

ROSEBERY MINE LEASES EXTENSION  
JOINT VENTURE

AUTHORITY TO PROSPECT NO. 1/88

REPORT FOR YEAR 1988/89

89-3002

<b>MINES</b>	
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- 2 AUG 1989	
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VOL 1/2

G.D. Iliff  
July, 1989

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## SUMMARY

The Joint Venture covers 16 square kilometres adjacent to the Read-Rosebery Mine Leases on the northern, eastern and southern sides, in two portions.

Work to date is the cutting of a 51 line km grid on the eastern area which has been used for geological mapping, sampling and geophysical (magnetics and gravity) surveys. Targets generated by this work will be drilled this financial year.

The budget for 1989/90 is \$400,000.

## 1.0 INTRODUCTION

As a consequence of exploration work on the Read-Rosebery Mine Leases, the latest phase commencing in 1982, and currently ongoing, it was recognised that prospective horizons within the Mine Leases either dipped or extended laterally out of the Leases. The decision was taken to extend the Mine Leases to cover these extensions, to allow further exploration of them.

## 2.0 ACQUISITION OF LEASES/ATP

In order to ensure tenure of the ground to be covered by the intended Leases, it was necessary to gain the permission of the holders of the surrounding Exploration Licence, the Mt. Black E.L. 1/62. This was held under joint venture between Billiton Australia, Norgold (which had taken over the interests of the original holders of the Licence, E.Z.), and Little River Goldfields. The upshot of the negotiations was permission was granted on the terms of:

- a) a percentage royalty of the net smelter return on exploitation of any minerals within the proposed leases to Norgold and Little River Goldfields, and
- b) a 50% interest joint venture with Billiton Australia.

Thereupon, seventeen leases covering 16.07 square kilometres, designated M.L.A. 1 to 17, were pegged and applied for by Rosebery Mine Survey Department in January, 1988. These applications were designated respectively 5M/88 to 21M/88 by the Department of Mines. In August, 1988, the Minister for Mines granted an Authority to Prospect 9ATO 1/88) over the M.L.A's to remain in force until the 17th August, 1989.

Description of the ground is per the Schedule, Attachment 1.

### 3.0 FUTURE STATUS

It is anticipated that when the Environmental Management Plan for the Read-Rosebery and New Leases, draft submitted to the Department of the Environment in May, 1989, is ratified, and a Licence to Operate provided for the leases, the Minister for Mines will grant the leases. It is agreed by the Registrar for Mines and the applicant, Electrolytic Zinc Company of Australasia Limited, trading as Pasminco Mining, Rosebery, that the leases will then be consolidated into two leases, as described in the attached schedule as Area 1 and Area 2, which are separated by the Read-Rosebery Leases.

## 4.0 EXPLORATION ACTIVITIES

### 4.1. Gridding

The eastern area of the southern portion of the ATP had a grid of 51 line kilometres cut on it, with 200m line spacing and a baseline on the eastern side. The grid was of a minimal, walking track standard.

The area covered by the grid is regarded as the most prospective for hidden targets, based on knowledge of the Read-Rosebery Leases.

### 4.2. Geological Mapping

The grid was geologically mapped during the Summer of 1988/89. A report on the mapping is attached (Attachment 2).

### 4.3. Stream Sediment and Rock Chip Sampling

Sampling of stream sediments and rock chips was done concurrently with the geological mapping. Results and comments are also to be found in Attachment 2.

The most promising rock chip sample (78102) came from the access track of Dunkerley's tram, and stream sediment sample (78203) from within the Read-Rosebery Leases. Both are down hill of the Koonya/Grand Centre mineralisation.

### 4.4. Geophysics

The grid was surveyed by both ground magnetics and gravity, at 20m centres on the nominally 200m spaced lines.

Such an intensive gravity survey on less than ideal lines in difficult terrain meant a large, tedious levelling job for the Mine Survey Team and a long wait for the geophysical data to be processed. Therefore five contract surveyor teams were hired to do the levelling. It was achieved in less than a month.

Dr. D.E. Leaman, of Leaman Geophysics, is currently processing the data of both surveys. It is anticipated the interpretations will provide drilling targets.

#### 5.0 EXPENDITURE

A breakdown of costs for the last quarter of 1988/89, the years 1988/89 and 1987/88 and project to date is shown in Table 1.

#### 6.0 PARTICIPATING INTEREST OF PARTNERS

On commencement of the Joint Venture the participating interest of the parties was:-

Billiton	50%
E.Z. Rosebery	50%

By the Joint Venture Agreement, Clause 8, either party has the right to dilute its interest at the rate of 1% for each \$18,000 exploration expenditure not contributed. By tacit agreement between the parties this is on a 50-50 basis, irrespective of the participating interest of the parties.

TABLE 1 - EXPLORATION PROJECT EXPENDITURE REPORT: TO END JUNE, 1989

Rosebery Extended Leases Joint Venture, ATP 1/88

	April-June 1989	1988/89	1987/88	Project to Date
Staffing Costs				
- Labour	5,245	13,839	715	14,554
- Travel	-	645	540	1,185
- Other	4,873	5,955	4,188	10,143
Tenement Costs	-	-	4,015	4,015
Vehicle/Equipment Costs	-	2,125	531	2,656
Field & Office Operating Costs	2,589	3,389	-	3,389
Professional Consultants	-	450	-	450
Geochemical Surveys	-	-	-	-
Geophysical Surveys	108,461	138,836	-	138,836
Analysis				
- Drilling samples	-	-	-	-
- Other Samples	42	1,347	-	1,347
Gridding/Survey/Access	15,488	48,499	15,717	64,216
Geological Studies	798	8,480	-	8,480
Environmental/Other	-	-	-	-
Draughting/Computer	1,068	2,264	-	2,264
Stores	152	2,574	-	2,574
<b>Total Direct Costs</b>	<b>138,716</b>	<b>228,403</b>	<b>25,706</b>	<b>254,109</b>
General Administration	13,872	22,840	2,571	25,411
<b>TOTAL PROJECT EXPENDITURE</b>	<b>152,588</b>	<b>251,243</b>	<b>28,277</b>	<b>279,120</b>

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Therefore, participating interest of the parties as at 1st July, 1989, is:

Billiton	42.25%
E.Z. Rosebery	57.75%

## 7.0 PROGRAMME FOR 1989/90

### 7.1. Target Generation

The results of the magnetic and gravity surveys will largely determine the next steps in the exploration of the gridded area.

An airborne magnetic survey was flown over the southern half of the Leases by R.G.C., incidental to its survey of exploration licences held on either side of the Leases. The readings over the Leases will be made available to E.Z. Rosebery, by agreement. These will be given to Leaman Geophysics to supplement data of previous magnetic surveys over the area.

It is anticipated the surveys will provide information as follows:

- Major structures.
- Alteration zones.
- Interpretation of rock types in conjunction with mapping.
- Zones of above background density.
- Anomalous density gradients.

The targets thus generated will be tested by diamond drilling, with selected holes used for down-hole EM surveys.

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### 7.2. Diamond Drilling

From knowledge of the Read-Rosebery Leases, it is anticipated that drilling targets will be at least 250m deep. Thus drilling will be done largely in NQ.

### 7.3. Lateral Extensions

Historic E.Z. data and more recent Billiton work will be re-assessed to look for extensions of mineralisation into the northern and southern leases.

## 8.0 BUDGET

E.Z. Rosebery envisages, and has budgeted for, a 1989/90 expenditure of \$400,000 on the Joint Venture Leases.

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ATTACHMENT 1

No. ...1/88.....

The Aid to Mining Act, 1927

## AUTHORITY TO PROSPECT

Issued to ...ELECTROLYTIC ZINC CO. OF AUSTRALASIA LTD.....

in respect of .....16.07.... square kilometres of land in the Land District of .....MONTAGU.....

vicinity of .....MT. READ..... as described in the schedule hereto.

This authority shall remain in force until the .....SEVENTEENTH... day of ...AUGUST.....,

19.89..

This authority is subject to the following conditions: -

1. That the holder shall immediately on the issue of this authority take steps to commence preliminary works necessary for the investigation of the area.
2. That the holder shall carry out investigations as may be necessary to determine the mineral potential of the area.
3. That the holder shall employ such technical and other staff and equipment as may be necessary effectively to carry out such investigations.
4. The holder shall notify the owner and occupier of private land, in writing, at least three days before entering such land.
5. The holder shall observe, perform and fulfil the conditions as set forth in Schedule 'A' (Revised) attached hereto.
6. The holder shall be liable to pay the cost of any work carried out to remedy any damage arising from any breach of the conditions of this authority.
7. If it is found, that the operations hereby authorised, are causing any undue damage to, or erosion of, the subject land or other land in the vicinity thereof or are unnecessarily disturbing the environment, the Minister may cancel the authority without compensation to the holder by giving seven days' notice in writing of his intention so to do.
8. The holder shall obtain the written permission of the Director of Mines before carrying out any work in a Forest Reserve.

The area embraced by this authority includes State Forests but does not include:

- (a) All other public reserves or municipal reserves or roadways.
- (b) Land exempt from the provisions of the Mining Act, 1929.
- (c) Land under the National Parks and Wildlife Act, 1970, not subject to the Mining Act, 1929.
- (d) All Crown reservations or other land set apart or dedicated for any public purposes.



MINISTER FOR MINES

15/07/02

SCHEDULE

Area 1            4.24 skm

Commencing at a south east corner of the area applied for whose approximate grid co-ordinates are 380 601 metres E. 5 376 705 metres N. and being a north east corner of mining lease 53M/55 thence westerly southerly and again westerly by a northern and a western boundary of 53M/55 aforesaid part of a western boundary of mining lease 9300/M and a northern boundary of mining lease 54M/55 to approximate grid co-ordinates 377 667 metres E. 5 375 558 metres N. grid west to 377 000 metres E. grid north to 5 377 600 metres N. grid east to 380 601 metres E. thence grid south to the point of commencement.

Area 2            11.83 skm

Commencing at the south west corner of the area applied for whose grid co-ordinates are 375 612 metres E. 5 364 000 metres N. thence grid north to approximate grid co-ordinates 375 612 metres E. 5 366 397 metres N. and being a south west corner of mining lease 9075/M thence easterly southerly again easterly again southerly again easterly again southerly again easterly northerly again easterly again northerly and again easterly by part of a southern boundary of 9075/M aforesaid a western a southern and again a western boundary of mining lease 10635/M a western a southern again a western and again a southern boundary of mining lease 10000/M a southern and an eastern boundary of mining lease 9749/M a southern and an eastern boundary of mining lease 99M/56 an eastern and a southern boundary of mining lease 70M/46 and a southern boundary of mining lease 98M/56 to approximate grid co-ordinates 380 319 metres E. 5 370 752 metres N. grid south to 5 368 183 metres N. westerly to grid co-ordinates 379 340 metres E. 5 368 305 metres N. southerly to grid co-ordinates 378 850 metres E. 5 364 000 metres N. thence grid west to the point of commencement.

ATTACHMENT 2

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PASMINCO MINING - ROSEBERY

ROSEBERY MINE LEASES EXTENSION  
JOINT VENTURE  
EASTERN AREA

GEOLOGICAL MAPPING

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VOL 2/2

A. Rosenhain  
May, 1989

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No.

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3.	Sample Location Plan     "     "     "	1:10,000
4.	"     "     "     "     "     "	"
5, 6, 7, 8, 9.	Fact Geology, 1989 Mapping Rosebery Ext. Leases J.V.	5 sheets 1:2,500

Table  
No.

1.	Anomalous Sample Results:
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## 1.0 INTRODUCTION

This report describes a programme of mapping and sampling undertaken during November, December, 1988 and January, 1989.

A total of twenty three (23) grid lines were mapped. Geology has been plotted at 1:2,500 scale (Plan No's 5-9).

Stream sediment samples were collected, the location of these and rock chip samples collected whilst mapping, are shown on Plan No's 3 & 4 (1:10,000).

## 2.0 PREVIOUS WORK

A detailed review of literature was not undertaken for this programme. A number of old trenches were observed in the grid area. These are probably related to timber collection, not mining, however a scan of past survey reports would be worthwhile.

The tracks and creeks in the grid area have been mapped by T. Lees at 1:2,500 scale. These maps are held in the Rosebery Mine office.

The area was sampled during the course of a study into Alteration & Mineralisation in the Mt. Read Volcanics, undertaken by Eastoe (1981).

A current study into the volcanics, being carried out by R. Allen of Monash University, covers some of the rock types exposed on the grid.

### 3.0 LOCATION & ACCESS

The grid is located south east of the Rosebery Township, on the north eastern slopes of Mt. Read.

Access to the grid is via the Lake Bull road and then south along a track behind the explosives magazine, which links with Dunkleys Tramway.

The western end of the lines are reached via the Mt. Read road (Plan No. 1).

### 4.0 GEOLOGY

#### 4.1 Introduction

The rock types appear to fall into 4 main groups. These are:

- i) Acid lavas with subordinate volcanoclastics of the western side of the grid.
- ii) Intermediate lavas in the centre of the grid.
- iii) Acid and Intermediate lavas and volcanoclastics of the eastern side of the grid.
- iv) Intermediate ?dolerite intrusives.

#### 4.2 Acid Lavas & Volcanoclastics of the Western Side

These rocks are more exposed than others in the area. They are well exposed on the summit and flanks of Mt. Read. Flow textures can be seen in many outcrops. Flow banding was observed on the western end of grid lines from 66,400N

to 67,400N. A flow breccia can also be traced across a number of grid lines at the western end of the grid (see Plan No. 2, 1:10,000 Geol. Interp.).

Volcaniclastic rocks are also present in this group. Rocks have been mapped as volcaniclastic if they contain fragmental material. There is difficulty in identifying fragmental rocks because the alteration can give the rocks a 'pseudo' brecciated appearance.

Laminated rocks at 66,600N, 79,000E have been mapped as volcaniclastics. Some of the laminations are thick and appear to be graded and have been interpreted as bedding. In places these beds are folded, with fold axes parallel to cleavage. The overall similarity of these rocks to the lavas, may mean the laminations are flow bands.

At 66,600N, 78,500E a possible pyroclastic occurs and may represent a debris flow. It contains broken lava clasts and rounded cherty clasts within a fine grained and strongly altered matrix.

Along the western boundary of the grid, close to the Dallwitz Tracks, a fine grained shale outcrops.

Petrology sample 110, from 66,400N - 78,040E, was mapped as a lava, but has been described as a semi-chilled minor intrusive 'granophyre'.

#### 4.3 Intermediate Lavas

These rocks are identified mostly by patches of dark green chlorite, thought to be altered mafic minerals. They are generally strongly deformed and schistose. Feldspar phenocrysts, altered to carbonate can often be observed.

#### 4.4 Acid & Intermediate Lavas & Volcaniclastics, Eastern Side

Bedding is clearly visible in some of these rocks (G.R. 70,850N, 79,755E), which are not as altered as others on the grid. The lavas appear to be mostly dacitic, with numerous feldspar phenocrysts and some quartz phenocrysts. These are intercolated with the very fine to medium grained bedded volcaniclastics. Some of these lavas are rich in feldspar crystals, others are strongly chloritic and no coarse fragments are visible.

A blocky granophyre (petrology sample 48) occurs at 68,400N, 80,290E. This is interpreted as a shallow intrusive.

Facing on these rocks, obtained at G.R. 70,850N, 79,755E, is west.

#### 4.5 Dolerites

The cross-cutting nature of these intrusions with respect to the other rocks is seen at G.R. 66,800N. They are fine grained and weathered to a characteristic green/brown colour. It is difficult to identify igneous textures in hand specimens. Although these rocks are deformed, they do not appear to have suffered the hydrothermal alteration of the rocks they intrude.

## 5.0 ALTERATION

### 5.1 Early

Areas of strong siliceous, carbonate and K-feldspar alteration have been marked on Plan No. 2.

In general terms, the intensity of alteration declines across the grid, from west to east. All rocks (with the exception of the dolerites) exhibit some alteration with minor, sericite, chlorite and carbonate alteration in the rocks on the eastern side of the grid.

As mentioned in the Geology Section, chlorite alteration is particularly marked in the intermediate lavas. These rocks also are extensively carbonate altered and some are partly silicified.

The rocks in the west of the grid are almost extensively altered to sericite, quartz and carbonate. The sericite alteration occurs in patches between 'nodules' of siliceous alteration. Carbonate altered feldspar phenocrysts are often observed in the sericite patches, which are generally 5-10cm across.

Siliceous alteration often occurs in concert with pink, K-feldspar alteration. This type of alteration can be so patchy that the rock has a 'pseudo brecciated' appearance.

Some quartz veining appears to accompany silicification, though not often. At G.R. 67,000N 78,610E these quartz veins are deformed.

'Oolitic' alteration, of the type described by Lees (1987), occurs at two sites on the grid (67,200N, 78,500E and 70,500N, 78,950E). These 'oolites' consist of carbonate spheroids, rimmed by amorphous silica, occurring at high densities through the rock. They are considered by Lees (1987) to be good indicators of the proximity of ore.

## 5.2 Late

Alteration associated with later quartz veining also occurs. These quartz veins often carry pyrite and tourmaline.

Siliceous and K-feldspar alteration surrounds these veins, but generally does not extend far into the country rock.

## 6.0 DEFORMATION

All rocks in the area exhibit some cleavage. In general the strike of this cleavage is  $340^{\circ}$  magnetic, with a dip of  $80^{\circ}$ E to vertical.

The rocks on the eastern end of the grid do not appear to have been as deformed as the others, probably because they are not as altered.

Cleavage is often very difficult to see in the rocks due to the very strong K-feldspar alteration and silicification, such as those at G.R. 67,000N, 77,750E.

## 7.0 MINERALISATION

Occurrences of sulphides have been marked on Plan No. 2. With the exception of the occurrence at G.R. 70,200N, 79,000E, the predominant sulphide is disseminated pyrite, in silicified rock. At 67,200N, 79,200E, the pyrite is related to quartz-tourmaline veining. Other occurrences of pyrite appear to be related to the earlier alteration.

The pyrite/chalcopyrite float at 70,200N, 79,000E is thought to have come from the Grand Centre workings.

## 8.0 SAMPLING

Thirty five (35) stream sediment samples and 19 rock chip samples were taken from the grid. The stream sediment samples were taken from trap sites throughout the grid. A 2-3kg sample was sieved down at each site, to a 500gm sample which was further sieved to -80 mesh size in the laboratory. Pan concentrate samples for heavy mineral identification were also collected from the better trap sites.

Rock chip samples were taken from outcrops where sulphides occurred or where alteration was intense (particularly silicification).

The location of sample sites is shown in Plans 3 & 4.

Eight (8) samples were also taken for petrological investigation. These may help to identify primary rock types, and primary rock types, often masked by alteration.

115 rock samples were taken to be sawn and examined closely, during the course of grid mapping. These are now stored in the core shed. The location of these samples are listed in Appendix I.

## 9.0 RESULTS

A number of rock chip and stream sediment samples returned anomalous and weakly anomalous concentrations of Pb, Cu, Zn, As and Au.

These are tabulated below:-

1. Rock Chips (ppm)

Sample No.	Co-Ords	Cu	Pb	Zn	Fe	Mn	As	Au*	Sb
78101	71020N 78850E	125	235	730	5.65	45500	30	0.010	4
78102	70120N 79000E	20,000	455	545	31.00	2600	98	0.692	15
78104	69000N 79140E	300	305	90	11.50	9650	13	0.013	<3
78108	71100N 79000E	90	185	120	2.60	375	53	<0.008	<3

2. Stream Sediments (ppm)

Sample No.	Co-Ords	Cu	Pb	Zn	Fe	Mn	As	Au*	Sb	
78201	71180N 79800E	<	5	55	125	14500	470	<1	0.424	10
78202	71020N 78850E	5	185	115	8000	365	7	0.341	8	
78203	70980N 77890E	170	1200	610	29500	5850	47	1.068	20	
78207	70450N 78780E	175	170	95	27500	2050	33	0.061	7	
78210	69900N 78750E	40	120	105	31500	8550	50	N/A	9	

\* Where check assay is done, average value is recorded

TABLE 1 Anomalous & Weakly Anomalous Sample Results

With the exception of 78104 and 78201, all these samples are from the N.W. portion of the grid. The rock chip samples are from strongly silicified and carbonate-altered rocks, along Dunkley's Tramway. The stream sediment samples are probably shed from

similar rocks and from mineralisation West of the grid, in the Koonya area.

Sample 78104 consists mostly of quartz veining, probably Devonian, in an andesitic lava.

The origin of sample 78201 is unclear, although some vein quartz was recorded in the sample.

The results of mineralogical analysis of heavy mineral fractions, shows little interest, the major constituents, by weight percent, being leucoxene and clinozoisite samples 78223 and 78229 contained small quantities of chromite, probably derived from the dolerite intrusions. Cassiterite was noted in Sample 78213 and could be associated with Devonian quartz/tourmaline veins.

All analysis results are appended.

## 10.0 CONCLUSIONS

Mapping has demonstrated that the rock types in the area fall into four main categories.

The intensity of alteration decreases across the grid, from West to East. Some of the stronger alteration observed (particularly "oolitic" carbonate) is similar to that recorded in close proximity to ore at Hercules (Lees, 1987).

Most mineralisation, sampled and/or observed occurs on the western boundary of the grid. Minor pyrite, associated with early silicification or with Devonian quartz/tourmaline veins was found near the centre of the grid. Where these types of mineralisation were found and assayed however, they were not anomalous in arsenic, base or precious metals.

## 11.0 RECOMMENDATIONS

Although the area was only covered at 200m grid intervals, the results of this mapping, previous creek mapping (Lees, 1987) and examination of float in creeks, indicate that a sulphide orebody does not outcrop in the grid area. The sulphide occurrence on Dunkley's Tramway, may come from outcropping mineralisation, but this is outside the grid and probably already identified (Grand Centre Workings). Any further work in the grid area would have to employ geophysical methods to attempt to identify ore beneath the surface. The presence of strong alteration in parts of the grid does not preclude the possibility of ore occurring at depth.

A detailed gravity survey has recently been completed over the grid. The grid is currently being levelled by outside contractors and the Survey Department at the mine, to enable a rapid interpretation of the gravity data by Dr. D. Leaman. Recent experience at Hercules (Hunns pers. comm.) suggests that this method would be effective in locating buried massive sulphides. It may not, however, be successful in locating precious metals occurring with pyrite in zones of silicification. An I.P./Resistivity survey over the grid, particularly the Western, more altered side, is suggested as a means of exploring for this type of ore.

In addition to geophysical work, it is also suggested that follow-up work be done in the N.W. portion of the grid, where samples 78101, 102, 108, 202, 203, 207 and 210 were taken. There has been drilling in this area (RLP programme), the holes should be checked, to determine whether they tested the area anomalous in Au, Ag and As.

It is further recommended that detailed sampling and mapping in the region of sample 78201 (71180N 79800E) be done. The gold anomaly here, has not yet been explained by mapping. The creek and others flowing into it, should be mapped in detail and samples taken upstream of 78201, to pin down the anomaly.

REFERENCES

- EASTOE, C.J., (1981) Alteration & Mineralisation in the Mt. Read Volcanics, Western Tasmania.
- LEES, T.C., (1987) Geology and Mineralisation of the Rosebery-Hercules Area, Tasmania.

APPENDIX I

Location of Rock Samples

STITT VALLEY/NORTH MT. READGrid Mapping - December, 1988 - January, 1989Sample Locations - Co-Ordinates

Sample No.	Co-Ordinates	
	North	East
4	71000	78950
5		78960
6		79070
7		79365
8		79740
9		79790
10		79880
11		80190
12		80260
13		80275
14	70800	79980
15		79890
16	Petrology	79840
17		79700
18		79225
19		79005
20		79005
21	70240	79000
22	Old	70410 78970
23	Tramway	70260 79000
24		70480 79050
25		70440 79000
26		70840 78900
27		70800 78900
28		70780 78940
29	Petrology	70600 79000
30		79020
31		
32	70600	79930
33		80070
34	70000	78970
35		79170
36	Petrology	79250
37	Petrology	79450
38		79450
39	70400	78990
40	69800	79070
41	69780	80290
42	69400	79050
43		79830
44	69000	79650
45	69180	80290
46	69200	79270
47		79210
48	Petrology	68640 80290
49		68600 79710

Sample No.	Co-Ordinates	
	North	East
50	67800	77620
51		77670
52		78830
53		79060
54	67600	79240
55		79010
56		79050
57		78340
58		78170
59		77830
61		77470
61		77450
70	67200	77570
71		77510
72		77670
73	Petrology	77990
74	Petrology	78130
75		78520
76		78690
77		78730
78		79030
79	67400	79250
80		79030
81		78910
82		78390
83	68400	78630
84		78890
85		79310
86	68200	79810
87		79430
88		78940
89		78550
90	67600	77970
91		77990
92		78310
93		78390/410
94		78490
95		78950/980
96		78990
97	67400	78830
98	67000	77750
99		77790
100		78030
101		78130
102		78150
103		78180

APPENDIX II

Assay Results

**ANALYTICAL DATA**

SAMPLE PREFIX

REPORT NUMBER

REPORT DATE

CLIENT ORDER No.

PAGE

TUBE No.	SAMPLE No.	Cu	Pb	Zn	Fe	Mn	As	Au	Se	
1	78001 <i>low order</i>	22	782	707	3,222	40307	31	40,000	-	
2	78002 <i>low order</i>	21	488	848	3,111	2800	48	40,000	43	
3	78003	20	78	87	3,125	27	5	40,000	-	
4	78004 <i>low order</i>	20	784	87	3,121	1110	11	40,000	43	
5	78005	19	48	70	2,700	438	7	40,000	43	
6	78006	20	140	115	2,114	250	2	40,000	43	
7	78007	20	25	48	5,150	70	5	40,000	43	
8	78008 <i>low order</i>	20	48	120	3,140	375	53	40,000	43	
9	78009	19	11	30	1,175	1750	3	40,000	43	
10	78010	18	50	57	1,175	342	2	40,000	43	
11	78011	17	105	70	1,150	205	3	40,000	43	
12	78012	15	210	155	7,141	2700	6	40,000	43	
13	78013	10	70	145	3,795	2700	7	40,000	43	
14	78014	11	17	112	2,111	1700	-	40,000	43	
15	78015	10	50	105	3,142	2150	6	40,000	43	
16	78016	8	45	120	2,110	3750	2	40,000	43	
17	78017	7	10	102	2,160	700	3	40,000	43	
18	78018	10	50	140	7,730	1,000	17	40,000	43	
19	78019	11	165	150	3,120	6000	10	40,000	43	
20	78020	11	50	105	2,125	3700	5	40,000	43	
21	78021	-	-	-	-	-	-	-	-	
22	78022	-	-	-	-	-	-	-	-	
23	78023	-	-	-	-	-	-	-	-	
24	78024	-	-	-	-	-	-	-	-	
25										

Results in ppm unless otherwise specified  
 T = element present; but concentration too low to measure  
 X = element concentration is below detection limit  
 -- = element not determined

AUTHORISED OFFICER 

032

111033

**ANALABS**

A Division of Macdonald Hamilton &amp; Co. Pty. Ltd.

**ANALYTICAL DATA**

SAMPLE PREFIX

REPORT NUMBER

REPORT DATE

CLIENT ORDER No.

PAGE

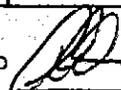
		27.1.08.05913				19/01/89	900947		1 OF 2	
TUBE No.	SAMPLE No.	Cu	Pb	Zn	Ag	Fe	Mn	As	Au	AuChk
1	78201	<5	55	125	<0.5	14500	470	<1	0.452	0.395
2	78202	5	185	115	<0.5	8000.0	365	7	0.380	0.301
3	78203	170	1200	610	6.5	29500	5850	47	1.380	0.756
4	78204	15	420	135	<0.5	19000	3400	10	<0.008	-
5	78205	<5	45	65	<0.5	25500	1150	2	<0.008	-
6	78206	<5	65	105	<0.5	20000	3550	7	<0.008	-
7	78207	175	170	95	<0.5	27500	2050	33	0.049	0.073
8	78209	<5	35	40	<0.5	6700.0	205	4	<0.008	-
9	78210	40	120	105	<0.5	31500	8550	50	18	-
10	78211	<5	25	40	<0.5	4600.0	90	1	<0.008	-
11	78212	<5	45	60	<0.5	13000	970	<1	<0.008	-
12	78214	10	70	165	<0.5	24500	5850	5	<0.008	-
13	78215	<5	55	60	<0.5	23500	1200	3	<0.008	-
14	78217	5	75	140	<0.5	26500	6750	6	<0.008	-
15	78213	-	-	-	-	-	-	-	-	-
16	78216	-	-	-	-	-	-	-	-	-
17										
18										
19										
20										
21										
22										
23	DETECTION	5	5	5	0.5	0.5	5	1	0.008	0.008
24	UNITS	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM
25	METHOD	103	103	103	103	103	103	114	309	309

Results in ppm unless otherwise specified.

T = element present; but concentration too low to measure

X = element concentration is below detection limit

- = element not determined

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111634

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**ANALYTICAL DATA**

SAMPLE PREFIX

REPORT NUMBER

REPORT DATE

CLIENT ORDER No.

PAGE

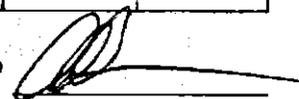
SAMPLE PREFIX			REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
			27.1.08.05913	19/01/89	900947	2 OF 2
TUBE No.	SAMPLE No.	Sb				
1	78201	10				
2	78202	8				
3	78203	20				
4	78204	20				
5	78205	15				
6	78206	10				
7	78207	7				
8	78209	5				
9	78210	9				
10	78211	7				
11	78212	5				
12	78214	7				
13	78215	9				
14	78217	7				
15	78213	-				
16	78216	-				
17						
18						
19						
20						
21						
22						
23	DETECTION	3				
24	UNITS	PPM				
25	METHOD	401				

Results in ppm unless otherwise specified

T = element present; but concentration too low to measure

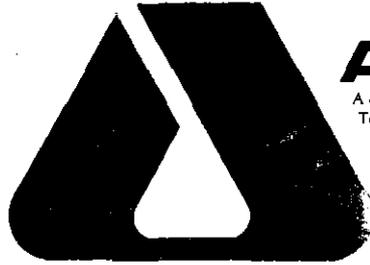
X = element concentration is below detection limit

-- = element not determined

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OFFICER


034

111035



# ANALABS

A division of Inchcape Inspection and  
Testing Services, Australia, Pty. Ltd.

Perth Head Office:

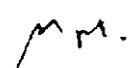
52 Murray Road, Welshpool, Western Australia 6106.  
Tel: (09) 458 7999. Telex: AA92560. Fax: (09) 458 2922.  
P.O. Box 210 Bentley, W.A. 6102.

7th February 1989

Analabs  
14 Thirkell Street  
COOEE TASMANIA 7320

OUR REF : 1000.0.07.689  
YOUR REF : 27.1.08.5953

Quantitative Mineralogical Analysis of Heavy Mineral Fractions of  
Samples 78223, 78229, 78232, 78235.

  
\_\_\_\_\_  
MARGARET HALL



Introduction

Samples 78223, 78229, 78232 and 78235 were submitted for determination of the weight percentage distribution of minerals in heavy mineral fractions. This was carried out by point counts on grain mounts in transmitted light and polished briquettes in reflected light.

The weights of the various fractions are as follows :

<u>Sample No</u>	<u>% Sinks</u>	<u>% Floats</u>
78223	0.3	99.7
78229	0.6	99.4
78232	0.2	99.8
78235	1.7	98.3



Results

MINERAL	Wgt %			
	78223	78229	78232	78235
Chromite	2.0	3.3	tr	1.3
Ilmenite	-	0.4	-	-
Altered ilmenite	1.9	0.4	tr	0.4
Leucoxene	35.0	24.9	17.7	14.7
Magnetite	-	-	1.0	-
Hematite	-	1.4	1.9	-
Limonite	11.7	27.1	20.7	10.7
Pyrite	-	-	tr	-
Zircon	1.3	tr	0.9	0.5
Clinzoisite	44.1	33.5	52.1	64.9
Epidote	2.4	4.2	1.6	0.3
Clinopyroxene	-	-	-	0.3
Chlorite	0.2	3.2	tr	5.3
Tourmaline	0.3	-	-	-
Quartz/feldspar	0.5	1.0	3.2	1.3
Other transparent minerals	0.6	0.6	0.9	0.3



Results	78213	78216
TBE sks wt%	1.1	3.7
Minerals wt%		
ALTERED ILMENITE	9.1	
LEUCOXENE	32.4	
LIMONITE/IRON OXIDES	2.7	
CHROMITE	0.5	
ZIRCON	1.3	
CASSITERITE	0.7	
EPIDOTE	4.1	
MICA	1.0	
LIGHTS	48.2	

SAMPLE 78216 was not analysed quantitatively because it contained a large amount of rock fragments, and had a very wide grainsize range. About 45% was > 500 microns. The - 500 micron fraction contained negligible zircon. A polished section of the complete sinks fraction found approximately 50% opaques which were composed of about 50% leucoxene, 40% iron oxides, and 10% altered ilmenite. Much of these were part of rock fragments.

Nb. The values for 78213 below 1% are not reliable.

APPENDIX III

Petrological Reports

## ROSEBERY LEASES EXTENSION GRID MAPPING

## Rocks for Thin Section Petrology

Field No.	Co-Ordinates	Description
73	67200N 77990E	Grey/pink, massive felsic lava fd-phyric. ?k-feldspar alteration and streaks of chlorite.
74	67200N 78130E	Grey, schistose ?Felsic lava. Patches dark chlorite with feldspar phenos => Cb and rimmed by silica. Rest of rock silicified.
48	68640N 80290E	Cream, massive feldspar-phyric (+?ferromags => chlorite) in granular matrix. Rare quartz phenos.
29	70600N 79000E	Dark green/grey, shistose rock, strongly chlir. and carbonate altered ?Andesite.
37	70000N 79450E	Grey, schistose rock Phenocrysts visible, some have 'fuzzy' edges.
16	70800N 79840E	Pink and dark grey, massive rock, occurs above tuffaceous seds in Mt. Black Volcanics. Fd-phyric, some lithic frags cavities filled with silica and CO <sub>2</sub> ?amydolooidal lava.

Field No.	Co-Ordinates	Description
36	70000N 79250E	Cream, massive v.fg rock, no phenocrysts visible. Streaks of chlorite/sericite are parallel to cleavage in outcrop, but may be a primary feature.
110	66400N 78040E	K-feldspar altered ?sediment or lava.

043

111042

# Central Mineralogical Services



39 Beulah Road, Norwood, South Australia 5067  
 Telephone (08) 42 5659 Fax (08) 363 1820  
 International: Telephone + 618 42 5659 Fax + 618 363 1820

The Mine Leases Geologist  
 Electrolytic Zinc Co. of  
 Australasia Ltd.  
 P.O. Box 21  
ROSEBERY / TAS. 7470

21st March, 1989

## REPORT CMS 89/2/11

YOUR REFERENCE: Order No. 900955  
 DATE RECEIVED: 13th February, 1989  
 SAMPLE NOS.: 8 Samples  
 SUBMITTED BY: S. Hunns  
 WORK REQUESTED: Petrology

	23/3 89
NAME	
ADDR	
PHONE	
TELETYPE	
FAX	
EMAIL	
OTHER	

*H. W. Fander*

H.W. Fander, M. Sc.

REPORT CMS 89/2/11

A suite of eight rock chip samples from the Rosebery Leases Extension area was received for petrological examination. Representative thin-sections were prepared and examined together with respective HF-etched and cobaltinitrite-stained offcuts. Carbonate stain tests were performed as warranted.

Attached descriptions summarise the microscopic data and include interpretative comments.

Summary

This suite comprises entirely altered and variably sheared intermediate to acid igneous rocks, the majority of which may be considered as volcanics, typically lavas.

A subordinate group of three rocks, specifically samples 48, 74 and 110, exhibits minor intrusive characteristics and, although variable (broadly intermediate to acid) in terms of composition, may well be closely related, that is, differentiation variants of a single intrusive phase.

Alteration assemblages are detailed in the individual descriptions. Apart from minor incidences of oxidised pyrite this suite is essentially unmineralised.

D. Cowan, B. Sc.

SAMPLE NO.:

16 / 70800N - 79840E

(T.S. 61350)

1.

CLASSIFICATION:Trachyandesitic BrecciaCOMPOSITION:

Frequent epidote-stained/albitised plagioclase phenocrysts (mean 600 um), subordinate composite K-feldspar-albite phenocrysts (initially sanidine-anorthoclase?) and relatively minor quartz-epidote-pseudomorphed ferromagnesian silicate phenocrysts. Groundmass/matrix of crypto- to microcrystalline alkali feldspar (albite, K-spar) with sporadic clots and films of chlorite and interspersed zones of relatively massive chlorite. Thinly disseminated xenolithic clasts of similarly altered (albitised, chloritised, epidote-stained) basaltic lava.

FABRIC:

Variable. Porphyritic/trend glomeroporphyritic with a perlitic-structured (devitrified) groundmass where relatively feldspathic. Dimensionally orientated millimetric- to centimetric-scale ovoid to lensoid chlorite-matrixed zones with the appearance of selectively altered clasts. Stressed and variably phyllitic-microtextured.

ACCESSORIES:

Minor fiamme-like (relatively sheared) lithoclasts. Disseminated leucogenised opaques, rare ultrafine apatite. Minor perlitic cracking-controlled microscale networks of quartz veinlets. Sparse similarly distributed clots and films of calcite. Minor clots of Mn-oxide.

COMMENTS:

Detail obscured by devitrification, albite-epidote-chlorite (-quartz-calcite) alteration, and shearing effects. Exhibits tuff lava-like flow breccia characteristics with xenolithic clasts of basic lava and eutaxitic tuff. Compositionally trachyandesitic, but apparently primarily banded, with flow-brecciated and selectively relatively chloritised "basic" ("andesitic") units. Rare quartz-fringed carbonate (calcite) amygdales.

044

SAMPLE NO.:

29 / 70600N - 79000E

(T.S. 61351)

2.

CLASSIFICATION: AndesiteCOMPOSITION:

Crudely lensoid aggregates (mean 750 um to 1.5 mm diameter) of fine granular albite with subordinate/variable proportions of carbonate (calcite), chlorite, sericite and a little quartz; representing altered and sheared feldspar phenocrysts. Subordinate lenses of chlorite representing altered and sheared ferromagnesian silicate phenocrysts. Groundmass/matrix of sericite and chlorite with varying proportions of fine granular to microcrystalline/weakly directed albite, minor quartz, a little calcite, and disseminated leucoxenised opaques.

FABRIC:

Strongly and coarsely porphyritic, with a marked/penetrative phyllitic overprint. Vague relict microscale felsitic (devitrification) textures in the altered and phyllitised groundmass. Evenly disseminated leucoxenised opaques.

ACCESSORIES:

Minor traces of apatite, corroded relics of opaques (?ilmenite), partly degraded to limonitic Fe-stainings.

COMMENTS:

A thoroughly [albite-chlorite-sericite(-quartz-calcite)]-altered and sheared/phyllitised, strongly porphyritic, primarily subvitric intermediate igneous phase. Relict compositional/textural features are andesitic. Could be interpreted as a lava or, alternately, a minor intrusive, dependent on field relationships.

045

1-1-60

SAMPLE NO.:

37 / 70000N - 79450E

(T.S. 61352)

3.

CLASSIFICATION:

Amygdaloidal Andesite

COMPOSITION:

Abundant calcite-impregnated and weakly/variably sericite-stained albite pseudomorphs (to 2 mm) of phenocrystal plagioclase, relatively minor leucoxene-fringed chlorite aggregates representing altered ferromagnesian silicate microphenocrysts, thinly dispersed quartz-calcite amygdales (to 1.5 mm) with impersistent chloritic selvages. Altered groundmass of semi-sericitic white mica, chlorite, and microcrystalline albite in varying proportions with a little microcrystalline quartz.

FABRIC:

Strongly porphyritic, weakly amygdaloidal, with a thoroughly altered microcrystalline felsic (feldspathic) groundmass and a phyllitic shearing overprint.

ACCESSORIES:

Evenly disseminated leucoxenised opaques, minor traces of apatite.

COMMENTS:

Affinities with sample 29, similarly altered and sheared. In comparison, this rock is weakly amygdaloidal and exhibits albitised but unrecrystallised feldspar phenocrysts; a reflection of slightly less marked shearing effects. Similarly exhibits orthodox andesitic relict compositional and textural features.

SAMPLE NO.:

36 / 70000N - 79250E

(T.S. 61353)

4.

CLASSIFICATION:Felsitic "Dacite"COMPOSITION:

Disseminated phenocrysts (mean 350 um) and phenocrystal clusters (to 1.6 mm) of stressed/partly recrystallised and weakly sericite-stained plagioclase (oligoclase) in a pervasively sericitic groundmass of felsitic anhedral quartz with included sericitic/indeterminate feldspar microlites. Minor quartzo-feldspathic microspherulites. Sparse quartz veinlets with disseminated clots of degraded/ferruginised carbonate.

FABRIC:

Porphyritic/trend glomeroporphyritic with a felsitic-devitrified ("snowflake"-microtextured) to incipiently spherulitic groundmass. Weakly flow-structured/incipiently banded with a weak but penetrative, essentially concordant phyllitic overprint. Stressed/partly recrystallised vein-quartz.

ACCESSORIES:

Thinly disseminated leucoxenised opaques. Minor traces of degraded/ferruginised feldspar-replacive carbonate. Weak but semi-pervasive secondary limonitic Fe-stainings. Rare oxidised pyrite subhedra (150 um) in the altered groundmass.

COMMENTS:

Primarily a relatively felsic (leuco-andesitic/dacitic) feldspar-porphyritic semi-glassy lava. Interpreted as dacitic, although devoid of phenocrystal quartz; similarly devoid of altered phenocrystal ferromags. Reflects a relatively simple sericitic alteration assemblage and a weak but penetrative phyllitic overprint. The rare oxidised pyrite is disseminated rather than (quartz-carbonate) veinlet-controlled.

SAMPLE NO.:

48 / 68640N - 80290E

(T.S. 61354)

5.

CLASSIFICATION:"Granophyre"COMPOSITION:

Disseminated phenocrysts (mean 750 um) of sericite-epidote-stained and partly albitised plagioclase (?oligoclase), subordinate corroded quartz and epidote-chlorite semi-pseudomorphed ferromagnesian silicate phenocrysts in a groundmass of fine (mean 35 um) anhedral/weakly poikilitic quartz and intergrown similarly textured weakly/pervasively sericite-stained K-feldspar with semi-pervasive microscopic clots of cloudy epidote. Minor chloritic quartz amygdales with interspersed clots of epidote.

FABRIC:

Porphyritic, weakly amygdaloidal, with a semi-micrographic textured groundmass. Minor micrographic selvages on quartz phenocrysts and thinly disseminated K-feldspathic microspherulites. Incipiently stressed.

ACCESSORIES:

Thinly disseminated extensively leucoxenised opaques, rare apatite, minor laths of plagioclase (sericitic) in groundmass.

COMMENTS:

A porphyritic, semi-micrographic ("granophyric") "microgranite", strictly adamellitic in composition, but with differentiated intermediate characteristics. Exhibits minor or semi-chilled marginal intrusive characteristics, with the sparse amygdales consistent with a relatively shallow intrusive deposition. Only incipient stress effects in contrast to the associated sheared volcanics. Moderately/pervasively sericite-epidote-chlorite-altered.

SAMPLE NO.:

73 / 67200N - 77990E

(T.S. 61355)

6.

CLASSIFICATION:Perlitic PitchstoneCOMPOSITION:

Disseminated phenocrysts (mean 400  $\mu\text{m}$ ), phenocrystal clusters (to 1.5 mm) and microphenocrystal laths of calcite-stained albite, minor chlorite-calcite semi-pseudomorphed ferromagnesian silicate phenocrysts and microphenocrysts in a groundmass of sericite-stained cryptocrystalline K-feldspar aggregates with subordinate anhedral quartz grains (mean 75  $\mu\text{m}$ ) and a little intergrown microcrystalline quartz. Disseminated clots of calcite; minor microscopic clots and discontinuous irregular films of chlorite.

FABRIC:

Porphyritic/trend glomeroporphyritic with a perlitic-structured (devitrified) groundmass and a weak but penetrative phyllitic overprint. Anhedral subvoid quartz grains represent recrystallised microspherulites in part.

ACCESSORIES:

Sparse crenulated/sheared microcrystalline quartz-calcite veinlets. Conspicuous fine leucoxenised opaques, traces apatite. Minor traces of magnetite. Marginal secondary Fe-stainings.

COMMENTS:

A perlitic-devitrified quartz-sericite-calcite-chlorite-altered and mildly sheared felsic pitchstone (porphyritic glass). Devoid of phenocrystal quartz, but with rhyodacitic or sodi-potassic rhyolitic relict compositional characteristics. Finer compositional detail obscured by alteration. Reflects selective recrystallisation of primarily microspheruloidal silica.

049

SAMPLE NO.:

74 / 67200N - 78130E

(T.S. 61356)

111050

7.

CLASSIFICATION: Altered Andesite?COMPOSITION:

Aggregates of sericite-stained cloudy anhedral quartz with interspersed relatively massive foliae of semi- to sericitic white mica. Disseminated single to clustered albitised/calcite-stained phenocrystal plagioclase grains (mean 500 um), typically fringed with sericitic quartz aggregates. Relatively minor similarly fringed microcrystalline quartz and chlorite-pseudomorphed ferromagnesian silicate phenocrysts (pyroxene in part).

FABRIC:

Crudely sericite-foliated phyllitic/relict feldspar-porphyrific and vaguely felsitic to perlitic in irregular zones.

ACCESSORIES:

Disseminated leucoxenised opaques. Minor traces of cloudy epidote.

COMMENTS:

A thoroughly sericite-quartz-albite(-calcite-epidote)-altered and relatively sheared basic-intermediate igneous phase. Textural detail obscured by alteration and particularly shearing effects, but this rock was primarily glassy in part. Relict textures consistent with, for example, a variolitic basalt or an ocellar-textured andesite. The distinction is tenuous and academic in view of the marked alteration and shearing.

SAMPLE NO.: 110 / 66400N - 78040E (T.S. 61357) 8.

CLASSIFICATION: Spherulitic Granophyre

COMPOSITION: Frequent phenocrystal laths of variably sericite-stained albite in a matrix of quartzofeldspathic (albitic) spherulites (mean 750 um), with interstitial masses of relatively sericitic fine-grained quartzofeldspathic material (dominantly K-feldspathic). Minor corroded phenocrystal quartz grains. Evenly disseminated leucoxenised opaques.

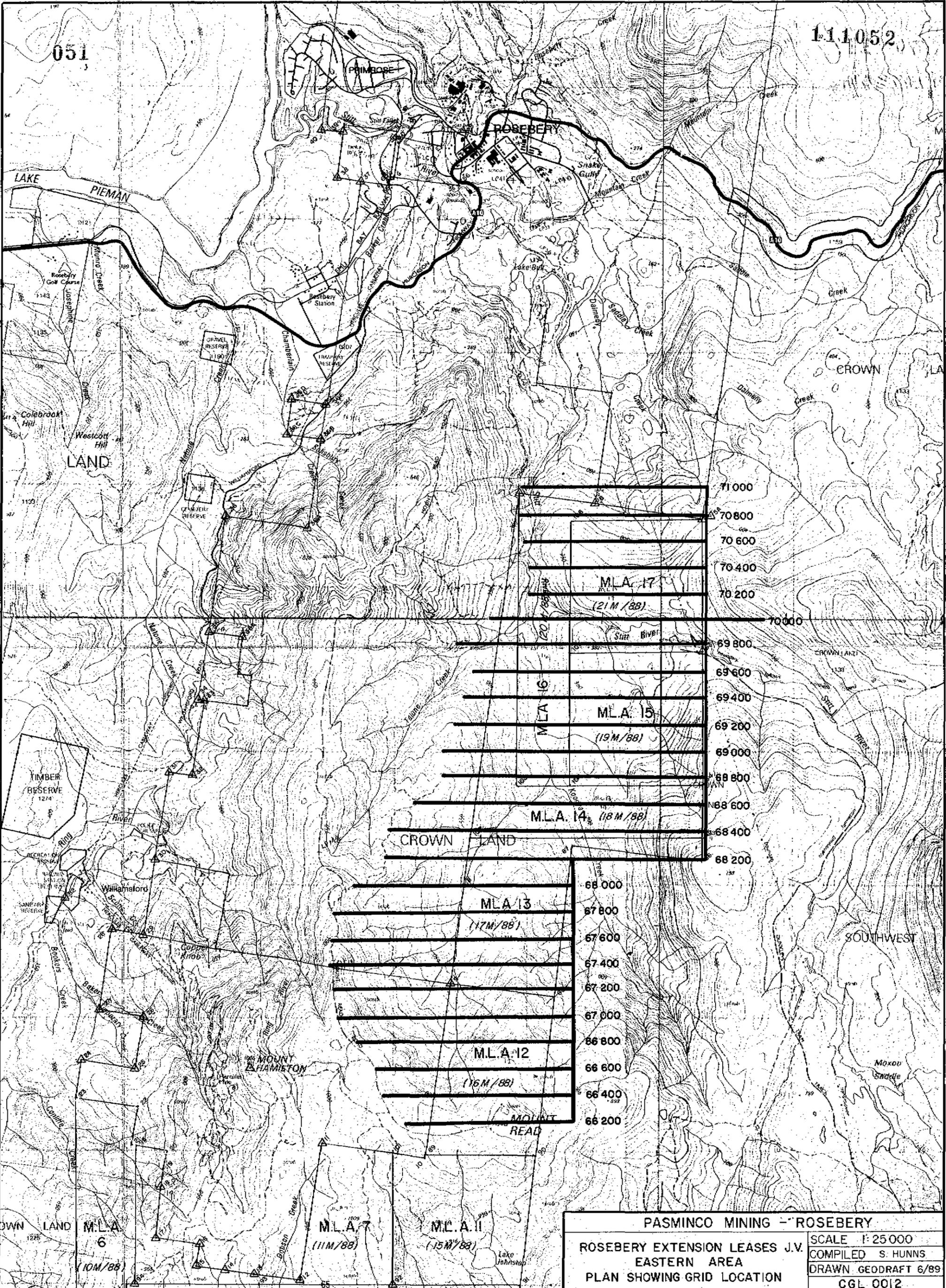
FABRIC: Porphyritic and coarsely spherulitic with interstitial finely granular to micrographic quartzofeldspathic aggregates. Minor fine-scale quartz amygdales. Spherulites are partly nucleated on phenocrysts ("ocellar" texture). Weakly stressed.

ACCESSORIES: Traces of degraded/ferruginised carbonate. Minor clots and films of degraded chlorite. Secondary limonitic Fe-stainings and minor microfracture-controlled Mn-oxidic limonite films.

COMMENTS: Approximates to rhyodacitic composition, but with vague felsic differentiated basic characteristics. Considered as primarily a semi-chilled minor intrusive. General features suggest this rock may represent a felsic differentiate of the relatively sericitised and sheared Sample 74. The ocellar textures, common to both rocks are unusual and rather distinctive.

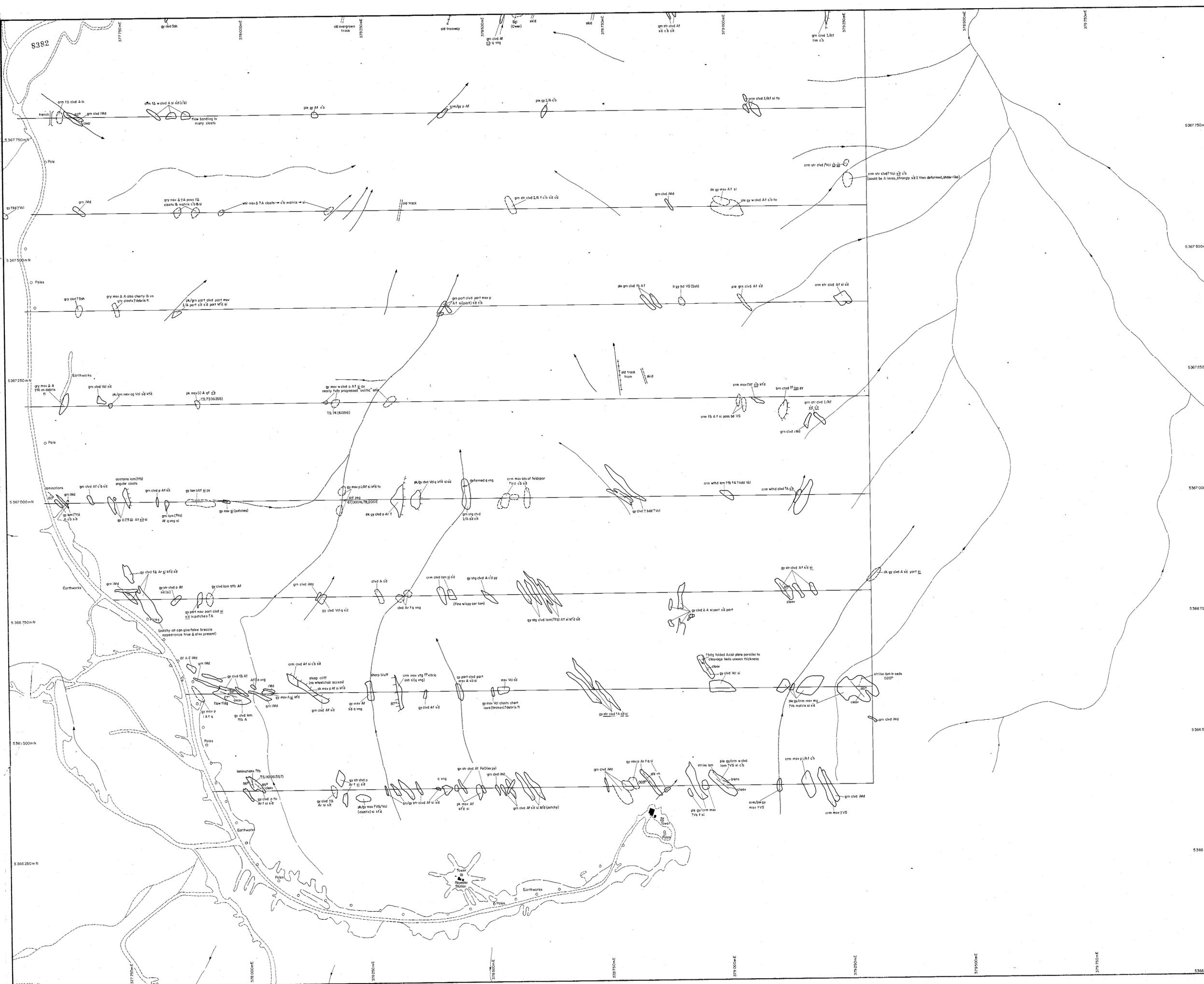
051

111052

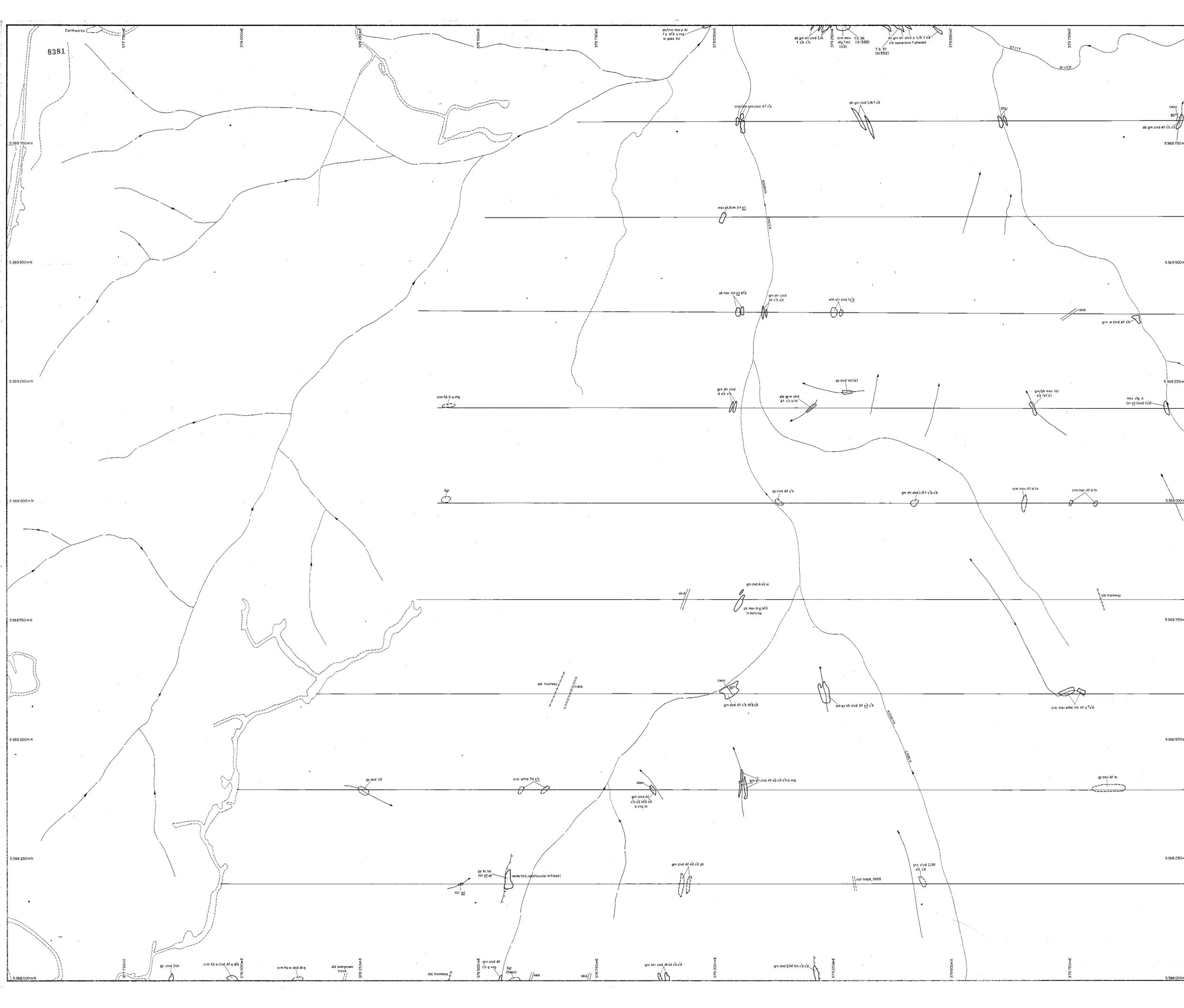


<b>PASMINCO MINING - ROSEBERY</b>	
ROSEBERY EXTENSION LEASES J.V.	SCALE 1:25 000
EASTERN AREA	COMPILED S. HUNNS
PLAN SHOWING GRID LOCATION	DRAWN GEODRAFT 6/89
	CGL 0012





<p><b>1. Colour</b></p> <ul style="list-style-type: none"> <li>pe pale</li> <li>dk dark</li> <li>pk pink</li> <li>rd red</li> <li>brn brown</li> <li>or orange</li> <li>yl yellow</li> <li>ol olive</li> <li>grn green</li> <li>blk black</li> <li>wht white</li> <li>crm cream</li> <li>pl purple</li> <li>clr clear</li> </ul>	<p><b>2. Cleavages</b></p> <ul style="list-style-type: none"> <li>ms</li> <li>w.cvd</li> <li>chd</li> <li>str.cvd</li> </ul>
<p><b>3. Igneous Grain Size</b></p> <ul style="list-style-type: none"> <li>lg &gt; 1mm</li> <li>mg 1-5mm</li> <li>cg 5-50mm</li> <li>vcg &gt; 50mm</li> </ul>	<p><b>4. Sediment Grain Size</b></p> <ul style="list-style-type: none"> <li>angulinas &lt; 0.06mm</li> <li>arenites 0.06 - 2.0mm</li> <li>vfg 0.06 - 0.12mm</li> <li>fp 0.12 - 0.25mm</li> <li>mg 0.25 - 0.5mm</li> <li>cg 0.5 - 1.0mm</li> <li>vcg 1.0 - 2.0mm</li> <li>rudites &gt; 2.0mm</li> <li>gr granule 2-4mm</li> <li>pb pebble 4-64mm</li> <li>cb cobble 64-256mm</li> <li>bb boulder &gt; 256mm</li> </ul>
<p><b>5. Igneous Rock Classification</b></p> <ul style="list-style-type: none"> <li>IA Acid tuff</li> <li>A Acid Lava</li> <li>IA Minor Acid Intrusives</li> <li>IA Major Acid Intrusives</li> <li>II Intermediate tuff</li> <li>I Intermediate lava</li> <li>II Minor Intermediate Intrusives</li> <li>DI Major Intermediate Intrusives</li> <li>MV Mafic Volcanics</li> <li>IM Minor Mafic Intrusives - dolerite d</li> <li>GB Major Mafic Intrusives</li> <li>U Ultramafic Rocks</li> </ul>	<p><b>6. Sedimentary Rock Classification</b></p> <ul style="list-style-type: none"> <li>VS Volcaniclastic Sediments</li> <li>Sv Volcanogenic Sediments</li> <li>Snd Rudites</li> <li>Sst Sandstones</li> <li>Sag Argillites</li> <li>Sst Limestone</li> <li>Sdol Dolomite</li> <li>Sct Chert</li> <li>Srl Iron formation</li> <li>Sev Evaporite</li> <li>Sch Undifferentiated Metamorphic Rocks</li> <li>Silicates</li> <li>Quartz</li> <li>K feldspar</li> <li>albite</li> <li>plagioclase</li> <li>amphibole</li> <li>pyroxene</li> <li>biotite</li> <li>chlorite</li> <li>sericite</li> <li>epidote</li> <li>tourmaline</li> <li>feldspar</li> <li>hornblende</li> <li>taic</li> <li>asp arsenopyrite</li> <li>Min Mn-oxides</li> <li>Fe Fe-oxides</li> <li>tet tetrahedrite</li> <li>cas cassiterite</li> <li>Sulphides</li> <li>bwk bowwork</li> <li>su sulphides</li> <li>gss gossan</li> <li>hem haematite</li> <li>mag magnetite</li> <li>lim limonite</li> <li>bn bornite</li> <li>co chalcopyrite</li> <li>sp sphalerite</li> <li>gn galena</li> <li>py pyrite</li> <li>po pyrrhotite</li> <li>ars arsenopyrite</li> <li>Mn Mn-oxides</li> <li>Fe Fe-oxides</li> <li>tet tetrahedrite</li> <li>cas cassiterite</li> </ul>
<p><b>7. Textures</b></p> <ul style="list-style-type: none"> <li>lava</li> <li>crystal tuff</li> <li>vitric tuff</li> <li>lapilli tuff</li> <li>ag agglomerate</li> <li>af ash flow</li> <li>ashfall</li> <li>breccia</li> <li>qz/aug quartz</li> <li>eyes augen</li> <li>bedded</li> <li>schistose</li> <li>lm bombs</li> <li>purpice</li> <li>hamme (length cm)</li> <li>porphyritic</li> <li>amphiboloid</li> <li>ves vesicular</li> <li>sph spherulitic</li> <li>wid welded</li> <li>rvw/r rounded</li> <li>fr fragments</li> <li>cl clasts</li> <li>bnd banded</li> <li>fb flow banded</li> <li>flow brecciated</li> <li>vns veins</li> <li>xbd cross-bedded</li> <li>tkbd thick-bedded</li> <li>trbd thin-bedded</li> <li>lb inter-bedded</li> <li>lam laminated</li> <li>clasts brecciated</li> <li>stg staining</li> </ul>	<p><b>8. Alteration</b></p> <ul style="list-style-type: none"> <li>ab abtized</li> <li>cd carbonated</li> <li>chd chloritized</li> <li>sd sericitized</li> <li>kd kaolinized</li> <li>epd epidotized</li> <li>sil silicified</li> </ul>
<p><b>9. Structure</b></p> <ul style="list-style-type: none"> <li>Fault</li> <li>Bedding</li> <li>Cleavage</li> <li>Joint</li> <li>Plunge</li> <li>Facing &amp; Class</li> <li>Unconformity</li> <li>Outcrop</li> <li>Interpreted boundary</li> </ul>	<p><b>10. Mineralisation</b></p> <ul style="list-style-type: none"> <li>dis disseminated (fs)</li> <li>str stringer</li> <li>msv massive</li> </ul>
<p><b>11. 1:2500 SHEET LAYOUT</b></p>	
<p><b>ELECTROLYTIC ZINC CO. OF ASIA LTD.</b>  <b>PROJECT: READ-ROSEBERRY LEASES, T.S.</b></p> <p>8382 111054</p> <p><b>GEOLOGY</b></p> <p>5cm</p> <p><b>SHEET 9A-III</b></p>	
<p>SCALE: 1:2500 Survey: A.N.R. Revised: _____          Reference: _____ Date: 2-5-89 Ref. No. _____          Drawn: N.W.D.S. Checked: _____ GEO-0020</p>	



**LEGEND**

<b>1 Colour</b>	<b>2 Cleavages</b>
pie pale	msv
dk dark	w.chd
chd	pink
rs red	str.chd
brn brown	
or orange	
yel yellow	
ol olive	
grn green	
blk black	
wht white	
cm cream	
ppl purple	
clr clear	

<b>3 Igneous Grain Size</b>	
fg > 1mm	
mg 1-5mm	
co 5-50mm	
vog > 50mm	

<b>4 Sediment Grain Size</b>	
argillites < 0.06mm	rudites > 2.0mm
arenites 0.06-2.0mm	gr granule 2-4mm
vfg 0.06-0.12mm	pb pebble 4-64mm
fg 0.12-0.25mm	cob cobble 64-256mm
mg 0.25-0.5mm	blt boulder > 256mm
co 0.5-1.0mm	
vog 1.0-2.0mm	

<b>5 Igneous Rock Classification</b>	
IA Acid tuff	rhyolite r
A Acid Lava	trachyte t
IA Minor Acid Intrusives	thryodacte r d
IA Major Acid Intrusives	dacite d
	P pegmatite
	GR granite
	QFP quartz feldspar porphyry

<b>6 Sedimentary Rock Classification</b>	
VS Volcaniclastic Sediments	
Sv Volcanogenic Sediments	
Rudites	Scn Conglomerate
	Sec Breccia (sedimentary)
	Sst Sandstone
	Sar arenites
	Sar < 15% matrix
	Sar > 15% matrix
	Ssw wackes
	Sgwk greywacke
	Sshk lithic wacke
	Svkc volcanic wacke

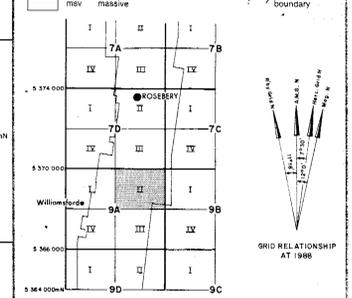
<b>7 Metamorphic Rock Classification</b>	
Sag Argillites	Sst Siltstone
Sst Limestone	Ssh Shale
Sdol Dolomite	Sbs Black shale
Sct Chert	Sgl Glacial deposits
Sif Iron formation	Sfjl Fluvioglacials
Sep Evaporite	Salv Alluvium
Sch Undifferentiated Metamorphic Rocks	

<b>8 Silicates</b>	<b>9 Carbonates</b>
q quartz	cb carbonate
k K-feldspar	bw bauxite
al albite	aul sulphides
pl plagioclase	gos gossan
am amphibole	hm haematite
px pyroxene	mag magnetite
b biotite	lim limonite
chl chlorite	bn bornite
ser sericite	co chalcocopyrite
ep epidote	rite rutile
tp tourmaline	sp sphalerite
f feldspar	gn galena
hb hornblende	py pyrite
t taic	pyrrhotite
	ars arsenopyrite
	Mn-oxides
	Fe-oxides
	tet tetrahedrite
	cas cassiterite

<b>10 Textures</b>	
lava	bm bombs
lithic tuff	pm pumice
crystal tuff	fm (length cm)
vt vitric tuff	fm (length cm)
lpt lapilli tuff	P porphyritic
ag agglomerate	a amygdaloidal
ves vesicular	ves vesicular
af ash flow	sph spherulitic
ashfall ash fall	wid welded
breccia	nwk reworked
ae/aug quartz	fr fragments
eyes augen	cl clastic
bedded	bnd banded
schistose	fb flow banded

<b>11 Alteration</b>	
a/b albited	
c/b carbonated	
c/d chloritized	
s/d sericitized	
k/d kaolinized	
ep/d epidotized	
sp/d spicified	

<b>12 Structure</b>	
Fault	
Bedding	
Cleavage	
Joint	
Plunge	
Facing & Class	
Unconformity	
Outcrop	
Interpreted boundary	



**ELECTROLYTIC ZINC CO OF ASIA LTD**  
**PROJECT: READ-ROSEBERY LEASES, TAS.**

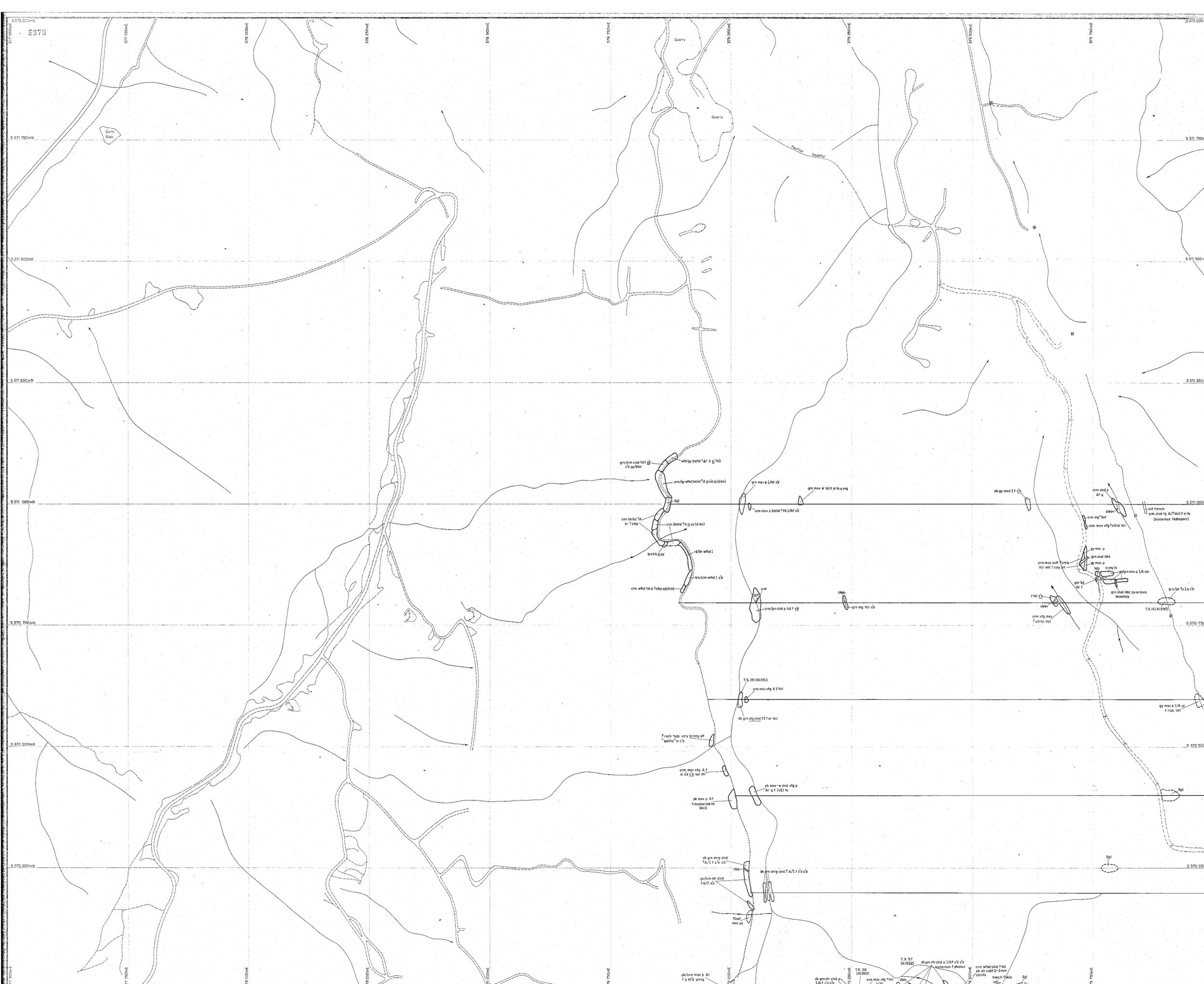
8381 111055

**GEOLOGY**

5cm

**SHEET 9A-II**

SCALE: 1:2500 Survey: A.N.R. Revised: 1  
 Reference: Date: 2-5-89 Ref No:  
 Drawn: N.W.D.S. Checked: GEO-0021



**LEGEND**

1. Colour		2. Clearages	
pl	pale	msv	msv
dk	dark	w.cvd	w.cvd
pk	pink	clvd	clvd
rd	red	str.cvd	str.cvd
brn	brown	3. Igneous Grain Size	
or	orange	fg	> 1mm
yl	yellow	mg	1-5mm
ol	olive	og	5-50mm
grn	green	vog	> 50mm
blk	black	4. Sediment Grain Size	
wht	white	argillites	< 0.06mm
crm	cream	arenites	0.06 - 0.20mm
gpl	purple	vfg	0.06 - 0.12mm
clr	clear	fg	0.12 - 0.25mm
		mg	0.25 - 0.5mm
		og	0.5 - 1.0mm
		vog	1.0 - 2.0mm
		rudites	> 2.0mm
		gr granule	2 - 4mm
		pb pebble	4 - 64mm
		cob cobble	64 - 256mm
		bd boulder	> 256mm
5. Igneous Rock Classification			
10	IA	Acid tuff	myolite
11	A	Acid Lava	myodacite
12	IA	Minor Acid Intrusives	dacite
13	MA	Major Acid Intrusives	pegmatite
			granite
			quartz feldspar
			porphyry
14	II	Intermediate tuffs	trachyte
15	I	Intermediate lava	basalt
16	II	Minor Intermediate Intrusives	andesite
17	DI	Major Intermediate Intrusives	
18	MV	Mafic Volcanics	
19	MI	Minor Mafic Intrusives - dolerite	d
20	MB	Major Mafic Intrusives	
21	U	Ultramafic Rocks	
6. Sedimentary Rock Classification			
22	VB	Volcaniclastic Sediments	
23	Sv	Volcanogenic Sediments	
24	Srd	Rudites	Scon Conglomerate
		Sbx Breccia (sedimentary)	Sst Tuff
25	Sst	Sandstones	Sar arenites
			Sar quartz arenite
			Sar feldspar arenite
			Sar lithic arenite
			Ssv volcanic arenite
			Ssw quartz wacke
			Ssw feldspathic wacke
			Ssw lithic wacke
			Ssw volcanic wacke
26	Sag	Argillites	Ssh Siltstone
27	Sst	Limestone	Sbs Black shale
28	Sdol	Dolomite	
29	Sct	Chert	Sgl Glacial deposits
30	Sf	Iron formation	Sfl Fluvioglacial
31	Sev	Evaporite	Sah Althum
32	Sch	Undifferentiated Metamorphic Rocks	
7. Sulfides			
33	q	quartz	cb carbonate
34	k	K-feldspar	sid siderite
35	ab	albite	su sulfides
36	p	plagioclase	gss gossan
37	a	amphibole	hm haematite
38	px	pyroxene	mag magnetite
39	b	biotite	lim limonite
40	c	chlorite	bn bornite
41	e	epidote	co chalcopyrite
42	a	arsenite	rt rutile
43	f	tourmaline	sp sphalerite
44	h	hornblende	gn galena
45	t	talc	py pyrite
			asp arsenopyrite
			Mn Mn-oxides
			Fe Fe-oxides
			tr tetrahedrite
			cas cassiterite
8. Oxides			
46	q	quartz	cb carbonate
47	k	K-feldspar	sid siderite
48	ab	albite	su sulfides
49	p	plagioclase	gss gossan
50	a	amphibole	hm haematite
51	px	pyroxene	mag magnetite
52	b	biotite	lim limonite
53	c	chlorite	bn bornite
54	e	epidote	co chalcopyrite
55	a	arsenite	rt rutile
56	f	tourmaline	sp sphalerite
57	h	hornblende	gn galena
58	t	talc	py pyrite
			asp arsenopyrite
			Mn Mn-oxides
			Fe Fe-oxides
			tr tetrahedrite
			cas cassiterite
9. Carbonates			
59	q	quartz	cb carbonate
60	k	K-feldspar	sid siderite
61	ab	albite	su sulfides
62	p	plagioclase	gss gossan
63	a	amphibole	hm haematite
64	px	pyroxene	mag magnetite
65	b	biotite	lim limonite
66	c	chlorite	bn bornite
67	e	epidote	co chalcopyrite
68	a	arsenite	rt rutile
69	f	tourmaline	sp sphalerite
70	h	hornblende	gn galena
71	t	talc	py pyrite
			asp arsenopyrite
			Mn Mn-oxides
			Fe Fe-oxides
			tr tetrahedrite
			cas cassiterite
10. Textures			
72	l	lava	bm bombe
73	it	lithic tuff	pm pumice
74	ct	crystal tuff	fm (l) flame
75	vt	volcanic tuff	lm (l) (length cm)
76	lpt	lapilli tuff	P porphyritic
77	ag	agglomerate	a amygdaloidal
78	af	ash flow	ves vesicular
79	ashf	ash fall	wd welded
80	bx	breccia	rw'd reworked
81	ey	eyes augen	lr fragments
82	bd	bedded	di laminated
83	sch	schistose	bd bedded
84			fo flow
85			stg staining
11. Alteration			
86	alb	albitized	
87	cb	carbonated	
88	ch	chloritized	
89	sd	sericitized	
90	ka	kaolinized	
91	epd	epidotized	
92	sil	silicified	
12. Structure			
93	F	Fault	
94	B	Bedding	
95	C	Cleavage	
96	J	Joint	
97	P	Plunge	
98	F&C	Facing & Class	
99	U	Unconformity	
100	O	Outcrop	
101	I	Interpreted	
102	B	Boundary	

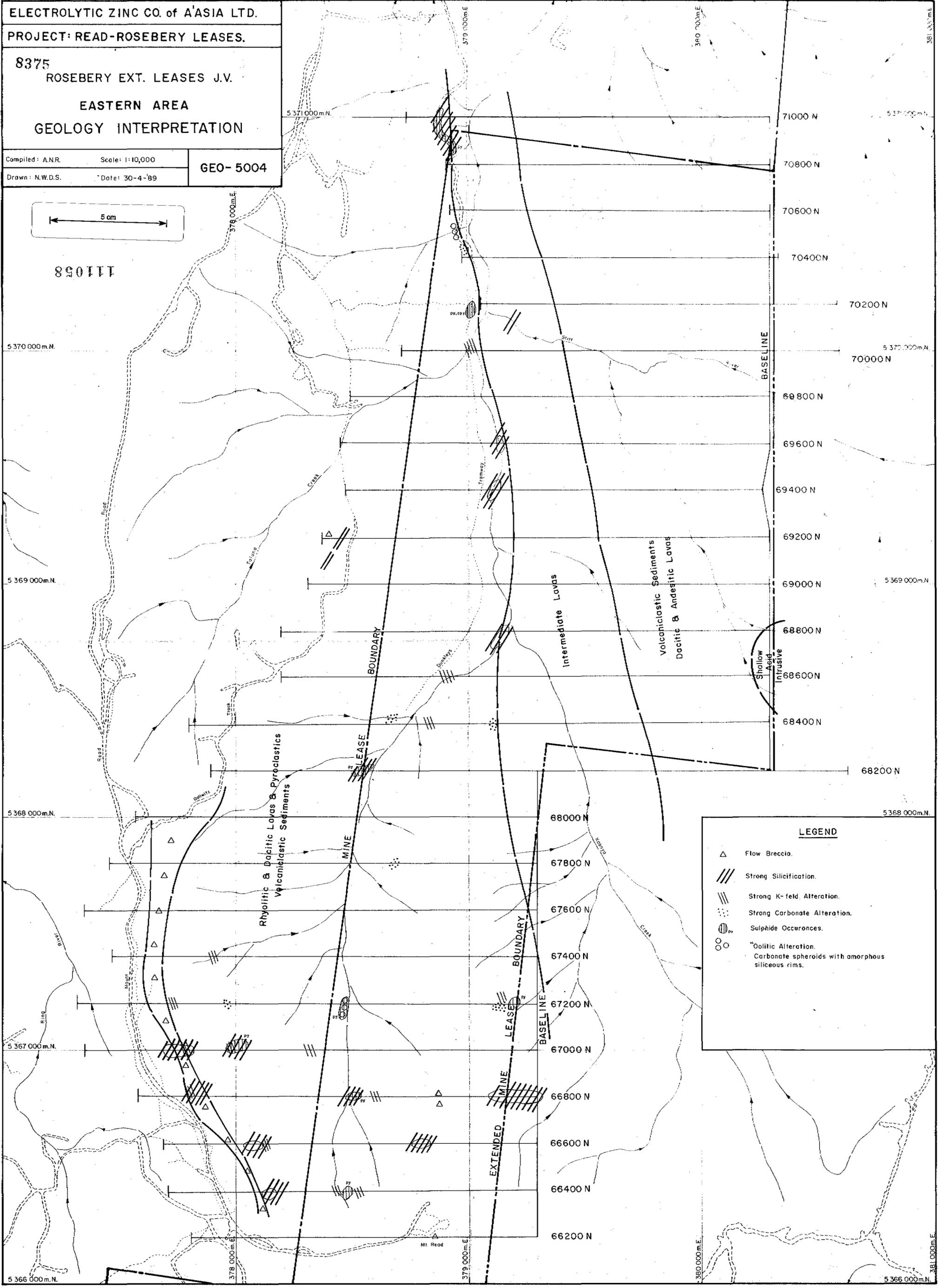
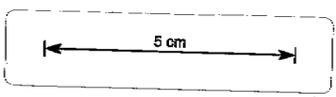
ELECTROLYTIC ZINC CO. OF ALASKA LTD.  
 PROJECT: READ-ROSEBERY LEASE, T.S.  
 8378 111056  
 GEOLOGY  
 SHEET 7D-III  
 SCALE: 1:2500 Survey: A.N.R. Revised:  
 Date: 3-5-89  
 Drawn: N.W.D.S. Checked: GEO-0022



ELECTROLYTIC ZINC CO. of ASIA LTD.  
 PROJECT: READ-ROSEBERY LEASES.  
 8375  
 ROSEBERY EXT. LEASES J.V.  
 EASTERN AREA  
 GEOLOGY INTERPRETATION

Compiled: A.N.R.    Scale: 1:10,000  
 Drawn: N.W.D.S.    Date: 30-4-'89

**GEO- 5004**



**LEGEND**

- △ Flow Breccia.
- /// Strong Silicification.
- ≡≡≡ Strong K-feld. Alteration.
- ⋯ Strong Carbonate Alteration.
- ⊙ Sulphide Occurrences.
- Oolitic Alteration.  
Carbonate spheroids with amorphous siliceous rims.

ELECTROLYTIC ZINC CO. of ASIA LTD.

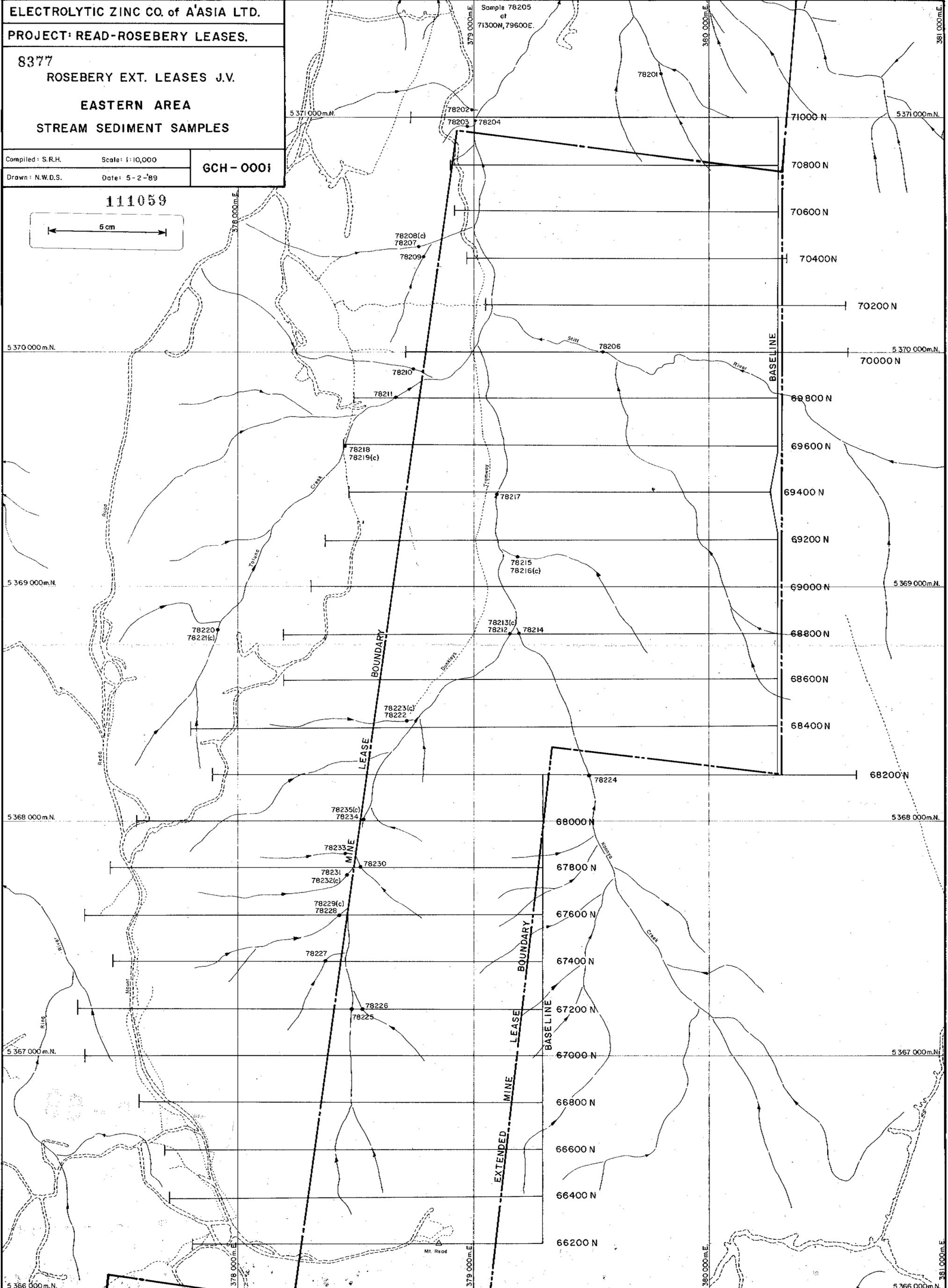
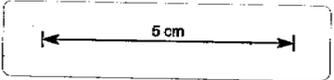
PROJECT: READ-ROSEBERY LEASES.

8377  
ROSEBERY EXT. LEASES J.V.  
EASTERN AREA  
STREAM SEDIMENT SAMPLES

Compiled: S.R.H. Scale: 1:10,000  
Drawn: N.W.D.S. Date: 5-2-'89

GCH-0001

111059



Sample 78205 at 71300N, 79600E.

Mt. Read

BASELINE

BOUNDARY

LEASE

EXTENDED MINE

BASELINE

MINE

ELECTROLYTIC ZINC CO. of ASIA LTD.

PROJECT: READ-ROSEBERY LEASES.

8376

ROSEBERY EXT. LEASES J.V.

EASTERN AREA  
ROCKCHIP SAMPLES

Compiled: S.R.H.      Scale: 1:10,000  
Drawn: N.W.D.S.      Date: 5-2-'89

GCH - 1001

111060

