Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3094 MAP

GEOCHEMICAL RESEARCH REPORT
ON
THE SALAL CREEK PROJECT

CLAIMS EE 1-15, 17-47, BAT 1-6
BAT 7 FR, BAT 8-9, BALL 1-15, BALL 16 FR

40 MILES N.W. OF PEMBERTON
LAT 50° 45' N - LONG. 123° 40' W 92J/14W

DEC., 1970 - APRIL, 1971

PREPARED FOR:

CERRO MINING OF CANADA LTD.
401-1111 W. GEORGIA ST.
VANCOUVER, B.C.

3094

PREPARED BY:

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REXDALE, ONTARIO

JUNE 8, 1971.

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Report Submitted, June 1971

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1. INTRODUCTION

A geochemical research programme was carried out on the BAT, BALL and EE claims by Barringer Research Limited during the period of December 1970 to April 1971. The work was performed by B. W. Smee of Barringer Research in Vancouver and Dr. P.M.D.Bradshaw, Chief Geochemist, Barringer Research in Toronto. A total of 49 rock samples were studied.

The BAT, BALL, and EE claims are situated approximately 40 miles northwest of Pemberton, B.C., in the Coast Range Mountains. Access is by helicopter from Pemberton. The area is very steep with little or no soil development, few streams, and many glaciers. Outcrop is widespread throughout the property.

The BAT, BALL, and EE claims lie within an area bounded by a recent intrusive complex in which widespread molybdenite occurs in fractures or as a dissemination in the intrusive rock. Occurrences of chalcopyrite and bornite are also known. A definite petrological zonation of this intrusive complex has been mapped and is thought to be related to differentiation of the original magma with coarse to fine grained phases present. Mineralization is noted in all phases.

The purpose of this research programme was to identify zoning in the bedrock genetically related to the mineralization which will:

a) more closely identify the centre of the last (generally most mineralizing) phase;
b) assist in confirming that fractionation and redistribution of elements has occurred which is consistent with the formation of ore deposits.

These data will not necessarily identify exactly the location of mineralization, but will reduce the search area and indicate if concentration of the ore forming elements is likely to have occurred.

Initially the study of fractionation trends on representative samples of the different intrusive phases was made using calcium and potassium as indicators. During rock fractionation the percentage of calcium (contained mainly in plagioclase) decreases while the percentage of potassium (contained mainly in the orthoclase) increases. This results in a marked increase in the K/Ca ratio as fractionation continues. Additional studies have also shown that, particularly at the acid end, K/Rb ratio decreases with increasing fractionation and the Ca/Sr ratio increases.

The samples were also analysed for the common trace elements to ascertain whether a trace element zonation was present.

In order to avoid modal variation between different rock types, samples were crushed and separated magnetically. The non-magnetic (feldspar plus quartz) fraction was used for all determinations.

2. ANALYTICAL METHODS AND SAMPLE PREPARATION

The rock samples were crushed and sieved in stainless steel screens so that a -45 and +150 mesh section was obtained. This section was then washed to remove all dust particles and dried in Kraft envelopes. The -45 and +150 mesh portion was then passed through a magnetic separator several times so that a clean salic fraction of the rock was obtained. The strongly magnetic, magnetic and whole rock fractions of the sample as well as the salic fraction were stored in Kraft paper envelopes. A microscopic examination of the salic fraction revealed samples which contained sulphide mineralization, and these samples were separated from the remaining rocks. The salic fraction was then analysed for calcium, potassium, copper, lead and zinc.

Calcium and potassium, being major rock constituents were analysed separately from the trace elements. 250 milligram samples were weighed into teflon dishes and dissolved using hydrofluoric, perchloric, and nitric acid. The resulting solution was transferred to a 100 milliliter flask and brought up to volume. A further dilution of 10 milliliters into a 100 milliliter flask was required in order to bring the concentration of elements into the range of detection. The final solutions were analysed by atomic absorption spectrophotometry using a Tectron instrument and an air acetylene flame.

The copper, lead, and zinc analyses were performed by dissolving a 250 milligram sample with perchloric acid, adjusting the sample volume to 5 milliliters and analysing by atomic absorption with a Tectron instrument. The work was performed by Mr. D. Read of Barringer's Vancouver laboratory.

3. RESULTS

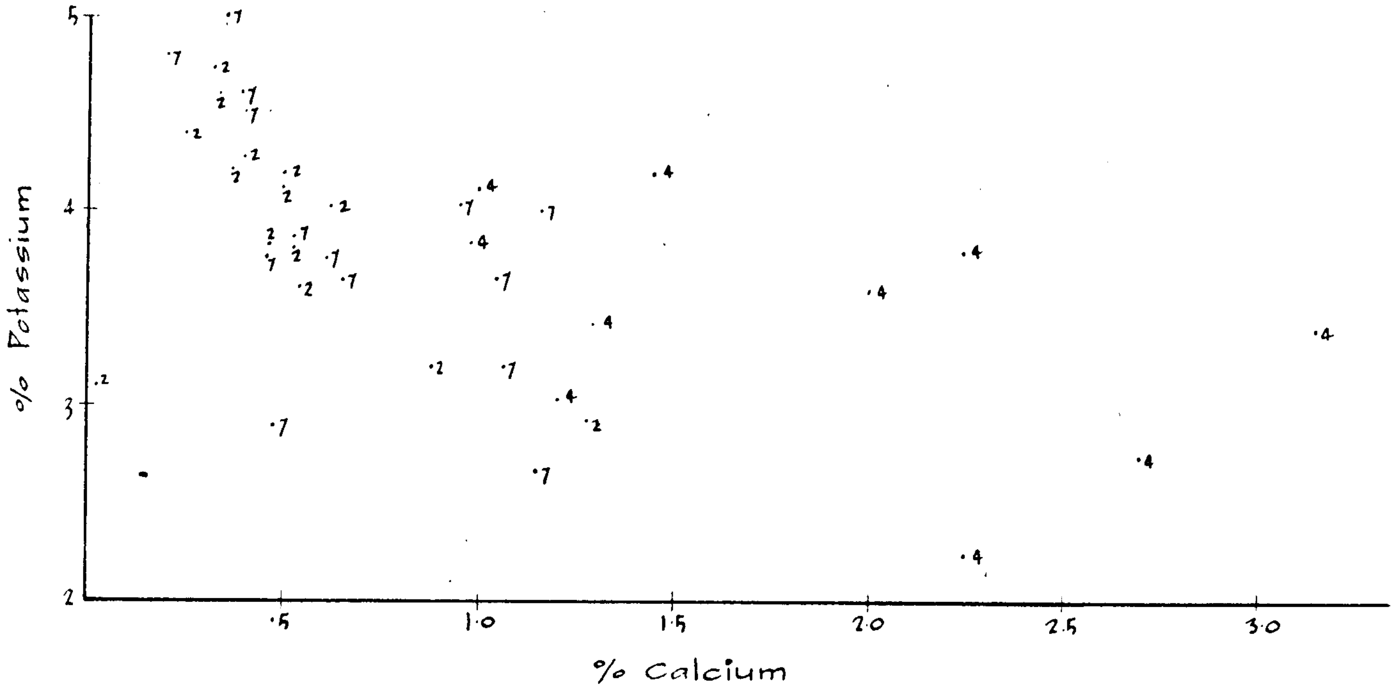
The calcium, potassium, copper, lead and zinc results are shown in Table I and are listed according to rock type as indicated by Cerro Mining. They are subdivided on the basis of fracturing and mineralization.

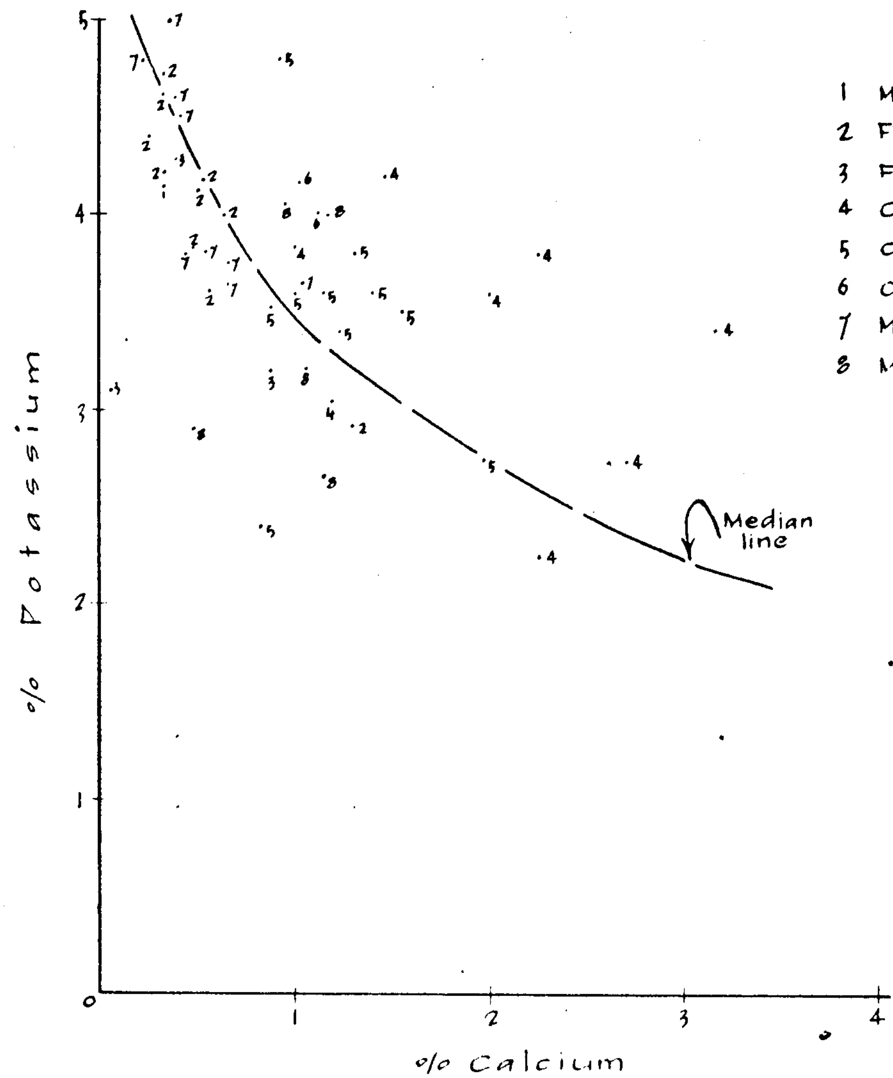
The calcium and potassium results show several interesting features:

1) for each rock type, the mean of the calcium concentration decreases regularly from unfractured to fractured to mineralized, with the exception of the medium grained fractured phase;
2) comparing unfractured, fractured and mineralized rocks between the different phases also shows a decrease in the mean of the calcium concentration from coarse grained to fine grained;
3) the potassium concentration shows a more erratic distribution, but there is a general tendency to increase from coarse to fine grained and from unfractured to fractured rocks;
4) the mean K/Ca ratio increases from unfractured to fractured to mineralized rocks within each type (with the exception of the medium grained unfractured), and from coarse to fine grained, (again with the exception of the medium grained unfractured unit);
5) the trace elements show no systematic variation.

The K/Ca results are plotted in Figure 1. For clarity the unfractured rocks are plotted by themselves on the right hand side and all the results are plotted together on the left. In general a fractionation trend from coarse grained to fine grained is evident. However, as seen in Table I, the medium grained unfractured rocks, on the basis of the K/Ca ratio are the most fractionated.

PLOT OF POTASSIUM (K.) VERSUS CALCIUM (Ca) IN THE SALIC ROCK FRACTION





Legend

1 Medium grained, fractured, mineralized
2 Fine grained, unfractured.
3 Fine grained, fractured.
4 Coarse grained, unfractured
5 Coarse grained, fractured
6 Coarse grained, fractured, mineralized
7 Medium grained, unfractured
8 Medium grained, fractured

Fig. 1

In Table I the individual samples are ranked according to increasing K/Ca ratio, 1 being the lowest and 47 the highest. In the case of two identical ratios, these are labelled A and B. The ranking numbers are plotted on the one inch to 500 feet geological plan supplied by Cerro Mining. From this map it can be seen that the most fractionated samples, i.e. those above 40, fall into two areas. The first group in the fine grained biotite and medium grained biotite granite north of the camp in the area known to contain significant mineralization, and the second group two isolated samples in small outcrops of medium grained granite to the south-southwest.

From these data it may be tentatively concluded that at least part of the medium grained granite is as fractionated as the fine grained granite and therefore is as likely to contain significant mineralization of syngenetic origin as the fine grained phase. Furthermore, both fine grained and medium grained phases show a rough zoning on the basis of the K/Ca ratio, some parts of each of these phases being more fractionated than others. The sample density is far too low at the present time to draw any firmer conclusions.

The use of the K/Ca ratio still however suffers from a disadvantage of modal variations as the potassium and calcium are contained in two separate minerals. This results from sampling errors, particularly in the coarse grained phase, and variable dilution due to quartz. This disadvantage can be largely eliminated by the use of Ca/Sr and K/Rb ratios as strontium substitutes directly for calcium in the plagioclase and rubidium for potassium in the orthoclase, consequently the use of these two ratios very largely eliminates the effect of modal variations once the mafic minerals are separated.

The trace metals show no reliable trend as is normal in the use of studies of this type.

4. CONCLUSIONS

1) The K/Ca ratios shows marked variations in the felsic phase of the 49 samples tested. These variations have been interpreted as related to fractionation.

2) The fine grained rocks generally have a higher K/Ca ratio than the medium grained, and the medium than the fine grained. Also the mineralized rocks generally have a higher ratio than the fractured rocks and these generally a higher ratio than the unfractured rocks. There are several notable exceptions, particularly in part of the medium grained granitic phase, to this general trend. These are interpreted as of possible economic significance.

3) A plot of the ranked K/Ca ratios shows a closed zone of higher ratios north of the camp in an area of significant mineralization. This zone is not confined to one rock type, but covers a small area mapped as both fine and medium grained, indicating that the fine grained phase as mapped is not necessarily the most fractionated. There are also two isolated samples with high K/Ca ratios which may relate to mineralization, but further information is not available at the time of writing.

4) This method is capable of identifying the zones of greatest fractionation and consequently the zones with the greatest potential for syngenetic mineralization, but further orientation samples should be collected and analyses for additional elements undertaken.

5) In detail, the plots of the K/Ca ratios is slightly at variance with the present geological map, however, on the basis of the known mineralization it does make good geological sense. The density of samples is sufficient to warrant further investigations but not to draw any firm conclusions.

5. RECOMMENDATIONS

1) This pilot study should be expanded to include rubidium and strontium analysis. This aspect will be completed as soon as analytical facilities are available.

2) The trace metal analyses to date show no significant trends but analysis should be completed to include molybdenum and mercury. In addition the trace metals, (copper, lead, molybdenum and mercury) should also be determined on the magnetic fraction (but not calcium, potassium, rubidium and strontium)

3) On the basis of the interpretation of the rubidium, strontium and molybdenum, mercury results the sample density should be increased to cover all phases of the intrusive considered as favourable.

BARRINGER RESEARCH LIMITED

PMDB:lh

Peter M. D. Bradshaw, P.Eng.,
Chief Geochemist.

D.K. Mustard, P. Eng.,
Division Geologist,
CERRO MINING COMPANY OF CANADA LIMITED

P. M. D. Bradshaw, Ph.D., E.Eng.

STATEMENT OF QUALIFICATIONS

1. B. Sc. in Geology from Carleton University, Ottawa, Ontario 1962.
2. Ph.D. in Geology from Durham University, Durham City, U.K., 1965.
3. Lecturer in Applied Geochemistry, Imperial College, London, U.K. 1965 - 1969.
4. Registered as Chartered Engineer in U.K., 1966.
5. Chief Geochemist, Barringer Research Limited, 1969 to present
6. Registered Professional Engineer, Province of Ontario, 1969.

TABLE I

Ca, K, Cu, Pb and Zn ANALYSIS FOR SALIC FRACTION OF ROCK SAMPLES

	% Ca	% K	K/Ca	Rank				$HClO_4$ Cu	$HClO_4$ Pb	$HClO_4$ Zn
COARSE GRAINED UNFRACTURED										
40009 - 75	1.28	3.40	2.66	13				2	2	18
- 76	0.98	3.84	3.92	22				5	4	19
- 77	1.18	3.04	2.58	12				6	6	50
- 78	1.00	4.12	4.12	24						
- 109	2.70	2.76	1.02	2				1	6	14
- 110	2.00	3.60	1.80	6				2	6	4
- 111	(2.10) 2.25	2.24	1.00	1				1	2	3
- 114	1.45	4.20	2.90	14				1	4	7
- 117	3.15	3.40	1.08	3				2	10	9
- 118	2.25	3.80	1.69	5				2	4	8
AVERAGE	1.82	3.44	1.89					2.4	4.9	14.7
COARSE GRAINED FRACTURED										
40009 - 120	1.14	3.60	3.16	17				33	12	12
- 122	1.24	3.40	2.74	13				1	2	7
- 127	1.56	3.48	2.23	7				28	20	115
- 129	1.98	2.74	1.38	4				6	2	11
- 132	(1.36) 1.30	(3.76) 3.80	2.50	10				2	14	11
- 136	0.86	3.52	4.09	23				2	16	13
- 137	0.94	4.80	5.11	28				3	24	12
- 139	1.40	3.60	2.57	11				2	6	5
- 140	0.82	2.38	2.90	14				1	6	16
- 144	1.00	3.60	3.60	20				1	6	10
AVERAGE	1.23	3.49	2.84					7.9	10.8	21.2

	% Ca	% K	K/Ca	Rank				$HClO_4$ Cu	$HClO_4$ Pb	$HClO_4$ Zn
COARSE GRAINED FRACT. MINERALIZED.										
40009 - 123	1.00	4.12	4.12	24				1	12	5
- 135	1.10	4.00	3.64	21				4	42	25
AVERAGE	1.05	4.06	3.87					2.5	27.0	15.0
MEDIUM GRAINED UNFRACTURED										
40009- 79	0.46	3.80	8.26	38				1	6	8
- 80	0.40	4.50	11.25	40				3	6	7
- 82	0.62	3.76	6.06	31				2	10	21
- 83	0.66	3.68	5.58	29				1	2	10
- 84	1.04	3.68	3.54	19				1	2	6
- 100	0.52	3.84	7.38	34				12	8	8
- 105	0.20	4.80	24.0	47				2	8	23
- 106	0.34	5.00	14.71	44				3	2	13
- 115	0.38	4.60	4.22	27				20	10	7
AVERAGE	0.51	4.18	8.20					5.0	6.0	11.4
MEDIUM GRAINED FRACTURED										
40009 - 124	1.06	3.20	3.02	16				7	16	23
- 126	0.48	2.90	6.04	30				2	2	8
- 131	1.16	2.66	2.29	9				2	2	64
- 142	0.96	4.04	4.21	26				8	4	6
- 148	1.16	4.00	3.44	18				3	6	7
AVERAGE	0.96	3.36	3.50					4.4	6.0	21.6
MEDIUM GRAINED MINERALIZED										
40009- 104	.30	4.16	13.87	43				3	8	115

	% Ca	% K	K/Ca	Rank				$HClO_4$ Cu	$HClO_4$ Pb	$HClO_4$ Zn
FINE GRAINED UNFRACTURED										
40009 - 85	0.50	4.12	8.24	36				2	10	22
- 86	0.24	4.40	18.33	46				40	4	47
- 87	0.36	4.20	11.67	41				2	8	10
- 88	0.51	3.80	7.45	35				1	10	24
- 89	0.54	3.60	6.67	33				3	12	8
- 90	0.46	3.80	8.26	38				1	12	25
- 107	0.34	4.60	13.53	42				19	12	18
- 112	1.28	2.92	2.28	8				1	10	3
- 113	0.32	4.72	14.75	45				2	14	9
- 116	0.50	4.12	8.24	36				13	2	4
- 119	0.62	4.00	6.45	32				3	6	32
AVERAGE	0.52	7.75	4.03					7.9	9.1	18.4
FINE GRAINED FRACTURED										
40009 - 128	-	-	-	-				-	-	-
- 130	0.88	3.20	3.64	17A				1	8	28
- 133	0.02	3.10	1.55	16A				4	6	11
- 121	0.39	4.28	10.97	27				-	-	-
AVERAGE	0.43	3.53	8.21					2.5	7.0	19.5

CERRO MINING COMPANY OF CANADA LIMITED

WESTERN DIVISION: SUITE 401
1111 WEST GEORGIA ST., VANCOUVER 5, B.C.
CANADA (604) 687-1457

June 30, 1971

Mr. R.H. McCrimmon,
Ghief Gold Commissioner,
Department of Mines and Petroleum Resources,
Victoria, B.C.

Dear Sir:

RE: EE, BALL, BAT, R Claims
The Salal Creek Prospect Geochemical Report
File No.: 166 - Lillooet
Your letter of June 24th 1971

The samples discussed in the report were taken from glaciated exposures which have only a thin skin of weathered surface. The weathered surfaces were removed so that the samples submitted were of fresh rock.

I apologise for the delay in replying but I was out of town when your letter was received and I returned only today.

Yours sincerely,

D.K. MUSTARD
BRITISH COLUMBIA
ENGINEER

D.K. Mustard,
Division Geologist

DKM/smr

7739

JUL 5 '71 AM

DEPT. OF MINES
AND PETROLEUM RESOURCES

REFERRED TO	DATE	INITIAL
D. M.		
C.G.C.	✓	
C.C.		
D.C.G.C.		
D.C.C.		
ACCTS.		
C.M.B.		
C.I.		
C.A.		
R. T.		
C.P.E.		
FI...		

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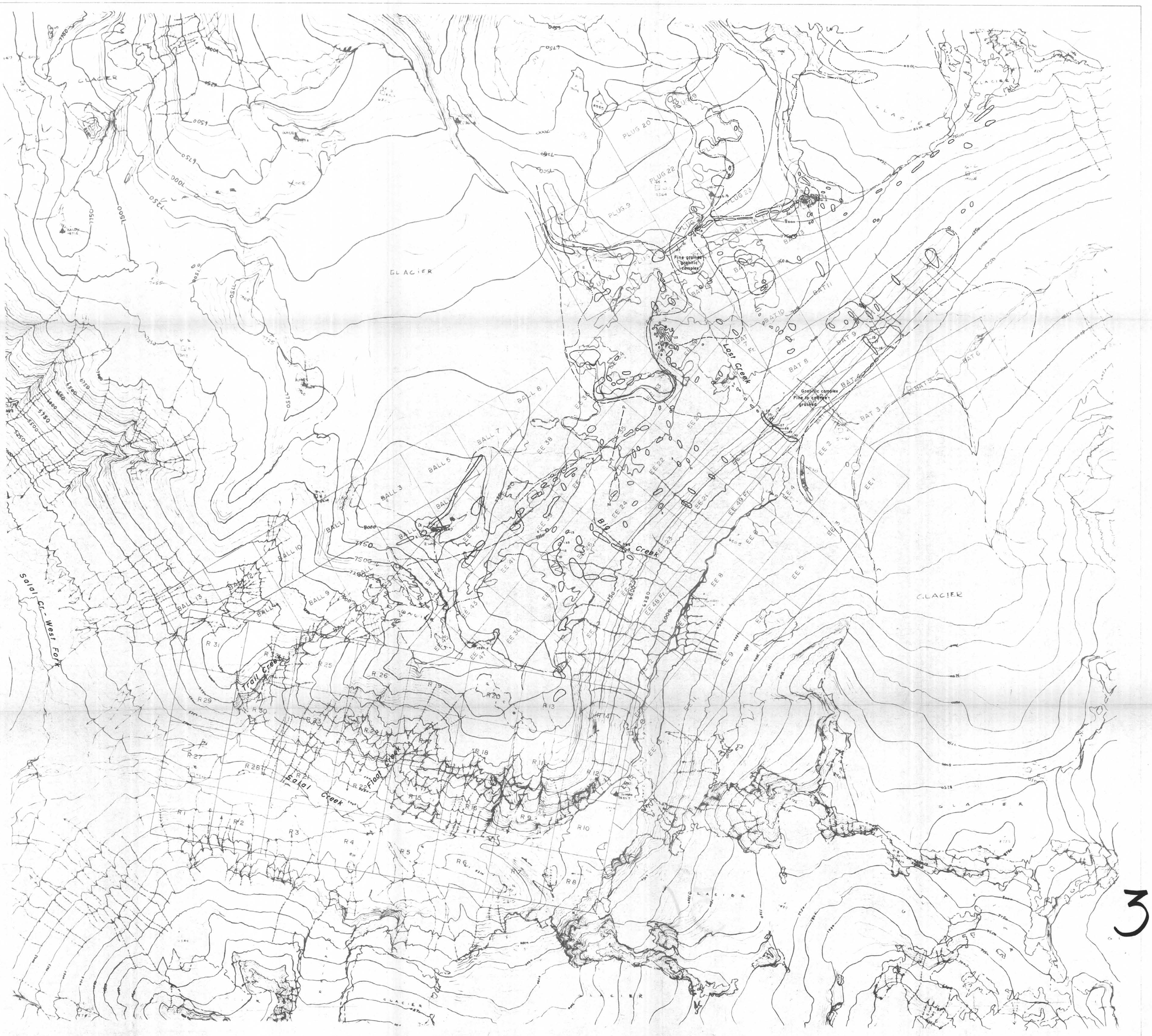
Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3094 MAP #1

ALRAE ENGINEERING LTD.
CONSULTING ENGINEERS & GEOLOGISTS, VANCOUVER, CANADA

CERRO EXPLORATION CORPORATION

SALAL CREEK PROJECT
GEOLOGICAL PLAN

SCALE: 1" = 500'	DESIGNED:
DATE: OCTOBER 1970	DRAWN:
	CHECKED:
REVISED:	MAP Nº 303-1



LEGEND

6	Basalt and mudflows.
5	Fine grained leucogranite.
4	Fine to medium grained porphyritic biotite granite.
3	Fine grained biotite granite.
2	Medium grained biotite granite.
1	Coarse grained biotite granite.

Moraine
Glacial boundary
Geological contact
Faults
Sample locations

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3094 MAP #2

3094 M-2

CLAIM MAP

ALRAE ENGINEERING LTD.
CONSULTING ENGINEERS & GEOLOGISTS, VANCOUVER, CANADA

CERRO MINING COMPANY OF CANADA LIMITED
DIVISION: WESTERN PROVINCE: B.C.

SALAL CREEK MOLYBDENUM PROPERTY

GEOLOGICAL MAP

SCALE : 1" = 1000'	DESIGNED : W.A.
DATE : 5 / 10 / 70	DRAWN : E.R.
	CHECKED :
REVISED :	MAP Nº 2