stainless steel sieve. The coarse material is discarded and the minus 35 mesh fraction replaced in the original bag providing that this is undamaged and not excessively dirty.

Rock samples are exposed to the air until the outside surfaces are dry; only if abnormally wet are rocks placed in the sample drier. Rock samples are processed in such manner that a fully representative 1/2 g. sample can be obtained for analysis. The entire amount of each sample is passed through a jaw crusher and thus reduced to fragments of 2 mm. size or less. A minimum of 1 kg. is then passed through a pulverizer with plates set such that 95% of the product will pass through a 100 mesh

screen. Where samples are appreciably heavier than 2 kg the material is split after jaw crushing by means of a Jones splitter. After pulverizing the sample is mixed by rolling on paper and is then placed in a Kraft paper bag.

#### SAMPLE DIGESTION

Digestion tubes (100 x 16 mm) are marked at the 5 ml level with a diamond pencil. Tubes are cleaned with hot water and concentrated HCl. 0.5 g samples are weighed accurately, using a Fisher Dial-O-Gram balance, and placed in the appropriate tubes.

To each of the samples thus prepared are added 2 ml of an acid mixture comprising 15% nitric and 85% perchloric acids. Racks of tubes are then placed on an electrical hot plate, brought to a gentle boil ( $\frac{1}{2}$  hour) and digested for 4 $\frac{1}{2}$  hours. Samples unusually rich in organic material are first burned in a porcelain crucible heated by a bunsen burner before the acid mixture is added. Digestion is performed in a stainless steel fume hood.

After digestion tubes are removed from the hot plate and the volume is brought up to 5 ml with deionized water. The tubes are shaken to mix the solution and then centrifuged for one minute. The resulting clear upper layer is used for Cu, Mo, Pb, Zn, Ag, Fe, Mn, Ni and Co determination by a Perkin-Elmer 290B atomic absorption spectrophotometer. Analytical procedures are given on the following pages.



ANALYTICAL PROCEDURESSilver

1. Scope - This procedure covers a range of silver in the sample from less than .5 to 1000 ppm
2. Summary of Method - The sample is treated with nitric and perchloric acid mixture to oxidize organics and sulphides. The silver then is present as perchlorate in aqueous solution. The concentration is determined by atomic absorption spectrophotometer.
3. Interferences - Silver below 1 gamma/ml is not very stable in solution. Maintaining the solution in 20% perchloric prevents silver being absorbed on the glass container. Determination must be completed on the same day as the digestion.

Samples high in dissolved solids, especially calcium, cause high background absorbance. This background absorbance must be corrected using an adjacent Ag line.

Silver AA Settings P.E. 290

Lamp - Ag

Current 4 ma position 3

Slit 7 A

Wavelength 3281A Dial 287.4

Fuel - acetylene - flow - 14

Oxidant - air - flow - 14

Burner - techtron AB\_51 in line

Maximum Conc. 3 to 4x

### Calibration

1. Set 1 gamma/ml to read 40 equivalent to 20 gamma/gm
  - Factor  $\frac{1}{2}$  x meter reading
  - Check standards
  - 4, 10, 20, 40 ppm Ag in sample
2. Set 15 gamma/ml to 100 equivalent to 100 ppm
  - Check standards
  - 40, 100 ppm
  - Factor directly in ppm Ag
3. Rotate burner to maximum angle
  - Set 10.0 gamma/ml Ag to read 100
  - Check standards
  - 100, 200, 400, 1000 ppm Ag
  - Factor 10x scale reading
4. Samples higher than 1000 ppm should be re-analyzed by assay procedure
5. Background correction for sample reading between 1 to 5 ppm
  - Calibrate AA in step 1
  - Dial wavelength to 300 (peak)
  - Read the samples again
  - Subtract the background reading from the first reading

### Standards

1. 1000 gamma/ml Ag - 0.720 gm  $Ag_2SO_4$  dissolved in 20 mls  $Hx10_3$  and dilute to 500 mls
2. 100 gamma/ml Ag - 10 mls of above + 20 mls  $HClO_4$ , dilute to 100 mls

### 3. Recovery spiked standard

5 gamma/ml Ag - 5 mls 100 gamma/ml dilute to 100 mls with  
"mixed" acid

#### Working AA Standards

Pipette .2, .5, 1, 2, 5, 10 mls of 100 gamma/ml and 2, 5 mls 1.000 gamma/ml dilute to 100 mls with 20% HClO<sub>4</sub>. This equivalent to 4, 10, 20, 40, 100, 200, 400, and 1000 ppm Ag in the sample .50 gm diluted to 10 mls.

#### Recovery Standard

Pipette 2 mls of 5 gamma/ml Ag in mix acids into a sample and carry through the digestion. This should give a reading of 20 ppm Ag + original sample content.

Follow the general geochemical procedure for sample preparation and digestion.

For low assay Ag, the same procedure is used. Ag is then calculated in oz/ton.

$$1 \text{ ppm} = .0292 \text{ oz/ton}$$

conversion factor

$$\text{oz/ton} = .0292 \times \text{ppm Ag}$$

Zn Geochemical AA Setting

Lamp Zn

Current 8 #3 Slit 20A

Wave length 2133 Dial 84.9

Fuel - Acetylene Flow 14

Oxidant - Air Flow 14

Burner - P.E. short path 90°

## Range

0 - 20 gamma/ml Factor 4x - 0 to 400 ppm

0 - 50 gamma/ml Factor 10x - 0 to 1000 ppm

For Waters - Burner AB- 51 in line 1 gamma/ml read 100 to give 0  
to 1000 ppb

High Zn Burner Boling in line. Wavelength 3075. Dial 250 Slit 7A

Fuel 14 Air 14.5

0 to 1000 gamma/ml read 0 to 20 Factor 400 x

Pure Standard 10,000 gamma/ml

1 gm Zn dissolved, H<sub>2</sub>O, HCl, HNO<sub>3</sub>, HClO<sub>4</sub>, fumed to HClO<sub>4</sub> -  
make up to 100 mls H<sub>2</sub>O

1000, 100 gamma/ml and 100 ml by dilution in 20 % HClO<sub>4</sub>

0 to 200 gamma/ml Zn use combined Cu, Ni, Co, Pb, Zn standards

## Pipette

1, 2, 3, 5, 8, 10 mls of 10,000 gamma/ml - dilute to 100 mls  
with 20% HClO<sub>4</sub> to give

100, 200, 300, 500, 800, 1000 gamma/ml Zn for high standards

Co Geochemical AA Setting

Lamp - 5 multi element

Current 10 #4 Slit 2A

Wavelength 2407 Dial 133.1

Fuel - Acetylene Flow 14

Oxidant - Air Flow 14

Burner - AB 51 in line

Range

0 - 10 gamma/ml read 100 Factor 2 x reading to 200 ppm

0 - 20 gamma ml read 100 Factor 4 x reading to 400 ppm

Burner at maximum angle

0 - 100 gamma/ml read 100 Factor 20 x reading to 2000 ppm

0 - 200 gamma/ml read 100 Factor 40 x reading to 4000 ppm

Standards - 1000 gamma/ml

1.000 gm cobalt metal dissolved in HCl, HNO<sub>3</sub>, and fumed into  
HClO<sub>4</sub>, dilute to 1 liter

Pipette

1, 2, 10, 20 mls into 100 ml vol flasks diluted to mark  
with 20% HClO<sub>4</sub>

This gives

10, 20, 100, 200 gamma/ml Co

Mixed - combination standards of Cu, Ni, Co, Pb, Zn

of

1, 2, 5, 10, 20, 30, 50, 80, 100, 150, 200 gamma/ml are used  
for calibration

Mn Geochemical AA Setting

Lamp Multi element Ca, Ni, Co, Mn Cr

Current 10 #4 Slit 7A

Wave length 4030.8 Dial 425.2

Fuel - Acetylene Flow 14.0

Oxidant - Air Flow 14.0

Burner - P.E. short path (or AB 50)

## Range

0 - 100 gamma/ml Factor 20x - 0 to 2000 ppm

0 - 200 gamma/ml Factor 40x - 0 to 4000 ppm

## Burner 90°

0 - 1000 gamma/ml Factor 200x - 0 to 20,000 ppm

0 - 2000 gamma/ml Factor 400x - 0 to 40,000 ppm

## EDTA Extraction - use AB 51 in line

0 - 20 gamma/ml Factor 4x - 0 to 400 ppm

## Standards

Fisher 10,000 gamma/ml ( ml)

10x Dilution 1000 gamma/ml

## Pipette

.5, 1, 2, 3, 5, 3, 10, ml of 1000 gamma/ml

2, 3, 5, 3, 10, 15, 20 ml of 10,000 gamma/ml dilute to 100

mls with 20% HClO<sub>4</sub>. This gives

5, 10, 20, 30, 50, 80, 100, 200, 300, 500, 800, 1000, 1500,

2000 gamma/ml.

No Geochemical AA Setting

Lamp ASI, H/C No

Current 5 #5 Slit 7A

Wavelength 3133 Dial 260.2

Fuel - Acetylene Flow 12.0 to give 1" red feather

Oxidant - Nitrous oxide Flow 14.0

Burner - AB 50 in line

Caution read the operation using  $N_2O$  and acetylene flame at  
end of general AA procedure

Range

0 - 10 gamma/ml Factor 2x - 0 to 200 ppm

Rotate burner to max. angle

0 - 50 gamma/ml Factor 10 x 0 to 1000 ppm

0 - 100 gamma/ml Factor 20 x 0 to 2000 ppm

Standards 1000 gamma/ml

Dissolve .750 gms  $MoO_3$  (acid molybdic) with 20 mls  $H_2O$ , 6  
lumps NaOH, when all dissolved, add 20 mls HCl, dilute to 500 mls  
100 gamma/ml - 10 x dilution

Pipette

.2, .5, 1, 2, 3, 5, 8, 10 mls of 100 gamma/ml

2, 3, 5, 8, 10 mls of 1000 gamma/ml add 5 mls 10%  $AlCl_3$

and dilute to 100 mls with 20%  $HClO_4$

This gives

.2, .5, 1, 2, 3, 5, 8, 10, 20, 30, 50, 80, 100 gamma/ml Mo

Fe Geochemical AA Setting

Lamp - Fe

- Do not use multi element Fe

Current 10 #4 Slit 2A

Wavelength 3440.6 Dial 317.5

Fuel - Acetylene Flow 14.0

Oxidant - Air Flow 14.0

Burner - PE Short Path 90°

Range

0 - 5000 gamma/ml 0.1 x % - 0 to 10.0%

0 - 10,000 gamma/ml 0.2 x % - 0 to 20.0%

Higher Fe - 10 x dilution

Standards 10,000 gamma/mlWeigh 5.000 gms iron wires, into beaker, add H<sub>2</sub>O, HCl, HNO<sub>3</sub>,HClO<sub>4</sub>, heat to HClO<sub>4</sub> fumes. Add HClO<sub>4</sub> to 100 mls + 100 mlsH<sub>2</sub>O, warm, dilute to 500 mls

Pipette

1, 5, 10, 20, 30, 50, 80 mls 10,000 gamma/ml dilute to 100  
mls with 20% HClO<sub>4</sub> to give100, 500, 1000, 2000, 3000, 5000, 8000 gamma/ml to be  
equivalent to .2, 1.0, 2.0, 4.0, 6.0, 10.0%, 16.0% Fe in geochem  
sample



Ni Geochemical AA Setting

Lamp P.E. H/C. Ni or multi element Cu, Ni, Co, Mn, Cr

Current 10 #4, Slit 2A

Wave length 3415 Dial 312.5

Fule - Acetylene Flow 14.0

Oxidant - Air Flow 14.0

Burner AB 51 in line

Range

0 - 20 gamma/ml Factor 4x - 0 - 400 ppm

0 - 100 gamma/ml Factor 20x - 0 - 2000 gamma

45° 0 - 200 gamma/ml Factor 40x - 0 - 4000 ppm

0 - 500 gamma/ml Factor 100x - 0 - 10,000 ppm

Ni in waters and very low ranges

Wave length 2320 Dial 113

Range 0 - 5 gamma/ml Factor 1x - 0 - 100 ppm

Standards 10,000 gamma/ml

1.000 gm pure Ni metal dissolved in HCl, HNO<sub>3</sub>, HClO<sub>4</sub> to perchloric fumes, dilute to 100 ml H<sub>2</sub>O

1000 gamma/ml and 100 gamma/ml Successive 10x dilutions in 20% HC

1, 2, 5, 8, 10 mls of 100 gamma/ml

2, 5, 8, 10 mls 1000 gamma/ml

2, 5, 8, 10 mls 10,000 gamma/ml - dilute to 100 mls in 20%

HClO<sub>4</sub>. This gives

1, 2, 5, 8, 10, 20, 50, 80, 100, 200, 500, 800, 1000 gam /ml

Combined Standards - Cu, Ni, Co, Pb, Zn is used as a working standard

Cu Geochemical AA Setting

Lamp Sample Cu or

5 multi element

Current 10 for multi element #4 Slit 7A

4 for single #3 Slit 7A

Wavelength 3247 Dial 280

Burner Techtron AB 51 (For Cu in natural waters)

P.E. Short Path (For geochem)

Fuel Acetylene Flow 14

Oxidant Air Flow 14

Range

0 - 5 gamma/ml Factor 1x to 100 ppm (for low Cu)

0 - 20 gamma/ml Factor 4x to 400 ppm

Burner 90°

0 - 200 gamma/ml Factor 40x to 4000 ppm

Wavelength 2492 Dial 147

Burner in line

Range

0 - 1000 gamma/ml Factor 200x to 20,000 ppm

0 - 2000 gamma/ml Factor 400x to 40,000 ppm

Higher range than 40,000 ppm requires 10x dilution

Standards

10,000 gamma/ml

1.000 gm metal powder, H<sub>2</sub>O, HCl, HNO<sub>3</sub> until dissolved, add

HClO<sub>4</sub>, fume dilute to 100 mls

1000 gamma/ml 10x dilution above in 20% HClO<sub>4</sub>

2000 gamma/ml 20 mls 10,000 gamma/ml - dilute to 100 mls in  
20% HClO<sub>4</sub>

100 gamma/ml 10x dilution 1000 gamma/ml dilute to 100 mls in  
20% HClO<sub>4</sub>

200 gamma/ml 10x dilution 2000 gamma/ml dilute to 100 mls in  
20% HClO<sub>4</sub>

#### Pipette

1, 2, 3, 5, 8, 10 mls 100 gamma/ml - dilute to 100 mls with  
20% HClO<sub>4</sub> to give 1, 2, 3, 5, 8, 10 gamma/ml

Combined standards Cu, Ni, Co, Pb, Zn

1, 2, 5, 10, 20, 30, 50, 80, 100, 150, 200 gamma/ml

Pb Geochemical AA Setting

Lamp ASI H/c Pb

Current 5 ma Slit 7A

Wave length 2833 Dial 203

Fuel - acetylene Flow 14

Oxidant - air Flow 14

Burner AB 51 in line

## Range

0 - 20 gamma/ml to read 0 to 80. Factor 5x 0 to 500 ppm

0 - 200 gamma/ml to read 0 to 80. Factor 50x 0 to 5000 ppm

Standards - 10,000 gamma/ml

1.000 pure metal, dissolved in HNO<sub>3</sub>, fumed to HClO<sub>4</sub> make up to 100 mls in 20% HClO<sub>4</sub>

1000 gamma/ml and 100 gamma/ml Successive 10x dilutions in 20% HClO<sub>4</sub>

## Pipette

1, 2, 5, 8, 10 mls 100 gamma/ml

2, 5, 8, 10, 20 mls 1000 gamma/ml dilute to 100 mls in 20%

HClO<sub>4</sub> this gives

1, 2, 5, 8, 10, 20, 50, 80, 100, 200 gamma/ml

Combined Standards Cu, Ni, Co, Pb, Zn, are used as working standards

W in Soils and Silts

## Reagents and apparatus

Test tubes - pyrex disposable

Test tubes - screw cap

Bunsen Burner

Flux - 5 parts  $\text{Na}_2\text{CO}_3$

4 parts  $\text{NaCl}$

1 part  $\text{KNO}_3$  pulverized to -80 mesh

7%  $\text{SnCl}_2$  in 70%  $\text{HCl}$

20%  $\text{KSCN}$  in  $\text{H}_2\text{O}$

Extractant - 1 part tri-n-butyl phosphate

9 parts carbon tetrachloride

## Standards

1000 gamma/ml W

.18 gms  $\text{Na}_2\text{WO}_4 \cdot 2\text{H}_2\text{O}$  dissolved in  $\text{H}_2\text{O}$ , make up to 100 mls

100 gamma/ml, 10 gamma/ml by dilution

## Standardization

Pipette .5, 1, 2, 3, 5, 8, 10 ml of 10 gamma/ml

and 1.5, 2 mls of 100 gamma/ml - dilute to 10 mls

continue from step #4

Artificial colors - Nabob pure Lemon Extract, dilute with 1:1 ethanol and water to match. Tightly seal these for permanent standards

Procedure

1. Weigh 1.0 gram sample, add 2 gm flux, mix

2. Sinter in rotary for 2 to 3 minutes (Flux dull red for one minute)
3. Cool, add 10 mls  $H_2O$ , heat in sand bath to boiling, cool, let sit overnight
4. Stir, crush, and mix. Let settle
5. Take 2 ml aliquot into screw cap test tube
6. Add 7 mls  $SnCl_2$ , heat in hot water bath for 5 minutes ( $80^\circ C$ )
7. Cool to less than  $15^\circ C$
8. Add 1 ml 20% KSCN, mix (if lemon yellow; compare color standard 10x)
9. Add  $\frac{1}{2}$  ml extractant, cap, shake vigorously 1 minute
10. Compare color

Molybdenum in Water Samples

1. Transfer 50 mls to 125 separatory funnel
2. Add 5 ml .2% ferric chloride in conc HCl
3. Add 5 mls of mixed KSCN and SnCl<sub>2</sub>
4. Add 1.2 mls isopropyl ether, shake for 1 minute, and allow phases to separate
5. Drain off water
6. Compare the color of extractant

Standardization

Pipette 0, .2, .5, 1, 2, 3, 4, 5, mls of 1 gamma/ml and 1, 1.5, 2, mls of 10 gamma/ml dilute to 50 mls with demineralized H<sub>2</sub>O, continue step #2.

This equivalent to

1, 4, 10, 20, 40, 60, 80, 100, 200, 300, 400 ppb Mo

Artificial color - Nabob orange extract dilute with 1:1 H<sub>2</sub>O to methanol to match. Seal tightly

SnCl<sub>2</sub> - 15% in 15% HCl

300 gm SnCl<sub>2</sub> · 2H<sub>2</sub>O + 300 mls HCl, until SnCl<sub>2</sub> dissolved  
dilute to 2 liters

KSCN - 5% in H<sub>2</sub>O

Mixed SnCl<sub>2</sub> - KSCN

3 parts SnCl<sub>2</sub> to 2 parts KSCN

Water Samples Run for AA

1. Cu - 2 gamma/ml reads 50 scale therefore 1 unit = 25 ppb
2. Zn - 1 gamma/ml reads full scale therefore 1 unit = 10 ppb
3. Ni - 2.5 gamma/ml reads 50 scale therefore 1 unit = 50 ppb

Burner: long slot techtron burner in line

xxi

Sulphate in Natural Waters

1. Pipette 0.5 ml sulphate reagent mix into a colorimetric tube
2. Add 5 ml water sample and mix
3. Read at 343 *mμ* against a demineralized water blank
4. Read again at 400 *mμ* and subtract from sulphate reading
5. Calculate ppm sulphate from the graph

Reagent

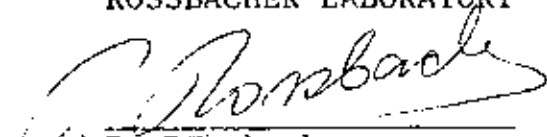
Dissolve 54 grams red mercuric oxide (J.T. Baker 2620- Can Lab) in 185 ml 70% perchloric acid and 20 ml H<sub>2</sub>O, shake for one hour. Add 46.3 grams ferric perchlorate [ Fe(ClO<sub>4</sub>)<sub>3</sub> · 6H<sub>2</sub>O ] (GFS 39) and 47 grams aluminum perchlorate [ Al (ClO<sub>4</sub>)<sub>3</sub> · 3H<sub>2</sub>O ] (GFS 2) Add 400 ml water to dissolve, let settle overnight, decant into bottle and make to 1 liter

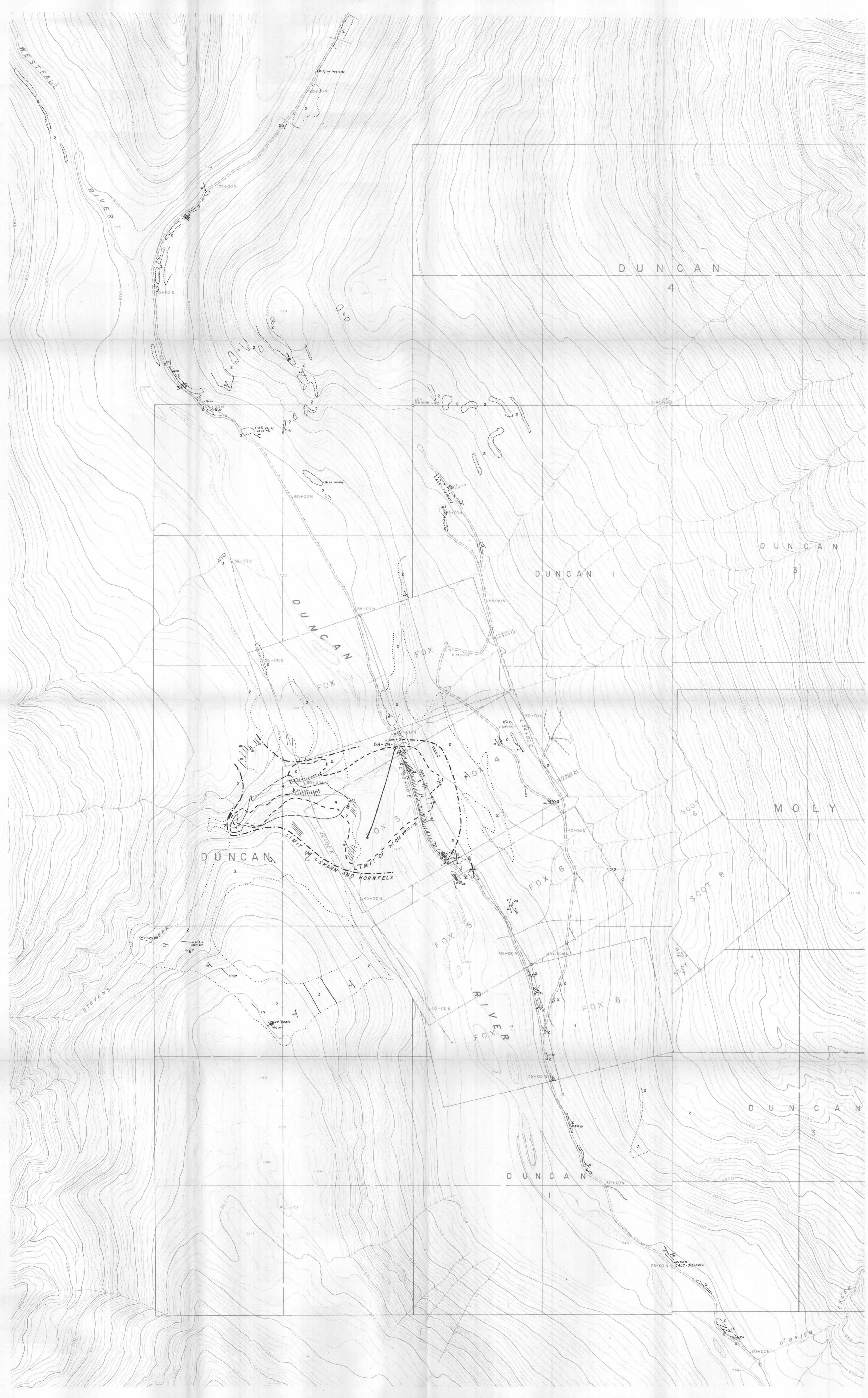


## pH MEASUREMENTS

Soil and drainage sediment samples are dispersed with water in a glass beaker to a pasty consistency. Demineralized water is used for this purpose as it has a low buffer capacity and thus does not influence the pH of the sample. Measurement is made with a Fisher Acument pH meter. Electrodes are stored in buffer overnight. A 30 minute warm up time is allowed for the instrument each morning. A 10 ml aliquot is taken from water samples for pH measurement.

ROSSBACHER LABORATORY

  
P. Rossbacher



**LEGEND**

- MESOZOIC (?)**
- 4 Leucocratic biotite quartz monzonite.
  - 3 Foliated diorite.
- PROTEROZOIC TO PALEOZOIC**
- LOWER CAMBRIAN**
- MARSH ADAMS FORMATION**
- 2 Phyllite, biotite schist, quartzite and hornfels.
  - 2a Epidote garnet skarn.
- HADRYNIAN (?)**
- HORSETHIEF CREEK GROUP**
- 1 Limestone and calc-silicate.

**SYMBOLS**

- Outcrop
- ..... Limit of outcrop area.
- Geological contact (defined, approximate).
- Bedding attitude.
- X — Fold axis (anticline, overturned anticline, syncline).
- Schistosity.
- Quartz veins, attitude of quartz veins (vertical, inclined).
- Trench.
- Legal corner post, claim boundary.
- Claim unit boundary.
- Claim post, claim location line.
- Claim boundary.
- Road.
- Stream.
- Topographic contour (contour interval 10 metres).

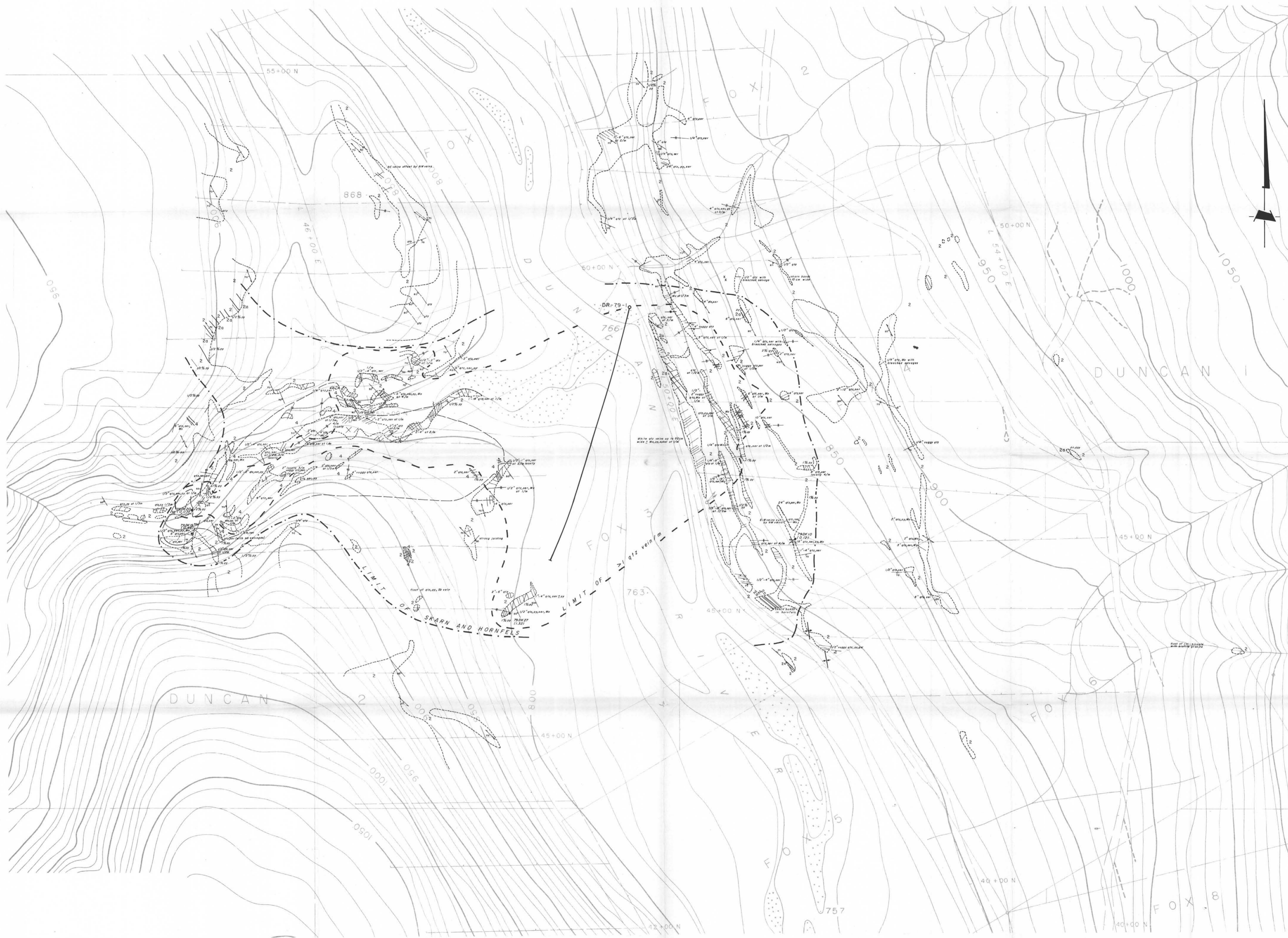
MINERAL RESOURCES BRANCH  
ASSESSMENT REPORT  
**7695**  
NO.

AMAX POTASH LIMITED  
DUNCAN RIVER PROPERTY  
SLOCAN MINING DIVISION — BRITISH COLUMBIA

**GEOLOGICAL MAP**

SCALE 1:5,000  
800 0 800 METRES  
800 0 800 FEET

To accompany 1979 Assessment Report by: B. W. Kyba, J. L. LeBel and C. J. Hodgson  
Vancouver



S Y M B O L S

**LEGEND**

- MESOZOIC (?)**
- 4 Leucocratic biotite quartz monzonite.
  - 3 Foliated diorite.
- PROTEROZOIC TO PALEOZOIC**
- LOWER CAMBRIAN**
- MARSH ADAMS FORMATION**
- 2 Phyllite, biotite schist, quartzite and hornfels.
  - 2a Epidote garnet skarn.
- HADRYNIAN (?)**
- HORSETHIEF CREEK GROUP**
- 1 Limestone and calc-silicate.

- Trench.
- Outcrop boundary.
- Geological contact (defined, approximate).
- Fault, showing dip.
- Bedding attitude.
- Major fold axis (anticline, syncline)
- Jointing attitude (inclined, vertical)
- Schistosity attitude (inclined, vertical)
- Quartz veins; quartz vein attitude (inclined, vertical).
- Chip sample location, sample number (assay values in % MoS<sub>2</sub>).

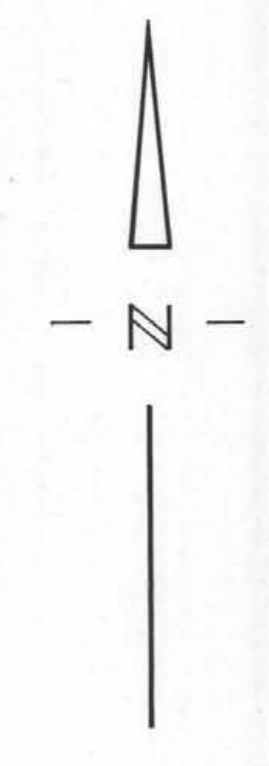
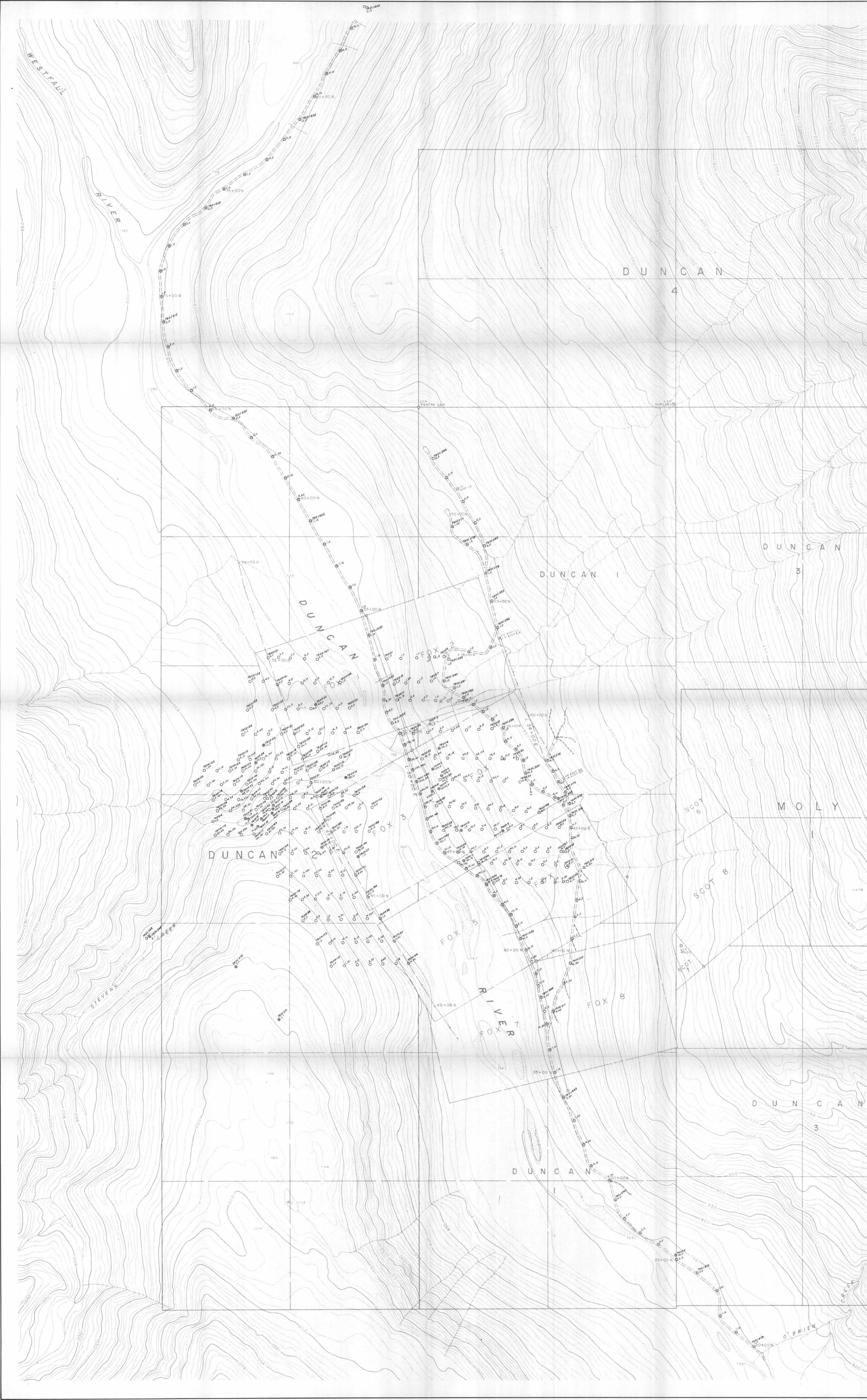
- Collar location and horizontal projection of diamond drill hole.
- Flagged grid line.
- Diamond drill hole collar location (Noranda).
- Claim boundary (M.G.S.)
- Claim unit boundary.
- Claim post, claim location line.
- Claim boundary.
- Road.
- Stream.
- Topographic contour (contour interval 10 metres).

MINERAL RESOURCES BRANCH  
ASSESSMENT REPORT  
**7695**  
NO.

AMAX POTASH LIMITED  
**DUNCAN RIVER PROPERTY**  
SLOCAN MINING DIVISION — BRITISH COLUMBIA  
**GEOLOGICAL MAP**

SCALE 1:2,000

To accompany 1979 Assessment Report by: B.W. Kyba, J.L. ...

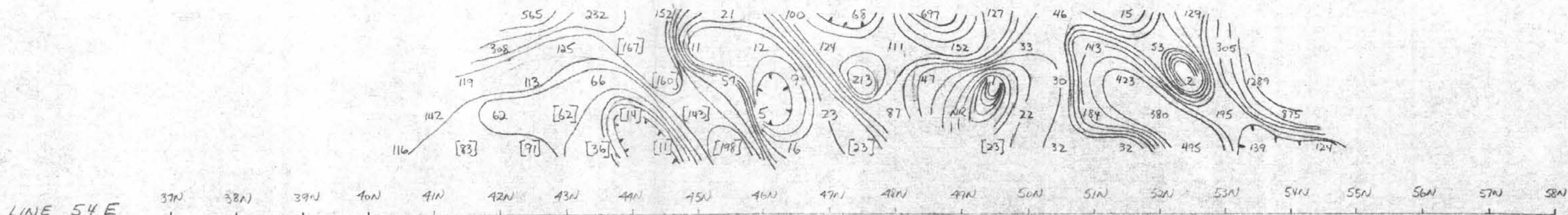


**S Y M B O L S**

- Soil
- Silt
- Rock chip
- Legal corner post, claim boundary.
- - - Claim unit boundary.
- · - · - Claim post, claim location line.
- - - Claim boundary.
- == Road.
- ~ Stream.
- Topographic contour (contour interval 10 metres).

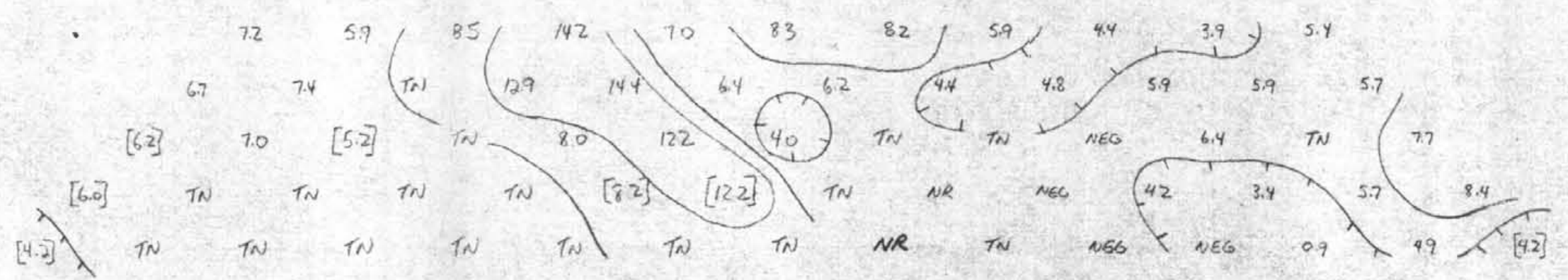
MINERAL RESOURCES BRANCH  
ASSESSMENT REPORT  
**7695**  
NO.

AMAX POTASH LIMITED  
DUNCAN RIVER PROPERTY  
SLOCAN MINING DIVISION — BRITISH COLUMBIA  
**GEOCHEMICAL MAP** C. J. Hodgson  
SCALE 1:5,000  
METRES  
FEET



eθ

AMAX MINERALS EXPLORATION  
 H.P. I.P. SURVEY DIPOLE DIPOLE ARRAY  
 SCALE: 2CM = 100M SPREAD: 100M  
 DUNCAN RIVER B.C  
 FREQ: 0.35 HZ  
 LINE 54E  
 DATE: AUG 16, 1979  
 OPERATOR: J. MACNEIL

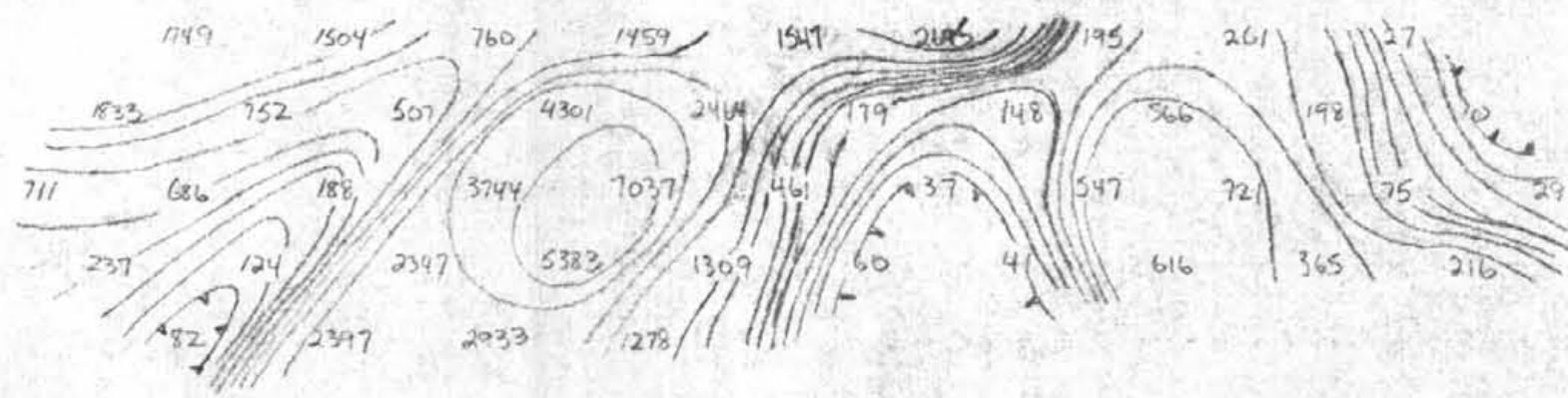


F.E

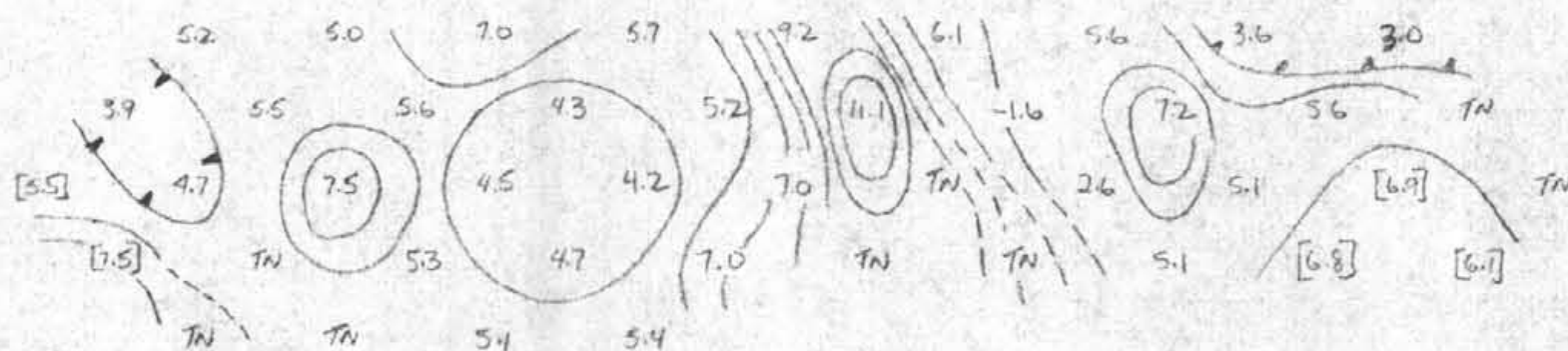
1:5,000

7695

J.S. Label  
 Nov 28/79 Fig 6a



LINE 46E



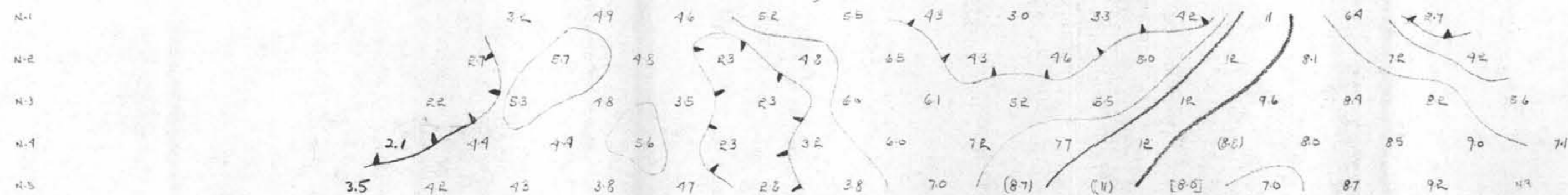
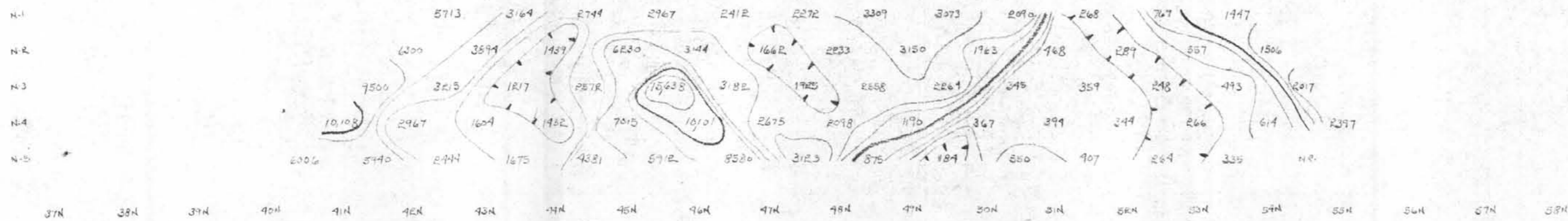
AMAX MINERALS EXPLORATION  
 DUNCAN RIVER  
 HP/IP SURVEY, DIPOLE DIPOLE  
 SCALE: 2CM=100M, SPREAD 100M  
 FREQ: 0.3 + 50 HZ  
 LINE: 46E  
 DATE: AUG. 16, 1979  
 OPERATOR: J. MACNEIL

1:5,000

7695

J. L. Label Fig 66  
 Nov 28/79

LINE 50E



C.B.

F.E.

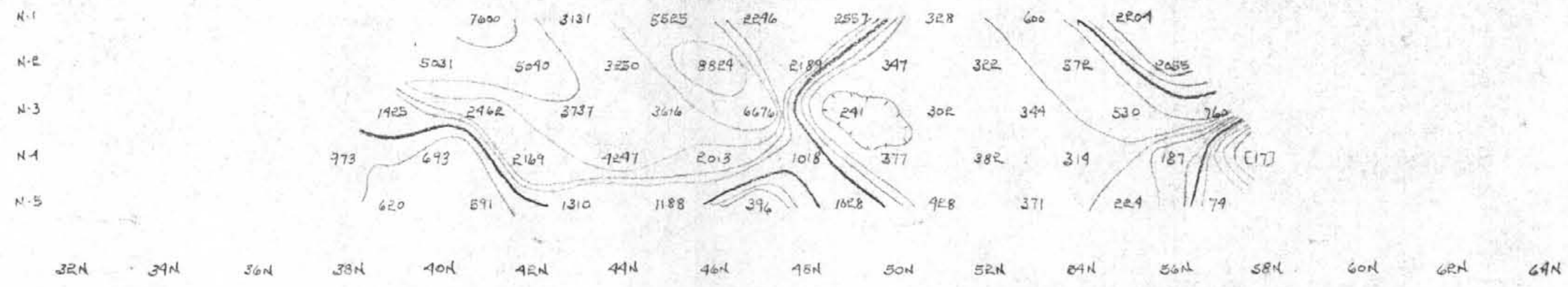
AMAX MINERALS EXPLORATION  
 H.P. I.P. SURVEY DIPOLE DIPOLE  
 SCALE: 2CM=100M SPREAD: 100M  
 DUNCAN RIVER B.C.  
 FREQ: 0.345HZ.  
 LINE: B.L. (LINE 50E)  
 DATE: AUG 17, 1979  
 OPERATOR: J. MAC NEIL

1:5,000

7695

J. S. Lebel  
Nov 28/79

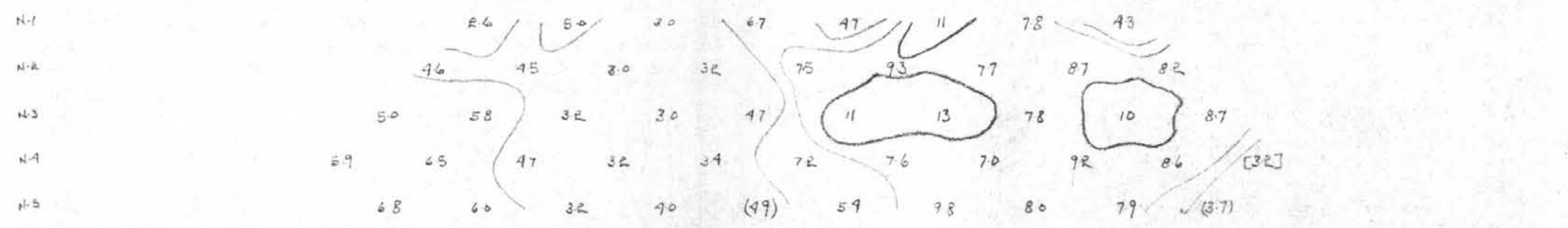
Fig 6C



C<sub>0</sub>

AMAX MINERALS EXPLORATION  
 DUNCAN RIVER B.C.  
 H.P. I.P. SURVEY  $\square$  POLE  $\square$  POLE  
 SCALE: 2CM = 200M SPREAD: 200M  
 FREQ: 0.345HZ.  
 LINE: B.L. (LINE 50E)  
 DATE: AUG. 18, 1979  
 OPERATOR: J. MAC NEIL

LINE 50E



F.E.

1:10,000

7695

J. S. Lebel Fig 6d  
 Nov 28/79