MAR 19900002: CROWSNEST

Received date: Apr 09, 1990

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Index No = 19900002

METALLIC MINERALS EXPLORATION

PERMIT # 6889060002

This property is 9 miles south of Burmis, Alberta and 3 1/2 miles S.W. of Beaver Mines, Alberta. The property contains 30 legal subdivisions for a total of 1200 acres of which 800 acres are within the Boundary of The Rocky Mountain Forest Reserve.

The property is bisected by Provincial Highway #774. This highway is paved to approximately 3 miles S.W. of the property. Both the Castle River and Beaver Mines Creek flow through the property.

In 1990, this property will be subjected to a very detailed examination since it was the source of a very good assay.

Group 2 Sample #9

Gold	= .044 oz/ton	= $22.00/ton approx.
Silver	= .74 oz/ton	= $ 4.44/ton approx.
Copper	= 3.18 %	= 65.6 lbs/ton
		= $75.28/ton

Total Approx Assay Value = $101.72/ton at February 28, 1990.

[redacted]

Leroy L. Gilbert
Geological & Engineering Technician

cc: File
cc: Larry Ayres

BACKGROUND REPORT
CROWSNEST VOLCANICS

The volcanics formations in the Crowsnest Pass area have been known for many years and were described as early as the 1920's by the Canadian Geological Survey. However, it was not until late 1988 that anyone bothered to assay the volcanic rocks for their precious metal content. The reason for this is without doubt the microscopic nature of the precious metals present as well as the comparatively low grades.

The precious metal content is also difficult to detect on the surface because of the age of the rock. The volcanics are approx 95 to 100 million years old and were in place long before the formation of the Rocky Mountains. The outcrops are very badly weathered and are noticeably altered from both the physical and chemical changes that such great periods of time impose.

The first samples assayed were collected along the cuts for the construction of Highway #3, immediately to the west of the town of Coleman, Alberta. These samples indicated preliminary values in the range of .02 ounces of gold per ton. That means that the value of the gold content (at $500.00 per ounce Canadian would be approx $10.00 per ton. This is considerably higher than the normal background content which is < .001 ounces per ton.

This fact led to the conclusion that the volcanics may have possibly given rise to the Lost Lemmon mine legend which many believe true but which many more describe as wishful thinking. Either way the volcanics have to date proven that they are a host rock for mineralization and very well may contain quantities of sufficient value to grade commercial. In large part because of the extremely rapid advances in technology that have occurred over the last 20 to 30 years. As little as 25 years ago, anyone suggesting that gold could be chemically dissolved from an ore would have probably been described as a damned fool. Leaching processes today are common place and make practical ores which in the past were virtually impossible to process.

This same technological advance has found new ways to detect mineralization, new methods of exploration, extraction, recovery and needless to say many new minerals are being discovered, described and identified. In the last 40 years, the recognized minerals bearing the platinum group have increased from approx 20 to close to 100 and the number will probably increase even further in the future.

One of the most interesting characteristics of the Crowsnest Volcanics is the fact that it is exposed at the surface in many areas for a distance (North - South) of approx 45 miles and for a distance (East - West) of approx 25 miles. Further, the thickness of the formation has been described by the Canadian Geological Survey as 1200 - 1400 feet thick. This means that the volume of rock that was in place at one time is hard to comprehend. Undoubtedly its thickness would have been greatest near the vents and would have diminished to almost zero at its outer edge, however, most gold bearing quartz zones or formations thickness is measured a few feet thick and imagine an ore body 300' thick and ten miles long. That's quite an interesting proposition and better yet, the preliminary work indicates that such a situation is not all that impossible.

The first task in early February, 1989 was to decide where to stake. It was decided to scatter the staking over a wide geographical area because it was felt that if a commercial ore body was discovered at any point, we would be comparatively close to the action. Even if it did add approx $5000.00 to the staking costs, it was worth the additional risk.

It was also felt that the initial exploration work should cover a wide geographical area to find or attempt to find the area with the greatest possibility of success. This process has met with some measure of success and in fact 2 areas have proven to be of considerable interest one south of Highway #3 and one north. These two prospects are approx 24 miles apart and the samples are almost identical, however, the azurite in the north sample was much more apparent with purple spots up to 1/4 of an inch across. (sample #20 Racehorse Creek area)

When time came to decide where and whom to employ for the lab, geological, geophysical work, etc.., the Alberta Geological Survey, a branch of the Alberta Research Council, was the logical place to obtain such assistance. Their mandate from the Alberta Government is to assist in the development of the provinces mineral resources. They also have a highly qualified, well respected staff. They arranged a consulting geologist, a commercial assay office, etc.., for the exploration work. They also review all of the results and are going to assist in the selection of exploration targets.

[redacted]

Leroy L. Gilbert

1989 EXPLORATION PROGRAM
CROWSNEST VOLCANICS

The summer was half gone before permission was obtained to begin surface collection of grab samples for assay. The first objective was to obtain sufficient information to decide if detailed work was justified. We first had to obtain samples over a wide area to learn what rock types were available for study. What rock types had sufficient mineralization to qualify for detailed study. As well, the rock types that held little or no promise at all had to be eliminated.

In total, 197 grab samples were gathered from the volcanic areas (map 35-1961 Fernie East Half) Geological Survey of Canada. From the 197 samples a total of 28 were selected for assay, the selections were made in six separate groups #1 = 5 samples, #2 = 9 samples, #3 = 5 samples, #4 = 4 samples, #5 = 1 sample and #6 = 4 samples.

The 197 samples have been broken down into 21 general rock types, each rock type has been assayed at least once and seven have been assayed twice. However, the 7 assayed twice were completed the second time for one of the following reasons:

a) Distance. There is at least 15 miles separating the two samples in all cases.

b) Color. There is a significant change in color.

c) Adjacent Rocks. There is a significant change in the environment or adjacent rocks.

d) Assay Results of First Sample. The first assay showed good possibilities. Example: Sample #9 Group 1 and Sample #20 Group 5. Distance apart approx 29 miles scaled from Map 35-1961.

The assays have all been completed to date on 7 minerals and their results have indicated that four of these should be discontinued in preliminary work in future. These are platinum, paladium, lead and zinc. The Geochemical work has not progressed to the point where any conclusions can be reached, this work will continue in 1990. The difficulty we are having in this case is the amount of time it takes from submission of samples to receipt of results. In 1990, this work will be divided among two or three labs in the hope of speeding results.

The first group of results however, are very encouraging. These were completed by the Saskatchewan Research Council.

ASSAY RESULTS

GOLD: Four assays have been completed that show one hundredth of an ounce per ton or more of gold. These are as follows:

1. Group #2 Sample #9 = .044 oz/ton
2. Group #3 Sample #1 = .01 "
3. Group #6 Sample #20 = .036 "
4. Group #6 Sample #21 = .028 "

These four samples represent 3 distinct rock types. The two that are the same rock type are Group 2 Sample 9 and Group 6 Sample 20.

It is also of interest that 27 of the 28 samples assayed showed results which are far in excess of background gold contents.

SILVER: Two assays have been completed that show better than one half of an ounce per ton and these are:

1. Group #2 Sample #9 = .74 oz/ton
2. Group #6 Sample #20 = .60 "

It is also of interest that 16 of the 28 assays completed to date show amounts of silver far in excess of the normal background amounts. These two assays are from the same rock type and the sample sites were approx 29 miles apart.

COPPER: Two samples have assayed significant amounts of copper again they are the same samples which showed the best gold results and the best silver results and the samples were gathered approx 29 miles apart. These are as follows:

1. Group #2 Sample #9 = 3.18 % copper
2. Group #6 Sample #20 = 3.59 % copper

If you combine the assay results and compute a value, these two samples both indicate a value of close to $100.00 per ton. Needless to say in 1990, the search for other outcrops of the same rock will be thorough and detailed because we are now familiar with the environments that the two showings were found in. Also, we are familiar with the color, texture, luster etc... of the rock. If there are more surface showing, we have an excellent chance of finding them.

[redacted]

Leroy L. Gilbert

CROWSNEST VOLCANICS

1989 ASSAY RESULTS

Sample Number	OZ/TON GOLD	OZ/TON SILVER	OZ/TON PLATINUM	OZ/TON PALLADIUM	% Cu	% Pb	% Zn
Assay Analysis							
1	.002	Trace	Trace	Trace	.03	.01	.02
2	Trace	Trace	Trace	Trace	.04	Trace	.01
3	.002	Trace	Trace	Trace	.01	Trace	.01
4	.002	Trace	Trace	Trace	.02	Trace	.02
5	.002	Trace	Trace	Trace	.03	.01	.01
6	.004	.06	Trace	Trace	Trace	Trace	.01
7	.006	.07	Trace	Trace	Trace	Trace	.01
8	.002	Trace	Trace	Trace	Trace	Trace	.01
9	.044	.74	Trace	Trace	3.18	Trace	Trace
10	.004	Trace	Trace	Trace	.02	Trace	Trace
11	.002	.02	Trace	Trace	Trace	Trace	Trace
12	.002	Trace	Trace	Trace	.01	Trace	Trace
13	.002	.14	Trace	Trace	Trace	Trace	Trace
14	.002	Trace	Trace	Trace	Trace	Trace	Trace
Carbondale Rd							
1	.010	.05	Trace	Trace	Trace	Trace	.02
2	.004	.08	Trace	Trace	Trace	Trace	Trace
3	.004	.02	Trace	Trace	Trace	Trace	.02
15	.004	Trace	Trace	Trace	Trace	Trace	.01
16	.006	.03	Trace	Trace	.01	Trace	.02
Beaver Mines Rd							
7	.004	Trace	Trace	Trace	Trace	Trace	.01
11	.004	.06	Trace	Trace	Trace	Trace	Trace
12	.002	.05	Trace	Trace	Trace	Trace	.01
14	.004	.06	Trace	Trace	.01	Trace	.01
Lynx Creek							
17	.006	.05	Trace	Trace	Trace	Trace	.01
Race Horse Ck							
18	.008	Trace	Trace	Trace	.02	Trace	.01
19	.004	.03	Trace	Trace	.02	Trace	.02
20	.036	.60	Trace	Trace	3.59	Trace	.01
21	.028	.06	Trace	Trace	Trace	Trace	.01

P.O. Box 8330, Postal Stn. "F",
Edmonton, Alberta T6H 5X2

ATTN: Doug Boisvert

Date July 6, 1989
Samples Crushed

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.	OZ./TON GOLD	OZ./TON SILVER	OZ./TON PLATINUM	OZ./TON PALLADIUM	% Cu	% Pb	% Zn
"Assay Analysis"							
1	.002	Trace	Trace	Trace	.03	.01	.02
2	Trace	Trace	Trace	Trace	.04	Trace	.01
3	.002	Trace	Trace	Trace	.01	Trace	.01
4	.002	Trace	Trace	Trace	.02	Trace	.02
5	.002	Trace	Trace	Trace	.03	.01	.01

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

[redacted]
Assayer

Rejects retained one month.
Pulps retained one month
unless specific arrangements
are made in advance.

P.O. Box 8330, Postal Stn. "F",
Edmonton, Alberta T6H 5X2

[redacted]: Dixon Edwards

Date August 31, 1989
Samples Pulp

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.	OZ./TON GOLD	OZ./TON SILVER	OZ./TON PLATINUM	OZ./TON PALLADIUM	% Cu	% Pb	% Zn
"Assay Analysis"							
# 6	.004	.06	Trace	Trace	Trace	Trace	.01
# 7	.006	.07	Trace	Trace	Trace	Trace	.01
# 8	.002	Trace	Trace	Trace	Trace	Trace	.01
# 9	.044	.74	Trace	Trace	3.18	Trace	Trace
# 10	.004	Trace	Trace	Trace	.02	Trace	Trace
# 11	.002	.02	Trace	Trace	Trace	Trace	Trace
# 12	.002	Trace	Trace	Trace	.01	Trace	Trace
# 13	.002	.14	Trace	Trace	Trace	Trace	Trace
# 14	.002	Trace	Trace	Trace	Trace	Trace	Trace

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

[redacted]

[redacted]ects retained one month.
[redacted]ps retained one month
[redacted]nless specific arrangements
are made in advance.

P.O. Box 8666, Postal Stn. E,
Edmonton, Alberta T6H 5X2

ATTN: Hans Beisvert

Date October 19, 1989
Samples Pulp

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.		OZ./TON GOLD	OZ./TON SILVER	OZ./TON PLATINUM	OZ./TON PALLADIUM	% Cu	% Pb	% Zn
"Assay Analysis"								
Carbondale Rd	# 1	.010	.05	Trace	Trace	Trace	Trace	.02
	# 2	.004	.08	Trace	Trace	Trace	Trace	Trace
	# 3	.004	.02	Trace	Trace	Trace	Trace	.02
	# 15	.004	Trace	Trace	Trace	Trace	Trace	.01
	# 16	.006	.03	Trace	Trace	.01	Trace	.02
RiverMines Rd	# 7	.004	Trace	Trace	Trace	Trace	Trace	.01
	# 11	.004	.06	Trace	Trace	Trace	Trace	Trace
	# 12	.002	.05	Trace	Trace	Trace	Trace	.01
	# 14	.004	.06	Trace	Trace	.01	Trace	.01
Lynx Creek	# 17	.006	.05	Trace	Trace	Trace	Trace	.01
Race Horse Ck	# 18	.008	Trace	Trace	Trace	.02	Trace	.01
	# 19	.004	.03	Trace	Trace	.02	Trace	.02
	# 20	.036	.60	Trace	Trace	3.59	Trace	.01
	# 21	.028	.06	Trace	Trace	Trace	Trace	.01

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

[redacted]
Assayer

Rejects retained one month.
Pulps retained one month
unless specific arrangements
are made in advance.

Crowsnest Volcanics - Whole Rock Analysis Samples 1-5
Saskatchewan Research Council - Page 1

Element	Symbol		#1	#2	#3	#4	#5
LUTETIUM	LU	P.P.M.	0.5	1.3	0.6	2.7	1.4
YTTERBIUM	Yb	P.P.M.	2.68	2.77	1.83	4.16	2.93
ERBIUM	Er	P.P.M.	0.5	0.5	0.5	0.5	0.9
TERBIUM	T6	P.P.M.	2	2	2	2	2
DYSPROSIUM	Dy	P.P.M.	0.5	1.9	1.9	0.5	1.5
EUROPIUM	Eu	P.P.M.	2.6	3.2	0.9	3.3	2.7
NEODYMIUM	ND	P.P.M.	39	39	24	46	46
CERIUM	CE	P.P.M.	142	110	48	147	163
ARSENIC	AS	P.P.M.	8.6	0.2	7.8	2.8	1.3
ANTIMONY	SB	P.P.M.	0.2	0.2	0.2	0.2	0.2
COPPER	CU	P.P.M.	200	210	14	121	281
TITANIUM OXIDE	Tio2	%	0.73	0.66	0.27	0.82	0.75
ZIRCONIUM	Zr	P.P.M.	182	229	58	232	195
YTTRIUM	Y	P.P.M.	11	16	12	10	11
LANTHANUM	La	P.P.M.	72	51	17	70	82
THORIUM	Th	P.P.M.	29	21	5	34	35
STRONTIUM	Sr	P.P.M.	785	827	77	683	719
BARIUM	Ba	P.P.M.	5300	4100	514	3900	5500
NICKEL	Ni	P.P.M.	2	2	21	1	2
MOLYBDENUM	Mo	P.P.M.	5	5	5	5	7
PHOSPHORUS	P2o5	%	0.2	0.16	0.17	0.36	0.26
ZINC	Zn	P.P.M.	133	116	87	1981	125
CADIUM	Cd	P.P.M.	1	1	1	3	1
COBALT	Co	P.P.M.	19	18	4	30	16
MANGANESE OXIDE	Mno	%	0.167	0.302	0.006	0.243	0.143
CROMIUM	Cr	P.P.M.	4	8	57	9	6
VANADIUM	V	P.P.M.	347	269	145	696	400
BERYLLIUM	Be	P.P.M.	7.8	9.0	1.3	20.5	8.3

Crownsnest Volcanics - Whole Rock Analysis Samples 1-5
Saskatchewan Research Council - Page 2

ALUMINUM OXIDE	AL203	%	16.19	16.91	6.29	13.24	16.17
IROX OXIDE	Fe203	%	7.02	6.91	1.86	12.36	6.26
CALCIUM OXIDE	CAO	%	1.246	0.677	0.801	1.018	1.065
MANGANESE OXIDE	MGO	%	0.699	0.861	0.895	1.350	0.699
POTASIUM OXIDE	K20	%	11.75	10.56	1.16	9.3	13.10
SODIUM OXIDE	Na20	%	.755	.241	.355	1.647	.702
LEAD OXIDE	PBO2	P.P.M.	43	23	10	32	36
SILICON OXIDE	Sio2	%	60.3	61.3	86.2	58.8	60.7
LOSS ON IGNITION		%	2.5	3.5	4.3	3.4	1.7
PLATINUM	PT	P.P.M.	5	5	5	5	5
PALADIUM	PD	P.P.M.	5	5	5	5	5
GOLD	AU	P.P.M.	23	11	17	13	12

ALBERTA
RESEARCH
COUNCIL

November 9, 1989

Ou File: 3690-C-3

Mr. Leroy L. Gilbert
Aggregate Exploration Consultants Ltd.
Box 295
Stony Plain, Alberta
T0E 2G0

Dear Mr. Gilbert:

Samples 1 through 5 were sent to the Saskatchwan Research Council for whole rock analyses. Each sample underwent atomic absorbtion and/or inductively coupled plasma analyses. These analyses determine the amount of identified elements in each sample. The results are indicated in two forms; the oxides are represented in percent and the elements are identified in parts per million (ppm) or parts per billion (ppb) where indicated. These results can be compared to the rock descriptions from the report presented to you, dated July 21, 1989. The results will provide further information regarding the elements present in the samples.

The cost for the analyses is $549.65 plus $401.45 preparation and handling time. An invoice for these amounts will follow shortly. Please append the results to your report dated July 21, 1989. If you have any futher questions please call.

Sincerely,

Doug Boisvert
Industrial and Metallic Minerals Section
Alberta Geological Survey

DB/mf

attachment

250 Karl Clark Road
Edmonton, Alberta
Canada
403/450-5111
Telex 037-2147
(RESEARCH EDM)

Mailing address
PO Box 8330
Postal Station F
Edmonton, Alberta
Canada T6H 5X2

ICP Analytical Report

Report for File Name M562 Data Collected on 10-10-1989 time 09:32:57

M562 A.R.C. BOISVERT OCT. 2/89 (6) PG. 953 [.125 GM HF DIGESTION]

1	LU	HF/HNO3/HCLO4	ICP
2	YB	HF/HNO3/HCLO4	ICP
3	ER	HF/HNO3/HCLO4	ICP
4	TB	HF/HNO3/HCLO4	ICP
5	DY	HF/HNO3/HCLO4	ICP
6	EUO	HF/HNO3/HCLO4	ICP
7	ND	HF/HNO3/HCLO4	ICP
8	CE	HF/HNO3/HCLO4	ICP
9			

	Lu	Yb	Er	Tb	Dy	Eu	ND	CE
CG504	0.8	2.73	2.0	2	4.1	0.5	33	78
SAMPLE # 1	0.5	2.68	0.5	2	0.5	2.6	39	142
SAMPLE # 2	1.3	2.77	0.5	2	1.9	3.2	39	110
SAMPLE # 3	0.6	1.83	0.5	2	1.9	0.9	24	48
SAMPLE # 4	2.7	4.16	0.5	2	0.5	3.3	46	147
SAMPLE # 5	1.4	2.93	0.9	2	1.5	2.7	46	163

REPORT
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1562 A.R.C. BOISVERT OCT. 2/89 (6) PG. 953 [.125 GM HF DIGESTION]

1 AS HNO3/HCL AA HYDRIDE
2 SB HNO3/HCL AA HYDRIDE
3
4
5
6
7
8
9

	AS	SB
CG504	5.2	0.2
SAMPLE # 1	8.6	0.2
SAMPLE # 2	0.2	0.2
SAMPLE # 3	7.8	0.2
SAMPLE # 4	2.8	0.2
SAMPLE # 5	1.3	0.2

ICP Analytical Report

Report for File Name M560 Data Collected on 10-02-1989 time 23:10:57

M560 A.R.C. BOISVERT OCT. 2/89 (6) PG. 953 [.125 GM HF DIGESTION]

1	CU	HF/HNO3/HCLO4	ICP
2	TIO2	HF/HNO3/HCLO4	ICP
3	ZR	HF/HNO3/HCLO4	ICP
4	Y	HF/HNO3/HCLO4	ICP
5	LA	HF/HNO3/HCLO4	ICP
6	TH	HF/HNO3/HCLO4	ICP
7	SR	HF/HNO3/HCLO4	ICP
8	BA	HF/HNO3/HCLO4	ICP
9	NI	HF/HNO3/HCLO4	ICP

	Cu	TiO2	Zr	Y	La	Th	Sr	BA	Ni
CG504	4	0.35	128	19	33	11	82	171	25
SAMPLE # 1	200	0.73	182	11	72	29	785	5300	2
SAMPLE # 2	210	0.66	229	16	51	21	827	4100	2
SAMPLE # 3	14	0.27	58	12	17	5	77	514	21
SAMPLE # 4	121	0.82	232	10	70	34	683	3900	1
SAMPLE # 5	281	0.75	195	11	82	35	719	5500	2

ICP Analytical Report

Report for File Name M560 Data Collected on 10-02-1989 time 23:10:57

M560 A.R.C. BOISVERT OCT. 2/89 (6) PG. 953 [.125 GM HF DIGESTION]

1	MO	HF/HNO3/HCLO4	ICP
2	P2O5B	HF/HNO3/HCLO4	ICP
3	ZN	HF/HNO3/HCLO4	ICP
4	CD	HF/HNO3/HCLO4	ICP
5	CO	HF/HNO3/HCLO4	ICP
6	MNO	HF/HNO3/HCLO4	ICP
7	CR	HF/HNO3/HCLO4	ICP
8	V	HF/HNO3/HCLO4	ICP
9	BE	HF/HNO3/HCLO4	ICP

	Mo	P2O5	Zn	Cd	Co	MnO	Cr	V	Be
CG504	5	0.10	36	1	9	0.066	124	53	1.8
SAMPLE # 1	5	0.20	133	1	19	0.167	4	347	7.8
SAMPLE # 2	5	0.16	116	1	18	0.302	8	269	9.0
SAMPLE # 3	5	0.17	87	1	4	0.006	57	145	1.3
SAMPLE # 4	5	0.36	191	3	30	0.243	9	696	20.5
SAMPLE # 5	7	0.26	125	1	16	0.143	6	400	8.3

REPORT
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A560 A.R.C. BOISVERT OCT. 2/89 (6) PG. 953 (.125 GM HF DIGESTION)

1	AL2O3	HF/HNO3/HCLO4	AA
2	FE2O3	HF/HNO3/HCLO4	AA
3	CAO	HF/HNO3/HCLO4	AA
4	MGO	HF/HNO3/HCLO4	AA
5	K2O	HF/HNO3/HCLO4	AA
6	NA2O	HF/HNO3/HCLO4	AA
7	PBO2	HF/HNO3/HCLO4	AA BKG CORR
8	SIO2	FUSION	ICP
9	LOI	900 C	

	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	PBO2	SIO2	%LOI
CG504	11.62	3.05	5.143	5.977	5.43	1.096	11.	62.6	
SAMPLE # 1	16.19	7.02	1.246	0.699	11.75	0.755	43.	60.3	2.5
SAMPLE # 2	16.91	6.91	0.677	0.861	10.56	0.241	23.	61.3	3.5
SAMPLE # 3	6.29	1.86	0.801	0.895	1.16	0.355	10.	86.2	4.3
SAMPLE # 4	13.24	12.36	1.018	1.350	9.30	1.647	32.	58.8	3.4
SAMPLE # 5	16.17	6.26	1.065	0.669	13.10	0.702	36.	60.7	1.7

REPORT
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563 A.R.C. BOISVERT OCT. 2/89 (5) PG. 953 [FIRE ASSAY]

1 AU ppb FIRE ASSAY AA
2 PT FIRE ASSAY
3 PD FIRE ASSAY
4
5
6
7
8
9

	AUppb	PTppb	PDppb
SAMPLE # 1	23.	5.	5.
SAMPLE # 2	11.	5.	5.
SAMPLE # 3	17.	5.	5.
SAMPLE # 4	13.	5.	5.
SAMPLE # 5	12.	5.	5.

ALBERTA
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July 21, 1989

Our File: 3690-6

Leroy L. Gilbert
Aggregate Exploration Consultants Ltd.
Box 295
Stony Plain, Alberta
T0E 2G0

Dear Mr. Gilbert,

The enclosed information is a result of analyses performed on five samples submitted as per our revenue research agreement dated June 22, 1989. The information includes petrographic descriptions and assays of each of the five samples. In addition, whole rock geochemical analyses will be performed on the samples, at our cost, and appended to this report when the analyses are complete.

If you have questions concerning the petrographic descriptions, please contact John Wilson at 439-1694 (except during the period of July 20 -31). Mr. Wilson is the geological consultant who performed the petrographic descriptions. Mr. Wilson has indicated that he would be available for private consultation should you be interested in assessing your property.

If you have any questions concerning the report please contact myself or Doug Boisvert. Please expect the invoice to follow shortly.

Sincerely,

Wylie Hamilton
Alberta Geological Survey

250 Karl Clark Road
Edmonton, Alberta
Canada
403/450-5111

Telex 037-2147
(RESEARCH EDM)

Mailing address
PO Box 8330
Postal Station F
Edmonton, Alberta
Canada T6H 5X2

A PETROGRAPHIC STUDY OF FIVE SAMPLES FROM THE CROWSNEST FORMATION OF SOUTHWESTERN ALBERTA.

BY

JOHN WILSON

INTRODUCTION

The Crowsnest Formation (Crowsnest Volcanics) are a sequence of volcanic rocks (trachyte, phonolite, blairmorite, agglomerate, and tuff, with minor interbedded sediments) derived from explosive eruptions in the Lower Cretaceous (approximately 96 million years ago). Blairmorite is a rare, analcite-rich phonolite (MacKenzie 1914) only reported from the Crowsnest area and the Zambezi valley in Africa. The eruptions deposited the rocks into an inland floodplain, from at least three volcanic centres (Norris 1964; Pearce 1968). The lack of thick lavas indicates that the type of volcanicity was explosive.

Mackenzie estimated that the volcanics once covered approximately 700 square miles (1810 square km), comprising 50 cubic miles (209 cubic km) of material and has a preserved thickness of 1400 feet (426 m).

At its base the Crowsnest Formation interfingers with the non-marine Blairmore Group sediments below (Norris 1964). The volcanics are overlain sharply by the marine shales of the Alberta Group.

SUMMARY OF THE PETROGRAPHY

The five samples examined, although altered, appear typical of the common rock types of the Crowsnest Formation as described by previous workers. With the exception of the sandstone (sample #3), all are pyroclastic rocks. Samples 2,3,4, and 5 contain trace to minor amounts of opaque minerals, probably magnetite and unidentified sulphides. They appear to be primary, being incorporated into the rock when it was deposited.

Sample 1, in addition to magnetite, contains significant amounts of sulphide mineralization. This mineralization is of two types; one is similar to the magnetite/sulphide mineralization in the other samples; the second is in fragments of agglomerate which are reworked into sample 1. This is interesting, since it indicates that sulphide mineralization ocurred very early in the history of the volcanics, probably within the vent, or close to it,while the volcano was still active. The mineralized agglomerate was then

broken up in a subsequent eruption and the fragments incorporated into sample 1.

A polished section of sample 1 was prepared. The presence of sulphide mineralization in the reworked agglomerates was confirmed by examination. In addition, microscope examination revealed rare flecks of visible gold in these fragments.

MINERALIZATION

The assay results indicate encouraging gold values in all the samples except #2. The uniformity of the values, given that only samples 1 and 5 are the same rock type suggests either a pervasive mineralization which occurred after deposition of the rocks (ie. the minor groundmass sulphides observed in all samples), or an early mineralization of underlying rocks which has been incorporated into the later ones (ie. the reworked agglomerate fragments in sample 1).

In either case, the question arises as to why sample 2 is not mineralized? If the mineralization is pre-existing and reworked into these samples, then sample 2 may represent an agglomerate from a different volcanic vent which was not mineralized. The fact that the suite of fragments in agglomerate #2 is less varied than the others, bears this idea out.

If the mineralization was controlled by the location of vents then it becomes important to attempt to locate these vents. If the mineralization is present in greater amounts in underlying beds which are then incorporated in these samples, it then becomes important to locate these beds. Obviously the controls on mineralization are complex, and detailed work is required before an exploration program can be fully developed.

RECOMMENDATIONS

1) Detailed field work in the area to determine:
   a. a stratigraphic framework for the property.
   b. the extent of the horizons which gave good assay values.
   c. the field relationships of the mineralized rocks.
   d. any indication of the location of source vents for the rocks.
   e. as far as possible a genetic history of the rocks on the property.

2) Detailed sampling program of all the rock types on the property to provide:

a. samples for a petrographic analysis (thin and polished section work) in order to petrographically characterize the rock types.
b. samples for geochemical analysis and assay to determine the extent of the mineralization, the presence of any indicator elements (eg. arsenic), and the relationship of the mineralization to the stratigraphic framework and petrography.

3) Modelling of the mineralization. Based upon the above results, develope a model for the mineralization to facilitate further exploration. For example attempt to answer the question posed in the mineralization section above.

4) Diamond drilling in order to establish:
   a. the extent of mineralization beyond the exposed sections.
   b. answer stratigraphic problems posed by the field work (eg. attempt to correlate horizons between isolated exposures).
   c. test the idea that there may be an early mineralized zone below the exposed section.

REFERENCES.

MacKenzie, J. D., (1914): The Crowsnest Volcanics; Geological Survey of Canada, Museum Bulletin No. 4, Geological Series No. 20, 34 pages.

Norris, D, K., (1964): The Lower Cretaceous of the southeastern Canadian Cordillera; Bulletin of Candian Petroleum Geology, vol. 12, Field Conference Guidebook, pp. 201-237.

Pearce, T. H., (1970): The analcite-bearing volcanic rocks of the Crowsnest Formation, Alberta; Canadian Journal of Earth Sciences, vol. 7, pp. 46-66.

GLOSSARY OF TERMS

AGGLOMERATE - a chaotic assemblage of coarse volcanic rock fragments.

ALKALI FELDSPAR - a group of calcium- to sodium-rich feldspars including sanidine, albite, orthoclase and microcline.

ANALCITE - $NaAlSi_2O_6.H_2O$.

BLAIRMORITE - a porphyritic extrusive rock consisting primarily of analcite in a matrix of analcite, alkali feldspar and pyroxene.

DETRITAL - fragmentary material which is introduced into a rock at the time of its deposition, not by chemical precipitation or later alteration.

FELSITE - light coloured, fine-grained rock composed predominantly of feldspar.

MICROLITE - microscopic mineral, commonly lath shaped, which may be too small to identify positively.

PHENOCRYST - relatively large crystal set in a finer-grained matrix.

PHONOLITE - an extrusive rock composed of alkali feldspar, minor dark minerals (eg. pyroxene) and any feldspathoid (eg. analcite).

PYROXENE - a group of dark, silicate minerals containing calcium, sodium, iron, magnesium and aluminium.

SANIDINE - one of the alkali feldspars containing potassium ($KAlSi_3O_8$)

TRACHYTE - fine-grained extrusive volcanic rock containing alkali feldspar and minor dark minerals as the prominant constituents.

TUFF - volcanic rock formed by the explosive ejection of material during an eruption (eg. the ash from Mount Saint Helens).

APPENDIX A: Petrographic descriptions of samples 1 to 5 from the Crowsnest Formation, Alberta.

The following are brief petrographic descriptions of hand specimens and thin sections from the Crowsnest Formation. They are general descriptions of the textures and mineralogy encountered. Detailed mineralogy of the sometimes complexly zoned minerals is not included. This would have involved extra time and would not add significantly to our knowledge of the general origin of the rocks and their mineral potential.

To prevent monotonous repetition, rock types encountered as fragments in the agglomerates are only described in detail when first encountered. Thus trachyte and phonolite fragments are described for sample #1 although their presence is mentioned in other samples.

SAMPLE: #1

ROCK NAME: Agglomerate.

HAND SPECIMEN DESCRIPTION:

Dark grey rock composed of angular to rounded fragments (up to 1 cm across) of various volcanic rock types. Larger fragments are of blairmorite and trachyte and phonolite. Smaller fragments are of felsite, feldspar phenocrysts, and the volcanics mentioned above. The groundmass is too fine-grained to identify in hand specimen.

One rock type is present as small to medium-sized fragments and consistently contains sulphide mineralisation. The possible presence of visible gold in these fragments was confirmed by the examination of a polished section. Isolated grains of sulphides are also present scattered through the groundmass.

THIN SECTION DESCRIPTION:

Blairmorite fragments are composed of equigranular phenocrysts of analcite with rare garnet and and sanidine. The analcite is reddish to green, and partly altered. The matrix has a similar composition and has a granular texture due to the analcite crystals. Minor amounts of pyroxene are present in the matrix. The texture is is dominated by the equigranular analcite, except locally where a crude flow texture is present.

Trachyte fragments are composed of a mosaic of interlocking sanidine crystals with minor laths of pyroxene and a trace of opaques. Phonolite fragments are similar to trachyte, but contain analcite. The small size of the fragments does not always permit the separation of trachyte and phonolite.

Some fragments consist of agglomerate. These are the mineralised grains which contain the gold. They are made up of fragments of very fine-grained felsite, trachyte or phonolite groundmass, and sanidine crystals in a groundmass of altered alkali feldspar microlites and analcite. The mineralization is present as blebs and grains scattered through the fragments.

Several of the larger fragments are heavily altered, but remnant textures suggest that they were blairmorite and tuff.

Smaller fragments are commonly monocrystalline sanidine, probably derived from the trachytes or phonolites, very fine-grained felsite, carbonate, trachyte and phonolite, and mineralized agglomerate.

The groundmass consists of very small fragments of the above described rocks, set in an altered mass of alkali feldspar, pyroxene and garnet. There is some evidence of a flow texture around some of the larger fragments.

Mineralization is also present in the groundmass of sample #1.

MINERALISATION:

The mineralisation is primarily sulphides and only occurs as disseminated grains in the incorporated agglomerate fragments or as larger patches within the matrix. This indicates that, at least some of the mineralisation, formed early in the history of the rock. It must have been implaced within the first agglomerate prior to its incorporation in sample #1. The matrix grains of sulphides may represent pieces eroded from the early agglomerate, or they may be a second phase of mineralization which formed after sample #1.

REMARKS:

This agglomerate contains fragments of most of the rock types found in the Crowsnest Formation. The rock formed explosively during an eruption which broke off fragments of pre-existing volcanic rocks from the walls of the eruptive vent and deposited them in this chaotic assemblage. Some of the rock types were at least partly altered prior to this eruption, and others, including the groundmass, were altered by interaction with groundwater after deposition of the agglomerate.

SAMPLE: #2

ROCK NAME: Agglomerate.

HAND SPECIMEN DESCRIPTION:

Grey to greenish grey rock composed of rare, large volcanic fragments in a matrix of small fragments and groundmass. Single large fragment is 2 cm across. It is composed of phenocrysts in a flow textured matrix. Small fragments are single crystals of volcanic rock fragments, and the groundmass is not as fine as #1. There is no obvious sulphide mineralization.

THIN SECTION DESCRIPTION:

The large fragment consists of broken crystals of alkali feldspar in a flow textured groundmass of analcite crystals and alkali feldspar, with minor amounts of garnet and opaques. Red, possibly hematitic, alteration is present around the large broken grains of alkali feldspar, and they contain small, altered inclusions, which may represent remnant perthitic textures. This is a phonolite.

Several smaller fragments consist of a very fine-grained alkali feldspar groundmass in which sit sanidine crystals. Biotite is present intimately associated with sanidine. The groundmass has a flow texture around the phenocrysts. This is a trachyte.

Other fragments consist of sanidine phenocrysts and the groundmass of volcanics. The groundmass fragments are too small to distinguish rock type with certainty, but, they are frequently rich in altered analcite crystals and alkali feldspar, with minor garnet and opaques, indicating that probably both phonolite and trachyte are present.

The groundmass of this agglomerate has a composition similar to the small volcanic rock fragments.

MINERALISATION:

Very minor amounts of unidentified opaques (probably magnetite) are present. There is however, no mineralization similar to sample #1.

REMARKS:

The fragments in this agglomerate represent a much less varied suite of rocks than sample #1. This may indicate an origin from a different vent, or a long hiatus between the two eruptions.

SAMPLE: #3

ROCK NAME: Sandstone

HAND SPECIMEN DESCRIPTION:

Dark grey, very well sorted, very fine-grained sandstone. The hand specimen shows no apparent variation in grain size or obvious bedding. Minor fractures cut the rock sub-parallel to the assumed bedding direction.

THIN SECTION DESCRIPTION:

Rock consists of very well sorted, subangular to subrounded quartz grains averaging 75 microns (0.075 mm) across. Quartz is by far the most common mineral, but minor amounts of alkali feldspar, chert, detrital carbonate, and biotite are also present. Rare opaque grains appear to be detrital.

What little groundmass is present appears to be a brown (possibly hematite stained) clay.

MINERALISATION:

The rare opaque minerals (magnetite and/or sulphides) are mainly detrital, although a few grains close to the microfractures may have formed in place.

REMARKS:

The preponderance of quartz in this sample indicates that the sandstone was not derived primarily from erosion of the volcanics. There may be a volcanic component represented by the alkali feldspar and the opaques, but it is minor.

The high degree of sorting and lack of volcanic rock fragments indicates that the sandstone was deposited in a hiatus in the volcanic activity. It may even be part of the Blairmore Group which underlies the Crowsnest Formation and interfingers with it near the base.

SAMPLE: #4

ROCK NAME: Phonolitic tuff

HAND SPECIMEN DESCRIPTION:

Medium, greenish grey, very fine-grained rock. Rare volcanic fragments at one end of the sample, but otherwise it exhibits a uniform texture. Patchy, locally hematitic, alteration is present throughout. This alteration appears strongest at the edges of the sample and probably represents recent surficial alteration. The rock is softer than previous samples.

THIN SECTION DESCRIPTION:

Remnant tuffaceous textures (altered shards) indicate the origin of this sample. Mineralogically it is the same as the phonolites. Equigranular sanidine and analcite phenocrysts predominate. These are small (<0.5mm). Minor amounts of garnet and laths of pyroxene are also present. The groundmass has a similar composition to the phenocrysts, being composed of small laths of alkali feldspar and analcite. Reddish brown alteration is present locally and there are minor opaques (magnetite/sulphides).

A rough alignment of the feldspar laths gives the rock a suggestion of a flow texture. The shard textures are only seen locally and are most obvious under crossed polars. Without them the rock could be classified as a fine-grained analcite phonolite flow. The rock is altered throughout.

There is some suggestion of fragmental texture throughout the rock, but it is most obvious at one end where recognizable fragments of phonolite and possibly blairmorite are incorporated into the rock.

MINERALISATION:

The minor opaque minerals are probably magnetite and sulphides, as in the groundmass of previous samples.

REMARKS:

The evidence for the tuffaceous origin of this rock is subtle but definite. It represents a pyroclastic equivalent of the phonolites present elsewhere in the Crowsnest Formation. The suggestion of a flow texture suggests that it was deposited at a high temperature, not as a simple air-

fall. It may be a basal surge deposit, which would indicate relative proximity to a vent. The rock may be more fragmental than it appears. The fragments are now indistinguishable due to alteration.

SAMPLE: #5

ROCK NAME: Agglomerate.

HAND SPECIMEN DESCRIPTION:

Medium grey to buff, matrix supported, fragmental rock. Fragments are all smaller than 1 cm, and appear to represent numerous different rock types. The rock is fresher then previous samples. Appears to have less magnetite and sulphides than samples 1, 3, and 4. sulphide mineralization.

THIN SECTION DESCRIPTION:

Larger fragments consist of fresh examples of typical trachyte, phonolite, tuff, and broken sanidine phenocrysts. One fragment of rock composed entirely of pyroxene laths was identified. One fragment, which may be a tuff, consists of opaques and alkali feldspar with one grain of biotite.

The groundmass consists of numerous broken sanidine phenocrysts, rare analcite fragments, and small fragments of volcanic rock groundmass, in a very fine-grained mass composed of alkali feldspar and pyroxene. Some reddish brown alteration is present.

MINERALISATION:

Minor grains of opaques are scattered through the sample, as previous samples

REMARKS:

This is the freshest sample submitted. It thus contains the best examples of the different rock types found in the agglomerates.

Compared to samples #1 and #2 this sample has more matrix. This may indicate a greater amount of tuffaceous material in the eruption which formed it.

ALBERTA RESEARCH COUNCIL

October 27, 1989

File # 3690-C3-6-2

Mr. Leroy L. Gilbert
Aggregate Exploration Consultants Ltd.
Box 295
Stony Plain, Alberta
T0E 2G0

Dear Mr. Gilbert:

The enclosed information is a result of analyses performed on samples 6, 7, 9 and 11 submitted as per our revenue research agreement dated August 30, 1989. The information includes petrographic descriptions and assays of each of the four samples, and assays on samples 8, 10, 11, 12, 13, and 14.

In addition, I have included with this report the assay values for samples from the Carbondale Rd., Beaver Mines Rd., Lynx Creek and Race Horse Creek areas. Several of these samples are interesting and may warrant further analyses.

If you have any questions concerning the petrographic descriptions, please contact John Wilson at 439-1694. If you have any questions concerning the report or additional work please contact me at your convenience. Please expect invoices to follow shortly.

Sincerely,

Doug Boisvert
Metallic and Industrial Minerals Section
Alberta Geological Survey

DB:mb

Enclosure

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type of mineralization. This consists of minor amounts of sulphides which have both a detrital and authigenic origin. This is essentially the type of mineralization which was observed in the previous samples described.

Sample #9 has mineralization of a different type, consisting of sulphide and copper minerals. This mineralization also appears to occur only as a secondary enrichment along fractures. It consists most obviously of malachite and azurite, with minor amounts of chalcopyrite and tetrahedrite/tennantite, with possibly some chalcocite.

The distinctive colour of the azurite and malachite in sample #9 should be a great help in defining the extent of the mineralized zone. In addition, the pale green unmineralized host rock is also distinctive and should prove to be a mappable unit whose outline and thickness may indicate the location of the vent from which it issued, and consequently, the probable source of the mineralization. Any geochemical work on this, or similar samples, should include antimony and arsenic to distinguish tetrahedrite and tennantite.

RECOMMENDATIONS

These have not changed from the previous report. The additional data presented here adds to, but does not significantly change the picture.

REFERENCES

MacKenzie, J.D., (1914): The Crowsnest Volcanics; Geological Survey of Canada, Museum Bulletin No. 4, Geological Series No. 20, 34 pages.

Norris, D.K., (1964): The Lower Cretaceous of the southeastern Canadian Cordillera; Bulletin of Canadian Petroleum Geology, vol. 12, Field Conference Guidebook, pp. 201-237.

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PHONOLITE - an extrusive rock composed of alkali feldspar, minor dark minerals (e.g., pyroxene) and any feldspathoid (e.g., analcite).

PYROXENE - a group of dark, silicate minerals containing calcium, sodium, iron magnesium and aluminum.

SANIDINE - one of the alkali feldspars containing potassium ($KAlSi_3O_8$)

TRACHYTE - a fine-grained extrusive volcanic rock containing alkali feldspar and minor dark minerals as the prominent constituents.

TUFF - volcanic rock formed by the explosive ejection of material during an eruption (e.g., the ash from Mount Saint Helens).

APPENDIX A: Petrographic descriptions of Beaver Mines Rd., samples 6, 7, 9 and 11, from the Crowsnest Formation, Alberta.

The following are brief petrographic descriptions of hand specimens and thin sections from the Crowsnest Formation. They are general descriptions of the textures and mineralogy encountered. Detailed mineralogy of the sometimes complexly-zoned minerals is not included. This would have involved extra time and would not add significantly to our knowledge of the general origin of the rocks and their minerals potential.

SAMPLE: #6

ROCK NAME: Sandstone

HAND SPECIMEN DESCRIPTION:

Medium to dark grey, very fine grained rock. Vague banding is defined by minor variations in the grain size and the proportions of the matrix. Brownish oxidation products are present on exposed fracture faces, and may indicate the presence of siderite.

THIN SECTION DESCRIPTION:

Similar to sample three from the initial report, although the grain size is more variable, and there is more matrix in sample 6.

Grains are predominantly of quartz, with minor amounts (locally up to 10 percent) of chert and rare alkali feldspars. Rare flakes of muscovite are present, and replacement textures suggest the original presence of biotite. The quartz and chert grains are angular and generally poorly sorted. Their size ranges from approximately 300 microns (0.3 millimeters) down to submicroscopic. The quartz grains are commonly clear and unstrained, although, rarely they are strained, polycrystalline or contain inclusions of opaques and biotite.

The matrix consists of finely recrystallized, brownish carbonate, which replaces the original (probably clay) matrix and exhibits minor replacement at the edges of the quartz grains. The proportions of matrix

to grains varies throughout the thin section, although the rock is always matrix supported. Rare isolated grains of opaques are scattered through the matrix.

MINERALIZATION:

The opaques comprise less than one percent of the rock. They consist of cubes of pyrite and irregular blebs of unidentified mineral. Some blebs are surrounded by a halo of reddish alteration, suggesting an iron rich composition. The reddish alteration and metallic sheen indicate that this opaque mineral is magnetite. Some of the well-formed grains may be detrital, but the blebs formed in place after the deposition of the rock.

REMARKS:

The dominance of quartz in this sample indicates that it was not derived from the volcanics, although there may be a volcanic component included. In all probability, the quartz and chert come from a reworking of the Blairmore Group sediments which underlie the Crowsnest Formation. This sandstone probably represents a period of reduced volcanic activity which allowed the reworking and accumulation of previously existing rocks.

SAMPLE: #7

ROCK NAME: Sandstone

HAND SPECIMEN DESCRIPTION:

Medium to dark grey clastic rock. The grain size variation defines a crude bedding, but this is strongly disrupted, probably due to the activities of burrowing organisms when the sediment was unconsolidated.

THIN SECTION DESCRIPTION:

This sample is very similar to sample #3 from the previous project. It consists of angular, well-sorted clasts of quartz and chert. As in sample #6, unstrained quartz predominates. Rare flakes of muscovite and grains of biotite are present. Rare detrital clasts of carbonate suggest that carbonate replacement of the underlying rocks was advanced prior to the deposition of this bed. The average grain size is around 160 microns (0.16 millimeters). Rare alkali feldspar and zircon grains are present.

The matrix is a very minor component and shows no signs of having been replaced by carbonate. Where present, it consists of a reddish-brown mixture of altered biotite and clay. Patches of matrix-rich rock may represent original clasts incorporated in the sandstone during deposition. Some of these patches are elongated and appear to have a crude internal structure. These may be due to bioturbation of the sediment. This feature is the result of the preservation of the feeding burrows of organisms, formed as they moved through the sediment.

Fractures running across the thin section appear reddish due to the concentration of matrix in them. Opaque grains are scattered through the section.

MINERALIZATION:

Opaques within the fractures are probably residual matrix rather than an introduced mineral. The opaque grains scattered through the rock are detrital. This indicates that mineralization occurred prior to deposition of the sandstone. Rarely, blebs of mineralization occur, suggesting a further phase of mineralization after deposition.

REMARKS:

The remarks for sample #6 apply equally well to this sample.

SAMPLE: #9

ROCK NAME: Aegirine-augite trachyte.

HAND SPECIMEN DESCRIPTION:

Pale green crystalline rock. The rock is flecked with spots of darker green malachite and black to metallic grey opaques. Along fractures, the malachite and opaques are more pronounced and are joined by blue azurite.

THIN SECTION DESCRIPTION:

This rock consists of an interlocking mosaic of alkali feldspar crystals. Most of these are probably sanidine. Much of the feldspar is extensively altered to serecite or carbonate. Crystals of aegirine-augite form about twenty percent of the rock. Where the crystals are elongated, they define a coarse flow texture. Rare phenocrysts of aegirine-augite occur up to 2 millimeters in length. Minor amounts of sphene are also present, as are rare grains of partially altered plagioclase.

Fractures cut the rock and are filled with carbonate, quartz, opaques and blue/green and bright green minerals. The carbonate is present as large, secondary grains, which enclose other minerals. The quartz occurs in minor amounts, probably representing remnants of an early fracture fill, the opaque minerals are of two kinds. The most common occurs as irregular patches and has a silvery grey colour in reflected light. These patches may enclose the bright green mineral or clusters of crystals of zeolites (possibly heulandite). The other opaque mineral has a brassy yellow colour and only occurs surrounding irregular patches of the pale blue/green mineral.

The bright green mineral occurs as radiating fibrous aggregates. The strong colour masks the optical properties, but the habit and colour indicate that it is malachite.

The pale blue/green mineral occurs in irregular to botryoidal patches which are commonly surrounded by a thin layer of opaque mineral. It does not appear to have any internal crystal structure. This is azurite.

MINERALIZATION:

Complex mineralogy occurs in the fractures, cutting this rock. The malachite and azurite are the source of the high copper values in the assays. The opaques are probably sulphide alterations of this mineralization.

A polished section of this sample enables identification of the opaques. Minor amounts of grass yellow chalcopyrite ($CuFeS_2$) are present, surrounded by black tetrahedrite ($C_{12}Sb_4S_{13}$) and/or tennantite ($Cu_{12}AsS_{13}$) which are identified by their brownish streak. Geochemical analysis for antimony (Sb) and Arsenic (As) would determine the proportions of these two minerals. The presence of tetrahedrite and/or tennantite could account for the high silver values seen in the assay. Chalcocite (Cu_2S) may also be present among the opaques.

The mineralization in sample #9 is a complex mix of copper minerals and alteration products. Since no visible gold was observed in the polished section, it is assumed that it is locked up within the sulphide minerals.

SAMPLE: #11

ROCK NAME: Sandstone.

HAND SPECIMEN DESCRIPTION:

Medium to dark grey rock very similar to sample #7. The distinctive disruption of the bedding is due to bioturbation prior to consolidation of the sediments.

THIN SECTION DESCRIPTION:

This section is very similar to sample #7. The description is broadly the same. Differences are that this sample has a higher proportion of chert and opaque grains. This sample also contains a few grains of plagioclase feldspar, a mineral which was not seen in the other samples. Minor small grains of a reddish mineral are present in one corner of the thin section. Their small size makes positive identification difficult, but they are probably a zeolite, most likely heulandite.

MINERALIZATION:

As with the other sandstone samples, the mineralization is both detrital land in place.

REMARKS:

The increase in the proportion of chert grains in this sample, and the presence of plagioclase feldspar, suggest a different erosional source than samples #6 and #7. However, it may merely indicate the erosion of a different bed from the underlying Blairmore Group.

Alberta
ENERGY

Petroleum Plaza - North Tower, 9945 - 108 Street, Edmonton, Alberta, Canada T5K 2G6 Telex 037-3676

File No. 6889060002

427-7749

1989 July 17

Mr Larry Donald Ayers and
Leroy L Gilbert Aggregate
Consultants Ltd.
PO Box 927
Stony Plain, Alberta
T0E 2G0

Dear Sirs,

Re: Metallic Mineral Exploration Permit No. 6889060002

I am enclosing your executed copy of the above permit which conveys the rights to explore for metallic minerals within the location described therein.

The lands you applied for were reviewed by the Crown Mineral Disposition Review Committee and have been approved subject to your company conducting exploration in accordance with the Exploration Regulations (Alberta Regulation 423/78). To obtain exploration approval under these Regulations kindly contact:

Doug Lyons
Head, Operations
Forest Land Use Branch
Alberta Forestry, Lands and Wildlife
6th Floor, Bramalea Building
9920 - 108 Street
Edmonton, Alberta T5K 2M4
Telephone: (403) 427-3582

Exploration approval may be subject to specific operating conditions determined during the review of the exploration program. There may be restrictions associated with the protection of land resource values (watershed, wildlife, fisheries, recreation, aesthetics and other renewable/non-renewable resources).

These restrictions may include watershed protection measures, buffer zones, timing constraints, access controls and other operational conditions.

... 2

The following lands are zoned as Critical Wildlife (Zone 2) and General Recreation (Zone 4) areas under the Castle River Sub-Regional Integrated Resource Plan:

Zone 2:

M5 R3 T5: 25L15P, L16P; 34L13; 36L2P

Zone 4:

M5 R3 T5: 34L7P, L10, L11, L14

Surface access to these lands is subject to specific restrictions. For more information contact:

Daryl Wig, Habitat Biologist
Fish & Wildlife
Provincial Building
Box 1139
Blairmore, Alberta
Tel.: 562-7331

There are potential environmental concerns with metallic mineral exploration and development on the requested lands. Significant land resource values occur, including watershed, agriculture (grazing), forestry, recreation, wildlife, and, fisheries, aesthetics and historical resources. There is an existing disposition for grazing, a disposition reservation for surface material removal, and a consultative notation for potential provincial park designation. There is one historic-site and one palaeontological site identified on the requested lands. The resource values disposition and reservations may lead to restrictions for any exploration and development on the requested lands and may preclude these activities in some instances, depending on the location and nature of the exploration or development. Any holder of a Metallic Mineral Exploration Permit will have to obtain the appropriate consents from existing interest holders (i.e. those having dispositions or reservations, including both government and private parties).

You are reminded that at the time of development, a preliminary disclosure may be required to evaluate any proposed major development of the lands (Contact person: Mr Ed Wyldman, Telephone: 427-5598); an Environmental Impact Assessment may be requested if the preliminary disclosure or other information identifies or suggests potential

... 3

environmental concerns (Contact person: Mr Fred Schulte, Telephone: 427-6270); and if any operation, either exploratory or developmental, interferes (or has the potential to interfere) with the existing coal resource, such operation may be subject to the Coal Conservation Act and Regulations (Contact person: Mr R Paterson, Energy Resources Conservation Board, Telephone: 297-8393).

Under Part 3 of the Land Surface Conservation and Reclamation Act, a Reclamation Certificate will be required to ensure that any surface disturbance has been satisfactorily reclaimed. Certificates are issued by Reclamation officers of the Land Conservation and Reclamation Council. On Crown land, the officers are from Alberta Forestry, Lands and Wildlife; on private land they are from Alberta Environment. Contact should be made with Bob Onciul, Senior Reclamation Officer, Land Conservation and Reclamation Council, 3rd Floor, 9820 - 106 Street, Edmonton, Alberta, T5K 2J6; telephone: 427-6212, prior to any site disturbance to ensure proper contact is made with the appropriate area Reclamation Officer.

The Department acknowledges receipt of the fee in the amount of $450.00 and the deposit in the amount of $4,800.00 in the form of cash.

Kindly pay particular attention to your responsibilities under Sections 8(3), 10 and 11 of the Metallic Mineral Regulations, a copy of which is enclosed.

Yours truly,

Eugene Saldanha
Manager
Mineral Agreements

/sla

Enclosures

cc: Doug Lyons, Head Operation
Forest Land Use Branch

Ed Wyldman, Director
Resource Planning Branch

Fred Schulte, Director
Environmental Assessment Division

AGGREGATE EXPLORATION CONSULTANTS LTD.
BOX 295
STONY PLAIN, ALBERTA
T0E 2G0

403 963-0069

August 15, 1989

Larry Donald Ayers &
Leroy L. Gilbert Aggregate Consultants Ltd.
Box 295,
Stony Plain, Alberta
T0E 2G0

Re: Work Completed on your Metallic Mineral Exploration Permit #6889060002 during June & July, 1989.

Supply all personnel, transportation and equipment to survey horizontal and vertical control from Alberta Transportation Castle River Bridge Benchmark to the North Boundary of Section 34-5-3-W5th.

Surveying	14 hrs @ $65.00/hr	$ 910.00
Living Allowance	2 days 2 man crew = 4@ $55.00	220.00
Air Photo Enlargement		66.00
Metallic Mineral Disposition Maps 82-G-8	4@ 4.50	18.00
Geological Survey Map 35-1961	2@ 7.25	14.50
Plotting (Technician)	21 hrs @ $35.00	735.00
		$1,963.50

Yours truly,

[redacted]

Paulette Boudreault-Gilbert

cc: file

AGGREGATE EXPLORATION CONSULTANTS LTD.
BOX 295
STONY PLAIN, ALBERTA
TOE 2GO

403 963-0069

November 10, 1989

Larry D. Ayres & Leroy L. Gilbert Aggregate Consultants Ltd.
Box 295
Stony Plain, Alberta
TOE 2GO

Dear Sirs:

Re: Work Completed on your Metallic Mineral Exploration Permit:

#6889060002

from Aug 16 - Oct 31, 1989.

Supply all personnel, transportation and equipment, etc. to obtain surface grab samples of the Crowsnest Volcanics for Assay, Geochemical Analysis and Petrographic Analysis to provide Technical Information for a Geological Background Report on the above permit area.

Prospecting Crew	34 hrs @ $65.00 =	2,210.00
Living Allowance	4 days x 2 men @ $55.00	440.00
	Sub-Total	2,650.00

Supply all personnel, transportation and equipment, etc. to map the Crowsnest Volcanics occurance on the above permit area to establish what area to add or delete from the permit.

Mapping Crew	51 hrs @ $60.00 =	3,060.00
Living Allowance	5 days x 2 men @ $50.00	500.00
	Sub-Total	3,560.00

Lab Work (Alberta Research Council) 1,915.85

Prospecting	$2,650.00
Mapping	$3,560.00
Lab Work	$1,915.85
TOTAL OF THIS INVOICE:	$ 8,125.85

BREAKDOWN:

#6889060002	=	8,125.85
		$ 8,125.85

Yours truly

[redacted]

Paulette Boudreault-Gilbert

cc: file

MINERAL PERMITS AS OF JANUARY 15/90

60002

PAID	5,250.00
FEE:	450.00
BALANCE:	4,800.00
SURVEY	1,963.50
SAMPLES	
PROSPECTING	2,650.00
MAPPING	3,560.00
LABORATORY	1,915.85
SUB TOTAL	10,089.35
RECEIVED:	4,800.00
BAL JAN/90	5,289.35
REPORT (Approx)	1,500.00
TOTAL:	6,789.35
[redacted]	5,431.48
	1,357.87
OUTSTANDING	6,789.35

Property	5,250.00
Fees	450.00
Agg Work	10,089.35
Report(est)	1,500.00
TOTAL:	17,289.35

Alberta
ENERGY
Mineral Resources Division

METALLIC MINERALS EXPLORATION PERMIT No. 6889060002

Commencement Date: 1989 June 16

A PERMIT of the Metallic Minerals Rights that are the property of the Crown in right of Alberta in the location described in the attached Appendix is hereby granted to

Larry Donald Ayers of an 80% undivided interest and
Leroy L. Gilbert Aggregate Consultants Ltd. of a 20% undivided interest

This permit is subject to

(a) the Mines and Minerals Act, as amended from time to time,

(b) any replacement of all or part of the Mines and Minerals Act from time to time enacted by the Legislature, as amended from time to time, and

(c) the Metallic Minerals Regulation and any other regulations, orders, directives, by-laws or other subordinate legislation from time to time made under any enactment referred to in clause (a) or (b), as amended from time to time, that prescribe, apply to or affect the rights and obligations of a holder of a metallic minerals exploration permit, or that relate to or affect the permittee in the conduct of his operations or activities under the permit.

ISSUED at the City of Edmonton in the Province of Alberta this seventeenth

day of July 19 89

Minister of Energy

APPENDIX

to

METALLIC MINERAL EXPLORATION PERMIT NO. 6889060002

AGGREGATE AREA:

480.00 hectares

DESCRIPTION OF LOCATION AND PERMITTED SUBSTANCES:

M	Rg	Twp	Sec	Part
5	02	005	29	L5,L6,L12
			30	NW,L9,L10,L15
5	03	005	25	L9,L15,L16
			34	L7,L8,L10,L11, L13,L14
			35	L5,L6,L9-L11
			36	L2,L3,L5,L6, L11,L12

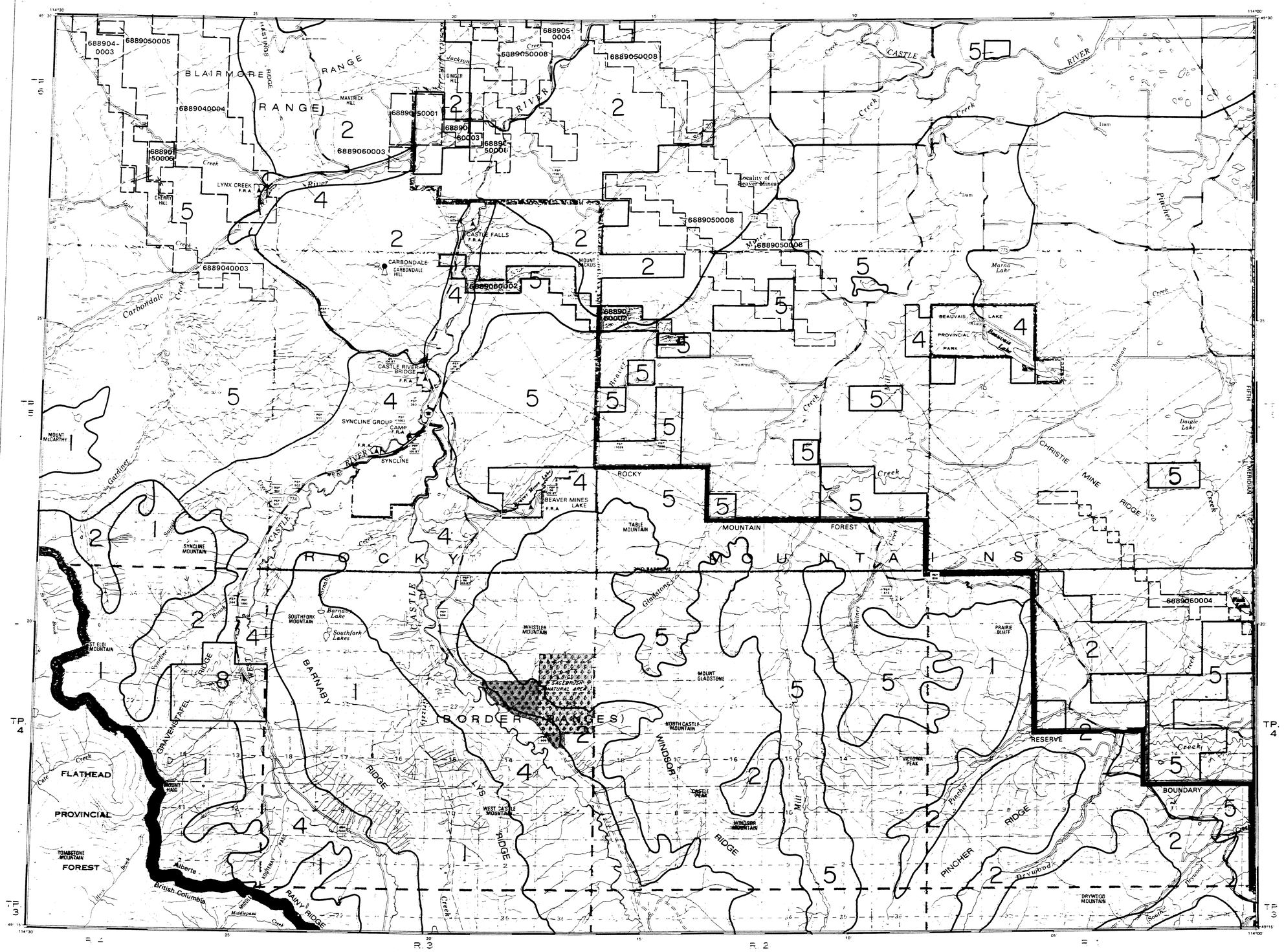
Metallic Mineral

SPECIAL PROVISIONS:

Nil

98

SHEET NO. 82-G-8



Alberta
ENERGY

METALLIC MINERALS DISPOSITION

THIS MAP HAS NO STATUTORY OR REGULATORY SANCTIONS

- Highway Designation: Primary, Secondary
- Hard Surface-All weather
- Loose or Stabilized Surface-All weather (Main route)
- Loose or Stabilized Surface-All weather
- Loose Surface-Dry weather
- Truck Trail
- Seismic Survey Line, Trail
- Highway Interchange
- Bridge
- Ford Crossing (Subject to conditions)
- Railway, Station, Siding or Stop
- Railway (Condition or use unknown)
- Pipeline (Major)
- Transmission Line (Major)
- Communication Tower (100 m+)
- Forest Headquarters
- Ranger Station
- Forestry Cabin
- Forest Recreation Area — Alberta Forest Service — F.R.A.
- Airstrip, Elevation and Length (A.S.L.) in hundreds of feet (Hundreds of metres in brackets)
- Airstrip (Condition unknown)
- Heliport — Transport Canada
- Township Line-Surveyed
- Township Line-Unsurveyed
- Section Line
- Quarter Section Line
- River (Over 20 metres wide)
- River or Creek (Under 20 metres wide)
- Intermittent Creek
- Lake
- Intermittent Lakes
- Gravel Bar, Sand or Mud
- Oil and Gas Activity Site
- Mill Site (Active) — M.S.
- Clearing (Man-made, purpose undefined) — Clg.
- Mine, Quarry or Gravel Pit
- Contours (Source 1:50 000 N.T.S.)
- Indian Reserve, Park Boundary

Lookout (Primary)
Lookout (Secondary)
Lookout (Point or Crawl Tower)
Floatlanding — Alberta Forest Service — A.F.S.
Campsite — Alberta Transportation — A.T.
Helipad — Alberta Forest Service

Township Diagram

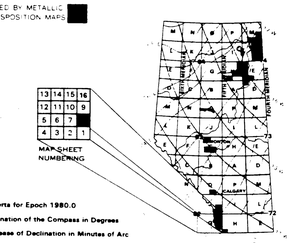
31	32	33	34	35	36
30	29	28	27	26	25
19	20	21	22	23	24
18	17	16	15	14	13
7	8	9	10	11	12
6	5	4	3	2	1

SECTION NUMBERING — LEGAL SUBDIVISION NUMBERING

AREA COVERED BY METALLIC MINERALS DISPOSITION MAPS

13	14	15	16
12	11	10	9
5	6	7	8
4	3	2	1

MAP SHEET NUMBERING



Magnetic Chart of Alberta for Epoch 1980.0
Average Declination of the Compass in Degrees
Average Decrease of Declination in Minutes of Arc

Note: Information as depicted, is subject to change, therefore the Government of Alberta assumes no responsibility for discrepancies at time of use.

WEST OF THE FIFTH MERIDIAN

SCALE 1:50 000

Copies may be obtained at a cost of $4.50 per sheet through:

Alberta Energy,
Administrative Support Branch,
12th Floor, Petroleum Plaza, South Tower,
9915 - 108 Street
Edmonton, Alberta
Canada
T5K 2C9

Telephone (403) 427-7707

Revision Date: 29 AUG 1989

SHEET NO. 82-G-8

LEGEND

- METALLIC MINERALS EXPLORATION PERMIT
- METALLIC MINERALS EXPLORATION APPLICATION
- METALLIC MINERALS LEASE
- CERTIFICATE OF RECORD
- QUARTZ MINERAL EXPLORATION PERMIT
- QUARTZ MINERAL EXPLORATION APPLICATION
- QUARTZ MINERAL LEASE
- METALLIC MINERALS WITHDRAWN FROM DISPOSITION
- REGISTERED RIGHTS OF FIRST REFUSAL — R
- FREEHOLD MINERALS — F
- NATURAL AREA/ECOLOGICAL REserve
- NO SURFACE ACCESS
- CONDITIONAL ACCESS

NOTE:
876090002
a b c d
a Prefix indicates type of agreement: 68-Permit, 26-Lease
b Year
c Month
d Sequence of agreement

METALLIC MINERALS AGREEMENTS

PERMIT	APPLICATION	LEASE
6889040003 / 6889040004	VENTANA EQUITIES INC.	
6889050001	GARY DOUGHLAS ADDISON	89-29 KEN BORDEN INVESTMENT
6889060003 / 6889060004	LEROY L. GILBERT AGGREGATE CONSULTANTS LTD.	
6889050004	KEN BORDEN INVESTMENTS CORP. & LEROY L. GILBERT AGGREGATE CONSULTANTS LTD.	
6889050005 / 6889050006	GERALD RYZNER	
6889050008	MICHIGAN HOLDINGS LTD.	
6889060002	LARRY DONALD AYERS & LEROY L. GILBERT AGGREGATE CONSULTANTS LTD.	

QUARTZ MINERAL AGREEMENTS

PERMIT	APPLICATION	LEASE	CERTIFICATE OF RECORD

EASTERN SLOPES ZONING

1	PRIME PROTECTION
2	CRITICAL WILDLIFE
3	SPECIAL USE
4	GENERAL RECREATION
5	MULTIPLE USE
6	AGRICULTURAL
7	INDUSTRIAL
8	FACILITY

ID 19900002
PERMIT # 6889060002

ARP - 93-4 (1)