MINING RECORDER

1978 Geochemical Assessment Report

TITLE	Anvil Creek Property LU 1-100 Claims
AUTHOR	R.G. Kidlark
DATE	October, 1978
COMMODITY	Pb-Zn
LOCATION	Anvil Range, Yukon Territory Whitehorse Mining District 62 30'N Latitude 133 50'W Longitude 105 K 5 and 12
WORK PERIOD	June 11 - 23, 1978 July 16 - 20, 1978

AMAX VANCOUVER OFFICE

090389

TABLE OF CONTENTS

APPENDICES

ILLUSTRATIONS

SUMMARY

The LU 1-100 claims were staked as a contiguous block in the summer of 1977 to cover a geological environment similar to that hosting the Anvil orebodies.

The property is situated 24 miles northwest of Faro, Yukon and is accessible by helicopter.

Work from late May to mid-August consisted of geological mapping, geochemistry, gravity, Max-Min and magnetic surveys. This report deals only with the geochemical survey of the LU claims. The geology is presented in a separate 1978 geological assessment report, Anvil Creek Property, LU 1-100 claims; by A.C. Hitchins.

Because soil geochemistry has been found to be effective in outlining Pb-Zn deposits in the Anvil area a geochemical survey consisting of rock, soil and silt sampling was carried out on the LU claims as part of an exploration program. A number of randomly distributed low order anomalies were located on the property.

CONCLUSIONS

No significant Pb-Zn soil, silt or rock chip geochemical anomalies appear to exist on the LU property.

INTRODUCTION

Physiography

The topography of the LU claims rises from creek bottoms at 1000 m elevation to a relatively flat saddle near the centre of the property up to a 1870 m peak at the north-west end.

Roughly half of the property is above tree-line and is sparsely covered by alpine grasses or buckbrush. The steep valley slopes are covered by stunted spruce and pine.

Streams are relatively youthful, moderately to fast flowing and vary from hillside seepages to creeks three feet in width.

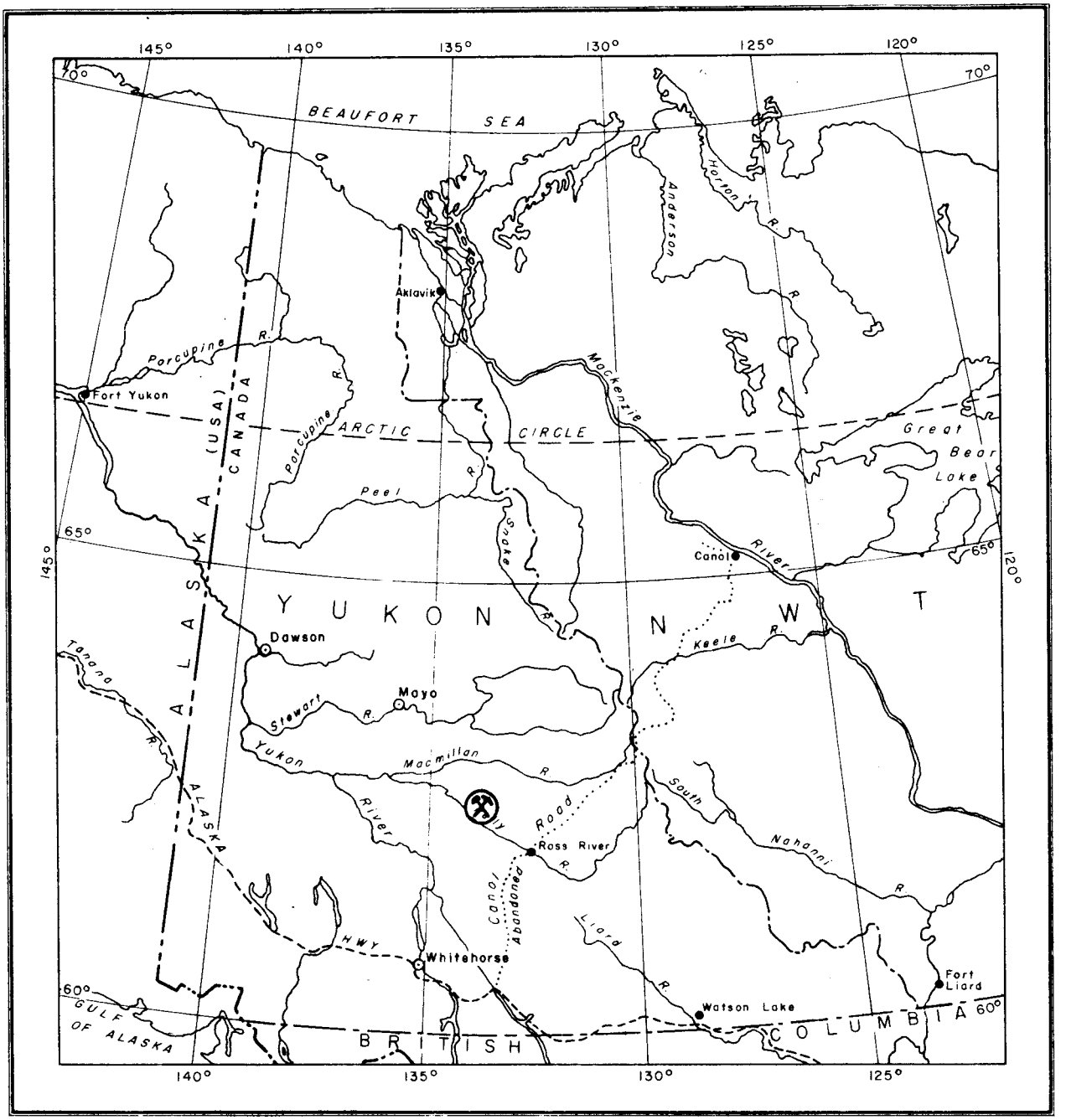
Immature soil profiles reflect the sub-arctic climate and glaciated history of the region.

Previous Work

Several companies including Cyprus Anvil and Welcome North have worked in the vicinity of the LU claims to the extent of drill testing geophysical anomalies, mainly to the south of the LU group in the Anvil Creek valley. No old claim posts were found on the LU claims.

Templeman-Kluit mapped the area from the LU claims south-east through the Anvil area deposits to Ross River for the G.S.C., in 1967-1968.

AMAX interest in the area began in 1975 with regional mapping and silt sampling. The main block of LU claims were staked in June 1977 to cover Lower Cambrian biotite schists and graphitic units considered favourable for Anvil-type mineralization. Additional claims were staked later in the season to include anomalies discovered in the course of an AEM survey carried out in 1977.



N. T. S. Ref. 105 K 5 and 12

AMAX POTASH LIMITED

ANVIL CREEK PROPERTY
LU CLAIMS

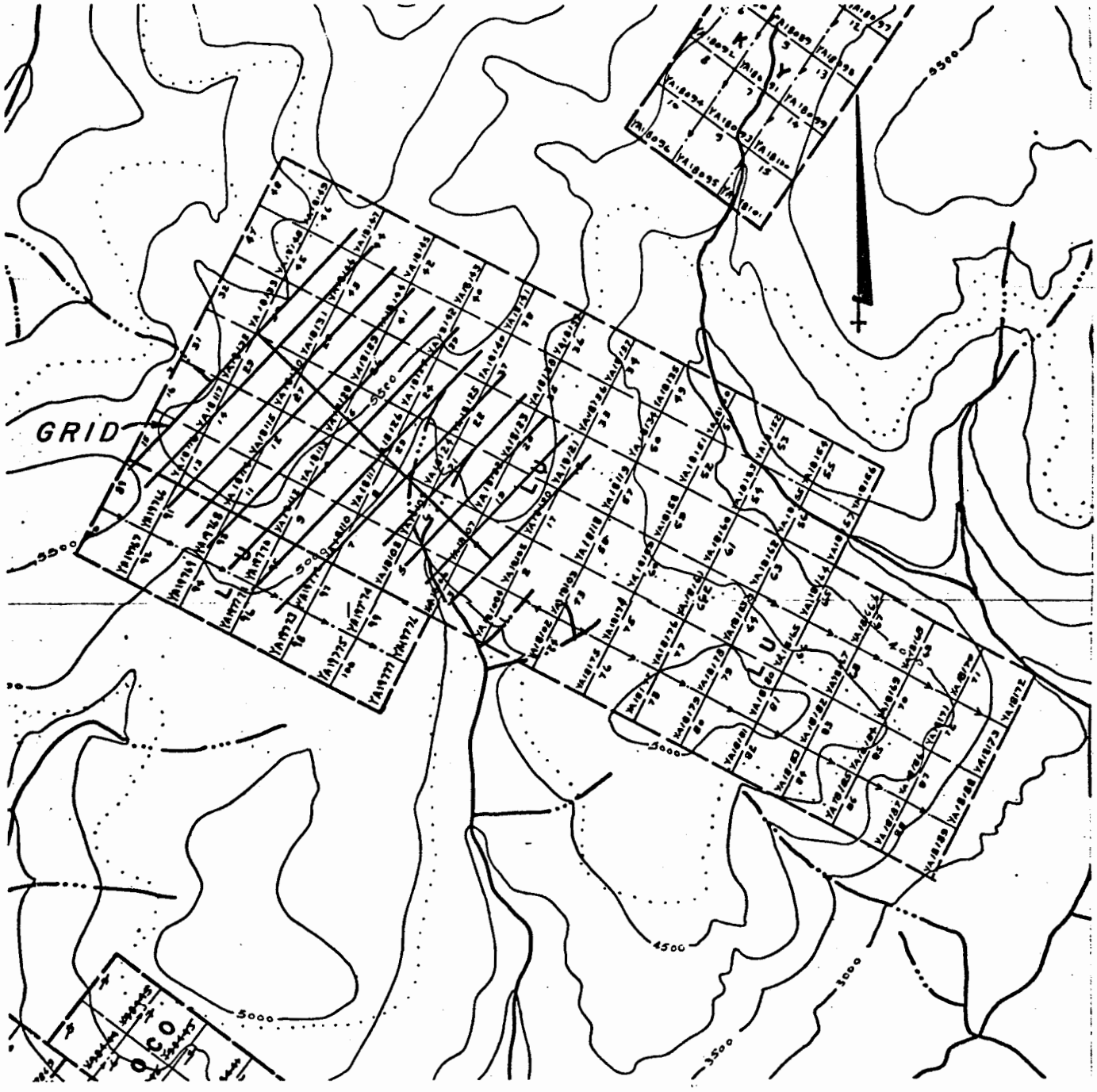
WHITEHORSE MINING DISTRICT — YUKON TERRITORY

LOCATION MAP

SCALE 1" = 120 MILES

Vancouver - *H.P.*

FIG. 1



AMAX POTASH LIMITED

ANVIL CREEK PROPERTY
LU CLAIMS

WHITEHORSE MINING DISTRICT — YUKON TERRITORY

(1) 18107
19774

CLAIM MAP

SCALE 1200 0 1200 METRES
4000 0 4000 FEET
1 : 50,000

Vancouver — H.P.

N. T. S. Ref. 105 K 5 and 12

FIG. 2

REGIONAL GEOCHEMISTRY

The following discussion is a summary of previous work by Leary et al (1977) and Morton (1970) on orientation surveys carried out by AMAX and others over major deposits in the Anvil area.

Despite the presence of permafrost and glacial overburden the trace element content of bedrock is reflected in the soil. However, soil horizons are often discontinuous leading to varying degrees of metal enrichment. At Vangorda local clay layers within the overburden mask metal ion migration from the underlying massive sulphide body to produce geochemical highs separated by areas of background values. In spite of these problems soil sampling over the Anvil, Vangorda and Swim deposits reveal secondary Pb, Zn, Mo and Ba haloes above the ore zones. In general the Zn anomalies appear to be the most extensive and uniform whereas Pb anomalies are more erratic.

At Vangorda erratic spot anomalies of 2 to 3 times background occur in low swampy areas and are not associated with underlying sulphide mineralization. Only homogeneous areas with anomalies greater than 2 to 3 times background are considered significant.

Soils overlying magnetic greenstone are enriched in nickel and copper while soils overlying granite are slightly enriched in tin.

Soil development in the region is immature and consists of the following zones:

A) Humus - several inches thick
B) Volcanic Ash - unconsolidated, up to 6" thick
C) Glacial - gravel, sand and clay to bedrock.

Orientation studies have concluded that the C soil zone is the most reliable zone to sample.

From previous AMAX surveys threshold values for soils in the Selwyn Basin are as follows:

Element Analyzed	Anomalous Threshold	
Pb	≥ 50 ppm	
Zn	≥150	
Ba	≥700	
Ag	≥1.0	
Cu	≥ 80	
Mo	≥ 10	
Ni	≥100	
Co	≥ 70	
Mn	≥600	
Fe	≥5.0%	{- Upper Threshold
W	≥ 10	

Cyprus Anvil has noted that rock chip samples from the ore-bearing graphitic unit, collected from outside the ore zone, are geochemically anomalous (whereas rock chips collected from other graphitic horizons are generally not).

PROPERTY GEOCHEMICAL SURVEY

Introduction

The objective of the present survey was to delineate areas of bedrock mineralization and expand the geochemical data base for the Anvil Creek area.

Soil samples were taken at 200 foot intervals along a number of traverse lines run perpendicular to the geological strike. Grub hoes were utilized to collect samples from the top of the C zone; just below the ash layer.

Silt samples were taken wherever traverses intersected streams.

Rock chip samples were collected from every graphite-bearing outcrop encountered.

Soil, silt and rock chip samples were analyzed by Rossbacher Laboratory for Cu,Ni,Co,Mn,Fe,Pb,Zn,Ag, and Mo.

A total of 801 samples consisting of 695 soil, 51 silt, and 55 rock chip samples were collected.

Environment

Soil development on the property closely resembles the general regional profile. Gleysols are prevalent over most of the property except on steep valley slopes where fairly clean sands are the dominant soil type. Slumping down valley slopes results in an increase of overburden thickness towards the valley bottom.

Wooded northern slopes locally have soil profiles completely indurated by permafrost, in which case, soil samples cannot be collected from the C zone and humic samples are accepted.

Results

Sample sites and corresponding values for Pb, Zn, Ag are plotted on 1;10,000 scale maps (Figure 3). Data for the remaining elements is presented in Appendix I. The range of values for each element is presented below.

Soil Samples

Element Analyzed	Low (ppm)	High (ppm)
Mo	1	8
Cu	2	124
Ni	4	440
Co	2	76
Mn	60	3400
Fe	0.4%	5.7%
Ag	0.2	3.0
Zn	6	246
Pb	2	160

Silt Samples - the range of geochemical values is as follows:

Mo	1	6
Cu	16	70
Ni	12	124
Co	10	38
Mn	100	3200
Fe	1.1%	>10.0%
Ag	0.4	6.0
Zn	54	880
Pb	12	120

Rock Chip Samples - the range of values are presented below:

Mo	1	52
Cu	12	248
Ni	38	1280
Co	32	104
Mn	80	1580
Fe	1.1%	8.6%
Ag	0.2	1.8
Zn	22	200
Pb	18	110

DISCUSSION OF RESULTS

Threshold values determined from previous AMAX soil surveys (see page 4), were used in the present survey.

Soil Samples

A few scattered low order lead-zinc anomalies exist on the property. They are close to threshold value and appear to have no particular lithologic correlation.

Silt Samples

A value of 880 ppm Zn adjacent to calc-silicate and graphitic rock units occurs at the northwestern corner of the property. Soil anomalies in this area are just above threshold values.

Two other anomalies of Pb (120 ppm), Zn (300 ppm), Ag (6.0 ppm) and Pb (48 ppm), Zn (180 ppm), Ag (1.4 ppm) occur at the bottom of a stream valley along the central northern part of the property (Figure 3). The stream is part of the drainage system of a geochemically anomalous lake situated on the former KY claims;northeast of the LU property.

Rock Chip Samples

Rock chips from graphitic units on the property are only slighly anomalous in Pb and Zn.

Rock chips with high Ni values are associated with bands of amphibolite at the southeastern end of the property.

REFERENCES

HITCHINS, A.C., 1978: Geological report on the Anvil Creek Property, LU 1-100 Claims. AMAX Company report.

LEARY, G.M., HITCHINS, A.C., LITTLE, J.G., 1977: 1976 Anvil Range Prospecting Program, AMAX Company report.

MORTON, R.C., 1970: Geochemistry of bedrock and soils in the vicinity of the Anvil Mine, Yukon Territory. MSc. thesis submitted to the University of British Columbia, May 1973.

TEMPLEMAN-KLUIT, D.J., 1972: Geology and Origin of the Faro, Vangorda, and Swim Concordant Zn-Pb Deposits, Central Yukon Terr., G.S.C. Bull. 208.

R.G. Kidlark

APPENDIX III

GEOCHEMICAL ANALYSES

and

Procedures for Collection and Processing of Geochemical Samples

Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

2225 S. SPRINGER AVE.,
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TELEPHONE: 299-6910
AREA CODE: 604

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 8043
INVOICE NO. 8056

TO: Amax Minerals Exploration Vancouver BC

PROJECT 791, L.V. claims

DATE ANALYSED JUNE 178

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Ag	Zn	Pb			No.
01	8FTL 1		1	52	58	20	380	3.0	L0	220	42			01
02	2		1	26	38	16	440	2.4	.6	150	30			02
03	3		1	34	42	18	360	2.5	.6	132	30			03
04	T4		32	22	58	54	120	1.2	.4	30	54			04
05	T5		41	38	102	98	180	2.4	.6	72	54			05
06	L6		1	30	50	18	520	3.0	.6	124	28			06
07	7		2	16	36	16	920	2.5	.4	152	24			07
08	8		1	20	46	14	520	2.3	.4	140	28			08
09	T9		1	46	76	42	240	2.9	L8	148	74			09
10	L10		1	36	50	24	520	3.1	.6	104	32			10
11	11		1	30	48	26	520	3.1	.4	112	26			11
12	12		2	28	46	16	360	2.5	.6	120	26			12
13	13		1	28	44	22	420	2.8	.4	112	24			13
14	T14		9	38	76	56	180	2.4	.6	50	26			14
15	L15		1	30	48	20	380	2.5	.4	118	26			15
16	16		1	22	38	14	320	2.4	.4	120	22			16
17	T17		8	44	78	52	400	3.1	L4	200	44			17
18	T18		6	42	66	50	200	2.9	.8	110	32			18
19	T19		4	38	38	36	440	4.1	.6	100	32			19
20	T20		25	34	48	50	120	1.9	.4	34	18			20
21														21
22														22
23														23
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Certified by F. Rossbach

AMAX

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 8055

TO: Amax Minerals Exploration
535 Thurlow St Van. B.C.

INVOICE NO.

PROJECT 791

DATE ANALYSED July 17

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Ag	Zn	Pb			No.
01	78 FTL40		1	20	28	16	380	2.4	.2	104	20			01
02	41		1	16	20	14	400	2.1	.2	160	18			02
03	42		1	16	20	14	400	2.2	.2	84	18			03
04	43		4	52	32	32	2900	5.4	1.8	160	40			04
05	T44		26	28	64	56	100	0.8	.2	24	36			05
06	45		5	24	64	52	500	5.6	.2	120	32			06
07	46		9	32	64	52	340	4.7	.4	76	28			07
08	L47		2	14	18	14	340	2.5	.4	84	24			08
09	48		2	16	20	18	460	2.6	.4	120	32			09
10	49		1	22	20	14	240	1.8	3.8	148	92			10
11	T50		1	110	1280	104	640	8.6	.6	72	64			11
12	L51		1	24	48	20	280	2.3	.2	84	24			12
13	T52		10	40	72	30	260	3.2	.4	76	32			13
14	T53		12	24	52	48	120	3.8	.2	124	24			14
15	L54		2	32	40	20	840	2.3	.2	124	20			15
16	T55		14	44	96	78	240	3.0	.2	84	24			16
17	56		3	52	72	40	160	3.1	.4	84	36			17
18	L57		2	36	48	34	400	3.8	.2	128	24			18
19	58		1	36	44	38	360	2.9	.2	112	20			19
20	59		1	30	56	22	320	3.0	.4	116	20			20
21	T60		3	64	56	36	200	2.9	.6	124	24			21
22	61		30	24	52	52	120	2.6	.4	104	16			22
23	62		4	48	68	44	120	1.6	.2	24	36			23
24	L63		2	32	42	22	340	2.6	.2	108	24			24
25	64		2	36	48	26	320	3.2	.2	148	24			25
26	T65		8	16	32	32	260	2.8	.2	84	24			26
27	69		36	24	78	78	120	1.5	.2	160	16			27
28	70		50	14	72	70	120	1.4	.2	22	22			28
29	71		28	8	44	40	80	1.0	.2	16	16			29
30	72		38	30	52	52	120	2.0	.2	52	20			30
31														31
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38														38
39														39
40														40

CLAIMS

Certified by P. Rossbacher

Rossbacher Laboratory

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JUL 5 1978
VANCOUVER OFFICE

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 8043
INVOICE NO. 8056

TO: Amax Minerals Exploration Vancouver, BC

PROJECT 791 - LV Claims ORDER # 2525 DATE ANALYSED June 1/78

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Ag	Zn	Pb			No.
01	8FGL 1		1	34	38	24	500	3.9	1.4	180	48			01
02	2		1	70	38	16	520	2.8	6.0	300	120			02
03	3		1	28	58	26	780	3.6	.6	120	32			03
04	4		1	32	42	26	520	4.4	.6	120	32			04
05	5		1	34	44	26	480	4.0	.4	130	28			05
06	G 26		7	22	12	12	420	2.5	.2	36	24			06
07														07
08														08

Rossbacher Laboratory

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AREA CODE: 604

JUL 5 1978
VANCOUVER OFFICE

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 8045
INVOICE NO. 8056

TO: Amax Minerals Explorations 535 Thurlow St Van, B.C.

PROJECT North Anvil Claims LV Claims TS DATE ANALYSED June/78

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Ag	Zn	Pb			No.
01	78FGT6		8	32	90	70	940	4.9	.2	138	24			01
02														02
03														03
04														04
05														10

AMAX

Rossbacher Laboratory

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AREA CODE: 604

JUL 12 1978
VANCOUVER OFFICE

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 8055
INVOICE NO.

TO: Amax Minerals Exploration 535 Thurlow St Van. B.C.

PROJECT 791

DATE ANALYSED July 1/78

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Ag	Zn	Pb			No.
01	78FGL7		2	20	24	18	400	2.8	.4	146	28			01
02	LV CLAIMS 8		1	20	20	16	400	2.8	.6	108	24			02
03	9		1	16	20	14	420	2.3	.2	80	20			03
04	T10		7	54	76	56	540	5.8	.4	134	20			04
05	11		2	104	92	48	340	4.2	.6	60	20			05
06	12		1	74	68	56	620	5.1	.6	92	32			06
07	13		1	78	x640	78	520	4.7	.6	108	28			07
08	14		3	748	288	72	360	5.4	.2	72	24			08
09														09
10														10
11														11

Rossbacher Laboratory

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 8043
INVOICE NO. 8056

TO: Amax Minerals Exploration Vancouver B.C.

PROJECT 791 - LV CLAIMS

DATE ANALYSED JUNE 1/78

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Ag	Zn	Pb			No.
01	8FWS41		1	6	6	6	100	0.6	.2	16	4			01
02	42		1	12	14	10	180	1.2	.4	40	12			02
03	43		2	26	34	18	660	3.0	.8	136	26			03
04	44		3	20	26	16	260	1.8	.6	60	20			04
05	45		1	10	10	10	160	1.0	.2	32	6			05
06	T46		10	30	50	40	180	1.1	1.0	30	34			06
07	L47		1	26	46	20	690	2.5	.8	136	24			07
08	S48		2	38	46	20	2360	2.8	1.2	96	28			08
09	49		1	16	30	14	240	2.0	.6	66	18			09
10	50		1	18	30	12	200	1.8	.6	60	16			10
11	51		1	24	42	18	360	2.2	.8	96	22			11
12	52		1	22	38	14	340	2.3	.8	100	26			12
13	53		1	26	38	12	240	2.1	1.4	112	22			13
14	54		1	22	36	10	360	1.8	1.2	88	20			14
15	55		1	12	20	10	240	1.4	.6	58	12			15
16	56		1	16	16	10	1040	0.6	.4	78	12			16
17	L58		1	18	22	26	760	>10.0	.8	118	16			17
18	59		1	22	34	20	1240	3.2	.6	180	26			18
19	60		1	18	38	18	380	2.5	.6	100	28			19
20	S61		1	26	30	14	260	2.4	.4	72	18			20
21	62		1	14	10	12	160	1.8	.4	36	10			21
22	63		1	36	52	30	360	4.3	.8	96	28			22
23	T64		13	20	60	54	500	4.6	.8	104	26			23
24	S65		2	54	76	28	440	4.3	1.0	126	30			24
25	66		1	6	6	6	60	0.7	.2	12	2			25
26	67		1	36	46	26	440	4.5	.8	122	30			26
27	68		1	10	14	8	140	1.4	.2	40	12			27
28	69		1	20	38	14	480	2.5	.4	98	22			28
29	70		1	30	50	24	880	3.3	.6	136	26			29
30	71		1	10	6	10	100	1.1	.2	20	2			30
31	72		4	42	50	18	280	3.0	.8	136	26			31
32	73		1	30	58	24	500	3.1	.6	140	30			32
33	74		1	24	30	22	2200	1.0	.4	42	20			33
34	75		1	26	24	12	560	1.0	.4	126	16			34
35	76		1	22	26	10	200	1.5	.4	76	14			35
36	77		1	2	6	6	60	0.6	.2	12	4			36
37	78		1	26	48	22	400	2.5	.4	100	26			37
38	L79		1	18	46	16	420	2.2	.4	156	24			38
39	8FW 580		1	26	22	12	400	1.5	.4	60	16			39
40	G 21		12	980	22	18	220	7.4	1.2	186	60			40

Certified by J. Rossbacher

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AMAX

JUL 5 1978

VANCOUVER OFFICE

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 8045

INVOICE NO. 8056

DATE ANALYSED June 1/78

TO: Amax Minerals Exploration
535 Thurlow St Vanc. B.C.

PROJECT North Anvil Range L.V. Claims 79

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Ag	Zn	Pb			No.
01	78FWS117		2	30	50	18	440	2.7	.4	78	24			01
02	118		3	30	50	24	420	2.7	.4	134	22			02
03	119		3	24	34	16	140	1.7	.4	80	16			03
04	L 120		2	36	82	10	100	1.1	.4	66	16			04
05	S 121		3	16	30	12	140	1.7	.2	48	10			05
06	122		1	10	14	10	180	0.7	.2	18	8			06
07	123		1	22	46	18	280	3.0	.4	124	24			07
08	124		4	26	44	22	400	3.2	.4	122	24			08
09	125		4	60	60	24	380	3.0	.4	160	26			09
10	126		4	40	64	36	420	4.9	.4	124	28			10
11	127		1	26	46	30	340	4.0	.4	94	26			11
12	128		2	34	62	22	380	3.7	.4	98	30			12
13	L 129		2	26	52	20	340	2.5	.4	86	24			13
14	S 130		3	38	66	28	400	3.2	.4	108	32			14
15	131		3	34	42	20	200	2.7	.4	70	20			15
16	132		2	40	66	32	560	4.5	.4	126	28			16
17	T 133		6	56	94	66	420	5.3	.6	138	30			17
18	S 134		2	48	64	56	500	4.7	.6	136	34			18
19	135		1	42	60	34	520	3.4	.4	126	28			19
20	136		1	22	32	16	180	2.1	.4	52	14			20
21	137		2	36	42	28	420	3.6	.4	88	28			21
22	138		2	34	34	28	1460	1.8	.4	48	16			22
23	L 139		4	50	80	36	640	4.1	.6	156	36			23
24	S 140		3	46	64	32	600	3.5	.8	124	30			24
25	141		2	40	34	16	420	1.7	.4	90	26			25
26	L 142		1	34	64	28	460	3.5	.4	118	30			26
27	S 143		1	16	18	18	840	1.8	.2	24	14			27
28	144		2	26	42	22	260	3.2	.4	82	26			28
29	145		1	30	14	16	220	2.4	.2	42	20			29
30	146		1	16	22	10	140	1.6	.2	36	14			30
31	147		1	56	74	38	580	4.6	.6	134	36			31
32	148		1	12	14	8	120	1.5	.2	26	14			32
33	149		1	4	6	6	60	0.8	.4	10	6			33
34	150		1	24	34	14	160	2.0	.2	62	22			34
35	151		1	14	18	10	140	1.6	.2	44	16			35
36	152		1	8	14	10	540	1.4	.2	22	8			36
37	153		1	10	18	8	140	1.0	.2	24	10			37
38	154		1	20	42	14	280	2.2	.4	62	20			38
39	155		1	6	10	6	60	0.8	.2	12	6			39
40	G 1		7	38	14	16	200	2.6	.4	106	28			40

Certified by C. Rossbacher

Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

2225 S. SPRINGER AVE.,
BURNABY, B.C.
CANADA
TELEPHONE: 299-6910
AREA CODE: 604

AMAX

JUL 5 1978

VANCOUVER OFFICE

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 8045
INVOICE NO. 8056

TO: Amax Minerals Exploration
535 Thurlow St Van B.C.

PROJECT North Amax Harry L.V. Claims

DATE ANALYSED June/78

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Ag	Zn	Pb			No.
01	78EWS195		2	26	70	30	500	3.7	.4	150	28			01
02	196		1	16	50	10	160	2.2	.2	86	14			02
03	197		1	14	18	10	140	1.9	.2	56	10			03
04	198		1	10	6	8	160	1.0	.2	20	6			04
05	199		1	10	6	6	140	0.6	.2	18	8			05
06	200		1	10	6	6	80	0.7	.2	18	6			06
07	201		1	6	4	6	60	0.9	.2	14	8			07
08	202		1	36	62	26	320	3.6	.4	94	32			08
09	203		1	6	2	6	60	0.9	.2	16	8			09
10	204		1	12	6	6	40	0.6	.2	14	8			10
11	205		3	30	42	22	460	3.2	.4	90	28			11
12	206		3	22	20	14	340	1.5	.2	54	14			12
13	207		4	26	30	14	280	2.0	.4	102	22			13
14	208		5	28	38	22	260	3.9	.6	114	34			14
15	209		5	42	52	22	420	3.2	.6	182	30			15
16	210		4	34	42	16	460	2.9	.6	170	28			16
17	211		4	32	34	14	500	2.3	.4	118	24			17
18	212		6	26	30	22	380	1.9	.4	98	20			18
19	213		3	32	54	8	580	3.2	.6	116	36			19
20	214		4	26	16	16	100	0.9	.2	66	14			20
21	215		1	26	30	26	540	1.9	.2	66	20			21
22	216		3	34	58	6	520	3.4	.4	126	30			22
23	217		1	16	22	14	100	1.2	.2	30	10			23
24	218		2	26	34	14	180	2.0	.2	72	14			24
25	219		2	26	38	14	180	1.9	.2	56	14			25
26	220		1	30	36	16	240	2.3	.6	70	20			26
27	221		2	24	40	18	220	2.6	.6	82	22			27
28	222		1	14	14	12	120	1.5	.2	38	12			28
29	223		1	10	12	12	140	2.0	.4	42	8			29
30	224		1	32	10	24	1360	0.8	.2	34	10			30
31	225		1	6	2	6	60	0.9	.2	14	2			31
32	226		2	38	54	30	340	3.8	.6	138	50			32
33	227		1	30	10	8	60	0.8	.2	26	12			33
34	228		1	2	6	6	60	0.8	.2	10	4			34
35	229		1	16	42	20	200	2.6	.4	102	20			35
36	230		1	64	98	32	380	3.4	.6	110	34			36
37	231		1	18	40	22	220	2.7	.4	104	24			37
38	232		1	40	16	12	460	0.6	.2	42	16			38
39	233		1	30	34	18	280	1.4	.4	68	20			39
40	G-7		28	194	230	12	100	1.0	.4	78	66			40

Certified by A. Rossbacher

Kossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

2225 S. SPRINGER AVE.,
BURNABY, B. C.
CANADA
TELEPHONE: 299-6910
AREA CODE: 604

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 8045
INVOICE NO. 8056
DATE ANALYSED June 1/78

TO: Amax Mineral Explorations
535 Thurlow St Van. B.C.
PROJECT North Anvil Stamp L.V. Claims 791

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Ag	Zn	Pb			No.
01	78 FWS 273		2	30	56	30	300	3.5	.4	88	30			01
02	274		2	38	82	32	420	3.4	.4	102	30			02
03	275		2	10	10	6	80	0.9	.2	14	6			03
04	276		4	28	58	24	320	3.6	.4	118	26			04
05	277		1	8	6	6	60	0.8	.2	12	4			05
06	278		1	6	6	8	220	0.9	.2	12	6			06
07	279		2	28	50	26	300	2.8	.6	86	30			07
08	280		1	8	8	6	100	1.0	.2	16	12			08
09	281		3	20	30	18	360	2.7	.4	78	28			09
10	282		4	16	30	12	280	2.2	.2	74	22			10
11	283		3	14	14	10	120	1.6	.2	30	10			11
12	284		2	14	10	8	120	1.0	.2	22	10			12
13	285		2	22	22	16	440	2.2	.4	54	24			13
14	286		3	28	44	22	340	3.0	.4	86	28			14
15	287		1	8	6	6	60	1.0	.2	16	10			15
16	288		3	50	70	36	320	5.4	1.0	112	40			16
17	289		1	14	10	12	100	1.5	.2	22	8			17
18	290		1	26	40	24	340	3.7	.4	86	32			18
19	291		2	22	38	14	400	2.7	.4	90	32			19
20	292		1	22	24	14	340	2.2	.4	60	24			20
21	293		1	20	28	16	300	2.5	.4	54	26			21
22	294		1	18	36	16	280	2.4	.4	58	28			22
23	295		1	34	96	30	340	3.1	.6	90	36			23
24														24
25														25
26														26
27														27
28														28
29														29
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Certified by C. Kossbacher

Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

AMAX

2225 S. SPRINGER AVE.,
BURNABY, B. C.
CANADA
TELEPHONE: 299-6910
AREA CODE: 604

7

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 8055

TO: Amax Minerals Exploration
535 Thurlow St Van. B.C.

INVOICE NO.

PROJECT 791

DATE ANALYSED July 3/78

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Ag	Zn	Pb			No.
01	78FWS334		2	38	44	20	400	3.0	.8	108	20			01
02	335		2	38	52	24	520	3.8	.6	126	20			02
03	336		2	34	44	18	400	3.2	.6	128	20			03
04	337		3	36	48	20	560	3.4	.6	130	20			04
05	338		2	30	48	20	400	3.3	.4	154	16			05
06	339		1	20	32	12	400	2.1	.4	92	16			06
07	(T) FWO340		1	66	60	40	280	2.0	1.0	86	76			07
08	S341		2	24	36	16	300	2.6	.6	110	24			08
09	342		1	14	20	8	520	1.2	.2	28	4			09
10	343		1	36	84	16	600	2.5	.6	114	18			10
11	344		2	24	84	16	440	2.4	.4	90	16			11
12	345		2	32	68	18	360	2.6	.4	102	16			12
13	346		1	12	24	12	240	2.0	.4	54	8			13
14	347		1	22	20	8	240	2.3	.4	66	18			14
15	348		1	22	24	16	520	2.5	.6	122	16			15
16	349		1	20	28	16	400	2.5	.4	98	16			16
17	350		1	14	20	12	240	1.9	.4	58	14			17
18	351		2	20	16	16	480	2.2	.4	70	16			18
19	352		1	46	52	24	560	3.4	.6	130	28			19
20	353		2	30	36	20	480	3.1	.6	122	20			20
21	L354		2	34	40	20	480	3.2	.6	108	28			21
22	S355		2	22	26	20	680	3.4	.6	102	24			22
23	356		2	20	24	16	280	2.4	.6	74	22			23
24	357		2	30	34	16	480	3.0	.6	108	28			24
25	358		2	26	32	16	360	3.0	.6	98	28			25
26	359		2	10	8	8	280	1.5	.4	36	12			26
27	360		3	20	28	14	280	3.0	.4	100	28			27
28	361		1	4	4	8	120	1.5	.2	24	4			28
29	362		1	16	28	8	360	2.2	.4	82	20			29
30	363		1	10	8	6	120	1.0	.4	24	8			30
31	364		1	14	12	8	120	1.0	.2	26	8			31
32	365		2	16	28	12	480	2.9	.4	122	16			32
33	366		1	34	8	6	1720	0.5	.2	20	10			33
34	367		2	26	28	10	420	2.5	.4	82	24			34
35	368		1	6	8	4	100	1.0	.2	22	8			35
36	L369		6	18	28	16	3200	2.8	.6	220	24			36
37	S370		1	2	4	8	160	1.2	.2	22	4			37
38	371		2	8	8	4	120	0.7	.4	24	4			38
39	372		2	16	12	8	240	1.5	.4	42	12			39
40	G7		28	198	224	12	120	1.0	.4	78	72			40

Certified by C. Rossbacher

Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

2225 S. SPRINGER AVE.,
BURNABY, B. C.
CANADA
TELEPHONE: 299-6910
AREA CODE: 604

RECEIVED JUL 12 1978 VANCOUVER OFFICE

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 8055

TO: Amax Minerals Exploration
535 Thurlow St. Van. B.C.

INVOICE NO.

PROJECT 791

DATE ANALYSED July 178

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Ag	Zn	Pb			No.
01	78 FWS 373		3	24	52	18	320	2.1	.2	112	20			01
02	374		4	32	52	18	300	2.4	.2	124	24			02
03	375		2	18	40	16	220	2.4	.2	124	18			03
04	376		2	28	48	18	120	1.9	.2	112	16			04
05	377		2	28	56	22	320	2.6	.2	108	24			05
06	378		1	16	44	14	200	2.0	.2	64	20			06
07	379		2	28	64	26	320	3.4	.2	116	32			07
08	380		2	28	56	24	280	3.0	.2	108	28			08
09	381		1	12	12	10	100	1.4	.2	24	8			09
10	382		1	12	8	8	80	1.0	.2	20	8			10
11	383		1	16	8	26	1300	1.0	.2	24	8			11
12	384		1	8	8	6	80	0.5	.2	12	8			12
13	385		1	32	32	16	240	2.5	.2	96	28			13
14	386		1	14	12	10	100	1.3	.2	28	8			14
15	387		1	24	28	16	260	2.6	.2	92	28			15
16	388		1	12	16	10	120	1.6	.2	40	16			16
17	389		1	20	32	16	240	2.5	.2	88	20			17
18	390		1	28	36	20	320	2.6	.2	100	24			18
19	391		1	22	28	14	200	2.1	.4	84	16			19
20	392		1	16	20	12	200	1.9	.2	60	12			20
21	393		1	16	16	8	120	1.5	.8	48	12			21
22	394		1	16	28	14	260	2.1	.2	64	12			22
23														23

2

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GEOCHEMICAL ANALYSTS & ASSAYERS

2225 S. SPRINGER AVE.,
BURNABY, B. C.
CANADA
TELEPHONE: 299-6910
AREA CODE: 604

RECEIVED JUL 17 1978

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. # 8061

TO: AMAX EXPLORATIONS INC
535 THURLOW ST. VAN. 5 BC

INVOICE NO. 8068

PROJECT FISHOOK CREEK

DATE ANALYSED July 178

No.	Sample	pH	Mo	Cu	Ni	~~Co~~	Mn	Fe	Ag	Zn	Pb	Co		No.
01	8FWS 434		2	36	76	26	400	2.7	.6	120	24	26		01
02	435		1	40	76	24	380	3.0	.4	110	24	26		02
03	436		1	38	72	28	360	3.2	.6	150	28	26		03
04	437		5	36	38	49	1100	3.0	.4	76	20	40		04
05	438		4	32	44	32	440	3.3	.6	86	24	28		05
06	439		1	16	32	60	360	0.9	.4	52	12	12		06
07	440		1	54	56	12	320	2.5	.6	110	20	22		07
08	441		3	28	8	80	340	0.6	.2	32	8	10		08
09	442		2	32	12	12	80	0.8	.2	30	4	6		09
10														10
11														11
12														12

- AMAX

Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

2225 S. SPRINGER AVE.,
BURNABY, B. C.
CANADA
TELEPHONE: 299-6910
AREA CODE: 604

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JUL 12 1978
VANCOUVER OFFICE

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 8055

TO: Amax Minerals Exploration
535 Thurlow St. Van. B.C.

INVOICE NO.

PROJECT 791

DATE ANALYSED July 3/78

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Ag	Zn	Pb			No.
01	78-E-13579		1	12	24	8	400	1.4	.4	50	8			01
02	80		1	22	28	12	400	2.1	.4	66	14			02
03	81		1	30	44	20	400	4.0	.6	106	20			03
04	82		1	22	32	20	420	2.7	.4	74	14			04
05	83		2	24	36	16	520	2.6	.4	92	16			05
06	84		1	2	8	4	80	0.5	.2	10	4			06
07	85		1	6	8	8	200	1.2	.2	26	4			07
08	86		1	32	20	16	300	3.0	.4	62	12			08
09	87		1	10	12	12	200	2.5	.2	40	4			09
10	88		1	54	40	24	280	41	.8	82	16			10
11	89		2	36	40	20	280	3.5	.4	86	12			11
12	90		2	44	32	20	460	3.4	.4	80	14			12
13	91		2	34	32	16	280	3.0	.4	62	16			13
14	92		2	22	28	20	320	3.4	.4	82	20			14
15	93		1	34	30	16	360	3.0	.6	76	16			15
16	94		1	14	16	12	240	1.9	.4	50	14			16
17	95		1	14	16	12	280	2.4	.4	56	12			17
18	96		1	6	10	8	280	1.5	.2	32	8			18
19	97		1	6	8	16	200	2.3	.2	34	8			19
20	98		1	34	40	24	360	3.1	.6	128	24			20
21	99		2	32	40	16	360	2.9	.4	114	24			21
22	100		2	26	28	16	400	2.8	.6	106	20			22
23	101		2	18	28	20	480	2.6	.4	86	20			23
24	102		2	26	24	16	320	2.3	.4	90	16			24
25	103		1	30	20	16	240	2.4	.4	82	20			25
26	104		2	28	20	12	520	1.8	.6	54	16			26
27	105		MISSING			—								27
28	106		1	18	12	16	160	2.2	.4	42	12			28
29	107		2	26	36	16	240	3.2	.4	150	20			29
30	108		1	14	12	8	120	1.6	.4	38	12			30
31	109		1	22	28	16	360	2.5	.6	66	16			31
32	110		1	46	12	12	500	1.2	.4	34	16			32
33	111		1	20	12	6	400	1.4	.4	40	12			33
34	112		4	44	42	20	720	3.0	.8	134	24			34
35	113		1	10	12	14	240	1.6	.2	34	8			35
36	114		1	26	32	20	480	2.8	.6	80	20			36
37	115		1	34	44	24	400	3.5	.6	98	20			37
38	117		6	22	24	12	160	2.9	.6	84	16			38
39	118		4	30	32	20	560	3.0	.6	120	24			39
40	G7		30	200	224	12	120	1.0	0.4	78	68			40

Certified by C. Rossbach

Kossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

2225 S. SPRINGER AVE.,
BURNABY, B. C.
CANADA
TELEPHONE: 299-6910
AREA CODE: 604

JUL 12 1978
VANCOUVER OFFICE

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 8055

TO: Amax Minerals Exploration
535 Thurlow St. Van 3, B.C.

INVOICE NO.

PROJECT 791

DATE ANALYSED July 1/78

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Ag	Zn	Pb			No.
01	78F-BS 158		1	16	8	6	120	0.4	.2	16	8			01
02	159		1	36	36	20	480	2.8	.4	96	24			02
03	160		2	40	44	22	400	2.9	.4	156	24			03
04	161		2	44	38	20	400	2.7	.6	132	20			04
05	162		1	38	42	20	560	2.8	.6	120	28			05
06														06
07														07
08														08
09														09
10														10
11														11
12														12
13														13
14														14
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38														38
39														39
40														40

Certified by D. Kossbacher

Rossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS
2225 S. SPRINGER AVE.,
BURNABY, B. C.
CANADA
TELEPHONE: 299-6910
AREA CODE: 604

RECEIVED JUL 17 1978

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. # 8061
INVOICE NO. 8068
DATE ANALYSED July 178

TO: AMAX EXPLORATIONS INC
535 THURLOW STR VAN. 5 BC
PROJECT FISHOOM CREEK

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Ag	Zn	Pb			No.
01	8FBS 202		1	8	12	12	160	1.9	.2	20	4			01
02	203		1	12	10	8	120	1.3	.2	28	4			02
03	204		2	16	16	12	200	1.9	.2	24	12			03
04	205		2	32	72	26	360	3.5	.2	64	20			04
05	206		2	36	68	24	320	3.2	.4	88	20			05
06	207		1	36	68	28	460	3.5	.4	100	20			06
07	208		2	20	36	20	320	2.8	.4	68	20			07
08	209		2	14	32	20	320	2.9	.4	84	18			08
09	210		3	16	32	16	360	3.1	.4	68	20			09
10	211		2	40	128	36	600	3.7	.4	120	28			10
11	212		2	32	84	32	320	5.2	.6	96	20			11
12	213		2	4	12	8	120	1.7	.4	32	12			12
13	214		4	36	80	24	440	3.4	.4	124	16			13
14	215		2	14	24	12	140	1.5	.4	40	4			14
15	216		4	32	60	24	300	3.9	.6	104	20			15
16	217		1	12	12	16	200	2.8	.2	44	2			16
17	218		2	68	120	32	520	3.1	.6	92	20			17
18	219		2	124	316	56	520	5.2	.8	136	28			18
19	220		3	112	x440	76	720	5.6	.6	192	24			19
20	221		2	48	124	28	360	3.2	.6	100	20			20
21	222		1	20	36	20	240	2.7	.4	52	8			21
22	223		1	44	150	32	420	2.9	.4	92	20			22
23	+ 224		1	108	180	64	840	5.7	.6	168	160			23
24	225		1	30	64	24	280	3.0	.4	60	20			24
25	226		1	28	60	24	360	3.2	.2	72	24			25
26	227		1	36	156	32	320	3.6	.4	72	20			26
27	228		2	14	44	16	240	2.3	.4	44	16			27
28	229		6	92	108	28	280	5.0	.4	90	20			28
29	230		4	84	240	56	520	5.2	.6	140	32			29
30	231		2	16	24	12	240	1.4	.2	24	6			30
31	232		1	32	24	8	240	1.0	.4	20	4			31
32	233		2	40	48	28	1680	4.4	.4	124	32			32
33	234		1	2	4	8	80	.06	.2	12	4			33
34	235		3	24	48	28	560	3.2	.6	120	36			34
35	236		2	14	20	16	320	1.9	.2	56	16			35
36	237		2	8	12	12	200	1.3	.6	44	12			36
37	238		2	26	20	12	360	1.0	.4	120	16			37
38														38
39														39
40	G1		7	48	12	12	240	2.6	.4	110	24			40

Certified by J. 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 SO_4^{--} in waters.

Amax Exploration, Inc.
Vancouver Office.

September 1970

SAMPLE COLLECTION

Soils

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 mls 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

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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 PROCEDURES

Silver

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 $Hxl0_3$ 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% $HClO_4$. 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 ppm = .0292 oz/ton

conversion factor

oz/ton = .0292 x ppm Ag

Zn Geochemical AA Setting

Lamp Zn

Current 8 #3 Slit 20A

Wave length 2138 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_2O, HCl, HNO_3, $HClO_4$, fumed to $HClO_4$ - make up to 100 mls H_2O

1000, 100 gamma/ml and 100 ml by dilution in 20 % $HClO_4$

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% $HClO_4$ 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, and fumed into $HClO_4$, dilute to 1 liter

Pipette

1, 2, 10, 20 mls into 100 ml vol flasks diluted to mark with 20% $HClO_4$

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

Pippette

.5, 1, 2, 3, 5, 8, 10, ml of 1000 gamma/ml

2, 3, 5, 8, 10, 15, 20 ml of 10,000 gamma/ml dilute to 100 mls with 20% $HClO_4$. This gives

5, 10, 20, 30, 50, 80, 100, 200, 300, 500, 800, 1000, 1500, 2000 gamma/ml

Mo Geochemical AA Setting

Lamp ASL H/C Mo

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 NaCH, 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/ml

Weigh 5.000 gms iron wires, into beaker, add H_2O, HCl, HNO_3, $HClO_4$, heat to $HClO_4$ fumes. Add $HClO_4$ to 100 mls + 100 mls H_2O, warm, dilute to 500 mls

Pipette

1, 5, 10, 20, 30, 50, 80 mls 10,000 gamma/ml dilute to 100 mls with 20% $HClO_4$ to give

100, 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 118

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_3, $HClO_4$ to perchloric fumes, dilute to 100 ml H_2O

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

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% HClO4. This gives

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

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

Cu Geochemical AA Setting

Lamp Single 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_2O, HCl, HNO_3 until dissolved, add $HClO_4$, fume dilute to 100 mls

1000 gamma/ml 10x dilution above in 20% $HClO_4$

2000 gamma/ml 20 mls 10,000 gamma/ml - dilute to 100 mls in 20% $HClO_4$

100 gamma/ml 10x dilution 1000 gamma/ml dilute to 100 mls in 20% $HClO_4$

200 gamma/ml 10x dilution 2000 gamma/ml dilute to 100 mls in 20% $HClO_4$

Pipette

1, 2, 3, 5, 8, 10 mls 100 gamma/ml - dilute to 100 mls with 20% $HClO_4$ 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 ASL H/c Pb

Current 5 ma Slit 7A

Wave length 2833 Dial 208

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_3, fumed to $HClO_4$ make up to 100 mls in 20% $HClO_4$

1000 gamma/ml and 100 gamma/ml Successive 10x dilutions in 20% $HClO_4$

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% $HClO_4$ 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 Na_2CO_3

4 parts NaCl

1 part KNO_3 pulverized to -80 mesh

7% $SnCl_2$ in 70% HCl

20% KSCN in H_2O

Extractant - 1 part tri-n-butyl phosphate

9 parts carbon tetrachloride

Standards

1000 gamma/ml W

.18 gms Na_2WO_4 $2H_2O$ dissolved in H_2O, 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 read 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°C)
7. Cool to less than 15°C
8. Add 1 ml 20% KSCN, mix (if lemmon 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 $SnCl_2$
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_2O, and 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_2O to methanol to match. Seal tightly

$SnCl_2$ - 15% in 15% HCl

300 gm $SnCl_2 \cdot 2H_2O$ + 300 mls HCl, until $SnCl_2$ dissolved dilute to 2 liters

KSCN - 5% in H_2O

Mixed $SnCl_2$ - KSCN

3 parts $SnCl_2$ to 2 parts KSCN

Water Samples Run for AA

1. Cu - 2 gamma/ml reads 80 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

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 400mμ 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_2O, shake for one hour. Add 46.3 grams ferric perchlorate [$Fe(ClO_4)_3 \cdot 6H_2O$] (GFS 39) and 47 grams aluminum perchlorate [$Al(ClO_4)_3 \cdot 8H_2O$] (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 dampened 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

SYMBOLS

- Soil
- Silt
- Rock chip

Sample site, sample number; p.p.m. Pb, Zn, Ag.
(See APPENDIX I for analytical values of other elements)

- Property boundary.
- Topographic contour (contour interval 20 metres).
- Stream.
- Swamp, swamp boundary.

AMAX POTASH LIMITED

ANVIL CREEK PROPERTY
LU CLAIMS

WHITEHORSE MINING DISTRICT — YUKON TERRITORY

GEOCHEMICAL MAP

SCALE 400 0 400 METRES
1,000 0 1,000 FEET
1 : 10,000

To accompany 1978 Geochemical Assessment Report by: R.G. Kidlark and A.C. Hitchins.

Vancouver — G.G., H.P.

N.T.S. Ref. 105 K 5 and 12

FIG. 3