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GEOPEKO

E.L. 96/87 PRESTON

ANNUAL REPORT ON EXPLORATION ACTIVITY

APRIL 1989 - MARCH 1990

A Report prepared for Pasminco Ltd

OPEN FILE

Report No. T244

K.J. Virgoe
March 1990



507002

E·Z

PROJECT: PRESTON E.L. 96/87

LOCATION MAP

Compiled: I. MAT. Date: 28-10-88

Drawn: D. THOM. Scale: 1:250 000

Fig. 1

002

507003

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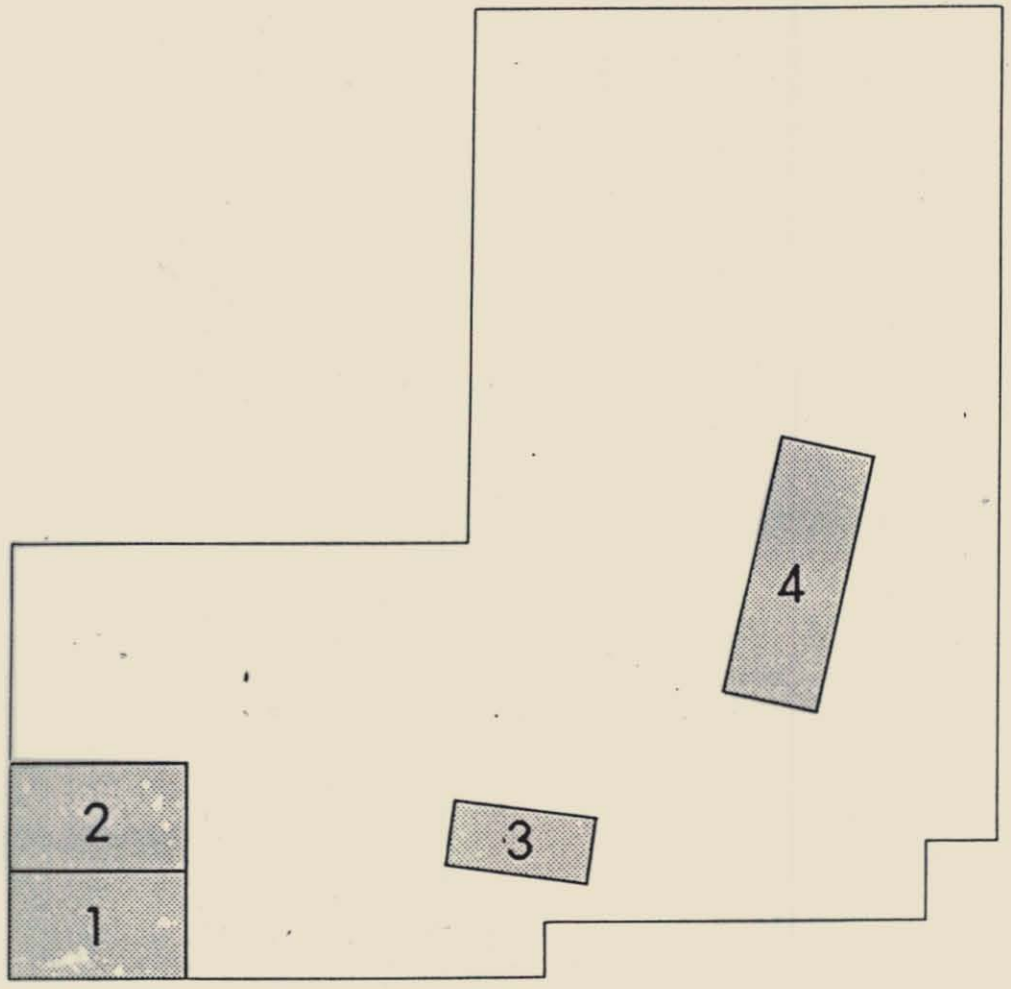
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533-0001	1:25000	EL 96/87	Geology
0002	1:25000	EL 96/87	Stream Sample Nos. & Locations
0004	1:25000	EL 96/87	Geochemistry - Cu
0005	1:25000	EL 96/87	Geochemistry - Pb
0003	1:25000	EL 96/87	Geochemistry - Zn
0006	1:25000	EL 96/87	Geochemistry - Au
0012	1:5000	Tulip Tree Ck Grid	Geol. Interpret.
0007	1:5000	Tulip Tree Ck Grid	Sample Locations
0008	1:5000	Tulip Tree Ck Grid	Geochemistry - Cu
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0010	1:5000	Tulip Tree Ck Grid	Geochemistry - Zn
	1:5000	Crosby Creek Grid	Geol. Interpret.
	1:5000	Crosby Creek Grid	Sample Locations
	1:5000	Crosby Creek Grid	Geochemistry - Cu
	1:5000	Crosby Creek Grid	Geochemistry - Pb
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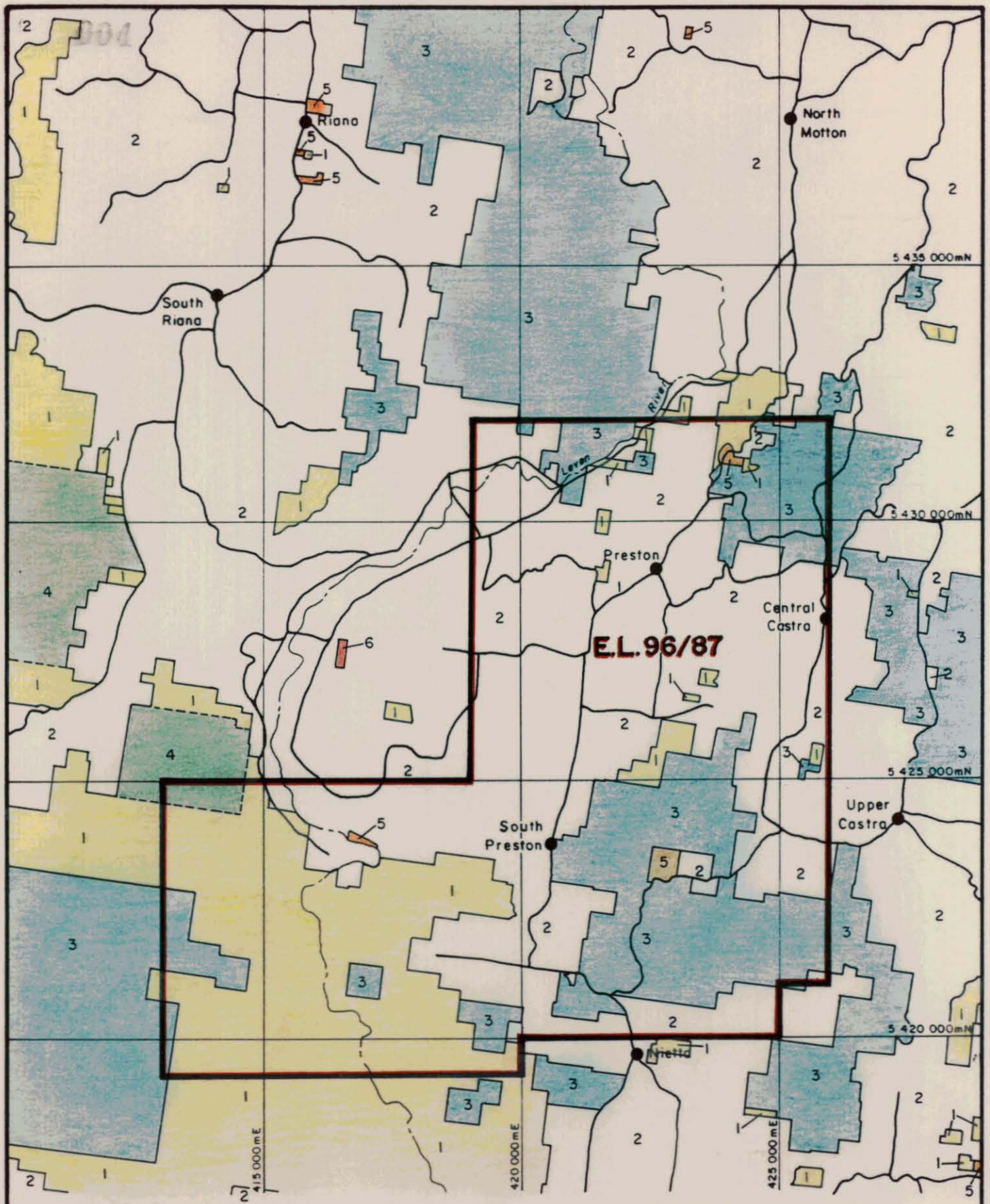


PROSPECTS

Tulip Tree) 1 Loyetea South
Creek Grid) 2 Loyetea North
3 Crosby Creek
4 Castra Road

Figure 4

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LEGEND

1. Leased or non-allocated crown land.
2. Private freehold land.
3. Forestry Commission - State forest.
4. Timber reserve.
5. Administrative reserve.
6. N.P.W.S. - State reserve.

5 cm

PROJECT: PRESTON E.L. 96/87

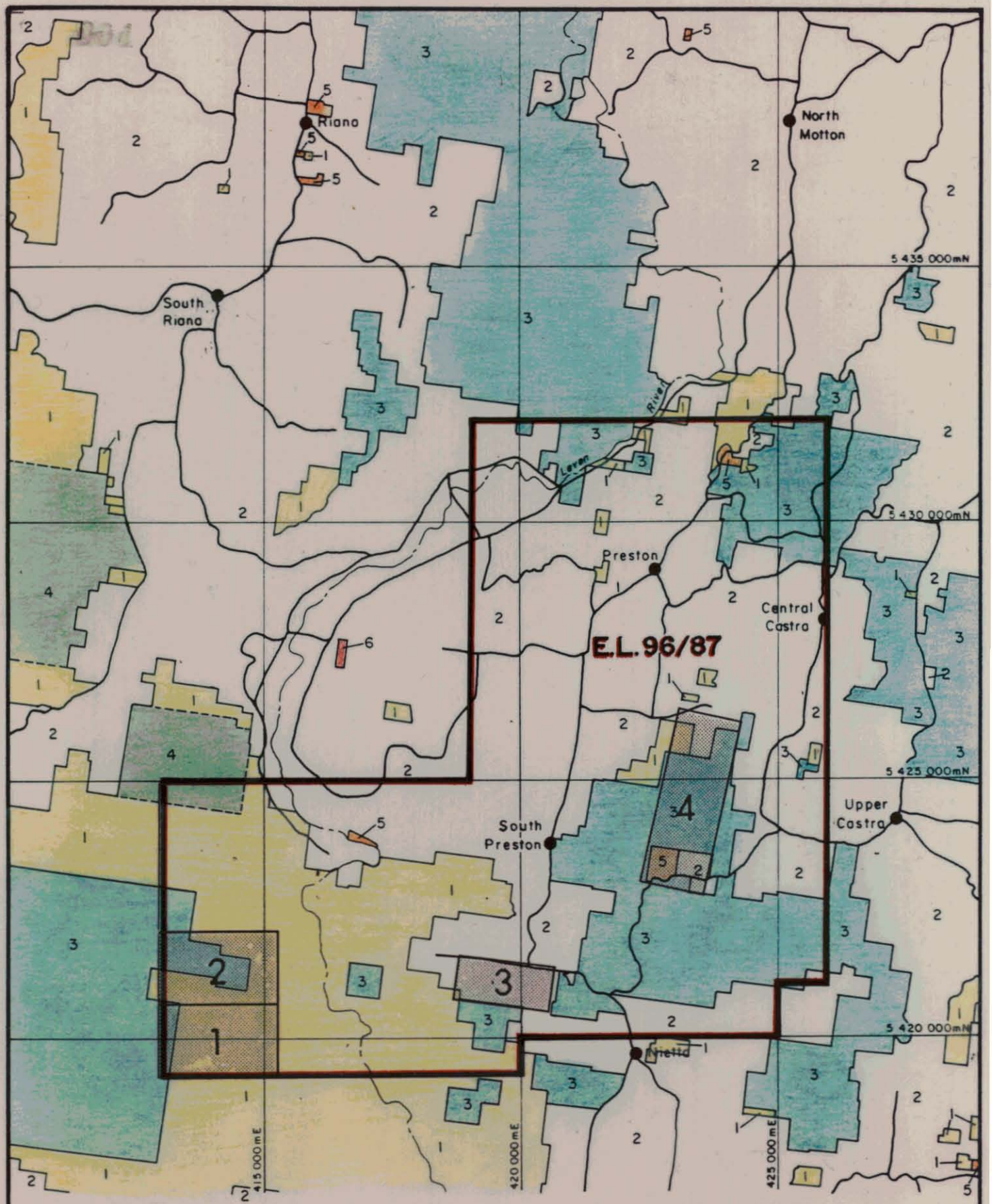
LAND TENURE

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Fig. 2

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LEGEND

1. Leased or non-allocated crown land.
2. Private freehold land.
3. Forestry Commission - State forest.
4. Timber reserve.
5. Administrative reserve.
6. N.P.W.S. - State reserve.

PROSPECTS

1. Loyetea South
2. Loyetea North
3. Crosby Creek
4. Castra Road

5 cm

Figure 4

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PROJECT: PRESTON E.L. 96/87

LAND TENURE

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1.0 INTRODUCTION

1.1 Location and Access (Fig. 1)

EL 96/87 is located in Northern Tasmania and is centred approximately 25km south of the coastal town of Penguin. Access to the eastern two thirds of the EL is by sealed roads with most area being between 35 and 45km from Devonport. Secondary 4WD access by farm tracks and logging tracks to most areas within this eastern portion is good.

However, access to the western third of the area is difficult. The few logging tracks that allow 4WD access are in poor repair and some are overgrown. The more accessible parts of this western area are over an hour's drive from Burnie or Devonport. Secondary access here is by walking track.

1.2 Tenure and Land Usage (Fig. 2 and Appendix 1)

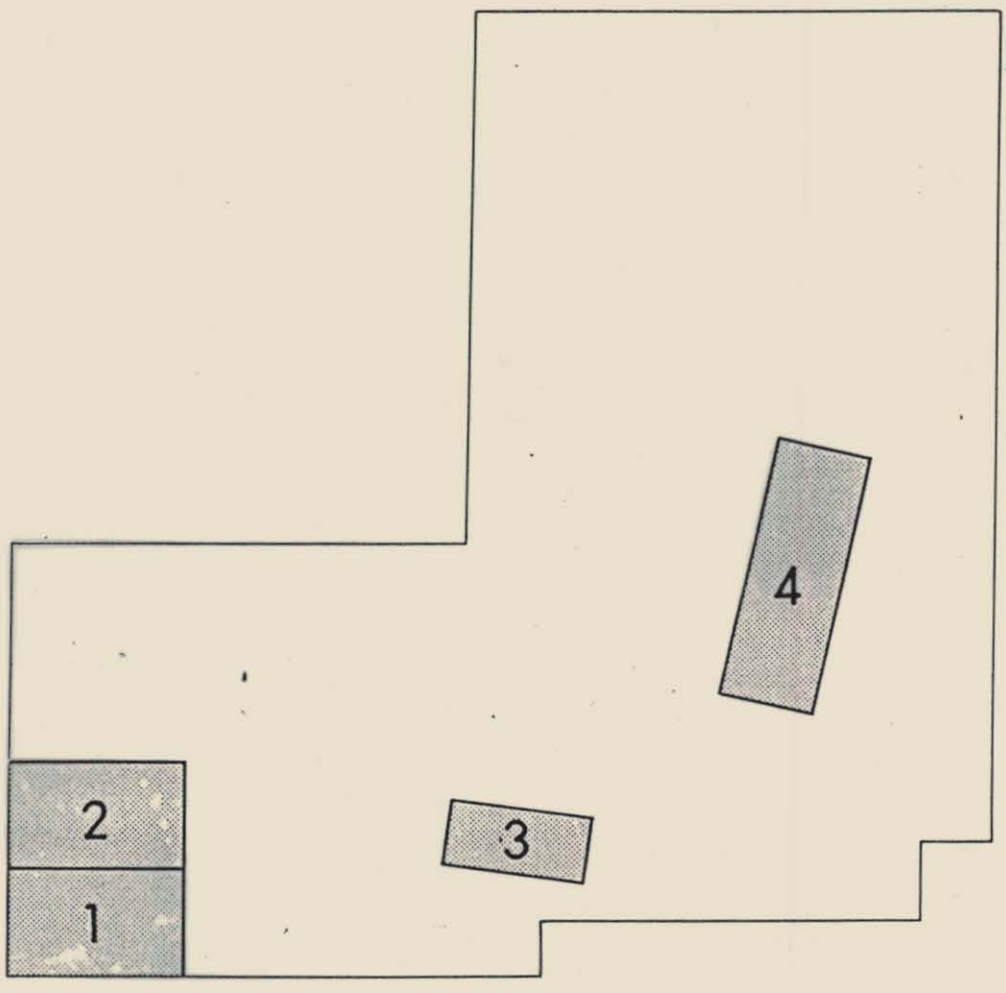
EL 96/87 of 113 sq.km. was granted to the Electrolytic Zinc Company of Australasia (E.Z.) in April, 1988. An additional EL, EL 21/88 of 5 sq. km. adjoining EL 96/87 was subsequently applied for to cover old CRA Exploration grids. When granted, this was combined with EL 96/87. The EL schedule is detailed in Appendix 1.

Most of the northern and eastern portions is arable land which is subdivided into numerous freehold blocks which are used for intensive pasture and some cultivation. The southern and western sections, however, are predominantly crown land and State Forest which are administered by the Forestry Commission. Most of these areas are covered by a thick regrowth of eucalypt with some pine plantations.

1.3 Regional Geology (Fig. 3)

The oldest rocks exposed in EL 96/87 comprise Cambrian volcano-sedimentary units infilling either the Fossey Mountain Trough or the Dial Range Trough. Both of these troughs are considered to be branches of the Dundas Trough which contains the extensively mineralized Mount Read Volcanics.

Within EL 96/87, these Cambrian rocks include felsic tuffs, lava and epiclastics; lithic greywackes and greywacke conglomerates; and greywacke-siltstone units. High level Cambrian intrusive bodies intruding the Volcano-sedimentary sequence have been mapped. These include quartz feldspar porphyries and dacitic feldspar porphyries (Bamford and Green, 1988 a and b).



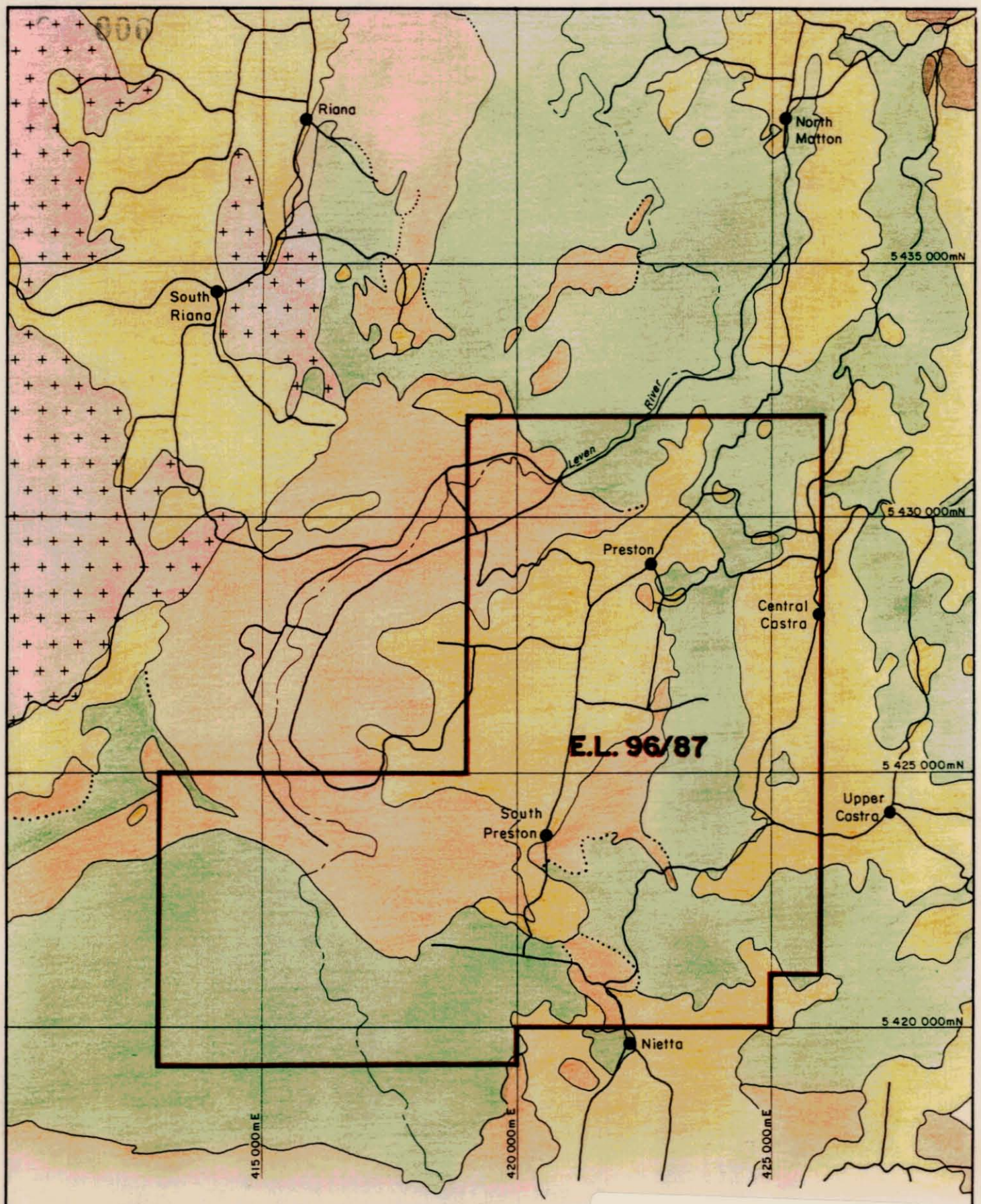
PROSPECTS

Tulip Tree) Creek Grid)

1	Loyetea South
2	Loyetea North
3	Crosby Creek
4	Castra Road

Figure 4

507008



LEGEND

- 58 Tertiary basalt.
- 13 Ordovician & Silurian Sedimentary rocks.
- 46 Cambrian Volcanic–Sedimentary rocks.
- 55 Precambrian rocks.
- 21 Devonian Granite.

5 cm

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PROJECT: PRESTON E.L. 96/87

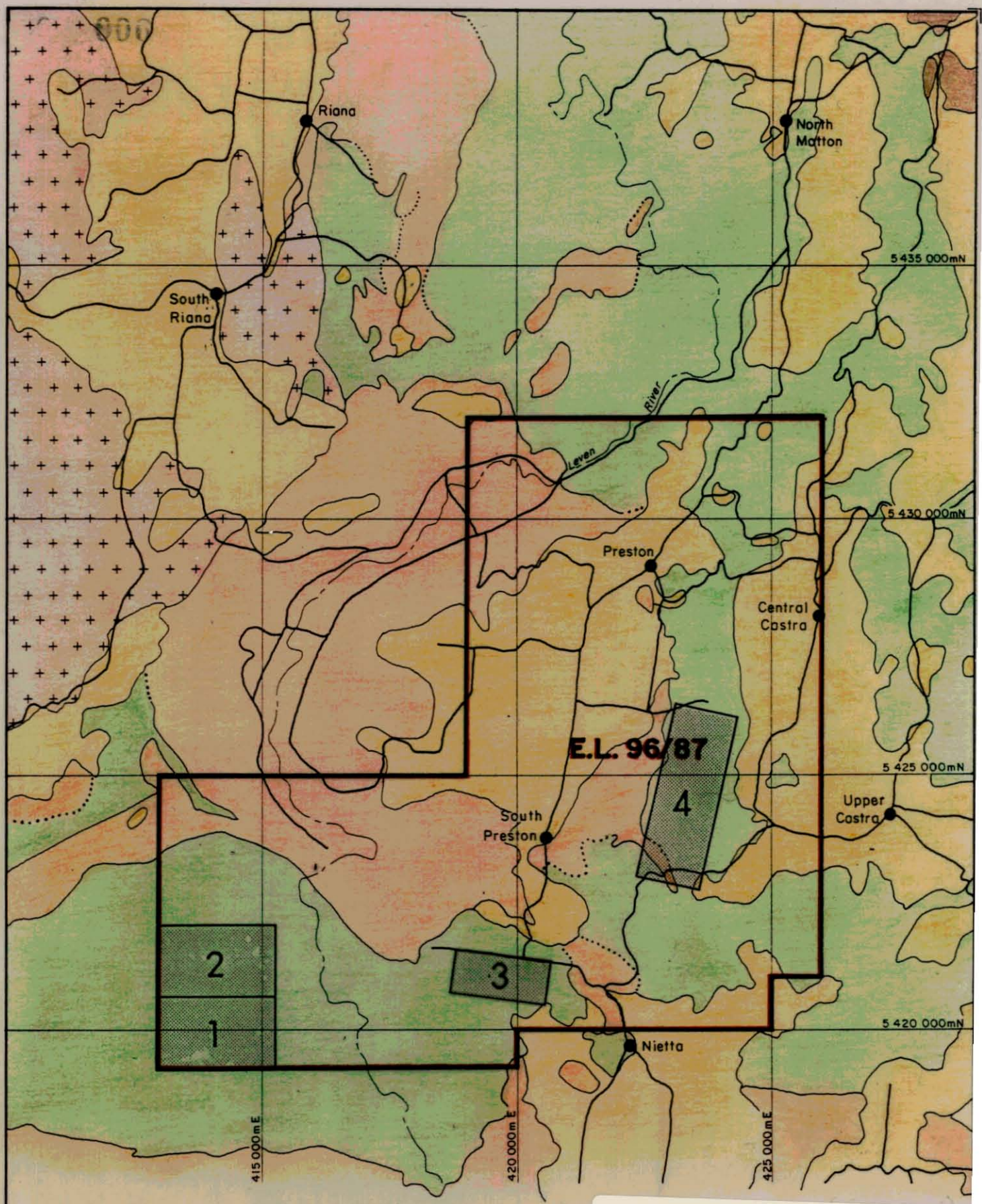
GEOLOGY

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Fig. 3

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Tulip Tree) Creek Grid)

Figure 4

507009

507008

Fig. 3

Ordovician rocks which unconformably overlie the Cambrian rocks flank most exposure of Cambrian rocks. These Ordovician units include the Roland Conglomerate, the Moina Sandstone and the Gordon Limestone.

Remnants of Tertiary Basalt flows with associated sub basalt sediments cap the faulted and folded Cambrian and Ordovician rocks. Over one third of EL 96/87 is covered by Tertiary Basalts.

Government maps, the Cethana 1:50,000 Mineral Occurrence Map (Bamford and Green, 1988a), the Ulverstone 1:50,000 Mineral Occurrence Map (Bamford and Green, 1988b), the St. Valentine 1:50,000 Geological Map Sheet (Baillie et al, 1986) and the Loongana Metallic Mineral Deposits Map (Green and Taheri 1989) provide up to date summaries of the geological understanding of EL 96/87 and surrounding areas.

1.4 Known Mineral Deposits/Occurrences (Fig. 5)

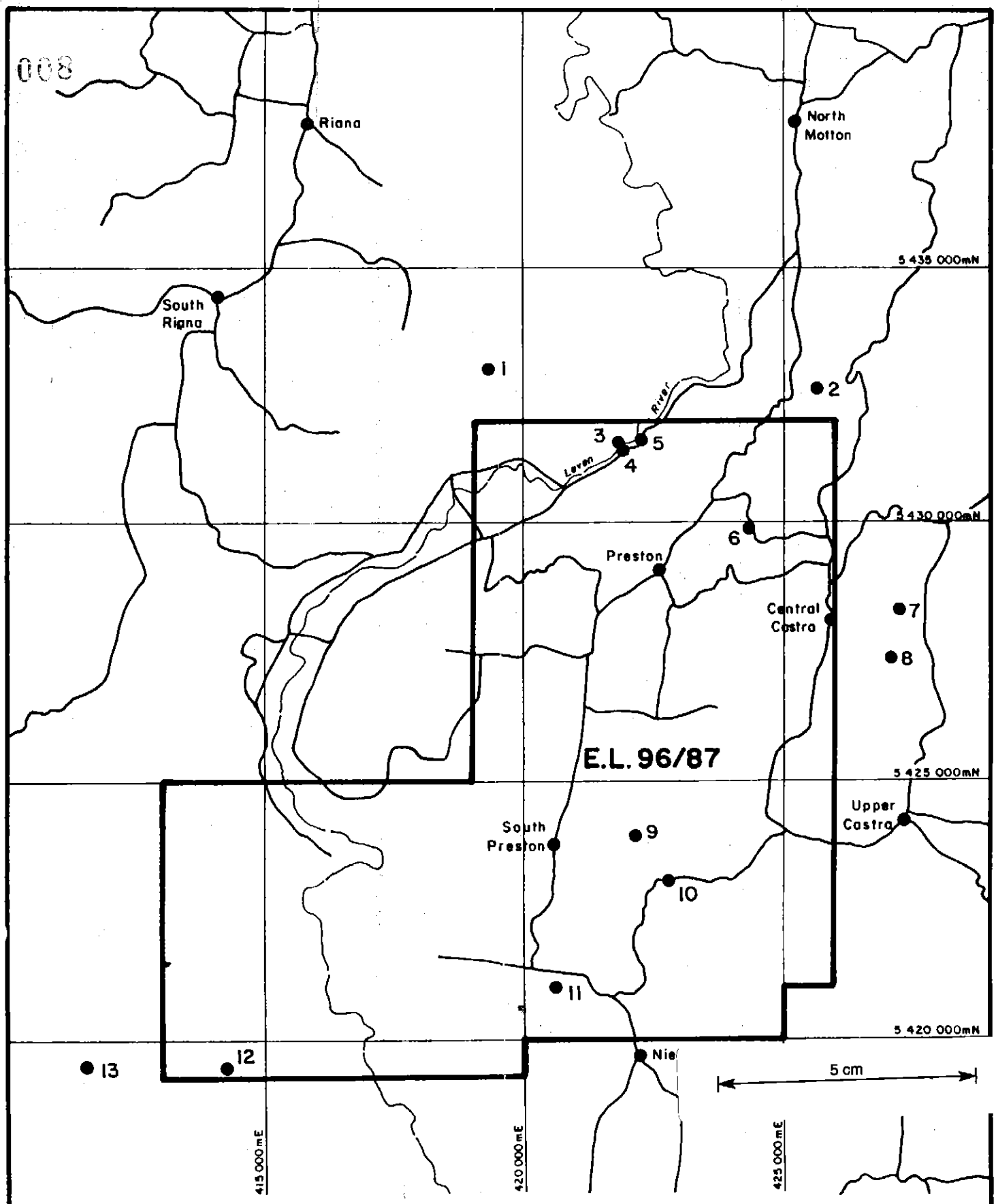
Bamford and Green (1988 a, b and 1989) list 13 occurrences of metallic minerals within and adjacent to EL 96/87. These are listed below and figure 5 shows their locations. Only one deposit, the Walloa Creek Mine (Copper Creek Mine) has any recorded production and this was only a few tonnes. Jennings 1979, contains a good review of early government reports on the old prospects.

1.5 Previous Exploration

Recent systematic exploration of parts of what is now EL 96/87 has been conducted by CRA Exploration (1973-77), Geopeko (1976-77), Comalco (1977-79), Shell Metals (1982-83), CRA Exploration again (1986-87) and Electrolytic Zinc Co. (1988-89). Techniques applied include stream sediment geochemistry, soil geochemistry, geological mapping, aeromagnetic surveys, helicopter electromagnetic (HEM400) surveys, gradient array EIP, pole dipole EIP, SP surveys, and diamond drilling. Details of EZ's exploration are outlined in the "Annual Report on Exploration Activity April 1988 - April 1989" (Report No. T235)

Results of earlier exploration are summarized in Section 2 of this report. For a more detailed outline of previous exploration see E.Z. Report No. T235.

008



LEGEND

No.	NAME	COMMODITIES	GEOLOGY
1.	Wallaa Creek Mine. (Copper Creek Mine).	Cu, Au, Ag, py.	Cambrian volcano sedimentary rocks.
2.	Hebblethwaites Propect.	py.	Cambrian volcano sedimentary rocks.
3.	Radfords Reef.	Cu, py.	Cambrian volcano sedimentary rocks. Near contact of dacitic intrusive.
4.	Browns Blow.	hte.	
5.	Colbourns Show.	py.	
6.	—	py.	Cambrian volcano sedimentary rocks.
7.	McPhersons Mine.	Cu, Pb, Zn, Ba.	Cambrian greywacke.
8.	—	Cu, Ba.	Cambrian greywacke.
9.	Preston Silver Mine.	Pb, Zn, Ag, py.	Cambrian volcano sedimentary rocks.
10.	Castra Prospect.	Ba, py.	Cambrian volcano sedimentary rocks.

LEGEND

No.	NAME	COMMODITIES	GEOLOGY
12.	Loyetea South Prospect.	Cu, Pb, Zn.	Cambrian volcano sedimentary rocks.
13.	—	Pb.	Cambrian volcano sedimentary rocks.

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PROJECT: PRESTON E.L. 96/87

MINERAL OCCURRENCES

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Fig. 5

2.0 SUMMARY OF RESULTS OF PREVIOUS EXPLORATION

2.1 Regional

* The Crosby Creek, Loyetea South and Loyetea North areas are geochemically anomalous for Cu, Pb, Zn.

* Some sections of the Cambrian stratigraphy have not been covered by reconnaissance stream sediment sampling and geological mapping because of access difficulties.

* Aeromagnetic surveys over prospective Cambrian stratigraphy have not been interpreted in detail.

2.2 Loyetea South

* Pb, Zn and Cu soil anomalies in this area are associated with intensely sericitised volcano-sedimentary rocks.

* Some gradient array IP anomalies are associated with soil geochemistry anomalies.

* Drill holes targeted on geochemistry and IP intersected intensely sericitised rocks associated with rhyodacitic or dacitic lavas.

* No mineralisation was observed and no source of the IP anomalies was detected.

* DD76LS2 failed to test its target anomaly. Because of access difficulties it was drilled over 100m too far to the south west.

2.3 Loyetea North

* Several coincident or related IP and geochemical anomalies were detected.

* No drill holes were proposed because of a perceived absence of rock alteration.

2.4 Crosby Creek

* "C" horizon soil sampling has outlined several zones anomalous in Pb and Zn and to a lesser extent Cu.

* The most prominent geochemical anomaly flanks a mapped microdiorite intrusive.

* Diamond drilling intersected minor disseminated and veinlet Cu, Pb, Zn sulphide mineralisation in tuffaceous shales at the contact with a porphyritic microdiorite intrusive.

* Only the easily accessible portions of the Crosby Creek area have been tested.

* Coincident IP and geochemical anomalies along the southern portion of the grid have not been tested. Mapping suggests that these southern anomalies are not related to the microdiorite intrusive.

2.5 Castra Road

* A large zone of pyritized and silicified volcanics occurs within a broader zone of fairly intense sericitic alteration.

* Along Castra Road, veins and segregations of barite occur within these pyritized volcanics.

* Rocks in this zone appear to be geochemically depleted in Cu, Pb and Zn.

* Sedimentary units flanking the altered volcanics are weakly anomalous in Pb, Zn and Cu.

3.0 EXPLORATION PHILOSOPHY

The elevated Pb, Zn, Cu geochemistry, rock alteration, barite mineralisation and geological setting indicates that the Loyetea-Crosby Creek Castra Road belt has potential for VMS deposits, for precious metal deposits of the South Hercules type and for low sulphide gold deposits. The lack of success by early prospectors and for later patchy systematic exploration by CRAE suggest that such mineralization is unlikely to outcrop. Any orebody within EL 96/87 is likely to be deeply buried or covered by later sediments or Tertiary Basalts.

The techniques currently available for the second phase exploration for deep VMS deposits and which have been shown to provide useful results at Rosebery, Que River, Hellyer or Queenstown can be sub-divided into two groups. The first group comprises techniques that are useful for screening anomalous areas and mineralised prospects and includes aeromagnetic interpretation; rock alteration studies by petrology and whole rock analysis; lead, oxygen and sulphur isotope studies; and the geological analysis of palaeovolcanic settings. These techniques permit an assessment of the age of mineralisation and allow comparison of prospect alteration with known alteration zones associated with both barren and mineralised systems.

The second group includes techniques used for target definition or for determining vectors towards mineralization within a hydrothermal system. Such techniques as detailed geological mapping, TEM, CSAMT, micro gravity, RMIP, downhole EM and deep diamond drilling have been applied with some success on the West Coast. A well orchestrated approach by a team of experienced and innovative specialists is an essential factor in determining the success of these advanced exploration techniques.

4.0 EXPLORATION ACTIVITY

4.1 Loyetea South

4.1.1. Aim

Anomalous lead and zinc geochemistry was detected in this area by the 1973-77 CRAE stream sediment and soil auger sampling programs.

During EZ's exploration from April 1988 - April 1989, on the Tulip Tree Creek Grid, a number of anomalous CRAE lead zones were identified and investigated.

One zone lying directly southeast of Query Road was still open to the east.

Work was aimed at testing the possible easterly extension of this anomaly by soil auger sampling of grid lines 148E, 150E and rock chip sampling a nearby tributary of Tulip Tree Creek.

4.1.2. Work Completed

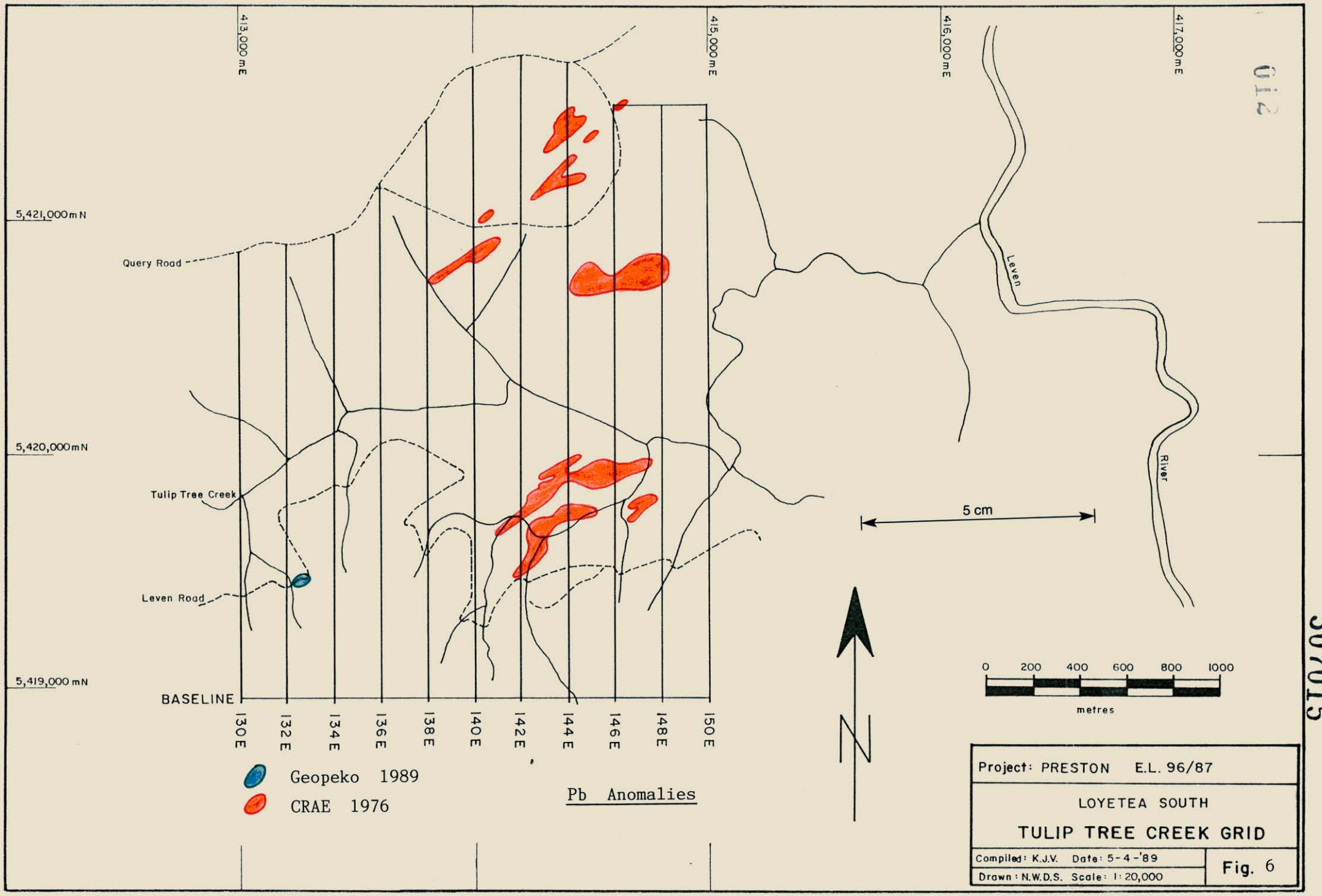
An attempt was made to sample the C soil horizon by hand auger on lines 148E and 150E. However, due to the presence of a steep, rock scree slope, no C horizon was found developed. Instead rock chip samples were taken in places of outcrop.

A tributary running sub parallel to line 150E and 200m to the east was geologically mapped and rock chip sampled every 50m.

4.1.3. Results Received

Geochemistry

The anomalous lead zone southeast of Query Road trends north east and is known to extend for 400m along the margin of a high level vesicular andesite intrusive. Values of up to 680 ppm Pb have been obtained in this zone.


413,000 mE
415,000 mE
416,000 mE
417,000 mE
5,421,000 mN
5,420,000 mN
5,419,000 mN
Query Road
Tulip Tree Creek
Leven Road
BASELINE
130 E
132 E
134 E
136 E
138 E
140 E
142 E
144 E
146 E
148 E
150 E
Leven
River
5 cm
0 200 400 600 800 1000
metres
Geopeko 1989
CRAE 1976
Pb Anomalies
Project: PRESTON E.L. 96/87
LOYETEA SOUTH
TULIP TREE CREEK GRID
Compiled: K.J.V. Date: 5-4-'89
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Fig. 6

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Results of the rock chip samples from lines 148E, 150E and the tributary were in general disappointing with only 2 samples out of 30 showing slight anomalism (>200 ppm) at 245, 220 ppm Pb, and with only one moderately anomalous value of 1800 ppm Pb. All nine samples taken along the tributary had very low values, the highest being 60 ppm Pb.

These poor results effectively close off any eastward extension of the lead anomaly further than Line 148E. Refer to figure 6 - Lead Anomalies.

The corresponding Cu values for these samples were also very low, the highest value reaching 20 ppm Cu. However, a number of anomalous Zn (>300 ppm) values of up to 650 ppm Zn were obtained. These values occur 200m west of and may be part of a coincident lead and zinc anomaly north of Query Road which contains values of up to 2100 ppm Pb and 1450 ppm Zn in sediments.

This zone was investigated during 1988-89, the details of which are outlined in EZ Report No. T235.

Geology

The rock unit underlying the sampled area is predominantly a shallow intrusive acid andesite with minor chloritic alteration. North of the andesite in the tributary is a feldspar phyric dacitic lava overlain by clastic sediments. These units correlate well with the geology known to the west of the sampled area.

4.1.4. Discussion

During the 1989-90 period only a minor amount of field work was carried out in this area. As a consequence no further significant results were received.

As outlined in E.Z. Report T235, two main anomalous lead zones occur within the gridded area. One 800m zone subparallel to the bedding crosses Query Road and contains values of up to 2100 ppm Pb and 1450 ppm Zn. The area is underlain predominantly by a dark grey volcanic greywacke to conglomerate unit, with minor dacite and siltstone and siliceous basalt float.

The other main zone occurs north of Leven Road and extends for 750m, striking northeast along the bedding. This zone contains values of up to 880 ppm Pb and 1150 ppm Zn in epiclastic sandstones, siltstone and conglomerate.

Minor chlorite, sericite and carbonate alteration are seen in these areas.

One other weaker anomaly also occurs on Leven Road in a pale green intensely sericitic acid ash tuff with values of up to 440 ppm Pb and 320 ppm Zn.

4.2 Crosby Creek

4.2.1. Aim

Anomalous lead and zinc geochemistry occurs in Crosby Creek and its tributaries south of the CRAE grid.

Further detailed exploration was warranted in this part of the EL as most of the anomalous area was unexplored and the creeks were thought to drain prospective Cambrian felsic volcanics and sediments.

Geopeko established a grid over the area to investigate the source of this base metal anomalism.

4.2.2 Work Completed

A grid of 7 north-south cross lines totalling 11.5km was cut over the area. The crosslines were based off Diprose Road, spaced 400m apart and pegged at 20m slope corrected intervals. See figure 7 which shows the Crosby Creek Grid.

Rock chip or C horizon soil sampling of the grid lines was carried out at 20m intervals.

A total of 162 rock and 291 soil samples were taken.

Each grid line, Diprose Road and the western end of Cullens Road were geologically mapped.

Road access into the area is limited. Access into the northern half of the grid is along Cullens Road, followed by walking south across private farm land into the Crosby Creek valley. See Photo 1.

In the south access along Diprose Road was restricted due to an uncooperative land owner, so a track was cut north from Barretts Road onto Diprose Road. This served as a walking and bombardier track.

Four bulk leach gold and 2 stream sediment samples were taken on Crosby Creek and on an unsampled creek 1½ km to the north.

Loongana Range
Black Bluff
Mt Tor
Crosby Creek Valley
Tulip Tree Creek
Cullens Road
Private farmland

507018



Photo 1 - Looking southwest from Watts Lookout over the southern Cambrian third of EL 96/87.

507019

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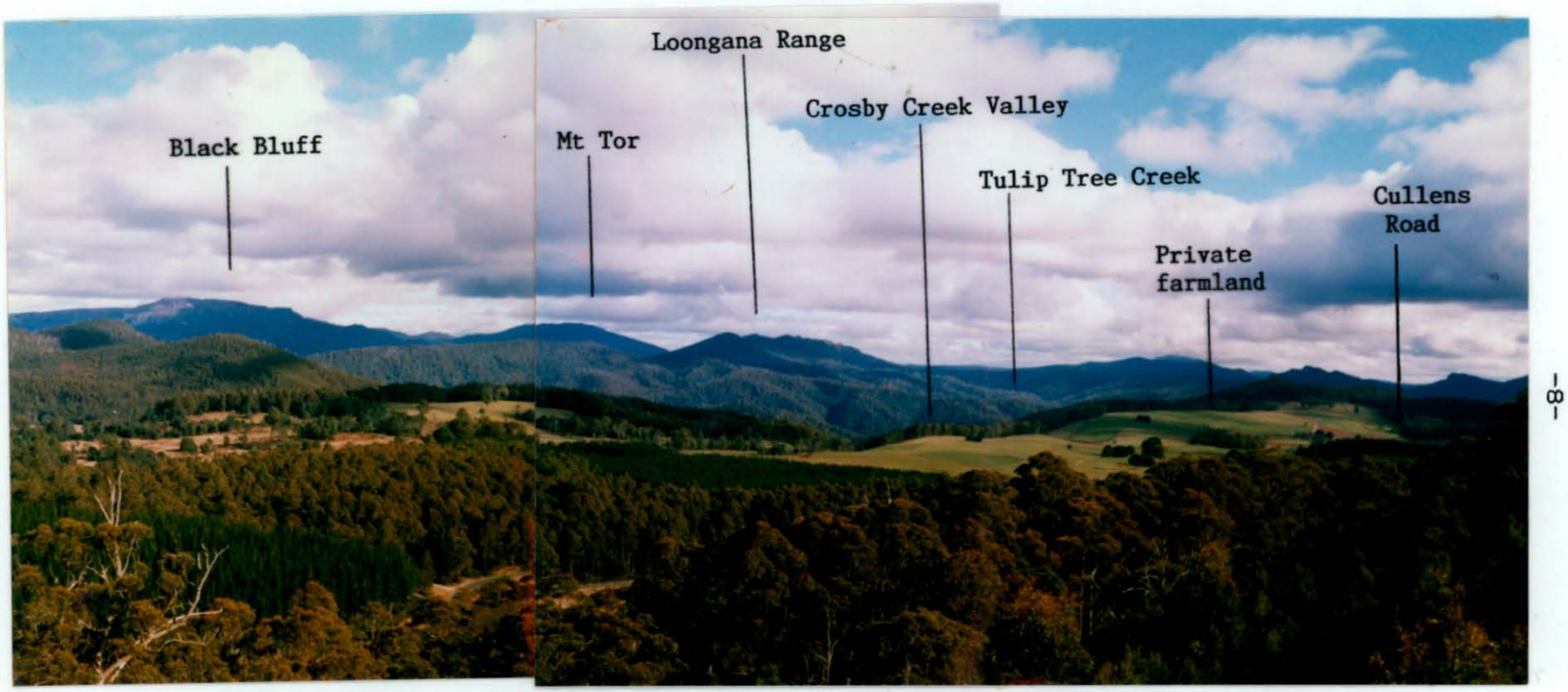


Photo 1 - Looking southwest from Watts Lookout over the southern Cambrian third of EL 96/87.

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4.2.3. Results Received

Geochemistry

Most of the probable anomalous lead and zinc geochemistry is centred on grid line 184E north of Crosby Creek.

This anomalous zone extends for 300m northeast along strike and occurs in a sequence of interbedded sediments, epiclastics and lavas, 200m away from a shallow intrusive diorite body.

Six anomalous lead values occur in this zone. Soil samples reach maximum values of 500, 450, 370 and 365 ppm Pb in siltstones and sandstones and the highest rock sample results are 385 and 250 ppm Pb which occur in dacitic lavas. See figure 7 - Lead Anomalies.

Twenty four samples in this area contain anomalous zinc values. Twenty soil samples have zinc values of between 330-1150 ppm and these occur in sediments, felsic epiclastics, dacite and basaltic andesite lava. Four rock chip samples are anomalous in zinc with values of 2100 and 560 ppm found in sandstones, 800 ppm in a brecciated dacite and 560 ppm from a basaltic andesite.

Along strike from this main anomalous zone is a halo of sub anomalous values of 150-200 ppm Pb and 150-300 ppm Zn stretching east to line 188E and west to 180E.

South of Crosby Creek on line 176E are 2 anomalous samples of siltstone and sandstone with values of 665 ppm Pb, 725 ppm Zn and 650 ppm Pb, 1200 ppm Zn. These samples occur within 400m of an intrusive monzonite and diorite.

Five scattered anomalous zinc values of between 320-480 ppm occur in sediments south of Crosby Creek. See figure 8 - Zinc Anomalies.

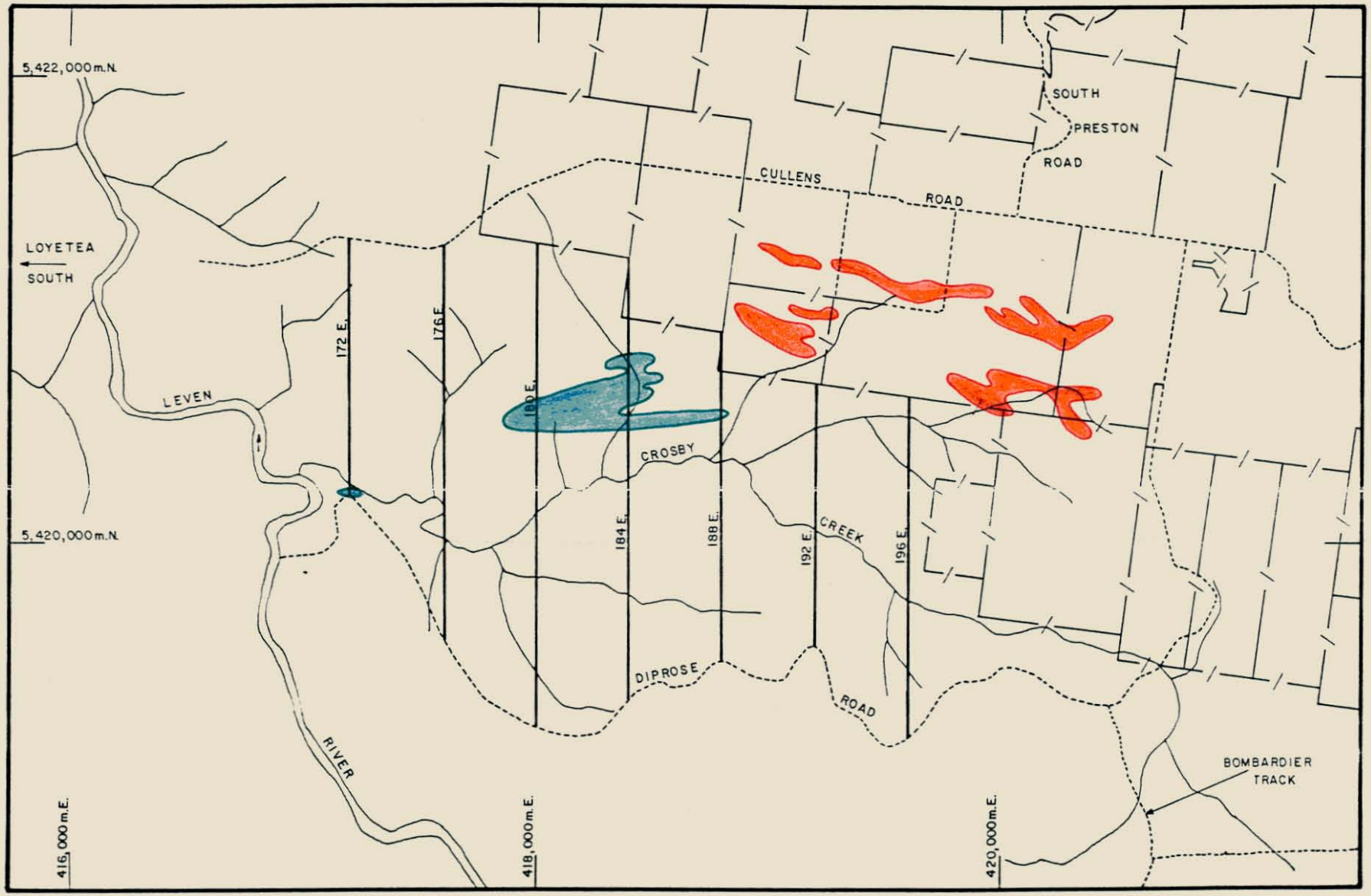
Copper values in general are very low with most samples containing less than 50 ppm Cu. However, two weakly anomalous (>150 ppm) zones occur in the eastern half of the grid.

The northern zone extends for 250m with 11 values of copper between 150-590 ppm occurring in sediments around a diorite intrusion. The southern zone occurs near Diprose Road in sediments and contains a maximum value of 375 ppm.

Four other isolated copper values no greater than 255 ppm Cu occur in unrelated positions on the grid. Refer to figure 9 - Copper Anomalies.

Gold values are extremely low with only 18 samples out of the 453 taken containing detectable gold. Values range from 10-43 ppb with the five highest occurring in a monzonite intrusion. The 13 other values contain a

507021



Geopeko 1989

CRAE 1976

5 cm

0 500 1000 1500 2000

metres

Project: PRESTON E.L. 96/87 Pb

CROSBY CREEK
GRID - Pb Anomalies

Compiled: K.J.V. Date: 7-3-'90

Drawn: N.W.D.S. Scale: 1: 25,000

Fig. 7



Geopeko 1989

CRAE 1976

5 cm

0 500 1000 1500 2000

metres

Project: PRESTON E.L. 96/87 Zn

CROSBY CREEK

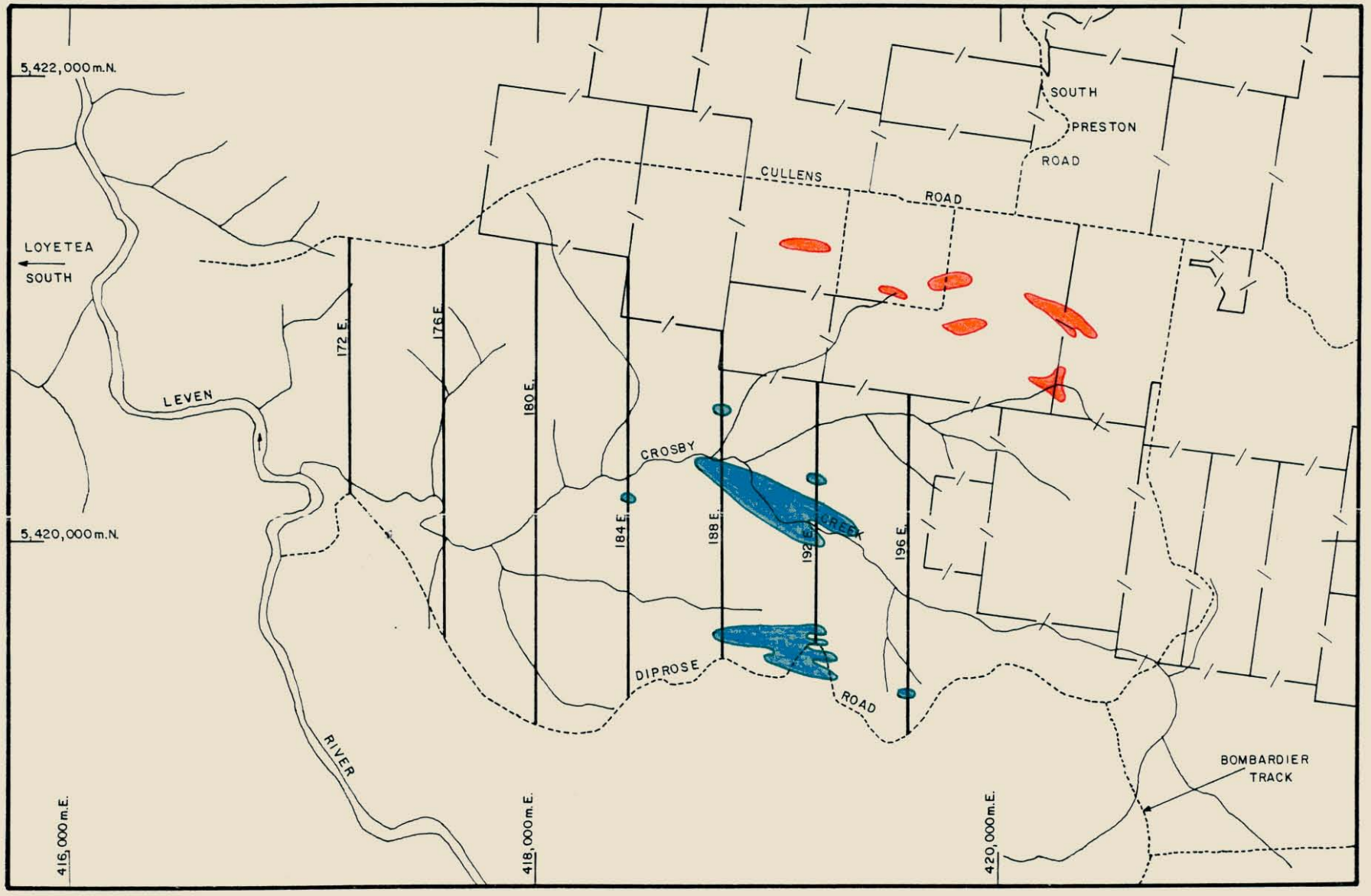
GRID - Zn Anomalies

Compiled: K.J.V. Date: 7-3-'90

Drawn: N.W.D.S. Scale: 1: 25,000

Fig. 8

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Geopeko 1989

CRAE 1976

5 cm

0 500 1000 1500 2000

metres

Project: PRESTON E.L. 96/87 Cu	
CROSBY CREEK GRID - Cu Anomalies	
Compiled: K.J.V. Date: 7-3-90	Fig. 9
Drawn: N.W.D.S. Scale: 1:25,000	

GIS 507023

maximum result of 16 ppm and ~~occur~~ exist in isolated positions on the grid.

The bulk leach gold and stream sediment sample results were very low. The highest gold result reached 0.20 ppb (BLEG) on a tributary of Crosby Creek and stream sediment values were very weakly anomalous with highs of 40 ppm Cu, 35 ppm Pb and 300 ppm Zn (-80#) occurring at the mouth of Crosby Creek.

The previously unsampled creek draining Cambrian lithologies reported <0.05 ppb Au (BLEG) and 10 ppm Cu, 20 ppm Pb and 110 ppm Zn (-80#).

Geology

The Crosby Creek grid is underlain by a sequence of clastic sediments, minor volcaniclastics, acid to intermediate lavas and intermediate intrusives.

The clastic sediments consist of laminated siltstone, quartz feldspar lithic sandstone and minor conglomerate. These sediments are interbedded with felsic epiclastics (line 180E), a rhyolitic crystal vitric tuff (line 196E) and the acid-intermediate lavas.

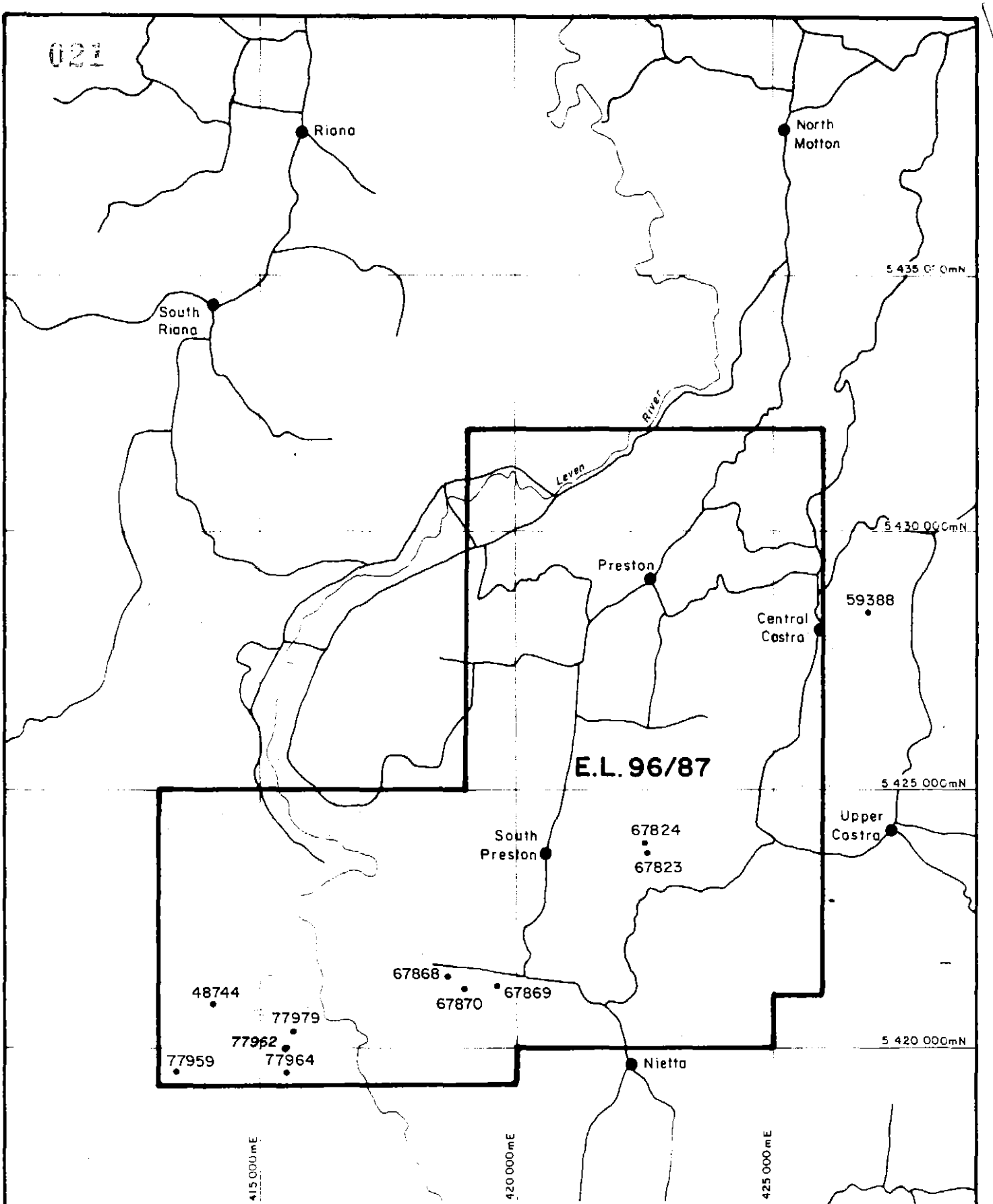
The lavas range compositionally from dacite to a basaltic andesite. Flow banded dacite occurs on Line 180E and brecciated dacite with large pink rhyolite clasts outcrops on Line 184E where it is associated with anomalous geochemistry. Basaltic andesite lava or a possible shallow intrusive occurs on Line 176E and Line 184E.

This sequence of sediments and volcanics is intruded by shallow diorite bodies to the north and in the centre of the gridded area and by a deeper seated diorite-monzonite body in the west.

A ridge on Line 196E is capped with Tertiary subvolcanic basalt.

Surface rock alteration of the area is very weak with only minor chloritic and sericitic alteration observed although intense manganese and iron staining occurs in places.

The rocks show a regional cleavage of 90-110° mag and are folded into a east-west trending anticline. A diorite intrusion seems to occur in the core of the fold and may be responsible for creating this structure.



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E-Z

PROJECT: PRESTON E.L. 96/87

Pb ISOTOPE SAMPLE LOCATIONS

Compiled: I MAT Date: 7-3-'90

Fig. 10

4.2.4. Discussion

The area now covered by the Crosby Creek Grid had been unexplored by any previous holders of this EL.

As Crosby Creek was thought to drain Cambrian felsic volcanics and sediments, Geopeko decided that the area warranted detailed sampling and mapping.

Geological mapping has revealed that the area is underlain by essentially unaltered acid to intermediate lavas and volcaniclastics, clastic sediments and an unexpected large volume of monzonite-diorite bodies.

All significant anomalous lead and zinc geochemistry is contained in sediment and lava sequences which occur within 400m of an outcrop of one of these intrusive masses.

Diamond drilling by CRAE found the source of coincident geochemical and geophysical anomalies on the farm land north of Geopeko's grid to be veinlets of galena and sphalerite in tuffaceous shale above a monzonite-diorite body.

It is possible that the anomalous zones found in the Crosby Creek Grid are also sourced by these intrusive bodies. As Cambrian porphyry related mineralization is not known to produce economic orebodies in the Mount Read Volcanics, these anomalous zones may prove to be unimportant.

However, it is also possible that anomalous geochemistry was present in the sequences prior to the intrusive events, in which case further investigation may be warranted.

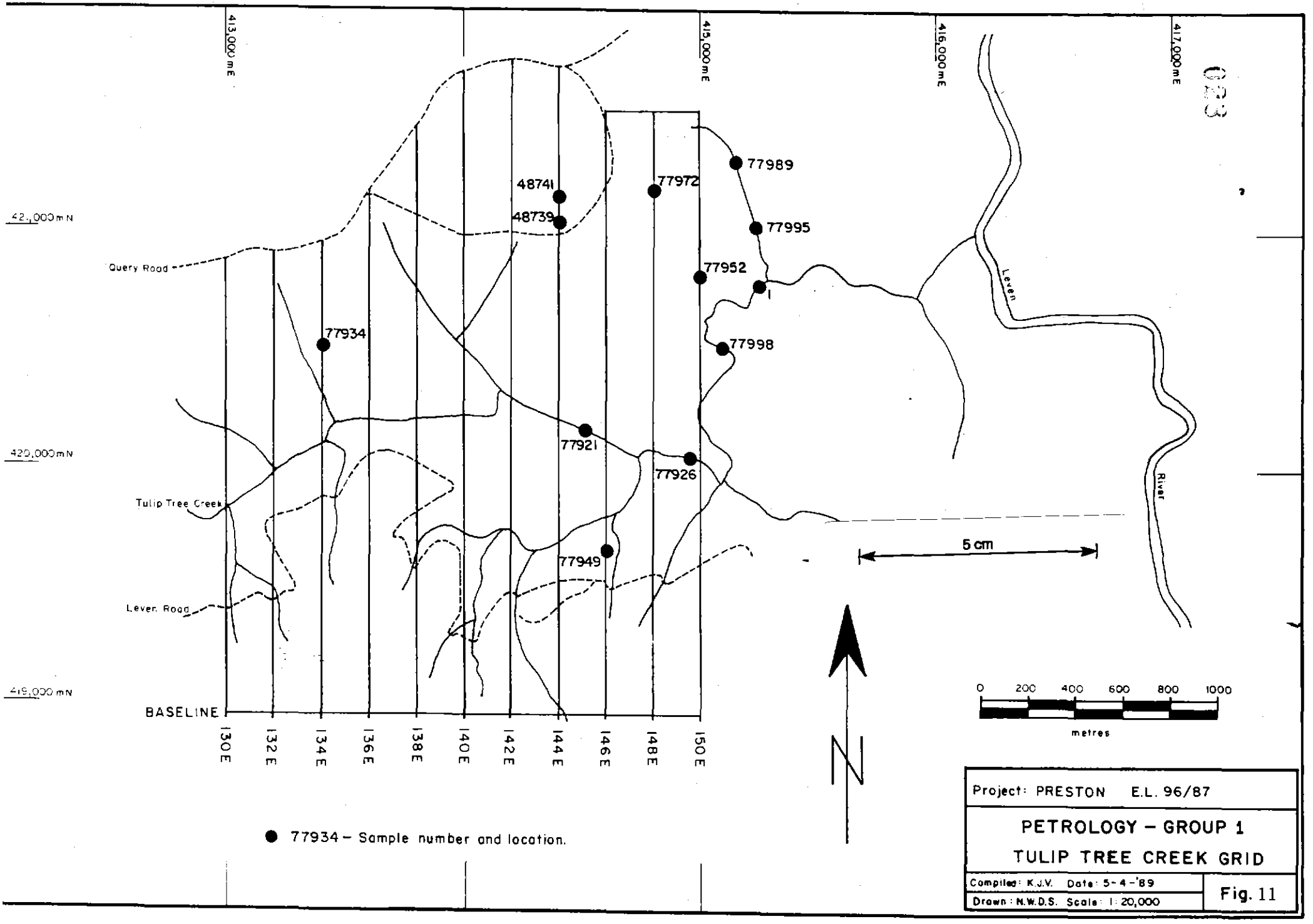
4.3 Lead Isotope Analysis (Appendix 3)

Eleven rock samples from the southern Cambrian third of the EL were sent to the CSIRO for lead isotope analysis by G.R. Carr.

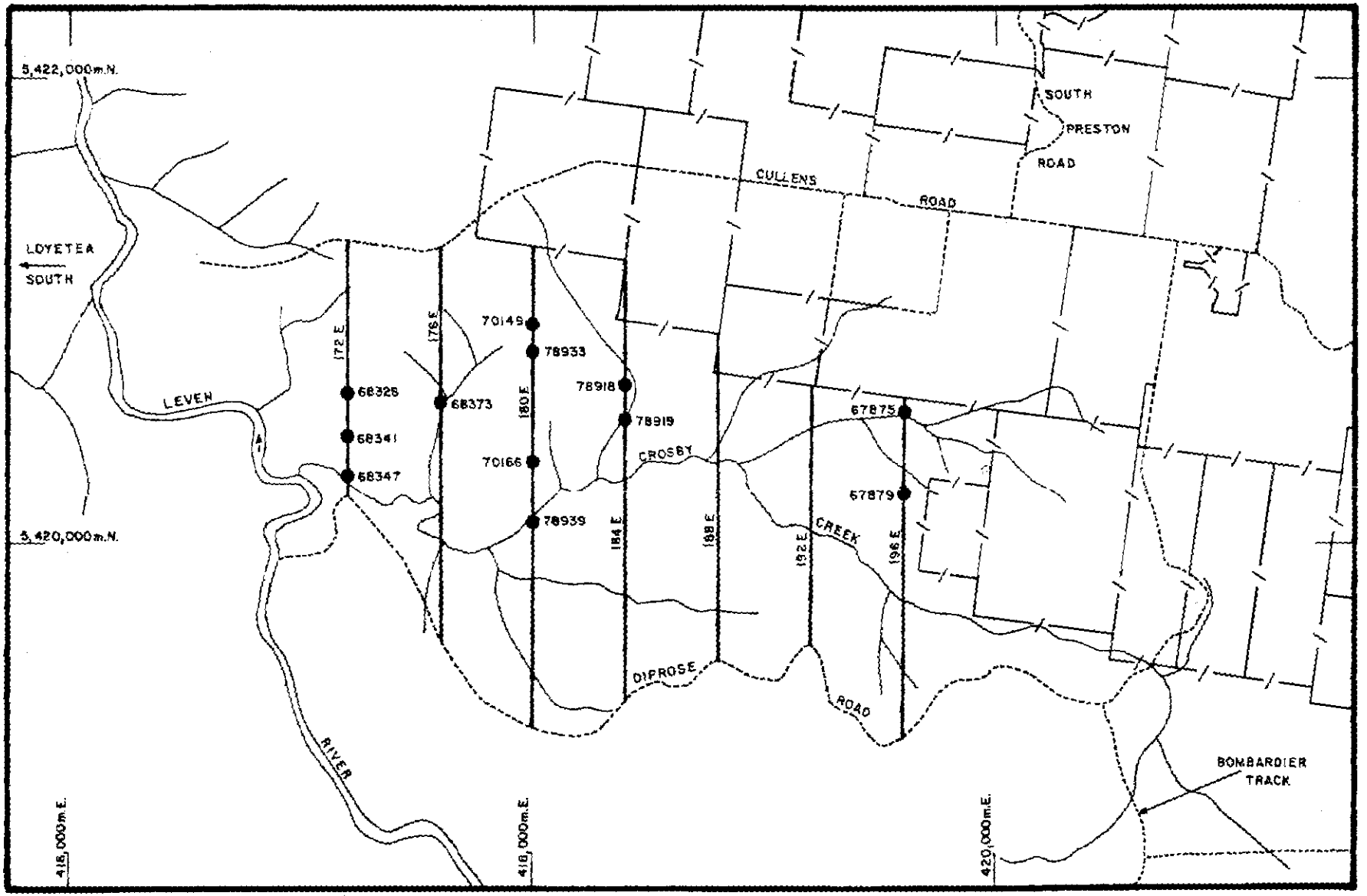
Five samples were from the Tulip Tree Creek area, two were from MacPhersons Mine just outside the EL, one was taken from the Preston Silver Mine and three came from CRA's diamond drill holes at Crosby Creek. See figure 10.

These samples were anomalous in lead, containing values of between 300 and 3100 ppm Pb.

Lead isotope analysis indicates that the eleven samples all possess a Cambrian signature and as such were formed in the "same Cambrian metallogenic event responsible for the VMS deposits of the region".


413,000 mE
415,000 mE
416,000 mE
417,000 mE
423
42.,000 mN
420,000 mN
419,000 mN
Query Road
Tulip Tree Creek
Lever Road
BASELINE
130E
132E
134E
136E
138E
140E
142E
144E
146E
148E
150E
48741
48739
77972
77989
77995
77952
77998
77934
77921
77926
77949
Leven
River
5 cm
0 200 400 600 800 1000
metres
N
● 77934 – Sample number and location.
Project: PRESTON E.L. 96/87
PETROLOGY – GROUP 1
TULIP TREE CREEK GRID
Compiled: K.J.V. Date: 5-4-'89
Drawn: N.W.D.S. Scale: 1:20,000
Fig. 11

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Project: PRESTON E.L. 96/87

CROSBY CREEK
PETROLOGY – GROUP 2

Compiled: K.J.V. Date: 7-8-89
Drawn: N.W.D.S. Scale: 1:25,000

Fig. 12

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These results increase the significance of the anomalism and mineralization found in this EL.

4.4 Petrology (Appendix 4)

Thirty four rock samples were sent to Tony Crawford from the Geology Department, University of Tasmania for thin section microscopy.

Twelve samples were taken from both the Tulip Tree Creek Grid (Fig 11) and Crosby Creek Grid (Fig 12), two samples were from the Preston Silver Mine and four samples were taken from each of the drill holes DD76LS1 and DD76LS2.

The petrology confirmed the given field name in most cases and provided a description of the mineralogy and any alteration assemblages.

Crawford envisions the palaeovolcanic environment as a "very shallow magma chamber from which glassy dacitic to rhyolitic lavas and crystal tuffs are erupting, which cools to form a subvolcanic plug/dome and underlying frozen magma chamber."

On the whole the rocks were quite fresh and hydrothermally unaltered with a number having undergone burial metamorphism of prehnite-pumpellyite to lowermost greenschist facies.

4.5 Zinc Ratios

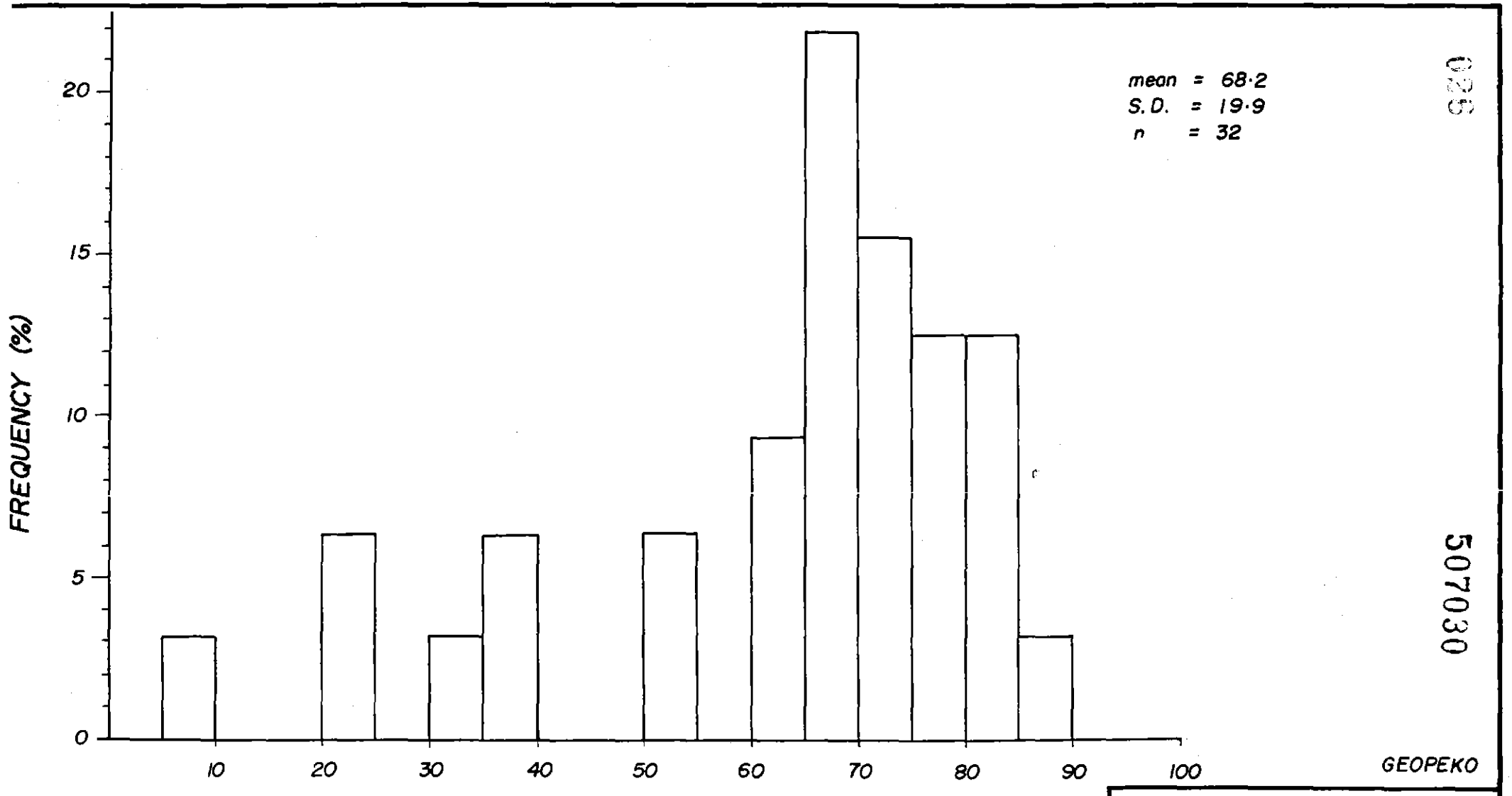
Research by D.L. Huston and R.R. Large (1987) has shown that volcanogenic massive sulphides can be distinguished from other styles of mineralization based on comparison of their zinc ratios; ie 100 Zn/(Zn & Pb). Plotting the zinc ratio against the lead isotope ratio (206 Pb/204 Pb) is another method of discriminating between different ages and styles of mineralization.

In an attempt to determine whether the Cambrian rocks in the EL have the potential for VMS mineralization, the zinc ratio of 32 samples with anomalous lead (>200 ppm) were calculated, graphed as a histogram and 10 plotted on Huston & Large's zinc ratio to Pb isotope ratio diagram.

The distribution of these samples is negatively skewed with a mean of 68.2 and standard deviation of 19.9. Refer to Figure 13.

Twenty four samples fall within the VMS range (60-77%) or slightly higher and eight samples form a tail of lower zinc ratios (<50).

Figure 14 shows six samples falling in the Cambrian VMS range including four within the Rosebery and Hercules range. These samples include core from DD75CC1, CC2 and



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GEOPEKO

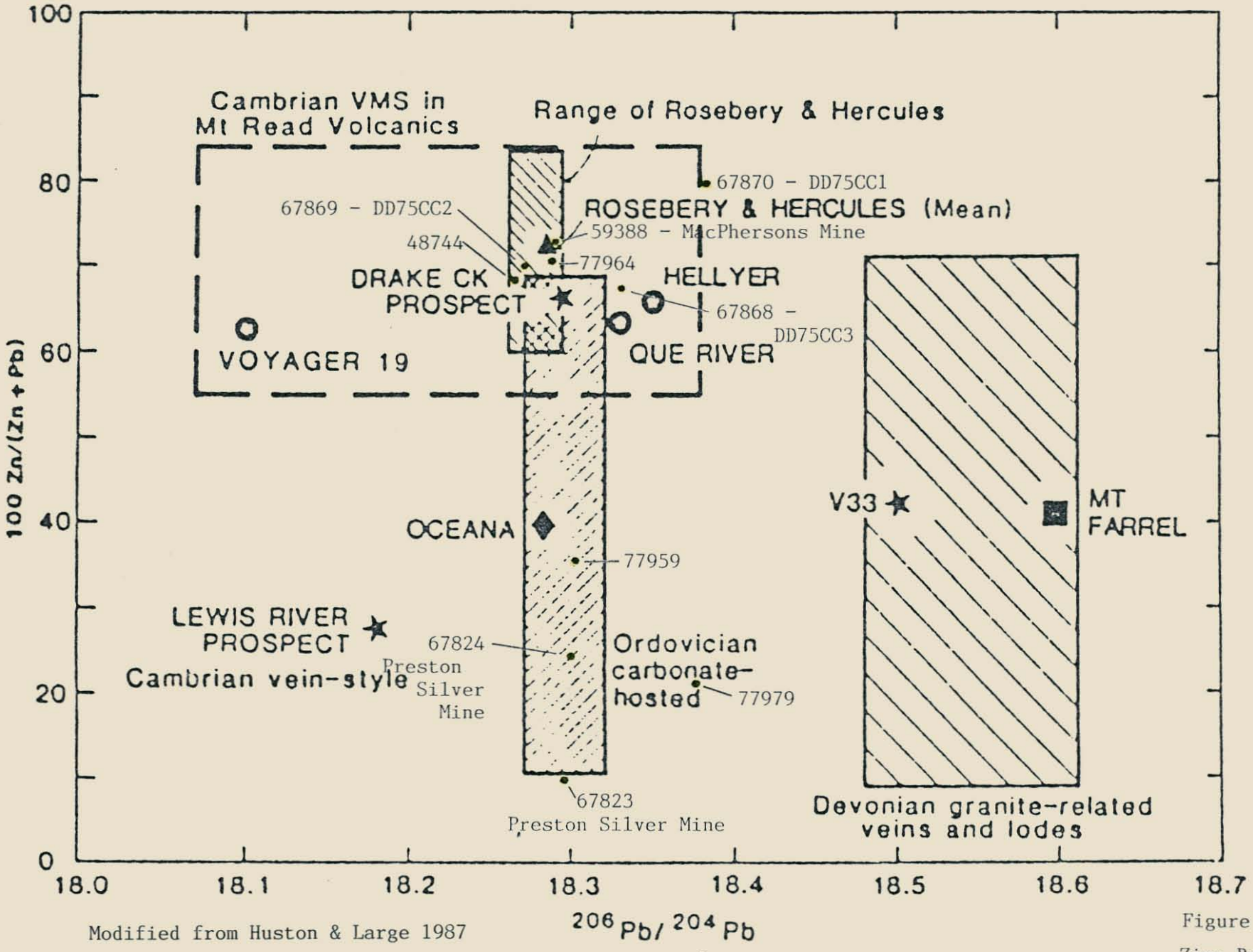
PROJECT: PRESTON EL 96/87

ZINC RATIOS

Author K.J.V.

Scale N/A

FIG. 13



Modified from Huston & Large 1987

Figure 14

Zinc Ratio versus
206 Pb/204 Pb Ratio

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CC3 (Crosby Creek) and rock chips from MacPherson's Mine. The other four samples including two from the Preston Silver Mine plot closer to mineralization of Cambrian vein style.

It is tentatively concluded that the zinc ratio does indicate potential for VMS mineralization and that it may be associated with vein deposits.

4.6 Geophysical Interpretation (Appendix 5)

Aeromagnetic, radiometric and gravity data covering the EL was interpreted by Dr D.E. Leaman with particular attention paid to the southern Cambrian region.

Unfortunately Leaman was unable to see any alteration zones within the sediments and volcanic units, due to the presence of intrusive bodies with an array of geophysical responses.

Any further reviews would require a detailed understanding of the variable properties and distribution of these intrusives.

4.7 Summary of Results (1989-90)

Regional

* gold and base metal results from a previously unsampled creek on the east side of the Leven River were very low
* mineralization at MacPhersons and the Preston Silver Mine has a Cambrian isotope signature
* petrology of 2 samples (77913 and 67823) from the Preston Silver Mine thought to contain possible stratiform sulphides has shown the mineralization to be diagentic and of vein form
* Pb isotope and zinc ratios of two samples from the Preston Silver Mine show characteristics similar to Cambrian vein type mineralization
* the Pb isotope and zinc ratio of a sample from MacPhersons Mine falls within the Rosebery and Hercules VMS range

Tulip Tree Creek

* the anomalous zone southeast of Query Road extends no further east than grid Line 148E
* 5 rock chip samples with anomalous Pb geochemistry have a Cambrian isotope signature

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* petrology has confirmed most of the given field names. The main andesite body in the northeast of the grid is now thought to be a shallow intrusive rather than a lava as implied in the last annual report

* core from DD76LS1 and LS2 shows sericitic & chloritic alteration

* surface rock alteration is weak

* zinc ratios of 9 out of 13 samples fall within the VMS range

Crosby Creek

* all significant anomalous geochemistry in sediment and lava sequences occurs near a monzonite-diorite intrusive body

* core samples from CRAE's 3 diamond drill holes possess a Cambrian isotope signature

* surface rock alteration is minor

* a number of sub surface rocks contain chlorite or calcite sericite alteration assemblages

* petrology confirms most of the given rock field names

* zinc ratios and Pb isotopes of samples from drill holes DD76CC1, CC2 and CC3 plot within the Cambrian VMS range, despite the presence of an underlying intrusion thought to be the source of mineralization

Castra Road

* gravity and magnetics suggests that a relatively small acid intrusion underlies the prospect area

5.0 Conclusions and Recommendations

5.1 Conclusions

Over the period April 1988 - April 1990 Geopeko has explored two of the three main VMS prospects in the EL with grid based mapping and sampling, ie the Tulip Tree Creek and Crosby Creek prospects.

Base metal results from these areas have been only weakly anomalous and mapping indicates that surface hydrothermal alteration is minor. Gold values are rarely above the detection limit.

The geology of the Cambrian rocks extending from the Tulip Tree Creek grid to the Crosby Creek area consists basically of a shallow intrusive - extrusive diorite - andesite body with flanking acid lavas, volcaniclastics and clastic sediments. Diamond drilling by CRAE indicates the presence of subsurface alteration zones within this stratigraphy.

The lack of both surface alteration and strongly anomalous geochemistry suggests that the likelihood of finding a near surface deposit is low, although potential exists for a deeper orebody, particularly at Tulip Tree Creek where the sediment pile appears thicker.

However, both the mapping and geophysics suggests that the Crosby Creek and possibly the Tulip Tree Creek areas are underlain by multiple intrusions and this is not the ideal geological enviroment for the generation of large VMS deposits.

The other main prospect is the Castra Road area where a highly sericitic and siliceous pyritic acid volcanic sequence occurs. Geopeko has mapped the immediate prospect area (see EZ Report No. T235), but further work maybe warranted pending alteration studies.

At this stage, the alteration and negative anomaly at Castra Road makes this area probably the most prospective in the EL.

5.2 Recommendations

Regional

* follow up of anomalous gold geochemistry draining Mt Minnie (see EZ Report No T235)

* mapping and sampling of the Cambrian stratigraphy along the Leven River

Tulip Tree Creek

* resampling of the entire grid area by Geopeko every 20m by soil augering or rock chipping, so that less reliance is placed on CRAE's results

* carry out alteration and sulphur and oxygen isotope studies on samples of drill core

Crosby Creek

* mapping and sampling two additional gridlines 200m west and east of line 184E north of Crosby Creek through the geochemically anomalous horizon

* mapping and sampling the two creeks in this anomalous zone

* conduct alteration and stable isotope studies on samples of the drill core

Castra Road

* analysis of the alteration zone to determine whether it is intrusive or VMS related

* further geological mapping and sampling of the prospect area and the Preston Silver Mine (1km to the north) if VMS style alteration is present

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Jennings, I.B. (1979) - Sheffield, 1: 63 360 Geological Map Explanatory Notes. Tas Dept. of Mines.

Mathison, I.J. & Virgoe, K.J. (1989), E.L. 96/87 - Preston, Unpublished Pasminco Report. Report No. T235; Annual Report on Exploration Activity, April 1988-April 1989.

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APPENDIX 1

EL 96/87 SCHEDULE

034

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ENDORSEMENTS

E.L. 96/87

ALTERATION TO AREA

In accordance with Section 15E(4) of the Mining Act 1929 this licence shall now apply to an area of 118 skm (more or less) as described in the schedule hereunder.

SCHEDULE

Commencing at the north eastern corner of the area whose grid co-ordinates are 426 000 metres E. 5 432 000 metres N. thence grid south to 5 421 000 metres N. grid west to 425 000 metres E. again grid south to 5 420 000 metres N. again grid west to 420 000 metres E. again grid south to 5 419 275 metres N. again grid west to 413 000 metres E. grid north to 5 425 000 metres N. grid east to 419 000 metres E. grid north to 5 432 000 metres N. aforesaid thence again grid east to the point of commencement.

The area excludes: 13.3 ha Gravel Reserve

LAND TENURE:

The area comprises:
Private Property
State Forest
Crown Land
Timber Reserve
Crown Land (subject to Lands Dept. approval)

This land tenure table is a guide only.

EXCLUSIONS

As previously shown.

R J Pearce

MINISTER FOR MINES

29/5/87.

E.L. 96/87

EXTENSION

This licence is extended under the provisions of Section 15F (4) of the Mining Act, 1929, until 21 April 1990.

R J Pearce

MINISTER FOR MINES

21/4/89

APPENDIX 2

SAMPLE LOGS AND ASSAY RESULTS

Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Freston LOCALITY: Crosby Creek
COLLECTED BY: KV DATE: June 1989

Sample Number	A.M.G. Co-ordinates N	A.M.G. Co-ordinates E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section: T or P	By	Reference	Rock-type (Microscopic)	Metal Content (p.p.m. unless specified): Cu	Pb	Zn	Fe %	Mn		Au
67874	20520-500	196E		Tuffaceous Arenite, pale go-gx, composed of gt grains, lithic silt clasts and clays.						10	15	40	1·7	345		<0·008
67875	20500-490	196		Tuffaceous Arenite (as above) and Greywacke, dk gx of fg quartz grains and minor feldspar.						10	20	220	3·4	380		<0·008
67876	20425	196	Float	Sediment?, v. clayey, Fe and Mn stained rock, also sericitic in places.						90	60	95	7·7	16500		<0·008
67877	20360	196	as	Andesite, gx-pink, fg groundmass of feldspar and ferromagnesium minerals, vesicular.												
67878	20270	196	Float	Gabbro-Diorite intrusive, black-dk gx, composed of 1-2mm feldspar laths + ferromags, heavily Fe + Mn stained.						75	15	105	6·2	1250		<0·008
67879	20180-160	196		as above						80	15	105	5·9	950		<0·008
67880	20160-140	196		as above						75	15	110	6·0	915		0·013
67881	20140-120	196		as above						75	10	105	5·6	880		<0·008

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CRA EXPLORATION PTY LTD

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Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Preston LOCALITY: Crosby Creek
COLLECTED BY: KV, BT DATE: June 1989

Sample Number	A.M.G. Co-ordinates N	A.M.G. Co-ordinates E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section: T or P	By	Reference	Rock-type (Microscopic)	Metal Content (p.p.m. unless specified): Cu	Pb	Zn	Fe %	Mn		Au
67882	20120 - 100	196		Diorite - Gabbro intrusive						80	<5	115	5·8	955		<0·008
67883	20100 - 80	196		as above						75	<5	115	6·2	1050		<0·008
67884	20800	196		Arenite, gy-gn, fg, consisting of quartz and feldspar → orange clay						10	5	65	4·5	400		<0·008
67885	20800	196·2		Arenite, gn, minor silification consisting of qt grains, fg Minor pyrite mineralization.						10	10	75	5·2	435		<0·008
67886	20730	196	Float	Volcanic rock, bright gn matrix / groundmass containing rounded clayey feldspar grains, elongated along the cleavage.						70	5	150	5·6	700		<0·008
67887	19660	196		as above, in trees roots						65	10	120	4·7	85		<0·008
67888	20435	188		Siltstone, gy-gn, siliceous						30	5	125	3·6	430		<0·008
67889	20420 - 430	188		Arenite, gy-gn fg - cg sediment; greywacke in places, very Mn and Fe stained in places						20	10	165	6·2	1050		<0·008
67891	20380 - 360	188		Laminated Siltstone, gy and quartz feldspar greywacke, minor silification.						40	35	105	4·2	1025		<0·008

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Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Preston LOCALITY: Crosby Creek
COLLECTED BY: KV, BT DATE: June 1989

Sample Number	A.M.G.Co-ordinates N	A.M.G.Co-ordinates E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section T or P	Thin or Polished Section By	Thin or Polished Section Reference	Thin or Polished Section Rock-type (Microscopic)	Metal Content (p.p.m. unless specified) Cu	Pb	Zn	Fe %	Mn		Au
67892	19880	188		Siltstone, gn-gy, minor silicification.						15	<5	55	4.0	960		<0.008
67893	19800	188		Arenite of pink feldspar laths and quartz crystals, v. red Fe stn in places. 1mm.						5	10	40	2.2	415		<0.008
67894	19735	188		Arenite, gy-gn, quartz, feldspar and minor lithic grains, 1-2mm.						5	10	100	2.4	340		<0.008
67895	19681	188		Arenite, fg. of quartz, feldspar + lithic grains and Conglomerate of angular quartz + weathered lithic fragments.						10	15	50	3.0	260		<0.008
67896	19605 - 595	188		Arenite, dk gn, poorly sorted, composed of rare mudclasts ±cm, gt grains 3mm, feldspar laths, lithic grains and clayey fragments.						10	10	105	4.5	540		<0.008
67897	20500 - 480	192		Siltstone gy and arenite of fg quartz and feldspar → clay, Mn stained in places.						15	75	210	5.8	645		<0.008
67898	20340 - 330	192		Siltstone go interbedded with sandstone, fawn, gt granite. 120/45/SW.						230	10	450	7.2	7		<0.008

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Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Preston LOCALITY: Crosby Creek
COLLECTED BY: KV DATE: June 1989

Sample Number	A.M.G.Co-ordinates N	A.M.G.Co-ordinates E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section: T or P	By	Reference	Rock-type (Microscopic)	Metal Content (p.p.m. unless specified): Cu	Pb	Zn	Fe %	Mn		Au	
67899	20140	192		Laminated Siltstone interbedded with sandstone, very brittle and fractured. 100/60/south.						590	10	160	7.5	1300		<0.008	
67900	20075	192		Laminated gy Siltstone. 100/45/south						75	30	195	4.5	1350		<0.008	
78906	19250	183.50	float	Quartz vein with black hematite / magnetite						40	10	120	14.0	535		<0.008	
78907	19495	191.75	float	Sandstone, very black + brown Fe + Mn stained weathered rock.						40	10	80	14.5	17500		<0.008	
78908	196 ↔ 20310			Arenite, gn-gy, fg quartz grains dominating, qt vein 3cm wide.						5	15	55	2.70	930		<0.008	
78909	sm 196 - 20080	196		Diorite - Gabbro intrusive, black - dark gy, composed of feldspar laths + ferromagnesium minerals, heavily Mn + Fe stained.						70	10	115	6.06	1050		<0.008	
78910	20080-60	196		as above						65	15	115	6.24	1050		<0.008	
78911	20060-40	196		as above						70	10	115	6.17	1050		<0.008	

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Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Preston LOCALITY: Crosby Creek
COLLECTED BY: KV DATE: June 1989

Sample Number	A.M.G.Co-ordinates N	A.M.G.Co-ordinates E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section: T or P	By	Reference	Rock-type (Microscopic)	Metal Content (p.p.m. unless specified): Cu	Pb	Zn	Fe %	Mn		Au
78912	20040 - 20	196		Diorite - Gabbro intrusive						70	10	120	6·30	1100		<0·008
78913	20020 - 20000	196		as above						75	10	120	5·95	1050		<0·008
78914	20000 - 19980	196		as above						70	20	115	6·01	1050		<0·008
78915	19285	196		Volcanic rock, highly cleaved 120°M, highly Fe stained and very clayey (after sericite?), probably feldspar grains in gn groundmass/ matrix. (67886)						10	10	20	4·49	1300		<0·008
78916	20650	184	float	Siltstone, purple grey, very hard + "cherty"						10	15	135	2·57	405		<0·008
78917	20580	184	float	Tuffaceous, arenite of feldspar grains, qt, and weathered clay fragments, gn						35	160	2100	6·43	1350		<0·008
78918	20570	184		Phonolite - intrusive, black groundmass with fg feldspar laths containing rounded + angular pink feldspar laths 2 - 10 mm in size						35	385	800	5·15	1000		<0·008
78919	20487	184		Diorite - Gabbro intrusive, dk gn-gy rock of gn feldspar laths 2mm + dk ferromagnesium minerals						20	40	560	5·04	1300		<0·008

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Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Preston LOCALITY: Crosby Creek
COLLECTED BY: KV DATE: June 1989

Sample Number	A.M.G. Co-ordinates N	A.M.G. Co-ordinates E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section: T or P	By	Reference	Rock-type (Microscopic)	Metal Content (p.p.m. unless specified): Cu	Pb	Zn	Fe %	Mn		Au
78928	19520	184		Siltstone, ple gn-gy, clvg 90°m						5	15	50	2.64	65		<0.008
78929	20860-870	180								5	20	110	5.82	560		<0.008
78930	20860-840	180		as above						5	10	90	4.80	465		<0.008
78931	20840-820	180		as above						10	15	115	5.39	595		<0.008
78932	20820-800	180		as above						10	15	125	5.07	635		<0.008
78933	20800-780	180		as above						5	10	155	6.09	665		<0.008
78934	20780-760	180		as above						20	10	160	5.64	700		<0.008
78935	20760-740	180		as above						20	15	190	6.01	790		<0.008
78936	20410	180		Siltstone interbedded with sandstone, siliceous. 350/50/SW						10	20	70	2.24	245		<0.008
78937	20360-380	180								5	10	145	4.64	765		

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Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Preston LOCALITY: Crosby Creek
COLLECTED BY: KV DATE: June 1989

Sample Number	A.M.G. Co-ordinates N	A.M.G. Co-ordinates E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section: T or P	Thin or Polished Section: By	Thin or Polished Section: Reference	Thin or Polished Section: Rock-type (Microscopic)	Metal Content (p.p.m. unless specified): Cu	Pb	Zn	Fe %	Mn		Au
78920	20355	184		Arenite, orange Fe weathered, composed of quartz + feldspar grains, 1-2mm Mn stained also						10	35	560	8·07	2400		<0·008
78921	20325-320	184		Arenite, ple gy-gn, consisting of quartz + feldspar grains and 3-5mm intraclasts of pale pk clayey lithic fragments. Fe + Mn stained.						10	40	160	4·36	550		<0·008
78922	20270	184		Arenite to Conglomerate, quartz + feldspar + lithic grains, few mm-2cm, also some siltstone sampled.						20	150	100	4·28	500		0·184
78923	20220	184		Siltstone, gy, clvd 90° m, 110/35/sw.						55	60	95	7·76	40		0·010
78924	20000	184·5		Siltstone, gn, clvd 110° m, Fe and Mn stained.						60	20	75	6·31	310		<0·008
78925	19980-985	184		Siltstone, gn-gy, clvd 120° m, Fe stained.						20	20	75	5·71	255		<0·008
78926	19580	184-184·5		Arenite of gt pebbles, feld crystals and a few lithic grains, 1-3 mm.						5	20	55	2·27	180		<0·008
78927	19540	184-184·5		Siltstone, gn-gy, clvd 100° m.						10	20	50	2·91	140		<0·008

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Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Preston LOCALITY: Crosby Creek
COLLECTED BY: KV DATE: June 1989

Sample Number	A.M.G.Co-ordinates N	E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section T or P	By	Reference	Rock-type (Microscopic)	Metal Content (p.p.m. unless specified) Cu	Pb	Zn	Fe %	Mn		Au	
78938	20250	180		Arenite, composed of quartz + feldspar, very weathered, Mn + Fe stained.						10	30	260	6.97	1100			
78939	20160-160	180		Monzonite intrusive, purple Fe stained rock of dominantly feldspar laths 2mm + few ferromagnesium minerals.						<5	15	125	5.28	980			
78940	20140-120	180		as above						<5	10	100	4.85	780			
78940	20100-80	180		as above						<5	15	90	4.52	775			
78942	20060-80	180		as above						<5	15	110	4.63	780			
78942	20060-40	180		as above						5	15	115	5.16	1500			
78944	19740-720	180		Siltstone, gn-gy, cleaved 120°m						55	35	60	5.24	1500			
78945	20960-65	176		Andesite, gy, fg with feldspar laths and dk gn ferromagnesium minerals → chlorite. Fe stained in places.						10	10	95	4.26	290			

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507047

Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Preston LOCALITY: Crosby Creek
COLLECTED BY: KV DATE: June 1989

Sample Number	A.M.G.Co-ordinates N	A.M.G.Co-ordinates E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section T or P	Thin or Polished Section By	Thin or Polished Section Reference	Thin or Polished Section Rock-type (Microscopic)	Metal Content (p.p.m. unless specified) Cu	Pb	Zn	Fe %	Mn		Au	
78946	20940 - 960	176		Andesite, as before with Mn + pink staining						10	15	135	4.75	430			
78947	20900 - 920	176		Andesite as before						5	5	125	4.19	465			
78948	20880 - 900	176		as before						5	10	120	5.13	770			
78949	20880 - 860	176		as before						5	10	160	5.19	830			
78950	20680 - 700	176		as before						5	10	145	5.59	890			
78951	20680 - 660	176	float	as before						5	15	175	5.61	1000			
78952	20660 - 640	176	float	as before						5	20	185	5.43	980			
78953	20640 - 620	176	float	as before						5	15	180	5.54	940			
78954	20620 - 600	176	float	as before						<5	10	180	5.44	920			
78955	20500 - 520	176		Monzonite? intrusive, qz feldspar rich groundmass, with ferromagnesium minerals						40	115	420	5.84	1600			

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507048

Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Preston LOCALITY: Crosby Creek
COLLECTED BY: KV DATE: June 1989

Sample Number	A.M.G.Co-ordinates N	A.M.G.Co-ordinates E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section T or P	Thin or Polished Section By	Thin or Polished Section Reference	Thin or Polished Section Rock-type (Microscopic)	Metal Content (p.p.m. unless specified) Cu	Pb	Zn	Fe %	Mn		Fe	
78956	20500 - 480	176		Monzonite intrusive, as before						30	100	345	5.55	1550			
78957	20480 - 460	176		as above						30	105	400	5.84	1300			
78958	20340 - 320	176		Greywacke - Arenite, 2-5mm, poorly sorted, consisting of quartz, feldspar and lithic grains - chert, + pk, dkgn + yellow.						5	15	110	4.19	400			
78959	20320 - 300	176		as above, also some gn-gy Siltstone float						10	15	110	4.03	425			
78960	20280 - 260	176		laminated Siltstone, gy + gn, 060/50/N						15	30	115	3.61	405			
78961	20205 - 180	176		Arenite, quartz + feldspar 1-2mm and Siltstone.						10	20	85	3.89	240			
44563	20635	188	Float	Siltstone, gy.gn, sheen on cleavage places.						40	15	115	3.13	255		<0.008	
44564	20620	188	Float	Siltstone, gy-gn, in trees roots.						40	15	120	3.50	240		<0.008	
44565	20590	188	Float	Siltstone, gy-gn, in trees roots						110	15	50	1.27	180		<0.008	
44568	20540	188	Float	Siltstone, dkgn-gy, some fg sandstone, in trees roots						40	5	125	4.06	615		<0.008	

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Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Preston LOCALITY: Crosby Creek
COLLECTED BY: KV, MP, JR, BT DATE: June 1989

Sample Number	A.M.G.Co-ordinates N	A.M.G.Co-ordinates E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section: T or P	By	Reference	Rock-type (Microscopic)	Metal Content (p.p.m. unless specified): Cu	Pb	Zn	Fe%	Mn		Au
44588	20040	188		Siltstone, gn-gy, in trees roots												
44596	19860	188	float	Arenite, quartz + feldspar grains, 1-2mm, very red Fe stained												
70107	19455	192		Arenite, fawn-gn mg, locally Mn r Fe stained, siliceous in places						35	10	40	6.3	2650		<0.008
70108	19820	192		Conglomerate of predominantly quartz pebbles + rare lithic silt + felsic fragments, 1mm - 30cm in size, sandy weathered matrix, grades to a quartz feldspar arenite						5	10	65	3.5	320		<0.008
70109	19860	192		as above						10	10	85	4.0	620		<0.008
70110	19960	192	float	Laminated Siltstone, Fe stained						45	25	30	2.9	45		0.012
70149	20935	180								5	10	130	6.22	990		<0008
70150	20720-740	180	float	as above												
70155	20660-680	180		as above						35	10	200	6.48	825		<0.008
70158	20600-620	180		as above						10	15	165	5.43	1100		<0008

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Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Preston LOCALITY: Crosby Creek
COLLECTED BY: KV DATE: June 1989

Sample Number	A.M.G. Co-ordinates N	A.M.G. Co-ordinates E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section: T or P	By	Reference	Rock-type (Microscopic)	Metal Content (p.p.m. unless specified): Cu	Pb	Zn	Fe %	Mn		Au
70165	20420-400	180		Arenite, quartz, feldspar + lithic grains, 1mm size, Fe stained						35	70	380	5.08	1900		<0.008
70166	20360-340	180								30	20	200	5.25	930		<0.008
70167	20280-300	180		Arenite, quartz + feldspar grains 1-2mm, Fe stained												
70168	20280-260	180		Arenite, quartz + feldspar grains 1-2mm, Fe stained						20	10	180	8.22	1000		<0.008
70176	19960	180		Siltstone, gn-gy, Fe stained, 100% clvd						40	10	100	6.67	515		<0.008
70180	19810	180		Sslt, gn, v. weathered, Fe + Mn staining						50	20	60	6.08	1600		<0.008
70181	19720	180		Laminated Silt, weathered, gn, some fg sandy interbeds, Fe + Mn stained 100/187/N clvd 130° N						70	5	65	4.93	320		<0.008
70182	19600-590	180		Laminated Siltstone, as above						95	25	40	4.15	845		<0.008
70183	19280-260	180		Siltstone, gn-gy, weathered, Fe + Mn stained						90	10	105	3.70	365		<0.008

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CR 89/51

Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Preston LOCALITY: Crosby Creek
COLLECTED BY: KV DATE: June 1989

Sample Number	A.M.G.Co-ordinates N	A.M.G.Co-ordinates E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section: T or P	By	Reference	Rock-type (Microscopic)	Metal Content (p.p.m. unless specified): Cu	Pb	Zn	Fe %	Mn		Au
68305	20040	184	float	Diorite, gn, feldspar porphyritic 2-3mm, very clayey + sheco						55	15	80	3·77	400		<0·008
68309	19900	184		Greywacke, gn matrix containing feldspar grains, Fe + Mn stained, weathered, a few gt grains						45	20	85	6·18	785		<0·008
68311	19280	184		Arenite - siltstone, gn, weathered, clvd 130°m						15	5	90	6·03	165		<0·008
68312	21040 - 20	172		Lava Andesite, dgn fg matrix with scattered fg white feldspar laths, vesicular in places						20	20	40	5·55	255		<0·008
68313	21020 - 21000	172		as before						5	20	40	4·95	500		<0·008
68314	21000 - 20980	172		as before						10	25	50	6·01	5155		<0·008
68315	20980 - 960	172		as before						15	25	60	5·99	345		<0·008
68316	20960 - 940	172		as before, but v. clayey + Fe, Mn stained						10	40	95	4·85	830		<0·008
68317	20940 - 920	172		as before						10	20	130	5·66	710		<0·008

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507053

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Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: LOCALITY:
COLLECTED BY: DATE:

Sample Number	A.M.G.Co-ordinates N	A.M.G.Co-ordinates E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section: T or P	By	Reference	Rock-type (Microscopic)	Metal Content (p.p.m. unless specified): Cu	Pb	Zn	Fe %	Mn		Au
68318	20920-900	172		as above						10	10	150	5.84	700		<0.008
68319	20900-880	172		Andesite, dk gy fg groundmass with dk gn ferromagnesium minerals → chlorite + scattered feldspar laths						5	10	140	5.58	615		<0.008
68320	20880-860	172		as above						20	15	140	5.54	670		<0.008
68321	20860-840	172		as above						10	15	125	5.16	625		0.038
68322	20840-820	172		as above						10	15	105	5.35	665		<0.008
68323	20820-800	172		as above						10	90	265	5.84	1000		<0.008
68324	20800-780	172		as above						5	20	125	5.30	575		<0.008
68325	20780-760	172		as above						5	75	250	5.40	915		<0.008
68326	20760-740	172		as above						15	30	130	5.52	800		0.043
68327	20740-720	172		as above, with Fe staining						10	30	130	5.66	835		0.019

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Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Preston LOCALITY: Crosby Creek
COLLECTED BY: KV, BT, JT, JR DATE: June 1989

Sample Number	A.M.G.Co-ordinates N	A.M.G.Co-ordinates E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section T or P	Thin or Polished Section By	Thin or Polished Section Reference	Thin or Polished Section Rock-type (Microscopic)	Metal Content (p.p.m. unless specified) Cu	Pb	Zn	Fe %	Mn		Au
68328	20700-720	172		Andesite - Diorite, rock more crystalline, pink with coarser grained groundmass of feldspar crystals						5	30	120	5·33	1000		<0·008
68329	20700-680	172		as above						5	<5	95	5·67	735		<0·008
68330	20680-660	172		as above						5	5	100	5·77	935		<0·008
68331	20660-640	172		as above						5	<5	100	5·32	575		<0·008
68332	20640-620	172		as above						10	10	115	5·97	840		<0·008
68333	20620-600	172		as above						5	<5	110	5·15	735		<0·008
68334	20600-580	172		as above						5	15	105	5·39	835		<0·008
68335	20580-560	172		as above						5	15	95	4·96	715		<0·008
68336	20560-540	172		as above						<5	10	110	5·10	940		0·019

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507054

Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Preston LOCALITY: Crosby Creek
COLLECTED BY: KV, BT, ST, JR DATE: June 1989

Sample Number	A.M.G. Co-ordinates N	A.M.G. Co-ordinates E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section: T or P	By	Reference	Rock-type (Microscopic)	Metal Content (p.p.m. unless specified): Cu	Pb	Zn	Fe %	Mn		Au
68336	20560-540	172		Andesite - Diorite intrusive?, as above.						<5	10	110	5.10	940		0.019
68337	20540-520	172		as above						5	10	110	5.30	880		<0.008
68338	20520-500	172		as above						5	10	95	5.20	780		<0.008
68339	20500-480	172		as above						10	<5	125	5.37	795		<0.008
68340	20480-460	172		as above						5	10	85	4.59	665		<0.008
68341	20460-440	172		as above						5	10	95	4.83	730		<0.008
68342	20440-420	172		as above						5	15	90	4.67	710		<0.008
68343	20420-400	172		as above						<5	20	100	4.88	760		<0.008
68344	20400-380	172		as above						<5	10	105	5.51	920		<0.008
68345	20380-360	172		as above						<5	20	95	5.31	735		<0.008

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507055

Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Preston LOCALITY: Crosby Creek
COLLECTED BY: KV, BT, JR, JT DATE: June 1989

Sample Number	A.M.G.Co-ordinates N	A.M.G.Co-ordinates E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section: T or P	By	Reference	Rock-type (Microscopic)	Metal Content (p.p.m. unless specified): Cu	Pb	Zn	Fe %	Mn		Au
68346	20360-340	172		Andesite - diorite, as above						10	25	110	6.06	700		<0.008
68347	20340-320	172		as above						5	5	100	5.89	820		<0.008
68348	20315	172		Intrusive, gn diorite, groundmass of feldspar laths 2-3m with smaller ferromagnesium minerals						15	30	235	12.50	1550		<0.008
68352	21220	176	float	Arenite, quartz, feldspar + lithic grains, 2mm, Fe stained + some Siltstone						15	15	20	2.95	170		<0.008
68355	21160	176	float	Greywacke, red Fe stained, mg, feldspar + quartz grains in deco matrix						10	15	30	3.69	200		<0.008
68365	20920	176		Lava Andesite, fg, gy-pk, vesicular, Mn stained in places						5	10	105	4.30	360		<0.008
68366	20840-860	176	float	as above						5	15	130	5.38	925		<0.008
68368	20720-740	176	float	as above						5	20	110	5.50	705		<0.008
68369	20720-700	176	float	as above						5	20	115	5.58	660		<0.008

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507056

Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Preston LOCALITY: Crosby Creek
COLLECTED BY: KV, JT, DATE: June 1989

Sample Number	A.M.G.Co-ordinates N	A.M.G.Co-ordinates E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section: T or P	By	Reference	Rock-type (Microscopic)	Metal Content (p.p.m. unless specified): Cu	Pb	Zn	Fe %	Mn		Au
68370	20590	176		andesite, gy, fg, feldspar laths rich groundmass with some ferromagnesium minerals.						10	5	150	4·82	415		<0·008
68373	20440-420	176		Monzonite intrusive, gn groundmass of feldspars, some ferromags, 5%, Mn stained.						65	40	290	4·34	985		<0·008
68374	20420-400	176	float	as above with gf granite + gn siltstone float						40	30	240	4·37	740		<0·008
68375	20400-380	176	float	Sediments, quartz feldspar 1-2mm arenite + greywacke - gn siltstone, Fe + Mn stained						30	25	165	3·68	545		<0·008
68376	20380-360	176		as above						25	5	95	4·00	285		<0·008
68377	20360-340	176		as above						30	15	110	3·14	535		<0·008
68378	20300-280	176		as above						10	10	110	4·01	450		<0·008
68380	20140-120	176		as above						25	35	140	4·40	720		<0·008
68380	20120-100	176		as above						40	35	80	4·08	370		<0·008

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5070570

Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Preston LOCALITY: Crosby Creek
COLLECTED BY: KV, BT DATE: June 1989

Sample Number	A.M.G. Co-ordinates N	A.M.G. Co-ordinates E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section: T or P	By	Reference	Rock-type (Microscopic)	Metal Content (p.p.m. unless specified): Cu	Pb	Zn	Fe%	Mn		Au	
68381	20120 - 100	176		Arenite of quartz + feldspar + Siltstone gn.						40	35	80	4.08	370		<0.008	
68382	20060	176		Siltstone, gn-gy, Fe stained.						20	650	1200	6.14	1700		<0.008	
68383	19980	176		Arenite, of quartz + feldspar fg, Fe stained, massive.						30	55	80	2.86	485		<0.008	
68384	19820	176		Siltstone, highly cleaved 110°, gn-gy, v. Fe + Mn stained.						15	15	60	3.89	335		<0.008	
68385	19760	176		as above						15	10	25	2.50	355		<0.008	

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507059

Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

Stream SAMPLE LEDGER

PROJECT: Preston LOCALITY: Crosby Creek
COLLECTED BY: KV, BT DATE: June 1989

Sample Number	A.M.G.Co-ordinates N	A.M.G.Co-ordinates E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section T or P	Thin or Polished Section By	Thin or Polished Section Reference	Thin or Polished Section Rock-type (Microscopic)	Metal Content (p.p.m. unless specified) Cu	Pb	Zn	Fe %	Mn		Au (ppb)	
70184	20315	172	SS	Cy sandy clayey sample from sugering into the bank of Crosby Creek, has dark leaves.						40	35	300	4.24	550		-	
67872	5421550	416250	SS	Sample from 3 med trapsites, fg - cg sand, float of siltstone, andesite + quartz.						10	20	110	2.37	550		-	
67873	5421550	416250	P.C	Tail of hematite/magnetite.													
67871	5421550	416250	BLEG	as for 67872.						-	-	-	-	-		<0.05	
68349	20315	172	BLEG	as for 70184.						-	-	-	-	-		0.1	
67890	20385	188	BLEG	Sample of fg - cg sand, rock frags + minor organic matter, poor trapsites due to fast moving ck.						-	-	-	-	-		0.1	
70111	20075	192	BLEG	Sample of fg - cg sand, gravel + minor organic matter, float of sslt + cong, med good trapsites.						-	-	-	-	-		0.2	

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507059

E.Z. Co. of A'Asia Ltd.,
ROSEBERY, Tasmania

GEOCHEMICAL SAMPLE DATA SHEET

PROJECT: Preston
LOCALITY: Crosby Creek
GRID NAME:
NOMINAL GRID AZIMUTH:

MATERIAL: soil
SAMPLE METHOD: Hand Auger
SAMPLED BY: Bruce Taylor, Jeff Randall
DATE: June 1989

SIZE FRACTION ANALYSED: whole sample
ANALYSED BY: ANALABS
METHOD: Cu, Pb, Zn, Fe, Mn A.A.S.
Au - Fire Assay

507060

SAMPLE NUMBER	SAMPLE LOCATION DATA: GRID LINE NO.	GRID EASTING	A.M.G. CO-ORDINATES: NORTHING	EASTING	DEPTH	SAMPLE COMPOSITION DATA: COLOUR	Clay %	Sand %	Rock Frags.	Organic	CONTAM.	Bedrock	METAL CONTENT (ppm unless specified): Cu	Pb	Zn	Ag	Au	Fe	Mn
7101 01			20600	1916	90	or-bn	30	70	✓										
7101 02			20580	1916	100	or-bn	40	60	✓										
7101 03			20550	1916	100	or-bn-rd	50	50	✓										
7101 04			20500	1916	70	or-bn-rd	40	60	✓	✓									
7101 05			20480	1916	100	or-bn-rd	40	60	✓										
7101 06			20460	1916	100	bn-rd	✓	✓	✓✓			✓							
7101 12			19400	1846	60	or-bn-cb-gn		✓	✓✓										
7101 13			19420	1846	70	or-bn-cb-gn			✓										
7101 14			19440	1846	80	or-bn-rd-gn			✓										
7101 15			19460	1846	90	or-bn-cb			✓										
7101 16			19600	1846	100	rd-bn		✓	✓										
7101 17			19620	1846	90	rd-bn			✓										
7101 18			19640	1846	80	rd-bn			✓										
7101 19			19660	1846	100	rd-bn	✓		✓										
7101 20			19680	1846	90	rd-bn	✓		✓			✓							
7101 21			19700	1846	90	or-gn	✓		✓										
7101 22			19720	1846	80	rd-bn	✓		✓			✓							
7101 23			19740	1846	80	rd-bn, blk gr	✓		✓										
7101 24			19770	1846	70	rd bn, gy-bn	✓		✓			✓							
7101 25			19792	1846	70	rd bn-cb	✓		✓										
7101 26			19840	1846	80	rd bn	✓		✓			✓							
7101 27			19860	1846	80	rd bn	✓		✓										
7101 28			20130	1712	90	or bn	✓	✓	✓										
7101 29			20160	1712	100	or bn	✓	✓	✓										
7101 30			20180	1712	100	or bn	✓	✓	✓										
7101 31			20200	1712	80	rd-or-bn	✓		✓										
7101 32			20220	1712	90	or bn	✓		✓										
7101 33			20240	1712	100	or bn	✓		✓										
7101 34			20260	1712	90	or-bn gn	✓		✓										
7101 35			20280	1712	90	or bn	✓		✓										
					100	or	✓		✓										

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E.Z. Co. of A'Asia Ltd.,
ROSEBERY, Tasmania

GEOCHEMICAL SAMPLE DATA SHEET

PROJECT: Preston
LOCALITY: Crosby Creek
GRID NAME:
NOMINAL GRID AZIMUTH:

MATERIAL: Soil
SAMPLE METHOD: Hand Auger
SAMPLED BY: Bruce Taylor, Jeff Randall
DATE: June 1989

SIZE FRACTION ANALYSED: whole sample
ANALYSED BY: ANALABS
METHOD: Cu, Pb, Zn, Fe, Mn A.A.S.
Au - Fire Assay

SAMPLE NUMBER	SAMPLE LOCATION DATA				SAMPLE COMPOSITION DATA								METAL CONTENT (ppm unless specified)						
	GRID LINE NO. N	GRID EASTING	A.M.G. CO-ORDINATES NORTHING	EASTING	DEPTH	COLOUR	Clay	Sand	Rock Frags.	Organic	CONTAM.	Bedrock	Cu	Pb	Zn	Ag	Au	Fe	Mn
7013 7			20320	17200	10	dk gy	✓	✓	✓										
7013 8			21160	18000	80	br/yel	✓												
7013 9			21140	18000	80	br	✓	✓	✓			✓							
7014 0			21120	18000	80	br/dk	✓	✓	✓										
7014 1			21100	18000	70	br	✓	✓		✓									
7014 2			21080	18000	90	br/dk	✓		✓	✓									
7014 3			21060	18000	70	br/dk	✓	✓		✓									
7014 4			21040	18000	140	br	✓					✓							
7014 5			21020	18000	80	br/dk	✓												
7014 6			21000	18000	90	br/dk	✓			✓									
7014 7			20980	18000	80	br/dk	✓												
7014 8			20960	18000	110	br/dk	✓					✓							
7015 0			20920	18000	100	br/yel	✓	✓	✓										
7015 1			20900	18000	80	br	✓		✓			✓							
7015 2			20880	18000	100	br/dk	✓	✓				✓							
7015 4			20700	18000	80	br/dk-gy	✓	✓	✓			✓							
7015 6			20660	18000	140	br	✓					✓							
7015 7			20640	18000	60	br/dk	✓	✓	✓										
7015 9			20580	18000	70	br/dk	✓	✓											
7016 0			20560	18000	80	br/dk	✓	✓											
7016 1			20540	18000	90	br/dk	✓	✓											
7016 2			20520	18000	80	br/dk	✓	✓				✓							
7016 3			20460	18000	70	br/dk			✓										
7016 4			20430	18000	80	br/yel	✓	✓	✓										
7016 9			20260	18000	80	br/dk	✓	✓	✓			✓							
7017 0			20220	18000	80	br/dk	✓	✓	✓										
7017 1			20200	18000	80	br/dk	✓		✓	✓									
7017 2			20175	18000	90	br/dk	✓					✓							
7017 3			20020	18000	140	br	✓					✓							
7017 4			20000	18000	120	br	✓					✓							
7017 5			19980	18000	140	br/dk	✓					✓							

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E.Z. Co. of A'Asia Ltd.,
ROSEBERY, Tasmania

GEOCHEMICAL SAMPLE DATA SHEET

PROJECT: Preston
LOCALITY: Crosby Creek
GRID NAME:
NOMINAL GRID AZIMUTH:

MATERIAL: Soil
SAMPLE METHOD: Hand Auger
SAMPLED BY: B. Taylor, J. Randell, Martin
DATE: June 1989

SIZE FRACTION ANALYSED: whole sample
ANALYSED BY: ANALABS
METHOD: Cu, Pb, Zn, Fe, Mn A.A.S.
Au - Fire Assay

SAMPLE NUMBER	SAMPLE LOCATION DATA				SAMPLE COMPOSITION DATA							METAL CONTENT (ppm unless specified)						
	GRID LINE NO.	A.M.G. CO-ORDINATES		DEPTH	COLOUR	Clay	Sand	Rock Frags.	Organic	CONTAM.	Bedrock	Cu	Pb	Zn	Ag	Au	Fe	Mn
	GRID EASTING	NORTHING	EASTING															
70177		19910	180	80	red brn	✓	✓				✓							
70178		19900	180	70	red brn	✓	✓✓				✓							
70179		19870	180	80	yel brn	✓✓		✓			✓							
78962		19720	188	100	red brn	✓		✓			✓							
78963			184	70	org	✓		✓✓										
78964		20940	184	80	org	✓		✓✓										
78965		20900	184	60	org	✓		✓✓										
78966		20880	184	60	org	✓		✓✓										
78967		20860	184	60	org brn	✓		✓✓										
78968		20840	184	70	org brn	✓		✓✓										
78969		20820	184	60	org brn	✓		✓✓										
78970		20800	184	80	org brn	✓		✓✓										
78971		20780	184	80	org brn	✓		✓✓										
78972		20760	184	140	org yel	✓	✓				✓							
78973		20740	184	110	org yel	✓					✓							
78974		20720	184	140	org yel	✓	✓				✓							
78975		20700	184	100	org brn	✓	✓	✓										
78976		20660	184	70	org brn	✓		✓										
78977		20640	184	90	org yel	✓		✓			✓							
78978		20620	184	70	org brn	✓		✓										
78979		20600	184	100	brn	✓			✓									
78980		20560	184	70	brn red brn	✓		✓	✓									
78981		20540	184	90	org brn	✓		✓										
78982		20520	184	80	org brn	✓												
78983		20500	184	90	brn yel	✓		✓										
78984		20460	184	80	org	✓					✓							
78985		20440	184	80	brn org	✓	✓	✓			✓							
78986		20420	184	80	org yel	✓	✓	✓			✓							
78987		20400	184	120	org yel	✓	✓	✓			✓							
78988		20380	184	90	red brn	✓		✓			✓							

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E.Z. Co. of A'Asia Ltd.,
ROSEBERY, Tasmania

GEOCHEMICAL SAMPLE DATA SHEET

PROJECT: ...Crosby Creek.....
LOCALITY: ...Preston.....
GRID NAME: .....
NOMINAL GRID AZIMUTH: .....

MATERIAL: .....Soil.....
SAMPLE METHOD: .....Hand Auger.....
SAMPLED BY: .B. Taylor, J. Randell, Martin
DATE: ...June 1988.....

SIZE FRACTION ANALYSED:- ...whole sample.....
ANALYSED BY: .ANALABS.....
METHOD: Cu, Pb, Zn, Fe, Mn A.A.S.
Au - Fire Assay

SAMPLE NUMBER	SAMPLE LOCATION DATA: GRID LINE NO.	GRID EASTING	A.M.G. CO-ORDINATES: NORTHING	EASTING	DEPTH	SAMPLE COMPOSITION DATA: COLOUR	Clay	Sand	Rock Frags.	Organic	CONTAM.	Bedrock	METAL CONTENT (ppm unless specified): Cu	Pb	Zn	Ag	Au	Fe	Mn
7897			20360	1840	80	yel or	✓	✓				✓							
7898			20340	1840	60	or lbn	✓	✓		✓		✓							
7899			20300	1840	80	or lbn	✓	✓	✓										
7900			20240	1840	70	or lbn	✓		✓	✓									
7901			20200	1840	80	lbn	✓			✓									
7902			20180	1840	140	or yel	✓	✓				✓							
7903			20160	1840	120	rd or	✓					✓							
7904			20140	1840	140	rd or	✓					✓							
7905			20120	1840	120	rd or	✓					✓							
7906			20100	1840	140	rd or	✓					✓							
7907			20080	1840	140	rd lbn	✓			✓		✓							
7908			20060	1840	140	or	✓		✓			✓							
6811			19260	1960	110	fawn	✓		✓			✓							
6812			19220	1960	100	or lbn	✓		✓										
6813			19240	1960	110	or lbn - fn		✓	✓										
6814			19280	1960	110	or lbn	40	60	✓										
6815			19260	1960	80	gy lbn	10	90											
6816			19300	1960	110	or lbn	40	40	✓										
6817			19325	1960	100	or lbn	20	80											
6818			19340	1960	100	or lbn - fn	30	70											
6819			19380	1960	80	gy		✓	✓										
6820			19400	1960	90	rd lbn	60	40											
6821			19420	1960	70	rd lbn		✓	✓										
6822			19440	1960	110	fn, krm, gy		✓	✓										
6823			19460	1960	100	or lbn	20	80				✓							
6824			19500	1960	70	or lbn		✓	✓										
6825			19520	1960	80	or lbn		✓	✓										
6826			19480	1960	80	or lbn	✓		✓			✓							
6827			19560	1960	80	or lbn	✓		✓			✓							
6828			19580	1960	80	or lbn - fn	✓		✓										

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E.Z. Co. of A'Asia Ltd.,
ROSEBERY, Tasmania

GEOCHEMICAL SAMPLE DATA SHEET

PROJECT: Preston
LOCALITY: Crosby Creek
GRID NAME:
NOMINAL GRID AZIMUTH:

MATERIAL: Soil
SAMPLE METHOD: Hand Auger
SAMPLED BY: B Taylor, J Randall + Martin
DATE: June 1989

SIZE FRACTION ANALYSED:- whole sample
ANALYSED BY: ANALABS
METHOD: Cu, Pb, Zn, Fe, Mn A.A.S.
Au - Fire Assay

SAMPLE NUMBER	SAMPLE LOCATION DATA				SAMPLE COMPOSITION DATA							METAL CONTENT (ppm unless specified)						
	GRID LINE NO.	GRID EASTING	A.M.G. CO-ORDINATES NORTHING	EASTING	DEPTH	COLOUR	Clay	Sand	Rock Frags.	Organic	CONTAM.	Bedrock	Cu	Pb	Zn	Ag	Au	Fe	Mn
6815 9			19600	196	80	or lbr	✓		✓										
6816 0			19630	196	100	gy	✓	✓	✓										
6816 1			19640	196	140	or yel	✓	✓	✓										
6816 2			19680	196	140	rd lbr	✓		✓										
6816 3			19700	196	90	dk br	✓		✓										
6816 4			19745	196	90	rd lbr, gb	✓		✓			✓							
6816 5			19760	196	10	rd lbr	✓		✓	✓									
6816 6			19780	196	90	rd lbr	✓		✓										
6816 7			19845	196	90	rd lbr	✓		✓										
6816 8			19860	196	90	rd lbr	✓		✓										
6816 9			19910	196	60	or lbr		✓	✓										
6817 0			19925	196	90	or lbr		✓		✓									
6817 1			19940	196	70	rd lbr	✓		✓	✓									
6817 2			19960	196	90	crm yel or	✓		✓			✓							
6817 3			20220	196	90	rd lbr	✓		✓										
6817 4			20240	196	100	yel crm or lbr	✓	✓	✓			✓							
6817 5			20280	196	70	rd lbr	✓		✓										
6817 6			20300	196	90	rd lbr	✓		✓										
6817 7			20350	196	90	rd lbr, Mn	✓		✓										
6817 8			20380	196	70	rd lbr	✓		✓	✓									
6817 9			20420	196	90	fn br lbr		✓	✓										
6818 0			20440	196	100	yel br crm		✓	✓										
6818 1			19420	192	60	rd lbr		✓	✓										
6818 2			19480	192	100	rd lbr	✓		✓										
6818 3			19500	192	80	rd lbr	✓		✓										
6818 4			19520	192	80	rd lbr	✓		✓										
6818 5			19540	192	60	rd lbr	✓		✓										
6818 6			19560	192	70	bn rd	✓		✓										
6818 7			19580	192	120	bn rd	✓		✓										
6818 8			19600	192	60	bn yel	✓		✓										
6819			19620	192	60	mot wt gy	✓		✓										

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E.Z. Co. of A'Asia Ltd.,
ROSEBERY, Tasmania

GEOCHEMICAL SAMPLE DATA SHEET

PROJECT: Preston
LOCALITY: Crosby Creek
GRID NAME:
NOMINAL GRID AZIMUTH:

MATERIAL: Soil
SAMPLE METHOD: Hand Auger
SAMPLED BY: B.Taylor, J.Randall, Martin
DATE: June 1989

SIZE FRACTION ANALYSED: Whole sample
ANALYSED BY: ANALABS
METHOD: Cu, Pb, Zn, Fe, Mn A.A.S.
Au - Fire Assay

SAMPLE NUMBER	SAMPLE LOCATION DATA				SAMPLE COMPOSITION DATA							METAL CONTENT (ppm unless specified)						
	GRID LINE NO.	A.M.G. CO-ORDINATES		DEPTH	COLOUR	Clay	Sand	Rock Frags.	Organic	CONTAM.	Bedrock	Cu	Pb	Zn	Ag	Au	Fe	Mn
		GRID EASTING	NORTHING	EASTING														
6810			19640	192	80	rd or - yel	✓		✓									
6811			19660	192	120	yel - gy	✓					✓						
6812			19680	192	80	yel/bn	✓		✓									
6813			19760	192	60	lt bn - gy	✓		✓									
6814			19720	192	90	or gy	✓		✓									
6815			19740	192	70	or rd	✓		✓									
6816			19760	192	60	or rd	✓		✓									
6817			19780	192	60	bn or	✓		✓									
6818			19800	192	90	rd/bn	✓		✓									
6820			19940	192	70	rd bn	✓		✓									
6945			19525	188	80	rd gn	✓		✓									
6946			19540	188	70	rd gn	✓		✓									
6947			19560	188	100	or gn	✓		✓									
6948			19580	188	100	or gn	✓		✓									
6949			19660	188	50	rd gn	✓		✓									
6950			19700	188	50	bn	✓		✓									
6946			21220	172	80	or	✓	✓	✓		✓							
6946			21260	172	80	or gn	✓	✓	✓		✓							
6947			21180	172	100	gn	✓		✓		✓							
6947			21160	172	120	gn dn	✓		✓		✓							
6947			21140	172	120	gn dn	✓	✓	✓									
6947			21120	172	90	gn dn	✓		✓									
6947			21100	172	90	rd dn, crm	✓		✓									
6948			21080	172	60	bn or	✓		✓									
6949			21060	172	90	rd dn	✓		✓		✓							
6970			19530	176	70	or gn	✓	✓			✓							
6971			19540	176	60	gn cm	✓	✓	✓		✓							
6972			19560	176	70	rd gn	✓		✓									
6973			19580	176	140	or gn	✓		✓	✓								
6974			19700	176	80	or gn	✓		✓									

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E.Z. Co. of A'Asia Ltd.,
ROSEBERY, Tasmania

GEOCHEMICAL SAMPLE DATA SHEET

PROJECT: Preston
LOCALITY: Crosby Creek
GRID NAME:
NOMINAL GRID AZIMUTH:

MATERIAL: Soil
SAMPLE METHOD: Hand Auger
SAMPLED BY: B. Taylor, J. Randall & Martin
DATE: June 1989

SIZE FRACTION ANALYSED: Whole sample
ANALYSED BY: ANALABS
METHOD: Cu, Pb, Zn, Fe, Mn A.A.S.
Au - Fire Assay

SAMPLE NUMBER	SAMPLE LOCATION DATA				SAMPLE COMPOSITION DATA							METAL CONTENT (ppm unless specified)						
	GRID LINE NO. N	GRID EASTING	A.M.G. CO-ORDINATES NORTHINGS	EASTINGS	DEPTH	COLOUR	Clay	Sand	Rock Frags.	Organic	CONTAM.	Bedrock	Cu	Pb	Zn	Ag	Au	Fe	Mn
6 9 4 7 5			1 9 7 2 0	1 7 6	8 0	or rd bn	✓		✓										
6 9 4 7 6			1 9 7 4 0	1 7 6	1 3 0	bn yel	✓		✓										
6 9 4 7 7			1 9 8 6 5	1 7 6	1 0 0	rd bn	✓		✓										
6 9 4 7 8			1 9 8 8 0	1 7 6	1 0 0	bn yel	✓		✓			✓							
6 9 4 7 9			1 9 9 0 0	1 7 6	1 0 0	rd dr bn	✓		✓			✓							
6 9 4 8 0			1 9 9 2 0	1 7 6	9 0	bn yel	✓		✓			✓							
6 9 4 8 1			1 9 9 4 0	1 7 6	8 0	bn	✓	✓	✓	✓									
6 9 4 8 2			1 9 9 7 0	1 7 6	9 0	or bn		✓	✓			✓							
6 9 4 8 3			1 9 3 0 0	1 8 0	6 0	or bn	✓		✓			✓							
6 9 4 8 4			1 9 3 2 0	1 8 0	6 0	rd bn	✓	✓	✓			✓							
6 9 4 8 5			1 9 3 4 0	1 8 0	9 0	or bn	✓	✓	✓										
6 9 4 8 6			1 9 3 6 0	1 8 0	1 0 0	rd bn	✓		✓			✓							
6 9 4 8 7			1 9 3 8 0	1 8 0	1 2 0	rd bn	✓	✓				✓							
6 9 4 8 8			1 9 4 0 0	1 8 0	1 2 0	rd bn	✓	✓				✓							
6 9 4 8 9			1 9 4 2 0	1 8 0	1 2 0	rd bn	✓	✓	✓			✓							
6 9 4 9 0			1 9 4 4 0	1 8 0	9 0	rd bn	✓		✓										
6 9 4 9 1			1 9 4 6 0	1 8 0	6 0	rd bn	✓		✓										
6 9 4 9 2			1 9 4 8 5	1 8 0	8 0	rd bn fine	✓		✓										
6 9 4 9 3			1 9 5 6 0	1 8 0	6 0	bn fine	✓		✓										
6 9 4 9 4			1 9 5 8 0	1 8 0	6 0	rd bn		✓	✓										
6 9 4 9 5			1 9 6 5 0	1 8 0	9 0	rd	✓		✓			✓							
6 9 4 9 6			1 9 6 9 5	1 8 0	5 0	rd bn			✓										
6 9 4 9 7			1 9 7 9 0	1 8 0	9 0	rd bn bn yel	✓		✓										
6 9 4 9 8			1 9 8 3 5	1 8 0	8 0	rd bn	✓		✓										
6 9 4 9 9			1 9 8 6 0	1 8 0	9 0	or bn	✓		✓										
4 4 5 3 3			1 9 9 8 0	1 9 2	9 0	or gy	✓		✓										
4 4 5 3 4			2 0 0 0 0	1 9 2	1 5 0	rd or	✓					✓							
4 4 5 3 5			2 0 0 2 0	1 9 2	8 0	fld - rd	✓		✓										
4 4 5 3 6			2 0 0 4 0	1 9 2	7 0	bn rd yel	✓		✓										
4 4 5 3 7			2 0 0 6 0	1 9 2	1 1 0	rd or	✓		✓			✓							

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E.Z. Co. of A'Asia Ltd.,
ROSEBERY, Tasmania

GEOCHEMICAL SAMPLE DATA SHEET

PROJECT: Preston
LOCALITY: Crosby Creek
GRID NAME:
NOMINAL GRID AZIMUTH:

MATERIAL: Soil
SAMPLE METHOD: Hand Auger
SAMPLED BY: B Taylor, J Randell, Martin
DATE: June 1989

SIZE FRACTION ANALYSED: Whole sample
ANALYSED BY: ANALABS
METHOD: Cu, Pb, Zn, Fe, Mn A.A.S.
Au - Fire Assay

SAMPLE NUMBER	SAMPLE LOCATION DATA				SAMPLE COMPOSITION DATA							METAL CONTENT (ppm unless specified)						
	GRID LINE NO. N	GRID EASTING	A.M.G. CO-ORDINATES NORTHING	A.M.G. CO-ORDINATES EASTING	DEPTH	COLOUR	Clay	Sand	Rock Frags.	Organic	CONTAM.	Bedrock	Cu	Pb	Zn	Ag	Au	Fe	Mn
+4538			20180	1912	60	rd dr			✓										
+4539			20220	1912	60	rd bn			✓										
+4540			20240	1912	60	bn rd													
+4541			20260	1912	70	gy bn		✓	✓										
+4542			20280	1912	60	bn rd		✓	✓										
+4543			20300	1912	100	gy bn rd	✓	✓	✓										
+4544			20360	1912	130	yel bn	✓	✓	✓										
4545			20380	1912	80	bn	✓		✓										
4546			20400	1912	140	bn rd	✓					✓							
4547			20420	1912	60	red bn gy	✓	✓	✓										
4548			20440	1912	140	dk rd bn	✓					✓							
4549			20460	1912	110	bn bn	✓		✓										
4550			20520	1912	60	bn rn		✓	✓										
4551			20540	1912	70	bn rd	✓		✓										
4552			20560	1912	70	bn bn	✓		✓										
4553			20580	1912	90	bn bn rd	✓		✓										
4554			20600	1912	70	bn bn	✓		✓										
4555			20620	1912	80	bn bn	✓		✓										
4556			20640	1912	60	bn bn	✓		✓										
4557			20660	1912	70	bn	✓		✓										
4558			20680	1912	80	bn	✓		✓										
4559			20720	1888	80	rd bn	✓	✓	✓										
4560			20700	1888	70	yel bn	✓	✓	✓										
4561			20680	1888	80	yel bn	✓	✓	✓										
4562			20660	1888	90	rd bn	✓		✓			✓							
4566			20580	1888	110	bn bn	✓		✓			✓							
4567			20560	1888	70	yel bn	✓	✓											
4569			21520	1888	70	bn rd	✓	✓	✓										
4570			20500	1888	70	bn	✓		✓										
4571			20490	1888	100	bn bn	✓	✓	✓										
4572			20400	1888	70	bn	✓		✓										

E.Z. Co. of A'Asia Ltd.,
ROSEBERY, Tasmania

507068

GEOCHEMICAL SAMPLE DATA SHEET

PROJECT: Preston
LOCALITY: Creasy Creek
GRID NAME:
NOMINAL GRID AZIMUTH:

MATERIAL: Soil
SAMPLE METHOD: Hand Auger
SAMPLED BY: B. Taylor, J. Randall, Martin.
DATE: June 1989

SIZE FRACTION ANALYSED: whole sample
ANALYSED BY: ANALABS
METHOD: Cu, Pb, Zn, Fe, Mn A.A.S.
Au - Fire Assay

SAMPLE NUMBER	SAMPLE LOCATION DATA				SAMPLE COMPOSITION DATA							METAL CONTENT (ppm unless specified)						
	GRID LINE NO. / N	GRID EASTING	A.M.G. CO-ORDINATES NORTHING	A.M.G. CO-ORDINATES EASTING	DEPTH	COLOUR	Clay	Sand	Rock Frags.	Organic	CONTAM.	bedrock	Cu	Pb	Zn	Ag	Au	Fe	Mn
4573			20340	1800	150	brwn	✓	✓				✓							
4574			20320	1800	70	brn	✓		✓										
4575			20300	1800	120	brn	✓		✓			✓							
4576			20280	1800	110	brn	✓		✓			✓							
4577			20260	1800	80	brn	✓	✓											
4578			20240	1800	80	brn	✓	✓				✓							
4579			20220	1800	110	brn	✓		✓			✓							
4580			20200	1800	90	brn	✓		✓			✓							
4581			20180	1800	110	brn	✓		✓			✓							
4582			20160	1800	80	brn	✓		✓			✓							
4583			20140	1800	100	brn	✓		✓			✓							
4584			20120	1800	110	brn	✓		✓			✓							
4585			20100	1800	110	brn	✓		✓			✓							
4586			20080	1800	120	brn	✓	✓	✓			✓							
4587			20060	1800	110	brn	✓		✓			✓							
4588			20020	1800	80	gry	✓		✓										
4590			20000	1800	80	brn	✓		✓			✓							
4591			19980	1800	80	brn	✓		✓			✓							
4592			19960	1800	80	pale brn	✓	✓	✓										
4593			19940	1800	100	brn	✓	✓	✓										
4594			19920	1800	70	brn	✓	✓	✓										
4595			19900	1800	90	brn	✓	✓	✓										
4597			19840	1800	80	brn	✓	✓	✓										
4598			19820	1800	90	brn		✓	✓			✓							
4599			19780	1800	80	brn	✓	✓	✓										
4600			19760	1800	60	brn	✓	✓	✓										
8306			20620	1840	60	brn	✓		✓			✓							
8307			19940	1840	60	rd brn	✓		✓										
8308			19920	1840	60	rd brn	✓		✓										
8310			19880	1840	60	brn	✓												

E.Z. Co. of A'Asia Ltd.,
ROSEBERY, Tasmania

507069 GEOCHEMICAL SAMPLE DATA SHEET

PROJECT: Preston
LOCALITY: Crosby Creek
GRID NAME:
NOMINAL GRID AZIMUTH:

MATERIAL: Soil
SAMPLE METHOD: Hand Auger
SAMPLED BY: B Taylor, J Randall, Martin
DATE: June 1989

SIZE FRACTION ANALYSED: whole sample
ANALYSED BY: ANALABS
METHOD: Cu, Pb, Zn, Fe, Mn A.A.S.
Au - Fire Assay

SAMPLE NUMBER	SAMPLE LOCATION DATA				SAMPLE COMPOSITION DATA							METAL CONTENT (ppm unless specified)						
	GRID LINE NO. N	A.M.G. CO-ORDINATES		DEPTH	COLOUR	Clay	Sand	Rock Frags.	Organic	CONTAM.	Bedrock	Cu	Pb	Zn	Ag	Au	Fe	Mn
	GRID EASTING	NORTHING	EASTING															
8350		21260	1761	70	or	✓		✓			✓							
8351		21240	1761	70	or fn	✓		✓										
8353		21200	1761	90	or fn	✓	✓	✓										
8354		21180	1761	80	or fn	✓	✓											
8356		21140	1761	80	or fn	✓	✓		✓									
8357		21120	1761	120	or fn	✓					✓							
8358		21100	1761	10	or rd	✓					✓							
8359		21080	1761	120	or bk	✓					✓							
8360		21060	1761	120	or rd	✓					✓							
8361		21040	1761	10	rd fn	✓					✓							
8362		21020	1761	140	or rd	✓		✓			✓							
8363		21000	1761	120	or fn gn	✓		✓			✓							
8364		20980	1761	120	yel or	✓		✓			✓							
8367		20770	1761	00	or fn	✓		✓										
8371		20570	1761	60	or fn	✓		✓			✓							
8372		20550	1761	60	or fn	✓		✓										
8379		20155	1761	70	or fn	✓		✓										

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507070

ANALABS

A division of MacDonald Hamilton & Co. Pty. Ltd.
Phone (09) 458 7999 — 52 Murray Road, Welshpool W.A. 6106 — FAX: 011 61 9458 7990 — Telex AA92560

ANALYTICAL REPORT No. 27.3.08.06383

THIS REPORT MUST BE READ IN CONJUNCTION WITH THE ACCOMPANYING ANALYTICAL DATA

Ian Mathison
Geopeko
P.O. Box 180
Rosebery
Tasmania 7470

ORDER No.	PROJECT
5921	Preston

DATE RECEIVED	RESULTS REQUIRED
28/07/89	ASAP

No. OF PAGES OF RESULTS	DATE REPORTED	No. OF COPIES	TOTAL No. OF SAMPLES
12	18/08/89	1	291

WITH ORDER BELOW	SAMPLE NUMBERS	PRE-TREATMENT: DRY	CRUSH	SPLIT	PULVERISE	SIEVE	OTHER SEE REMARKS	NONE	ANALYSIS	REFER TO ANALYSIS SECTION	PREPARATION	METHOD
	Various	SO	Prep: 016						Cu,Pb,Zn,Fe,Mn/101			
	Various	SO							Au,AuChk/309			

RESULTS TO

Ian Mathison
Geopeko
P.O. Box 180
Rosebery
Tasmania 7470

REMARKS

RESULTS TO

STATE OF SAMPLES		ANALYSIS — PREPARATION				ANALYSIS — METHODS	
whole core	WC	perchloric acid	A1	cold acid	CA	atomic absorption	AAS
split core	SC	hydrochloric acid	A2	specific sulphide	SS	x-ray fluorescence	XRF
cuttings	CU	nitric acid	A3	other mixed acids	Mx	spectrophotometry	SPEC
rock	RO	aqua regia	A4	alkaline attack	AA	colorimetry	COL
soil	SO	nitric-perchloric	A5	volatilization	VO	chromatography	CHR
slag	PU	HF mixture	A6	ignition	IG	titration	TIT
water	WA	HF under pressure	A7	pressed powder (XRF)	PP	other chemicals means	CHEM
waste	TI	fusion	A8	glass fusion (XRF)	GF	miscellaneous	MISC
stream sediment	SS					fluorescence	FLUOR
heavy mineral	HM					inductively coupled plasma	ICP

067

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ANALABS

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

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06383	18/08/89	5921	1 OF 12

TUBE No.	SAMPLE No	Cu	Pb	Zn	Fe	Mn	Au	AuChk		
1	44533	105	35	80	5.33	155	<0.008	<0.008		
2	44534	95	35	140	9.91	4600	<0.008	–		
3	44535	85	20	90	6.04	480	<0.008	–		
4	44536	110	20	90	6.40	650	<0.008	–		
5	44537	210	20	110	7.53	650	<0.008	–		
6	44538	55	10	150	7.91	1800	<0.008	–		
7	44539	45	10	105	7.33	2600	<0.008	–		
8	44540	40	10	95	6.81	2850	<0.008	–		
9	44541	20	5	65	3.18	1000	<0.008	–		
10	44542	200	15	170	7.51	1800	<0.008	–		
11	44543	165	10	145	6.60	570	<0.008	–		
12	44544	125	15	190	7.71	710	<0.008	–		
13	44545	95	15	175	7.91	1900	<0.008	–		
14	44546	95	20	175	7.68	700	<0.008	–		
15	44547	110	25	170	6.91	880	<0.008	–		
16	44548	100	35	210	7.76	1300	<0.008	–		
17	44549	90	45	150	6.02	1000	<0.008	<0.008		
18	44550	50	65	140	5.80	2100	<0.008	–		
19	44551	40	45	160	5.43	1000	<0.008	–		
20	44552	45	145	130	5.11	1750	<0.008	–		
21	44553	30	40	105	4.35	1350	<0.008	–		
22	44554	35	45	140	5.15	1450	<0.008	–		
23	44555	40	45	95	5.25	1100	<0.008	–		
24	44556	45	40	125	4.81	2100	<0.008	–		
25	44557	45	50	80	5.44	3300	<0.008	–		

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

650

507072

ANALABS

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

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06363	18/08/89	5921	2 OF 12

TUBE No.	SAMPLE No.	Cu	Pb	Zn	Fe	Mn	Au	AuChk		
1	44558	35	35	85	5.09	1800	<0.008	–		
2	44559	15	50	110	3.53	1300	<0.008	–		
3	44560	20	50	155	3.73	810	<0.008	–		
4	44561	10	15	145	3.92	1000	<0.008	<0.008		
5	44562	30	40	225	8.07	1200	<0.008	–		
6	44566	40	40	105	5.90	2050	<0.008	–		
7	44567	190	190	340	9.38	2050	<0.008	–		
8	44569	100	25	160	5.26	1750	<0.008	–		
9	44570	45	15	105	4.46	1000	<0.008	–		
10	44571	40	30	110	4.83	1200	<0.008	–		
11	44572	30	50	140	5.22	1000	<0.008	–		
12	44573	15	5	65	3.65	85	<0.008	–		
13	44574	20	20	130	6.39	1050	<0.008	–		
14	44575	230	30	230	5.89	1200	<0.008	–		
15	44576	235	35	200	7.67	1900	<0.008			
16	44577	90	20	145	7.63	5700	<0.008	–		
17	44578	140	20	160	7.23	1600	<0.008	–		
18	44579	180	25	130	6.90	1550	<0.008	–		
19	44580	165	20	150	7.75	580	<0.008	<0.008		
20	44581	150	20	150	7.68	1900	<0.008	–		
21	44582	115	20	105	6.80	820	<0.008	–		
22	44583	80	30	90	6.07	930	<0.008	–		
23	44584	115	30	100	6.84	2400	<0.008	–		
24	44585	70	30	80	5.86	700	<0.008	–		
25	44586	130	35	160	6.01	1750	<0.008	–		

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

069

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ANALABS

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

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06383	18/08/89	5921	3 OF 12

TUBE No.	SAMPLE No.	Cu	Pb	Zn	Fe	Mn	Au	AuChk		
1	44587	60	30	60	5.14	340	<0.008	–		
2	44589	40	30	60	6.76	45	<0.008	–		
3	44590	35	35	50	5.39	110	<0.008	–		
4	44591	35	40	50	7.55	200	<0.008	–		
5	44592	40	30	40	5.52	35	<0.008	–		
	44593	35	35	50	3.91	40	<0.008	–		
7	44594	40	25	35	3.42	70	<0.008	–		
8	44595	65	115	285	6.18	165	0.016	–		
9	44597	15	<5	45	3.31	80	<0.008	–		
10	44598	20	10	60	2.90	260	<0.008	–		
11	44599	15	15	80	4.05	2300	<0.008	<0.008		
12	44600	15	5	85	3.54	1100	<0.008	–		
13	68141	35	15	60	4.98	80	0.015	–		
14	68142	20	15	45	6.72	65	<0.008	–		
	68143	10	5	35	2.72	930	<0.008	–		
16	68144	45	5	100	3.82	900	<0.008	–		
17	68145	30	15	80	3.65	3050	<0.008	–		
18	68146	25	15	75	9.36	420	<0.008	–		
19	68147	255	40	90	8.15	135	<0.008	–		
20	68148	40	25	60	2.55	90	<0.008	–		
21	68149	5	10	15	1.04	25	<0.008	–		
22	68150	25	20	65	5.34	55	<0.008	–		
23	68151	40	35	90	6.72	230	<0.008	–		
24	68152	60	50	125	5.10	135	<0.008	–		
25	68153	115	30	240	7.11	430	<0.008	–		

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

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06383	18/08/89	5921	4 OF 12

TUBE No.	SAMPLE No.	Cu	Pb	Zn	Fe	Mn	Au	AuChk		
1	68154	50	30	190	8.98	560	<0.008	<0.008		
2	68155	85	45	200	8.80	1600	<0.008	–		
3	68156	115	50	430	9.33	1350	<0.008	–		
4	68157	45	25	75	6.43	120	<0.008	–		
5	68158	30	10	55	3.92	60	<0.008	–		
6	68159	50	15	110	6.26	225	<0.008	–		
7	68160	65	25	115	3.42	65	<0.008	–		
8	68161	40	5	60	6.28	35	<0.008	–		
9	68162	35	10	85	5.48	100	0.013	–		
10	68163	30	15	65	7.90	150	<0.008	–		
11	68164	35	15	80	5.14	440	<0.008	–		
12	68165	40	10	90	5.56	525	<0.008	–		
13	68166	25	20	65	5.49	170	<0.008	–		
14	68167	40	40	55	8.16	1200	<0.008	–		
15	68168	35	30	65	6.00	1890	0.016	–		
16	68169	15	15	35	3.00	125	0.010	0.011		
17	68170	15	25	135	8.00	550	<0.008	–		
18	68171	30	20	65	5.31	200	<0.008	–		
19	68172	45	15	45	3.84	70	<0.008	–		
20	68173	95	15	140	9.18	750	<0.008	–		
21	68174	45	5	40	3.79	170	<0.008	–		
22	68175	45	30	95	6.53	3558	<0.008	–		
23	68176	65	35	150	7.12	3550	<0.008	–		
24	68177	25	25	85	5.06	260	<0.008	–		
25	68178	15	15	80	7.13	1000	<0.008	–		

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

507075

ANALABS

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

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06383	18/08/89	5921	5 OF 12

TUBE No.	SAMPLE No.	Cu	Pb	Zn	Fe	Mn	Au	AuChk		
1	68179	65	45	35	4.62	90	<0.008	–		
2	68180	25	15	35	1.94	810	<0.008	–		
3	68181	375	20	150	8.46	2000	<0.008	–		
4	68182	150	25	140	7.70	1550	<0.008	–		
5	68183	170	15	100	9.46	1300	<0.008	–		
6	68184	95	15	125	7.02	4900	<0.008	<0.008		
7	68185	160	5	65	7.39	2900	<0.008	–		
8	68186	90	15	80	8.09	5000	<0.008	–		
9	68187	195	10	90	8.47	1200	<0.008	–		
10	68188	75	10	90	6.37	1200	<0.008	–		
11	68189	65	35	70	4.66	520	<0.008	–		
12	68190	65	20	70	5.27	770	<0.008	–		
13	68191	50	10	80	4.94	270	<0.008	–		
14	68192	40	10	60	3.20	500	<0.008	–		
15	68193	40	20	70	4.73	210	<0.008	–		
16	68194	70	20	100	4.07	650	0.016	–		
17	68195	50	40	95	5.61	380	<0.008	–		
18	68196	45	30	65	5.31	205	<0.008	–		
19	68197	40	30	50	4.31	70	<0.008	–		
20	68198	10	<5	45	4.24	150	<0.008	–		
21	68200	35	20	45	5.73	250	<0.008	–		
22	68306	75	10	85	8.02	1300	<0.008	–		
23	68307	20	5	30	2.92	630	<0.008	0.009		
24	68308	15	10	35	3.03	1900	<0.008	–		
25	68310	40	20	45	4.83	360	<0.008	–		

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

072

507076

ANALABS

A Division of Macdonald Hamilton & Co. Pty Ltd.

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06383	18/08/89	5921	6 OF 12

TUBE No.	SAMPLE No.	Cu	Pb	Zn	Fe	Mn	Au	AuChk		
1	68350	45	20	115	6.84	1200	<0.008	–		
2	68351	40	20	75	5.74	720	<0.008	–		
3	68353	35	15	140	6.63	1000	<0.008	–		
4	68354	40	15	125	6.17	990	<0.008	–		
5	68356	30	20	90	6.55	880	<0.008	–		
6	68357	35	25	125	6.49	700	<0.008	–		
7	68358	35	25	135	5.30	1300	<0.008	–		
8	68359	40	25	145	6.32	1350	<0.008	–		
9	68360	40	25	130	6.17	2500	<0.008	<0.008		
10	68361	30	20	95	4.41	1500	<0.008	–		
11	68362	30	20	130	6.03	470	<0.008	–		
12	68363	10	20	80	3.80	160	<0.008	–		
13	68364	15	15	55	3.07	60	<0.008	–		
14	68367	25	40	135	6.53	1850	<0.008	–		
15	68371	85	35	260	7.56	1050	<0.008	–		
16	68372	35	55	270	6.94	2200	<0.008	–		
17	68379	50	130	150	6.21	1300	<0.008	–		
18	69455	130	30	320	8.77	700	<0.008	–		
19	69456	120	100	245	8.14	3950	<0.008	<0.008		
20	69457	310	115	380	8.56	650	<0.008	–		
21	69458	345	160	185	6.85	340	<0.008	–		
22	69459	40	10	80	5.24	880	<0.008	–		
23	69460	40	10	75	6.21	1150	<0.008	–		
24	69461	25	<5	50	4.53	100	<0.008	–		
25	69462	25	<5	45	4.83	150	<0.008	–		

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

507077

ANALABS

A Division of Macdonald Hamilton & Co Pty. Ltd.

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06383	18/08/89	5921	7 OF 12

TUBE No.	SAMPLE No.	Cu	Pb	Zn	Fe	Mn	Au	AuChk		
1	69463	25	10	50	4.58	355	<0.008	–		
2	69464	35	10	60	5.73	380	<0.008	–		
3	69465	35	10	75	5.74	490	<0.008	–		
4	69466	30	20	90	5.97	1100	<0.008	<0.008		
5	69467	20	<5	80	6.36	1600	<0.008	–		
6	69468	10	<5	95	6.39	1100	<0.008	–		
7	69469	10	<5	105	6.21	490	<0.008	–		
8	69470	60	15	210	7.58	470	<0.008	<0.008		
9	69471	25	<5	55	3.18	105	<0.008	–		
10	69472	45	20	70	6.36	180	<0.008	–		
11	69473	50	5	90	5.86	260	<0.008	0.012		
12	69474	35	<5	100	4.93	255	<0.008	–		
13	69475	25	<5	75	4.66	655	<0.008	–		
14	69476	30	<5	70	4.36	740	<0.008	–		
15	69477	60	10	75	5.03	1700	<0.008	–		
16	69478	40	40	85	5.75	720	<0.008	–		
17	69479	175	665	725	5.95	7700	<0.008	–		
18	69480	60	170	295	6.36	2000	<0.008	–		
19	69481	50	30	90	5.40	770	<0.008	–		
20	69482	25	25	105	3.49	100	<0.008	–		
21	69483	95	5	70	5.82	250	<0.008	–		
22	69484	30	10	55	4.84	340	<0.008	–		
23	69485	35	10	55	5.40	660	<0.008	<0.008		
24	69486	60	15	100	5.78	5500	<0.008	–		
25	69487	45	25	75	4.80	4050	<0.008	–		

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

507078

ANALABS

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06383	18/08/89	5921	8 OF 12

TUBE No.	SAMPLE No.	Cu	Pb	Zn	Fe	Mn	Au	AuChk		
1	69488	60	20	100	6.33	7500	<0.008	–		
2	69489	65	15	90	5.85	1100	<0.008	–		
3	69490	70	20	80	5.56	2550	<0.008	–		
4	69491	40	5	50	6.13	375	<0.008	–		
5	69492	40	5	65	5.26	950	<0.008	–		
6	69493	65	<5	95	7.04	2250	<0.008	–		
7	69494	90	5	105	7.42	1000	<0.008	–		
8	69495	110	<5	130	9.31	1800	<0.008	–		
9	69496	50	<5	60	5.83	700	<0.008	–		
10	69497	50	15	50	4.82	620	<0.008	–		
11	69498	45	10	60	5.50	500	<0.008	–		
12	69499	30	25	100	3.82	4450	<0.008	–		
13	70101	10	20	160	5.56	5	<0.008	–		
14	70102	20	10	195	8.89	1300	<0.008	–		
15	70103	30	85	210	3.06	900	<0.008	<0.008		
16	70104	20	25	125	5.16	870	<0.008	–		
17	70105	35	60	75	5.44	670	<0.008	–		
18	70106	40	20	60	6.31	910	<0.008	–		
19	70112	80	5	50	1.09	40	<0.008	–		
20	70113	30	10	25	3.43	20	<0.008	–		
21	70114	30	10	35	5.31	80	<0.008	–		
22	70115	50	10	30	3.86	50	<0.008	–		
23	70116	25	15	60	4.73	100	<0.008	–		
24	70117	25	20	40	5.21	890	<0.008	–		
25	70118	60	5	100	5.02	2000	<0.008	–		

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
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— = element not determined

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.0638S	18/08/89	5921	9 OF 12

TUBE No.	SAMPLE No.	Cu	Pb	Zn	Fe	Mn	Au	AuChk		
1	70119	105	20	85	6.61	5000	<0.008	–		
2	70120	70	10	65	5.51	2150	<0.008	–		
3	70121	65	10	55	5.70	195	<0.008	–		
4	70122	50	10	40	5.47	120	<0.008	<0.008		
5	70123	25	10	25	1.50	80	<0.008	–		
6	70124	20	25	45	4.49	520	<0.008	–		
7	70125	125	15	55	4.85	550	<0.008	–		
8	70126	35	15	45	4.76	550	<0.008	–		
9	70127	80	20	60	5.88	690	<0.008	–		
10	70128	5	<5	165	7.27	700	<0.008	–		
11	70129	5	<5	110	4.71	1900	<0.008	–		
12	70130	10	5	200	6.93	1250	<0.008	–		
13	70131	50	100	130	5.72	1300	<0.008	–		
14	70132	35	155	135	5.33	1800	<0.008	–		
15	70133	40	80	120	4.99	1100	<0.008	–		
16	70134	60	120	130	4.82	3500	<0.008	–		
17	70135	40	85	95	5.10	1300	<0.008	–		
18	70136	30	105	90	4.82	475	<0.008	<0.008		
19	70137	30	10	195	3.63	280	<0.008	–		
20	70138	45	70	185	7.35	990	<0.008	–		
21	70139	55	120	125	5.83	2000	<0.008	–		
22	70140	70	30	125	5.43	2300	<0.008	–		
23	70141	55	40	105	5.43	3250	<0.008	–		
24	70142	65	50	120	1.47	2250	<0.008	<0.008		
25	70143	40	20	95	4.00	3900	<0.008	–		

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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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.03.06383	18/08/89	5921	10 OF 12

TUBE No.	SAMPLE No.	Cu	Pb	Zn	Fe	Mn	Au	AuChk		
1	70144	45	<5	135	5.52	620	<0.008	–		
2	70145	35	<5	105	6.00	4100	<0.008	–		
3	70146	50	<5	120	5.93	4200	<0.008	–		
4	70147	20	<5	100	6.58	1450	<0.008	–		
5	70148	15	<5	145	6.65	620	0.011	–		
6	70150	45	<5	175	6.56	920	<0.008	–		
7	70151	45	<5	145	7.22	570	<0.008	–		
8	70152	15	<5	95	6.89	580	<0.008	<0.008		
9	70154	25	10	145	6.09	1350	<0.008	–		
10	70156	85	5	110	6.90	1100	<0.008	–		
11	70157	45	15	170	5.81	5050	<0.008	–		
12	70159	45	20	155	5.17	3200	<0.008	–		
13	70160	80	150	400	6.66	1450	<0.008	–		
14	70161	70	150	330	6.62	1950	<0.008	–		
15	70162	145	250	655	7.21	1750	<0.008	–		
16	70163	30	<5	100	2.77	120	0.025	–		
17	70164	70	210	270	5.43	3500	<0.008	–		
18	70169	35	15	155	4.77	1450	<0.008	–		
19	70170	35	5	85	4.79	550	<0.008	–		
20	70171	30	10	75	5.53	450	<0.008	–		
21	70172	45	75	75	4.18	2700	<0.008	–		
22	70173	105	25	480	5.22	600	<0.008	–		
23	70174	45	60	190	3.66	115	<0.008	–		
24	70175	25	20	130	4.66	100	<0.008	–		
25	70177	30	10	85	1.92	220	<0.008	–		

Results in ppm unless otherwise specified
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X = element concentration is below detection limit
– = element not determined

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ANALABS

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06383	18/08/89	5921	11 OF 12

TUBE No.	SAMPLE No.	Cu	Pb	Zn	Fe	Mn	Au	AuChk		
1	78178	10	5	75	1.92	1050	<0.008	-		
2	78179	25	5	105	2.62	3150	<0.008	-		
3	78962	55	<5	115	4.02	1350	<0.008	-		
4	78963	25	<5	85	3.85	600	<0.008	-		
5	78964	30	<5	90	2.39	280	<0.008	-		
6	78965	45	5	130	4.19	600	<0.008	-		
7	78966	40	5	105	4.53	2400	<0.008	-		
8	78967	25	<5	90	4.20	2050	<0.008	-		
9	78968	35	<5	155	4.24	1300	<0.008	-		
10	78969	25	5	140	4.14	1800	<0.008	-		
11	78970	25	5	105	4.59	1450	<0.008	-		
12	78971	80	85	440	5.16	2350	<0.008	-		
13	78972	60	165	665	5.46	1600	<0.008	-		
14	78973	105	450	1000	5.17	3150	<0.008	-		
15	78974	30	180	890	5.53	1650	<0.008	-		
16	78975	35	95	630	5.15	1250	<0.008	-		
17	78976	65	145	530	5.10	1750	<0.008	-		
18	78977	135	500	935	5.15	1450	<0.008	-		
19	78978	45	170	275	4.80	2350	<0.008	-		
20	78979	60	370	1150	4.97	1450	<0.008	-		
21	78980	45	365	1350	5.51	2100	<0.008	-		
22	78981	45	130	835	5.69	1250	<0.008	-		
23	78982	60	195	685	5.46	1300	<0.008	-		
24	78983	40	195	650	5.22	1550	<0.008	-		
25	78984	140	215	940	5.43	1200	<0.008	-		

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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ANALABS

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.00.0638	13/03/87	5921	12 OF 12

TUBE No.	SAMPLE No.	Cu	Pb	Zn	Fe	Mn	Au	AuChk		
1	78985	85	135	420	5.25	2150	<0.008	–		
2	78986	145	25	265	7.00	1850	<0.008	–		
3	78987	15	30	135	4.79	210	<0.008	–		
4	78988	25	30	55	1.82	420	0.008	–		
5	78989	20	20	365	7.92	1295	<0.008	–		
6	78990	15	25	210	6.90	1750	<0.008	–		
7	78991	30	30	105	4.00	1100	<0.008	–		
8	78992	65	60	75	5.26	1100	<0.008	–		
9	78993	50	40	105	4.65	1350	<0.008	–		
10	78994	60	15	75	1.50	440	<0.008	–		
11	78995	80	25	120	5.59	3300	<0.008	–		
12	78996	160	25	155	5.24	970	<0.008	–		
13	78997	95	15	145	6.50	1150	<0.008	–		
14	78998	95	15	155	5.70	580	<0.008	–		
15	78999	125	20	150	5.33	1600	<0.008	–		
16	79000	120	20	230	5.93	1500	<0.008	–		
17										
18										
19										
20										
21										
22										
23	DETECTION	5	5	5	0.05	5	0.008	0.008		
24	UNITS	PPM	PPM	PPM	%	PPM	PPM	PPM		
25	METHOD	101	101	101	101	101	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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079

APPENDIX 3

LEAD ISOTOPE ANALYSIS

507084

Sirotope

CSIRO
AUSTRALIA

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Chief: Dr B.J.J. Embleton

THE METALLOGENIC ASSOCIATION

OF EXPLORATION SAMPLES

FROM A NBH-PEKO PROSPECT

TO THE NORTH OF ROSEBERY

GRAHAM R. CARR
22/6/89

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Telephone: (02) 467 6733
Telex: AA26296

1. AIM

The aim of this study has been to determine whether exploration samples from a prospect within the Mt Read Volcanics to the north of Rosebery have the isotopic signature of Cambrian VMS or Devonian mineralization.

2. SAMPLES

A total of 7 pulps of surface samples were provided containing between 300 and 2600ppm Pb. In addition three samples of diamond drill core (67868-70) and a sulfide-rich clast (77962) from epiclastic sediments were analysed.

3. TARGETS

The Pb isotope target signature for Cambrian massive sulfide mineralization is well established, and is based on analyses of ore samples from Rosebery, Que River and Hellyer. These data are presented in Figure 1 as 95% confidence ellipses which represent the mean +/- 2 x standard deviations of the data. Also in this figure is the broad field for the Devonian vein system at Queen Hill. The data are plotted in relation to the lead evolution curve of Cumming and Richards (1975).

4. METHODS

About 0.1 to 0.2g of rock pulp was leached in hot 7N HCl + 7N HNO_3 in sealed Savillex beakers for several hours. The leachate was dried, taken up in 1N HBr and Pb was extracted by a double ion exchange technique. Lead contents of the 4 samples crushed at CSIRO were determined by isotope dilution using a ^{202}Pb spike (data points 8-11, Table 1). The samples were analysed on a VG 54E thermal ionization mass spectrometer in fully automated mode. Analytical precision, based on the analyses

of over 1000 standards, is given in the top left hand corner of the diagrams.

5. RESULTS

The Pb isotope ratios of the samples are presented in Table 1 together with the Pb contents determined by isotope dilution. These data which are presented in Figure 2, all plot within or adjacent to the Cambrian target signatures.

6. DISCUSSION

The isotopic compositions of these exploration samples indicates they have a very high probability of having formed during the same Cambrian metallogenic event responsible for the VMS deposits of the region. The overall variation in isotopic compositions of these samples is slightly greater than that found in the individual target deposits. However, this would not be unexpected if the samples were from a number of geographically distinct sites within the prospect area.

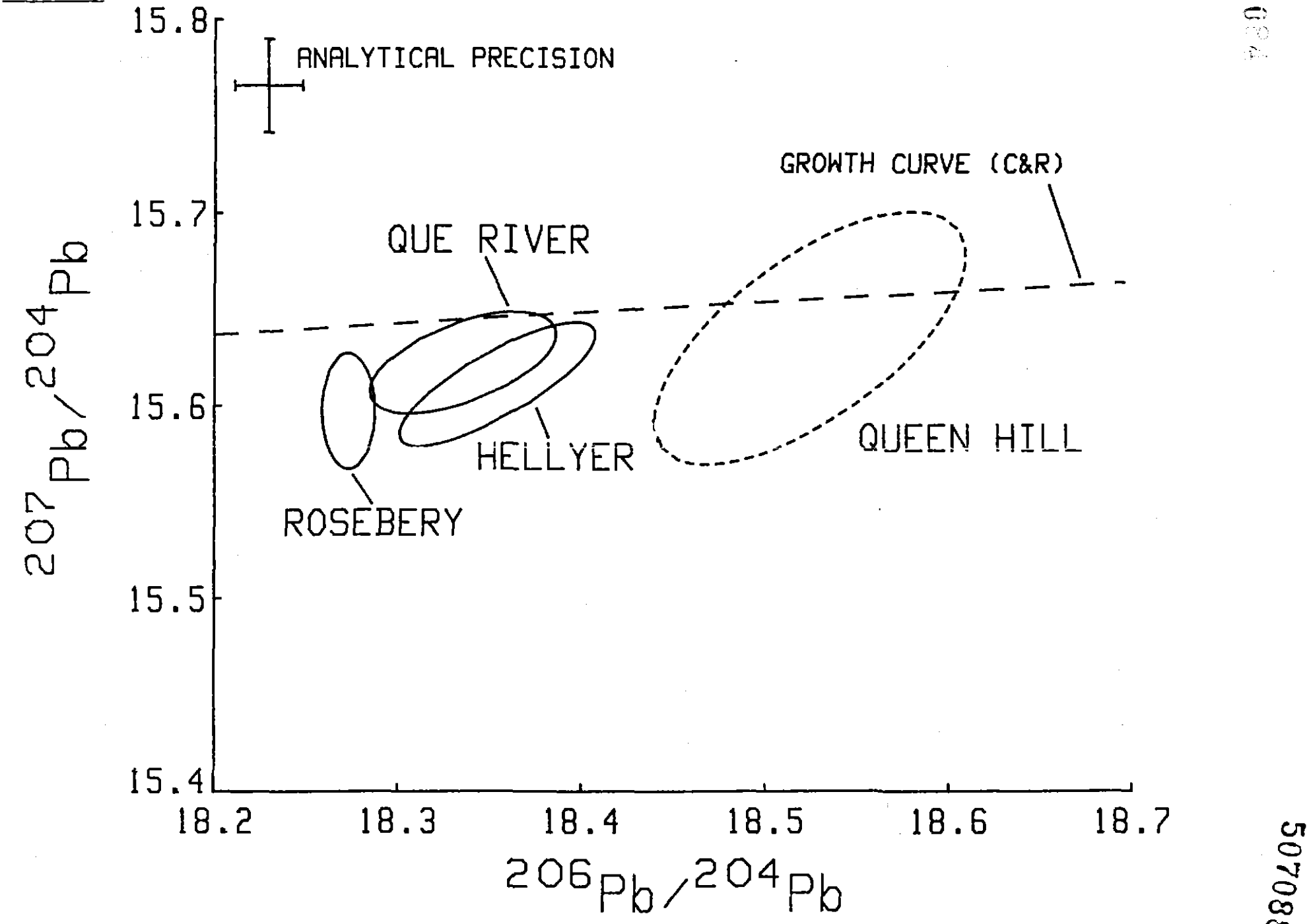
507087

TABLE 1. LEAD ISOTOPE RATIOS OF NBH-PEKO EXPLORATION SAMPLES.

Sample	$\frac{208\ Pb}{206\ Pb}$	$\frac{207\ Pb}{206\ Pb}$	$\frac{206\ Pb}{204\ Pb}$	$\frac{207\ Pb}{204\ Pb}$	$\frac{208\ Pb}{204\ Pb}$	Pb(ppm)
1 48744	2.0860	0.8540	18.261	15.594	38.093	
2 59388	2.0836	0.8535	18.285	15.606	38.099	
3 67823	2.0864	0.8540	18.296	15.624	38.173	
4 67824	2.0865	0.8539	18.299	15.626	38.181	
5 77959	2.0842	0.8530	18.303	15.612	38.146	
6 77964	2.0857	0.8539	18.288	15.617	38.144	
7 77979	2.0807	0.8500	18.357	15.603	38.197	
8 67868	2.0857	0.8531	18.329	15.637	38.229	252
9 67869	2.0882	0.8551	18.271	15.623	38.153	1,000
10 67870	2.0859	0.8553	18.236	15.597	38.039	410
11 77962	2.0874	0.8515	18.380	15.651	38.366	104

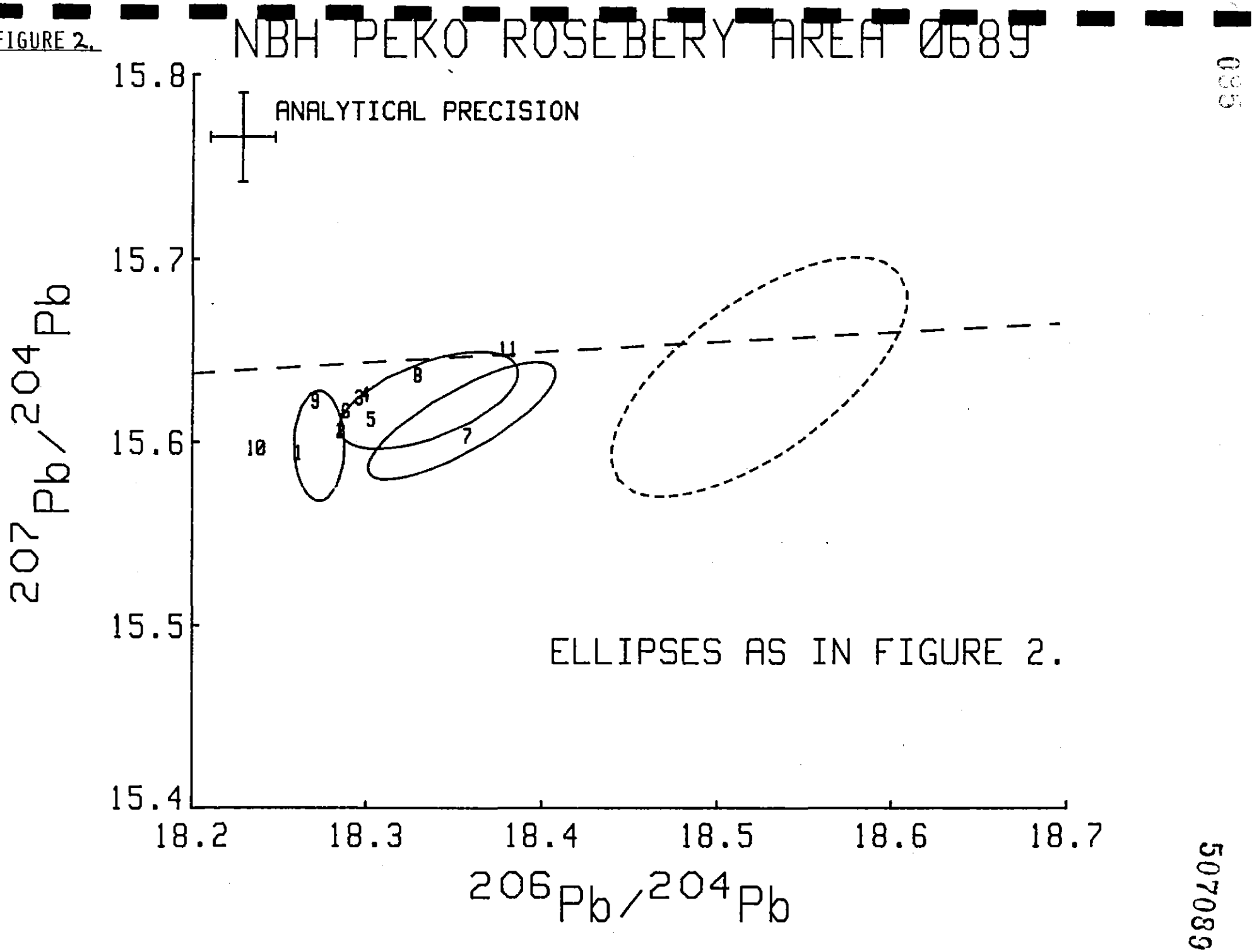
Sample number prefixes refer to points plotted in Figures 1 and 2.

FIGURE 1.



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FIGURE 2.



680

507089

086

507090

APPENDIX 4

PETROLOGY

007

507091

PETROGRAPHIC REPORT

ROCKS FROM FOSSEY MTN TROUGH AREA

FOR GEOPEKO EXPLN. (Attn. Katrina Virgoe)

ANTHONY J. CRAWFORD
Geology Dept
University of Tasmania
31/8/89

507092

Dear Katrina:
Sorry for taking so long to get these rocks described and back to you. My work time was broken up by a trip to Seattle (nice place) and days spent chasing up lost baggage (a high-calibre piss-off).

Anyway, your rocks were relatively straight forward to diagnose, with the possibility that I missed a bit of Kspar in the least altered diorites (they would thus be monzonites, but the difference is trivial). A big problem was that many of the samples (again, the diorite-monzonite group) were so similar that it became hard to write something new about each rock, so I decided to group a few very similar ones together and describe these in groups, pointing out their similarities and differences.

Although I am not at all familiar with the geology of your area, I think that many of the samples I looked at could reasonably be interpreted to come from the same sequence, if not the same rock unit. I envision a very shallow magma chamber from which glassy dacitic to rhyolitic lavas (77989, 48741,48739,78933, 78918, 70149) and crystal tuffs (70192 and 67875) are erupting, which cools to form a subvolcanic plug/dome and underlying frozen magma chamber with relatively fine-grained marginal facies (eg. 77972, 77934) grading through slightly coarser-grained varieties (77926, 1, 77952, 77995, 70189, 70190, 77921, 77949, 68328) to quite coarse-grained dioritic or monzonitic rocks from the interior of the body (eg. 68347,78939, 68341, 77998).
I realize that these samples are from two different grids some couple of km apart, but I am just trying to show that it requires minimal imagination (or stretching thereof) and is petrologically quite reasonable to have all these samples being generated in the one broad volcano-plutonic episode in the same area. I would like to do some XRF analyses on a few of the samples, and this will test the possible comagmatic nature of those selected. I will pass this data on to you when I have them (months away).

The basaltic andesites (68373 and 78919) are very similar to lavas from the Beulah area, and I would also like to analyze one of these for comparitive purposes.

Anyway, thanks for the opportunity to work on some Geopeko rocks. Please ring up (202740 or 202476) for any further questions about these samples or other Mount Reads problems. I hope to visit the W Coast in late September or early October, and may cross your path then. Good luck, and keep in touch if you have more thinnie work you want done.

Best wishes

Tony Crawford.

089

507093

SAMPLE NUMBER: 77949

SUMMARY:

This is a sparsely plagioclase-phyric holocrystalline metadacitic or silicic andesite shallow intrusive.

HAND SPECIMEN:

This is a grey green intermediate metavolcanic with a 5mm wide black chlorite-quartz vein transecting the sample.

THIN SECTION DESCRIPTION:

This sample in thin section is seen to be a sparsely plagioclase-phyric dacitic lava or shallow intrusive rock. Plagioclase phenocrysts are euhedral to subhedral slightly elongate blocky prisms mainly less than 1mm long that have been albitized during low-grade alteration, and are about 20-50% replaced by flecks of sericite. Twinning is preserved but there is no trace of compositional zoning. These plagioclase phenocrysts form about 5-10 modal% of the sample, and commonly occur in 2 or 3 crystal clusters with smaller chloritized mafic phenocrysts. About 1-2 modal% of the sample is made up of small (<0.5mm) subhedral pale green chlorite pseudomorphs after a mafic phase, probably augite (by analogy with fresher samples of similar Mount Read Volcanics). Former FeTi oxide phenocrysts form much less than 1 modal% of the rock, and are totally altered to very fine-grained chlorite-magnetite-sphene intergrowths.

The groundmass of this sample is holocrystalline, and composed of a relatively coarse-grained intergrowth of tabular albitized plagioclase crystals around 0.1mm long average and anhedral blebby quartz. A modally subordinate amount of pale green chlorite may replace former augite blades grown interstitially between plagioclase laths. Small ragged elongate crystals of very pale yellow epidote are scattered through the groundmass.

This sample probably contains slightly more chlorite than typical Mount Read Volcanics dacites, and may therefore be a silicic andesite. The relatively coarse groundmass texture is almost certainly an indication that this sample crystallized as a subvolcanic plug or dyke, rather than the more typically glassy evolved andesitic-dacitic lavas that are abundant in the Central Volcanic Complex of the Mount Read Volcanics.

This sample is transected by a chlorite-quartz veinlet composed of long, strained ribbons of quartz intergrown with a dense mass of pale green chlorite that shows strong deep blue anomalous pleochroism. The metamorphic mineral assemblage in this sample (albite-chlorite-quartz-epidote-sphene) is typical of the regionally-developed prehnite-pumpellyite facies to lowermost greenschist facies of burial metamorphism of intermediate to felsic lavas.

SAMPLE NUMBER: 77972

SUMMARY:

This is a strongly weathered vesicular, sparsely plagioclase-phyric, chlorite-rich meta-dacitic lava or shallow intrusive rock, probably derived from the same body as 77934.

HAND SPECIMEN:

This is a light brownish green highly weathered vesicular intermediate lava with abundant black chlorite-filled vesicles mainly less than 1mm diameter.

THIN SECTION DESCRIPTION:

This sample has suffered strong weathering and oxidation, and the primary texture, although not totally obliterated, is rather difficult to discern. The sample originally contained a few modal % of plagioclase phenocrysts less than 1mm long. These elongate prisms have been albitized, and strongly sericitized, and many contain abundant chlorite. As with the previous sample, sparse former small mafic phenocrysts, probably originally augite, have been replaced by yellow-geen chlorite. A similar small modal abundance of totally altered former FeTi oxide phenocrysts are replaced by chlorite and sphene, with the crystal outlines being preserved by tiny magnetite or hematite granules.

The groundmass of this sample varies from highly altered and probably originally vitrophyric, to more crystalline, with an intersertal intergrowth of strongly sericitized albitized plagioclase and chlorite replacing augite plates, with former glassy mesostasis replaced by quartz and yellowish chlorite. Small equidimensional FeTi oxide microphenocrysts are evenly dispersed throughout the groundmass, and tiny subspherical grains of leucoxenized FeTi oxide or sphene are abundant.

The abundant undeformed vesicles in this sample are filled by a patchy intergrowth of yellow chlorite and granular quartz, and minor fine-grained sericite. The metamorphic assemblage is typical of the low-grade prehnite-pumpellyite to low greenschist facies of regional burial metamorphic degradation of the Mount Read Volcanics.

This sample is clearly a former intermediate to felsic rock, and was probably dacitic in composition. The groundmass texture, being dominantly crystalline, suggests that this sample may have been from the margins of a shallow intrusive body. The texture is quite unlike typically (devitrified) glassy dacitic lavas in the Mount Read Volcanics. This sample is quite probably derived from the same body as sample 77934, described further on, although 77934 is probably taken from further from the margins of the intrusive (?) cooling unit.

SAMPLE NUMBER: 77998

SUMMARY:

This is a plagioclase-phyric intrusive diorite with a low-grade burial metamorphic mineral assemblage.

HAND SPECIMEN:

This is an altered grey-green plagioclase-phyric relatively intrusive andesitic rock.

THIN SECTION DESCRIPTION:

This sample is an holocrystalline plagioclase-phyric andesitic (dioritic) intrusive rock, composed of around 60 modal% of ragged blocky prisms of intergrown albitized plagioclase in a finer-grained holocrystalline groundmass. The plagioclase crystals average 1-2mm long, and are shot through (not like a Bondi tram) with small granular epidote crystals and patches and trains of chlorite, with minor sericite flecking.

The groundmass of this sample is composed of a holocrystalline intergrowth of tabular plagioclase (albite) averaging around 0.2-0.4mm long, and smaller, less abundant plates of chloritized and epidotized augite, both set in a K feldspar-quartz matrix. The same material fills angular interstices. Small equigranular and totally altered FeTi oxide crystals are replaced by very fine-grained magnetite-sphene-chlorite. Tiny apatite needles are common in the finer-grained groundmass.

This sample is clearly an intrusive, almost doleritic-textured andesitic (diorite) rock with too little primary (now altered) mafics to be doleritic in composition. The metamorphic assemblage is characteristic of low-grade burial metamorphism.

SAMPLE NUMBER: 77921

SUMMARY:

This sample is a plagioclase-phyric dioritic intrusive rock, almost certainly from the same body as 77998, but from a more rapidly-cooled marginal or roof part of the intrusive body.

HAND SPECIMEN:

This is an abundantly plagioclase-phyric relatively coarse-grained intrusive andesitic rock very similar to the previous sample in hand specimen, although perhaps slightly better preserved and with a finer-grained groundmass.

THIN SECTION DESCRIPTION:

This sample is seen in thin section to be a plagioclase-phyric intrusive dioritic rock with around 30-40 modal% of quite large (1-3mm long) albitized plagioclase phenocrysts. These are blocky subhedra, often intergrown with adjacent crystals, and have ragged edges intergrown with the smaller groundmass plagioclase. As in the previously described sample (77998), the plagioclase phenocrysts are riddled with small epidote granules and small patches of pale green chlorite and sericite flecks. A single elongate 2mm-long ragged prism of deep green chlorite has a shape suggestive of a hornblende precursor.

The groundmass of this sample is certainly finer-grained than that of related sample 77998, but is otherwise mineralogically identical. Plagioclase (albite) laths in the groundmass show more elongate, narrower shapes, indicative of more rapid cooling; these are intergrown in a matrix of more anheral albite, possible cloudy K feldspar and blebby quartz, with abundant pale green chlorite, all the matrix being peppered with tiny leucoxene granules, apatite needles and anhedral epidote grains.

In my opinion, there is little doubt that this sample is from the same intrusive body as 77998, albeit from a more marginal, rapidly-cooled part of the intrusion. It is almost certainly andesitic in composition, and shows the characteristic low-grade burial metamorphic assemblage shown by the other samples described above. I would like to analyze this sample for our Mount Read Volcanics data base if you don't mind (see letter).

SAMPLE NUMBER: 77934

SUMMARY:

This is a sparsely plagioclase-phyric vesicular shallow intrusive dacite.

HAND SPECIMEN:

This is a pale brown, weathered vesicular felsic volcanic lava(?) with pinkish feldspar phenocrysts

THIN SECTION DESCRIPTION:

In thin section, this sample is seen to be a sparsely plagioclase-phyric vesicular dacitic lava with around 3-5 modal% of albitized plagioclase phenocrysts in a quite altered holocrystalline groundmass. The plagioclase phenocrysts are slightly corroded blocky prisms mainly 1-2mm long, that are variably replaced by a mass of very fine-grained sericite.

The groundmass of this sample is quite altered and it is rather difficult to discern the primary texture. Small albite laths, many replaced by sericite, occur intergrown with quartz and anhedral albite, and a subordinate amount of yellow-green chlorite perhaps after groundmass augite. Former tiny FeTi oxides are abundant and replaced by leucoxene aggregates.

The abundant vesicles are lined by a narrow rim of yellowish-green chlorite and are partially or completely filled by quartz. This sample is probably a vesicular shallow intrusive dacite. The degree of sericite alteration is greater than in the samples described above, yet is not as intense as seen in local hydrothermal alteration of similar rocks in the Mount Read Volcanics.

SAMPLE NUMBER: 77952

SUMMARY:

This is a quite well-preserved holocrystalline shallow intrusive silicic andesite or dacite that is remarkably similar (though fresher) to sample 77949.

HAND SPECIMEN:

This is a dark brown well preserved sparsely plagioclase phyric dacitic lava (?).

THIN SECTION DESCRIPTION:

This sample is seen to be much better preserved than the other dacitic-andesitic samples described above. It is composed of around 2-5 modal% of almost inclusion-free albitized plagioclase phenocrysts, mainly less than 1mm long. These are commonly aggregated in multi-crystal clots with sparse equigranular FeTi oxide phenocrysts and anhedral deep green chlorite, possibly after augite.

The groundmass of this sample is a holocrystalline intergrowth of tabular albite crystals averaging 0.2-0.4mm long set in an intergrowth of anhedral albite and almost spherical blebs of quartz in which tiny angular interstices, probably formerly filled with a glass-dominated mesostasis, are replaced by green chlorite. FeTi oxide microphenocrysts are not uncommon, and equigranular groundmass grains are abundant; the former appear to be fresh, while the smaller grains are leucoxenized.

Although you question whether this sample might be related to 77972, I suggest that it is remarkably similar to a fresher version of 77949, and is therefore possibly from the same unit as that sample. It is probably a silicic andesite or dacite compositionally, and is certainly worth analyzing for our Mount Read Volcanics data base.

SAMPLE NUMBER: 77926

SUMMARY:

This is a holocrystalline shallow intrusive dacite or acid andesite that is remarkably similar to samples 77949 and 77952, and may well be from the same unit.

HAND SPECIMEN:

This is a quite altered massive dark red-brown metadacitic or intermediate lava (?).

THIN SECTION DESCRIPTION:

This sample is seen in thin section to be a holocrystalline dacite with around 10-15 modal% of quite large albitized plagioclase phenocrysts . These occur as blocky euhedra to about 3mm long, that are virtually completely replaced by a dense mat of relative coarse-grained sericite. Since the groundmass (including the FeTi oxides) is quite well preserved, this sericite alteration may be a surficial alteration feature.

The groundmass of this sample is very similar to 77949, being a well-preserved holocrystalline intergrowth of tabular albite laths in anhedral albite and blebby quartz. Small but common equidimensional FeTi oxide grains appear to be fresh, and the small amount of former mafic crystals (augite plates) intergrown in the groundmass are replaced by pale green chlorite. Tiny granules of epidote are also ubiquitous through the groundmass.

This sample is a shallow intrusive dacite or acid andesite that is almost identical to 77949, and very similar to 77952; the latter probably contains slightly more chlorite than the other two samples, but all three could well be from the same eruptive unit.

SAMPLE NUMBER: 1

SUMMARY:

This is a well-preserved holocrystalline intrusive andesitic or dioritic rock very similar to sample 77998, and possibly from the same body.

HAND SPECIMEN:

This is a dark grey-and red-brown altered holocrystalline andesitic lava or shallow intrusive rock.

THIN SECTION DESCRIPTION:

This sample contains around 10 modal % of blocky albite phenocrysts up to 3mm long that are flecked to around 30 modal% replaced by sericite, and occasionally contain streaks and veinlets of green chlorite. These crystals sometimes occur in glomeroporphyritic clots, intergrown with rare small chloritized mafic phenocrysts. Well-formed equidimensional FeTi oxide microphenocrysts, mainly less than 0.3mm across, are common and appear to be fresh.

The groundmass of this sample consists of abundant blocky to elongate albite laths averaging around 0.3mm long set in a matrix of more cloudy K feldspar (?) and blebs of clear quartz, with abundant tiny apparently fresh FeTi oxide granules and scattered epidote grains.

This sample is almost identical to sample 77998, but is definitely better preserved, as shown by the much smaller amount of epidote in sample 1, especially as inclusions in plagioclase. It is worth analyzing for the Mount Read Volcanics data base.

SAMPLE NUMBER: 77989

SUMMARY:

This is a well-preserved sparsely plagioclase- and biotite-phyric formerly glassy dacitic lava.

HAND SPECIMEN:

This is a massive red-brown sparsely plagioclase-phyric dacitic lava with a dense very fine-grained groundmass.

THIN SECTION DESCRIPTION:

This sample is a sparsely plagioclase-phyric formerly glassy dacitic lava that contains around 5 modal% of euhedral blocky albite phenocrysts to around 2mm long that are liberally speckled with sericite and subordinate chlorite. The plagioclase phenocrysts occasionally contain small FeTi oxide phenocrysts, and the latter also occur as scattered discrete phenocrysts less than 1mm across. Sparse former mafic phenocrysts are elongate narrow prisms now composed of intergrown quartz, green chlorite and spindle-shaped sphene crystals; these were probably originally biotite phenocrysts.

The groundmass of this sample consists of a patchwork mosaic of albite, K feldspar and secondary quartz riddled with pale green chlorite flakes, with a texture characteristic of devitrified felsic glass. Tiny albite microlites are common and occur embedded in the former glass. The metamorphic assemblage is typical of the low-grade burial metamorphism of felsic lavas, and is probably prehnite-pumpellyite facies. This sample is a typical formerly glassy dacitic lava such as make up a large proportion of the Central Volcanic Complex of the Mount Read Volcanics. The sample should be analyzed for the Mount Read Volcanics data base.

SAMPLE NUMBER: 77995

SUMMARY:

This is a sparsely plagioclase-phyric intrusive andesitic-dioritic rock, virtually identical to samples 1 and 77998, but transected by a subparallel chlorite-quartz vein system probably related to proximity to a major fault.

HAND SPECIMEN:

This sample is an altered, fractured and chlorite-veined sparsely plagioclase-phyric intermediate lava or shallow intrusive rock.

THIN SECTION DESCRIPTION:

This sample is a fractured and veined holocrystalline intrusive rock with sparse phenocrysts of albitized plagioclase to about 2mm long, slightly flecked by sericite. The plagioclase phenocrysts make up les than 2 modal% of the sample.

The groundmass of this sample is a holocrystalline intergrowth of tabular albite laths mostly around 0.2-0.4mm long, set in a matrix of dusty K feldspar and blebby quartz with interstitial pale green chlorite riddled with tiny FeTi oxide grains and trains of grains.

The sample is cut by a subparallel fracture network that is filled with pleochroic green chlorite and quartz, and less abundant sericite. The sericite also pervades grain boundaries through the groundmass.

This is a holocrystalline intrusive andesitic -dioritic rock. In my opinion, this sample is certainly from the same dioritic intrusive body as samples 1 and 77998-77921. It is fractured and veined relative to sample 1, probably as a result of cold, shallow-level brittle deformation associated with the Late Devonian deformation event. This suggests proximity of this sample to a significant fault structure.

SAMPLE NUMBER: 48741

SUMMARY:

This sample is a fluidal-textured formerly highly glassy dacitic lava containing two populations of plagioclase phenocrysts, one cognate and the other xenocrystal, and also several andesitic lithic clasts.

HAND SPECIMEN:

This is a dark brown fine-grained felsic lava or felsic tuff, containing plagioclase phenocrysts and several angular dark lithic fragments (?) in a formerly glassy groundmass.

THIN SECTION DESCRIPTION:

Thin section examination of this sample immediately shows that it is a fluidal formerly glassy felsic lava. About 5-10 modal% of the sample consists of albitized plagioclase phenocrysts that vary from 0.2 to 1.2mm long. They include both tabular euhedral shapes, and rather rounded and reacted crystals with a different paragenesis to the euhedral crystals. Plagioclase phenocryst crystal clusters are quite common. All plagioclase phenocrysts are slightly flecked by sericite.

Mafic phenocrysts are much less abundant and generally finer-grained than plagioclase phenocrysts. They are small euhedral shapes composed of green chlorite, and have shapes suggestive of both augite, and orthopyroxene precursors. Equidimensional FeTi oxide phenocrysts to about 0.5mm across are not uncommon, and appear to be fresh.

A distinctive feature of this sample is the presence of angular andesitic lithic fragments up to 4mm long composed of albite and chloritized augite phenocrysts in a microcrystalline groundmass.

The groundmass of this sample is most distinctive, with a pronounced fluidal texture. This is defined by areas of exceptionally fine-grained products of felsic glass devitrification that form wavy domains within slightly coarser-grained formerly glassy areas containing abundant tiny albite microlites.

The presence of lithic fragments and two separate populations of feldspar phenocrysts (one probably cognate and the other xenocrystal) in this sample indicate a hybrid origin. The texture is characteristic of viscous fluid glassy dacite lavas, and the lack of glassy lapilli and shards suggest to me that a vitric-crystal tuff origin can be ruled out for this sample.

SAMPLE NUMBER: 48739

SUMMARY:

This is a formerly highly glassy fluidal dacitic lava that incorporated abundant small volcanic lithic fragments during its eruption. It is very similar to 48741, and was probably derived from the same unit.

HAND SPECIMEN:

This is a structureless dark grey fine-grained massive felsic lava or tuff that contains a few quite large (to 1cm) lithic fragments. Is is very similar in overall features and genesis to the previous sample.

THIN SECTION DESCRIPTION:

This sample in thin section is seen to be very similar in general terms to sample 48741, but the following differences are noted:

1. this sample contains a more abundant and diverse population of volcanic lithic fragments, including formerly aphyric glassy dacite to plagioclase+augite (?)-phyric andesitic lavas.
2. the groundmass, although showing the same fluidal structure that characterizes 48741, is even more heterogeneous, perhaps due to devitrification blurring definition of formerly glassy felsic lava or vitric tuff lithic fragments from the formerly glassy groundmass of this sample.

Both 48739 and 48741 may well be derived from the same formerly glassy fluidal dacitic lava flow that picked up and incorporated relatively common volcanic lithic fragments during its eruption.

SAMPLE NUMBER: 78933

507105

SUMMARY:

This is a formerly glassy plagioclase-phyric dacitic lava.

HAND SPECIMEN:

This is a very fine-grained feldspar-phyric lava with a patchily weathered, probably variably devitrified dark grey and brown groundmass.

THIN SECTION DESCRIPTION:

This is a texturally very well preserved felsic lava with around 10-15 modal% of plagioclase phenocrysts and much less abundant chloritized mafic phenocrysts set in an extremely fine-grained formerly vitrophyric groundmass. The plagioclase phenocrysts are albitized (formerly more calcic) euhedral and subhedral whole crystals and crystal fragments that are mainly less than 0.5mm long, but occasionally reach 1mm in length. They are generally slightly flecked with sericite and contain pale green chlorite inclusions and cross-cutting veinlets. The former mafic phenocrysts make up around 1-2 modal% of the sample and are entirely pseudomorphed by bright green chlorite. that is sometimes rimmed with apple green pumpellyite. The shapes of most of the former mafic crystals suggest orthopyroxene (hypersthene) precursors, although several are strongly suggestive of former augite. Euhedral equidimensional FeTi oxide microphenocrysts are not uncommon, and do not appear to be altered to leucoxene. Several fine-grained volcanic lithic fragments are obvious in this sample, all being less than 2mm long and composed of plagioclase laths set in a chlorite matrix. A second fragment population is more altered and seems to be composed of devitrified rhyolitic glass with a fine-scale snowflake texture; abundant Fe oxide dust and flakes occur within these fragments and may have crystallized during devitrification and alteration of the felsic glass.

The groundmass of this sample is a well-preserved formerly vitrophyric intergrowth of almost submicroscopic feldspar microlites in devitrified glass. Curved perlitic cracks are common, and devitrification fronts are defined by bands of very fine-grained opaque oxides and chlorite in a lighter coloured quartz-albite dominated devitrification intergrowth. Varying extents of devitrification and (re)crystallization of adjacent domains in the sample groundmass, coupled with variable response of these domains to low-grade metamorphism and weathering, have produced the blotchy appearance of the hand specimen.

This sample was a glassy plagioclase-phyric dacitic lava. The presence of pumpellyite and chlorite, and absence of metamorphic amphibole, plus the non-hornfelsic texture, all suggest to me that this sample is not at all contact metamorphosed. Rather, it represents a typical low-grade burial metamorphic felsic lava, such as are common in the Moun t Read Volcanics.

SAMPLE NUMBER: 67875

SUMMARY:

This is a devitrified, formerly glassy rhyolitic crystal-vitric tuff containing abundant flattened pumice fragments, and quartz and albite crystal debris.

HAND SPECIMEN:

This is a light greenish fragmental epiclastic or tuffaceous rock with common dark flattened glass(?) fiammae and light coloured very fine-grained cherty or devitrified felsic tuff fragments mainly less than 5mm long.

THIN SECTION DESCRIPTION:

This sample in thin section shows a texture typical of a crystal-vitric tuff. The crystal component is dominated by small fragments of quartz and albite crystals mainly less than 0.5mm across, that clearly indicate a rhyolitic or rhyodacitic magma composition. Quartz grains are angular unstrained, sometimes rounded or subhedral grains with typical volcanic form. Feldspar grains are subhedral or euhedral crystals and abundant angular crystal fragments that are slightly sericite flecked and sometimes internally subgrain recrystallized. Sparse former glassy lithic clasts are difficult to differentiate from the devitrified glassy groundmass, and may have been obsidian. By far the most abundant component of this sample is devitrified felsic glass, probably originally rhyolitic. It occurs as flattened wavy chlorite-rich fiammae, bundles of shards, and somewhat flattened pumice fragments, all of which have devitrified to a texturally heterogeneous quartz-albite+generally minor chlorite intergrowth of variable grainsize. The groundmass of the sample, between the pumice fragments and crystal debris was probably comminuted glass, that also devitrified in similar fashion to the pumice, making definition of former pumice clasts and glassy shards rather difficult.

SAMPLE NUMBER: 78918

SUMMARY:

This is a dacitic lava breccia composed of fragments of albite-phyric formerly glassy lava fragments in a slightly more oxidized vitric ash matrix.

HAND SPECIMEN:

This is an altered andesitic lava breccia composed of often zoned feldspar-phyric fragments to about 1cm across, and concentrations of black chlorite and pink albite or Kspar common throughout the sample.

THIN SECTION DESCRIPTION:

This is a very well-preserved lava breccia composed largely of 2 to 5mm sized angular fragments of plagioclase-phyric andesite or dacite. The fragments make up around 80 modal% of the sample and occur either abutting one another, or embedded in a darker coloured fine-grained matrix. Feldspar phenocrysts make up around 10 modal% of the lava fragments and are tabular to blocky euhedra of albite after more calcic plagioclase, usually less than 1mm long. They are free of sericitic alteration, although they sometimes contain small trains of chloritized melt inclusions. There is no sign of the former presence of mafic phenocrysts in this rock. The groundmass of the lava fragments is an extremely fine-grained formerly vitrophyric intergrowth of tiny plagioclase microlites and glass; the latter has devitrified to a fairly even-textured fine-grained mosaic intergrowth of quartz and albite, with minor pale green chlorite and tiny leucoxene globules. Perlitic cracks and almost circular devitrification cells following cracks in the former glassy groundmass are very well shown in this sample. The striking pink fragments in the hand specimen are petrographically identical to the other lava fragments except for development of very fine-grained Fe oxide films on albite microlites in these fragments, which are also much less chloritic than most of the other lava fragments.

The matrix between the lava fragments is also a very fine-grained devitrification product after felsic glass, but it lacks plagioclase phenocrysts and contains more abundant fine-grained opques than the lava fragments. In places it is replaced by curved masses of green chlorite.

It is difficult to determine whether the lava fragments and the matrix of this sample are broadly comagmatic. It is possible that the matrix was a porous vitric ash that was more accessible to alteration fluids than the impermeable lava fragments, so that it altered and oxidized more readily than the lava fragments. There is little doubt, however, that the sample is a dacitic lava breccia

SAMPLE NUMBER: 78939

SUMMARY:

This is a weathered and oxidized Kspar-bearing monzonite with a prehnite-pumpellyite facies burial metamorphic assemblage.

HAND SPECIMEN:

This is a reddish strongly weathered and oxidized holocrystalline diorite or granodiorite.

THIN SECTION DESCRIPTION:

This is a holocrystalline medium-grained sample composed of an intergrowth of albite, quartz, granophyre, Kspar and at least one altered former mafic phase. The sample is dominated by suhedral to subhedral tabular plagioclase prisms of dominantly albite composition. These are up to 2mm long, but average around 1mm. They are slightly flecked by sericite and grade at their margins either into a quartz-albite granophyric intergrowth, or to cloudy Kspar. Occasionally albite crystals show intimately sutured boundaries against other albite crystals. Kspar (microcline?) also occurs as quite common large (around 0.5-1mm) anhedral grains with very poorly-defined chequerboard twinning; these grains are cloudy under plane polarized light and contrast with the clear albite. Quartz always occurs as clear, anhedral grains interstitial to the albite prisms and marginal Kspar and granophyre. Former FeTi oxide grains, to almost1mm across, are not uncommon, anf have all exsolved ilmenite then broken down to magnetite-chlorite-leucoxene skeletal grains. The sample is characterized by abundant very elongate and narrow apatite needles.

Green chlorite, mainly altered to red oxychlorite or limonite, and commonly intergrown with fairly coarse-grained sericite, is scattered through the rock, both in veinlets and probably replacing former ragged interstitial augite grains. Some of the interstitial chlorite occurs as radiating rosettes in triangular interstices between blocky feldspars, and may have been produced by reaction of late magmatic fluids with mesostasis (trapped residual liquid). The metamorphic assemblage in this sample, dominated by albite and chlorite, but also including leucoxene, quartz and possibly fine-grained bright green pumpellyite, is typical of the prehnite-pumpellyite facies of burial metamorphism.

SAMPLE NUMBER: 68373

SUMMARY:

This sample is a plagioclase+augite-phyric basaltic andesite or basalt with a prehnite-pumpellyite facies metamorphic assemblage. The sample is more likely to be a lava or shallow intrusive dyke than a 'gabbroic intrusion'.

HAND SPECIMEN:

This is a dark grey-black feldspar- and augite-phyric basalt.

THIN SECTION DESCRIPTION:

This sample in thin section is seen to be a strongly porphyritic basaltic or mafic andesitic lava composed of subequal proportions (each around 20 modal%) of relatively large albitized plagioclase and fresh augite phenocrysts set in a vitrophyric groundmass. The albite phenocrysts are mainly elongate tabular euhedra to around 3mm maximum grainsize; they are at least half replaced by very fine-grained sericite, and often occur in multi-crystal clots. Augite phenocrysts reach a similar maximum grainsize, and are mainly euhedral or slightly rounded and reacted, commonly twinned grains showing no actinolite or chlorite alteration. FeTi oxides are absent as a phenocryst or microphenocryst phase.

The groundmass of this sample is composed of a formerly vitrophyric intergrowth of quite acicular plagioclase (albite) microlites in chloritized glass. Small anhedral plates of augite also occur in the groundmass. Tiny granular epidote crystals occur embedded in chlorite in the groundmass, and several patches composed of radiating sheaves of yellowish epidote also overprint patches of groundmass. Several small almost circular patches of multicrystalline calcite are present in the sample. The alteration assemblage, chlorite-albite-epidote-sericite-cacite and possibly very fine-grained pumpellyite is typical of the prehnite-pumpellyite facies of burial metamorphism.

The porphyritic texture and vitrophyric groundmass of this sample rule out the possibility that it is a gabbroic intrusion. Rather, I suggest it is a crystal-rich basaltic andesite or basalt lava, or shallow intrusive dyke.

507110

SAMPLE NUMBER: 78919

SUMMARY:

This is a plagioclase+augite-phyric basaltic andesite or basalt lava or shallow intrusive rock essentially identical to 68373.

HAND SPECIMEN:

This is a dark grey massive, feldspar+augite-phyric basaltic lava

THIN SECTION DESCRIPTION:

In most respects, this sample is essentially identical to 68373. It is composed of subequal amounts of quite large albite and augite phenocrysts in a finer-grained groundmass. Several minor points of difference between this sample and the previous one include:

1. this sample has a more holocrystalline (albeit still relatively 'volcanic' textured) groundmass than the vitrophyric groundmass of 68373., implying it was further from the margin of this cooling unit, be it a flow or dyke.
2. The groundmass of this sample contains more patches of green chlorite than 68373, probably as a result of local alteration and replacement.
3. Pumpellyite unambiguously is present in this sample as bright green small granular inclusions in plagioclase grains.
4. At least two well preserved chlorite-serpentine-magnetite pseudomorphs after former olivine phenocrysts are present in this sample, but no similar feature was seen in 68373.

I have no doubt that this sample is basically the same beast as 68373, and is a strobgly plagioclase+augite-phyric basaltic or basaltic andesite lava or shallow intrusive with prehnite-pumpellyite facies burial metamorphic overprint.

I would like to analyze this sample if this is OK.

SAMPLE NUMBER: 67879

SUMMARY:

This is an olivine-phyric alkaline Tertiary dolerite.

HAND SPECIMEN:

This is a dark, uniform doleritic-textured basaltic rock.

THIN SECTION DESCRIPTION:

This is very fresh Tertiary mafic rock with a doleritic texture and an alkaline mineral assemblage including titanaugite and ilmenite. The sample is holocrystalline, and contains around 10 modal % of perfectly fresh fractured subhedral olivine crystals set in a subophitic intergrowth of anhedral pinkish titanaugite plates and tabular laths of calcic plagioclase (~An_{50-65}) with subordinate but common ilmenite needles. Strongly pleochroic aegirine occurs as marginal green fringes on some titanaugite grains. Acicular apatite needles are abundant throughout the groundmass of this sample.

This sample is undoubtedly a subvolcanic Tertiary dolerite related to the widespread Tertiary basalts in northern Tasmania. There is no way this rock is part of the Cambrian succession or related to the two previous samples (78919 and 68373).

SAMPLE NUMBER: 68347, 68328 and 68341

SUMMARY:

These are identical relatively fine-grained monzonites with prehnite-pumpellyite facies burial metamorphic assemblages.

HAND SPECIMEN:

These samples are medium-grained holocrystalline dull brown to reddish monzonites or diorites cut by several quartz veinlets up to 7mm wide.

THIN SECTION DESCRIPTION:

These samples are texturally and mineralogically identical holocrystalline intrusive rocks composed of an intergrowth of two feldspars, quartz and green chlorite after a former mafic phase. Average grainsize is around 0.5mm. The feldspars include tabular crystals of clear, twinned albite, and larger, almost anhedral grains of checkerboard-twinned microcline or Kspar that are quite dusty under plane polarized light. Neither variety of feldspar contains much sericite flecking. Quartz occurs as generally anhedral grains interstitial to albite and Kspar; it makes up around 10 modal% of this sample. Minor amounts of granophyre also occur interstitally to the feldspar grains.

The bright green chlorite in these samples in some instances clearly replaces a former mafic phase, possibly hornblende. This occurs as ragged elongate subhedral grains interstitial to the feldspars. Identical chlorite also occurs as fillings in meandering veinlets occurring along fractures. Small granular epidote grains are occasionally present in the chlorite. Blocky equidimensional FeTi oxide grains averaging around 0.1mm across are quite common (<5 modal%), and show marginal alteration to leucoxene.

The quartz veinlets that cut two of the samples (68347, 68341) are composed of strained polygonal grains of quartz averaging around 1mm across, with intimately sutured grain boundaries. Brittle fracture zones less than 1mm wide cut the rocks and quartz veins, and are marked by granulation and subgrain recrystallization of quartz and albite.

The amount of Kspar present in these samples indicates that they are monzononites, and all show a prehnite-pumpellyite facies low grade burial metamorphic assemblage. I have no doubt that they are from the same intrusive body. Sample 68328 is less weathered than the other two, and I would like to analyze it, if I may. These samples are very similar to sample 1, except that the latter may have slightly less (or slightly less altered, and therefore less 'recognizable') Kspar.

SAMPLE NUMBER: 70166

SUMMARY:

This sample is an epiclastic sandstone derived largely from a felsic volcanic source, although a minor detrital fraction derived from Precambrian pelitic schist is also notable. The sample is clearly unrelated to the three previously described monzonites (68328, 68341 and 68347).

HAND SPECIMEN:

This is a relatively coarse-grained epiclastic or pyroclastic rock with abundant lithic fragments to 3mm across.

THIN SECTION DESCRIPTION:

This is an epiclastic sediment composed of a framework of 1-2mm-diameter subrounded grains of quartz, feldspar and felsic volcanic fragments. Feldspar grains are most abundant, and are mostly clear twinned albite with very minor sericite flecking. Quartz grains are unstrained volcanic quartz with occasional round chloritized melt inclusions. Most felsic volcanic fragments are composed of quartz and albite, with a fine 'snowflake' texture indicative of crystallization from devitrified glass. Quite large (around 1mm across) grains of totally altered FeTi oxide are common, and composed of a magnetite rim around a core of pale green chlorite, granular dark sphene and tiny magnetite crystals. Several lithic fragments are clearly quartz-muscovite pelitic schists of Precambrian derivation.

The matrix of this sample is stronly chloritized, and contains small angular grains of quartz and albite. The rock is cut by several zones of strong brittle fracturing containing granulated quartz and albite and a strong concentration of opaque oxides, possibly concentrated in these zones by dissolution of the more soluble silicates. The detrital assemblage in this sample indicates a nearby felsic volcanic source; the sample is very similar to many Dundas Group epiclastic sandstones.

SAMPLE NUMBER: 77913

SUMMARY: This is a siltstone with a mixed felsic volcanic - pelitic metamorphic source, and abundant carbonate in the matrix. It contains elongate concretions of pyrite and minor chalcopyrite that have grown in the sample broadly parallel to the sedimentary layering.

HAND SPECIMEN: This is a weakly-laminated fine-grained grey siltstone with an irregular centimeter-sized pyritic concretion that cross-cuts the layering.

THIN SECTION DESCRIPTION:

This sample is a poorly laminated, fairly well-sorted siltstone composed of angular quartz grains. Most are probably of felsic volcanic derivation, as crystal faces are occasionally preserved, and rounded melt inclusions are also noted. However, many grains are multicrystalline strained quartz with intimately intergrown grain boundaries and trains of tiny inclusions or bubbles. These are probably derived from pelitic metamorphics or quartz veins. Extremely fine-grained chert fragments are also not uncommon. Sparse detrital albite grains are probably felsic volcanic derived. A notable feature of this sample is the relatively abundant large zircon crystals; these are usually euhedral, and often occur in concentrations along with FeTi oxides in heavy mineral layers.

The matrix of this sample is volumetrically subordinate, although this may be due to pressure solution; calcite is abundant in the matrix, and streaks and trains of sericite pervade the rock.

Several concretions, slightly flattened along the layering, are seen in thin section to be composed of abundant small anhedral grains of pyrite intergrown with quartz and recrystallized curved grains of chlorite. Outlines of the pyrite-dominated concretions are irregular and crosscut the layering locally. I suggest that these concretions grew in their present sites in the rock, and that they do not represent disrupted syngenetic layers of sulphide.

In reflected light, the pyrite is seen to be free of inclusions, but partially altered to a secondary Fe oxide-hydroxide phase. Small amounts of chalcopyrite occur marginal to some pyrite grains, and as fracture fillings in the pyrite.

SAMPLE NUMBER: 70149

SUMMARY: This is a former flow banded glassy plagioclase-phyric dacite lava that has been brittle fractured and veined by quartz-sericite-chlorite veinlets.

HAND SPECIMEN: This is a dark brown, highly fractured very fine-grained tuff (?) with disrupted mm-scale layering, and chlorite and quartz veins mainly less than 1mm thick.

THIN SECTION DESCRIPTION:

Thin section examination shows that this sample is a very fractured formerly glassy plagioclase-phyric dacitic lava. The rock contains around 10 modal% of albitized plagioclase phenocrysts. These are less than 0.5mm long, euhedral elongate to blocky prisms showing a general flow alignment of their long axes. They are embedded in a pale brown vitrophyric groundmass that consists of tiny aligned plagioclase microlites in a devitrified glass groundmass. The groundmass shows flow banding that is reflected in the variable devitrification textures of the formerly largely glassy groundmass. Some small angular fragments of identical lithology are embedded in the groundmass, and may represent quenched flowtop crust incorporated into the flow during convective overturn. A few former mafic crystal sites are now composed of bright green chlorite, quartz and muscovite flakes, and small microphenocrysts of FeTi oxides are not uncommon.

The sample is transected by several types of veins and replacement features. Most abundant are areas in which the devitrified glassy groundmass of the sample is totally replaced by an exceptionally fine-grained quartz intergrowth that occasionally grades into coarser areas. This light grey cherty material contains common perfect rhombs of calcite, many of which are altered to a limonitic material, or else have been plucked from the section during sample preparation. Core regions of these areas are generally composed of a relatively coarse-grained meandering quartz veinlet, in which quartz is often intergrown with muscovite (coarse sericite?) flakes. Other veinlets are partially or totally composed of green chlorite and minor quartz.

This rock was a flow-banded glassy dacitic lava that has ben brittle-fractured and laced by quartz-sericite-chlorite veinlets.

SAMPLE NUMBER: 67823

SUMMARY: This is a incipiently-cleaved laminated carbonaceous shaley siltstone with a high pyrite concentration; it is cut by quartz-carbonate veinlets that contain a small amount of galena and chalcopyrite.

HAND SPECIMEN: This is a black laminated shale with grey 1-3mm thick silty laminations and a few tiny subspherical pyrite concretions.

THIN SECTION DESCRIPTION:

The dark shaley layers of this sample are composed dominantly of tiny angular grains of detrital quartz and flakes of detrital muscovite that show pronounced alignment in the bedding. These are set in an irresolvable dark groundmass that may contain a high carbon content. The coarser layers are composed of essentially the same detrital components, with less of the carbonaceous matrix that renders the bulk of the rock almost black. The coarser sandy-silt layers are the site of calcite nucleation and grain growth; many calcite crystals growing in these layers are almost euhedral rhombs to around 0.2mm across. The detrital assemblage for this sample clearly indicates derivation from pelitic Precambrian metamorphics.

An incipient cleavage cuts the bedding at a high angle, and is marked by crenulation of mica flaskes, concentration of carbonaceous material along cleavage planes, and regular step-like offsets of the tops and bases of sandy lamellae.

In reflected light, the rock is seen to be pervaded by evenly distributed tiny pyrite and magnetite grains; the former are mainly amoeboid or euhedral, and appear to have grown in situ. A single narrow quartz-calcite veinlet contains a small concentration of galena and chalcopyrite for which it is not possible to determine their paragenetic sequence.

SAMPLE NUMBER: 70189

SUMMARY: This is a former intrusive plagioclase-phyric dacite with relatively intense sericite-calcite alteration due to local hydrothermal activity.

HAND SPECIMEN: This is a light grey fine-grained andesite (?) mottled by veinlets of quartz-sericite recrystallization giving the rock an autobrecciated appearance.

THIN SECTION DESCRIPTION:

This is a relatively fine-grained holocrystalline mafic crystal-poor subvolcanic dyke or sill. It contains a few modal % of 1-2mm long feldspar phenocrysts that have been totally sericitized, set in a feldspathic groundmass composed of interlocking blocky laths of partially sericitized albite and interstitial quartz and possibly Kspar. The only mafic phase in the sample is dispersed tiny grains and a few larger microphenocrysts of altered FeTi oxide.

Besides the abundant sericitization of this sample, and the common narrow sericite veinlets, the sample is riddled with small subhedral to well-formed rhombs of calcite. The amount of alteration of this sample is notably more intense that in the regionally altered samples described above, and must be attributable to local hydrothermal alteration. The sample was probably dacitic in composition, and texturally is clearly subvolcanic/intrusive in origin.

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SAMPLE NUMBER: 70190

SUMMARY: This is a relatively fine-grained intrusive plagioclase-phyric dacite with less hydrothermal alteration than 70189, but otherwise very similar to that sample.

HAND SPECIMEN: This is a relatively fresh fine-grained grey dacitic lava or shallow intrusive with sparse plagioclase phenocrysts.

THIN SECTION DESCRIPTION:

This sample is very similar to the previous one (70189) in most respects, except for the following.

1. 70190 has slightly more albite pehnccrysts than 70189, and these are less sericitized than in 70189.
2. the groundmass of this sample is slightly finer-grained than 70189, suggesting that this sample came from closer to the margin of the intrusive body from which it was sampled.
3. this sample is notably less sericitized and carbonated than 702189, indicating less hydrothermal alteration.
4. this sample contains not uncommon pale green chlorite as patches and streaks in the matrix;

This sample is almost certainly from the same intrusive unit as 70189, although the finer grainsize suggests that it comes from closer to the margin of the intrusion (dyke or plug?).

SAMPLE NUMBER: 70191

SUMMARY: This is an epiclastic sandstone derived from a felsic volcanic source; it contains a strongly sericite-carbonate -altered formerly vitric ash matrix.

HAND SPECIMEN: This is a pale grey green structureless epiclastic sediment or crystal tuff with some calcite veining.

THIN SECTION DESCRIPTION:

In thin section, this sample is clearly an epiclastic sediment composed largely of 0.1 - 1mm sized detrital grains of feldspar and quartz. The feldspar grains are angular subhedral or euhedral grains that have not travelled very far from their source, and are slightly sericitized albite. Quartz grains are angular to subrounded, and are almost all derived from a felsic volcanic source; many contain small round, chloritized melt inclusions. Lithic fragments form only a small percentage (<5 modal%) of the detrital fraction, and are mainly formerly glassy to vitrphyric felsic lava, now composed of mosaic intergrowths of quartz and albite, sometimes with abudant tiny albite leths in the devitrified glassy groundmass. Occasional leucoxenized grains of former FeTi oxide are also not uncommon.

The matrix of this sample was probably a transported and reworked silty rhyolitic ash. It has recrystallized as a very fine-grained quartz-albite intergrowth and is extensively replaced by a felted mesh of sericite and calcite; the latter mineral also occurs as small patches and veinlets, as well as in several wider veins.

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SAMPLE NUMBER: 70192

SUMMARY: This is a sericite+calcite-altered quartz+feldspar -phyric (ash flow) crystal tuff.

HAND SPECIMEN: This is a mottled grey and cream coloured crystal tuff or coarse-grained epiclastic sandstone containing some crystal and lithic fragments to at least 6mm across.

THIN SECTION DESCRIPTION:

In thin section, this sample is seen to be a felsic crystal tuff containing quite large (to 3mm across) rounded and embayed quartz phenocrysts that often contain melt inclusions, and are quite fractured. Somewhat more abundant, though not usually as coarse-grained, are sericitized subrounded euhedra of albite. The few lithic fragments in this section are devitrified vitrophyric rhyolitic lava fragments, very difficult to distinguish from the groundmass of this sample.

The groundmass of this rock is a variably devitrified and recrystallized very fine-grained quartz-albite intergrowth. It is locally pervaded by streaky sericite and overprinted by abundant tiny calcite rhombs. Calcite veinlets are common in this sample.

This rock was a fluidal rhyolitic quartz-feldspar-phyric crystal tuff, probably an ashflow. It is unlike the previous sample (70191) in that it does not appear to have been reworked, although it could be derived from an identical rhyolitic magma.

SAMPLE NUMBER: 70185, 70186, 70187, 70188

SUMMARY: These samples are all former dioritic or monzonitic shallow intrusive holocrystalline rocks that have suffered probably high-temperature autobrecciation and fluidization-granulation. Two samples have chlorite-dominant alteration assemblages (70185 and 70187) and the other two (70186, 70188) have sericite-carbonate alteration assemblages

HAND SPECIMEN:

70185: dark brown, fractured even-grained holocrystalline diorite
70186: lighter red-cream holocrystalline diorite with pronounced autobrecciated texture, with fragments up to 2cm across, and rusty calcite-siderite(?)-rich matrix.
70187: massive grey feldspar-phyric fine-grained holocrystalline intrusive andesite.
70188; Brown-cream strongly calcite-sericite altered feldspar-phyric fine-grained diorite, possibly autobrecciated on a fine-scale.

THIN SECTION DESCRIPTION:

I have no doubt that these four samples come from the same body of rock. They are all feldspar-phyric dioritic rocks that have been strongly but variably autobrecciated at high temperature, and had a strong alteration overprint superimposed on the autobrecciation. The rocks contain around 10-20 modal% of quite large feldspar phenocrysts up to about 3mm long, but averaging much less, probably around 0.5 - 1mm long. The feldspar is now albite, although it is frequently alterd partially or completely to sericite. Most feldspar crystals are blocky subhedra and these often occur gathered together and intergrown in multicrystal clots. Where it is least disturbed by granulation, the groundmass of these rocks was a holocrystalline intergrowth of albitized, plagioclase laths and minor interstitial quartz and Kspar. If a mafic silicate phase originally coexisted with this groundmass assemblage, it has been obliterated by subsequent alteration. Tiny grains of altered FeTi oxide occur intergrown with matrix quartz and albite.

A most important and distinguishing feature of all four samples is the unusual autobrecciation noted in hand specimen (especially 70186) and evident in thin section as diffuse very fine-grained, rather dark coloured regions. These are composed of a microcrystalline quartz-albite-Kspar(?) intergrowth in which are embedded broken and granulated crystals of quartz and dominantly albite. These zones of granulation occur in branching diffuse networks through the rocks, and appear to be zones in which the holocrystalline diorites/andesites were cracked, crushed and partially fluidized and recrystallized, possibly due to the action of

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superheated water jetting through the cooling, shrinking rock mass.

Two alteration assemblages are present in these four rocks. The two darker coloured samples (70185 and 70187) contain abundant chlorite, both scattered through the granulated matrix, and also interstitially within less granulated, more pristine-textured fragments. In both samples with dominant chlorite as the alteration phase, calcite and sericite are scarce. Lighter coloured samples 70186 and 70188, in contrast, contain a strong calcite-sericite alteration assemblage. Calcite occurs as brownish veinlets and patches throughout the rock, whereas sericite is less abundant but nevertheless fairly common as a very fine-grained alteration phase throughout the groundmass and granulated areas.

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APPENDIX 5

GEOPHYSICAL INTERPRETATION

LEAMAN GEOPHYSICS
Survey Review, Specification, Reduction, Interpretation
Gravity, Magnetic and Seismic Methods
Structure and Prospect Evaluation

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REGIONAL INTERPRETATION
GEOPHYSICAL DATA
EL 96/87 PRESTON

for
GEOPEKO

by
Dr. D.E. Leaman

March 1990

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SUMMARY

A preliminary review of regional geophysical data in the Preston region of North west Tasmania has revealed a pattern of striking and anomalous apparent inconsistency between the data sets inspected and the surface geology as presently understood.

Gravity, aeromagnetic and radiometric data have been examined.

Magnetic data imply either the presence of major discontinuities affecting Cambrian rocks or variations in lithologies which have been unmapped or unrecognised. It is clear that the exposed Cambrian rocks are more variable than their descriptions would imply and that some other magnetic sources are disguised within them. Tertiary materials do not obscure the issues for much of the area and the deeper source responses can be recognised through most basalt source patterns.

Radiometric data have also proven selective and have separated some members of the Cambrian sequence. Variations in this data appear to be related to certain acid-intermediate igneous rocks but either the descriptions of these are inconsistent or the properties are variable since there is limited coherence to the correlations.

The gravity data, poorest in coverage and quality, provide an unambiguous definition of the major structure in the Nietta area but present a field distribution which conflicts with many elements of the magnetic data. The data also provide evidence for significant volumes of non siliceous or felsic, but non mafic, materials at shallow depth.

Only two ways have been found to resolve the geophysical character which is consistent with current geological mapping and knowledge of rock distribution. Either large slab-like bodies of granodiorite-diorite which have now been folded and relatively thickened in some fold cores are present, or there are a number of relatively minor and highly variable intrusives with compositions ranging from highly siliceous to dioritic. The former might imply Devonian intrusives, the latter Cambrian.

Although more work is necessary to firm any conclusion the variability in implied properties and the volume of material indicates that these are Cambrian intrusives.

No evidence has been found to support any concept of massive detachment or structural concealment in this area.

Known mineralisation is relatively minor and can be associated with the stronger radiometric responses and the steepest gravity gradients above the edge of the implied intrusives. If this correlation and the nature of the igneous rocks is correct then parts of this area may carry copper-gold rather than large base metal sulphide deposits. The overall prospectivity may be down rated if the presence of large granodioritic bodies or multiple and small Cambrian masses can be confirmed.

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INTRODUCTION

EL 96/87, Preston, is located in Northwest Tasmania (Figure 1) midway between exposures of the Housetop, Dolcoath and "Beulah" Granites (see Leaman & Richardson, 1989a; Collins and Williams, 1986).

Much of the area is covered by Tertiary sedimentary rocks and basalt and Quaternary talus and screes. Substantial exposures of Cambrian and Ordovician rocks occur in the southern part of the EL, especially south of 5425 000 mN, and it is this portion of the licence which is discussed in this report.

Geological information on the area has been compiled by I. Mathison of Geopeko and this is used as a basemap for most diagrams. This compilation is a revised version of mapping by Jennings et al (1959), Baillie et al (1986) and Bamford and Green (1988). Revisions of interest include inclusion of quartz porphyry (presumed Cambrian) in two areas - near Castra and Crosby Creek. K. Virgoe (Geopeko, pers. comm.) indicated to me that other igneous rocks of intermediate composition, including monzonite, diorite and andesite, may be more prevalent than indicated on maps, especially in the western half of the area reviewed.
The general mix of Cambrian lithologies and some mineralisation suggest a potentially prospective area.

Detailed review of available geophysical data was requested. However, due to problems of timing, data availability and the variable correlations evident between known geology and the data sets suggested that a preliminary review might prove more profitable in order to suggest locations of concealed structures or rock masses, account for the few known mineralised sites and evaluate whether detailed examination for alteration or mineralisation signatures is feasible, or justified, with extant data in this area.

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GEOPHYSICAL DATA

Much geophysical data is available for the Preston area. Pre 1981 acquisitions and releases were listed by Leaman (1980). Unfortunately most of this material is poorly presented and not well specified or corrected. A comprehensive aeromagnetic survey by the Shell Company in 1981 has also not been used - at this stage. The many reports supplied to the Mines Department which refer to this survey and anomalies observed do not provide good quality compilations of the required area. An example is shown in Figure 2. Although digital data tapes were made available to Geopeko for detailed study it was felt that a more preliminary study of the implications of all data sets was advisable first. Consequently more accessible data has been used first.

The magnetic and radiometric data used were acquired by the Mines Department as part of its Mount Read Volcanics Project in 1985 (Bishop, 1987). The nominal specifications for this survey were a N-S line coverage with spacing of about 500 m, sample interval of about 40 m and a terrain clearance of 150 m. The contoured presentations of residual magnetic field and total count radiometrics have been used for this review. Raw data have not been used and the data have not been corrected for deficiencies in specifications, especially variations in terrain clearance.

The gravity data used have been extracted from the TASGRAV data base (Richardson & Leaman, 1987) essentially in the forms available to Leaman & Richardson (1989a, b). The data coverage for the Preston area is relatively poor and some large gaps exist. The station spacing varies from 1 to 3 km.

Figures 3, 4 and 5 present aeromagnetic, radiometric and gravity data overprinted on the Geopeko geological basemap for the southern part of the EL. The symbols are most clearly read in Figure 5.

THE OBSERVED DATA - COMMENTS

The data presented in Figures 3 to 5 reveal several anomalous and apparently inconsistent facets between the diverse data sets and the geophysical data and the base map. A more extreme and more regional view of the aeromagnetic data is provided by Figure 2 due to coarser contour intervals and smaller scale.

The MAGNETIC FIELD displays a number of high amplitude responses; notably south of Watts Lookout, near the Leven River (416 000 mE, 5422 000 mN) and south of Warringa (420, 424). Parts of these responses can be ascribed to Tertiary basalt. The regional influence of basalt is best appreciated from the Shell compilation (Figure 2) where most of the obvious and large scale effects are related to basalt. Closer examination in the Castra

and Nietta area suggests that this is not as significant as implied by the lower level Shell survey. Compare Figures 2 and 3.
The disposition of anomalies W and SE of Watts LO and east of Mt Minnie shows that the source of most variation lies within, or beneath, the Cambro-Ordovician rocks exposed. In these areas the basalt, if present, contributes no more than 25% of any combined effect observed usually as relatively high frequency noise or localised features.

The large responses, trending E-W, from 412 to 419 000 mE at 5422 000 mN, and 420 to 426 000 mE at 5419 000 mN, can be associated with Palaeozoic rocks. These features have asymmetric anomaly forms and distinct boundaries. Those boundaries correlate with some topographic features or stream segments but no subdivisions mapped within the presumed dominantly felsic rocks of the south of the EL can be correlated. The orientation of magnetic features, as summarised in Figure 6, often crosses the grain of the geology as mapped.

The two primary magnetic features (defined above) are offset and a marked discontinuity can be observed in the magnetic field near 420 000 mE. Evidence of a nearly N-S break can be recognised within the basalt responses W of Warringa (Figure 2). No mapped features reflect this change.

These observations suggest that the near surface geology is not representative of the section as a whole and that some important units and structures are either not exposed or have not been mapped. While the latter option is possible it is less likely than the former and there are only two ways to produce such a conclusion.
Either the exposed near surface geology has been detached, perhaps in a series of thrust sheets, or the anomalies are due to older units within fold cores or large igneous bodies and their marginal effects.

The few prospects known to me, Castra (422 800, 5423 000), Crosby Creek (420 600, 5421 000) and Preston Silver (422 200, 5424 000) have been related to magnetic field character. The nature of the data available precludes review of any subtle links or relationships, especially in absence of any corrections for clearance variations during acquisition, but no obvious variations or indications of gross alteration effects is evident in association with either Crosby Creek or Preston Silver although some response may occur at Castra. This latter variation may reflect deeper sources and lithological changes not yet fully defined.

The magnetic data do not, in general, correlate well with the indicated geology.

Correlation between basemap geology and RADIOMETRICS is also erratic and inconsistent. None of the major trends or faults identified in mapping are evident with the possible exception of

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a fault segment NW of Watts LO. Nor is there any systematic correlation between counts and basalt-covered areas. Marked differences may be observed between the responses from the Warringa, Nietta, Mt Minnie and Watts LO vicinity basalts. The last three zones present "normal" responses.
It may be noted that the magnetic response for the Warringa basalts is also exceptional.

Responses from Cambrian rocks are also variable and there is often little distinction between exposed Cambrian and Ordovician units. The array of correlations suggests that the counts reflect more than surface disposition of elements.

The most obvious radiometric anomalies occur in the centre of the area (near 420, 421) and SW of Mt Minnie where Cambrian rocks including quartz porphyries are exposed. There is no direct correlation between response and mapped rock type and the breadth of effect suggests that the source is more general than any surface exposure. In the central and Mt Minnie zones the anomalies are limited by abrupt gradients which are apparently not related to any flight or terrain effect.
A comparable, but less obvious, response may be noted west of the Leven River at about 5422 000 mN. Raised count levels in this zone may be correlated with the magnetic response; both are terminated at 5420 500 mN in the south although there is some divergence in source termination to the north. No such approximate correlation applies to the eastern Mt Minnie or central zones.

The largest responses are directly associated with mapped quartz porphyry in the centre and east of the area and by implication it could be suggested that all three zones of raised response reflect presence of comparable or related units. If this is assumed then the lack of systematic magnetic response is difficult to explain. The reduction in count level and increase in magnetic response westward must mean a gross change in composition of the source.
The occurrence of other monzonitic or dioritic rocks west and south west of the Crosby Creek prospect, quartz porphyry, and radiometric anomaly (K. Virgoe, pers. comm.) and the change in radiometric character certainly indicates that variability in lithology and lack of mapping definition limit correlations and evaluation.

The GRAVITY data set (Figure 5) provides a simpler view of the region. A major NW-SE trend is evident which correlates with mapped faulting but in all other respects this presentation is as unexpected and inconsistent as the other data sets. There is no obvious reason why the field should be high NW of Nietta, of low south of Mt Minnie and along the Leven River. While the detailed character of the field might be transformed by infill coverage the general variations cannot be dismissed. It will be noted that there are no systematic responses from blocks of any rock group. The Tertiary materials do not contribute in any significant way to the map shown in Figure 5.

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This means that the gravity field reflects concealed structures or sources. Most secondary anomalies are transverse to the exposed structural grain. Note the anomaly trend along the Leven River; other data sets trend E-W and the geology ESE.

It may be observed that the varied occurrences of quartz porphyries and sundry other acid-intermediate materials occur where the Bouguer anomalies are lowest or on the gradients of such anomalies. The larger bodies certainly occur where values approach minima. The local negative anomaly along the Leven River at 416 000 mE, 5423 000 mN is exceptional as explained below. The more regional negative effects, although poorly defined, indicate the presence of large volumes of igneous rock. The normal density range for Cambrian rocks is relatively narrow and averages about 2.74 t/cu m although some andesitic or mafic members may exceed 2.80 t/cu m. Rocks of granodiorite-monzonite-diorite compositions have densities of 2.68 to 2.71 t/cu m. Thus it is possible to generate negative anomalies with such materials where these intrude felsic or other Cambrian materials. Ordovician rocks, with the exception of the Gordon Limestone, may also generate negative effects but in this area this correlation is only possible near 120, 423.

The above discussion suggests that the various anomalies presented are related to igneous rocks of moderate to large volume but of variable and somewhat erratic composition and properties. There is no systematic suggestion of structural detachment or direct correlation of normal stratigraphic or structural units systematically folded given the indications of exposed fold and fault systems.

The implications of previous regional study should also be considered.
Leaman & Richardson (1989a) defined a granite known as the Beulah Granite on the basis of variable and relatively subtle responses in the Preston - Beulah region of NW Tasmania. Granite (?) occurrences at Beulah were mapped by Jennings et al (1959) and considered Devonian in age. The composition was revised to granodiorite by Collins and Williams (1986). Leaman & Richardson (1989a) examined several regional profiles across this region and seven transect the area reviewed in this report (lines 2, 5, 8, 12, 18, 24 and 26). In every case there are negative gravity responses in association with either the Beulah occurrences or the mineralised sites of the area. Leaman & Richardson (1989a) were limited to regional study but considered that there must be a large but variable mass of possibly predominantly granodiorite composition in the region. They inferred that it might be Devonian and comparable with the intrusive of NE Tasmania and have a gold affinity. Magnetic data were not studied but in the region around Beulah it can be shown that the material must have a density of about 2.7 t/cu m and be variably but quite strongly magnetised; in part reversely magnetised. The average intensity of magnetisation is there some +/- 0.001 cgs or more than 300% greater than the uniform properties of the established Devonian granodiorites.

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The properties inferred for the Beulah Granite, at Beulah, are thus more consistent with the Cambrian granitoids.

If similar properties and variations could be established in the the Preston area then the nature and age of the intrusives might well be indicated; along with an assessment of prospectivity.

Leaman & Richardson (1989a) suggest that the granitoid is less than 2 km deep over a wide area near Preston.

INTERPRETATION

Quantitative interpretation of the data described has focussed on the issues raised in the above comments.

In particular

1. Can a single granitoid account for the anomalies observed? If so, what is its composition and properties? Are these consistent with Devonian or Cambrian granitoids?

2. Are multiple granitoids implied?

3. Can modelling exclude any structural detachment option?

4. Can any igneous or structural features be defined and related to mineralisation?

5. Do any inferred property variations limit further analysis of any data set?

6. Do any rock suites present anomalous behaviour?

Several profiles across the gravity and magnetic maps (Figures 3 and 5) were selected and modelled in order to assess the likely origin of the features and their sources. It is not possible to model the radiometric data.

Many of these profiles proved uninterpretable in the time allocated for this review and no discussion of them is offered here. Samples of profiles for which solutions were found are presented and these illustrate the options and problems presented for ALL profiles.

The magnetic data were sampled directly from the contour presentation (Figure 3) but the gravity data shown in Figure 5 were filtered using the MANTLE-88 procedure of Leaman & Richardson (1989b). This process provides true residuals. The residual anomalies have been interpreted using two dimensional methods. Such methods yield approximate results but, given the quality of the data base in this area, no more reliable approach is justified. Use of the residuals places considerable demands upon the interpreter, the geological data base and density

information. More positively, however, it restricts solution options.

Consider magnetic profile M2 (Figure 7).
From 416 000 mE, 418 000 mN to 419 000 mE, 425 000mN

The profile extends across the major magnetic anomaly traversed by the Leven Gorge and terminates in the basalt cap south of Warringa. The profile is representative of the western half of the area.
Exhaustive tests show that the profile character cannot be easily explained by simple source geometries such as fold cores, folded units, faulted folded units or anything comparable.
An important aspect of the evaluation is disguised by the curve fit parameters (upper right hand corner). Experience with this data set has shown that the base reference for the survey was about 100 to 130 nT offset from the IGRF function used to provide residual magnetic values for contouring. Thus the calculated values must exceed any observed values by this amount where a scalar shift of 2000 nT has been applied to the data to obtain wholly positive numbers. This value was removed for modelling purposes. When the curves fit with about 100 nT shift offset then feasible solutions have been obtained.
When the anomalies are considered with respect to this crucial condition it is found that the profile is difficult to match. Substantial negatively magnetised sources are required and these cannot be produced by overturning in this area. Sedimentary units and folding solutions can be excluded.
The source or sources must be igneous and variable.

The model shown in Figure 7 suggests that the source may take the form of a folded sheet of variable composition although many refinements are possible. The contrasts indicated are forced by observed gradients and are believable in terms of Cambrian intrusives and are associated with limited depth ranges. No deep or massive magnetic plutons are implied or feasible.
An alternative rendering of this solutions would be to describe the folded sheet as the thermally altered halo of a major but non magnetic pluton. This level of alteration could only be associated with a large Devonian pluton.
The gravity data have been examined in order to attempt a separation of these possibilities (below).

When the distribution of intermediate rocks and porphyry is related to the profile several other possibilities are suggested but these lithologies cannot directly explain the responses. All occurrences of the porphyry are essentially non magnetic (Figure 3). So is the monzonite. The source of magnetic anomalies is either within or below these intrusions.

The curve fit is imperfect reflecting an interim solution and multiple sources and properties. These problems are exacerbated in the eastern half of the area and have not been resolved. The modelling completed does suggest that contrasts are not related

to any exposed members of a stratigraphic sequence or any concealed members. The contrasts have limited source depth range and are quite high, consistent only with intermediate igneous or altered mafic rocks. There is no evidence, however, for any massive high contrast mafic accumulation.

Two gravity profiles have been included.

Profile gravity 1 (G1) (Figures 8, 9, 10).
From 5418 000 to 5425 000 mN at 416 000 mE.

Three possible solutions are presented.
Solution 1 (Figure 8) suggests that little of the geology is abnormal with respect to Cambrian bulk densities. The model considers the effect of the Dolcoath and Housetop Granites to south and west. The limit of the Dolcoath Granite is shown and represents the most extreme northward extension of the base of the pluton. The remainder of the form of this granite is indicated by Leaman & Richardson (1989a).
The Gordon Limestone near Loyetea accounts for most of the positive anomaly at the northern end of the profile and presumes that the limestone is up to 1000 m thick and partly dolomitic. The local negative anomaly where the Leven River emerges into its flood plain can be assigned either to a faulty terrain correction or the alluvial materials.
Figures 9 and 10 present alternative solutions.
Figure 9 shows that if the effect of the Dolcoath Granite is reduced, if say the northern wall of the pluton is 3 km further south than assumed in Figure 8, then very little material with density in excess of 2.74 t/cu m can be added to the folded sequence west of Crosby Creek or the Leven River unless an additional negative contrast is added. There is not much evidence for either but the mass balance which would be required is shown. In Figure 9 the negative component is associated with a slab of granodiorite. The northern limit of this mass cannot be north of 5421 000 mN - the position of the southern gradient of the principal magnetic anomaly. Were such a mass to extend further north there would be no way to balance the mass involved with the materials available due to the absence of mafic Cambrian rocks and the downfolded insertion of siliceous Ordovician rocks in the Heka-Loyetea region.
Note that such a large mass could generate a thermal skin effect in the roof rocks and is not immediately incompatible with the magnetic solution of Figure 7.
Nor is the solution in Figure 10 which couples the same form for the Dolcoath Granite used for Figure 9 with direct solutions presuming that the porphyry, monzonites and related rocks are the only sources. The solution depends on extension of the porphyries to the north west from Crosby Creek. The source shapes are meant only to indicate the volumes involved and may be varied substantially. This solution is not inconsistent with the magnetic solution of Figure 7 either.

Gravity profile 2 (G2) (Figures 11 and 12).
From 419 000 mE, 5417 000 mN to 427 000 mE, 5425 000 mN.

This profile samples the principal gravity gradient in the region. Contrasting solutions are offered.

In Figure 11 the profile is explained by a large folded segment of abnormally dense Cambrian material, andesite perhaps, and an extension of a granodiorite slab from the northeast. This slab must have more silicic protrusions or underlie older silicic rocks. Porphyries are exposed on this alignment. Tertiary and Ordovician rocks produce minor modifying effects and are not significant.
Figure 12 suggests an alternative mass balance excluding a slab of granodiorite - presumed Devonian. Any minor intrusive must be very siliceous but of limited volume. Such a rock mass would not be magnetic; the granodiorite would be, and would also produce a metamorphic halo effect. Consideration of the magnetic field in this area south of Mt Minnie indicates that the magnetic character expected in association with either granodiorite or alteration is not observed.
There is absolutely no suggestion of a large adamellitic or granitic pluton.

Can these conflicting models be unified? It is clear that more extensive magnetic modelling is necessary and that the gravity data base should be infilled in order to trace elements of each solution across the region. The geological map must also be upgraded.

However, gravity profile G2 (Figure 12) coupled with observations of the magnetic field suggests that a relatively small acid intrusion may account for the observations in the eastern half of the area. This body is not strongly magnetised but may be negatively magnetised. There is no evidence for the irregular magnetic field character associated with thermal metamorphism which supports the inference that the mass is limited. Radiometrics from the area SW of Mt Minnie supports this conclusion; elevated values are centred on the porphyry exposures but are limited to the general area of negative gravity anomaly.

The issues are not so clear cut in the western half of the area. The gravity anomaly near the Crosby Creek porphyry is more positive and it may be associated with more dioritic or andesitic material. Magnetic responses in this area are also quite different, of moderate contrast but variable sign. This material is also strongly radioactive.
West of the Leven River the preferred solution must be a group of variable but small intrusions of intermediate composition. A deep and large mass of granodiorite - presumed Devonian, would not be associated with a negative magnetic anomaly and would produce a uniform distribution of metamorphic halo anomalies. These would not be restricted to the steeply dipping north face as implied by Figure 9.

The present work cannot be considered definitive but the conclusions taken cumulatively with other work within the confines of the "Beulah Granite" of Leaman & Richardson (1989a) strongly suggests that this body is composed of a number of relatively small and quite variable bodies. Many are intermediate in composition.

The variability of the properties of this material is consistent with a Cambrian suite. The scale of the intrusions is also an order of magnitude smaller than equivalent Devonian intrusions. Thermal alteration is not significant.

PROSPECTIVITY AND MINERALISATION

Most known mineralisation can be associated with the more radioactive, siliceous materials of the eastern half of the area. All old prospects fall within the envelope of raised radiometric response and I suspect that more recent finds east of Crosby Creek do as well. This suggests that only the more acid, less magnetic and low density mini-plutons are significant terms of base metal and barytes mineralisation.

The more intermediate compositions implied for the western half of the area which lack strong radiometric responses may be associated with gold since there is some suggestion that this pattern may extend south to the Black Bluff region.

On the basis of this work it would appear that none of the known mineralisation in this area is definitely volcanogenic in origin since all sites could be associated with igneous intrusions. If these intrusions are, indeed, small then the prospectivity of the area is very limited. Other Cambrian intrusives have not produced large or economic deposits.

The trend summary (Figure 6) suggests that there is no coherent structural pattern within this region and that field character has been determined by the peculiarities of the sources rather than superimposed controls. No obvious primary controls of the location of known mineralisation are evident.

RECOMMENDATIONS

Little further work can be recommended unless some of the conclusions offered above can be proven to be suspect. Gold should certainly be part of all analyses.

Any further work, either in confirmation or definition of features, should also be based on structural analyses of corrected magnetic data coupled with an infill of the gravity

data base to a nominal 500 to 1000 m spacing. The individual intrusives or structures present can only be defined with this level of coverage. Such work should be supported by revision of the geological mapping and property sampling.

No detailed review of magnetic profiles for alteration or mineralisation responses is feasible in the absence of detailed understanding of properties and rock distribution due to the variability of concealed sources.

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507137



EL 96/87 PRESTON LOCATION

FIGURE 1

507138

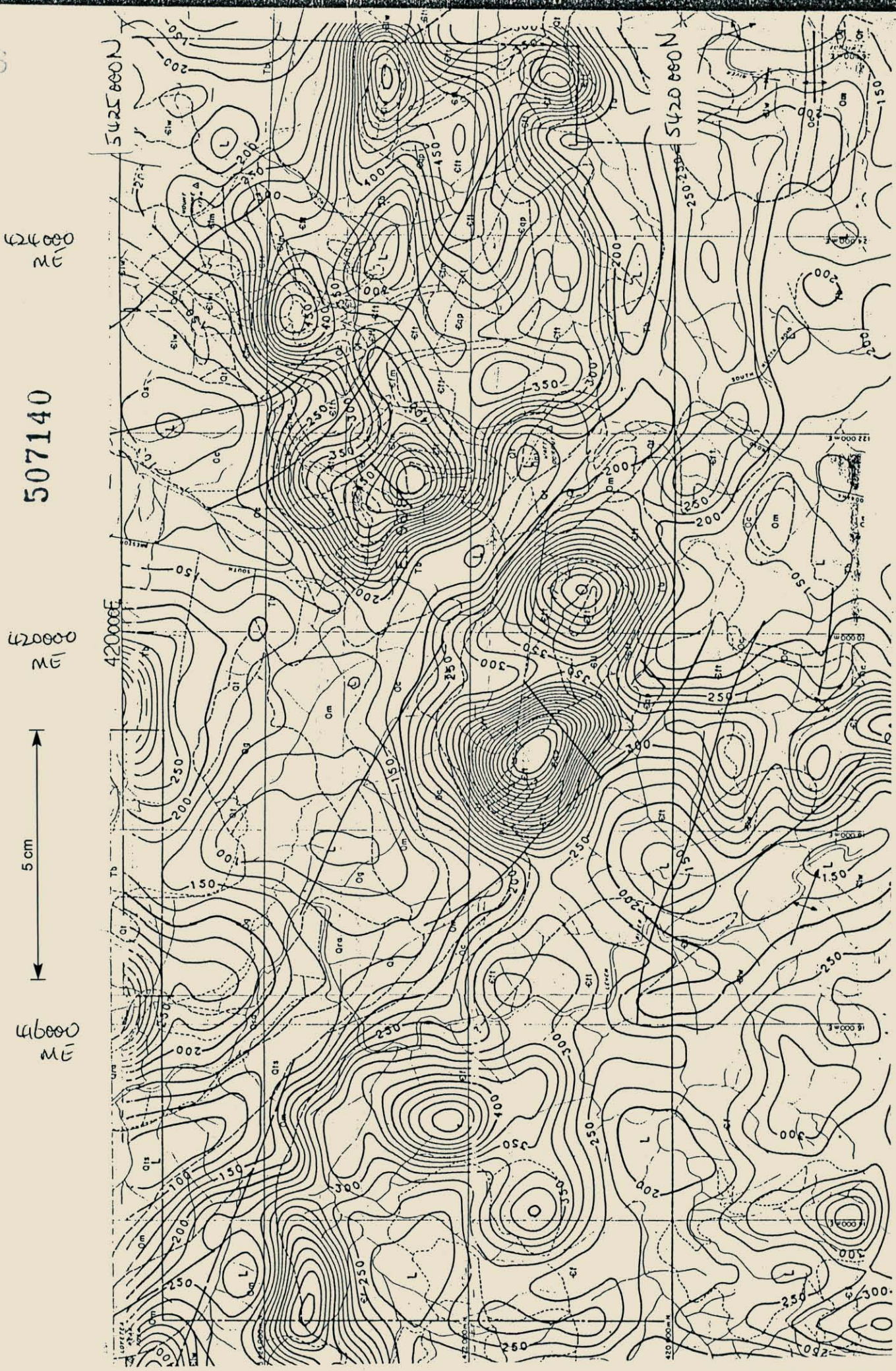
EL96/87 PRESTON AREA 1;63360 MAGNETIC FIELD COMPILATION
BY SHELL CO FIGURE 2

135

507139

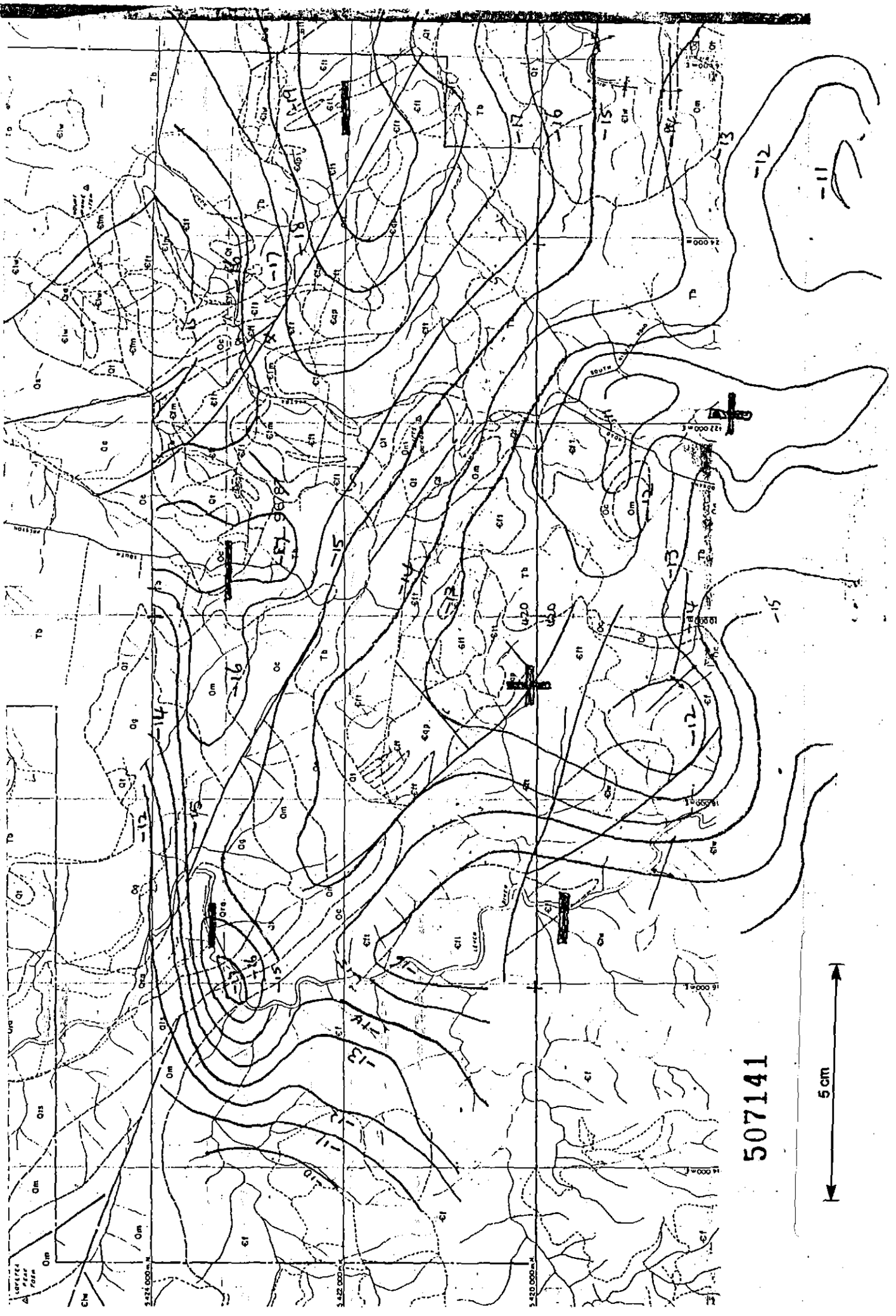
EL96/87 PRESTON 1:50000 PEKO GEOLOGY BASE AND TOTAL MAGNETIC FIELD

FIGURE 3



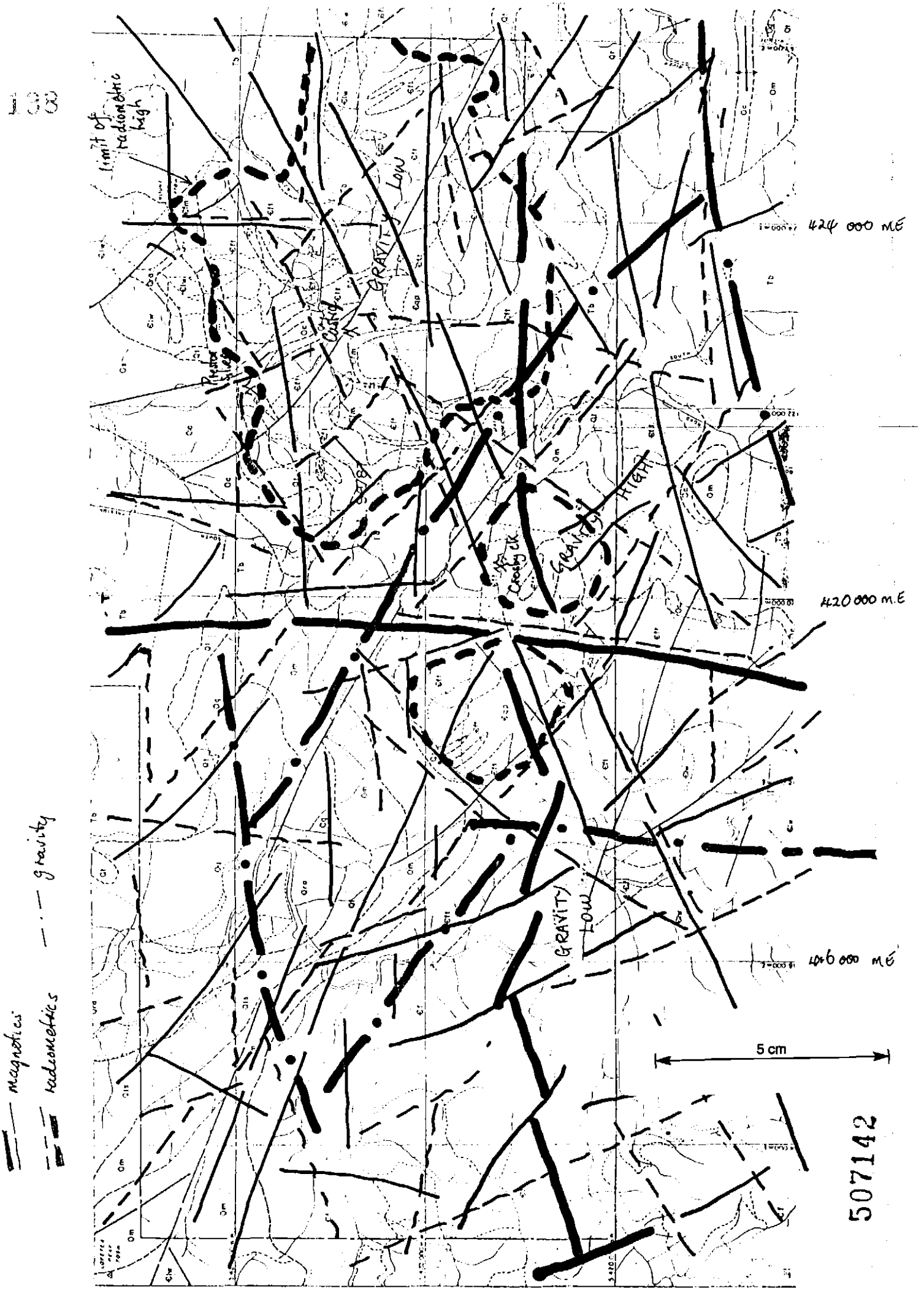
EL 96/87 PRESTON 1:50000 PEKO GEOLOGY BASE AND TOTAL COUNT RADIOMETRICS

FIGURE 4



EL 96/87 PRESTON 1:50000 PEKO GEOLOGY BASE AND BOUGUER ANOMALY (2.67)

FIGURE 5

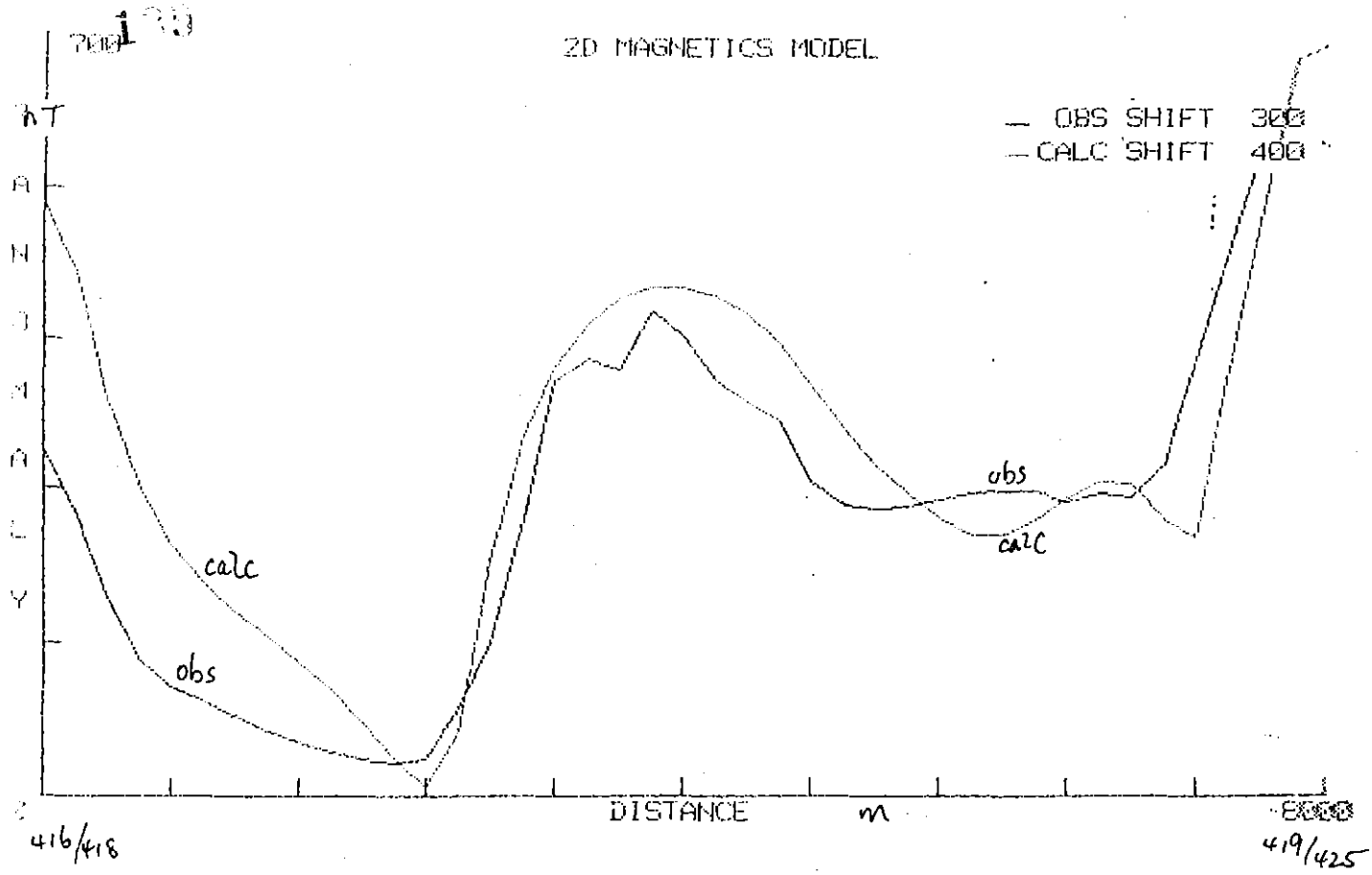


EL 96/87 PRESTON 1:50000 PEKO GEOLOGY BASE AND GEOPHYSICAL TRENDS INFERRED FROM DATA SETS FIGURE 6

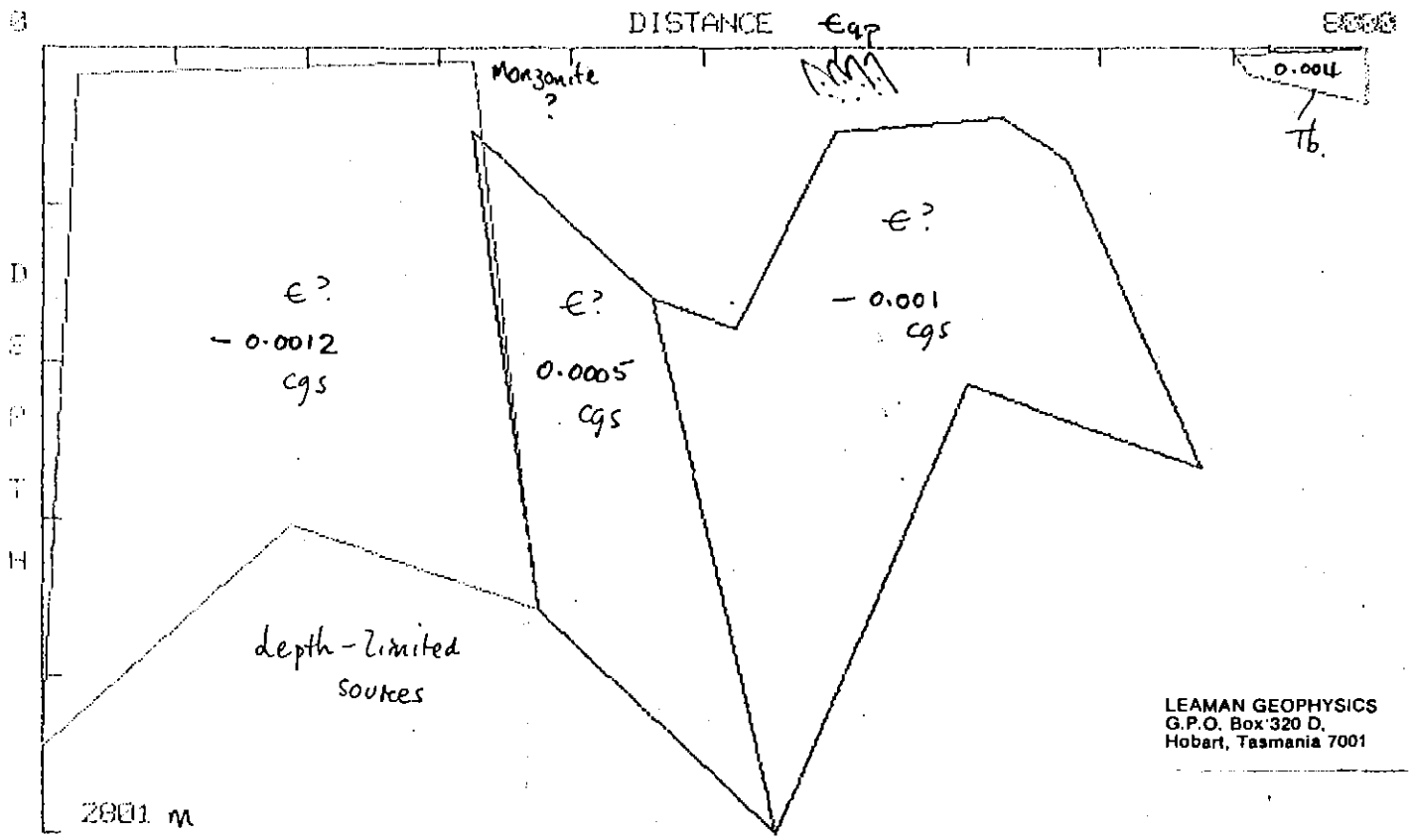
507142

LINE PARAMETERS - ORIGIN,LIMIT,INCR : 0 8000 200

507143



PRESTON LINE 2 416/418-419/425



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Hobart, Tasmania 7001

EL 96/87 PRESTON 2D MAGNETIC MODEL M2 FIGURE 7

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G.P.O. Box 320 D,
Hobart, Tasmania 7001

ORIGIN,LIMIT,INCR : 0 7500 500

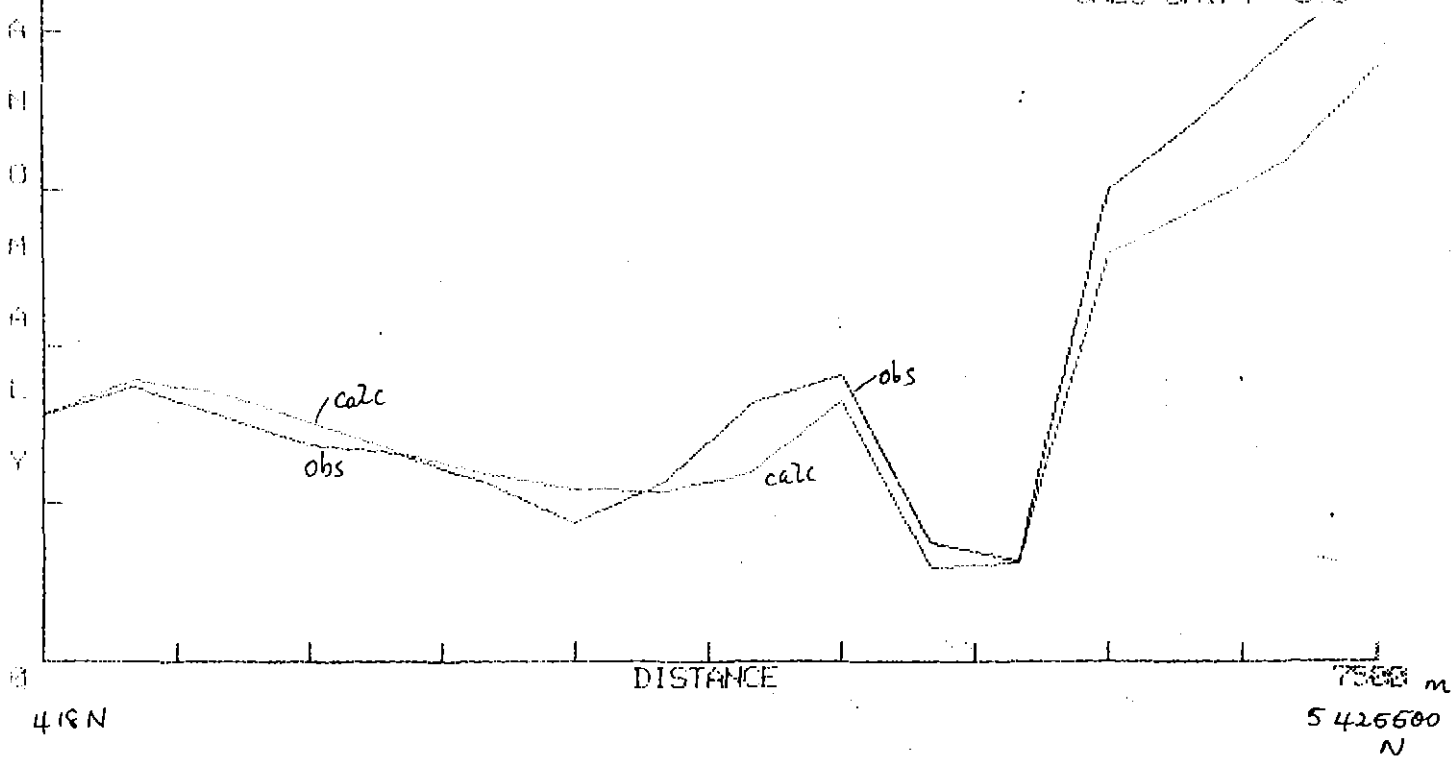
507144

120

2D GRAVITY MODEL

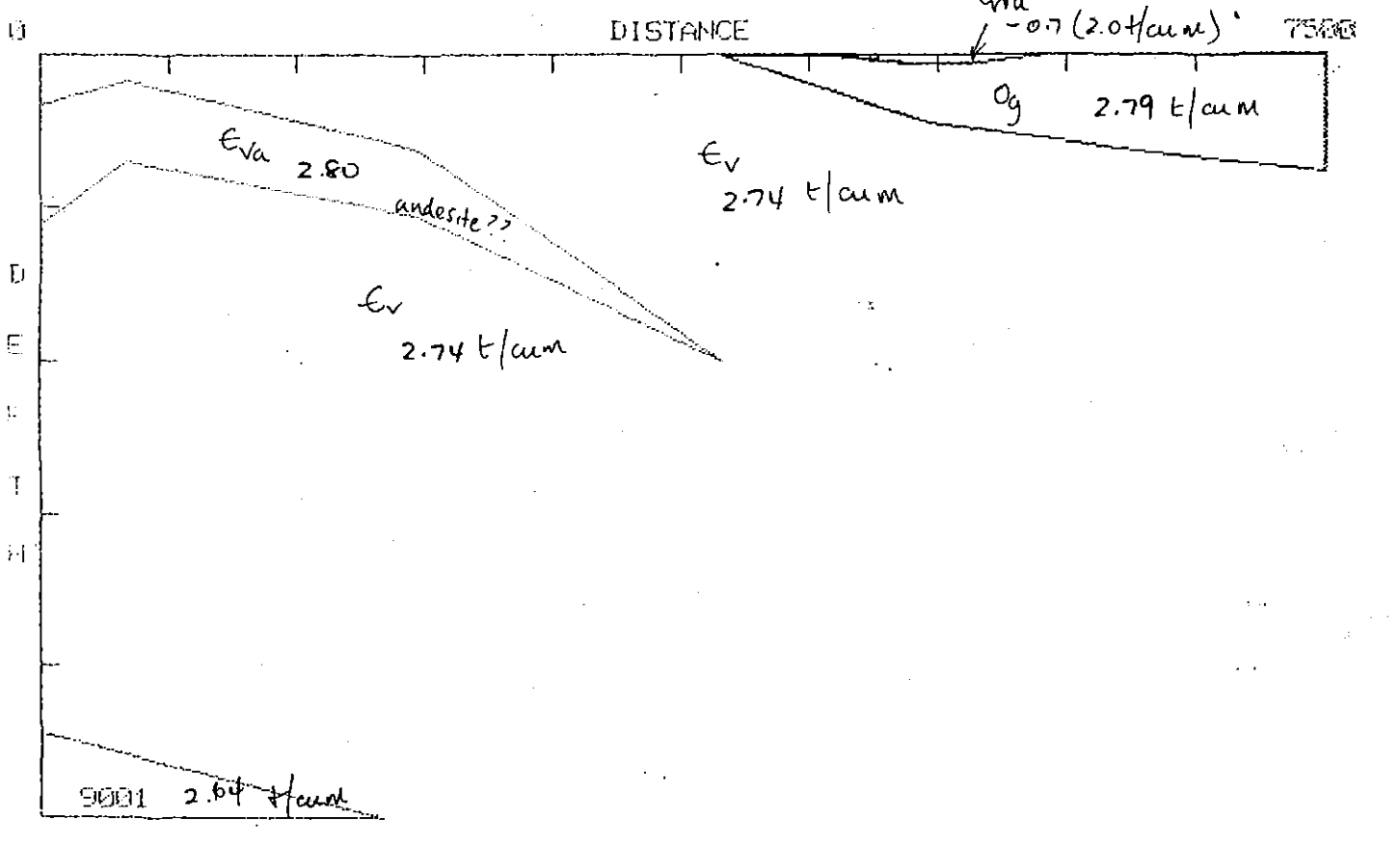
mGal

— OBS SHIFT 3
— CALC SHIFT 3.5



PRESTON LINE 1 416500 418-425500

@ 416500 mE

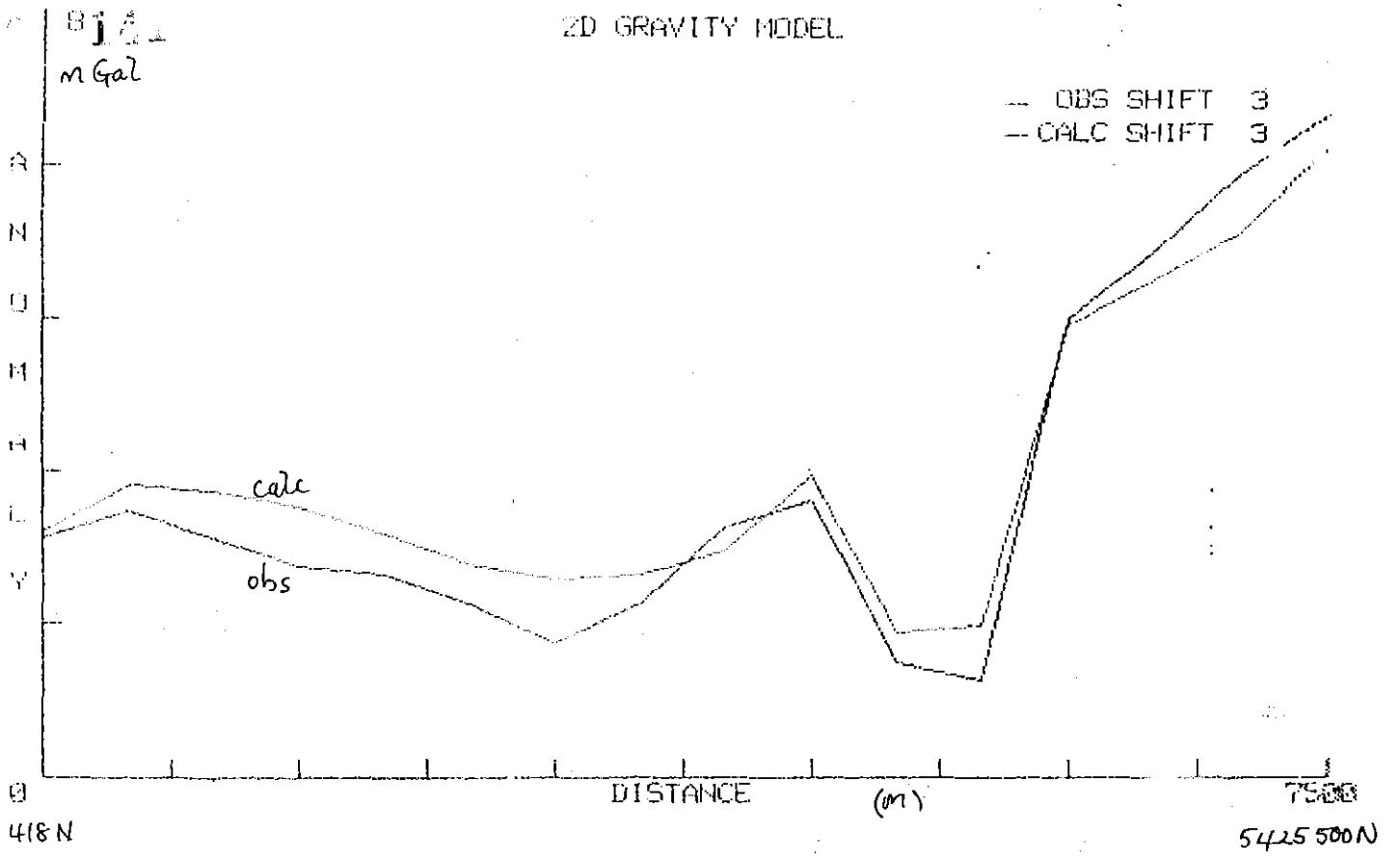


EL 96/87 PRESTON 2D GRAVITY MODEL G1 MODEL A FIGURE 8

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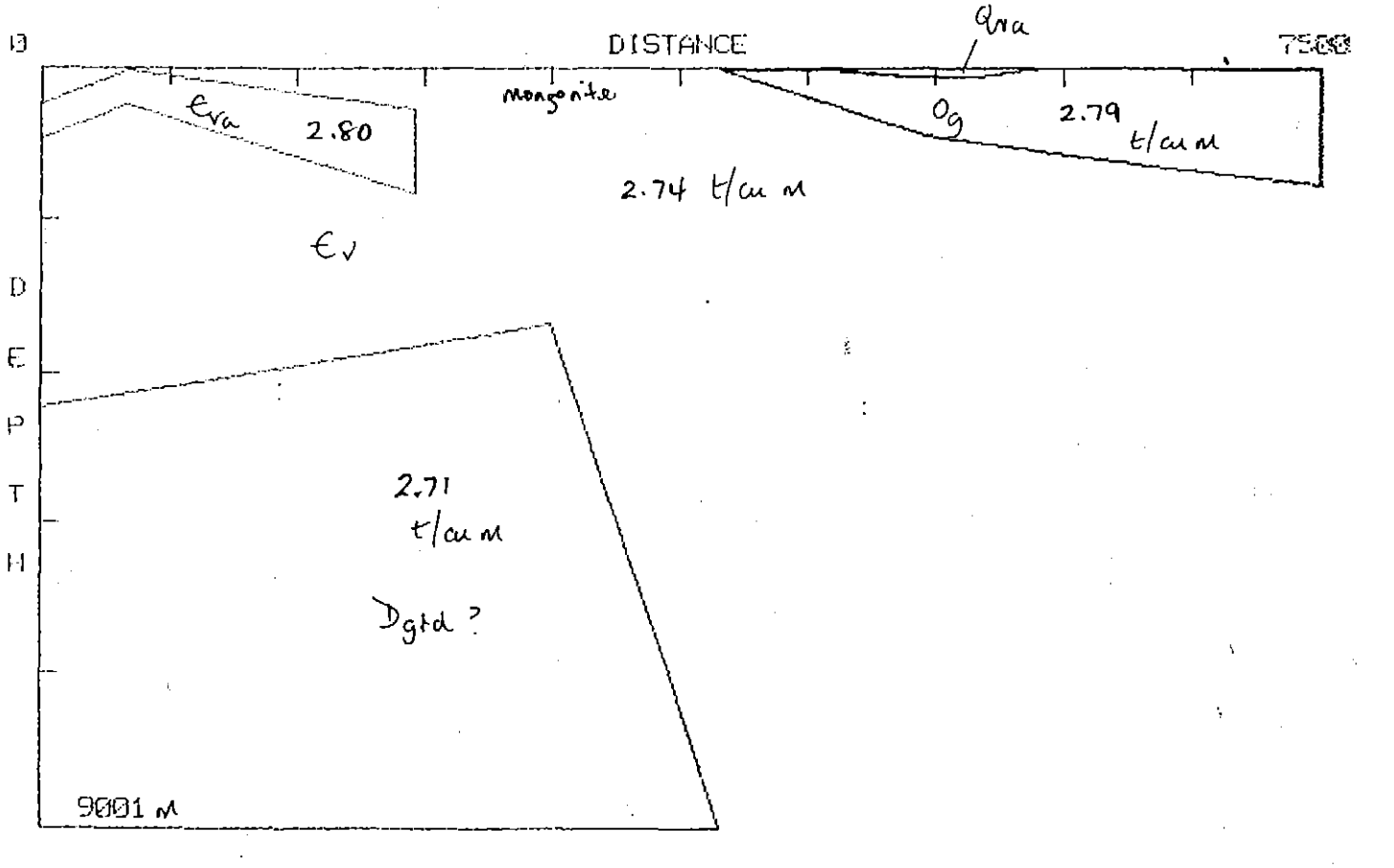
ORIGIN,LIMIT,INCR : 0 7500 500

507145



PRESTON LINE 1 416500 418-425500

@ 416500 mE



EL 96/87 PRESTON 2D GRAVITY MODEL G1 MODEL B FIGURE 9

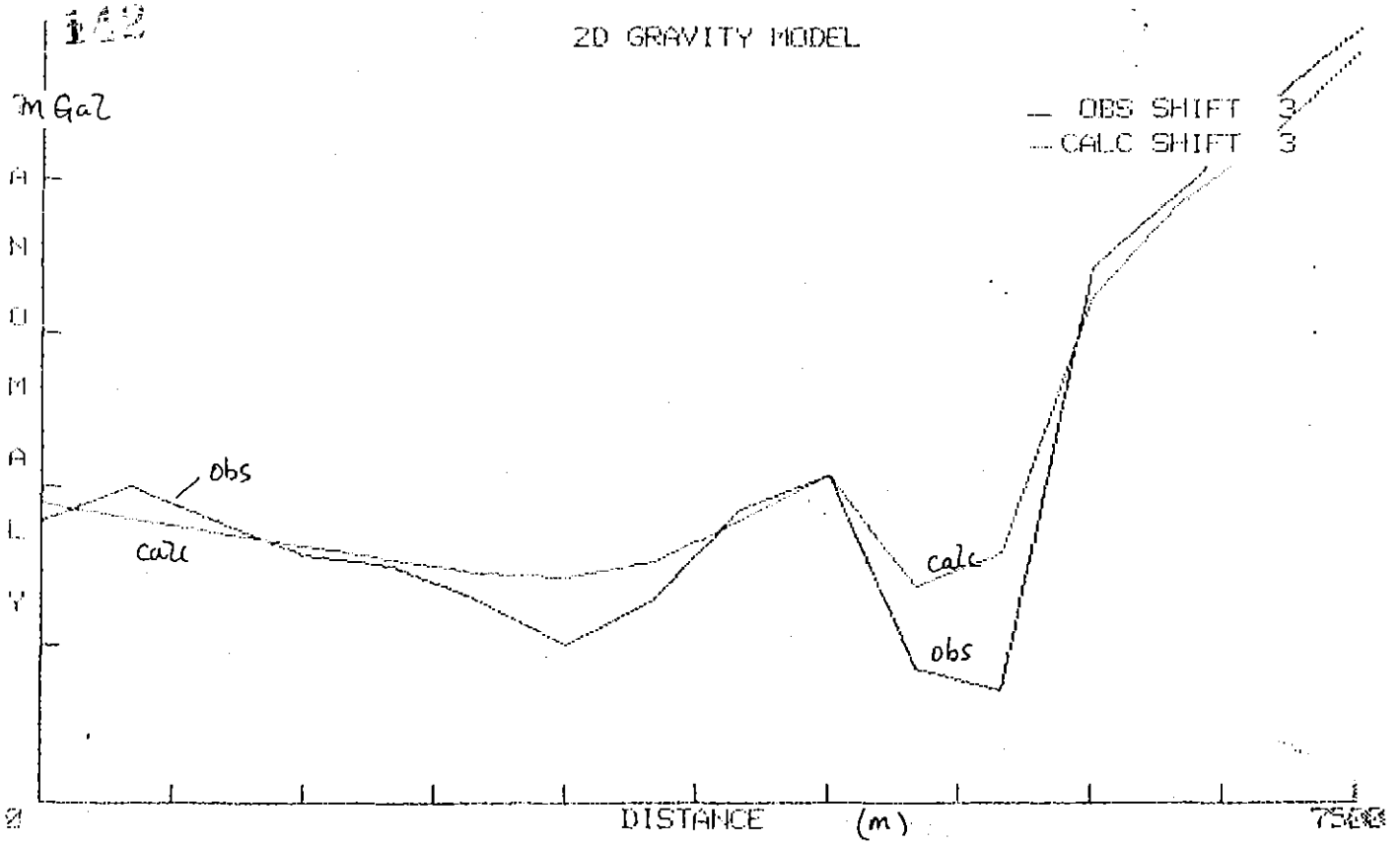
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G.P.O. Box 320 D,
Hobart, Tasmania 7001

ORIGIN,LIMIT,INCR : 0 7500 500

507140

1A2

2D GRAVITY MODEL

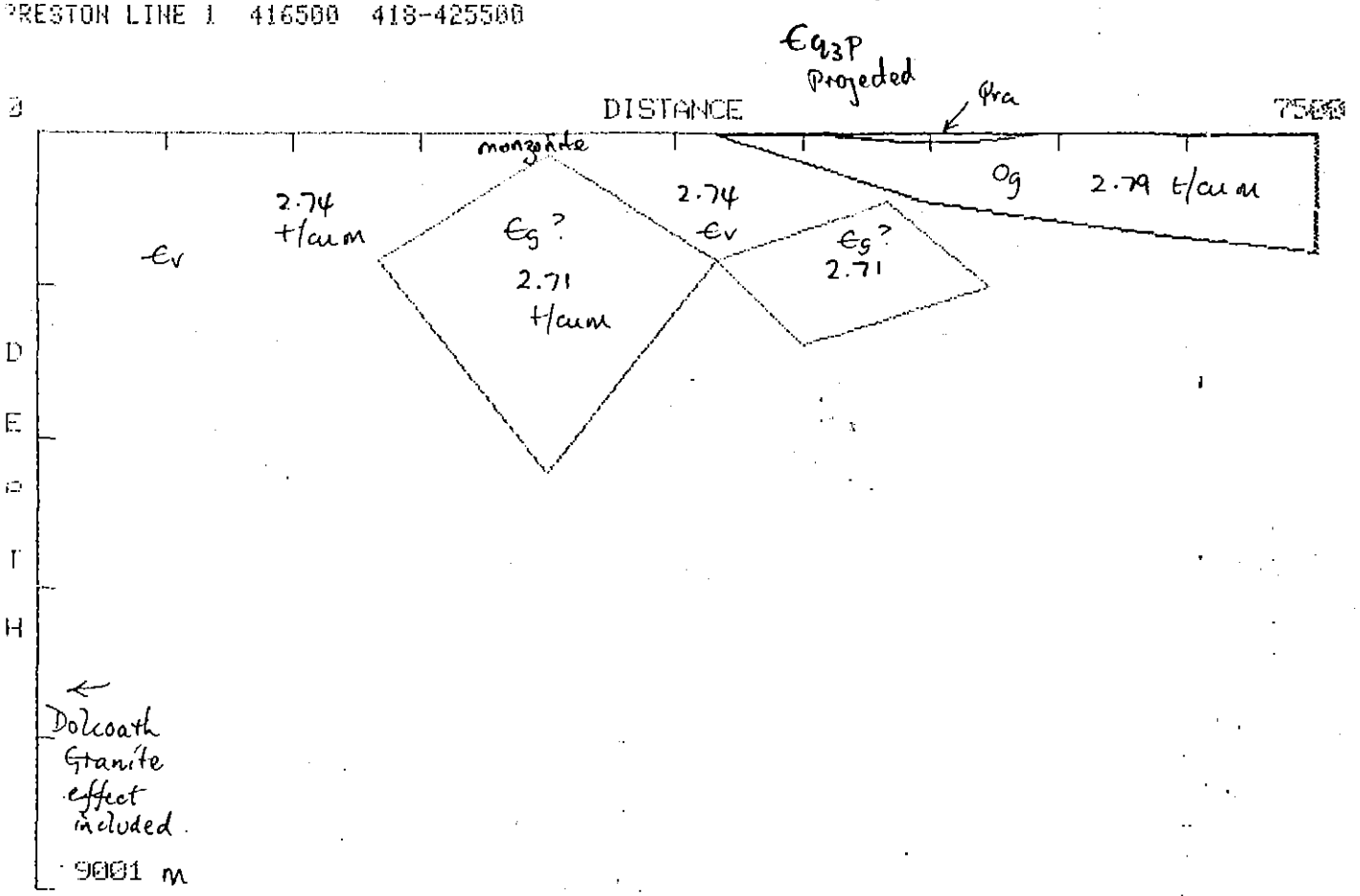


418 N

5425500 mN

(a) 416500mE

PRESTON LINE 1 416500 418-425500

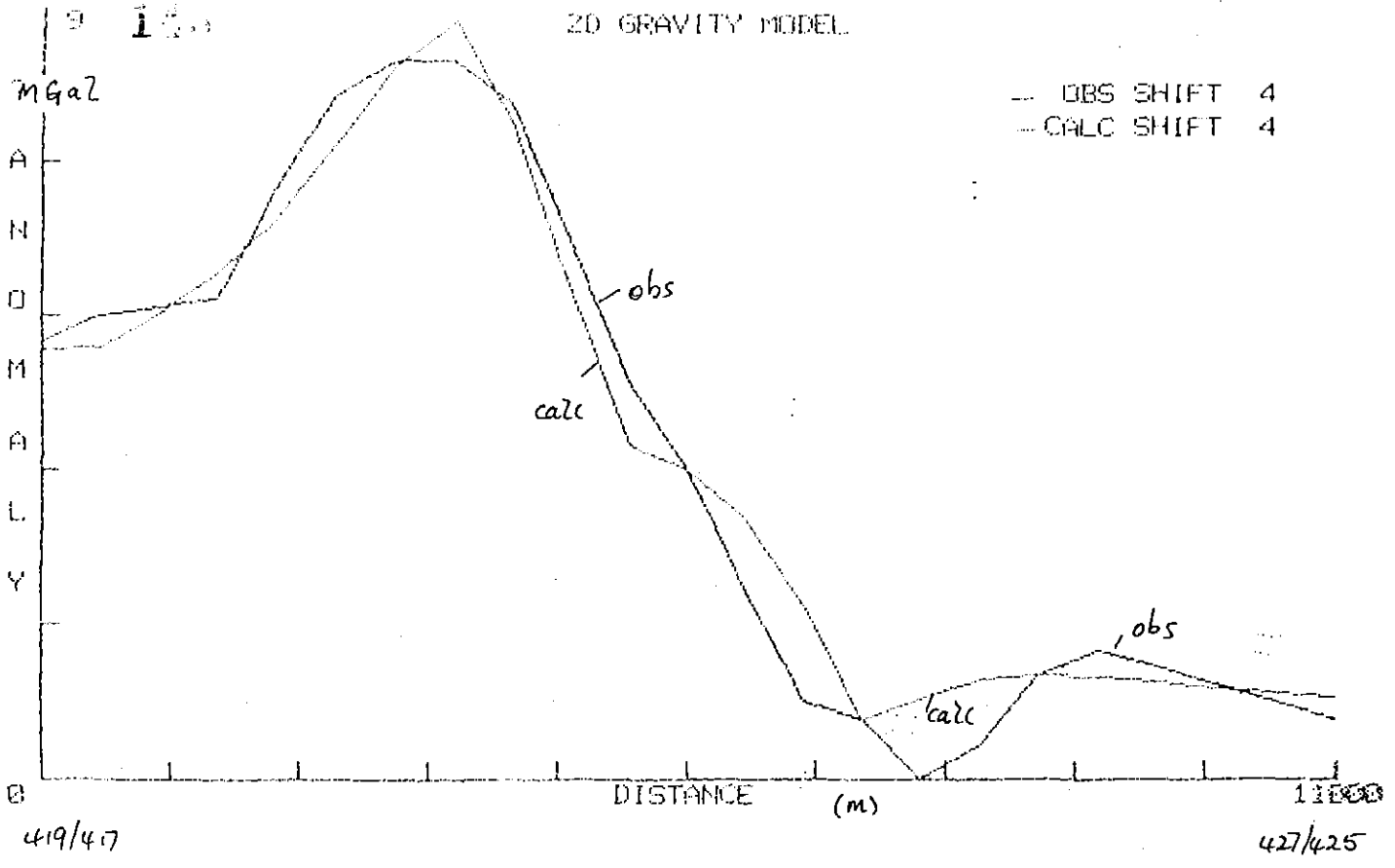


EL 96/87 PRESTON 2D GRAVITY MODEL G1 MODEL C FIGURE 10

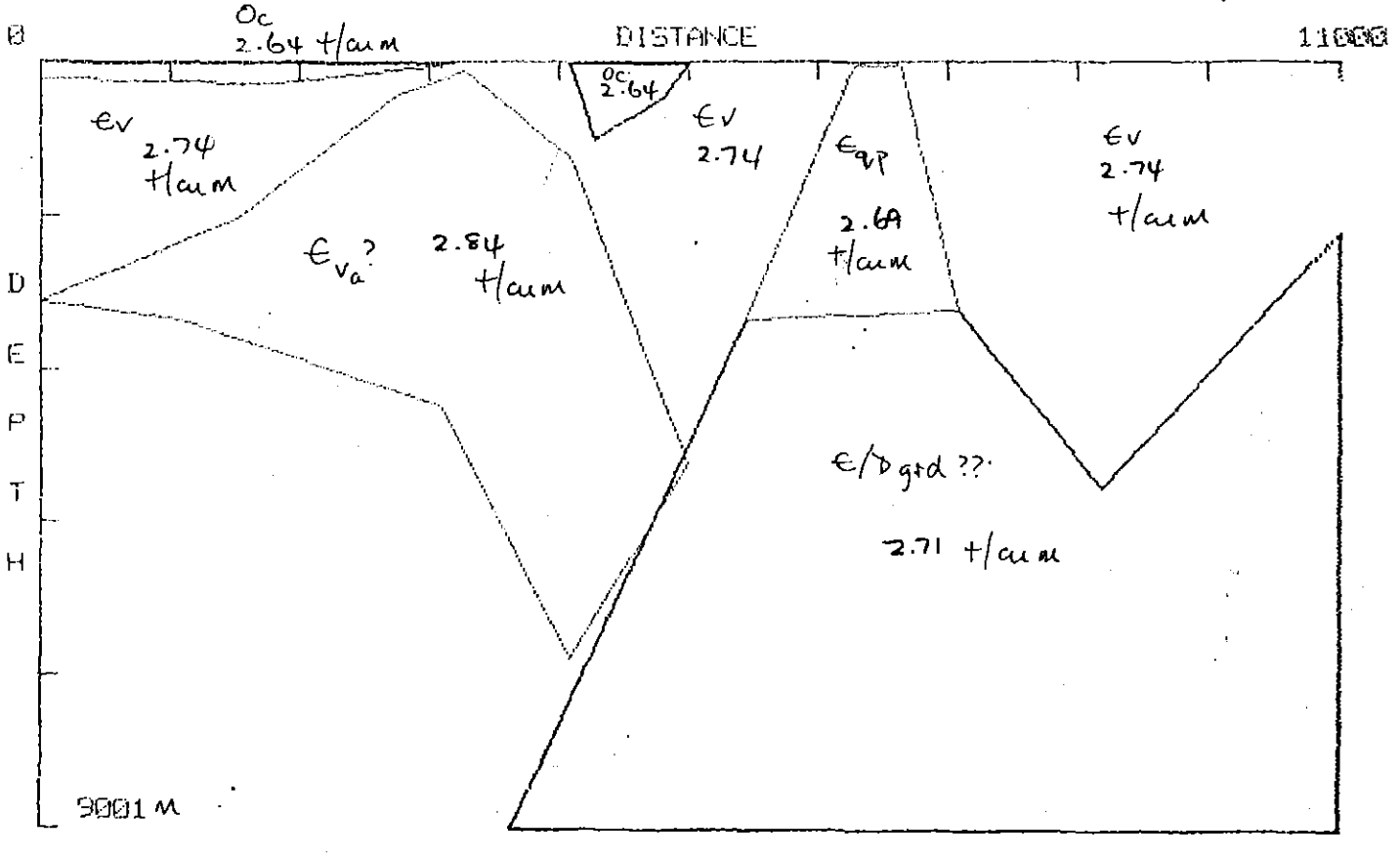
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Hobart, Tasmania 7001

507147

ORIGIN,LIMIT,INCR : 0 11000 500



PRESTON LINE 2 419/417-427/425



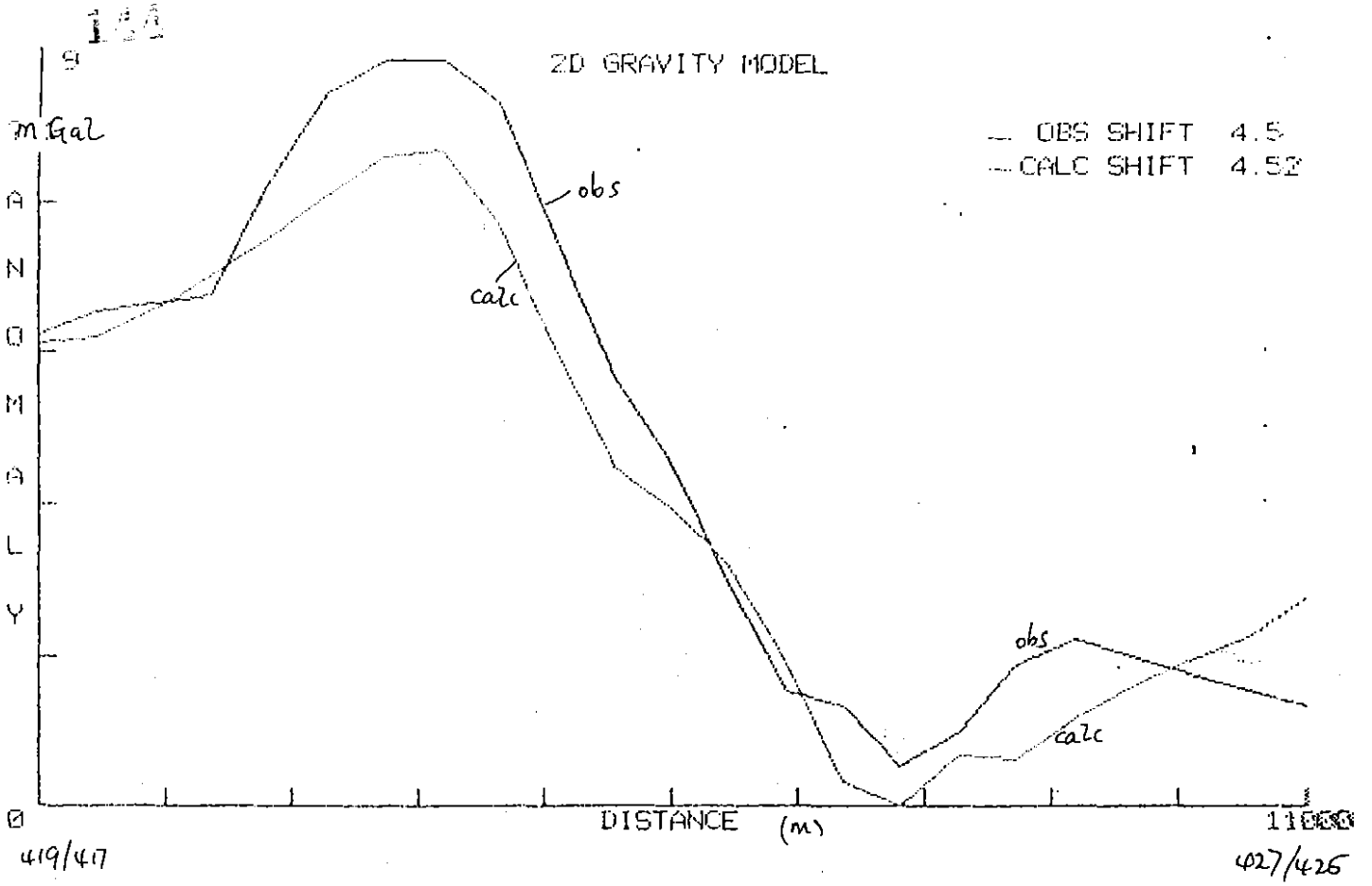
EL96/87 PRESTON 2D GRAVITY MODEL G2 MODEL A FIGURE 11

17-427/425

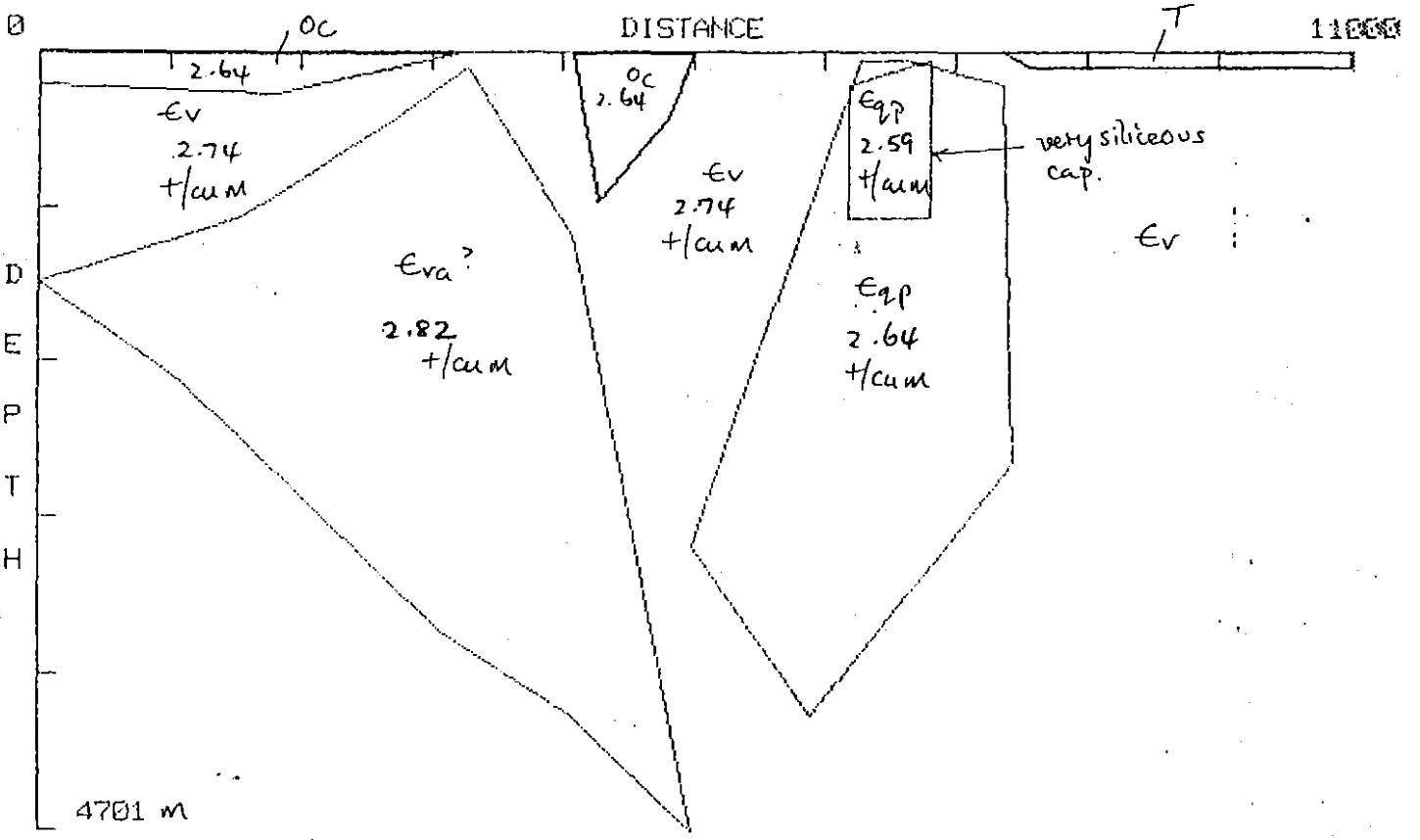
LEAMAN GEOPHYSICS
G.P.O. Box 320 D,
Hobart, Tasmania 7001

507148

LINE PARAMETERS - ORIGIN,LIMIT,INCR : 0 11000 500



PRESTON LINE 2 419/417-427/425
K6=-.1



EL 96/87 PRESTON 2D GRAVITY MODEL G2 MODEL B FIGURE 12

507149

Report submitted on behalf of
Leaman Geophysics
by

Dr. D.E. Leaman, B.Sc., Ph.D
M.Aus.I.M.M., M.M.I.C.A

19/3/90

AI-533-0001

LEGEND

- E L BOUNDARY
- SEALED ROADS
- UNSEALED ROADS & TRACKS
- FOOT- TRACK
- RIVERS & CREEKS
- TOWNS
- HILLS

GEOLOGICAL LEGEND

QUATERNARY

- 2 Qra — Alluvium.
- 2 Qt — Talus, scree deposits of dominantly basalt (Qtb), siliciclastic rocks (Qts), bas & sil rocks (Qtm)
- 2 Qg — Till, marsh deposits, residual gravel

TERTIARY

- 11 Tb — Basalt lava and pyroclastic rocks
- 9 Ts — Dominantly terrestrial sand, gravel, silt and clay with rarer indurated equivalents

SILURIAN

- 18 Sc — Shallow marine quartzose sandstone, possible correlate of Crotty Sandstone

ORDOVICIAN

- 33 Og — Limestone, dolomite and mudstone (Gordon Group Correlate)

EARLY ORDOVICIAN–LATE CAMBRIAN

- 35 Os, 35 Om, 35 Oc — Marine quartzose sandstone, shale, minor conglomerate (Moina Sandstone). Dominantly quartzite and vein quartz pebble to boulder conglomerate, commonly polymict with clast composition (Duncan & Roland Conglomerate)

CAMBRIAN

DOMINANTLY FELSIC VOLCANIC ROCKS

- 51 €f — Undifferentiated, felsic volcanics and sediments
- 24 €fm — Siltstone, mudstone, lithicwacke
- 42 €fl — Felsic lava, quartz phyric
- 47 €ft — Felsic tuff
- 26 €lw — Lithicwacke, mudstone, minor conglomerate (Gog Range Greywacke)

N.B.– Colour numbers from the DERWENT 19 series.

LATE MIDDLE TO LATE CAMBRIAN – RADFORDS CREEK GROUP

- 39 €r, 39 €rc — Mudstone with horizons of tuff, lava, lithicwacke and quartzose conglomerate. Conglomerate with clasts of chert and less common spilite in a lithicwacke matrix (Sprent Formation)
- 63 €m — Basalt, locally pillowed (Motton Spilite)
- 69 €b — Chert, minor mudstone (Barrington Chert)

INTRUSIVE IGNEOUS ROCKS

DEVONIAN

- 15 Dgh — Biotite, adamellite of Housetop Granite.

CAMBRIAN

- 64 €di — Dacitic feldspar porphyry
- 64 €qp — Quartz–feldspar porphyry

- Geological boundary – approximate
- Fault.
- Fault – approximate
- Axial surface trace of major antiform, synform.

5 cm

TOP LEFT

SCALE 0 500 1000 1500 2000 2500 metres

ELECTROLYTIC ZINC COMPANY OF AUSTRALASIA LIMITED
MINERAL RESOURCES DIVISION

PROJECT PRESTON E.L. 96/87		
90-3105 GEOLOGY 507150		
Compiled I. MAT.	Date 22-5-'88	Scale 1:25,000
AMG	Latitude	Longitude
Drawn N.W.D.S.	File No	PLAN NO: AI-533-0001

9381

AI-533-0002

E.L. 96/87

LEGEND

- E.L. BOUNDARY.
- SEALED ROADS.
- UNSEALED ROADS & TRACKS.
- FOOT- TRACK.
- RIVERS & CREEKS.
- TOWNS.
- HILLS.

O = Samples taken by COMALCO, 1978.

X = Samples taken by C.R.A.E., 1976.

□ = Samples taken by SHELL, 1984.

■ = Samples taken by C.R.A.E., 1985.

▲ = Samples taken by GEOPEKO, 1976.

✡ = Samples taken by NORTH, 1988.

1:250000 SHEET

SCALE

0 500 1000 1500 2000 2500 metres

5 cm

N

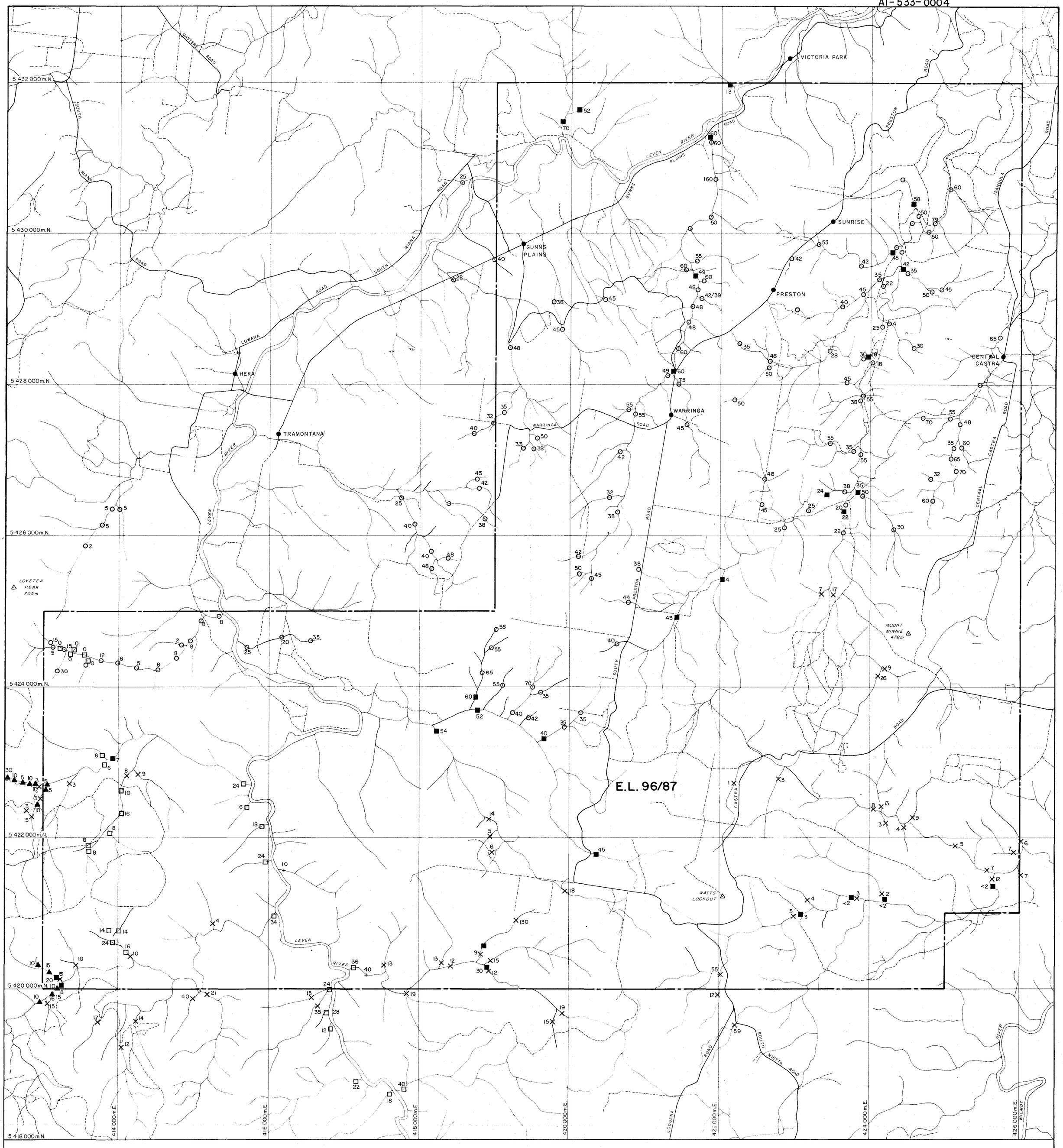
90-3105

ELECTROLYTIC ZINC COMPANY OF AUSTRALASIA LIMITED
MINERAL RESOURCES DIVISION

PROJECT: PRESTON E.L. 96/87		
507151 STREAM SEDIMENT SAMPLES NUMBERS AND LOCATIONS		
Compiled: I. MAT.	Date: 29-5-'88	Scale: 1:25,000
AMG:	Latitude:	Longitude:
Drawn: N.W.D.S.	File No:	PLAN NO: AI-533-0002

9383

AI-533-0004



LEGEND

- E.L. BOUNDARY.
- SEALED ROADS.
- UNSEALED ROADS & TRACKS.
- FOOT- TRACK.
- RIVERS & CREEKS.
- TOWNS.
- HILLS.

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N.B.- All results are p.p.m.

□ = Samples taken by SHELL, 1984.

■ = Samples taken by C.R.A.E., 1985.

▲ = Samples taken by GEOPEKO, 1976.

+ = Samples taken by N.B.H.P., 1988.

1 250000 SHEET

SCALE

0 500 1000 1500 2000 2500 metres

5 cm

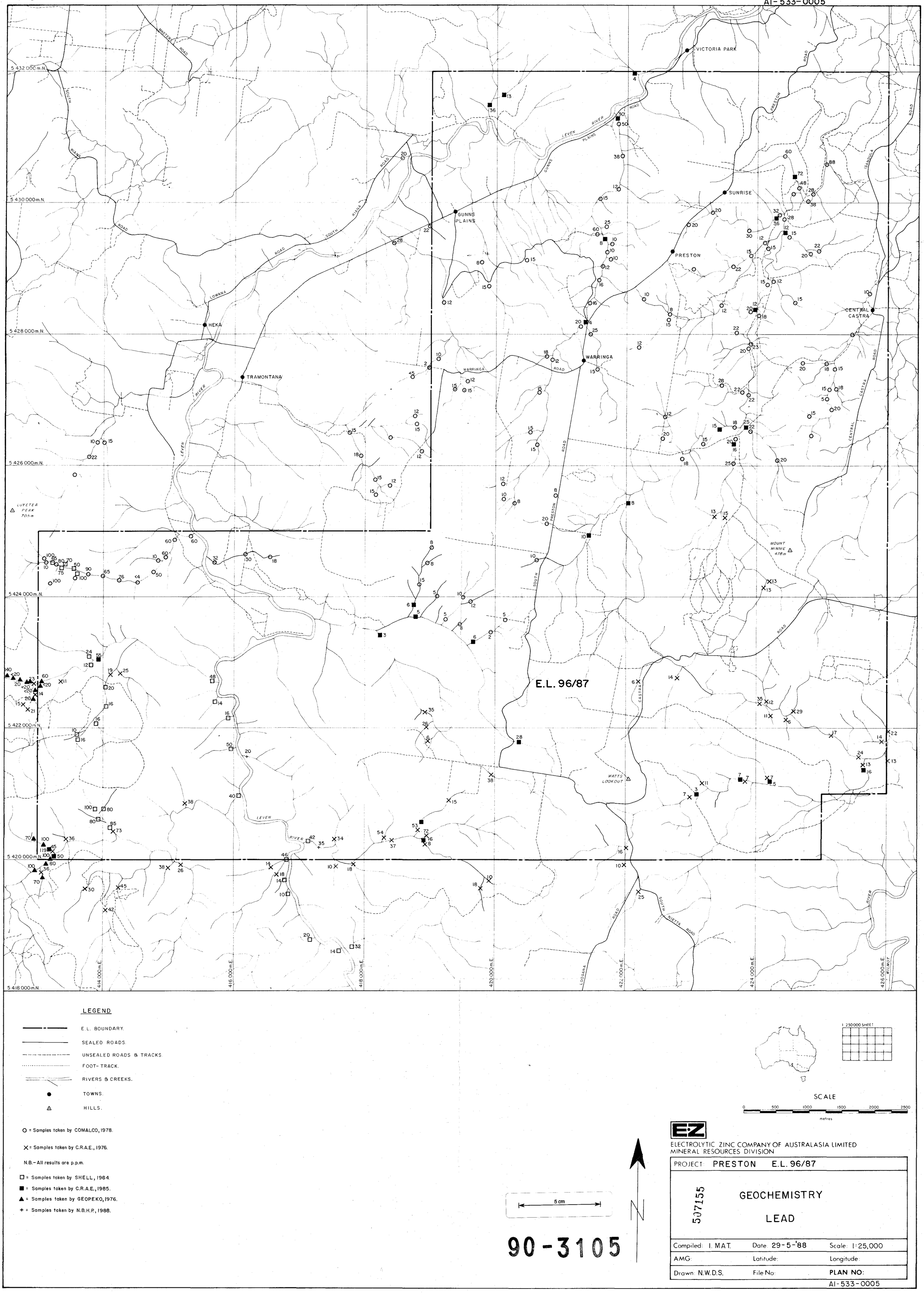
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ELECTROLYTIC ZINC COMPANY OF AUSTRALASIA LIMITED
MINERAL RESOURCES DIVISION

PROJECT: PRESTON E.L. 96/87		
507153 GEOCHEMISTRY COPPER		
Compiled: I. MAT.	Date: 29-5-'88	Scale: 1:25,000
AMG:	Latitude:	Longitude:
Drawn: N.W.D.S.	File No:	PLAN NO: AI-533-0004

9385

AI-533-0005



LEGEND

- E.L. BOUNDARY.
- SEALED ROADS.
- UNSEALED ROADS & TRACKS.
- FOOT-TRACK.
- RIVERS & CREEKS.
- TOWNS.
- HILLS.

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□ = Samples taken by SHELL, 1984.

■ = Samples taken by C.R.A.E., 1985.

▲ = Samples taken by GEOPEKO, 1976.

+ = Samples taken by N.B.H.P., 1988.

5 cm

90-3105

1:250000 SHEET

SCALE

0 500 1000 1500 2000 2500 metres

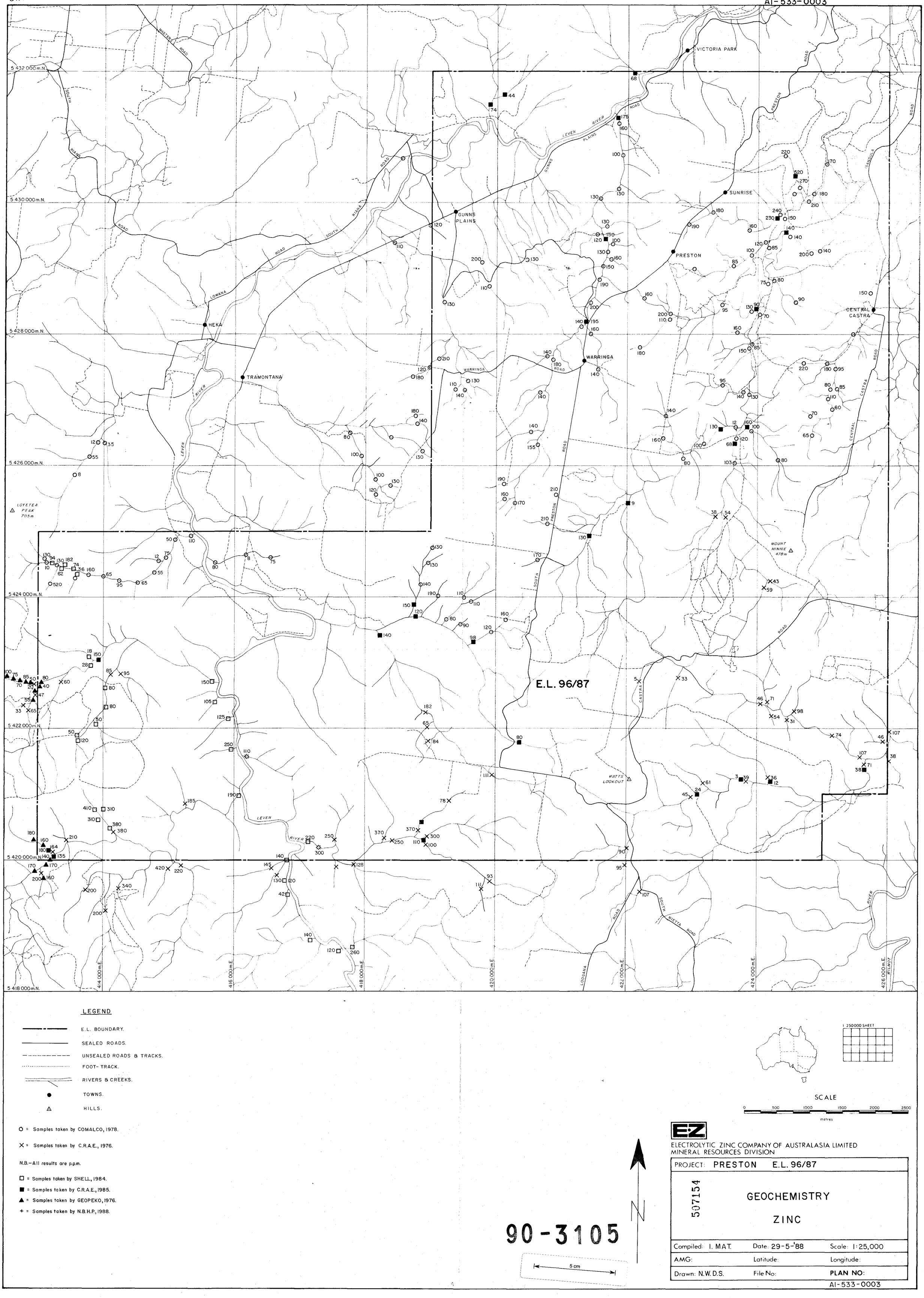
EZ

ELECTROLYTIC ZINC COMPANY OF AUSTRALASIA LIMITED
MINERAL RESOURCES DIVISION

PROJECT: PRESTON E.L. 96/87		
507155 GEOCHEMISTRY LEAD		
Compiled: I. MAT.	Date: 29-5-'88	Scale: 1:25,000
AMG:	Latitude:	Longitude:
Drawn: N.W.D.S.	File No:	PLAN NO: AI-533-0005

9384

AI-533-0003



LEGEND

- E.L. BOUNDARY.
- SEALED ROADS.
- UNSEALED ROADS & TRACKS.
- FOOT- TRACK.
- RIVERS & CREEKS.
- TOWNS.
- HILLS.

O = Samples taken by COMALCO, 1978.

X = Samples taken by C.R.A.E., 1976.

N.B.–All results are p.p.m.

□ = Samples taken by SHELL, 1984.

■ = Samples taken by C.R.A.E., 1985.

▲ = Samples taken by GEOPEKO, 1976.

\+ = Samples taken by N.B.H.P., 1988.

1 250000 SHEET

SCALE

0 500 1000 1500 2000 2500

metres

90-3105

5 cm

ELECTROLYTIC ZINC COMPANY OF AUSTRALASIA LIMITED
MINERAL RESOURCES DIVISION

PROJECT: PRESTON E.L. 96/87

507154

GEOCHEMISTRY

ZINC

Compiled: I. MAT.	Date: 29-5-'88	Scale: 1:25,000
AMG:	Latitude:	Longitude:
Drawn: N.W.D.S.	File No:	PLAN NO: AI-533-0003

9382

AI-533-0006

E.L. 96/87

LEGEND

- E.L. BOUNDARY.
- SEALED ROADS.
- UNSEALED ROADS & TRACKS.
- FOOT- TRACK.
- RIVERS & CREEKS.
- TOWNS.
- HILLS.
- ■ = Samples taken by C.R.A.E., 1985.

All results are p.p.t.

Assays: −4# Bulk Cyanide Leach.

☼ = Samples taken by NORTH, 1988.

1 250000 SHEET

SCALE

0 500 1000 1500 2000 2500 metres

5 cm

90-3105

ELECTROLYTIC ZINC COMPANY OF AUSTRALASIA LIMITED
MINERAL RESOURCES DIVISION

PROJECT: PRESTON E.L. 96/87

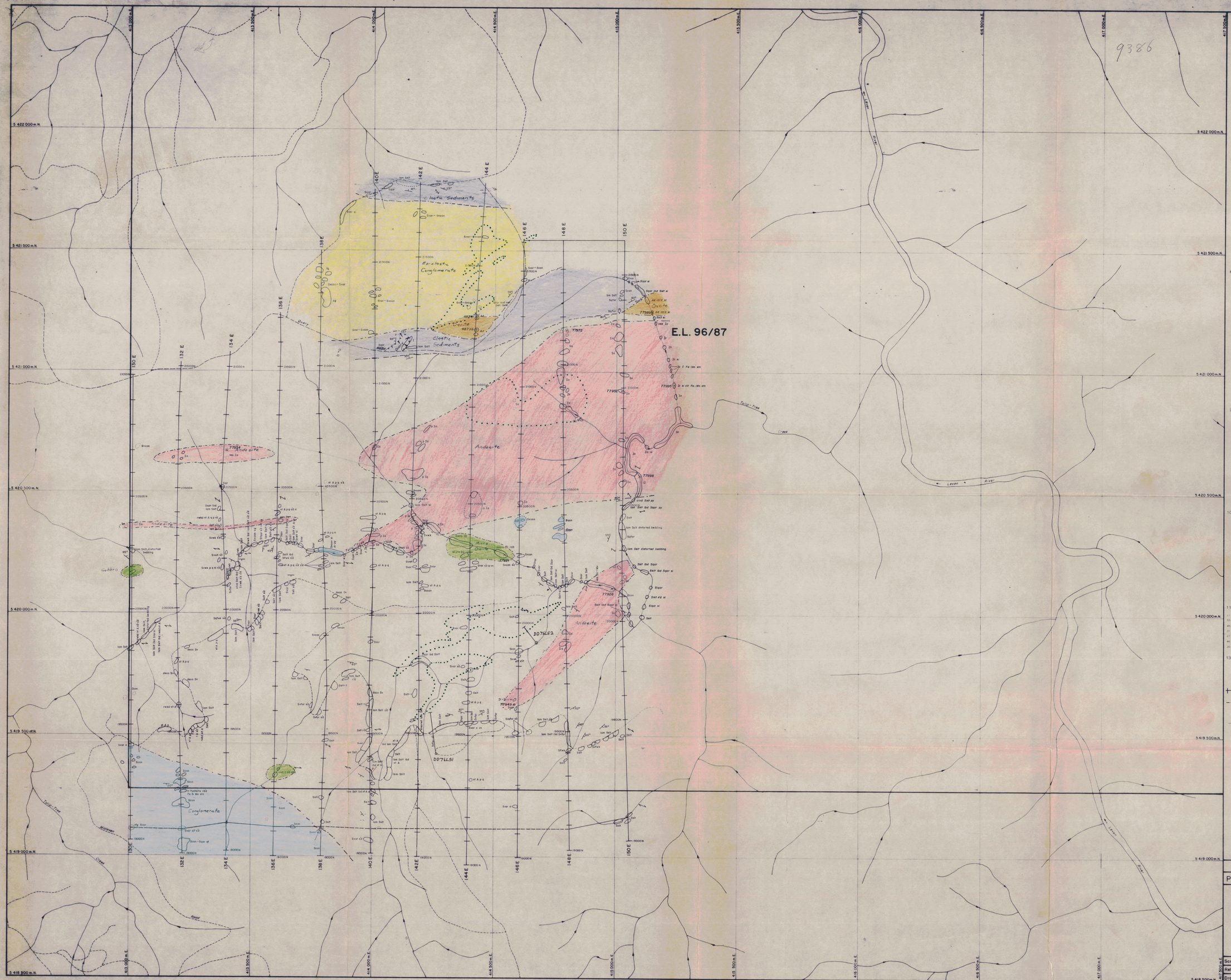
507152

GEOCHEMISTRY

GOLD

Compiled: I. MAT.	Date: 27-3-'89	Scale: 1:25,000
AMG:	Latitude:	Longitude:
Drawn: N.W.D.S.	File No:	PLAN NO: AI-533-0006

9386



9386

LEGEND

1 Colour

ple	pale
dk	dark
pk	pink
rd	red
brn	brown
or	orange
yel	yellow
ol	olive
grn	green
blk	black
wht	white
crm	cream
ppl	purple
clr	clear

2 Cleavages

msv	
w.clvd	
clvd	
str.clvd	

3 Igneous Grain Size

fg	> 1mm
mg	1 - 5mm
cg	5-50mm
vcg	> 50mm

4 Sediment Grain Size

argillites	< 0.06mm	rudites	> 2.0mm
arenites	0.06 - 2.0 mm	gr granule	2 - 4 mm
vfg	0.06 - 0.12mm	pb pebble	4 - 64 mm
fg	0.12 - 0.25mm	cob cobble	64 - 256mm
mg	0.25 - 0.5 mm	bld boulder	> - 256mm
cg	0.5 - 1.0 mm		
vcg	1.0 - 2.0 mm		

5 Igneous Rock Classification

10	1A Acid tuff	rhyolite	r
9	A Acid Lava	rhyodacite	r d
		dacite	d
8	iA Minor Acid Intrusives		
7/6	Major Acid Intrusives	P	pegmatite
		GR	granite
		QFP	quartz feldspar porphyry
5/5	1I Intermediate tuffs	trachyte	t
4/4	I Intermediate lava	latite	l
4/3	i Minor Intermediate Intrusives	andesite	a
4/2	Di Major Intermediate Intrusives		
4/0	MV Mafic Volcanics		
3/4	iM Minor Mafic Intrusives - dolerite d		
3/4	GB Major Mafic Intrusives		
4/4	U Ultramafic Rocks		

6 Sedimentary Rock Classification

2/7	VS Volcaniclastic Sediments		
2/7	Sv Volcanogenic Sediments		
2/6	Srd Rudites	Scgn	Conglomerate
		Sbx	Breccia (sedimentary)
		Stl	Tillite
3/3	Ssst Sandstones	Sar arenites < 15% matrix	Sqtz orthoquartzite
			Sqar quartz arenite
			Sfar feldspar arenite
			Sak arkose
			Slar lithic arenite
			Svar volcanic arenite
		Swk wackes	Sqwk quartz wacke
		Sgwk greywacke > 15% matrix	Sfwk feldspathic wacke
			Slwk lithic wacke
			Svwk volcanic wacke
2/7	Sag Argillites	Slst	Siltstone
3/4	Slst Limestone	Ssh	Shale
3/4	Sdol Dolomite	Sbs	Black shale
3/1	Sct Chert	* Sgl	Glacial deposits
3/1	Sif Iron formation	* Sfgl	Fluvioglacials
3/1	Sev Evaporite	* Salv	Alluvium
6/9	Sch Undifferentiated Metamorphic Rocks		

7 Silicates

q	quartz	hb	hornblende
k	K-feldspar	t	talc
ab	albite		
p	plagioclase		
a	amphibole		
px	pyroxene		
b	biotite		
c	chlorite		
s	sericite		
e	epidote		
to	tourmaline		
f	feldspar		

8 Sulphides, Oxides

bwk	bowork	Mn	Mn-oxides
sul	sulphides	Fe	Fe-oxides
gos	gossan	tet	tetrahedrite
hm	haematite	cas	cassiterite
mag	magnetite		
lim	limonite		
bn	bornite		
co	chalcopy- rite		
sp	sphalerite		
gn	galena		
py	pyrite		
po	pyrrhotite		
asp	arsenopyrite		

9 Carbonates

cb	carbonate		
sid	siderite		
cl	calcite		
dol	dolomite		
rh	rhodochrosite		
ba	barite		
fl	fluorite		
shl	scheelite		
Au	gold		
lx	Leucoxene		

10 Textures

lava		bm	bombs	l△	flow breccia
lt	lithic tuff	pm	pumice		ted
xt	crystal tuff	fm ()	fiamme (length cm)	vns	veins
vt	vitric tuff	P	porphyritic	xbd	cross-bedded
lpt	lapilli tuff	a	amygdaloidal	tkbd	thick-bedded
ag	agglomerate	ves	vesicular	tnbd	thin-bedded
af	ash flow	sph	spherulitic	ib	inter-bedded
ashfll	ash fall	wld	welded	lam	laminated
bx	breccia	rwk'd	reworked	bx'd	breccia-ted
qe/aug	quartz eyes augen	fr	fragments	sfg	staining
bd	bedded	cl	clasts		
schistose		bnd	banded		
		fb	flow banded		

11 Alteration

a	a'b	albitized	
c	c'b	carbonated	
ch	c'd	chloritized	
s	s'd	sericitized	
k	k'd	kaolinized	
ep	ep'd	epidotized	
si	si	silicified	

12 Structure

- Fault
- Bedding
- Cleavage
- Joint
- Plunge
- Facing & Class
- Unconformity
- Outcrop
- Interpreted boundary

13 Mineralisation

diss	(-)	disseminated (%)
str		stringer
msv		massive

Cut grid line

Approximate position of base line

possible lithological boundary

CRAE anomalous Pb zone

5 cm

90-3105

MINERAL RESOURCES DIVISION

PROJECT: PRESTON E.L.96/87 ,TAS.

SOUTH LOYETEA

TULIP-TREE CREEK GRID

GEOLOGY INTERPRETATION

537157

Scale: 1:5000	Survey: K.V.	Revised:
Reference:	Date: 14-4-89	A0-533-0012
Drawn: N.W.D.S.	Checked:	

9387

9387

E.L. 96/87

LEGEND

Cut grid line.

Approximate position of base line.

Float Sample = 77963 F.

Hand Specimen Sample = 77925

Assayed Sample = 77939

5cm

90-3105

MINERAL RESOURCES DIVISION

PROJECT: PRESTON E.L.96/87 ,TAS.

SOUTH LOYETEA

TULIP-TREE CREEK GRID

SAMPLE LOCATIONS

507150

Scale: 1:5000	Survey: K.V.	Revised:
Reference:	Date: 29-3-89	AO-533-0007
Drawn: N.W.D.S.	Checked:	

9388

E.L. 96/87

LEGEND

Cut grid line.

Approximate position of base line.

Float Sample = 20 F.

Assayed Sample = 55

All results are ppm.

5cm

90-3105

MINERAL RESOURCES DIVISION

PROJECT: PRESTON E.L. 96/87 ,TAS.

SOUTH LOYETEA

TULIP-TREE CREEK GRID

GEOCHEMISTRY- Cu.

507158

Scale: 1:5000	Survey: K.V.	Revised:
Reference:	Date: 29-3-'89	A0-533-0008
Drawn: N.W.D.S.	Checked:	

9389

9389

E.L. 96/87

LEGEND

Cut grid line.

Approximate position of base line.

Float Sample = 355 F.

Assayed Sample = 125

All results are ppm.

5 cm

90-3105

MINERAL RESOURCES DIVISION

PROJECT: PRESTON E.L.96/87 ,TAS.

SOUTH LOYETEA

TULIP-TREE CREEK GRID

GEOCHEMISTRY- Pb.

507519

Scale: 1:5000	Survey: K.V.	Revised:
Reference:	Date: 29-3-89	A0-533-0009
Drawn: N.W.D.S.	Checked:	

9390

E.L. 96/87

LEGEND

Cut grid line.

Approximate position of base line.

Float Sample = 225 F

Assayed Sample = 265

All results are ppm.

5cm

90-3105 1

MINERAL RESOURCES DIVISION

PROJECT: PRESTON E.L.96/87 ,TAS.

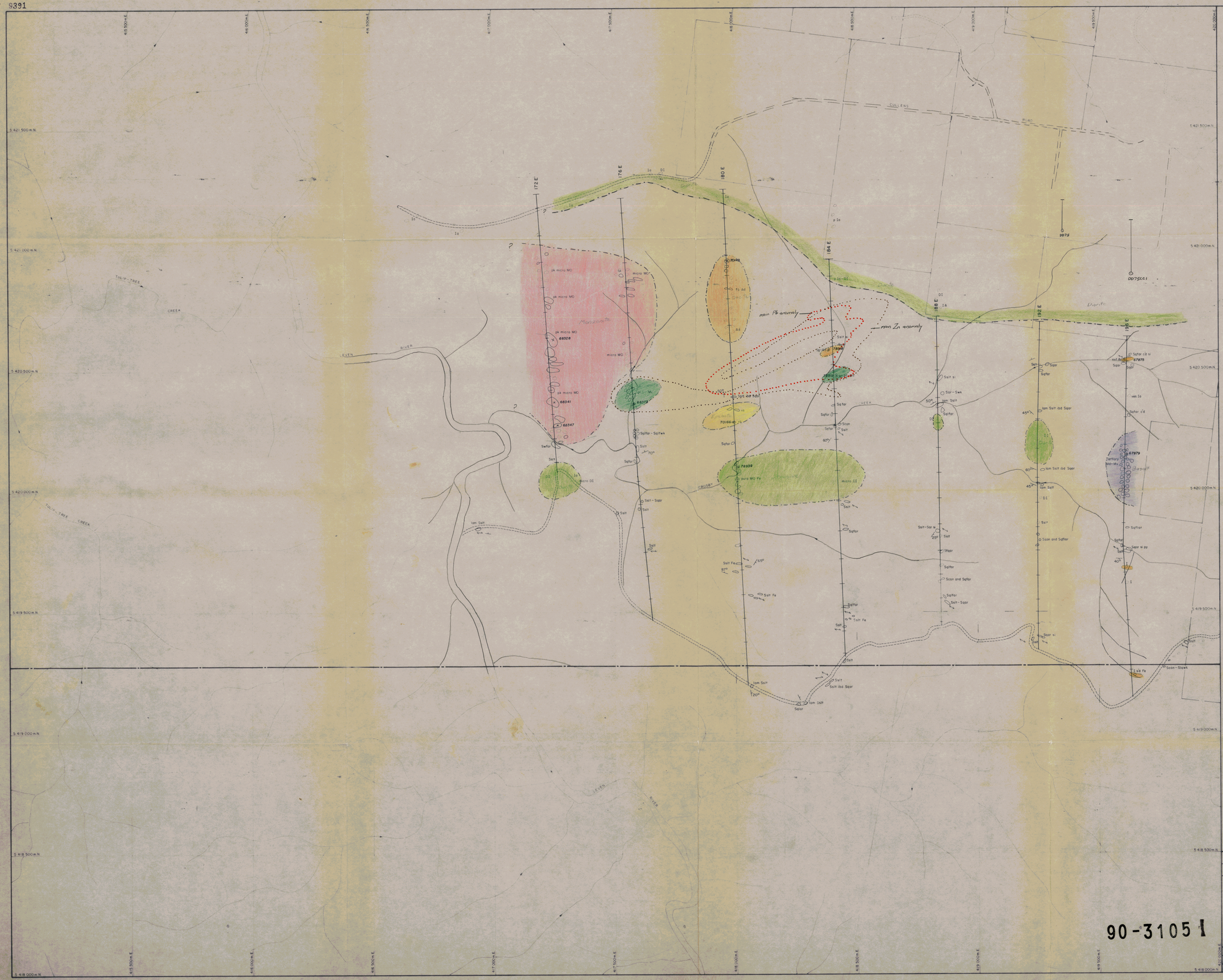
SOUTH LOYETEA

507100 TULIP-TREE CREEK GRID

GEOCHEMISTRY- Zn.

Scale: 1:5000	Survey: K.V.	Revised:
Reference:	Date: 30-3-89	A0-533-0010
Drawn: N.W.D.S.	Checked:	

9391


415 500m E
416 000m E
416 500m E
417 000m E
417 500m E
418 000m E
418 500m E
419 000m E
419 500m E
420 000m E
5 421 500m N
5 421 000m N
5 420 500m N
5 420 000m N
5 419 500m N
5 419 000m N
5 418 500m N
5 418 000m N
CULLENS ROAD
TULIP-TREE CREEK
LEVEN RIVER
CROSBY CREEK
172 E
176 E
180 E
184 E
188 E
192 E
196 E
DD75
DD75CC1
Monzonite
Diorite
Basalt
main Pb anomaly
main Zn anomaly
micro MO
micro DI
pk micro MO
68328
68341
68347
68373
70149
70166
78939
78940
78941
67875
67879
Sqfor
Sqfor-Sqfwk
Sqfor-Sqsr
Sqfor-Sqsw
Sqsr
Sqsw
Sqfor cd si
Sqsr si py
Sqfor cd
Scon and Sqfor
Scon-Sqwk
Sqsr-Sqsw
Sqfor-Sqsr
Sqsw-Sqsr
Sqsr-Sqfor
Sqsw-Sqfor
Sqsr-Sqsw
Sqsr-Sqfor
Sqsw-Sqsr

9392

LEGEND

- BLEG
- Stream Sediment Sample
- Pan Concentrate Sample
- Spot Rock Chip Sample
- Interval Rock Chip Sample
- HS Hand Specimen
- Soil Auger Sample

9392

5 cm

90-3105

GEOPEKO

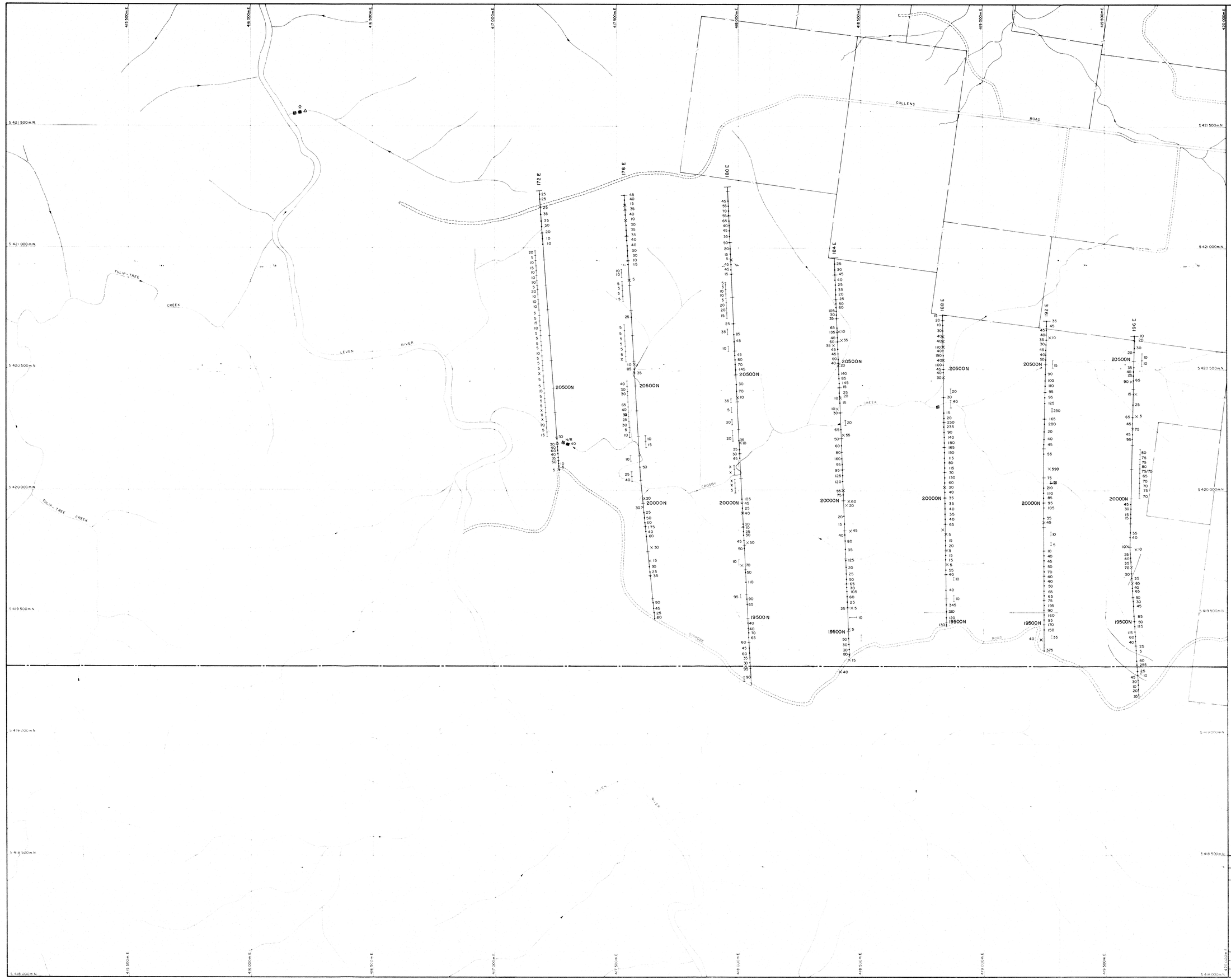
Project: PRESTON E.L. 96/87

CROSBY CREEK

SAMPLE LOCATIONS and NUMBERS

5071162

Scale 1:5000	Survey K.J.V.	Revised
Reference	Date 16-9-89	
Drawn N.W.D.S.	Checked	



LEGEND

- ⊠ BLEG.
- ■ Stream Sediment Sample.
- △ Pan Concentrate Sample.
- × Spot Rock Chip Sample.
- I Interval Rock Chip Sample.
- HS Hand Specimen.
- • Soil Auger Sample.
- X Below Level of Detection (under 5ppm.).
- N/R No Result.

NOTE :- All results in ppm.

9393

5cm

90-31051

GEOPEKO

Project : PRESTON E.L. 96/87

CROSBY CREEK

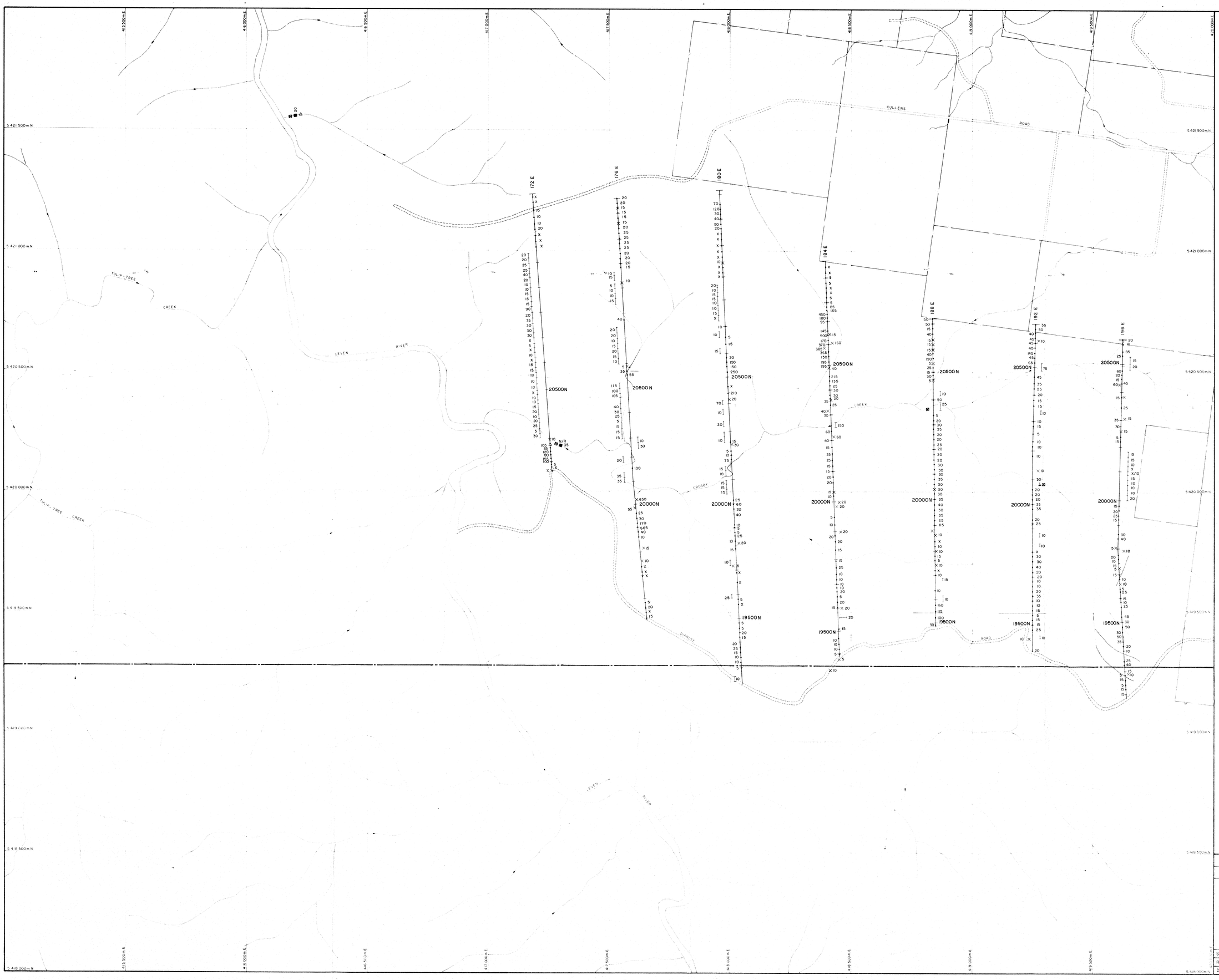
GEOCHEMISTRY

Cu

507163

Scale : 1:5000	Survey K.J.V.	Revised:
Reference	Date 8-10-89	
Drawn N.W.D.S.	Checked:	

9394



LEGEND

- ⊠ BLEG.
- ■ Stream Sediment Sample.
- △ Pan Concentrate Sample.
- × Spot Rock Chip Sample.
- I Interval Rock Chip Sample.
- HS Hand Specimen.
- • Soil Auger Sample.
- X Below Level of Detection (under 5ppm).
- N/R No Result.
- NOTE :- All results in ppm.

9394

5cm

90-31051

GEOPEKO

Project : PRESTON E.L. 96/87

CROSBY CREEK

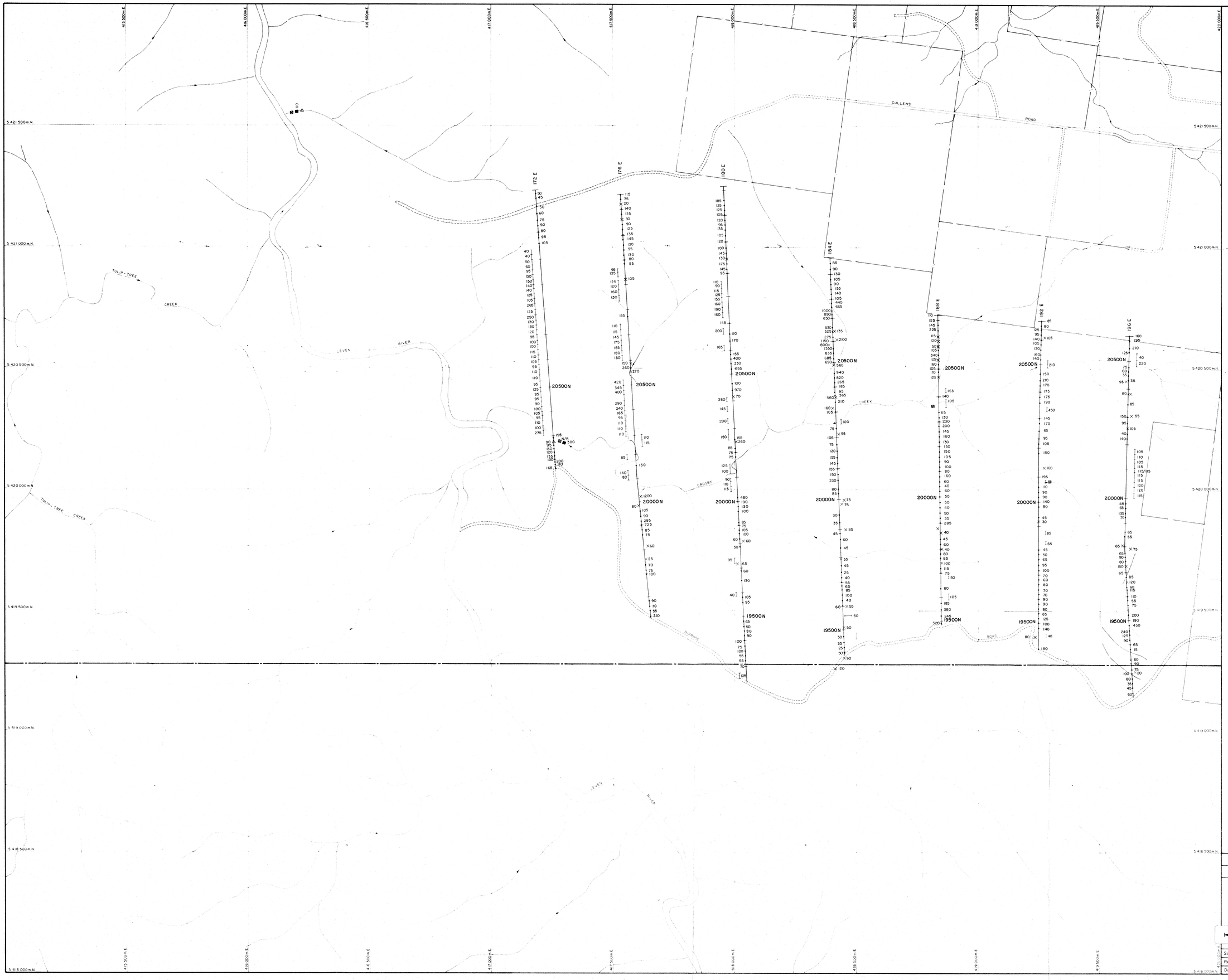
GEOCHEMISTRY

Pb

50716A

Scale : 1:5000	Survey : K.J.V.	Revised :
Reference :	Date : 13-10-89	
Drawn : N.W.D.S.	Checked :	

9395



LEGEND

- ⊠ BLEG.
- ■ Stream Sediment Sample.
- △ Pan Concentrate Sample.
- × Spot Rock Chip Sample.
- I Interval Rock Chip Sample.
- HS Hand Specimen.
- • Soil Auger Sample.
- N/R No Result.

NOTE:— All results in ppm.

90-3105

GEOPEKO

Project: PRESTON E.L. 96/87

507165

CROSBY CREEK

GEOCHEMISTRY

5cm

Zn

Scale: 1:5000	Survey: K.J.V.	Revised:
Reference:	Date: 14-10-'89	
Drawn: N.W.D.S.	Checked:	

9396

LEGEND

- ⊠ BLEG.
- ■ Stream Sediment Sample.
- △ Pan Concentrate Sample.
- × Spot Rock Chip Sample.
- I Interval Rock Chip Sample.
- HS Hand Specimen.
- • Soil Auger Sample.
- X Below Level of Detection (under 8ppb.).
- N/R No Result.
- I/S Insufficient Sample.

NOTE :— All results in ppb.

9396

90-3105

GEOPEKO

Project : PRESTON E.L. 96/87

507166

CROSBY CREEK

5cm

GEOCHEMISTRY

Au

Scale 1:5000	Survey K.J.V.	Revised
Reference	Date 2-10-89	
Drawn N.W.D.S.	Checked	