1979 Assessment Report
Prospecting and Geochemistry

TITLE	KITIMAT RIVER
CLAIMS	MAT 1 - 2
COMMODITY	Mo-Cu
LOCATION	48 km southeast of Terrace Latitude 54°08'N Longitude 128°13'W Skeena Mining Division 103 I/1E
BY	D.G. Allen P.Eng. (B.C. and D.B. Fleming
FOR	AMAX of Canada Limited
WORK PERIOD	August 23-27 and October 27 and 30, 1979

AMAX VANCOUVER OFFICE

MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
7928
NO.

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ILLUSTRATIONS

INTRODUCTION

General Statement

The objective of 1979 field work, was to fill in areas left unsampled in 1966 by establishing two detailed soil sampling grids. Prospecting was also carried out on ridges between the creeks and mineralized outcrops were examined.

Location and Access

The Kitimat River molybdenum-copper prospect is situated forty-eight km southeast of Terrace, B.C. (Figure 1). The property covers three easterly flowing tributaries in the upper Kitimat River valley. Access is made by helicopter from the Terrace airport.

Claims

The property consists of two, twenty unit claims (MAT 1-2) staked on March 27 and 28, 1979 (Figure 2).

	Record Number	Expiry Date
Mat 1 (20 units)	1235	April 18, 1980
Mat 2 (20 units)	1236	April 18, 1980

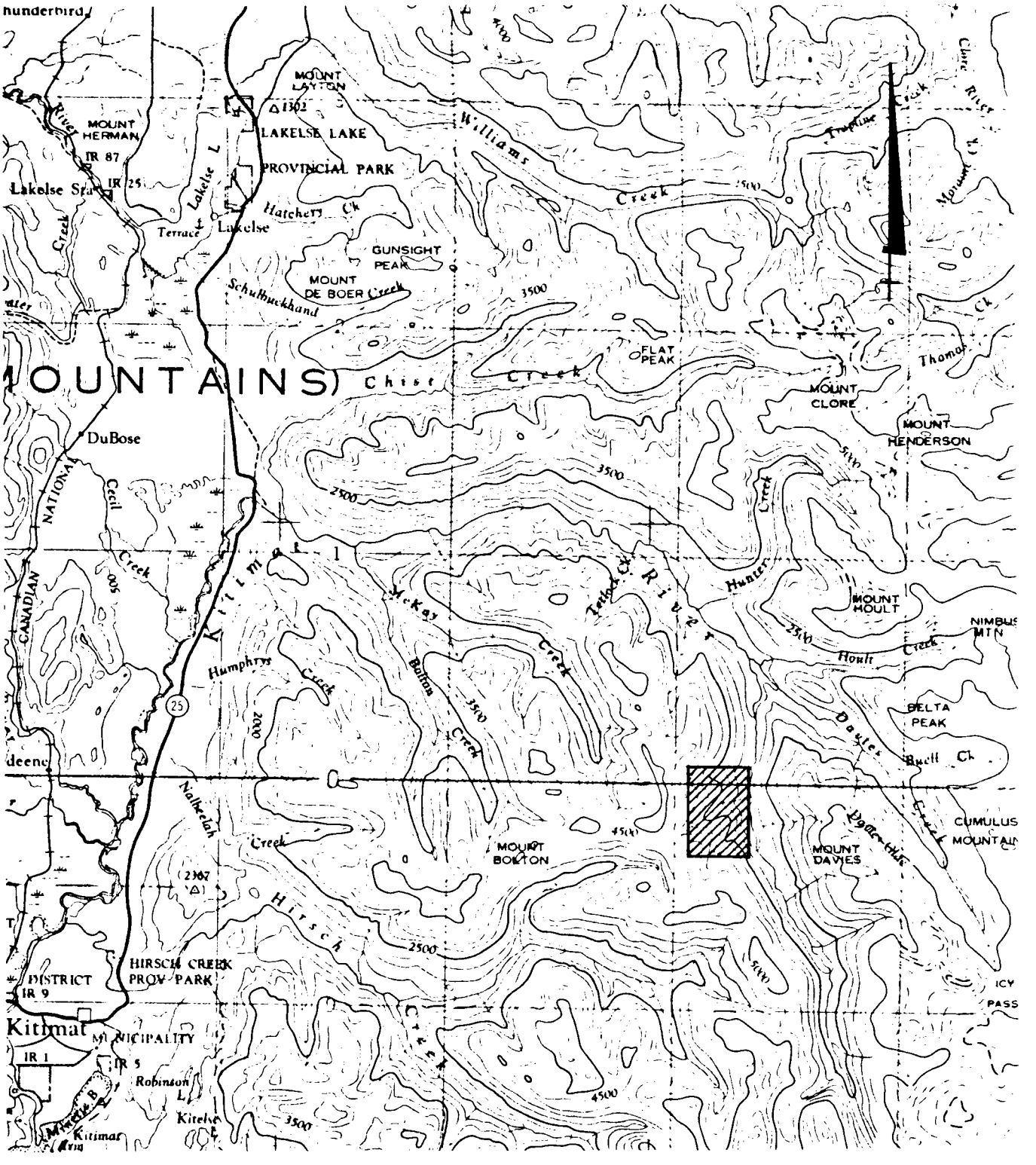
Physiography

The property lies within the Coast Range Mountains. Topography is very rugged, characterized by steep slopes rising from the Kitimat River which are deeply incised by three creeks.

Slopes and ridges are characterized by thick forest cover and relatively little undergrowth whereas the valley bottom has a very thick undergrowth of alder and devils club.

Previous Work

The property was initially staked in June, 1965 by personnel acting as agents for Southwest Potash Corporation.



AMAX OF CANADA LIMITED

KITIMAT RIVER PROPERTY

SKEENA M.D. — B.C.

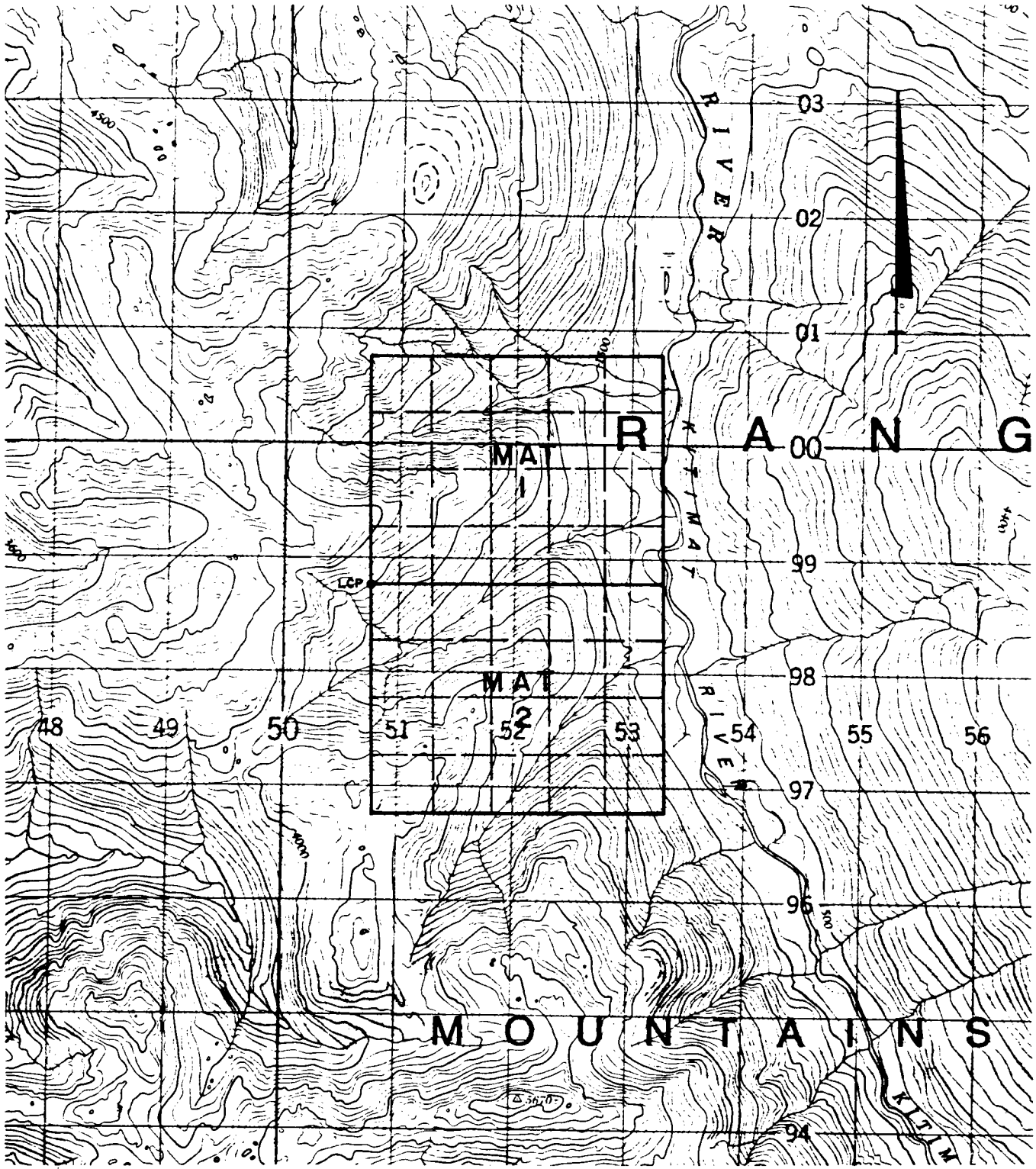
LOCATION MAP

SCALE 8 0 8 KILOMETRES
4 0 4 MILES

1:250,000

N.T.S. Ref. 103 I 1

FIG. 1



AMAX OF CANADA LIMITED

KITIMAT RIVER PROPERTY

SKEENA M. D. — B. C.

CLAIM MAP

Donald S. allen

SCALE 1600 0 1600 METRES
4000 0 4000 FEET

1 : 50,000

N. T. S. Ref. 103 I 1

FIG. 2

Work included geological mapping, geochemical water, silt and soil sampling, and 8.5 line miles of induced polarization survey.

In 1966 work consisting of plane table mapping, geological mapping, geochemical soil sampling and rock chip sampling was carried out under the supervision of P.W. Richardson for AMAX Exploration, Inc. (Assessment Reports 818, 819).

GEOLOGY

Mantle Creek

The Mantle Creek area to the south, is underlain by a medium grained equigranular biotite granite. The rock is light pink and highly feldspathized and pyritized, and is cut by light grey, porphyritic quartz-monzonite dykes and by dark grey andesite dykes. Dykes of feldspathized and pyritized quartz-eye porphyry occur locally.

Gossan Creek

The lower reaches of Gossan Creek are underlain by Hazelton Group(?) greenstones. Steep, gossanous cliffs along the southern wall of the creek, mark the quartz-eye-muscovite porphyry intrusive contact. Muscovite books and anhedral quartz phenocrysts are scattered in a light pink-brown aphanitic groundmass. The porphyry is weakly feldspathized and pyritized.

MINERALIZATION

Molybdenite mineralization in the .0X% range occurs in isolated quartz-vein stockwork zones along Mantle Creek and in the muscovite-quartz-eye porphyry in Gossan Creek. The zones are highly silicified and original textures are obliterated. The lower zone in Mantle Creek is in part, associated with a silicified quartz-eye porphyry outcropping nearby.

Molybdenite occurs mostly as fine disseminations along vein selvages, and also as fine grained individual flakes within the vein.

GEOCHEMISTRY

Soil

One hundred and thirty-four soil samples were collected from two separate areas. Samples were taken at fifty metre intervals along lines one hundred metres apart (Figure 3).

Sample depths generally ranged between twenty and thirty cm. All samples were taken from B horizon soils ranging in colour from dark grey to orange with sand and silt as major components. Humus leached from the overlying forest humus layer usually appeared in the B horizon soils. Samples were analyzed for 9 elements (Appendix II).

Rock Chip

Twenty-six rock chip samples were taken and also analyzed for nine elements.

Results

Mo and Cu soil anomalies (>4 ppm Mo, >100 ppm Cu) were outlined in each of the sampled areas (Figure 3). Mo values ranged from 1-350 ppm with a frequency curve peaking at 0-10 ppm. Cu values ranged from 0-1940 ppm with a modal value of between 20 and 40 ppm.

Adjacent to Gossan Creek, a 250 x 100 m Cu anomaly is coincidental with the southern lobe of a larger Mo anomaly. Conversely, one and a half km to the south, adjacent to Lamp Creek, the Mo and Cu anomalies are generally noncoincidental.

South of the anomalous zone in Gossan Creek, are large precipitous cliffs exposing significant molybdenite and chalcopyrite(?) mineralization. Soil geochemistry has therefore, possibly defined the northerly extension of the mineralization.

The isolated Mo and Cu anomalies in Lamp Creek are interesting due to the fact that mineralization is not apparent anywhere along Lamp Creek. The anomalies are closed off on all sides and do not appear to meet with a previously determined open anomalous area extending down from the northeast (1966 Final Report Kitimat River, AMAX company report).

A greater percentage of soil samples were found anomalous in Mo than in Cu (68.5% vs. 45%). Assays taken from chip sampling in 1966, however, repeatedly indicated high Cu concentration over Mo. The chemical nature of the soil is thought to mobilize Mo more than Cu.

Dave F. Fleming

D.B. Fleming

D.G. Allen, P.Eng. (B.C.)

Donald G. Allen

APPENDIX I - STATEMENT OF COSTS

Kitimat River

Summary of Work — Prospecting and Geochemical Sampling

Period of Work — August 23 - 27, October 27, and 30, 1979

Personnel

D.G. Allen, P.Eng., 601-535 Thurlow Street, Vancouver		
2 days @ $141.79/day		283.58
D.B. Fleming, Sr. Asst., R.R. #4 Uplands Drive, Kelowna		
6 days @ $ 43.40/day		260.40
J.W. Mortensen, Jr. Asst., 931 Ambrose Avenue, Prince Rupert		
5 days @ $ 31.66/day		158.30

Room and Board

3 man days @ $35.00/day	105.00	
10 man days @ $20.00/day	200.00	305.00

Transportation

Okanagan Helicopters Ltd., Vancouver	
Inv. 358002, 358028. 363516, 358298	2,207.40

Geochemical Analysis

Rossbacher Laboratory Ltd., Burnaby
Inv. #9249, 0030

134 soil samples - 9 elements @ $4.50	603.00	
2 silt - 9 elements @ $4.50	9.00	
26 rock - 9 elements @ $4.50	117.00	
2 rock - whole rock @ $11.50	23.00	752.00

Report Preparation	200.00
TOTAL	$4,166.68

Work to be applied as follows: 1 year each to MAT #1 and #2

APPENDIX II - GEOCHEMICAL RESULTS AND ANALYTICAL PROCEDURES

Kossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

BURNABY, B. C.
CANADA
TELEPHONE 299-6910
AREA CODE: 604

CERTIFICATE NO. 9297 - 1

INVOICE NO.

DATE ANALYSED 79/09/16

PROJECT 998 Kitimat River

CERTIFICATE OF ANALYSIS

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

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Ag	Zn	Pb			No.
01	79 CRS 753		7	82	28	24	400	3.3	.4	184	4			01
02	754		5	42	22	20	300	3.7	.4	58	2			02
03	755		8	20	12	16	280	4.0	.2	30	6			03
04	756		16	92	28	28	520	3.5	.2	134	2			04
05	757		17	64	30	22	500	2.7	.2	272	8			05
06	758		12	40	28	24	480	3.6	.4	344	4			06
07	759		10	56	44	32	520	4.7	.2	170	2			07
08	760		6	54	30	24	320	4.2	.2	88	4			08
09	761		7	194	40	40	800	3.7	.2	158	2			09
10	762		3	16	12	12	320	2.5	.2	30	6			10
11	763		20	168	22	40	1400	7.8	.4	194	4			11
12	764		6	72	20	22	320	3.9	.4	72	2			12
13	765		4	194	16	28	1280	5.0	.6	510	10			13
14	766		4	54	32	24	480	4.0	.2	116	6			14
15	767		13	100	24	22	360	4.6	.2	148	6			15
16	768		18	64	24	28	640	5.2	.4	84	6			16
17	769		11	160	16	32	3700	5.0	.6	96	6			17
18	770		8	76	28	26	680	5.3	.4	110	4			18
19	771		9	100	22	26	840	4.5	.2	108	2			19
20	STD B		32	158	16	4	140	.9	1.2	150	96			20
21	772		6	18	12	14	200	2.8	.2	18	4			21
22	773		4	20	44	18	300	3.8	.4	56	6			22
23	774		10	36	18	20	280	4.2	.4	50	4			23
24	775		4	48	18	18	280	5.3	.8	26	10			24
25	776		14	150	64	46	1760	5.5	.4	204	4			25
26	777		7	24	14	14	360	3.5	2	34	6			26
27	778		4	24	12	12	260	3.3	.2	16	6			27
28	779		5	46	32	24	480	3.2	2	100	2			28
29	780		8	120	36	32	800	3.9	.2	138	4			29
30	781		6	118	32	28	800	3.9	.2	140	2			30
31	782		22	20	12	12	1040	2.6	.4	32	4			31
32	783		4	16	8	14	280	2.5	.2	26	2			32
33	784		12	60	20	20	2100	3.6	6	258	2			33
34	785		8	390	36	28	1580	3.6	4	434	2			34
35	786		7	66	26	26	420	4.2	.2	86	2			35
36	787		6	84	52	22	420	4.8	.4	134	2			36
37	788		20	200	66	40	1220	4.4	.4	110	2			37
38	789		24	144	38	56	2400	3.9	.2	76	6			38
39	790		28	156	48	24	480	4.4	.4	80	2			39
40	STD B		32	160	16	4	140	.8	1.2	148	90			40

Certified by A. Kossbacher

Kossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

BURNABY, B. C.
CANADA
TELEPHONE: 299-6910
AREA CODE: 604
CERTIFICATE NO. 9297 - 2
INVOICE NO.
DATE ANALYSED 79/09/16
PROJECT 998 Kitimat River

CERTIFICATE OF ANALYSIS

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

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Ag	Zn	Pb			No.
01	79CRS 791		10	160	43	30	600	3.4	.6	98	4			01
02	792		8	52	20	20	240	3.0	.4	44	2			02
03	793		12	92	24	20	540	2.6	.2	54	4			03
04	794		8	6	8	8	120	1.7	.1	2	8			04
05	795		8	56	30	24	440	3.0	.3	46	2			05
06	796		6	20	18	16	240	3.5	.6	20	6			06
07	797		10	16	16	14	240	3.2	.4	26	6			07
08	798		10	26	22	18	240	4.1	.4	30	4			08
09	799		10	80	34	22	420	3.7	.2	48	2			09
10	800		9	52	32	20	320	3.7	.2	38	4			10
11	801		5	32	24	16	220	3.5	.4	30	2			11
12	802		350	1940	68	84	1320	>10%	.6	160	2			12
13	803		7	26	20	20	380	3.9	.6	34	2			13
14	804		18	32	22	20	280	4.2	.6	36	4			14
15	805		18	32	20	20	260	6.0	.8	28	4			15
16	806		6	16	16	12	200	3.5	.4	24	6			16
17	807		9	22	20	12	240	3.5	.2	12	2			17
18	808		8	22	16	16	160	4.2	.2	10	6			18
19	809		5	22	20	18	200	4.2	.4	18	2			19
20	STD C		80	200	54	14	160	1.3	.6	120	80			20
21	810		3	10	8	12	120	2.1	.4	6	6			21
22	811		5	32	18	18	320	4.0	.6	38	4			22
23	812		3	10	10	12	120	3.1	.2	2	8			23
24	813		4	20	12	16	160	3.4	.4	14	8			24
25	814		6	30	24	20	200	5.8	.8	26	6			25
26	815		2	10	8	8	120	1.7	.4	2	6			26
27	816		3	60	20	24	1320	3.8	.4	50	4			27
28	817		4	32	20	14	180	3.3	.4	10	2			28
29	818		5	66	26	20	280	2.7	.4	38	2			29
30	819		4	24	16	20	220	8.0	.6	20	6			30
31	820		5	42	16	16	220	4.5	.8	28	4			31
32	821		12	36	22	20	200	4.1	.4	36	2			32
33	822		5	12	16	14	220	3.6	.2	20	6			33
34	823		12	38	24	16	300	3.9	.4	40	2			34
35	824		11	50	28	20	320	4.3	.4	66	4			35
36	825		200	560	76	62	1540	5.6	.6	116	2			36
37	826		2	72	28	26	460	3.3	.2	66	2			37
38	827		40	390	122	60	440	4.6	.2	74	2			38
39	L830		8	72	68	46	1000	3.1	.4	290	2			39
40	STD C		16	194	56	14	200	1.3	.6	118	80			40

Certified by G. Kossbacher

Kossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

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

CERTIFICATE NO. 9297 - 3

INVOICE NO.

DATE ANALYSED 79/09/20

PROJECT 998 Kitimat River

CERTIFICATE OF ANALYSIS

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

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Ag	Zn	Pb			No.
01	79 CRS 831		7	68	24	18	300	3.3	.2	46	2			01
02	832		10	40	32	20	200	3.9	.2	34	2			02
03	833		7	54	24	20	240	4.6	.2	34	2			03
04	834		6	116	24	20	220	4.8	.4	28	4			04
05	835		18	160	40	38	580	4.2	.2	56	2			05
06	836		3	12	12	14	140	4.3	.2	8	6			06
07	837		6	60	16	18	240	4.2	.2	40	2			07
08	838		9	88	14	18	280	4.0	1.4	30	2			08
09	839		40	300	172	220	2720	8.6	.6	220	4			09
10	840		4	52	38	24	360	3.1	.2	60	2			10
11	841		10	36	26	16	320	3.8	1.0	44	2			11
12	842		4	44	18	16	220	3.2	.4	30	2			12
13	843		3	24	22	20	360	2.8	.4	58	2			13
14	844		2	10	14	16	200	4.7	.4	84	6			14
15	845		2	24	20	20	520	3.0	.4	52	2			15
16	846		3	46	28	20	280	3.0	.4	46	2			16
17	847		4	40	24	16	320	3.6	.2	36	2			17
18	848		4	32	20	20	460	3.8	.4	30	2			18
19	849		13	36	38	22	1520	3.7	.4	60	2			19
20	D		2	136	4	4	120	1.3	4.4	506	100			20
21	850		6	56	36	24	320	3.2	.2	86	2			21
22	851		4	36	28	18	280	2.9	.2	52	2			22
23	852		4	38	22	18	260	3.1	.4	42	2			23
24	853		3	32	14	14	200	3.2	.4	38	2			24
25	854		2	20	14	16	280	4.0	.4	24	2			25
26	855		2	8	8	8	120	1.9	.2	4	6			26
27	T826		1	52	72	30	360	2.0	.2	47	2			27
28	827		1	96	50	32	680	4.7	.2	100	2			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

Certified by C. Kossbacher

Kossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

BURNABY, B. C.
CANADA
TELEPHONE: 299-6910
AREA CODE: 604

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 9297 - A
INVOICE NO.
DATE ANALYSED 79/09/15
PROJECT 998

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

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Ag	Zn	Bc Pb			No.
01	479 CFA 479		200	508	16	18	320	2.8	9.0	56	214	— G. Stewart		01
02	T 480		6	20	12	20	320	2.0	.6	12	4	—		02
03	481		4	20	16	22	240	3.6	.2	58	10			03
04	482		2	24	30	28	360	3.1	.2	88	6			04
05	483		2	16	32	32	2160	4.8	.2	96	8			05
06	484		48	32	8	10	80	6	.8	28	10			06
07	485		46	40	24	28	280	3.0	.2	48	4			07
08	486		6	2	8	12	40	.7	.2	12	8			08
09	487		10	24	8	12	80	1.5	2.5	44	12			09
10	488		3	4	12	16	440	1.6	.4	72	12	Selim Creek		10
11	489		1	4	16	24	120	1.0	.2	12	2			11
12	490		1	80	16	22	80	1.3	2.0	98	50			12
13	L751		1	30	36	20	760	3.7	.2	92	6			13
14	T752		1	28	36	28	520	3.7	.4	128	6			14
15	493		1	40	8	12	40	1.3	4.0	64	24			15
16	494		4	12	20	20	300	2.3	.4	32	12			16
17	495		1	56	28	30	360	3.0	.2	40	4	—		17
18	495A		4	12	12	20	80	1.0	.2	20	10			18
19	496		1	24	12	24	800	4.6	2	80	2			19
20	510 C		20	210	56	12	200	1.3	.8	132	88	C Bigness		20
21	497		1	34400	12	28	760	2.0	18.0	224	4	Claims		21
22	498		1	>40000	16	22	1040	4.4	54.0	84	6	—		22
23	L499		4	68	32	28	880	7.7	.2	140	2			23
24	S500		6	84	36	28	1200	5.5	.2	260	2			24
25	501		2	28	16	12	280	4.1	.6	60	2			25
26	502		14	52	28	20	600	4.6	.4	136	2			26
27	503		10	84	32	32	900	5.5	.4	192	4			27
28	504		10	50	24	18	500	4.8	.2	104	2			28
29	505		26	32	16	14	360	4.7	.4	68	2			29
30	506		10	36	12	20	720	5.2	.8	100	2			30
31	507		6	38	20	16	260	5.0	.8	56	156	K. Finet		31
32	508		14	44	16	20	700	5.1	.6	92	2	River		32
33	509		6	44	20	16	540	4.9	.4	96	2			33
34	510		2	56	20	16	440	5.8	.6	56	8			34
35	511		2	72	16	24	520	5.5	.6	88	2			35
36	512		5	28	12	12	320	4.1	2.0	58	2			36
37	513		3	8	8	8	240	2.5	.4	28	2			37
38	514		1	24	16	16	400	4.4	.4	56	2			38
39	515		22	44	20	16	400	4.6	.4	94	2			39
40	510 C		18	204	56	14	220	1.4	.6	128	82			40

Certified by J. Kossbacher

Kossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

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

CERTIFICATE NO. 9297 - 4

CERTIFICATE OF ANALYSIS

INVOICE NO.

DATE ANALYSED 79/09/15

PROJECT 998 ~~79/09/~~

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

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Ag	Zn	Pb			No.
01	79 CFS 516		11	>520	30	28	760	1.3	.8	156	6			01
02	517		12	32	14	14	300	2.8	.4	48	6			02
03	518		16	100	24	24	1080	3.4	.2	138	2			03
04	519		6	108	24	28	440	2.7	.2	69	2			04
05	520		6	20	16	16	280	4.5	.2	38	6			05
06	521		5	224	50	42	1600	5.2	.2	400	2			06
07	522		4	112	86	36	840	4.0	.2	206	2			07
08	523		3	36	40	20	400	4.0	.2	80	2			08
09	524		6	46	16	18	280	4.4	2.0	36	2			09
10	525		4	148	28	28	820	4.2	.2	196	2			10
11	526		7	40	20	20	320	4.4	.2	56	4			11
12	527		6	250	16	32	720	4.3	.2	178	4			12
13	528		1	12	8	10	160	2.0	.2	6	6			13
14	529		10	>840	16	16	2880	1.9	2.0	182	4			14
15	530		1	44	10	16	440	3.4	.4	56	2			15
16	T531		1	232	12	22	280	1.8	.2	18	2			16
17	532		108	400	8	12	520	.5	.4	154	2			17
18	533		4	92	12	20	320	2.1	.2	76	2			18
19	534		54	76	10	16	160	.6	.2	2	2			19
20	STD E		4	84	44	16	280	2.7	.2	164	16			20
21	535		2	4	14	16	120	.4	.2	2	2			21
22	536		10	228	24	30	1160	3.0	.2	96	2			22
23	537		108	140	16	18	360	1.4	.2	26	2			23
24	538		38	24	8	12	80	.4	.2	2	2			24
25	539		3	6	8	12	60	.3	.2	2	4			25
26	540		90	16	8	12	80	1.0	.2	2	2			26
27	541		2	4	14	20	320	1.6	.2	48	2			27
28	542		16	12	8	14	300	.9	.2	16	2			28
29	543		6	22	12	20	120	.8	.2	6	8			29
30	544		4	32	14	22	80	.6	.2	2	2			30
31	545		60	84	12	16	460	1.4	.2	50	6			31
32	546		12	16	8	14	440	1.4	.2	30	2			32
33	STD E		4	80	40	16	280	2.7	.2	160	16			33
34														34
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36														36
37														37
38														38
39														39
40														40

Certified by C. Kossbacher

Kossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

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

CERTIFICATE NO. 9451 - 1

INVOICE NO.

DATE ANALYSED DEC. 14/79

PROJECT 998, D. FLEMMING Kitimat River

CERTIFICATE OF ANALYSIS

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

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Ag	Zn	B.C. Pb			No.
01	79CAT157		4	104	16	16	360	2.3	0.2	60	76			01
02	158		140	700	24	32	280	4.4	0.8	20	10			02
03	159	<	290	204	36	24	880	2.6	1.0	40	8			03
04	160		168	136	20	20	200	2.4	1.0	44	14			04
05	161		12	92	10	12	480	1.8	0.2	44	4			05
06	162	<	340	148	12	10	280	1.0	0.2	28	8			06
07	163		6	16	12	10	240	.7	0.2	8	4			07
08	164		4	12	14	14	400	1.9	0.2	28	2			08
09														09
10														10
11														11
12														12
13														13
14														14
15														15
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Certified by C. Kossbacher

Kossbacher Laboratory

GEOCHEMICAL ANALYSTS & ASSAYERS

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

CERTIFICATE NO. 9451-2

INVOICE NO.

DATE ANALYSED Dec. 14/79

PROJECT 998, D FLEMMING

CERTIFICATE OF ANALYSIS

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

No.	Sample	pH	Mo	Cu	Ni	Co	Mn	Fe	Ag	Zn	Pb			No.
01	79CFT706		4	8	36	30	760	3.9	0.6	84	2	} Kitimat River		01
02	707		18	24	20	18	360	1.0	0.4	40	18			02
03	708		24	62	8	8	200	1.6	0.2	70	8			03
04	cedar 709		14	46	8	6	120	1.2	0.4	24	16			04
05	710		2	292	14	12	40	1.0	5.4	440	5200			05
06														06
07														07
08														08
09														09
10														10
11														11
12														12
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38														38
39														39
40														40

Certified by E. Kossbacher

APPENDIX III

STATEMENT OF QUALIFICATIONS

NAME	D.B. Fleming
ADDRESS	R.R. #4 Uplands Drive Kelowna, B.C.
EDUCATION	B.Sc. Geology 1979 University of B.C. Vancouver
EXPERIENCE	1976-1977 Seumotech (64) Ltd. - Explosives assistant 1978 AMAX Minerals - Field assistant 1979 AMAX Minerals - Field assistant

STATEMENT OF QUALIFICATIONS

NAME	J.W. Mortensen
ADDRESS	931 Ambrose Avenue Prince Rupert, B.C.
EDUCATION	High School - Prince Rupert
EXPERIENCE	1979 AMAX Minerals - Junior Assistant

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.

Kossbacher Laboratory
GEOCHEMICAL ANALYSTS & ASSAYERS

BURNABY, B.C.
CANADA
TELEPHONE: 299-6910
AREA CODE: 604

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

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.

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 35% 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 $Hx1O_3$ 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% $HClO_4$

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 Ni

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 ½ 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 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_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

MAT 1

MAT 2

LCP 1

LCP 2

LEGEND

- 9CF528 (1.2) — Soil
- □ — Silt
- 9CF541 ⊕ (2.4) — Rock chip

Sample site, sample number, p.p.m. Mo, Cu

- K-Ar — Samples taken for K-Ar age date
- Legal corner post, claim boundary
- Claim unit boundary
- 1500 — Topographic contour (contour interval 50 feet)
- Stream

MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 7928

AMAX OF CANADA LIMITED

KITIMAT RIVER PROPERTY

SKEENA MINING DIVISION — BRITISH COLUMBIA

GEOCHEMICAL MAP

800 600 400 200 0 400 800 METRES

200 150 100 50 0 100 200 FEET

1: 5,000

Donald S. Allen

To accompany 1979 Assessment Report by D.B. Fleming & D.G. Allen

Vancouver – 1979

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Fig. 3