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BILLITON AUSTRALIA

THE METALS DIVISION OF THE
SHELL COMPANY OF AUSTRALIA LIMITED

E.L. 103/87 - BASIN LAKE

VOLUME 1 OF 1

Progress Report on Exploration for the Period Ending 21st April, 1990

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1. Dept. of Mines, Hobart
2. Billiton Aust., Melb.
3. Billiton Aust., Tas.

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1.0 INTRODUCTION

This report details exploration completed and results achieved by Billiton Australia within the Basin Lake portion of EL 103/87 during the 12 month period to 21st April 1990.

Exploration philosophy for the Basin Lake area has been to locate massive base metal sulphide mineralization at depths, probably greater than 200m.

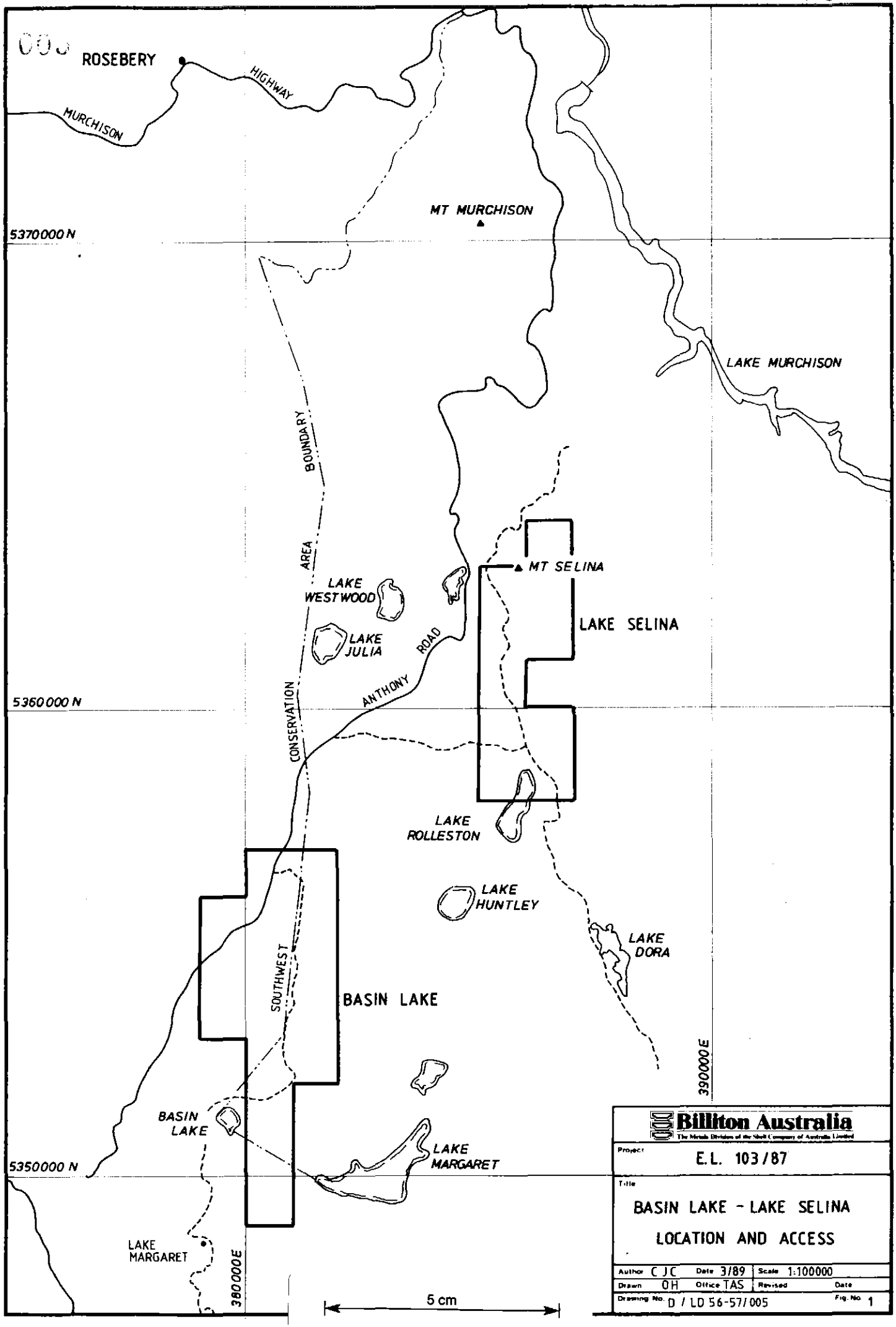
2.0 LAND TENURE

EL 103/87 was granted to The Shell Company of Australia until the 21st April 1990. The licence consists of 26 km², which is divided into two separate areas known as Lake Selina (10km²), and Basin Lake (16km²) (Fig 1). This report deals with the Basin Lake area only, the Lake Selina report is in Volume 2.

The Basin Lake area comprises 6.9km² of Southwest Conservation Area, 7.6km² Crown Land and 1.5km² of land vested in the HEC.

3.0 LOCATION & ACCESS

The Basin Lake EL is located on the west coast of Tasmania, immediately west of the Tyndall Range, approximately 10km north of Queenstown (Fig 1). Access to the licence area is via the Anthony Road, which cross cuts the north western corner



Billiton Australia
The Metals Division of the Shell Company of Australia Limited

Project: E.L. 103/87

Title: BASIN LAKE - LAKE SELINA
LOCATION AND ACCESS

Author	C J C	Date	3/89	Scale	1:100000
Drawn	O H	Office	TAS	Revised	Date
Drawing No.	D / LD 56-57/005			Fig. No.	1

of the licence. Access within the licence is via 4WD tracks which commence from the Anthony Road. Access to the southern portion of the licence is via a walking track which commences at the Lake Margaret power station.

Large steep sided glacial moraines cross-cut (E-W) the southern portion of the licence. Vegetation varies from thick rainforest to sparse buttongrass. A HEC transmission line (un-grounded) passes through two thirds of the licence.

4.0 GEOLOGICAL SETTING

The Basin Lake licence area is located within the Cambrian Mt. Read Volcanics, a northerly trending predominantly felsic volcanic arc on the west coast of Tasmania (Fig 2). More specifically the EL contains a comprehensive cross-section of the Mt. Read Volcanics, bound on the west by the South Henty Fault. Moving up through the sequence and across strike from west to east the licence area contains units of the Western Volcano-sedimentary Sequence, a sequence of Middle Cambrian felsic to basic volcanics and intrusives, quartz rich sandstones greywackes and shales. Situated stratigraphically above and interfingering with the Western Sequence are members of the Middle to Late Cambrian Central Volcanic Complex. This complex forms the central part of the licence, consisting of a north-south striking sequence of predominantly feldspar phyric inter-mediate volcanics and epiclastics, shales and sandstones. This sequence is commonly pyritic, and within the licence area is

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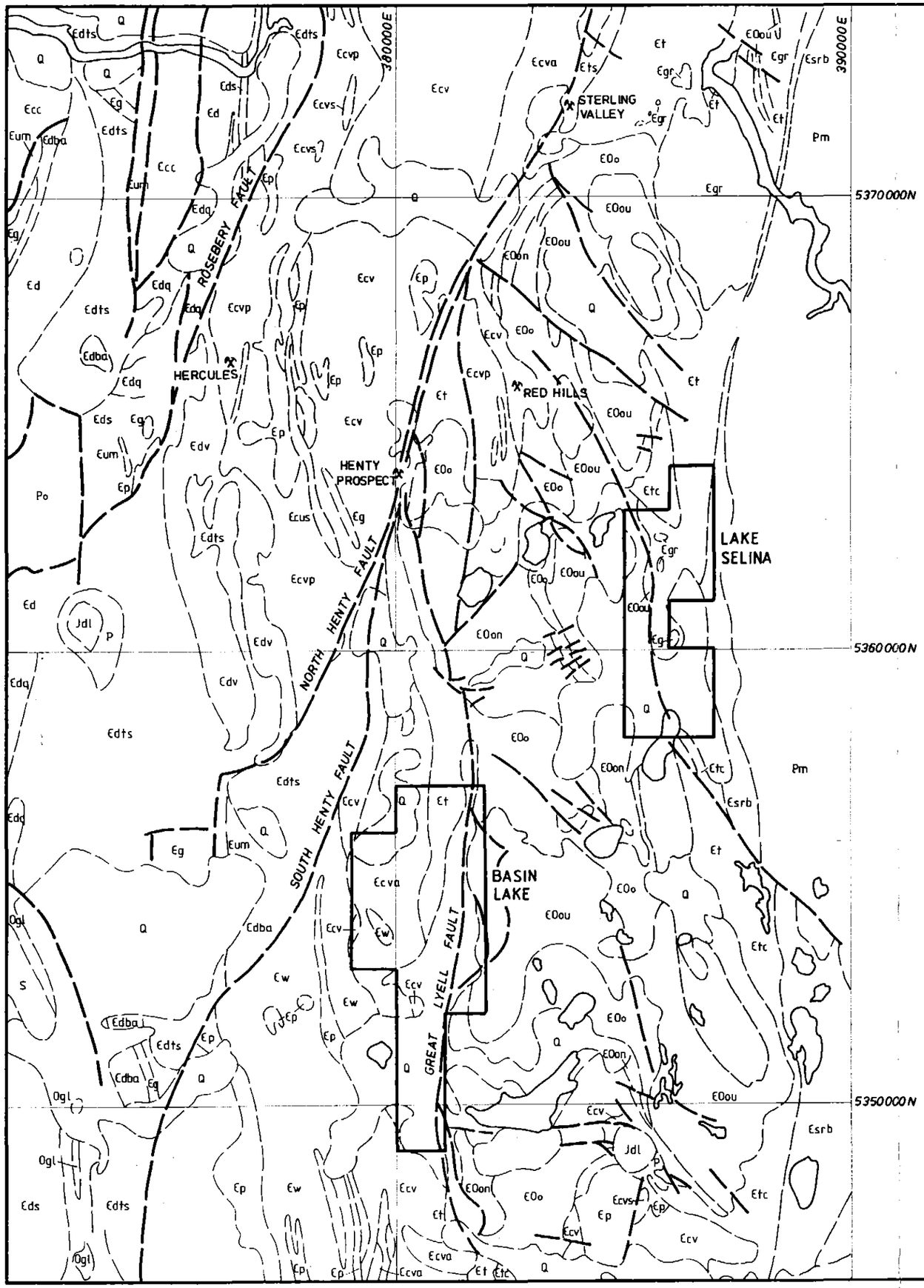

LEGEND

Q	Quaternary
Jdl	Jurassic
P	Permian
S	Silurian
Ogl	Ordovician
€Oou, €Oon, €Oo	Cambrian Denison Group
€t, €ts, €tc, €srb	Cambrian Tyndall Group
€d, €ds, €dts, €dq, €dv, €dba	Cambrian Dundas Group
€cv, €cvp, €cvs, €cva	Cambrian Central Volcanic Complex
€w	Cambrian Western Sequence
€cc	Cambrian Crimson Creek Formation
Po, Pm	Pre Cambrian
€gr, €p, €g, €um	Cambrian Intrusives

5 cm

Billiton Australia
The Metals Divisions of the Shell Company of Australia Limited

Project: E.L. 103/87

Title:
BASIN LAKE - LAKE SELINA
GEOLOGICAL SETTING

Compiled from Corbett & McNeill 1988

Author CJC	Date 3/89	Scale 1:100 000	
Drawn OH	Office TAS	Revised	Date
Drawing No. D/LD 56-57/006			Fig No. 2

known as the Basin Lake Sulphide Zone. East of the Central Volcanic Complex and conformably overlying are members of the Tyndall Group, predominantly quartz-feldspar phyric volcanics and their sedimentary derivatives. The eastern boundary of the licence is dominated by the Great Lyell Fault, to the east of which is a massive down thrown fault block of Ordovician Owen Conglomerate.

The Basin Lake licence is located 10km north of the giant Mt. Lyell ore body and 10km south of the recently discovered Henty Prospect.

5.0 PREVIOUS EXPLORATION

Exploration carried out within the Basin Lake licence area prior to April 1988 is reported in Progress Report for Exploration for the Period Ending 21st April 1989 (08.4246). Exploration by Billiton Australia from April 1988 to April 1989 consisted of the construction of 12.2km of grid lines at 400m line spacing. The grid lines were surveyed by CSAMT and ground magnetics and interpretation carried out. Anomalous regions were investigated by Max-Min EM, gravity and ground magnetics.

6.0 EXPLORATION COMPLETED

Exploration during the reporting period has been a continuation of the work commenced during the initial 12 months of the licence, in keeping with the original exploration phil-

osophy. A total of 873.4m of diamond drilling was carried out on three targets generated within the southern half of the licence. A new AMG based grid, totalling 34.4km of grid lines at 400m spacing, was constructed over the northern half of the licence. Grid line mapping, ground magnetic survey and CSAMT survey were carried out over the new grid. A whole-rock rock chip sampling programme was carried out along the Anthony Road, delineating a significant geochemical break within the stratigraphy of the Basin Lake EL.

7.0 EXPLORATION RESULTS

7.1 Geology

A total of 34.4km of grid and tie lines were constructed over the northern half of the licence (Fig 3) at 400m line spacing, as a continuation to the grid constructed over the southern half of the licence during the initial 12 month reporting period (1988-89). Grid construction was carried out by contractor with minimal impact upon the environment. Mapping of the grid was carried out. Extensive glacial and alluvial sediments along with large tracts of dense vegetation obscure a large percentage of the licence area. As a result outcrop is poor and interpretation difficult. A good exposure is available from road cuttings along the Anthony Road (Figs 8, 9) which cross-cuts the north western portion of the licence. Examination of drill core from previous exploration efforts has aided in the interpretation and is presented in Figs 10 to 13. From west to east the

geology can be separated into six zones:

1. In the south western corner of the licence, north of line 353000N, occurs the Western Volcanosedimentary Sequence (CWS, Figs 10 to 13). Wihtin the licence area this sequence consists of predominantly fine grained epiclastics, volcanoclastics and sandstones from a mixed felsic and intermediate volcanic source. Weak to moderate sericitic alteration occurs throughout.

2. Immediately east and conformably overlying the Western Volcanosedimentary Sequence is a sequence of predominantly intermediate volcanoclastics, epiclastics and lavas. Minor lenses of sandstone, siltstone and graphitic black shale occur. A narrow black shale horizon (1-2m) marks the western contact with the CWS. This region forms part of the Central Volcanic Complex (Ccsl, Figs 10 to 13). Significant zones of intense chloritic and pyritic alteration occur within the Ccsl, namely Bradshaws Pyrite Zone, on the Anthony Road, and Leech Hill Pyrite Zone, 1km southeast of Bradshaws.

3. A prominent feature of the Basin Lake licence area is a central, north-south striking, hornblende-feldspar ± pyroxene phyric dacitic-andesitic, shallow level intrusive (Ci, Figs 10 to 13). The margins of this intrusive are auto brecciated with the intruded intermediate volcaniclastics within fractures along the intrusive margins, suggesting the intruded volcaniclastics were wet during intrusion. The margins of the intrusive contain abundant fine to coarse

grained pyrite. The intrusion is thought to consist of several shallow level sills, as observed from drill core, however extensive ground cover prevents an accurate interpretation of the intrusives true nature. Minor extrusive equivalents occur towards the east. The intrusion has a stronger magnetic signature than the surrounding lithologies.

4. East of the dacitic-andesitic intrusive body/bodies is a further sequence of intermediate and lesser felsic volcaniclastics, epiclastics and lavas of the Central Volcanic Sequence (Ccsu, Figs 10 to 13). This sequence of volcanics contains abundant lenses of sandstones, siltstones and black shales (Ccsh), some of which are graphitic. The sequence from the Ccsl unit to the Ccsu unit is believed to be continuous, with the central intrusive bodies and extensive bedrock cover obscuring the nature of the geology between the above units. Significant pyritic alteration occurs within the Ccsu, with a narrow lens of stratiform pyrite occurring on DDH BL4. This zone is known as the Basin Lake Sulphide Zone.

5. Overlying the Ccsu are the felsic volcanics of the Tyndall Group (Ct, Figs 10 to 13). The contact with the Ccsu appears conformable and marked by significant carbonate alteration in the northeast portion of the licence. The Tyndall Group consists of rhyolitic-dacitic quartz-feldspar phyric lavas, volcaniclastics and epiclastics with lesser interbedded argillaceous sedimentary lenses. Exposed within

the northeast corner of the licence is a significant epiclastic horizon containing large well-rounded fragments of pyritic chert.

6. To the east of the Tyndall Group and bounded along the north-south striking Great Lyell Fault is a downthrown sequence of siliciclastic sediments of the Ordovician Owen Conglomerate.

The stratigraphy within the licence area has a strike varying from NW-SE to N-S with dips from vertical to steeply east with facing to the east. A north-south foliation is developed throughout a large portion of the EL.

7.2 Drilling

Three diamond drill holes were completed on targets resulting from work carried out in the preceeding reporting period. All three holes can be considered a technical success, however results from the drilling were disappointing.

Considerable care was taken when establishing the drill sites with minimal impact upon the environment. All three drill sites have been rehabilitated to a standard which should see complete recovery in less than five years.

A summary of the drill holes is listed below with detailed logs and analytical assay reports listed in Appendices 1 & 2 respectively.

Hole : BLD 89-1
Collar Co-ords : 380416E, 5352715N
Azimuth : 267° AMG
Dip : 60°
Depth : 235m

AIM - To test a concurrent UTEM and CSAMT anomaly for VMS style mineralization.

0 - 7 m	Glacial sediments.
7 - 10.3m	Hornblende-feldspar phyric dacitic-andesitic intrusive porphyry. Chloritic alteration.
10.3-141.6m	Feldspar phyric andesitic volcaniclastics and epiclastics. Strong weathering to 46.9m. Strong chloritic-sericitic alteration in parts. Minor disseminated pyrite.
141.6-145.6m	Fine grained quartz-sericite sandstone. Minor disseminated pyrite.
145.6-172.1m	Andesitic lavas and epiclastics.
172.1-216.4m	Interbedded sandstones, siltstones, black shales (partly graphitic) and minor andesitic volcaniclastic. Minor sericitic-siliceous alteration. Minor disseminated pyrite.
216.4-235.0m	Hornblende-feldspar phyric dacitic-andesitic intrusive porphyry.

EOH

Results suggest the geophysical anomalies can be attributed to conductive graphitic black shales intersected 180m down hole (Fig 14). Selective core samples returned no significant anomalous geochemistry.

Hole : BLD 89-2
Collar Co-ords : 380985E, 5352615N
Azimuth : 262° AMG
Dip : 60°
Depth : 250m

AIM - To test a coincident CSAMT, UTEM, MAX-MIN EM and weak soil geochemical anomaly for VMS style mineralization

0 - 51.0m	Glacial sediments.
51.0-205.0m	Hornblende-feldspar phyric dacitic-andesitic intrusive porphyry. Strong weathering to 97.6m. Up to 15% disseminated pyrite associated with silicification from 105.0m.
205.0-229.1m	Interbedded graphitic black shales, with lesser sandstones and siltstones. Minor disseminated pyrite.
229.1-250.0m	Feldspar phyric andesitic volcaniclastics. Minor disseminated pyrite throughout.

EOH

Results suggest the geophysical anomalies can be attributed to a conductive graphitic black shale intersected 205.0m down dole (Fig 15). Selective core samples returned no significant anomalous geochemistry (Appendix 2).

Hole : BLD 89-3
Collar Co-ord : 381140E, 5352760N
Azimuth : 095° AMG
Dip : 60°
Depth : 388m

AIM - To test a significant CSAMT conductor at or near the Great Lyell Fault.

0- 31m	Glacial scree.
31- 89m	Quartz feldspar phyric felsic lava.
89-134m	Sericitic rhyodacitic lava (2-10% pyrite).
134-195m	Feldspar + quartz phyric sericitic rhyodacitic lava (1-5% pyrite).
195-232m	Sericitic foliated pyrite rhyodacitic lava (2-5% pyrite).
232-239m	Chloritic sericitic dacitic lava breccia.
239-250m	Sericitic and silicified dacitic lava.
250-311m	Strongly silicified, K-spar and chlorite altered dacitic lava.
311-323m	Chloritized pumiceous dacitic ?lava.
323-327m	Basaltic dyke.
327-336m	Silicified chlorite K-spar altered dacitic lava.
336-361m	Layered chloritic pumiceous feldspar phyric dacitic epiclastic.
361-388m	Interlayered arenaceous and pelitic sediments with minor pebble conglomerate.

EOH

The modelled CSAMT source correlates well with the disseminated pyrite zone from 130-220m. Selective core samples returned no significant geochemistry. The altered pyritic zone can be extrapolated down dip to a zone of similar alteration intersected in DDH BL1 (Fig 16). Apart from the lack of chalcopyrite, the alteration is similar to the mineralization at Mt. Lyell. There is good potential for a continuation of this zone to the north, which to date has not been properly tested.

7.3 Geochemistry

A lithogeochemical sampling programme has been carried out along the Anthony Road, which provides an almost complete cross section of the stratigraphy within the licence area.

A total of 24 rock chip samples were collected and analysed for whole rock and selected trace element compositions (Appendix 3, Fig 17). To aid in rock identification 23 thin sections were produced. Brief descriptions are listed in Appendix 4.

The purpose of this study was to determine whether a favourable horizon for VMS style mineralization occurs within the licence area. This study resulted from an extensive investigation of the Cambrian volcanics of Western Tasmania, carried out by Billiton Research, which has identified two compositionally and spatially distinct rock types whose contact horizon occurs at or close to the known massive sulphide deposits of Western Tasmania. The results from the Anthony Road study indicate a significant horizon occurs within the licence area.

Follow up work to these results involves locating the favour-able horizon along strike. To achieve this it is necessary to log and sample selected drill core from existing drill holes within the licence area. Holes logged and sampled to date include TYN-5 and BL-3. Logs and profiles from these holes are presented in Figs 18 and 19 and Appendix 5. Analyses and interpretation of the results from the sampling programme will be presented in the Annual Report 1990-91.

7.4 Geophysics

A CSAMT survey completed by Zonge Engineering in early 1989 has been previously summarized in Billiton report 08.4246. However, a final interpretation report of results was not completed by the reporting date of 21st March 1989. This report is now available and is presented in this report as Appendix 6.

Drill holes BLD 89-1, 89-2, 89-3 were completed during the reporting period and down hole EM has been completed on BLD 89-1, 89-2; surveying of BLD 89-3 has not yet been completed and will be reported on in the next annual report.

Hole BLD 89-1 (6352715N, 380416E)

This hole was drilled on the westernmost trend of CSAMT conductors. UTEM, magnetic and gravity surveys were all carried out. The UTEM survey indicated a probable conductor at 380380E, and there was a possible gravity anomaly about 100 metres west of this conductor almost coincident with a magnetic anomaly. Unfortunately a grounded powerline is coincident with the conductor on this line but apparently not on adjacent lines. This created problems of interpretation as to the precise nature and location of the conductor.

The two down-hole EM profiles (Figs 20, 21) from adjacent transmitter loops do not indicate that a conductor had been intersected. Surprisingly the 'graphitic shales' do not appear to be conductive.

This implies either that the conductor is wholly due to the powerline, or that it occurs some distance beyond the end of the drill hole. Geologically the latter seems unlikely since the hole ended in a hornblende-feldspar porphyry which appears to be quite extensive (and may be the cause of the magnetic and gravity anomalies).

The recent CSAMT results on lines to the north indicate the continuation of this conductive trend which is not coincident with the powerline. Further examination of this trend will be required when all the CSAMT data has been received.

Hole BLD 89-2 (5352615N, 3380985E)

This hole was drilled on the central CSAMT conductive trend and is coincident with a moderately conductive UTEM (RGC) and Max-Min EM anomaly.

The down-hole EM profiles (Figs 22, 23) indicate that two conductive units have been intersected. One is centred at about 110 metres down-hole coincident with a slightly increased level of disseminated pyrite within the porphyry. The other conductor at 220 metres is coincident with a graphitic shale, which appears to be the predominant cause of the surface EM anomalies. Note that the relatively low amplitude of the deeper (down-hole) conductor may be due to screening of the EM primary field by the shallower one.

The stronger responses from the southern transmitter loop, indicate that the conductors are more conductive to the south of the hole, but not significantly enough to warrant further drilling in this area, especially with the lack of base metal values in the core.

CSAMT surveying of the northern portion of the licence has only recently been completed and hence results are not available to include in this report. Details of the survey are listed below:

Survey: 24 line kms at 80m station spacing

Lines	353000N	379000E - 380000E
	353400N	379000E - 381600E
	353800N	379000E - 381600E
	354200N	379000E - 381600E
	354600N	379000E - 381600E
	355000N	379000E - 381600E
	355400N	379000E - 381600E
	355800N	379000E - 381600E
	356200N	380000E - 381600E
	356600N	380000E - 381600E
	357000N	380000E - 381600E

Equipment: GDP 16/3 Receiver; GGT - 6.5kw Transmitter

Data Processing: Cagniard RHO

Phase Difference

I-D General Field Modelling Section

8.0 CONCLUSIONS

Drill testing of three separate geophysical targets was unsuccessful in locating significant base metal mineralization, however, the results can be considered to be a technical success, reinforcing the application of various geophysical techniques in generating targets in areas where geological information is poor.

The strong sericitic-pyritic alteration intersected in BLD 89-3 (except for the lack of chalcopyrite), is similar to the alteration and location of (with respect to the Great Lyell Fault), the Mt Lyell ore body. Signficant potential for increased base and precious metal mineralization exists, as the altered section from BLD 89-3 can be extrapolated for a further 4km to the north within the licence area. To date exploration over this horizon has been minimal.

A significant horizon for potential VMS style mineralization has been located within the licence area, resulting from the successful application of a lithogeochemical technique developed within the Billiton Research group. This horizon coincides with a favourable geological setting recognised from detailed grid line mapping and interpretation.

9.0 RECOMMENDATIONS

As the results of the recently completed CSAMT survey are unavilable for interpretation, specific targets cannot be recommended for further exploration. However, the results of the lithogeochemical mapping indicate the presence of an horizon favourable for the development of significant VMS mineralization. It is recommended that special emphasis should be placed upon this horizon and the geophysical data should be examined closely to determine coincidence of both data sets. Diamond drilling of these identified targets should then be carried out.

APPENDIX 1

DRILL LOGS BLD 89-1, BLD 89-2, BLD 89-3

SHLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

HEADING SHEET

COLLAR INFORMATION	DATA TYPE	COLLAR CO-ORDINATES: EASTING	NORTHING	ELEVATION	COLLAR SURVEY: AZIMUTH	DIP	HOLE NAME	TOTAL DEPTH	HOLE TYPE	DESC CODE	REMARKS
		380416	5535271		267	-60	BLD89-1	235			

PROJECT BASIN LAKE	HOLE NAME BLD - 89 - 1
LOGGED BY C. CREAGH	TOTAL DEPTH 235m
CONTRACTOR D. SHARP DRILLING SERVICES PTY. LTD.	RIG LONGYEAR 38
CREW K. HOW J. KAYE	DATE STARTED 7 AUG 89 FINISHED 18 AUG 89
CORE STORAGE: No OF TRAYS / LOCATION: DEVONPORT	SAMPLE STORAGE
M & P LAB	ASSAY LAB ANALABS BURNIE

DESC.	SIZE	FROM	TO	TOTAL	REMARKS
NON CORE	HW	0	7	7	Hole cased with slotted PVC pipe.
CORE	HQ	7	55.7	48.7	
	NQ	55.7	235	179.3	
	BQ				
CASING					
CASING LEFT	HW	0	7		(S) steel (P) plastic

SURVEY INFORMATION

DISTANCE FROM COLLAR: TO TOP	TO BOTTOM	AZIMUTH	DIP	REMARKS
0		267	-60	
55		-	-59	
100		254	-51½	
150		254	-47	
200		255	-44½	
235		259	-43½	

PLOTTING KEY

SYMBOL: DES. CODE	G/LOG	INTERVAL: FROM	TO	SYMBOL: DES. CODE	G/LOG	INTERVAL: FROM	TO

ASSAY INFORMATION

DISTANCE FROM COLLAR: TO TOP	TO BOTTOM	SAMPLE No	CORE ANGLE	ROCK TYPE	DIAM	DESC CODE	GRAPHIC LOG

DESCRIPTIVE LOG

0 - 7m GLACIAL SEDIMENTS

7 - 10.3m FELDSPAR HORNBLENDE PHYRIC ANDESITIC ?INTRUSIVE/VOLCANOCLASTIC
Core badly broken 60% recovery
Massive light green-green medium grained feldspar hornblende phyric andesitic ?intrusive/volcanoclastic. Glomeroporphyritic texture within fine grained chloritic groundmass

10.3 - 19.3m INTENSELY WEATHERED ANDESITIC ?VOLCANOCLASTICS
Core badly broken: 26% recovery
Deep red-brown intensely weathered Fe-rich medium grained feldspar phyric andesitic volcanoclastic. 50% red-brown clays.

19.3 - 28.0m WEATHERED ANDESITIC ?VOLCANOCLASTICS
Core badly broken 38% recovery
Light brown - red weathered Fe rich medium grained feldspar phyric ?volcanoclastics

28.0 - 46.9m WEATHERED ANDESITIC ?VOLCANOCLASTICS
Core badly broken 79% recovery
Light brown - light green weathered medium grained

DRILLING OBJECTIVES / SUMMARY: To test a UTEM anomaly occurring within a sequence of intermediate volcanics and intrusives for VMS style mineralisations. Results suggest the UTEM anomaly can be attributed to conductive graphitic black shales intersected 180m down hole.

REPORT REFERENCE

SHEET 1 OF 4

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SHLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

Samples also assayed for As, Sb and Ba
See appendix for details

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

CONTINUATION SHEET

PROJECT	CASINLAKE	HOLE NAME	BLD 89-1
LOGGED BY	C. CREAGH	TOTAL DEPTH	235m

DISTANCE FROM COLLAR TO TOP	DISTANCE FROM COLLAR TO BOTTOM	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Au ppm	Sn ppm	SAMPLE Nº	CORE ANGLE	ROCK TYPE	DUMP	DESC CODE	GRAPHIC LOG
138.0	138.5	40	15	75	<0.5	0.009	3	167001					
141.5	143.5	10	15	75	<0.5	<0.008	4	167002					
143.5	145.5	15	55	115	<0.5	0.013	3	167003					
145.5	147.5	15	25	100	<0.5	0.011	5	167004					
147.5	149.5	10	15	100	<0.5	0.009	5	167005					
149.5	151.5	15	10	90	<0.5	<0.008	6	167006					
151.5	153.5	15	15	90	<0.5	0.012	<3	167007					

ASSAY INFORMATION

DESCRIPTIVE LOG

Cont'd

Feldspar phyric andesitic volcanoclastic. Minor fragments of ?dacite from 36.7m.

96.9 – 135.6m FELDSPAR PHYRIC ANDESITIC VOLCANOCLASTIC

Massive green medium grained feldspar phyric andesitic volcanoclastic. Feldspar phenocrysts pink to white in colour within a dark green-green fine grained chloritic-sericitic groundmass. Very minor very fine grained disseminated pyrite throughout. Weak to moderate cleavage at 35°LCA.

Alteration varies from massive quartz-chlorite-sericite replacement over narrow zones to a fine grained grey-green assemblage with original textures largely absent. Small zones of intense quartz ± hematitic alteration up to 10cm across form pink nodules, sometimes rimmed by very fine grained pyrite, gives the rock a clastic appearance. Clasts of chert, massive pyrite and quartz-pyrite occur occasionally (≤2cm) increasing in frequency from 92.0m.

Minor wispy pyrite parallel to foliation from 118-119m.

135.6 – 138.5m VOLCANIC BRECCIA

Coarse angular clasts of feldspar phyric medium grained andesites, fine grained sediments and siliceous cherts within a fine grained sericite groundmass. Narrow grey fine grained sandstones occur at the top and bottom of the sequence. Bedding 35°LCA. Intense silicification and quartz-chlorite veining from 136.2 – 137.2m.

138.5 – 141.6m ANDESITIC VOLCANOCLASTIC

Massive medium grained green feldspar phyric andesitic volcanoclastic. Feldspars phenocrysts within a fine grained sericitic-chloritic groundmass. Cleavage at 15–20°LCA.

Interfingering with very fine grained grey siltstones/sandstones at base.

141.6 – 145.6m SILTSTONE/SANDSTONE

Fine grained light grey quartz sericite sandstone containing irregularly shaped and oriented chloritic fragments. Very fine grained disseminated pyrite, <1% throughout.

145.6 – 152.6m AUTOBRECCIATED ANDESITIC LAVA

Large irregular fragments of medium-coarse grained feldspar phyric andesite within a siliceous-sericitic matrix.

SHLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

Samples also assayed for As, Sb and Ba
See appendix for details

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

CONTINUATION SHEET

PROJECT BASIN LAKE | HOLE NAME [redacted]
LOGGED BY C. CREAGH | TOTAL DEPTH 235m

ASSAY INFORMATION

DISTANCE FROM COLLAR TO TOP	TO BOTTOM	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Au ppm	Sn ppm	SAMPLE Nº	CORE ANGLE	ROCK TYPE	DIAM	DESC CODE	GRAPHIC LOG
158.0	160.0	30	15	85	<0.5	0.011	5	167108					
160.5	168.5	25	10	90	<0.5	0.009	<5	167109					
168.5	170.5	30	10	100	<0.5	0.011	<5	167110					
174.5	176.5	30	55	90	<0.5	<.008	3	167111					
176.5	178.5	15	10	65	<0.5	<.008	4	167112					
178.5	180.5	15	5	65	<0.5	0.010	<5	167113					
186.0	188.0	95	80	210	<0.5	0.011	4	167114					
188.0	190.0	45	130	370	<0.5	0.013	3	167115					
190.0	192.0	20	15	70	<0.5	<.008	3	167116					
196.5	198.5	30	65	140	<0.5	0.009	4	167117					

DESCRIPTIVE LOG

152.6 – 172.1m EPICLASTIC
Predominantly medium grained feldspar phyric andesitic detritus containing fragments of black shale up to 8cm in length with lesser chert fragments. Fragment content decreases downhole. Quartz-chlorite-sericite alteration varies from weak to intense with minor quartz veining

172.1 – 175.9m SANDSTONE/SILTSTONE/SHALE
Fine grained grey intermediate volcanic sandstone containing detrital feldspar phenocrysts. Rare clasts of black shale and andesite irregularly oriented within. Bedding 37° to CA.
Fining downhole to laminated very fine grained grey-black siltstones and shales.
Weak disseminated fine grained pyrite throughout
Prominent sericitic alteration.

175.9 – 177.7m SANDSTONE
Fine-medium grained intermediate volcanic sandstone containing feldspar phenocrysts, coarsening downhole. Sericitic alteration prominent.

177.7 – 186.0m VOLCANIC BRECCIA
Irregular, angular clasts of medium grained feldspar phyric andesitic flows/volcaniclastics within a matrix of similar composition. Occasional clasts (≤5cm) of massive fine grained pyrite.
Increasing silicification towards base accompanying sericitic alteration. Cleavage at 40° to CA. Minor quartz veining.

186.0 – 190.1m SHALES/SILTSTONE/SANDSTONE
Interbedded partly graphitic black shales with fine grained grey siltstones and sandstones. Fragments of feldspar visible within the sandstone
Bedding at 40° to CA. Facing up-hole
Predominantly sericitic alteration with lesser/small zones of intense silicification. Weak disseminated pyrite.

190.1 – 197.1m ANDESITIC VOLCANICLASTIC/BRECCIA
Fine-medium grained feldspar phyric andesitic volcaniclastic containing fragments up to 10cm of predominantly fine grained andesites and lesser cherts.
Strong sericitic alteration accompanied by minor silicification.

SHEET 2 OF 4

12025

SHLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

Samples also assayed for As, Sb, and Ba
See appendix for details

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

CONTINUATION SHEET

PROJECT: BASIN LAKE
HOLE NAME: GLO 89/1
LOGGED BY: C. CREAGH
TOTAL DEPTH: 235m

ASSAY INFORMATION

DISTANCE FROM COLLAR TO TOP	DISTANCE FROM COLLAR TO BOTTOM	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Au ppm	Sn ppm	SAMPLE NO	CORE ANGLE	ROCK TYPE	DIAM	DESC CODE	GRAPHIC LOG
198.5	200.5	30	40	140	<0.5	0.001		167218					
200.5	202.5	45	95	1400	<0.5	0.013		167219					
202.5	204.5	45	30	110	<0.5	0.001		167220					
204.5	206.5	46	70	1110	<0.5	0.009		167221					
206.5	208.5	45	80	1800	<0.5	0.001		167222					
208.5	210.5	45	75	2115	<0.5	0.012		167223					
210.5	212.5	45	80	<10	<0.5	0.015		167224					
212.5	214.5	45	100	295	<0.5	0.009		167225					
214.5	216.5	40	25	70	<0.5	0.015		167226					

DESCRIPTIVE LOG

197.1 – 199.85m SANDSTONE / SILTSTONE
Interbedded fine grained grey quartz-sericitic siltstones and sandstones. Narrow lenses of andesitic volcaniclastics. Large irregularly oriented fragments of black shale (10-15cm) may represent a narrow mass-flow unit.

199.85 – 216.4m SHALES / SANDSTONE / SILTSTONE
Interbedded graphitic black shales with lesser fine grained sandstones and siltstones, finely laminated in parts. Shale content decreasing down-hole. Fining upwards sequence. Bedding 30° to CA. 1% fine grained disseminated pyrite throughout. Minor sericite alteration. Very minor quartz veining.

216.4 – 235.0m HORNBLENDE-PLAGIOCLASE PORPHYRY ANDESITE INTRUSIVE
Massive medium grained hornblende feldspar phyric andesitic intrusive. Fine grained chilled margin at upper contact incorporating minor xenoliths of sediment.

E.O.H.

SHEET 2 OF 2

SHLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

HEADING SHEET

COLLAR INFORMATION	DATA TYPE	COLLAR CO-ORDINATES EASTING	NORTHING	ELEVATION	COLLAR SURVEY AZIMUTH	DIP	HOLE NAME	TOTAL DEPTH	HOLE TYPE	DESC CODE	REMARKS
		380985	2526155		262	-60	BLOBB-2	250			

PROJECT	BASIN LAKE
LOGGED BY	C. CREAGH
CONTRACTOR	P. SHARP DIAMOND DRILLING TAS
CREW	K. HOW J. KAYE
CORE STORAGE	
No OF TRAYS	
LOCATION	DEVONPORT
M&P LAB	
HOLE NAME	BLO 89-2
TOTAL DEPTH	250m
RIG	LONGYEAR 38
DATE STARTED	12/6/89 FINISHED 17/6/89
SAMPLE STORAGE	
ASSAY LAB	ANALABS

DESC.	SIZE	FROM	TO	TOTAL	REMARKS
NON CORE	HW 4.9	0	10.5	10.5	Hole cased with
		10.5	50.0	39.5	slotted PVC pipe
CORE	NQ	51.0	81.0	30.0	
	NQ	81.0	250.0	169.0	
	BQ				
CASING					
CASING LEFT	HW	0	10.5	10.5	(S) steel (P) plastic

SURVEY INFORMATION

DISTANCE FROM COLLAR TO TOP	TO BOTTOM	AZIMUTH	DIP	REMARKS
0		262	-60	
50			-60½	
100		245	-59	
150		245	-58	
250		249	-57	

PLOTTING KEY

SYMBOL DES. CODE	G/LOG	INTERVAL FROM	TO	SYMBOL DES. CODE	G/LOG	INTERVAL FROM	TO

ASSAY INFORMATION

DISTANCE FROM COLLAR TO TOP	TO BOTTOM	SAMPLE No	CORE ANGLE	ROCK TYPE	DIAM	DESC CODE	GRAPHIC LOG	DESCRIPTIVE LOG
								0 - 51.0m GLACIAL SEDIMENTS
								51.0 - 97.6m FELDSPAR HORNBLENDE PHYRIC ANDESITIC INTRUSIVE Core badly broken 32% core recovery from 81.0 - 97.6m Light green, weathered, clay rich, partly haematitic massive medium - coarse grained hornblende - feldspar phyric andesitic intrusive. Weathering decreasing downhole.
								97.6 - 199.5m FELDSPAR HORNBLENDE PHYRIC ANDESITIC INTRUSIVE Massive grey-green medium to coarse grained hornblende feldspar phyric andesitic intrusive. Fine grained groundmass contains weak to moderate chloritic alteration overprinted by silicification and disseminated pyrite to varying degrees throughout. Very fine grained disseminated pyrite throughout (<1%). Pyrite mineralisation accompanied by intense silicification, removing original texture in parts. 5-10% disseminated pyrite from 105.25 - 105.65m and 111.5 - 111.9m. Quartz - chlorite - carbonate veins cross cut quartz-pyrite alteration from 115.95 - 115.65m

DRILLING OBJECTIVES / SUMMARY To test a coincident CSAMT, UTEM and MAX-MIN EM anomaly within a sequence of intermediate volcanics and intrusives for VMS style mineralisation. Results suggest the anomaly can be attributed to a conductive graphitic black shale intersected 205.8m down hole

REPORT REFERENCE

SHEET 1 OF 3

CR 12027

SHLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

Samples also assayed for Sb and As
See appendix for details

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

CONTINUATION SHEET

PROJECT BASIN [redacted] | HOLE NO [redacted]LO [redacted]2

LOGGED BY C. CARBAGH | TOTAL DEPTH 250m

ASSAY INFORMATION

DISTANCE FROM COLLAR TO TOP	DISTANCE FROM COLLAR TO BOTTOM	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Au ppm	Ba ppm	SAMPLE NO	CORE ANGLE	ROCK TYPE	CLASS	DESC CODE	GRAPHIC LOG
100.0	102.0	70	150	390	<0.5	0.064	2300						
102.0	104.0	495	285	495	2.0	0.025	1850						
104.0	106.0	50	30	60	<0.5	<.008	1650						
106.0	108.0	55	25	70	<0.5	<.008	1400						
108.0	110.0	50	215	270	<0.5	<.009	1400						
110.0	112.0	130	340	270	<0.5	0.042	1150						
112.0	114.0	55	90	160	<0.5	0.019	1400						
114.0	116.0	70	50	195	<0.5	0.020	2200						
125.0	127.0	60	80	260	<0.5	0.023	1750						
137.0	138.0	60	55	70	<0.5	0.017	1550						
139.0	140.0	55	130	395	<0.5	0.021	740						
143.0	143.0	55	25	85	<0.5	0.012	3600						
154.0	155.0	90	25	55	<0.5	0.024	990						
163.0	165.0	55	25	50	<0.5	0.024	1450						
165.0	167.0	45	25	55	<0.5	0.024	820						
167.0	169.0	45	20	55	<0.5	0.057	880						
169.0	171.0	55	25	60	<0.5	0.013	1100						
171.0	173.0	40	20	50	<0.5	0.010	1750						
173.0	175.0	45	20	55	<0.5	0.012	2200						
175.0	177.0	45	25	60	<0.5	0.015	3000						
179.0	181.0	35	25	45	<0.5	0.010	4500						
181.0	183.0	50	20	45	<0.5	0.015	7100						
183.0	185.0	40	15	40	<0.5	<.009	2250						
190.8	191.2	40	20	60	<0.5	0.023	3300						
192.8	193.2	35	25	60	<0.5	0.012	2350						
199.0	201.0	60	30	55	<0.5	0.015	1450						
201.0	203.0	65	40	85	<0.5	0.017	1400						
203.0	205.0	50	45	95	0.5	0.015	610						
205.0	207.0	35	45	90	<0.5	0.025	520						
207.0	209.0	40	55	95	<0.5	<.009	550						
209.0	211.0	50	95	160	<0.5	0.030	610						
211.0	213.0	60	105	190	<0.5	<.008	660						
213.0	215.0	60	70	115	<0.5	0.023	2700						
215.0	217.0	65	65	110	<0.5	0.057	250						
217.0	219.0	70	65	110	<0.5	0.021	470						
219.0	221.0	70	60	140	<0.5	0.021	370						
221.0	223.0	500	1055	1170	<0.5	0.046	320						
223.0	225.0	40	95	160	<0.5	0.015	400						
225.0	227.0	65	130	170	<0.5	0.085	610						

DESCRIPTIVE LOG

Shear zone from 119.5 – 122.0m at 20° to CA with accompanying zones of quartz – chlorite – pyrite alteration (<5% pyrite).
Increased silicification from 125.1 – 126.6m containing narrow veins (<2cm) of quartz – chlorite – pyrite at 126.2m and 126.6m.
Wispy pyrite (<2%), cross cutting breccia with quartz chlorite veining from 130.85 – 131.25m.
Increased silicification accompanied by 2% disseminated fine grained pyrite at 117.0 – 118.0m, 119.0 – 119.0m, and 142.0 – 143.0m.
5% disseminated pyrite from 154.2 – 154.3m
15% disseminated fine grained pyrite in chalcedonic quartz from 166.4 – 167.2m Original textures absent.
2% disseminated fine grained pyrite from 163.0 – 166.4m
15% disseminated fine grained pyrite accompanied by quartz – chlorite alteration from 183.5 – 183.9m
Silicification increases from 185.0m, accompanied by lesser chlorite alteration largely replacing original texture

199.5 – 202.5m FAULT ZONE
Core badly broken – piggy. Cleavage at 20° CCA

199.5 – 201.3m HORNBLENDE FELDSPAR PHYRIC ANDESITIC INTRUSIVE
Massive grey green foliated medium – coarse grained Feldspar hornblende phyric andesitic intrusive.

201.3 – 205.0m BRECCIA
Possible intrusive contact. Feldspar hornblende phyric andesitic intrusive containing numerous irregularly oriented and shaped fragments of fine grained shales, siltstones and sandstones.

205.0 – 229.1m SHALE / SILTSTONE / SANDSTONE
Interbedded graphitic black shales with lesser fine grained sandstones and siltstones derived from an intermediate volcanic source. Finely laminated in parts. Bedding predominantly 60 – 70° LCA. Cross bedding gives up-hole facing. Soft sediment slump structures prominent within shale and sandstone units.
1% disseminated pyrite throughout with occasional pods (<2cm) of pyrite.

SHEET 2 OF 3

5 12028

SHLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

Samples also assayed for Sb and As
See appendix for details

The Shell Company of Australia [redacted]
METALS DIVISION

DRILL LOG SHEET

CONTINUATION SHEET

PROJECT [redacted]
HOLE NAME [redacted] BLO [redacted] 2 [redacted]
LOGGED BY C. CREAGH
TOTAL DEPTH 250m

ASSAY INFORMATION

Distance from collar: To top	Distance from collar: To bottom	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Au ppm	Ba ppm	Sample No	Core angle	Rock type	Diam	Desc code	Graphic log
227.0	229.0	45	45	105	<0.5	0.016	610						
229.0	231.0	60	25	70	<0.5	0.016	1200						
231.0	233.0	50	15	60	<0.5	0.019	910						
233.0	235.0	60	25	65	<0.5	0.016	1050						
235.0	237.0	56	25	95	<0.5	0.020	540						

DESCRIPTIVE LOG

229.1 – 250.0m ANDESITIC VOLCANICLASTIC
Massive grey-green medium grained feldspar phyric andesitic volcaniclastic. Finegrained chloritic-sericitic groundmass.
Upper contact at 50° LCA
<1% disseminated pyrite throughout.

E.O.H.

SHEET 2 OF 2

512029

SHLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

HEADING SHEET

COLLAR INFORMATION

DATA TYPE	COLLAR CO-ORDINATES EASTING	NORTHING	ELEVATION	COLLAR SURVEY AZIMUTH	DIP	HOLE NAME	TOTAL DEPTH	HOLE TYPE	DESC CODE	REMARKS
	381140	3527660		095	60	BLD89-3				

PROJECT	BASIN LAKE
LOGGED BY	J. RANDELL
CONTRACTOR	DIAMOND DRILLING TAS
CREW	K. HOW
CORE STORAGE NO OF TRAYS	CORE STORAGE LOCATION: DEVONPORT
MAP LAB	A. CRAWFORD

HOLE NAME	BLD 89-3
TOTAL DEPTH	388.4m
RIG	LY 38.
DATE STARTED	18/9/89 FINISHED 25/10
SAMPLE STORAGE	DEVONPORT
ASSAY LAB	ANALABS

DESC	SIZE	FROM	TO	TOTAL	REMARKS
NON CORE	HW	0	4	4	
CORE	HQ	4	102	98	
	NQ	102	388	286	
	BQ				
CASING					
CASING LEFT	PVC	0	388		(S) steel (P) plastic

SURVEY INFORMATION

DISTANCE FROM COLLAR TO TOP	TO BOTTOM	AZIMUTH	DIP	REMARKS
0		095	60	
50		090	57	
100		089	54	
150		087	48	
195		084	42	
250		083	41	
300		085	39	
350			37	

PLOTTING KEY

SYMBOL DES. CODE	SYMBOL G/LOG	INTERVAL FROM	INTERVAL TO	SYMBOL DES. CODE	SYMBOL G/LOG	INTERVAL FROM	INTERVAL TO

ASSAY INFORMATION

DISTANCE FROM COLLAR TO TOP | TO BOTTOM | SAMPLE Nº | CORE ANGLE | ROCK TYPE | DIAM | DESC CODE | GRAPHIC LOG

DESCRIPTIVE LOG

0 – 31.4 // GLACIAL SCREE (OWEN CONGLOMERATE)

0 – 7.1. Pebble conglomerate
7.1 – 7.4. Purple lamahtic sandstone
7.4 – 10.3. Pebble-cobble conglomerate
10.3 – 11.5. Pink coarse sandstone
11.5 – 28.0. Pink-purple pebble-cobble conglomerate.
28.0 – 28.6. Purple sandstone.
28.6 – 31.4. Pebble conglomerate

31.4 – 73.5 // CLAY (EX-VOLCANIC)

Pale grey-green clay, very poor core recovery. Coarse quartz grains ~20% throughout. Minor pebbles of disseminated pyrite, up to 7 %.

73.5 – 89.4 // WEATHERED QUARTZ-FELDSPAR PHYRIC FELSIC LAVA

73.5 – 76.4. Yellow brown quartz phyric clay.
76.4 – 79.8. Quartz + yellow brown clay.
79.8 – 84.3. Becoming more competent. Pale

DRILLING OBJECTIVES / SUMMARY: Collared to test a CSAMT anomaly at or near the Great Lyell Fault and to extend through the fault into Owen Conglomerate.

REPORT REFERENCE:

SHEET 1 OF 9

GP 12030

SHILMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

CONTINUATION SHEET

PROJECT	BASIN LAKE	HOLE NAME	BLD 89-3
LOGGED BY	J. RANDELL	TOTAL DEPTH	

	DISTANCE FROM COLLAR TO TOP	DISTANCE FROM COLLAR TO BOTTOM	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Au ppm	As ppm	Ba ppm	SAMPLE NO	CORE ANGLE	ROCK TYPE	DIAM	DESC CODE	GRAPHIC LOG
SP	89·4	91·0	25	50	110	<0.5	<0.009	10	13000	172201					
SP	91·0	93·0	45	30	1100	40.5	<0.008	<2	14000	172202					
SP	93·0	95·0	20	20	70	<0.5	<0.008	2	14000	172203					
SP	95·0	97·0	25	15	70	1.0	<0.008	<2	16000	172204					
SP	97·0	99·0	25	<5	75	<0.5	<0.008	<2	15500	172205					
SP	99·0	101·0	25	25	85	<0.5	<0.008	<2	16000	172206					
SP	101·0	103·0	20	25	100	<0.5	<0.005	<2	16000	172207					
SP	103·0	105·0	20	30	80	<0.5	<0.009	2	16000	172208					
SP	105·0	107·0	30	20	100	<0.5	<0.008	<2	14000	172209					
SP	107·0	109·0	25	20	85	<0.5	0.031	<2	22500	172210					
SP	109·0	111·0	25	10	70	<0.5	<0.008	2	15000	172211					
SP	111·0	113·0	15	15	75	<0.5	<0.008	<2	13000	172212					
SP	113·0	115·0	15	10	75	<0.5	<0.008	<2	12000	172213					
SP	115·0	117·0	20	5	90	1.5	<0.008	<2	12000	172214					
SP	117·0	119·0	20	10	80	<0.5	<0.008	<2	11000	172215					
SP	119·0	121·0	25	60	120	<0.5	<0.008	2	12000	172216					
SP	121·0	123·0	25	55	90	<0.5	<0.008	2	18500	172217					
SP	123·0	125·0	20	<5	100	<0.5	<0.008	3	13000	172218					
SP	125·0	127·0	25	30	80	<0.5	0.049	15	9600	172219					
SP	127·0	129·0	25	40	70	<0.5	<0.008	15	10000	172220					
SP	129·0	131·0	20	20	90	<0.5	<0.005	15	9900	172221					
SP	131·0	133·0	20	20	85	<0.5	<0.008	9	10500	172222					
SP	133·0	134·4	15	10	120	<0.5	<0.008	9	10500	172223					

ASSAY INFORMATION

SAMPLE: 16909

SUMMARY:

This is a quartz+plagioclase-phyric rhyodacitic lava showing relatively intense calcite-sericite alteration.

DESCRIPTIVE LOG

Yellow brown coarsely quartz + feldspar phyric volcanic. Vague layering at 40° LCA.

84·3 – 89·4 Pale green-white coarse quartz, medium feldspar phyric chloritic moderately layered volcaniclastic, dacitic to andesitic. Becoming fresher down hole, layering at 45° LCA. Chloritic wisps ex pumice. Minor K-spar alteration.

89·4 – 134·4 // FRESH SERICITIC (+ K-SPAR – PYRITE) RHYODACITIC LAVA

Upper contact sharp but obscure. Strong sericitic alteration, chloritic alteration very patchy, K-spar ubiquitous but variable in intensity. Generally feldspar phyric to 89·4m. Fine disseminated pyrite in fracture fill usually accompanied by sericite, estimated 2-3%.

Quartz rich phyric component from 93m, moderate to strong K-spar. Vague layering at 50° LCA

? Carbonate altered volcanics 97·5 – 97·8.

At 95·0 5-10% gy diseminated pyrite.

100 – 100·5 Vuggy quartz stockwork composed of 15-20% quartz veins.

104 – 106 m, Gradual change to more massive volcanics quartz + K feldspar phenocrysts. Appears more like a dacitic lava.

Further down hole, K-spar decreases, becomes chloritic + sericitic.

106 – 109 m Few quartz known quartz veins. Fine disseminated pyrite in fractures, irregular. Unit contains more feldspar than quartz

T.S. 16909 110m.

Disseminated pyrite in fracture planes, also minor irregular patches 5cm wide ~10·5%

Towards 130m, stronger sericitic alteration more strongly layered.

Bottom contact gradational over 10cms but layering suggests 55° LCA contact.

134·4 – 195·4 // FELDSPAR – QUARTZ PHYRIC SERICITIC PYRITIC DACITIC – RHYODACITIC LAVA.

134·4 – 135·5. Strongly broken core sheared very strong sericitic alteration.

SHEET 2 OF 9

5120 31

SKLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

CONTINUATION SHEET

PROJECT	BASIN LAKE	HOLE NAME	BLD 89-3
LOGGED BY	J. RANDELL	TOTAL DEPTH	

ASSAY INFORMATION

	DISTANCE FROM COLLAR TO TOP	DISTANCE FROM COLLAR TO BOTTOM	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Au ppm	As ppm	Ba ppm	SAMPLE NO	CORE ANGLE	ROCK TYPE	DIAM	DESC CODE	GRAPHIC LOG
SP	134.4	136.0	20	50	65	1.5	0.013	10	1450	172244					
SP	136.0	138.0	25	75	50	<0.5	0.012	10	1300	172245					
SP	138.0	140.0	15	20	75	<0.5	0.011	7	1310	172246					
SP	140.0	142.0	20	15	50	<0.5	0.014	4	1170	172247					
SP	142.0	144.0	50	<5	75	<0.5	0.013	<2	580	172248					
SP	144.0	146.0	40	<5	80	<0.5	<0.008	<2	560	172249					
SP	146.0	148.0	40	10	75	<0.5	0.009	<2	580	172250					
SP	148.0	150.0	20	<5	75	<0.5	<0.008	<2	500	172251					
SP	150.0	152.0	20	<5	65	<0.5	0.017	2	520	172252					
SP	152.0	154.0	20	<5	80	<0.5	0.017	<2	630	172253					
SP	154.0	156.0	20	<5	75	1.5	0.011	<2	570	172254					
SP	156.0	158.0	15	<5	60	<0.5	0.011	2	570	172255					
SP	158.0	160.0	25	10	80	0.5	0.013	4	730	172256					
SP	160.0	162.0	60	<5	115	<0.5	0.012	2	1200	172257					
SP	162.0	164.0	50	<5	70	<0.5	0.013	<2	1000	172258					
SP	164.0	166.0	60	10	80	0.5	0.015	<2	1350	172259					
SP	166.0	168.0	50	<5	75	<0.5	0.012	<2	910	172260					
SP	168.0	170.0	40	20	120	1.5	0.014	7	850	172261					
SP	170.0	172.0	40	10	115	<0.5	<0.008	5	710	172262					
SP	172.0	174.0	100	25	90	0.5	0.014	30	760	172263					
SP	174.0	176.0	65	80	120	0.5	0.013	25	820	172264					
SP	176.0	178.0	40	100	285	<0.5	0.013	10	1100	172265					
SP	178.0	180.0	75	40	280	1.5	0.018	15	1100	172266					
SP	180.0	182.0	65	10	60	0.5	0.030	15	1000	172267					
SP	182.0	184.0	35	50	140	<0.5	0.020	5	790	172268					
SP	184.0	186.0	35	45	170	0.5	0.015	10	820	172269					
SP	186.0	188.0	33	<5	145	<0.5	0.012	6	870	172250					
SP	188.0	190.0	30	80	140	<0.5	0.013	15	840	172251					
SP	190.0	192.0	70	20	200	0.5	0.013	20	1100	172252					
SP	192.0	194.0	20	10	175	<0.5	<0.008	8	740	172253					
SP	194.0	195.4	30	30	200	<0.5	<0.008	9	1200	172254					
SP	195.4	198.0	75	30	195	<0.5	0.010	7	1400	172255					

SAMPLE: 16910

SUMMARY:

This is a foliated former quartz+plagioclase-phyric rhyolitic or rhyodacitic lava with calcite-sericite alteration which is less well-developed than the previous sample. The original rock from which this sample was derived via foliation development was identical to sample 16909.

SAMPLE: 16911

SUMMARY:

This is a sparsely plagioclase-phyric, formerly glassy dacitic to rhyodacitic lava with strong calcite-dominated alteration, and cut by discrete well-spaced microshear zones in which sericite is extensively developed. This sample is petrographically unlike the two previous samples, and clearly comes from a different flow.

SAMPLE: 16912

SUMMARY:

This is a foliated quartz+plagioclase-phyric rhyolitic lava with sericite-calcite-pyrite alteration pre-foliation.

DESCRIPTIVE LOG

135.5 – 142 Well foliated (55-60° LCA) sericitic

T.S. 16910 volcaniclastic. Pyrite strong sericitic alteration

137.5m Also v bigvitrous fine disseminated pyrite 2-5% along foliation planes.

142 – 150m. More chloritic, less sericitic, less pyritic. Fine chlorite veining, also minor quartz ± pyrite veins. Quartz + feldspar phyric. Moderate layering 45° LCA.

150 – 152.6. Strong sericitic alteration, little chlorite. Pyrite occurs as irregular veinlets parallel to foliation + disseminated.

152.6 – 155.7. Moderate chlorite + sericitic alteration. Some white quartz bands at 155m. Little dissem. pyrite in this zone.

159.2 – 160. Moderate pink K-spar alteration

T.S. 16911 161.2 – 167.8. Moderately chloritic but banded. At 162.0m 45°-50° LCA. Little or no pyrite.

167.8 – 171.2. Sericitic with irregular veinlets and lenses pyrite (1-5%). Not banded.

171.2 – 174. Weak to mod. broken core + bands white quartz.

172.9 – 181.3. Increasing sericite + pyrite (5-7%) alteration. Generally strongly sericitised variable pyrite from veinlets to dissemination to 10-15% in localised bands. Foliation 45° LCA

181.3 – 188.6 More chloritic, less sericitic, less pyritic. Moderately broken core + thick quartz veins 184.6 – 185.5m.

T.S. 16912 188.6 – 191.4. Moderately sericitised + pyrite 188.6m (up to 5%), well foliated.

191.4 – 195.4. Estimated 40% white quartz bands + irreg. quartz in chloritic clastics. Little sulphide ~1%.

195.4 – 231.8 // SERICITIC FOLIATED PYRITIC FINE GRAINED RHYODACITIC LAVA

Moderately sericitised, well layered, pyrite 3-5%

SHEET 3 OF 9

5120232

SHLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

CONTINUATION SHEET

PROJECT	BASIN LAKE	HOLE NAME	BLD 89-3
LOGGED BY	J. RANDELL	TOTAL DEPTH	

	DISTANCE FROM COLLAR TO TOP	TO BOTTOM	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Au ppm	As ppm	Ba ppm	SAMPLE NO	CORE ANGLE	ROCK TYPE	QUAN	DESC CODE	GRAPHIC LOG		DESCRIPTIVE LOG
SP	198.0	200.0	115	5	235	<0.5	0.010	3	1300	172556							Becoming finer grained, wk qtz or feldspar phyric.
SP	200.0	202.0	130	<5	155	<0.5	<0.0008	6	1550	172557					T.S.	16913	
SP	202.0	204.0	125	<5	180	<0.5	0.009	10	1150	172558						198.2m	Wk to moderate chloritic alteration, fine chloritic layering 40° LCA. Pyrite mainly as thin bands/laminations often re-crystallized to medium grained euhedral cubes.
SP	204.0	206.0	2550	15	1490	<0.5	0.014	15	830	172559							
SP	206.0	208.0	175	<5	175	0.5	<0.0008	20	780	172560							
SP	208.0	210.0	125	<5	135	<0.5	<0.0008	10	710	172561							
SP	210.0	212.0	100	<5	160	<0.5	<0.0008	9	890	172562							
SP	212.0	214.0	125	<5	160	<0.5	0.009	14	910	172563							211.2 - 211.8. Strongly broken core.
SP	214.0	216.0	195	<5	150	<0.5	0.012	12	900	172564							
SP	216.0	218.0	125	<5	130	<0.5	<0.0008	3	780	172565							211.8 - 215.0. Moderately chloritic + strongly sericitic altered. Few irreg. ab/bk/gn pyrite dissemination + veinlets.
SP	218.0	220.0	1500	110	430	<0.5	<0.0008	10	570	172566							
SP	220.0	222.0	175	20	355	<0.5	<0.0008	5	630	172567							
SP	222.0	224.0	175	<5	235	<0.5	0.009	<2	740	172568							
SP	224.0	226.0	1855	5	2120	<0.5	0.013	5	970	172569							215 - 216.6. Strong sericitic + silica alteration. Strong pyrite lamination + dissemination up to 5-10%. Many foliation planes at 40° LCA.
SP	226.0	228.0	130	<5	150	<0.5	0.011	2	910	172570							
SP	228.0	230.0	15	<5	160	<0.5	<0.0008	<2	860	172571							
SP	230.0	231.8	75	<5	170	<0.5	<0.0008	<2	720	172572							
SP	231.8	234.0	200	<5	180	<0.5	0.015	5	800	172573							216.6 - 219.4. Moderately chloritic alteration irreg. crackle quartz veins with some granular clasts. Minor pyrite to 2%.
SP	234.0	236.0	180	<5	150	<0.5	0.032	<2	1500	172574							
SP	236.0	238.0	130	<5	165	<0.5	0.011	<2	990	172575							
SP	238.0	239.3	185	<5	170	<0.5	0.012	<2	1100	172576							219.4 - 220. Well laminated (55° LCA) strongly sericitic + silicified + up to 10% fine disseminated pyrite in laminations.
															T.S.	16914	220 - 231.8. Fine grained chloritic mod-strong
																220.4m	irregular quartz veinlets, little pyrite.
																	231.8 — 239.3 // CHLORITIC SERICITIC DACITIC LAVA BRECCIA
																	Upper contact gradational over 20 cm. - well layered 50° LCA.
															T.S.	16915	Lithic fragments variable in size, ash - 4cm
																238.9m	mostly subrounded and composed of predominantly very fine grained ash, minor quartz phenocrysts. Pyrite absent. Lower contact sharp at 45° LCA.
																	239.3 — 250.2 // STRONGLY SERICITIC SILICIFIED AND CHLORITE SPOTTED DACITIC LAVA
																	Irregular distribution of up to 2.5cm lithic fragments (subrounded). Intensely chlorit

ASSAY INFORMATION

SAMPLE: 16913

SUMMARY:

This is a foliated formerly poorly quartz+feldspar-phyric rhyolitic or rhyodacitic lava that suffered sericitization, probably followed by chlorite-pyrite alteration, and then calcite-veining coeveal with foliation development.

SAMPLE: 16914

SUMMARY:

This is a strongly foliated sericite-chlorite-pyrite schist derived from a rock very similar to 16913 by more intense foliation development in a higher strain zone.

SAMPLE: 16915

SUMMARY:

This is a formerly dacitic vesicular lava breccia that has suffered strong chloritization and shows a weak foliation.

SHLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

CONTINUATION SHEET

PROJECT	BASIN LAKE	HOLE NAME	BLD 89-3
LOGGED BY	J. RANDELL	TOTAL DEPTH	

ASSAY INFORMATION

DISTANCE FROM COLLAR TO TOP	DISTANCE FROM COLLAR TO BOTTOM	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Au ppm	As ppm	Ba ppm	SAMPLE NO	CORE ANGLE	ROCK TYPE	CLASS	DESC CODE	GRAPHIC LOG
239·3	241·0	160	<5	180	<0·5	0·070	<2	1400	172717					
241·0	243·0	265	<5	220	<0·5	0·016	<2	1000	172718					T.S. 16916
243·0	245·0	1725	830	2400	<0·5	0·013	<2	1000	172719					246·7m
245·0	247·0	1725	32700	2615	<0·5	<0·008	5	1550	172720					
247·0	249·0	1905	<5	2715	<0·5	0·011	<2	1150	172721					
249·0	251·0	1455	<5	1715	<0·5	0·015	<2	1700	172282					

SAMPLE: 16916

SUMMARY:

This is a strongly feldspar-phyric dacitic lava that has been intensely chlorite altered without pyrite mineralization.

SAMPLE: 16917

SUMMARY:

This is a relatively weakly altered massive plagioclase-phyric dacitic lava or pumiceous tuff lacking the intense chlorite alteration that characterized many of the previous samples.

SAMPLE: 16918

SUMMARY:

This is a lava breccia derived from a rhyolitic or rhyodacitic glassy, sparsely plagioclase-phyric flow. It shows fairly strong sericite alteration, but no chlorite alteration.

DESCRIPTIVE LOG

spotted + well layered generally 45-50° LCA.

T.S. 16916 241·6 – 244·3. Some irregular quartz veins.

246·7m

No sulphide visible.
Lower contact sharp but sheared and obscured.

250·2 – 311·2 // STRONGLY SILICIFIED K-SPAR AND CHLORITE ALTERED DACITIC LAVA

Generally strongly silicified, sometimes massive but some pumiceous layers. Irregular K-spar alteration of feldspar phenocrysts.

250·2 – 258·4. Strongly chloritic, massive but often with silicified + K-spar – quartz breccia zones.

258·4 – 260·5. Non chloritic strongly feldspar phyric but also silicified. Fine quartz crackle veining.

260·5 – 263·4. Moderately chloritic, silicified and quartz crackle veined.

263·4 – 266. Moderately broken core, strongly silicified + pink K-spar alteration.

No sulphides observed except speck Cpy @ 261·5m

266 – 268·7. Moderately chloritic, massive silicified and feldspar phyric.

268·7 – 270·2. Strong siliceous zone 80% quartz.

T.S. 16917 270·2 – 278·3. Moderately chloritic and
27468 strongly silicified. Strongly feldspar phyric. Strong bleaching at 276·2m. From 276·4 – 278·3 massive strongly chloritic but not feldspar porphyritic.

278·3 – 287·3. Moderate to strong K-spar + silica
T.S. 16918 alteration. K-spar replaces feldspar porphyroblasts
28432 but also occurs as fine matrix with patchy but pervasive silica alteration.
From 283·8 – 286·2m, mod-strong white carbonate veining and strong autobrecciation with fine pumiceous bands. Maybe a hyalo-clastic.

SHEET 5 OF 9

SHLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

CONTINUATION SHEET

PROJECT	BASIN LAKE	HOLE NAME	BLD 89-3
LOGGED BY	J. RANDELL	TOTAL DEPTH	

DISTANCE FROM COLLAR: TO TOP | TO BOTTOM

SAMPLE NO | CORE ANGLE | ROCK TYPE | CLASS | DESC CODE | GRAPHIC LOG

ASSAY INFORMATION

SAMPLE: 16919

SUMMARY:

This is a pumiceous lithic tuff composed of sparsely plagioclase-phyric formerly glassy dacitic lava and pumice fragments in a devitrified glassy matrix.

DESCRIPTIVE LOG

287·3 – 290·3. Strongly chloritic vague foliation or flow banding at 55° LCA. Generally massive but with fine carbonate-quartz veining. Not feldspar phyric.

290·3 – 291·4. Moderately chlorite and irreg. K-spar alteration. Some irregular quartz veinlets. Some minor auto breccia.

291·4 – 292·5. Strongly chloritic with irregular quartz veins and patches.

292·5 – 296·3. Massive strongly silicified, weak irregular feldspar porphyroblastic. Irregular fine quartz veinlets with pyrite on shear planes in bleached zone from 294·2 – 294·5.

296·3 – 305·2. Moderate K-spar and strong silica alteration. Weak irregular feldspar phyric. Irregular K-spar alteration, some bleaching occur. Auto brecciation 299·7 – 299·9. At 303·5 – 303·8 90% silica 10% chlorite + K spar.

305·2 – 307·4. Moderately chloritic no K spar but fine quartz crackle veining. Some brecciation at 305·8.

307·4 – 311·2. Moderate irregular K-spar + bleaching + strong silica alteration, very irreg and patchy. Minor fine quartz-carbonate veinlets. Strongly broken core 307·7 – 307·8.

311·2 – 323·1 // CHLORITIZED WEAKLY K-SPAR ALTERED PUMICEOUS DACITIC LAVA/VOLCANICLASTIC

T.S. 16919 316·2m. Gradational contact. Vague foliation developed at 55° LCA. Minor bands and clots of chloritized pumice.

321·4 – 322·1. Strongly feldspar phyric pumiceous chloritic layered volcaniclastic.

322·1 – 323·1. Strong silica + sericite + K spar.

Lower contact sharp but brecciated at 65° LCA.

SHEET 6 OF 9

5120351

SHLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

CONTINUATION SHEET

PROJECT BASIN LAKE	HOLE NAME BLD 89-3
LOGGED BY J. RANDELL	TOTAL DEPTH

DISTANCE FROM COLLAR: TO TOP | TO BOTTOM

SAMPLE No | CORE ANGLE | ROCK TYPE | CHAM | DESC CODE | GRAPHIC LOG

ASSAY INFORMATION

DESCRIPTIVE LOG

323-1-327.3 // FINE GRAINED MASSIVE BASALTIC DYKE

Moderately magnetic, chloritic, weakly quartz fracture veined. Minor K-spar altered feldspar clots.

327.3-336.4 // SILICIFIED VARIABLY K-SPAR AND CHLORITE ALTERED DACITIC LAVA/VOLCANICLASTIC

Upper contact sharp at 45° CA, Alb bleached.

Strong pervasive silicification but variable patchy K-spar + minor chlorite.
Strongly feldspar phyric.

333.2-333.8. 8-7 silica.

333.8-336.4 Strongly chloritic, fracture veined + strong silicification. Minor zones of chloritised-pumice + ? lava clasts.

336.4-360.5 // LAYERED CHLORITIC PUMICEOUS FELDSPAR PHYRIC DACITIC EPICLASTIC.

Upper contact gradational.

Moderately well layered broken cor. Dominantly pumiceous to 339m.

339-341.5. Minor chloritic pumice clasts in fine chlorite matrix with minor large (5-6cm) subrounded K-spar altered ? lava clasts.

341.5-342.6. Strong chloritic anastomosing veinlets in strongly feldspar phyric dacitic epiclastic. Clasts of sub elongate fine volcaniclastics and subrounded K-spar silicified volcanics

342.6-347.8. Strongly silicified moderately K-spar altered strongly chloritic and quartz veined in clast dominant breccia. Lower 2m is strongly K-spar altered. Clasts quite variable in size up to 3-4cms and dominantly K-spar silicified lava.

SHEET 7 OF 9

SHLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

CONFORMATION SHEET

PROJECT	BASIN LAKE	HOLE NUMBER	DLD [redacted]
LOGGED BY	J. RANDELL	TOTAL DEPTH	

ASSAY INFORMATION

DISTANCE FROM COLLAR: TO TOP / TO BOTTOM

SAMPLE: 16920

SUMMARY:
This is a strongly foliated, abundantly plagioclase-phyric, sericitized pumiceous crystal tuff.

SAMPLE No	CORE ANGLE	ROCK TYPE	DIAM	DESC CODE	GRAPHIC LOG		DESCRIPTIVE LOG
							347·8–349·7. Massive siliceous weakly quartz veined and fractured? hematitic volcanic.
							349·7–358·6. Strongly feldspar phyric chloritic pumiceous dacitic volcaniclastic. Minor zones of subangular fine volcaniclastic clasts. Other zones of bleached silicified quartz veined rhyodacitic lava breccia. Minor lithic component only but increasing downhole.
						T.S. 16920 355·1m	
							358·6–360·3. Rounded pebbles of hematitic conglomerate in intensely chloritic and silicified K-spar volcanics. Lower 30cms intensely silicified. Vague layering 65°LCA.
							360·3–360·5. Green + grey piggy clays.
							360·5–388·4 // INTERLAYERED ARENACEOUS AND SILTY SEDIMENTS.
							360·5–361·5. Massive silicified sandstone
							361·5–361·8. Pebble conglomerate, well rounded quartz pebbles in chloritic sandy matrix.
							361·8–363·8. Interlayered chloritic sandstone and siltstone. Bedding at 65°LCA.
							363·8–366·0. Intensely broken core sheared chloritic shale, not laminated but strongly brecciated
							366·0–375·0. Mixed chloritic sandstone and fine siltstone. Often in fine laminations 65°LCA or as irregular pods/bands. Mainly fine sand size sediments.
							366·3. Fine scour marks ⇧ UPHOLE FACING
							370·7. " " " " " "
							Broken core to 369·5.
							375·0–377·7. More uniformly laminated. becoming dominant sand silt laminations consistent at 60°LCA.
							377·7–384·3. Some irregular laminations and pods bands becoming mixed from fine silt to fine sands. Strongly broken at bottom.

SHEET 8 of 9

SHLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

CONTINUATION SHEET

PROJECT: BASIN LAKE	HOLE NAME: BLD 89-3
LOGGED BY: J. RANDELL	TOTAL DEPTH:

DISTANCE FROM COLLAR TO TOP	TO BOTTOM	SAMPLE No	CORE ANGLE	ROCK TYPE	DIAM	DESC CODE	GRAPHIC LOG

DESCRIPTIVE LOG

384.3–388.4. Pebble to cobble conglomerate. Sharp contact 45° CA. Well rounded composed of massive quartz, chloritic fine sandstone in hematitic siliceous matrix. Mainly vein quartz pebbles, lesser quartzite

E.O.H. 388.4m.

ASSAY INFORMATION

CORE RECOVERIES

FROM	TO	INT	REC	%
4.5	5.4	0.9	0.5	56
5.4	7.1	1.7	0.5	29
7.1	9.3	2.2	1.6	73
9.3	10.5	1.2	0.9	75
10.5	11.7	1.2	0.4	33
11.7	14.1	2.4	1.0	42
14.1	15.7	1.6	1.0	63
15.7	17.9	2.2	1.3	59
17.9	19.5	1.6	0.7	44
19.5	20.8	1.3	0.8	62
20.8	21.3	0.5	0.4	80
21.3	22.4	1.1	0.8	73
22.4	22.9	0.5	0.2	40
22.9	23.9	1.0	0.5	50
23.9	24.6	0.7	0.4	57
24.6	25.2	1.6	0.4	25
25.2	28.0	2.8	2.0	71
28.0	28.7	0.7	0.3	43
28.7	29.4	0.7	0.3	43
29.4	29.9	0.5	0.4	80
29.9	31.5	1.6	0.5	31
31.5	34.5	3.0	0.6	20
34.5	37.5	3.0	1.0	33
37.5	40.5	3.0	0.6	20
40.5	43.5	3.0	0.4	13
43.5	46.5	3.0	0.5	17
46.5	49.5	3.0	0.4	13
49.5	52.5	3.0	0.5	17
52.5	55.5	3.0	0.5	17
55.5	58.5	3.0	0.8	27
58.5	61.5	3.0	1.0	33
61.5	64.5	3.0	2.1	70
64.5	67.5	3.0	1.0	33
67.5	70.5	3.0	0.9	33
70.5	73.5	3.0	1.1	37
73.5	76.5	3.0	0.6	20
76.5	79.8	3.3	0.4	12
79.8	81.7	1.9	1.2	63

FROM	TO	INT	REC	%
133.4	135.3	1.9	1.6	84

ALL OTHER CORE 100% RECOVERY

SHEET 9 OF 9

512038

APPENDIX 2

ANALYTICAL REPORTS BLD 89-1, BLD 89-2, BLD 89-3

12040

ANALABS

A division of MacDonald Hamilton & Co. Pty. Ltd
Phone (09) 458 7999 52 Murray Road, Welshpool, W.A. 6106 Telex AA92560
FAX 004 31 8870

ANALYTICAL REPORT No. 204.0.08.06490

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

The Shell Company of Australia
Metals Division
P.O. Box 860
Devonport Tasmania 7310

ORDER No.	PROJECT
08474	

DATE RECEIVED	RESULTS REQUIRED
06/09/89	ASAP

No. OF PAGES OF RESULTS	DATE REPORTED	No. OF COPIES	TOTAL No. OF SAMPLES
4	25/09/89	1	26

STATE OF SAMPLES (REF. BELOW)	SAMPLE NUMBERS	PRE-TREATMENT: DRY	CRUSH	SPLIT	PULVERISE	SIEVE	OTHER SEE REMARKS	NONE	ANALYSIS: REFER TO ANALYSIS SECTION	PREPARATION	METHOD
	a701/726	DC Prep: 010,011,016							Cu,Pb,Zn,Ag/101		
	a70 726	DC							Au,AuChk/309		
	16701/726	DC							As,Ba,Sb,Sn/401		

RESULTS TO

The Shell Company of Australia
Metals Division
P.O. Box 860
Devonport Tasmania 7310

RESULTS TO

REMARKS

LD57
BLD 89-1

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

AUTHORISED OFFICER

ANALABS

A Division of Inchcape Inspection and Testing Services (Australia) Pty Ltd

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	204.0.08.06490	25/09/89	08474	1 OF 4

TUBE No	SAMPLE No	Cu %	Pb %	Zn %	Ag	Au g/t	AuChk	As	Sn	Sb
1	16701	40	15	75	<0.5	0.009	<0.008	8	3	<3
2	16702	10	15	75	<0.5	<0.008	-	8	4	<3
3	16703	15	35	115	<0.5	0.013	-	5	3	<3
4	16704	15	25	100	<0.5	0.011	-	10	5	<3
5	16705	10	15	100	<0.5	0.009	-	6	5	3
6	16706	15	10	90	<0.5	<0.008	-	4	6	4
7	16707	15	15	90	<0.5	0.012	-	4	<3	<3
8	16708	30	15	85	<0.5	0.011	-	5	5	<3
9	16709	25	10	90	<0.5	0.009	-	7	<3	<3
10	16710	30	10	100	<0.5	0.011	-	<2	<3	<3
11	16711	30	55	90	<0.5	<0.008	-	15	3	5
12	16712	15	10	65	<0.5	<0.008	-	<2	4	<3
13	16713	15	5	65	<0.5	0.010	-	<2	<3	<3
14	16714	45	80	210	<0.5	0.011	-	45	4	3
15	16715	45	120	340	<0.5	0.013	0.010	25	3	5
16	16716	20	15	70	<0.5	<0.008	-	<2	3	<3
17	16717	30	65	140	<0.5	0.009	-	6	4	<3
18	16718	30	40	140	<0.5	0.010	-	20	<3	6
19	16719	45	95	140	<0.5	0.023	-	40	5	3
20	16720	45	30	110	<0.5	0.010	-	30	5	<3
21	16721	45	70	110	<0.5	0.009	0.010	30	8	<3
22	16722	45	80	180	<0.5	0.010	-	45	4	<3
23	16723	45	75	215	<0.5	0.012	-	60	3	5
24	16724	45	80	210	<0.5	0.015	-	40	6	<3
25	16725	45	100	295	<0.5	0.009	-	30	7	3

Results in ppm unless otherwise specified

T= element present, but concentration too low to measure

<= element concentration is below detection limit

- = element not determined

AUTHORISED OFFICER

12041

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty Ltd

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	204.0.08.06490	25/09/89	08474	2 OF 4

TUBE No	SAMPLE No	Cu %	Pb %	Zn %	Ag	Au	AuChk	As	Sn	Sb
1	16726	40	25	70	<0.5	0.015	<0.008	25	<3	<3
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23	DETECTION	5	5	5	0.5	0.008	0.008	2	3	3
24	UNITS	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM
25	METHOD	101	101	101	101	309	309	401	401	401

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

AUTHORISED OFFICER

12042

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty Ltd

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No	PAGE
	204.0.08.06490	25/09/89	08474	3 OF 4

TUBE No.	SAMPLE No.	Ba								
1	16701	940								
2	16702	820								
3	16703	670								
4	16704	510								
5	16705	550								
6	16706	540								
7	16707	610								
8	16708	490								
9	16709	500								
10	16710	510								
11	16711	730								
12	16712	840								
13	16713	820								
14	16714	700								
15	16715	640								
16	16716	740								
17	16717	680								
18	16718	830								
19	16719	500								
20	16720	730								
21	16721	600								
22	16722	670								
23	16723	650								
24	16724	590								
25	16725	720								

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

12043

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty Ltd

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No	PAGE
	204.0.08.06490	25/09/89	08474	4 OF

TUBE No.	SAMPLE No.	Ra								
1	16726	530								
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23	DETECTION	10								
24	UNITS	PPM								
25	METHOD	401								

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

AUTHORISED OFFICER

12644

012615

ANALABS

A division of MacDonald Hamilton & Co. Pty. Ltd.
Phone (09) 458 7999 — 52 Murray Road, Welshpool, W.A. 6106 — Telex AA92560
FAX: 004 31 8890

ANALYTICAL REPORT No. 204.0.08.06535

LD57 CORE.

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

The Shell Company of Australia
Metals Division
P.O. Box 860
Devonport Tasmania 7310

ORDER No.	PROJECT
08475	

DATE RECEIVED	RESULTS REQUIRED
25/09/89	ASAP

No OF PAGES OF RESULTS	DATE REPORTED	No. OF COPIES	TOTAL No. OF SAMPLES
2	16/10/89	1	44

STATE OF SAMPLES		PRE-TREATMENT							ANALYSIS		
RETAIN	SAMPLE NUMBERS	DRY	CRUSH	SPLIT	PULVERISE	SIEVE	OTHER SEE REMARKS	NONE	REFER TO ANALYSIS SECTION	PREPARATION	METHOD
	o75./794	DC	Prep: 00$,009,016						Cu,Pb,Zn,Ag/101		
	o751/794	DC							Au,AuChk/309		
	o751/794	DC							As,Ba,Sb/401		

RESULTS TO

The Shell Company of Australia
Metals Division
P.O. Box 860
Devonport Tasmania 7310

RESULTS TO

REMARKS

BLD 89-2

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

AUTHORISED OFFICER

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty Ltd

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	204.0.08.06535	16/10/89	08475	1 OF 2

TUBE No	SAMPLE No.	Cu	Pb	Zn	Ag	Au g/t	AuChk	As	Ba	Sb
1	16751	70	150	380	<0.5	0.064	-	15	2300	4
2	16752	45	285	495	2.0	0.025	-	20	1850	<3
3	16753	50	30	60	<0.5	<0.008	-	60	1650	9
4	16754	55	25	70	<0.5	<0.008	-	55	1400	9
5	16755	50	215	270	<0.5	<0.008	-	35	1400	7
6	16756	130	340	270	<0.5	0.042	-	60	1150	<3
7	16757	55	90	160	<0.5	0.019	-	40	1400	<3
8	16758	70	50	195	<0.5	0.020	-	40	2200	4
9	16759	60	80	260	<0.5	0.023	-	10	1750	<3
10	16760	60	35	70	<0.5	0.017	-	50	1550	<3
11	16761	55	130	395	<0.5	0.023	-	35	740	<3
12	16762	55	25	85	<0.5	0.012	-	30	3600	<3
13	16763	40	25	55	<0.5	0.022	-	25	990	<3
14	16764	55	25	50	<0.5	0.024	0.018	20	1450	3
15	16765	45	25	55	<0.5	0.024	-	50	820	3
	16766	45	20	55	<0.5	0.057	-	50	880	4
17	16767	55	25	60	<0.5	0.013	-	60	1100	<3
18	16768	40	20	50	<0.5	0.010	-	110	1750	<3
19	16769	45	20	55	<0.5	0.012	-	150	2300	<3
20	16770	45	25	60	<0.5	0.015	-	120	3000	<3
21	16771	35	25	45	<0.5	0.010	-	260	4500	3
22	16772	50	20	45	<0.5	0.015	-	180	7100	<3
23	16773	40	15	40	<0.5	<0.008	-	150	2250	10
24	16774	40	20	60	<0.5	0.023	-	190	3300	<3
25	16775	35	25	50	<0.5	0.012	-	70	2350	<3

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

12046

ANALABS

Analabs (W.A.) Pty. Ltd. A Division of Inchcape Inspection and Testing Services Australia Pty Ltd.

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	204.0.08.06535	16/10/89	08475	2 OF 2

TUBE No	SAMPLE No.	Cu	Pb	Zn	Ag	Au	AuChk	As	Ba	Sb
1	16776	60	30	55	<0.5	0.015	-	20	1650	4
2	16777	65	40	85	<0.5	0.017	-	45	1400	6
3	16778	50	45	95	<0.5	0.015	-	20	610	<3
4	16779	35	45	90	<0.5	0.025	-	10	520	6
5	16780	40	55	95	<0.5	<0.008	-	15	550	<3
6	16781	50	95	160	<0.5	0.033	-	30	610	5
7	16782	60	105	190	<0.5	<0.008	-	55	660	<3
8	16783	60	70	115	<0.5	0.023	-	25	270	<3
9	16784	65	65	110	<0.5	0.057	0.056	20	250	10
10	16785	70	65	110	<0.5	0.021	-	25	470	5
11	16786	70	60	140	<0.5	0.021	-	20	370	5
12	16787	50	105	170	<0.5	0.046	-	25	320	10
13	16788	40	95	160	<0.5	0.015	-	40	400	10
14	16789	65	130	170	<0.5	0.085	-	35	610	15
15	16790	45	45	105	<0.5	0.016	-	50	610	10
	16791	60	25	70	<0.5	0.016	-	50	1200	<3
17	16792	30	15	60	<0.5	0.019	-	20	910	4
18	16793	60	25	65	<0.5	0.016	0.020	20	1050	3
19	16794	55	25	95	<0.5	0.020	-	40	540	3
20										
21										
22										
23	DETECTION	5	5	5	0.5	0.008	0.008	2	10	3
24	UNITS	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM
25	METHOD	101	101	101	101	309	309	401	401	401

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

AUTHORISED OFFICER

12047

ANALABS

A division of MacDonald Hamilton & Co. Pty. Ltd.

Phone (09) 4587999 52 Murray Road, Welshpool, W.A. 6106 Telex AA92560

ANALYTICAL REPORT No. 204.0.08.06700

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

The Shell Company of Australia
Metals Division
P.O. Box 860
Devonport Tasmania 7310

ORDER No.	PROJECT
11711	

DATE RECEIVED	RESULTS REQUIRED
01/12/89	ASAP

No. OF PAGES OF RESULTS	DATE REPORTED	No. OF COPIES	TOTAL No. OF SAMPLES
2	28/12/89	1	32

STATE OF SAMPLES		PRE-TREATMENT							ANALYSIS			
REFER BELOW	SAMPLE NUMBERS	DRY	CRUSH	SPLIT	PULVERISE	SIEVE	OTHER SEE REMARKS	NONE		REFER TO ANALYSIS SECTION	PREPARATION	METHOD
	72,01/82	DC	Prep: 006,010,011,012,013,016						Cu,Pb,Zn,Ag/101			
	72,01/82	DC							Ag,AuChk/307			
	72,01/82	DC							As,Bi/401			

RESULTS TO

The Shell Company of Australia
Metals Division
P.O. Box 860
Devonport Tasmania 7310

RESULTS TO

REMARKS

LOS7
BLD 89-3
CORE.

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

AUTHORISED OFFICER

12648

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty Ltd

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
048	204.0.08.06700	28/12/89	11711	1 OF 4

TUBE No.	SAMPLE No.	Cu	Pb	Zn	Ag	Au	AuCh:	As	Ba	
1	17201	25	50	110	<0.5	<0.008	<0.008	10	1200	
2	17202	45	30	100	<0.5	<0.008	–	<2	1400	
3	17203	20	20	70	<0.5	<0.008	–	2	1400	
4	17204	25	15	70	1.0	<0.008	–	<2	1600	
5	17205	25	<5	75	<0.5	<0.008	–	<2	1550	
6	17206	25	25	85	<0.5	<0.008	–	<2	1600	
7	17207	20	25	100	<0.5	<0.008	–	<2	1600	
8	17208	20	30	80	<0.5	<0.008	–	2	1600	
9	17209	20	20	100	<0.5	<0.008	–	<2	1400	
10	17210	25	20	85	<0.5	0.033	0.010	<2	2250	
11	17211	25	10	70	<0.5	<0.008	–	2	1500	
12	17212	15	15	75	<0.5	<0.008	–	<2	1300	
13	17213	15	10	75	<0.5	<0.008	–	<2	1200	
14	17214	20	5	90	1.5	<0.008	–	<2	1200	
15	17215	20	10	80	<0.5	<0.008	–	<2	1100	
16	17216	25	60	120	<0.5	<0.008	–	7	1200	
17	17217	25	55	90	<0.5	<0.008	–	2	1850	
18	17218	20	<5	100	<0.5	<0.008	<0.006	3	1300	
19	17219	25	30	80	<0.5	0.049	–	15	960	
20	17220	25	40	70	<0.5	<0.008	–	15	1000	
21	17221	20	20	90	<0.5	<0.008	–	15	990	
22	17222	20	20	85	<0.5	<0.008	–	9	1050	
23	17223	15	10	120	<0.5	<0.008	–	9	1050	
24	17224	20	50	65	1.5	0.013	0.011	10	1450	
25	17225	25	75	50	<0.5	0.012	–	10	1200	

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

512049

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty Ltd.

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
049	204.0.08.06700	28/12/89	11711	2 OF 4

TUBE No.	SAMPLE No.	Cu	Pb	Zn	Ag	Au	AuCh.K	As	Ba	
1	17226	15	20	75	<0.5	0.011	–	7	730	
2	17227	20	15	50	<0.5	0.014	–	4	670	
3	17228	50	<5	75	<0.5	0.013	–	<2	580	
4	17229	40	<5	80	<0.5	<0.008	–	<2	560	
5	17230	40	10	75	<0.5	0.009	–	<2	580	
6	17231	20	<5	75	<0.5	<0.008	–	<2	500	
7	17232	20	<5	65	<0.5	0.017	–	2	520	
8	17233	20	<5	80	<0.5	0.017	–	<2	630	
9	17234	20	<5	75	1.5	0.011	–	<2	570	
10	17235	15	<5	60	<0.5	0.011	–	2	570	
11	17236	25	10	80	0.5	0.013	–	4	730	
12	17237	40	<5	115	<0.5	0.012	–	2	1200	
13	17238	50	<5	70	<0.5	0.013	0.009	<2	1000	
14	17239	60	10	80	0.5	0.015	0.010	<2	1350	
15	17240	50	<5	75	<0.5	0.012	–	<2	910	
16	17241	40	20	120	0.5	0.014	–	7	850	
17	17242	40	60	115	<0.5	<0.008	–	5	710	
18	17243	100	25	80	0.5	0.014	–	20	760	
19	17244	65	80	120	0.5	0.013	–	25	820	
20	17245	40	100	285	<0.5	0.013	–	10	1100	
21	17246	75	40	280	1.5	0.018	–	15	1100	
22	17247	65	10	60	0.5	0.020	–	15	1000	
23	17248	35	50	140	<0.5	0.020	–	5	790	
24	17249	35	45	170	0.5	0.015	–	10	820	
25	17250	35	<5	145	<0.5	0.012	–	6	870	

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

512050

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty Ltd

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
050	204.0.08.06700	28/12/89	11711	3 OF

TUBE No.	SAMPLE No.	Cu	Pb	Zn	Ag	Au	AuChk	As	Ba
1	17251	30	80	140	<0.5	0.013	–	15	840
2	17252	70	20	200	0.5	0.013	–	20	1100
3	17253	20	10	175	<0.5	<0.008	–	8	740
4	17254	30	30	200	<0.5	<0.008	–	9	1200
5	17255	75	30	195	<0.5	0.010	–	7	1400
6	17256	115	5	235	<0.5	0.010	–	3	1300
7	17257	130	<5	155	<0.5	<0.008	–	6	1550
8	17258	135	<5	180	<0.5	0.009	0.012	10	1150
9	17259	250	15	140	<0.5	0.014	0.011	15	830
10	17260	175	<5	175	0.5	<0.008	–	20	790
11	17261	125	<5	135	<0.5	<0.008	–	10	710
12	17262	100	<5	160	<0.5	<0.008	–	9	890
13	17263	125	<5	160	<0.5	0.009	–	4	970
14	17264	155	<5	150	<0.5	0.012	–	2	900
15	17265	125	<5	130	<0.5	<0.008	–	3	780
16	17266	150	110	430	<0.5	<0.008	–	10	570
17	17267	175	20	355	<0.5	<0.008	0.012	5	630
18	17268	175	<5	235	<0.5	0.009	<0.008	<2	740
19	17269	165	5	220	<0.5	0.013	–	5	970
20	17270	130	<5	150	<0.5	0.011	–	2	910
21	17271	15	<5	160	<0.5	<0.008	–	<2	860
22	17272	75	<5	130	<0.5	<0.008	–	<2	970
23	17273	200	<5	180	<0.5	0.015	–	5	800
24	17274	180	<5	150	<0.5	0.032	–	<2	1500
25	17275	130	<5	165	<0.5	0.011	–	<2	990

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

512051

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty. Ltd.

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
051	204.0.08.06700	28/12/89	11711	4 OF 4

TUBE No.	SAMPLE No.	Cu	Pb	Zn	Ag	Au	AuChk	As	Ba	
1	17276	185	<5	170	<0.5	0.012	-	<2	1100	
2	17277	160	<5	180	<0.5	0.070	-	<2	1400	
3	17278	265	<5	220	<0.5	0.016	-	<2	1000	
4	17279	175	830	240	<0.5	0.013	-	<2	1000	
5	17280	175	2700	265	<0.5	<0.008	-	5	1550	
6	17281	190	<5	275	<0.5	0.011	-	<2	1150	
7	17282	145	<5	175	<0.5	0.015	0.014	<2	1700	
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23	DETECTION	5	5	5	0.5	0.008	0.008	2	10	
24	UNITS	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	
25	METHOD	101	101	101	101	309	309	401	401	

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

AUTHORISED OFFICER

512052

APPENDIX 3

LITHOGEOCHEMICAL ANALYTICAL REPORT

512054

CLASSIC COMLABS LTD
Analytical Laboratories (INC. IN W.A.)

305 South Road, Mile End South, South Australia, 5031
Telephone: (08) 43 5722 Fax: (08) 234 0321 Telex: LABCOM AA89323

Mr. Jeff Randell
Billiton Australia Ltd
PO Box 860
DEVONPORT
TAS 7310

Job Number: 9AD1932

Your Reference: 08476/LD57/CJC
Number of Samples: 25
Extra Samples : 0

Date Received: 18-SEP-1989
Date Reported: 06-NOV-1989

This report comprises a cover sheet and pages 1 to 3

This report relates specifically to the samples tested in so far as that the samples as supplied are truly representative of the sample source. Please address any enquiries to Mr. Trevor Francis.

Approved Signature:

for

Dr. John Kikkert
General Manager - Adelaide.

MM Mr Jeff Randell Devonport

Report Analyte Codes:
N.A. - Not Analysed.
L.N.R. - Listed But Not Received.
I.S. - Insufficent Sample for Analysis.

Distribution Codes:
CC - Carbon Copy
EM - Electronic Media
MM - Magnetic Media

CLASSIC COMLABS LTD
Analytical Laboratories (INC. IN WA.)

512055

Job: 9AD1932
O/N: 08476/LD57/CJC

ANALYTICAL REPORT

Sample	SiO2	TiO2	Al2O3	Fe2O3	MnO	MgO	CaO
16727	67.8	0.61	13.5	3.94	0.04	2.68	1.84
16728	68.9	0.55	15.0	4.94	0.02	0.71	0.26
16729	66.8	0.52	16.6	5.35	0.02	1.64	0.09
16730	59.8	0.52	16.7	9.10	0.03	2.82	0.05
16731	62.4	0.52	16.7	7.50	0.08	4.14	0.13
16732	59.4	0.53	16.6	9.00	0.09	4.42	0.25
16733	60.7	0.61	17.0	7.95	0.08	4.32	0.14
16734	59.5	0.61	18.4	8.00	0.17	3.68	0.04
16735	53.2	0.58	17.3	10.5	0.17	5.65	2.76
16736	59.9	0.45	14.7	7.80	0.12	4.00	4.86
16737	67.2	0.45	14.5	7.75	0.08	1.75	0.37
16738	58.1	0.45	14.5	6.80	0.12	2.02	5.40
16739	57.1	0.49	14.3	6.50	0.65	4.10	7.90
16740	57.7	0.46	14.9	8.15	0.12	4.48	7.65
16741	54.1	0.54	17.0	9.90	0.14	4.68	3.98
16742	61.9	0.47	14.6	5.75	0.12	2.84	3.08
16743	52.2	0.66	23.9	6.30	0.03	0.93	0.23
16744	65.8	0.39	16.9	4.20	0.04	1.49	0.39
16745	52.5	1.07	21.0	9.65	0.01	2.34	0.07
16746	56.1	0.61	17.1	7.60	0.07	3.28	3.48
16747	75.1	0.23	12.2	2.62	0.03	0.96	0.84
16748	72.4	0.17	15.2	2.28	0.04	0.64	0.19
16749	70.1	0.16	15.4	2.88	0.04	1.20	0.11
16750	53.8	1.24	18.3	8.80	0.18	3.94	1.71
15972	55.8	0.96	16.1	9.75	0.28	2.62	1.76
Units	%	%	%	%	%	%	%
Detn Limit	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Scheme	ICP5	ICP5	ICP5	ICP5	ICP5	ICP5	ICP5

512056

CLASSIC COMLABS LTD

Analytical Laboratories (INC. IN WA)

Job: 9AD1932
O/N: 08476/LD57/CJC

ANALYTICAL REPORT

Sample	Na2O	K2O	P2O5	LOI	Total
16727	0.36	3.98	0.12	4.26	99.1
16728	2.32	4.44	0.16	2.10	99.4
16729	0.90	3.08	0.19	4.24	99.4
16730	0.39	2.96	0.10	7.50	100.0
16731	0.63	2.02	0.14	5.40	99.7
16732	0.62	2.40	0.21	6.45	100.0
16733	0.26	2.16	0.32	6.00	99.5
16734	0.22	2.34	0.14	6.80	99.9
16735	3.20	0.33	0.23	5.40	99.3
16736	3.76	0.43	0.21	2.98	99.2
16737	1.78	2.26	0.19	3.40	99.7
16738	2.60	2.40	0.20	5.65	98.2
16739	2.46	2.04	0.25	4.98	100.8
16740	2.60	1.40	0.22	2.78	100.5
16741	1.37	2.84	0.24	4.76	99.5
16742	5.70	2.34	0.20	1.82	98.8
16743	4.98	4.38	0.29	5.65	99.5
16744	4.20	2.60	0.13	3.22	99.4
16745	0.11	5.75	0.31	6.70	99.5
16746	3.86	3.48	0.28	3.76	99.6
16747	4.22	1.68	0.08	1.80	99.8
16748	6.80	1.14	0.03	1.51	100.4
16749	6.00	2.16	0.04	1.68	99.8
16750	7.70	0.51	0.16	3.18	99.5
15972	6.40	1.44	0.23	4.04	99.4
Units	%	%	%	%	%
Detn Limit	0.01	0.01	0.01	0.01	0.01
Scheme	ICP5	ICP5	ICP5	ICP5	ICP5

512057

CLASSIC COMLABS LTD

Analytical Laboratories (INC IN WA)

Job: 9AD1932
O/N: 08476/LD57/CJC

ANALYTICAL REPORT

055

Sample	Zr	Sr	Rb	Y	Nb
16727	300	100	200	28	19
16728	230	92	120	30	13
16729	250	55	115	30	14
16730	155	86	96	6	10
16731	155	88	60	20	10
16732	125	100	70	18	8
16733	195	52	52	20	11
16734	165	35	65	15	11
16735	165	1120	6	18	12
16736	130	1280	9	20	9
16737	120	140	64	15	9
16738	120	250	72	16	8
16739	120	530	46	18	8
16740	130	610	62	18	9
16741	155	370	130	24	9
16742	145	300	48	16	11
16743	190	340	145	16	13
16744	160	480	82	24	10
16745	165	11	210	35	13
16746	175	710	60	20	11
16747	125	270	32	25	16
16748	115	300	28	20	18
16749	140	130	42	30	22
16750	160	230	5	18	12
15972	125	250	46	24	12
Units	ppm	ppm	ppm	ppm	ppm
Detn Limit	4	2	2	4	2
Scheme	XRF1	XRF1	XRF1	XRF1	XRF1

APPENDIX 4

THIN SECTION DESCRIPTIONS

Sample No. 16727

Rock Type: Fine-very fine grained Cambrian rhyolitic-rhyodacitic volcanoclastic.

Mineralogy: Fine-very fine grained fragments of quartz, k-spar with lesser plagioclase (?albite) with minor-very minor apatite and pyrite with a very fine groundmass of the above with abundant sericite, chlorite ±sphene.

Alteration: Strong sericite-chlorite alteration of the groundmass.

Mineralization: Minor pyritic clasts (<2cm).

Comments: Part of the Western volcano-sedimentary sequence.

Sample No. 16728

Rock Type: Cambrian, feldspar phyric, medium grained, andesitic lava.

Mineralogy: Fine to medium grained euhedral plagioclase laths, often forming glomero-porphyritic clusters within a very fine grained feldspar rich groundmass. Very minor apatite, zircon and opaque oxides.

Alteration: Groundmass moderately altered to chlorite and sericite. Very minor fine grained disseminated pyrite (could be primary). Minor silicification - predominantly of the feldspar phenocrysts.

Mineralization: Very minor disseminated pyrite.

Comments: Andesitic lava of the Central Volcanic Sequence.

Sample No. 16729

Rock Type: Cambrian feldspar phyric andesitic ?lava.

Mineralogy: Fine to medium grained plagioclase phenocrysts within a fine grained recrystallized sericitic, chloritic groundmass.

Alteration: Strong sericite-chlorite alteration of groundmass and margins of fragmented feldspar phenocrysts.

Deformation: Strong cleavage developed throughout. Pressure shadows developed around feldspar fragments.

Mineralization: -

Comments: Andesitic lava of the Central Volcanic Sequence.

Sample No. 16730

Rock Type: Cambrian felsic-intermediate volcanoclastic schist

Mineralogy: Recrystallized mosaic of feldspar and lesser quartz with occasional fine-medium grained feldspar and quartz fragments. Abundant haematite pseudomorphs after pyrite.

Alteration: Moderate chlorite-sericite alteration parallel to cleavage, largely replaced by haematite. ?Minor siliceous alteration.

Deformation: Strong cleavage, recrystallized groundmass and phenocrysts. Cleavage deflected around quartz, feldspar and pyrite fragments.

Mineralization: Abundant (1-2%) disseminated pyrite.
Comments: The cleavage is deflected around the pyrite grains indicating the pyrite is of a Pre-Devonian age.

Sample No. 16731

Rock Type: Cambrian volcaniclastic sandstone.
Mineralogy: Fine grained ?recrystallized quartz and feldspar with <0.5% very fine grained sphere. Very minor disseminated fine grained pyrite.
Alteration: Moderate-strong sericite-chlorite alteration. Possible minor silicification.
Deformation: Cleavage weak-moderately developed, depicted by the chlorite-sericite alteration.
Mineralization: -
Comments: Possibly developed as a result of erosion of a rhyolitic-rhyodacitic volcanic, part of the Central Volcanic Sequence.

Sample No. 16732

Rock Type: Cambrian epiclastic of dacite-andesite origin.
Mineralogy: Medium grained clasts of andesite and embayed quartz fragments within a fine grained quartz, feldspar, sericite groundmass. 5% fine grained disseminated pyrite. Very minor feldspar fragments.
Alteration: Strong sericite alteration with lesser silicification.
Deformation: Strong cleavage developed, groundmass largely recrystallized.
Mineralization: 5% disseminated fine grained pyrite.
Comments: The pyrite occurs randomly throughout, occassionally forming rims to clasts of crystal fragments but not parallel to cleavage suggesting a Cambrian origin, part of the Central Volcanic Sequence.

Sample No. 16733

Rock Type: Cambrian? volcaniclastic of dacite-andesite origin
Mineralogy: Predominantly medium grained feldspar phenocrysts pseudomorphed by sericite with lesser phenocrysts of rounded, fine-medium grained, partially embayed quartz in a very fine grained groundmass. Minor sphene.
Alteration: Strong sericite-chlorite alteration of the groundmass and feldspar phenocrysts. Very minor silicification.
Deformation: Weak cleavage developed with minor recrystallization of the groundmass.
Mineralization: -
Comments: Part of the Central Volcanic Sequence.

Sample No. 16734

Rock Type: Cambrian feldspar-hornblende phyric andesitic lava.
Mineralogy: Medium grained feldspar and hornblende phenocrysts largely altered to sericite and chlorite respectively within a fine grained feldspar rich ± quartz groundmass. Minor very fine grained ?sphene/?epidote.
Alteration: Strong chlorite, sericite alteration.
Mineralization: -
Comments: Phenocrysts are aligned suggesting possible flow banding. Part of the Central Volcanic Sequence.

Sample No. 16735

Rock Type: Cambrian feldspar hornblende phyric andesitic ?intrusive.
Mineralogy: Medium to coarse grained feldspar phenocrysts with minor hornblende phenocrysts in a fine grained feldspar rich groundmass. Minor sphene is present. Strong replacement by chlorite, sericite ±epidote.
Alteration: Chlorite, sericite, epidote.
Deformation: Moderate cleavage developed.
Mineralization: -
Comments: Hard to observe fine grained aligned feldspar laths within the groundmass suggest possible extrusive origins.

Sample No. 16736

Rock Type: Cambrian hornblende-pyroxene-feldspar phyric dacitic-andesitic intrusive porphyry.
Mineralogy: Medium to coarse grained hornblende, pyroxene, plagioclase ±quartz phenocrysts within a fine grained groundmass of similar composition.
Alteration: Moderate to strong alteration to calcite, sericite, chlorite and epidote.
Deformation: -
Mineralization: -
Comments: Shallow level Cambrian intrusive.

Sample No. 16737

Rock Type: Cambrian feldspar-quartz phyric dacitic-andesitic ?epiclastic.
Mineralogy: Medium grained feldspar phenocrysts with occassion-al fine grained embayed quartz phenocrysts within a recrystallized groundmass of similar composition.
Alteration: Moderation-strong sericite, pyrite, chlorite alteration.
Deformation: Weak cleavage developed.
Mineralization: Fine grained disseminated pyrite (<5%) closely associated with sericite-chlorite alteration.
Comments: Part of the Central Volcanic Sequence.

Sample No. 16738

Rock Type: Cambrian dacitic-andesitic lava.
Mineralogy: Medium grained feldspar phenocrysts with minor fine grained embayed quartz phenocrysts within a fine grained groundmass of similar composition.
Alteration: Weak to moderate carbonate, sericite, chlorite, pyrite alteration with lesser siliceous alteration
Deformation: -
Mineralization: 1-2% very fine grained disseminated pyrite associated with carbonate alteration.
Commensts: Part of the Central Volcanic Sequence.

Sample No. 16739

Rock Type: Cambrian hornblende feldspar phyric intrusive dacitic-andesitic porphyry.
Mineralogy: Medium-coarse grained hornblende and playioclase phenocrysts in a fine grained groundmass of predominantly fine grained feldspars.
Alteration: Moderate-strong carbonate alteration with calcite, epidote replacement of the phenocrysts and groundmass. Moderate chloritic alteration.
Deformation: -
Mineralization: -
Comments: Strong carbonate alteration occurring close to intrusive contact.

Sample No. 16740

Rock Type: Cambrian feldspar, hornblende, pyroxene phyric dacitic-andesitic intrusive porphyry.
Mineralogy: Medium-coarse grained plagioclase, honrblende and clino-pyroxene (augite) phenocyrsts within a fine grained predominantly plagioclase groundmass.
Alteration: Moderate to strong carbonate, sericite, epidote alteration of feldspar phenocrysts and groundmass. Minor chloritic alteration of groundmass and hornblende phenocrysts.
Deformation: -
Mineralization: -
Comments: -

Sample No. 16742

Rock Type: Cambrian feldspar, hornblende, pyroxene phyric dacitic-andecitic intrusive porphyry.
Mineralogy: Medium-coarse grained plagioclase, hornblende, clinopyroxene phenocrysts in a fine grained feldspar rich groundmass. 1-2% very fine grained opaque oxides.
Alteration: Minor carbonate, chloritic alteration of phenocrysts. Very minor silicification.
Deformation: -
Mineralization: -
Comments: Fresh sample.

C62

Sample No. 16743

Rock Type: Feldspar phyric dacitic-andesitic ?lava.
Mineralogy: Medium grained plagioclase phenocrysts - including some glomeroporphyritic clusters within a fine grained feldspar rich groundmass. Minor very fine grained opaque oxides (?magnetite).
Alteration: Moderate sericitic alteration of the groundmass. Very minor chloritic alteration. Haematite alteration of groundmass possibly due to surficial weathering.
Deformation: Very weak cleavage.
Mineralization: -
Comments: Groundmass shows possible flow banding. Part of Central Volcanic Sequence.

Sample No. 16744

Rock Type: Cambrian medium-coarse grained felsic epiclastic.
Mineralogy: Predominantly angular fragments of quartz, plagioclase ±kspar phyric rhyodacitic-dacitic volcaniclastic with occassional fragments of andesite (similar to 16743) incorporated within.
Alteration: Weak sericite-chlorite alteration of the groundmass, predominantly along zones of deformation. Minor haematite developed.
Deformation: Weak to moderate brittle deformation and cleavage developed. Undulose extinction within quartz phenocrysts.
Mineralization: -
Comments: Possible facing information as andesitic fragments possible source occurs in the lava to the immediate south along the Anthony Road.

Sample No. 16745

Rock Type: Cambrian quartz-sericite schist.
Mineralogy: Minor fine grained quartz ±plagioclase phenocrysts within a very fine grained matrix of sericite, epidote, haematite and very minor fine grained biotite.
Alteration: Intense development of sericite, epidote and haematite.
Deformation: Strong cleavage/schistosity developed.
Mineralization: Possible haematite after pyrite boxwork texture
Comments: Original rock type possibly an andesite.

Sample No. 16746

Rock Type: Cambrian hornblende, pyroxene, feldspar phyric dacitic-andesitic intrusive porphyry.
Mineralogy: Medium-coarse grained plagioclase, clinopyroxene, hornblende phenocrysts in a fine grained groundmass of similar composition.
Alteration: Weak chlorite, haematite, ±epidote alteration predominantly of the phenocrysts.
Deformation: -
Mineralization: -
Comments: -

Sample No. 16747

Rock Type: Cambrian dacitic volcaniclastic.
Mineralogy: Fine-medium grained quartz, plagioclase, orthoclase phenocrysts within a fine-very fine grained recrystallized groundmass of similar composition. Quartz embayed.
Alteration: Very minor chlorite alteration.
Deformation: -
Mineralization: -
Comments: Possibly part of the Tyndall Group.

Sample No. 16748

Rock Type: Cambrian dacitic volcaniclastic.
Mineralogy: Fine-medium grained quartz, plagioclase, ±orthoclase phenocrysts within a very fine grained ground mass of similar composition. Phenocrysts angular. Quartz embayed.
Alteration: Very minor chlorite alteration.
Deformation: -
Mineralization: -
Comments: Possibly part of the Tyndall Group.

Sample No. 16749

Rock Type: Cambrian dacitic volcaniclastic.
Mineralogy: Fine-medium grained quartz, plagioclase ±orthoclase phenocrysts in a very fine grained groundmass of similar composition. Quartz and feldspar phenocrysts angular. Quartz embayed.
Alteration: Very minor chloritic alteration.
Deformation: -
Mineralization: -
Comments: Possibly part of the Tyndall Group.

C64

512065

Sample No. 16750

Rock Type: ?Cambrian diorite/monzonite intrusive.
Mineralogy: Equigranular medium grained plagioclase ±orthoclase with minor hornblende. Minor fine grained pyrite.
Alteration: Weak chlorite alteration.
Deformation: Weak brittle deformation.
Mineralization: -
Comments: Possible deep intrusive associated with shallow level porphyritic dacitic/andesitic intrusives.

APPENDIX 5

DRILL LOGS TYN-5, BL-3

SHLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

HEADING SHEET

COLLAR INFORMATION	DATA TYPE	COLLAR CO-ORDINATES: EASTING	NORTHING	ELEVATION	COLLAR SURVEY: AZIMUTH	DIP	HOLE NAME	TOTAL DEPTH	HOLE TYPE	DESC CODE	REMARKS
					ORD	45	TYN-5	307.8			

PROJECT	BASIN LAKE	HOLE NAME	TYN-5
LOGGED BY	C. CREAGH	TOTAL DEPTH	307.8m
CONTRACTOR		RIG	
CREW		DATE STARTED ..... FINISHED	
CORE STORAGE: Nº OF TRAYS / LOCATION		SAMPLE STORAGE	
M & P LAB		ASSAY LAB	

DESC.	SIZE	FROM	TO	TOTAL	REMARKS
NON CORE					
CORE	HQ	0	26		
	NQ	26	176.6		
	BQ	176.6	307.8		
CASING					
CASING LEFT					(S) steel (P) plastic

SURVEY INFORMATION

DISTANCE FROM COLLAR: TO TOP	TO BOTTOM	AZIMUTH	DIP	REMARKS

PLOTTING KEY

SYMBOL: DES. CODE	G/LOG	INTERVAL: FROM	TO	SYMBOL: DES. CODE	G/LOG	INTERVAL: FROM	TO

ASSAY INFORMATION

DISTANCE FROM COLLAR: TO TOP	TO BOTTOM	SAMPLE Nº	CORE ANGLE	ROCK TYPE	DRAM	DESC CODE	GRAPHIC LOG	DESCRIPTIVE LOG
								0 – 38.0m ANDESITIC VOLCANICS
								Medium to coarse grained feldspar-hornblende phyric, pale green to purple andesitic lavas or shallow level intrusive. Feldspars euhedral to fragmented, partially glomeroporphyritic largely replaced by sericite ± chlorite. Hornblende phenocrysts 5–10mm in size, euhedral and fragmented, replaced by chlorite. Ground mass fine grained, pale green. Phenocrysts are aligned and form distinct foliation/lineation at 40–50° LCA, as a result of deformation or primary flow banding. Strong cleavage at 40–50° LCA. Moderate sericitic-chloritic alteration from 0–16.8m. From 16.8m moderate haematitic ± silicic alteration with phenocrysts predominantly replaced by haematite. Strongly haematitic at base. Core badly broken.
								38.0 – 40.8m ANDESITIC LAVA
								Fine to medium grained feldspar phyric pale green andesitic lava. Upper and lower contacts wispy suggesting shallow water to subaerial extrusion. Flow banding at 40° LCA. Feldspar phenocrysts 2–3mm in size within a fine grained

DRILLING OBJECTIVES / SUMMARY: Original hole drilled and logged by Gold Fields Exploration Pty Ltd. Only 307.8m of core available from the original 323.0m

REPORT REFERENCE :

SHEET 1 OF 5

C.C.S.

5120967

SHLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

CONTINUATION SHEET

PROJECT	BASIN LAKE	HOLE NAME	TYN-5
LOGGED BY	C. CREAGH	TOTAL DEPTH	307.8m

ASSAY INFORMATION

DISTANCE FROM COLLAR TO TOP	DISTANCE FROM COLLAR TO BOTTOM	SAMPLE Nº	CORE ANGLE	ROCK TYPE	DIAM	DESC CODE	GRAPHIC LOG	DESCRIPTIVE LOG
								groundmass. Moderate sericitic-chloritic alteration. Minor wispy chlorite parallel to flow banding
								40.8 — 63.4m ANDESITIC VOLCANICS
								Medium grained feldspar ± hornblende phyric pale green to purple andesitic flow or shallow level intrusive. Feldspar phenocrysts irregularly oriented within a fine grained groundmass. Occasional clasts (10cm), of flow banded andesites incorporated. Narrow shear zones at 40° to CA accompanied by increased haematitic-siliceous alteration. Phenocrysts largely replaced by haematite, chlorite and sericite. Groundmass largely altered to haematite and sericite. Strong quartz-haematite-epidote alteration from 51.9-53.6m, and 54.7-55.8m. Core badly broken from 60.0m with alteration to pale yellow-brown limonite.
								63.4 — 119.1m ANDESITIC VOLCANOCLASTICS
								Medium grained feldspar phyric pale grey to green andesitic volcanoclastics. Euhedral to angular feldspar phenocrysts within a fine grained groundmass. Narrow lenses of fine grained andesitic volcanoclastics occur from 80.0-81.1m and 83.0-84.9m. Upper and lower contacts of fine grained lenses are gradual and carbonatic. Strong brecciation accompanied by almost total replacement infill of fine grained carbonate ± silica from 64.2-70.1m, 71.45-72.2m, 76.2-77.4m, 81.4-81.9m, 90.4-90.7m, 95.6-98.9m, and 106.3-113.5m. Fe stain imparts a pale pink colour to altered zones. Alteration zones associated with shears at 50° to CA. Total replacement from 84.8-87.7m, 107.4-108.4m, and 115.45-118.55m.
								119.1 — 140.45m ANDESITIC INTRUSIVE PORPHYRY
								Medium grained feldspar-hornblende phyric, grey-green andesitic intrusive porphyry. Massive texture. Feldspar and hornblende phenocrysts euhedral to angular within a fine grained groundmass. Coarse lithic fragments at upper contact. Weak to strongly magnetic. Weak to moderate sericitic and chloritic alteration throughout. Strong total carbonate-silica ± haematite replacement and veining from 119.95-120.55m, 126.5-126.7m, 139.0-140.4m, and 141.0-141.3m. Strong carbonate-epidote-pyrite

SHLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

CONTINUATION SHEET

PROJECT BASIN LAKE	HOLE NAME TYN-5
LOGGED BY C. CREAGH	TOTAL DEPTH 307.8m

DISTANCE FROM COLLAR TO TOP	DISTANCE FROM COLLAR TO BOTTOM	ASSAY INFORMATION	SAMPLE No	CORE ANGLE	ROCK TYPE	DIAM	DESC CODE	GRAPHIC LOG	DESCRIPTIVE LOG
									±haematite ± chlorite alteration and veining from 130.6 – 130.63m, 130.9 – 130.93m, 132.12 – 132.13m and 133.45 – 133.76m. Narrow irregularly oriented veins of epidote-carbonate-quartz from 127.3 – 129.2m. Very fine grained pyrite occurs as narrow veins up to 2cm wide infilling fractures at 60 – 80° to CA. Pyrite mineralization occurs after carbonate alteration but syngenetic to haematitic alteration.
									140.45 – 160.6m ANDESITIC LAVA
									Medium grained feldspar ± hornblende phyric grey/green to purple andesitic lava. Feldspar phenocrysts euhedral to angular. Hornblende phenocrysts occur sporadically, replaced by chlorite. Flow banding at 70 – 75° to CA. Weak to moderate sericitic-chloritic-haematitic alteration throughout. Minor coarse lithic fragments throughout. Intense brecciation accompanied by strong carbonate-silicic-haematitic ± epidote ± pyrite alteration and veining from 141.05 – 142.5m, 143.2 – 143.6m and 144.7 – 146.25m.
									160.6 – 170.75m ANDESITIC VOLCANOCLASTICS
									Medium to coarse grained feldspar phyric green to purple andesitic volcanoclastic. Feldspar phenocrysts prominent, irregularly oriented, angular to euhedral. Small to large lithic fragments of similar composition. Weak to moderate chloritic, haematitic alteration throughout. Strong brecciation accompanied by infilled veins carbonate-chlorite ± quartz ± haematite from 164.1 – 164.5m and 164.7 – 165.2m. Base of unit strongly haematitic.
									170.75 – 171.7m ANDESITIC INTRUSIVE PORPHYRY
									Medium to coarse grained feldspar-hornblende phyric grey to green andesitic intrusive porphyry. Upper contact sharp and amygdaloidal over 15cm. Lower contact brecciated.
									171.7 – 177.8m ANDESITIC VOLCANOCLASTICS
									Medium grained feldspar phyric grey/green to purple andesitic volcanoclastics. Rare lithic fragments. Weak to moderate chloritic and haematitic alteration. Occasional brecciation

SHLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

CONTINUATION SHEET

PROJECT BASIN LAKE	HOLE NAME [redacted]YN-5
LOGGED BY C. CREAGH	TOTAL DEPTH 307.8m

DISTANCE FROM COLLAR TO TOP	DISTANCE FROM COLLAR TO BOTTOM	ASSAY INFORMATION	SAMPLE No	CORE ANGLE	ROCK TYPE	DESC CODE	GRAPHIC LOG	DESCRIPTIVE LOG

accompanied by infilling carbonate ± chlorite ± quartz ± haematite.

177.8 – 180.75m ANDESITIC INTRUSIVE PORPHYRY

Medium to coarse grained feldspar hornblende phyric grey to green andesitic intrusive porphyry. Upper and lower contacts autobrecciated. Foliated/flow banded along boundaries at 35° to CA.

180.75 – 193.6m ANDESITIC VOLCANOCLASTIC

Medium to coarse grained feldspar phyric pale green to purple andesitic volcanoclastic. Strong brecciated texture suggestive of intermixing of wet unconsolidated sediment with a shallow level intrusive. Sporadic fragments of feldspar hornblende phyric intrusive. Brecciation accompanied by development of infilling and replacement fine grained carbonate ± chlorite ± quartz ± haematite

193.6 – 279.45m ANDESITIC ?LAVA/?INTRUSIVE

Fine to medium grained feldspar-hornblende grey green to purple ?lava/?intrusive. Flow banding from 45–80° to CA. Week to moderate haematite alteration to 227.0m. Predominantly fresh lavas from 227.0 – 260.75m. Gradual increase of haematitic alteration base of unit with narrow zones of moderate sericitic-chloritic alteration. Strong autobrecciation at top of unit. Shear zones brecciated, accompanied by replacement and vein fill fine grained carbonate – quartz – chlorite ± haematite ± epidote from 263.6 – 264.7m, 265.7 – 266.8m, 267.5m, 267.9 – 269.3m, 269.8 – 271.6m, 271.9 – 272.0m, 274.2 – 274.55m, 276.2 – 276.8m and 277.1 – 279.4m. Very minor disseminated pyrite along vein margins.

279.45 – 307.8m ANDESITIC VOLCANICLASTICS

Fine to medium grained feldspar ± hornblende phyric pale green to purple andesitic volcaniclastics. Fine grained groundmass. Weak to moderate chloritic sericitic-carbonate alteration throughout. Minor epidote alteration associated with shearing, in parts completely replacing original texture. Shear zones brecciated and accompanied by infill/replacement carbonate ± quartz ± chlorite ± epidote from 279.45 – 282.05m, 283.7 – 283.9m, 285.2 – 285.6m

SHEET 2 OF 2

SHLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

CONTINUATION SHEET

PROJECT	BASIN LAKE	HOLE NAME	TYN-5
LOGGED BY	C. CREAGH	TOTAL DEPTH	307.8m

DISTANCE FROM COLLAR		SAMPLE NO	CORE ANGLE	ROCK TYPE	DIAM	DESC CODE	GRAPHIC LOG	DESCRIPTIVE LOG
TO TOP	TO BOTTOM							
								286.4 – 287.9m, 278.25 – 288.6m, 288.85 – 293.1m, 293.9 – 295.6m, 301 – 301.6m, 303.1 – 303.5m, and 307.6 – 307.8m
								E.O.H.

ASSAY INFORMATION

SHEET 5 OF 5

5120 71

SHLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

HEADING SHEET

COLLAR INFORMATION

DATA TYPE	COLLAR CO-ORDINATES			COLLAR SURVEY		HOLE NAME	TOTAL DEPTH	HOLE TYPE	DESC CODE	REMARKS
	EASTING	NORTHING	ELEVATION	AZIMUTH	DIP					
1 5	7 14	15 22	23 30	31 36	37 43	43 50	51 57	58 59	60 63	64 80
	3209855	7535990		100	55	BL 3	451			

PROJECT BASIN LAKE	HOLE NAME BL-3
LOGGED BY C. CREAGH	TOTAL DEPTH 451m
CONTRACTOR	RIG
CREW	DATE STARTED ..... FINISHED .....
CORE STORAGE: No OF TRAYS / LOCATION: ORONMART	SAMPLE STORAGE
M & P LAB	ASSAY LAB

DESC.	SIZE	FROM	TO	TOTAL	REMARKS
NON CORE					
CORE	HQ				
	NQ				
	BQ				
CASING					
CASING LEFT					(S) steel (P) plastic

SURVEY INFORMATION

DISTANCE FROM COLLAR: TO TOP	TO BOTTOM	AZIMUTH	DIP	REMARKS
1 8	3 9 10 16	17 22	23 28	

PLOTTING KEY

SYMBOL: DES. CODE	G/LOG	INTERVAL: FROM	TO	SYMBOL: DES. CODE	G/LOG	INTERVAL: FROM	TO

ASSAY INFORMATION

DISTANCE FROM COLLAR: TO TOP	TO BOTTOM	SAMPLE Nº	CORE ANGLE	ROCK TYPE	DIAM	DESC CODE	GRAPHIC LOG
1 8	3 9 10 16	59 64	65 70	71 74	75 76	77 80	

DESCRIPTIVE LOG

0-34m GLACIAL SEDIMENTS

34.0 - 55.0m CLAYS
Reddish brown clays containing occasional weathered fragments of medium grained feldspar phyric andesitic volcanics.

55.0 - 162.0m DACITIC - ANDESITIC LAVA
Medium to coarse grained hornblende - feldspar phyric light green-grey dacitic-andesitic lavas. Faintly discernable foliation from aligned phenocrysts. Crystal rich. Phenocrysts euhedral - subhedral within a fine grained weakly chloritic groundmass. Hydraulic fracturing common, occurring parallel to shear zones at 45-60°CA. Fracture zones infilled by fine grained carbonate & quartz & haematite. Strongest fracturing from 58.0 - 58.5m, 61.0 - 62.9m, 70.1 - 71.0m, 75.2 - 76.0m, 82.0 - 85.0m, 93.4 - 106.0m and 124.5 - 127.6m. Possible fault zones at 77.2 - 90.7m, 85.0 - 85.5m and 105.8 - 107.9m. Minor epidote alteration parallel to sheering and as narrow anastomosing veinlets from 122.3 - 124.2m. 5cm wide, strongly sericitised shear zones from at 138.0 and 153.0m. Weakly magnetic.

162.0 - 166.4m DACITIC - ANDESITIC INTRUSIVE BRECCIA
Medium to coarse grained feldspar-hornblende phyric pink-

DRILLING OBJECTIVES / SUMMARY Hole originally logged by Gold Fields Exploration Pty Ltd

REPORT REFERENCE :

SHEET 1 OF 4

SHLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

CONTINUATION SHEET

PROJECT	BASIN LAKE	HOLE NAME	BL-3
LOGGED BY	C. CREAGH	TOTAL DEPTH	451.0m

ASSAY INFORMATION

DISTANCE FROM COLLAR TO TOP	DISTANCE FROM COLLAR TO BOTTOM	SAMPLE Nº	CORE ANGLE	ROCK TYPE	DIAM	DESC CODE	GRAPHIC LOG	DESCRIPTIVE LOG
								grey dacitic-andesitic intrusive porphyry. Upper and lower contacts brecciated. More abundant hornblende phenocrysts content than lower of similar composition. Weak sericitic and chloritic alteration throughout. Weak to moderately magnetic
								166.4 – 169.8m DACITIC-ANDESITIC VOLCANIC BRECCIA Medium-coarse grained hornblende-feldspar phyric light green-grey dacitic-andesitic volcanic breccia. Weak sericitic alteration throughout. Minor epidote alteration. Weakly magnetic
								169.8 – 193.7m DACITIC-ANDESITIC LAVA Medium-coarse grained hornblende-feldspar phyric grey, dacitic-andesitic lava. Autobrecciated at top (upto 1m) over several metres. Base (down hole) erosional. Weak sericitic-chloritic alteration throughout. Flow banding at 80°CA
								193.7 – 206.0m DACITIC-ANDESITIC VOLCANOCLASTICS Interbedded medium grained hornblende-feldspar phyric pink-light green-grey dacitic-andesitic volcaniclastics. Bedding at 70° CA. Weak sericitic and chloritic alteration throughout. Irregularly oriented quartz-chlorite-epidote veins from 202.1 – 202.8m.
								206.0 – 246.8m DACITIC-ANDESITIC LAVA Medium to coarse grained hornblende-feldspar phyric light green-pink-grey dacitic-andesitic? lava. Strong autobrecciation at top. Erosional contact at base. Weak sericitic and chloritic alteration throughout. Stronger chloritic alteration at top within brecciation. Minor quartz phenocrysts and lithic fragments. Weak-moderately magnetic. 0.5m wide shear zone at 20° CA at 241.0m.
								246.8 – 252.7m VOLCANIC BRECCIA Coarse volcanic breccia-probable mass flow. Clasts up to 10cm across, mostly subangular, parallel to bedding at 40° CA. Fragments consist of medium grained feldspar phyric purple basaltic andesitic volcanics within a light green dacitic-andesitic matrix
								252.7 – 253.3m SHALES / SILTSTONES Interbedded fine-very fine grained purple siliceous shales and siltstones. Bedding at 50° CA
								253.3 – 281.0m ANDESITIC VOLCANOCLASTIC Medium grained feldspar-phyric green-purple

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512073

SHLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

CONTINUATION SHEET

PROJECT	BASIN LAKE	HOLE NAME	BL - 3
LOGGED BY	C. CRAIGH	TOTAL DEPTH	451m

DISTANCE FROM COLLAR — TO TOP / TO BOTTOM | SAMPLE No | CORE ANGLE | ROCK TYPE | DIAM | DESC CODE | GRAPHIC LOG | DESCRIPTIVE LOG

ASSAY INFORMATION

andesitic volcanoclastic. Minor lithic fragments. Weak-moderate foliation at 50° LCA. Banded moderate chloritic - siliceous - haematitic alteration. Weakly magnetic.

281.0 – 309.5m DACITIC - ANDESITIC LAVA
Medium - coarse grained hornblende - feldspar ?quartz phyric, light green-grey-pink dacitic-andesitic lava. Strong brecciation at top of unit (upto 1m). Weak sericitic alteration throughout. Narrow veins of quartz - chlorite - epidote parallel to foliation at 50° LCA, occur after 286.0m, along with narrow anastomosing veinlets of similar composition. Weak to moderately magnetic. Moderate deformation from 299.3 - 301.9m accompanied by fill quartz and epidote. Strongly auto brecciated at base.

309.5 – 321.8m EPICLASTIC MASS FLOW BRECCIA
Coarse fragments of flow banded andesitic lavas and andesitic volcanoclastics within a medium grained feldspar rich green chloritic matrix. Lithic rich. Bedding at 25° LCA. Weak to moderate sericitic and chloritic alteration throughout.

321.8 – 329.3m DACITIC - ANDESITIC LAVA
Medium to coarse grained hornblende - feldspar phyric grey-green andesitic-dacitic lava. Brecciated at base. Narrow shear zones 2-3cm wide at 90° LCA, occurring randomly. Weak sericitic and chloritic alteration throughout.

329.3 – 333.0m DACITIC - ANDESITIC INTRUSIVE
Medium to coarse grained equigranular rich hornblende - feldspar phyric, pink-grey/green dacitic-andesitic intrusive porphyry. Minor incorporated lithic fragments. Fine grained chloritic contact zones at top and base. Moderately magnetic.

333.0 – 341.85m ANDESITIC VOLCANICS
Predominantly fine-medium grained feldspar phyric andesitic volcanoclastics with minor lenses of hornblende - feldspar phyric andesitic ?volcanoclastics or ?lavas. Minor quartz phenocrysts. Weak to moderately magnetic. Weak chloritic alteration throughout.

341.85 – 365.2m DACITIC-ANDESITIC LAVA
Medium grained hornblende - feldspar phyric pink-grey/green massive dacitic-andesitic lava. Weak

SHLMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

CONTINUATION SHEET

PROJECT	BASIN LAKE	HOLE NAME	BL-3
LOGGED BY	C. CREAGH	TOTAL DEPTH	451.0m

ASSAY INFORMATION

DISTANCE FROM COLLAR TO TOP	DISTANCE FROM COLLAR TO BOTTOM	SAMPLE No	CORE ANGLE	ROCK TYPE	DIAM	DESC CODE	GRAPHIC LOG	DESCRIPTIVE LOG

to moderate sericitic alteration throughout. Weak to moderately magnetic.

365.2 — 378.2m ANDESITIC VOLCANOCLASTICS
Fine to medium grained feldspar phyric green andesitic volcanoclastics. Weakly cleaved at 20° ∠ CA. Moderate chloritic alteration throughout. Moderate silicification in zone of strong cleavage development. Weakly magnetic. 30cm zones of quartz-chlorite & carbonate veining at 372.6m and 373.7m.

378.2 — 391.1m DACITIC-ANDESITIC ?LAVA
Strongly altered medium grained hornblende-feldspar phyric dacitic-andesitic ?lavas. Strong very fine grained pink to purple carbonate + hematite alteration cocalled to foliation at 45-30° CA occurring from 383.2 to 387.3m. Carbonate alteration overprints pervasive moderate to weak chloritic and sericitic alteration.

391.1 — 446.3m SANDSTONES/SILTSTONES/SHALES
Predominantly interbedded fine grained sandstones and siltstones with minor shale. Bedding occurs at 70° CA. Wispy chlorite and carbonate occurs throughout. Sediments derived from intermediate volcanic source. Significant narrow quartz + carbonate + chlorite veining from 396.0 - 400.0m, 408.3 - 418.9m, and 429.7 - 431.7m.

446.3 — 451.0m ANDESITIC VOLCANOCLASTICS
Strongly cleaved medium grained feldspar phyric pale green andesitic volcanoclastics. Very strong sericitic alteration. Cleavage at 80-90° CA. Weak chloritic alteration throughout.

E.O.H.

SHEET # OF #

512075

APPENDIX 6

1989 SCAMT SURVEY - FINAL REPORT

by

Zonge Engineering

512077

FINAL REPORT

CSAMT SURVEY
BASIN LAKE PROSPECT
for
Billiton Australia

Zonge Engineering & Research Organization, Inc.
3322 East Fort Lowell Road, Tucson, Az 85716 (602)327-5501

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Executive Summary

Five of eleven CSAMT lines run for Billiton Australia by Zonge Engineering Australia, Ltd., were processed and interpreted by Zonge Engineering (U.S.). We static-corrected the data using our phase-integration technique, and then performed smooth-model inversions to produce interpretable electrical cross-sections.

The data are of good quality except in the vicinity of a power line, where high noise levels and current-channeling effects invalidated data over a 200 meter wide swathe.

Several north-south trending, conductive features are present in the data. Their persistence from line to line indicates geologic structures with significant strike extent. The data indicate anisotropic geology with strong lateral resistivity contrasts. A narrow, steeply dipping conductive feature on the western ends of lines 353000N and 352600N may be an attractive exploration target.

A second conductive feature is present on the eastern ends of the five lines. It is rather broad and dips at a moderate to steep angle to the west. This second feature is coincident with a known fault.

Project Logistics

The CSAMT project was contracted by Zonge Engineering Australia, Ltd., which can provide details of survey logistics. Work was done on eleven east-west lines using a dipole length of 80 meters, with detailing over part of line 353000N using 40 meter dipoles. Data were obtained between 32 and 4096 Hz. One electric-field and one magnetic-field component were measured at each station using a GDP-12 receiver. This report reviews the results from five of the eleven lines surveyed. Line locations are shown on a plan map in figure 1.

Geology

The survey area is dominated by Cambrian volcanics of very high resistivity, overlain in the south by about 50 meters of resistive glacial cover.

Data Presentation

Billiton has already received Cagniard resistivity and phase difference data. The data presented in this report are static-corrected apparent resistivity and smooth-model inversions.

The static-corrected data are located in plates at the back of this report:

Plate 1	Static-corrected resistivity, line 353000N a=80m
Plate 2	Static-corrected resistivity, line 353000N a=40m
Plate 3	Static-corrected resistivity, line 352600N a=80m
Plate 4	Static-corrected resistivity, line 351800N a=80m
Plate 5	Static-corrected resistivity, line 350200N a=80m
Plate 6	Static-corrected resistivity, line 340400N a=80m

The other information is provided as figures:

Fig. 1	Location map
Fig. 2	Selected magnetic field plots
Fig. 3	Smooth-model inversion, line 353000N
Fig. 4	Smooth-model inversion, line 352600N
Fig. 5	Smooth-model inversion, line 351800N
Fig. 6	Smooth-model inversion, line 350200N
Fig. 7	Smooth-model inversion, line 340400N

Data Quality

The data are typically of good quality. Error bars on resistivity and phase are generally $\pm$10% or better, although data at 2048 Hz is often somewhat noisier. Data near the power line on lines 353000N and 352600N are very noisy and reflect strong cultural contamination.

Data Interpretation

Near-Field Effects

The extremely high resistivities in this area place most of the data in the near-field zone. The transition zone notch typically occurs near 1024 Hz, with near-field saturation occurring at frequencies of about 256 Hz and below. In general, only data at 4096 Hz are truly in the far-field zone. Figure 2 shows averaged magnetic-field magnitude curves for each line as an illustration of the onset of near-field data (see Zonge and Hughes, in press). Figure 2 shows nearly constant magnetic field amplitudes at frequencies below 256 Hz. Frequency independent magnetic-field amplitudes are characteristic of near-field data.

The occurrence of near-field data has important implications for this project. Near-field data are more sensitive to lateral variations in resistivity than far-field data and penetration depths are controlled more by the geometric relationship between source and receiver than by frequency. Reducing the frequency of a near-field measurement will not achieve greater depth penetration.

The implication of this is that data below 256 Hz should be interpreted with great caution. Above 256 Hz, the soundings generally are sensitive enough to frequency to be useful for interpretation.

Surface Anisotropy Effects

The northern three lines have data which suggest a very pronounced conductor at the surface. Plots of log(resistivity) versus log(frequency) show responses which are far more exaggerated than would be expected from a 1D (layered) environment. It is probable that the effect is due to strong surface anisotropy. The anomalously high phase-difference values observed at Basin Lake are also consistent with anisotropic geology. The effect is strongest on the most northern line, diminishing to the south. It is possible that the glacial cover to the south mitigates the anisotropic response. Alternatively, the anisotropic material may be confined to the north of the east-west fault shown in figure 1. Anisotropic geology is probably contributing to the dramatic contrasts in apparent resistivity observed in this area.

Cultural Contamination

Two cultural features are observed in this data set. The most disruptive is the power line which crosses the two northern-most lines. This causes two problems: high noise levels and current-channeling.

High noise levels not only cause scattered data values, but may also saturate the CSAMT magnetic antenna. The result is noisy, peculiarly shaped resistivity sounding curves within several stations of the power line.

Current-channeling is particularly troublesome at Basin Lake due to the high surface resistivities. The CSAMT source fields are strongly coupled into the transmission wires. This problem is exacerbated by the fact that the western electrode of the source bipole was placed very close to the power line. This may

have allowed direct conduction of current down the power line into the area of exploration.

The data show unrealistic patterns of high and low resistivities beneath the power line. These patterns are typical of high-power transmission lines and of direct current-channeling from the source bipole. The result is that several stations on either side of the power line on the northern two lines are not suitable for interpretation. The data have been removed in the smooth-model inversions. This interrupts the continuity of the lines, but the remaining data set is still interpretable.

Topographic Effects

The survey area is relatively flat and produces insignificant topographic effects. Steep topography to the east of the survey area has no discernable effect on the CSAMT data.

Line-by-Line Interpretation

Line 353000N. This line was run with 80 meter dipoles, and part of it was detailed with 40 meter dipoles. Measurements from both data sets are in close agreement.

The 80 meter static-corrected data (plate 1) show surface anisotropy and power line contamination, as discussed above. Figure 3 shows the smooth-model inversion. A nearly vertical contact occurs near station 300, with resistive material to the west and more conductive material to the east. At depth the contact may assume a more easterly, shallower dip. This effect is more pronounced on this line than on any of the other four lines evaluated in this report.

Figure 3 appears to outline a conductive body between stations 300 and 520. Such a body may be of strong exploration interest. However, a key point to note is that the resistor centered on the power line gives this conductor its distinct shape. If the resistor is real, then the conductor is a localized feature; if the resistor is artificial, the conductor is more likely to be the west end of a broad conductive area, a less interesting result. Hence, it is crucial to understand the nature of the resistor.

The fact that the resistor is centered on the power line is not encouraging. Looking at plate 1, we note that all the surface within two stations of the power line is anomalously resistive. The resistor in figures 3 is the result of resistive stations which we did not choose to blank out of the inverted data. It is our opinion that the resistor is artificially induced by the power line.

This finding weakens support for a distinct conductive body in this area. However, magnetic-field information indicates strong lateral contrasts. In the 40 meter dipole data there is a symmetric pattern of low magnetic-field amplitude at station 300, flanked on both sides by symmetrical high amplitude values. The feature is some 200 meters in apparent width. The electric field shows little disturbance in this area; hence there is a distinct resistivity feature near station 300. The feature's unique behavior and almost perfect symmetry suggest a narrow sheet-like or pipe-like vertical conductor. Its lateral dimension is probably less than 80 meters.

We conclude that there is evidence for a steeply-dipping, distinct conductor centered near station 300. The evidence is not conclusive. However, even if one adopts the conservative view that there is no distinct conductor but only a geologic contact, the steep contact at station 300 may still of strong exploration interest.

Other conductors are found east of the structure. The most prominent are found between stations 920 and 1000 and on the extreme east end of the line. These are strong in amplitude and coherent in shape, and might represent exploration targets.

The pronounced apparent resistor centered at depth below station 840 is in the deep near-field and may very well be a geometric effect unrelated to geology under the measurement location. Based upon the available data, no firm conclusion can be drawn on this feature.

Line 352600N. Plate 3 shows the static-corrected resistivity data for this line. Note the power line crossing at station 200. Figure 4 shows the more useful smooth-model inversion. As on the previous line, there is a contact associated with an apparent conductor dipping steeply to the east, this time on the far west end of the line. Unlike the previous line, however, the ground to the east of the contact is not consistently conductive all the way to the east.

As before, we consider whether or not the conductor below station 120 is real or not. Again there is a resistor west of the power line which may be artificial, tending to enhance the appearance of a conductor. But the magnetic field again shows a symmetrical perturbation similar to that observed on line 353000N, suggesting a steeply-dipping conductive sheet or pipe. Thus it is probable that the conductor is real; certainly there is a major contact there. The dip is roughly 70 degrees to the east, as opposed to the near-vertical easterly dip on line 353000N. This might represent an attractive exploration target.

The other feature of interest on this line is the conductor centered on station 1240 and the deeper conductor to the west and deeper. Actually these are both lows in a broad conductive zone which drops roughly vertically from the surface, then dips at an intermediate angle to the west. Although more data would be needed to the east in order to better define this feature, it is most likely a conductive structure.

Line 351800N. Plate 4 shows the static-corrected data for this line. No culture crosses the line to disturb the interpretability of the data.

Figure 5 shows the smooth-model inversion for the line. A narrow conductor is observed beneath station 120. The data do not extend far enough to the west to fully define it, but it appears that the conductor is narrow (probably less than 80 meter wide) and steep in angle (nearly vertical, with a possible westerly dip at depth). This may be the same conductor observed on the more northern lines, but here it is much less pronounced.

A second conductor is observed on the east end of the line at depth. It is broad (roughly 100 meters) and dips at perhaps 75 degrees to the west. It is similar to the one observed on line 352600N but may be deeper.

Line 350200N. Plate 5 shows the static-corrected data for this line. The data behavior is very "normal," with no peculiar surface or other effects.

Figure 6 shows the smooth-model inversion for the line. A narrow conductor is observed beneath station 120, as on line 351800N. The data suggest only a moderate conductor, narrow in width (perhaps 50 meters), with a very nearly vertical dip. It is evident only in the intermediate depths, not at the surface or at depth.

There are no other conductors evident on this line.

Line 349400N. Plate 6 shows the static-corrected data for this southern line. Figure 7 shows the smooth-model inversion for the line. The conductor seen on the other lines is not immediately evident here, but we speculate that it is the feature barely detected by station 40. If so, it confirms a NNE trend to the conductor.

A broad, moderately conductive zone is observed between stations 520 and 880. It seems to be intermediate in depth, not coming to the surface or extending very deep. It is thus similar to the feature seen on line 350200N.

Conclusions

From a geophysical viewpoint, the data clearly identify two interesting conductive features. Communications from Billiton Australia indicate that the western conductor on the northern lines is the most interesting exploration target. Despite complications from the power line, we consider this to be a real conductor which is associated with a significant structure or contact. The feature's appearance on both line 35300N and 352600N indicate that it is a conductor with significant strike extent.

Billiton may benefit from additional processing on the remaining six lines of CSAMT. We took a quick look at two of these, and believe more work could be profitable. Scott MacInnes can discuss the details if you wish.

References

Zonge, K.L., and Hughes, L.J., in press, Controlled source audio-frequency magnetotellurics, *in* E.M. Methods, M.N. Nabighian (Ed.), Society of Exploration Geophysicists.

Scott MacInnes Geophysicist

Norm Carlson Geophysicist

CSAMT Smooth-model Inversion

Smooth-model inversion is a robust method for converting CSAMT measurements to profiles of resistivity versus depth. Observed apparent resistivity and phase data for each station are used to determine the parameters of a layered-earth model. Layer thicknesses are fixed by calculating source-field penetration depths for each frequency. Layer resistivities are adjusted iteratively until the modeled CSAMT response is as close as possible to observed data. Smoothness constraints restrict layer resistivities to minimum variation from layer to layer.

The algorithm for calculating the CSAMT response of a layered model includes the effects of finite transmitter-receiver separation and a three-dimensional source field. Accurate impedance values are calculated for all frequencies and transmitter-receiver separations.

The result of smooth-model inversion is a set of estimated resistivities which vary smoothly with depth. Lateral variation is determined by inverting successive stations along a line. Results for a complete line can be presented in pseudosection form by contouring model resistivities. For contouring, resistivity values are placed at the midpoint of each layer, forming a column below every station. The columns form an array representing modeled resistivities in cross-section.

Inverting apparent resistivity and phase to a smoothly varying model resistivities is an effective way to display the information inherent in CSAMT measurements. Smooth-model inversion does not require any a priori estimates of model parameters. The data are automatically transformed to resistivity as a function of depth. Models with smoothness constraints are complementary to more detailed models incorporating a priori geologic constraints.

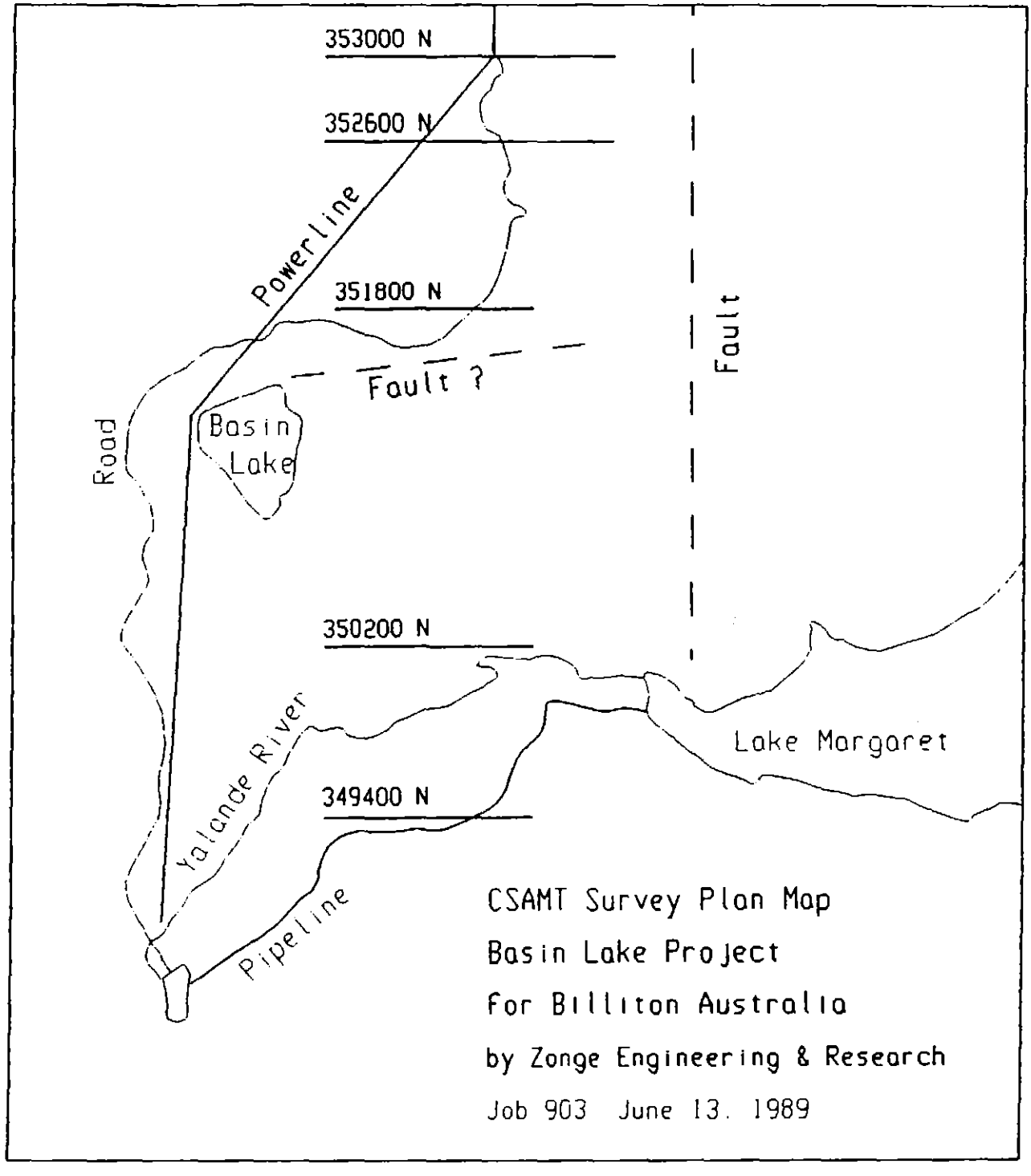


Figure 1: CSAMT line location map.

5 cm

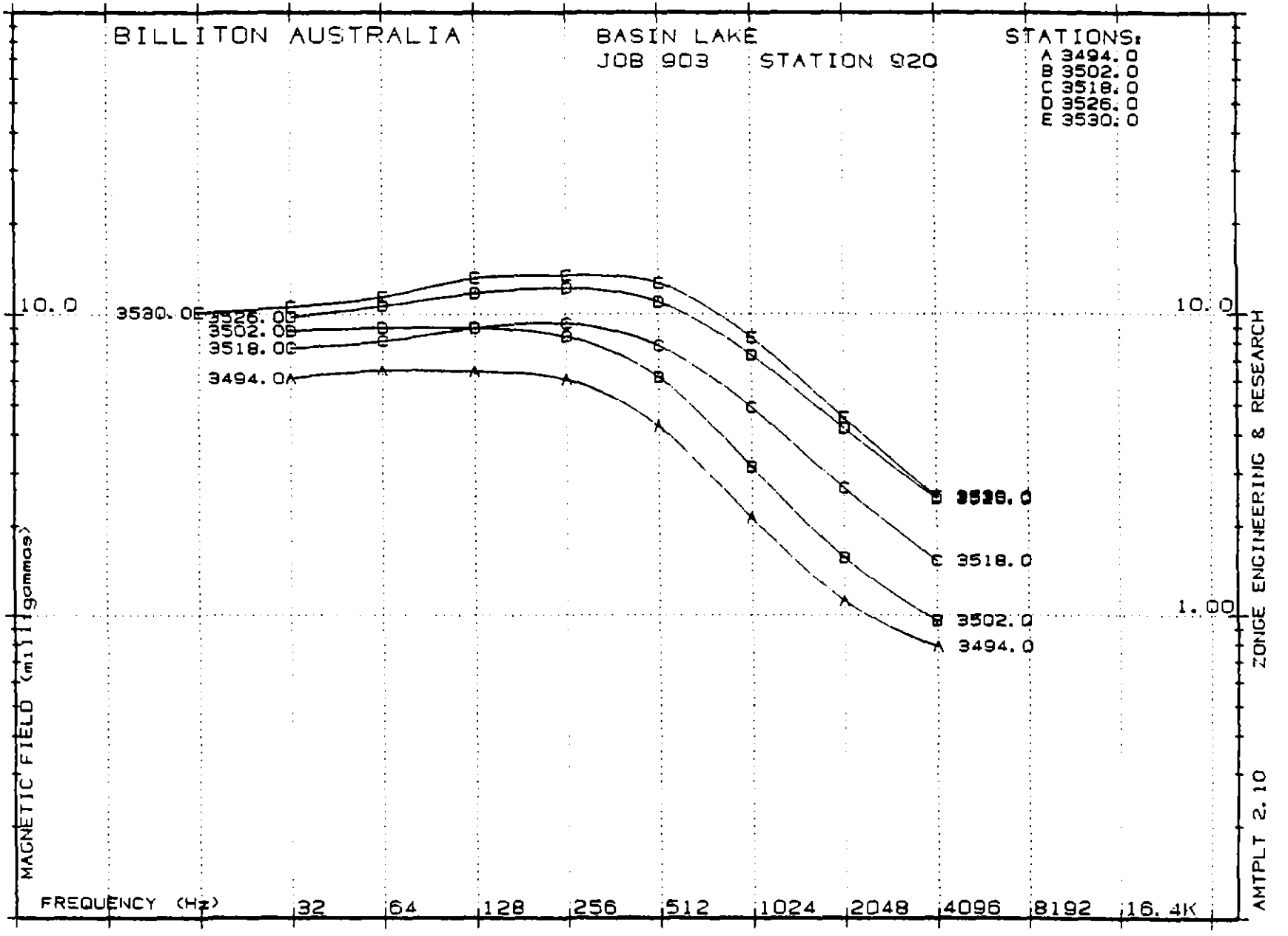


Figure 2: Log-log plot of magnetic-field amplitude versus frequency.

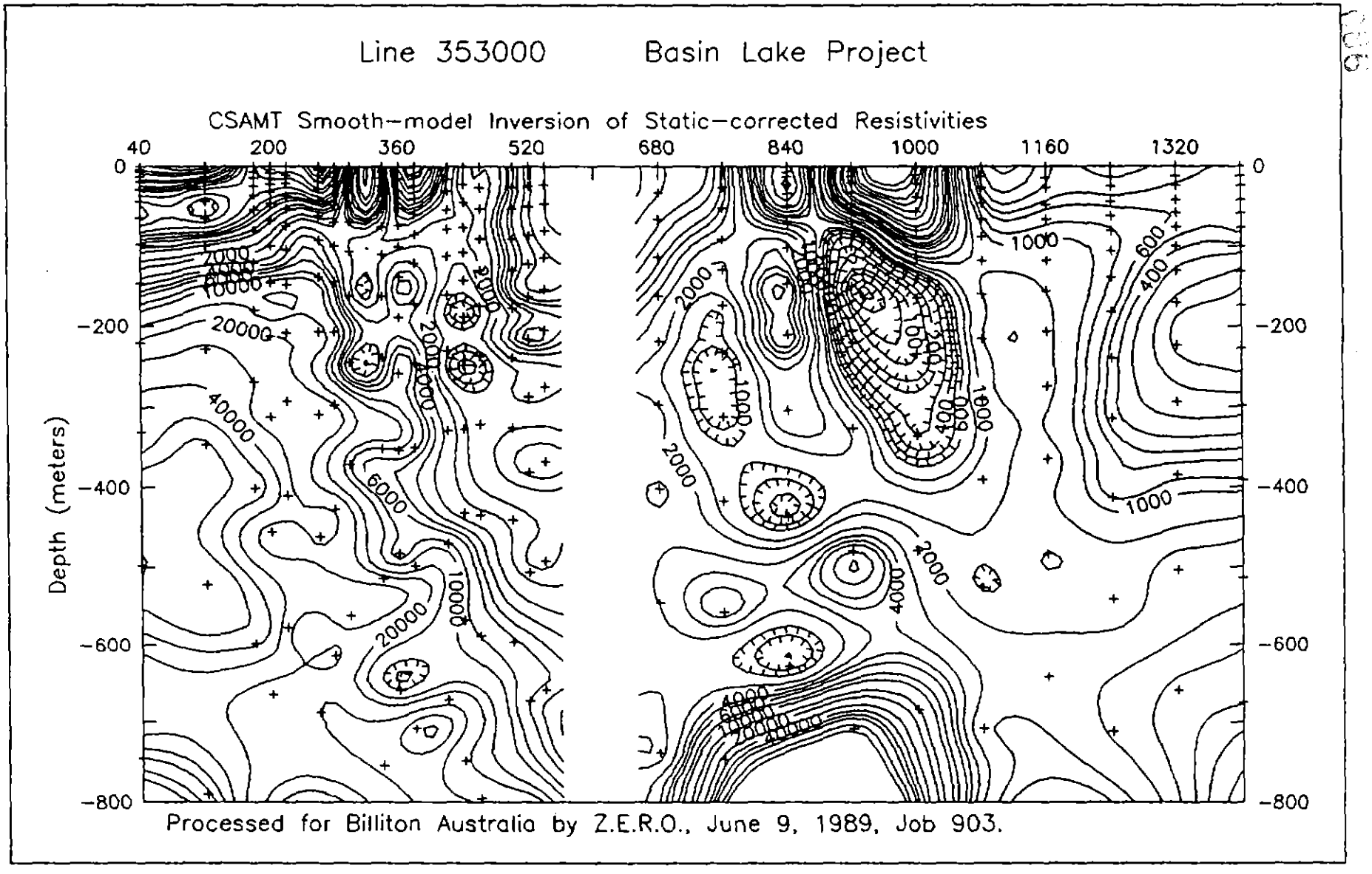


Figure 3: Smooth-model inversion for line 353000N.

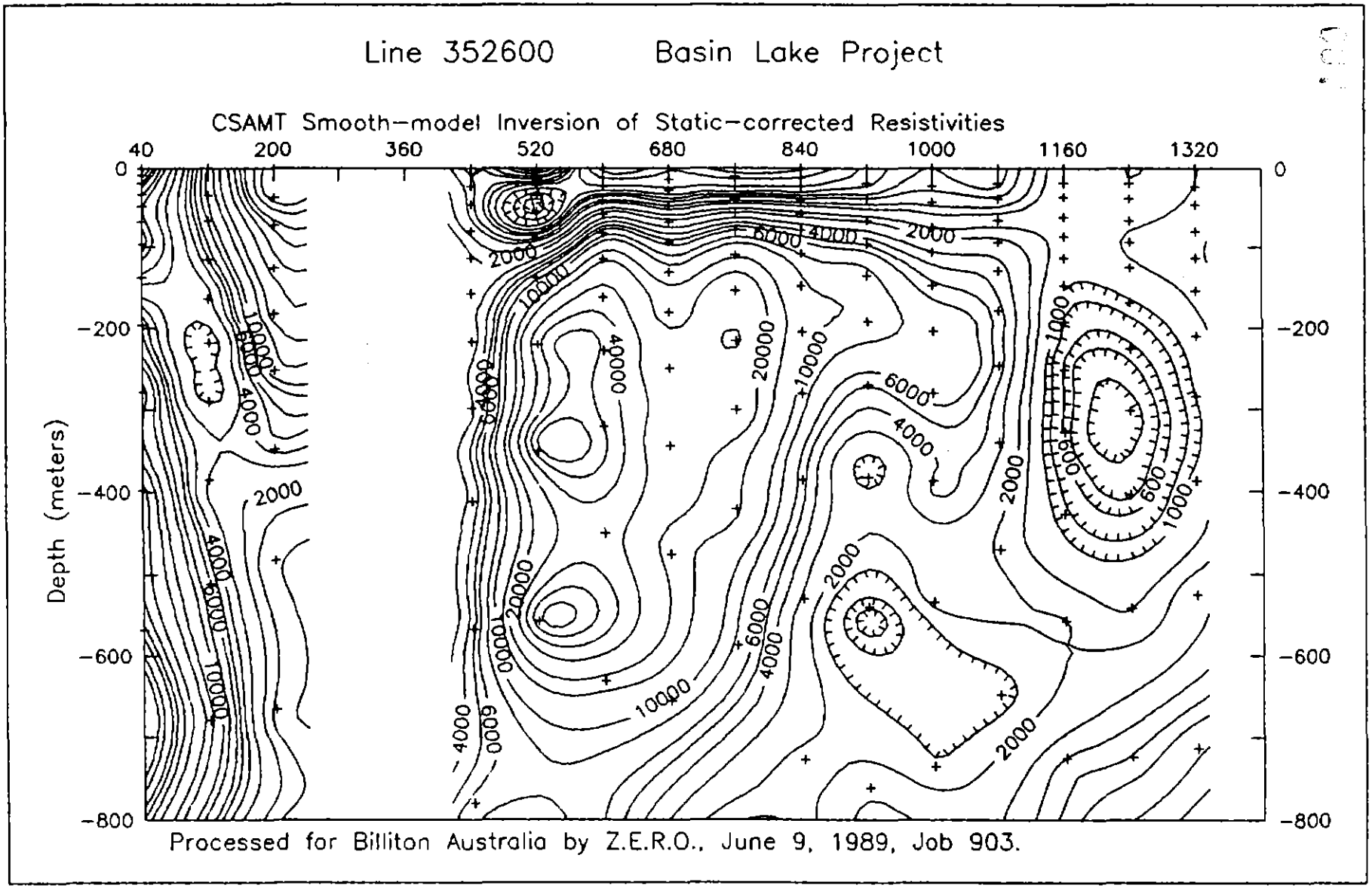


Figure 4: Smooth-model inversion for line 352600N.

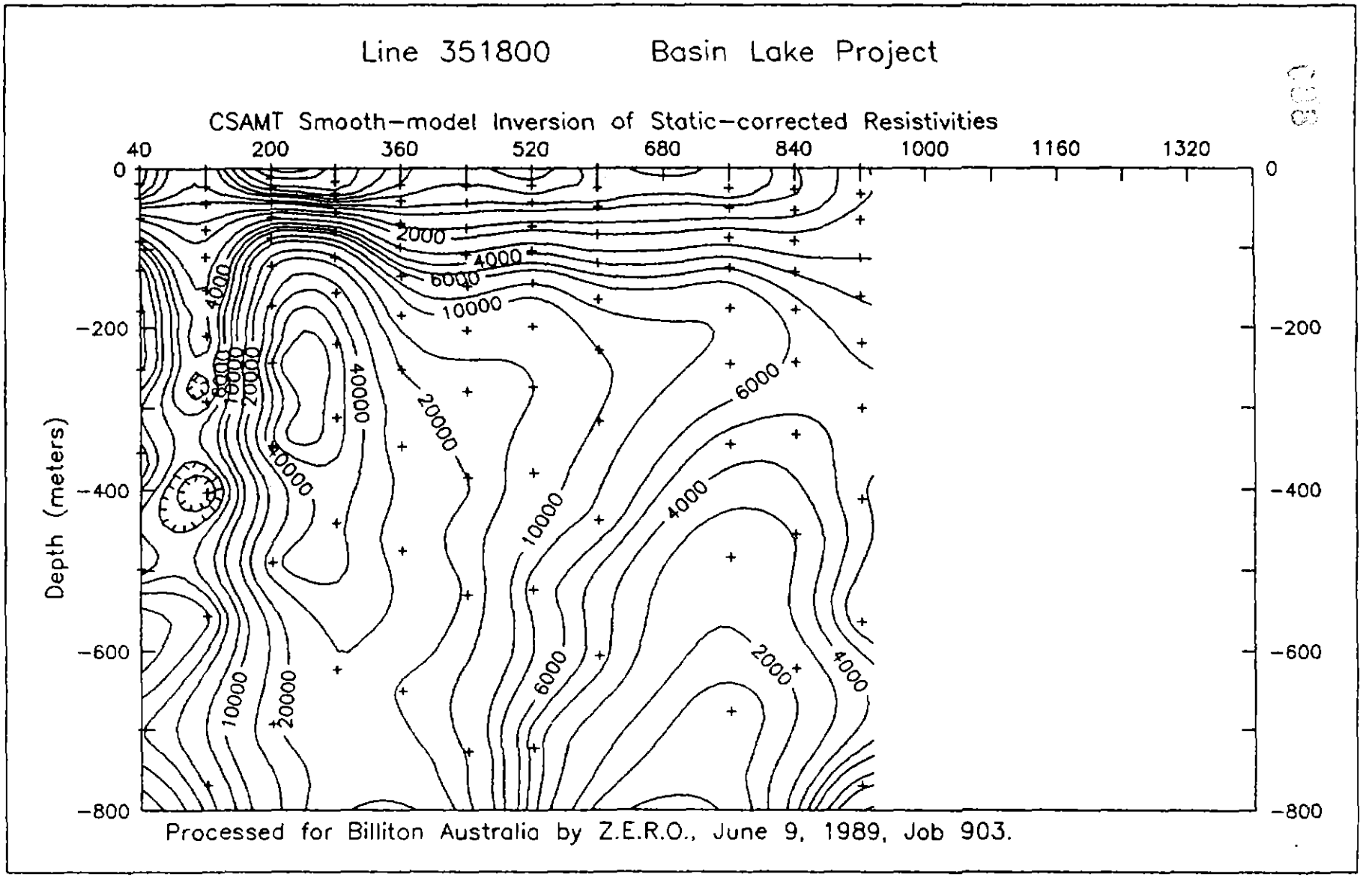


Figure 5: Smooth-model inversion for line 351800N.

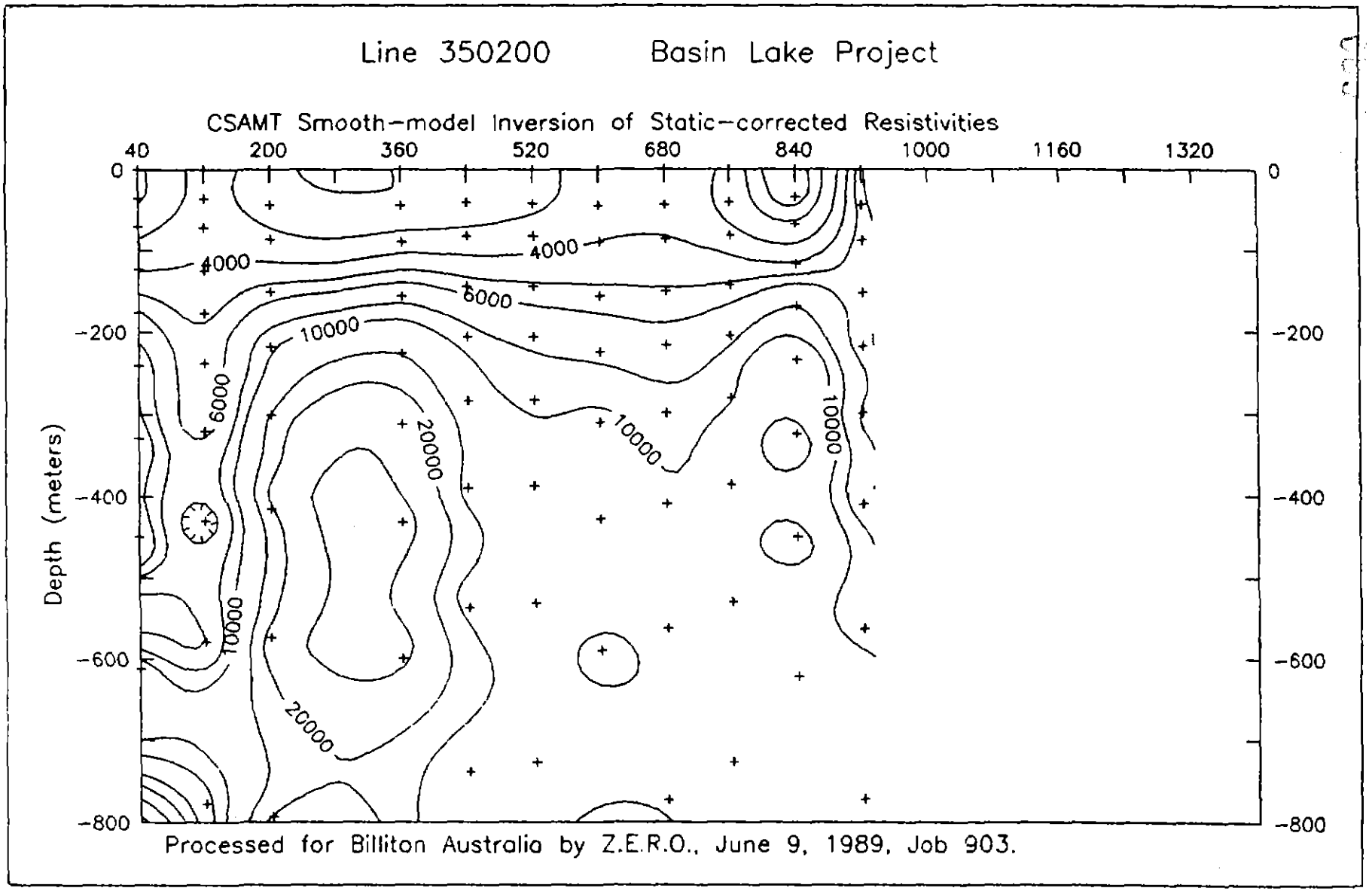


Figure 6: Smooth-model inversion for line 350200N.

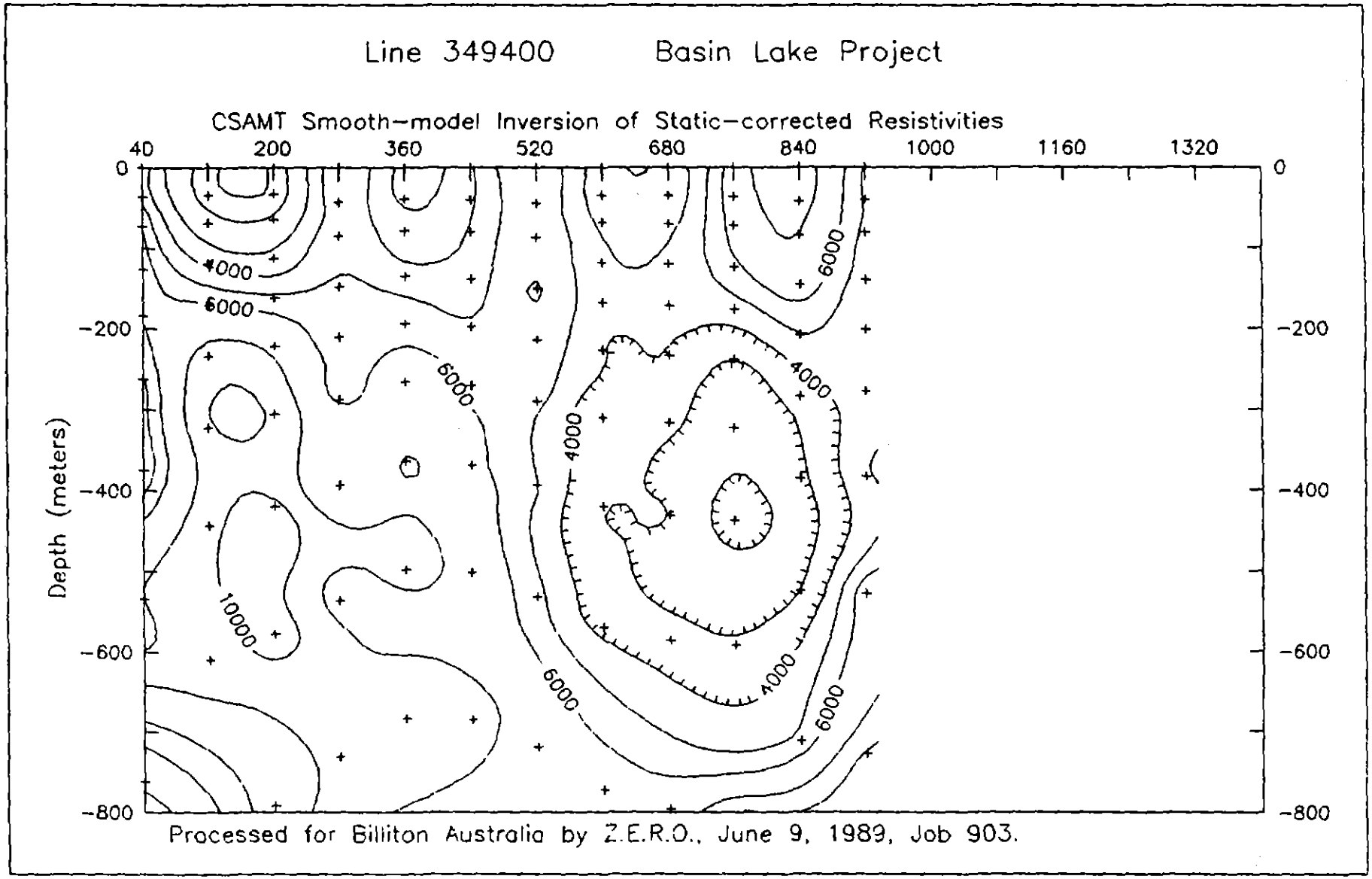
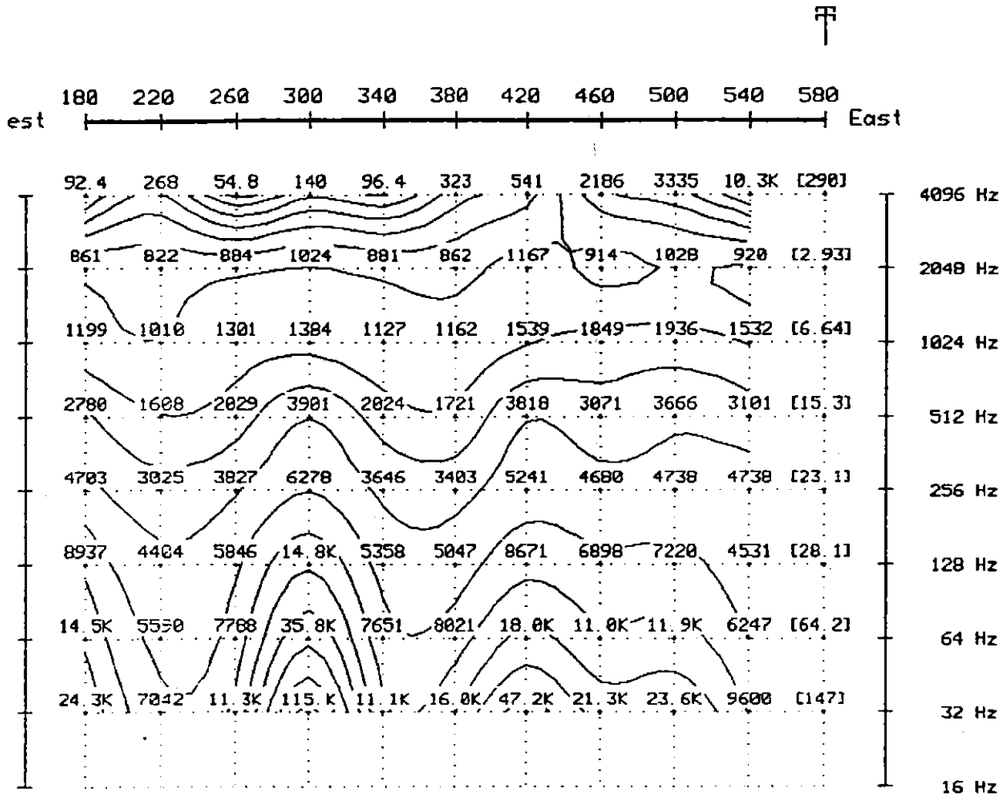


Figure 7: Smooth-model inversion for line 349400N.



STATIC CORRECTED RESISTIVITY
HO: 718, PHZ: 546 , FREQ 14: 2048.

[Plot limits] and LOGARITHMIC CONTOURS
(Interval: 0.20)

[115.K] 158
100.K 100
63.1K 63.1
39.8K [54.8]
25.1K
15.8K
10.0K
6310
3981
2512
1585
1000
631
398
251

ZONGE Job 903
PLOT BY CPLOT 5.40
PLOTTED 14 Jun 89

512092

CSAMT SURVEY DATA
STATIC CORRECTED RESISTIVITY

Line 353000
BASIN LAKE
for
BILLITON AUSTRALIA

RECEIVER DATA
DiPole Length= 40.m
Stn. SPacing = 40.m
Line Orient= East
DiPole Orient= East
Date of survey= NOV 88

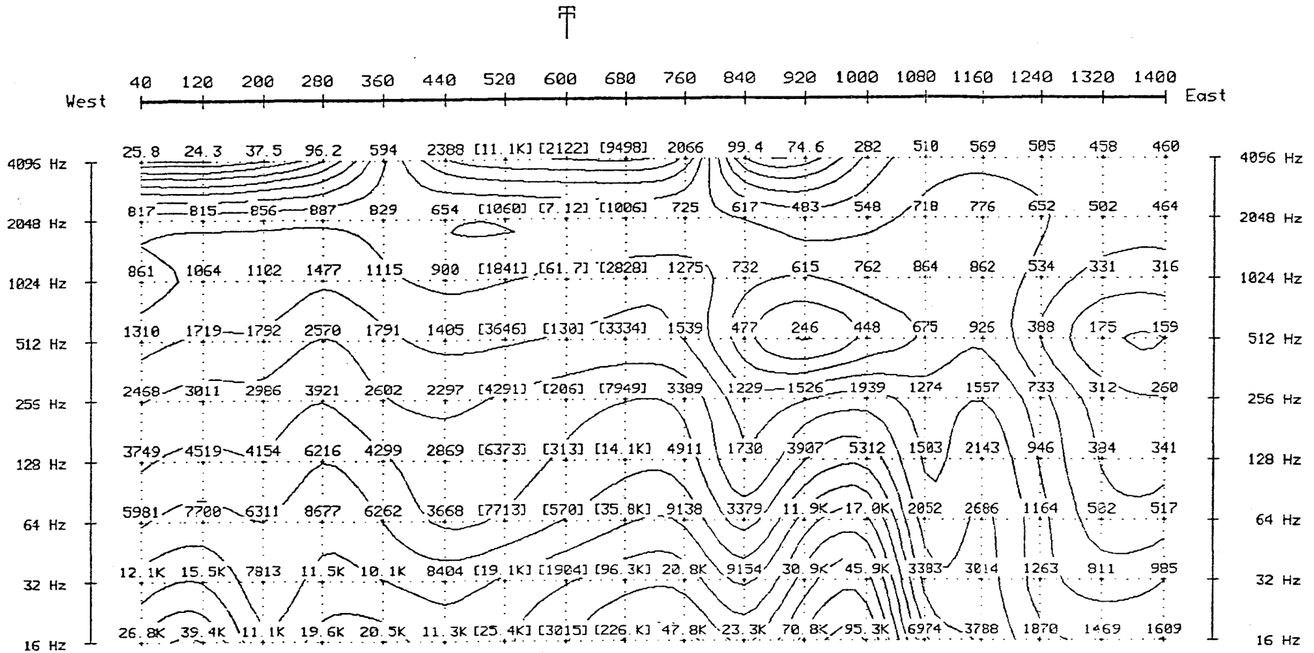
TRANSMITTER DATA
Length = 1400M
Orient. = East
Distance= 7KM
Rx to Tx= North

CULTURE SYMBOL LEGEND
Major Powerline

Plate 2: Line 35300N, a=40m.

ZONGE ENGINEERING &
RESEARCH ORGANIZATION

0323



STATIC CORRECTED RESISTIVITY
RHO: 718 PHZ: 546 FREQ: 2048

[Plot limits] and LOGARITHMIC CONTOURS
(Interval: 0.20)

[115.K] 158
100.K 100
63.1K 63.1
39.8K 39.8
25.1K 25.1
15.8K [23.6]
10.0K
6310
3981
2512
1585
1000
631
398
251

ZONGE Job 903
PLOT BY CPLOT 5.40
PLOTTED 10 Jun 89

512093

CSAMT SURVEY DATA
STATIC CORRECTED RESISTIVITY

Line 353000

BASIN LAKE

for

BILLITON AUSTRALIA

RECEIVER DATA
DiPole Len9th= 80.m
Stn. SPacin9 = 80.m

Line Orient= East
DiPole Orient= East

Date of survey= NOV 88

TRANSMITTER DATA
Len9th = 1400M
Orient. = East
Distance= 7KM
Rx to Tx= North

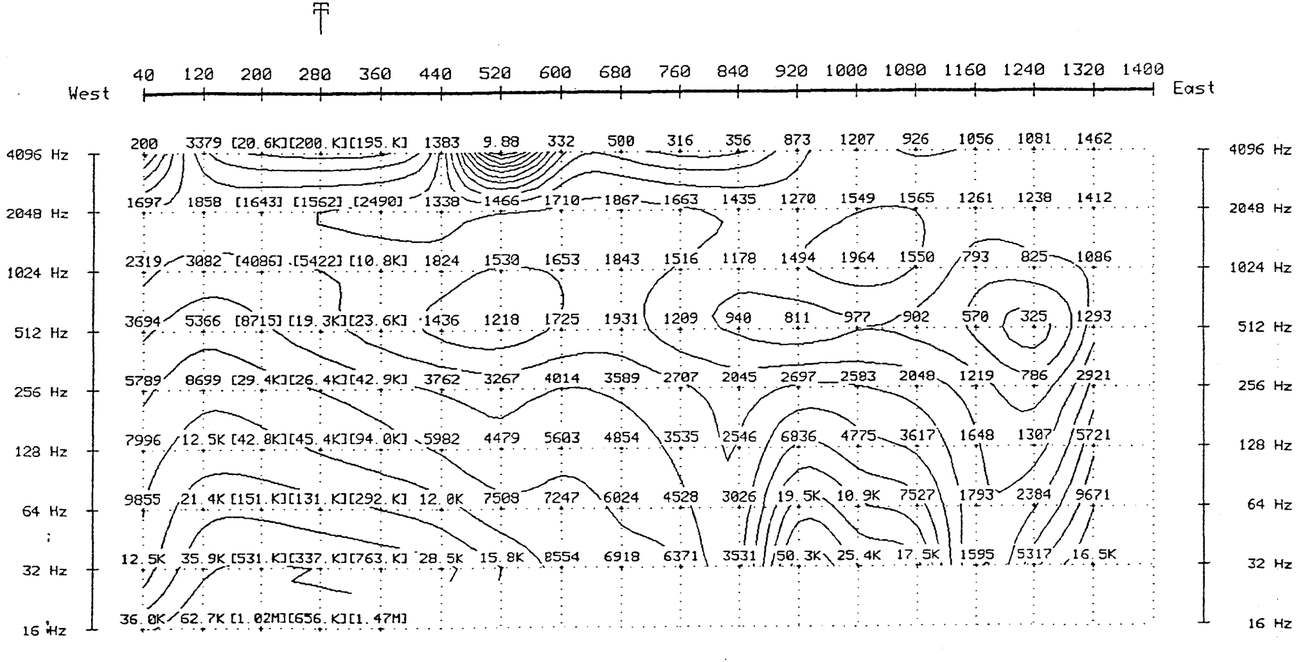
CULTURE SYMBOL LEGEND

Major Poverline

Plate 1: Line 35300N, a=80m.

ZONGE ENGINEERING &
RESEARCH ORGANIZATION

9325



STATIC CORRECTED RESISTIVITY
RHO: 1557 PHZ: 593 FREQ: 2048

[Plot limits] and LOGARITHMIC CONTOURS
(Interval: 0.20)

[62.7K]	63.1
39.8K	39.8
25.1K	25.1
15.8K	15.8
10.0K	10.0
6310	[9.88]
3981	
2512	
1585	
1000	
631	
398	
251	
158	
100	

ZONGE Job 903
PLOT BY CPLOT 5.40
PLOTTED 10 Jun 89

512094

CSAMT SURVEY DATA
STATIC CORRECTED RESISTIVITY

Line 352600

BASIN LAKE

for

BILLITON AUSTRALIA

RECEIVER DATA
DiPole Length= 80.m
Stn. SPacing = 80.m
Line Orient= East
DiPole Orient= East
Date of survey= NOV 88

TRANSMITTER DATA
Length = 1500M
Orient. = East
Distance= 7KM
Rx to Tx= North

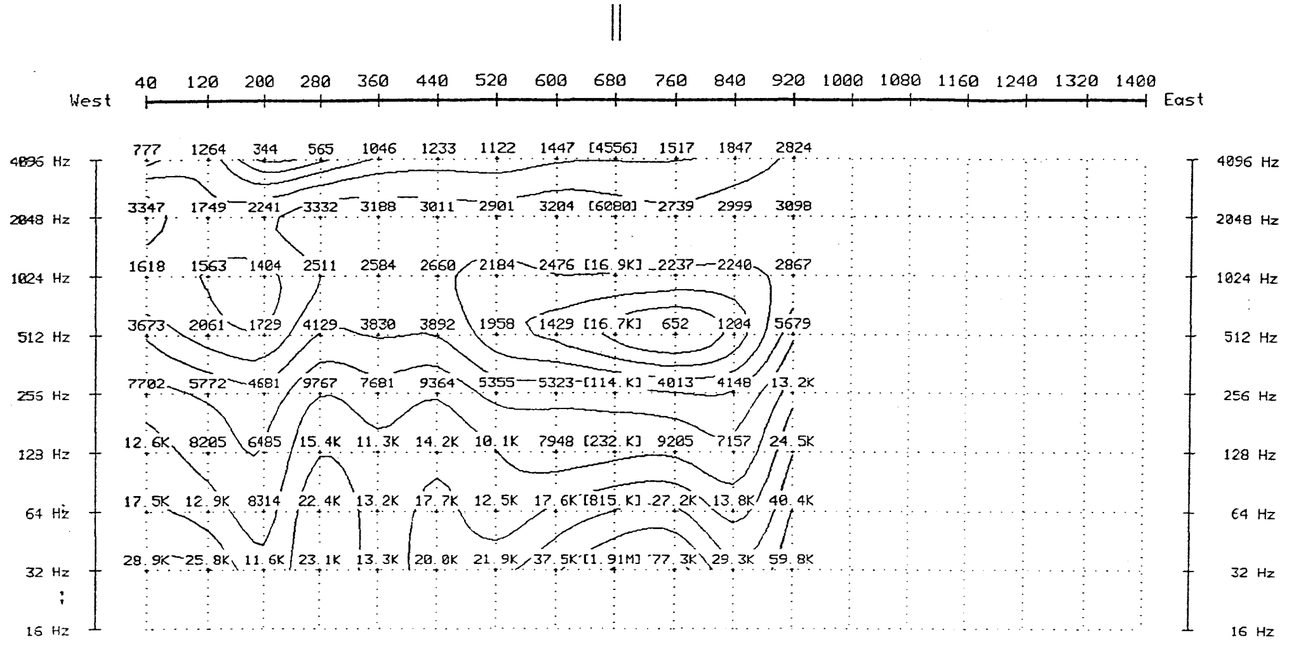
CULTURE SYMBOL LEGEND
Major Powerline

Plate 3: Line 35260N, a=80m.

ZONGE ENGINEERING & RESEARCH ORGANIZATION

0336

512095



STATIC CORRECTED RESISTIVITY
RHO: 3074 PHZ: 590 FREQ: 2048

[Plot limits] and LOGARITHMIC CONTOURS
(Interval: 0.20)

[82.2K]
63.1K
39.8K
25.1K
15.8K
10.0K
6310
3981
2512
1585
1000
631
398
[332]

ZONGE Job 903
PLOT BY CPLOT 5.40
PLOTTED 10 Jun 89

CSAMT SURVEY DATA
STATIC CORRECTED RESISTIVITY

Line 351800

BASIN LAKE

for

BILLITON AUSTRALIA

RECEIVER DATA
DiPole Length= 80.m
Stn. SPacing = 80.m
Date of survey= NOV 88

Line Orient= East
DiPole Orient= East

TRANSMITTER DATA
Length = 1500M
Orient. = East
Distance= 7KM
Rx to Tx= North

CULTURE SYMBOL LEGEND

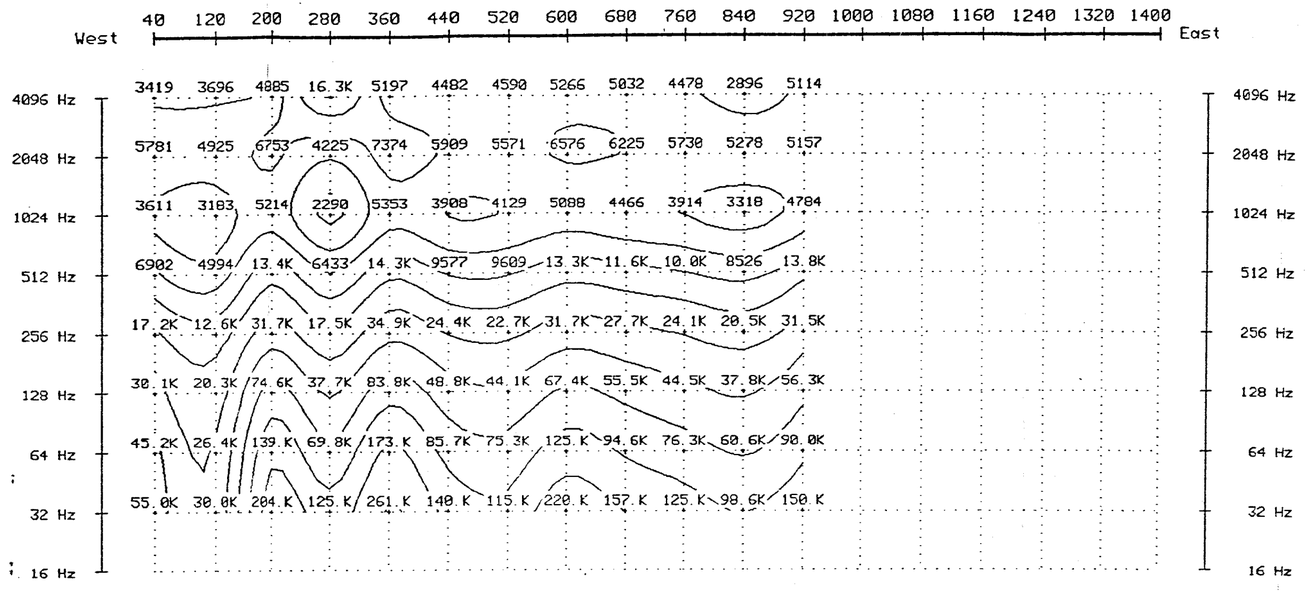
‖ Road, Highway

Plate 4: Line 35180N, a=80m.

ZONGE ENGINEERING &
RESEARCH ORGANIZATION

0327

512096



STATIC CORRECTED RESISTIVITY
RHO: 5760 PHZ: 492 FREQ: 2048

[Plot limits] and LOGARITHMIC CONTOURS
(Interval: 0.20)

[261.K]
251.K
158.K
100.K
63.1K
39.8K
25.1K
15.8K
10.0K
6310
3981
2512
[2290]

ZONGE Job 903
PLOT BY CPLOT 5.40
PLOTTED 10 Jun 89

CSAMT SURVEY DATA
STATIC CORRECTED RESISTIVITY

Line 350200
BASIN LAKE
for
BILLITON AUSTRALIA

RECEIVER DATA
DiPole LenGth= 80.m
Stn. SPacinG = 80.m

Line Orient= East
DiPole Orient= East

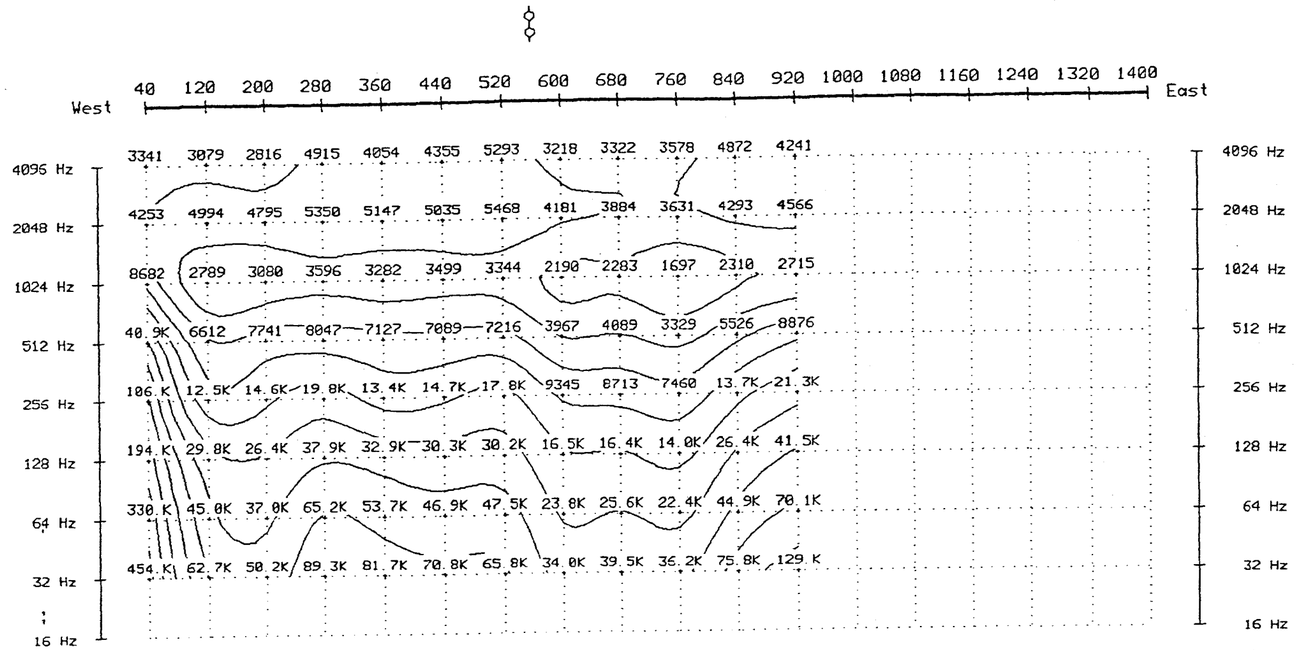
Date of survey= NOV 88

TRANSMITTER DATA
LenGth = 1500M
Orient. = East
Distance= 7KM
Rx to Tx= North

Plate 5: Line 35020N, a=80m.

ZONGE ENGINEERING &
RESEARCH ORGANIZATION

0328



STATIC CORRECTED RESISTIVITY
RHO: 4680 PHZ: 577 FREQ: 2048

[Plot limits] and LOGARITHMIC CONTOURS
(Interval: 0.20)

[454.K]
398.K
251.K
158.K
100.K
63.1K
39.8K
25.1K
15.8K
10.0K
6310
3981
2512
[1697]

ZONGE Job 903
PLOT BY CPLOT 5.40
PLOTTED 10 Jun 89

512097

CSAMT SURVEY DATA
STATIC CORRECTED RESISTIVITY

Line 349400

BASIN LAKE

for

BILLITON AUSTRALIA

RECEIVER DATA
Dipole Length= 80.m
Stn. Spacing = 80.m
Date of survey= NOV 88

Line Orient= East
Dipole Orient= East

TRANSMITTER DATA
Length = 1500M
Orient. = East
Distance= 7KM
Rx to Tx= North

CULTURE SYMBOL LEGEND

Pipeline

Plate 6: Line 34940N, a=80m.

ZONGE ENGINEERING &
RESEARCH ORGANIZATION

9329

380000 E

385000 E

390000 E

HENTY Au

NORTH HENTY FAULT

LAKE WESTWOOD

LAKE SELINA

LAKE HUNTLEY

LAKE MARGARET

LAKE MARY

BASIN LAKE

ROLLESTON

TYNDALL MINE

NEWTON CAMP

ANTHONY ROAD

GRAVITY

HOWARDS ANOMALY

SOUTH HENTY FAULT

TYN 1

TYN 2

TYN 3

TYN 4

TYN 5

FAULT

LINE

TIE

YELL

GREAT

MINES DEPT DDH

SER PY

LEECH HILL

INFILL TEM

BRADSHAWS ROAD

ANTHONY ROAD

BLD 89-1

BLD 89-2

BLD 89-3

BL 1

BL 2

BL 3

BL 4

BL 5

BL 801

BL 802

CSAMT COMPLETED ON ENTIRE GRID NOV-DEC '88

YOLANDE RIVER

WPZ

MSAZ

EPZ

ANTHONY FAULT

364000N

363600N

363200N

362800N

362400N

362000N

361600N

361200N

360800N

360400N

360000N

359600N

359200N

358800N

358400N

358000N

357000N

356600N

356200N

355800N

355400N

355000N

354600N

354200N

353800N

353400N

353000N

352600N

352200N

351800N

351400N

351000N

350600N

350200N

349800N

349400N

349000N

381400E

UTEM Coverage by Goldfields

CSAMT Completed Dec. '88

CSAMT Completed Dec. '88

CSAMT COMPLETED ON ENTIRE GRID NOV-DEC '88

< > MAR 89 EM 37

EM 37 ANOMALY

CSAMT ANOMALY

5360000 N

5355000 N

5350000 N

LATE CAMBRIAN OWEN CONGLOMERATE

- €Bou — Pink sandstones, granule pebble conglomerate
- €Bom — Thick bedded cobble pebble conglomerate
- €Bon — Interbedded micaceous sandstone siltstone + conglomerate
- €Bol — Thick bedded conglomerate
- €Bj — Volcaniclastic conglomerate

TYNDALL GROUP

- €ts — Shale
- €tvc — Mixed quartz feldspar phyric epiclastics. Dominant volcaniclastics (€tvc), cherty ash (€tva), volcaniclastic conglomerate (€tc)
- €tt — Quartz feldspar phyric tuff, minor andesitic rocks
- €tp — Quartz feldspar phyric porphyry (€tp) intrusives (€tpi), + lava (€tpl)

STICHT RANGE BEDS

- €srb — €src: Siliciclastic conglomerate, pink pebble conglomerate (€src) and minor volcaniclastics (€srv)

PRECAMBRIAN

- Pp — Pelitic quartz mica phyilite
- Ppq — Phyllite, quartzite
- Pq — Quartzite

(Legend after Mines Dept.)

LATE CAMBRIAN OWEN CONGLOMERATE

- €Bs — Interbedded siltstone, sandstone
- €Bcs — Interbedded sandstone, conglomerate
- €Bc — Siliciclastic conglomerate
- €Bon — Siltstone, sandstone, conglomerate
- €Bj — Volcaniclastic conglomerate

TYNDALL GROUP

- €tc — Volcaniclastic conglomerate
- €tt — Crystal ± lithic tuff
- €ts — Shale, siltstone
- €tl — Quartz feldspar lava
- €ta — Andesitic tuff

HENTY RIVER SEQUENCE

- €hfb — Basaltic volcanics
- €hfa — Andesitic volcanics
- €hft — Felsic tuff
- €hfg — Interbedded lithicwacke, siltstone

CENTRAL VOLCANICS

- €p — Quartz feldspar porphyry
- €cv — Feldspar phyric pyroclastics, lavas
- €cvs — Shale siltstone - sandstone
- €cva — Andesitic lavas
- €cvl — Feldspar phyric rhyolite - dacite lava

WESTERN SEQUENCE

- €p — Quartz feldspar porphyry
- €wst — Felsic pyroclastics
- €wss — Interbedded siltstone, shale

(Legend after Mines Dept.)

A - Mag High

Gravity H

Gravity Data point

CSAMT Anomaly

90-3099

512098

Billiton Australia
The Metals Division of the Shell Company of Australia Limited

Project

Title
BASIN LAKE - LAKE SELINA
EXPLORATION STATUS

Author JPR	Dept. TAS	Scale 1:25 000	
Drawn OH	Date 1/89	Revised	Date
Checked	Date	S'ceded	Date
Sheet No. FIG 3		Drawing No. D/LD 56-57/006	

5 cm

9331

90-3099

512099

0 100 200 300 m
1:5000

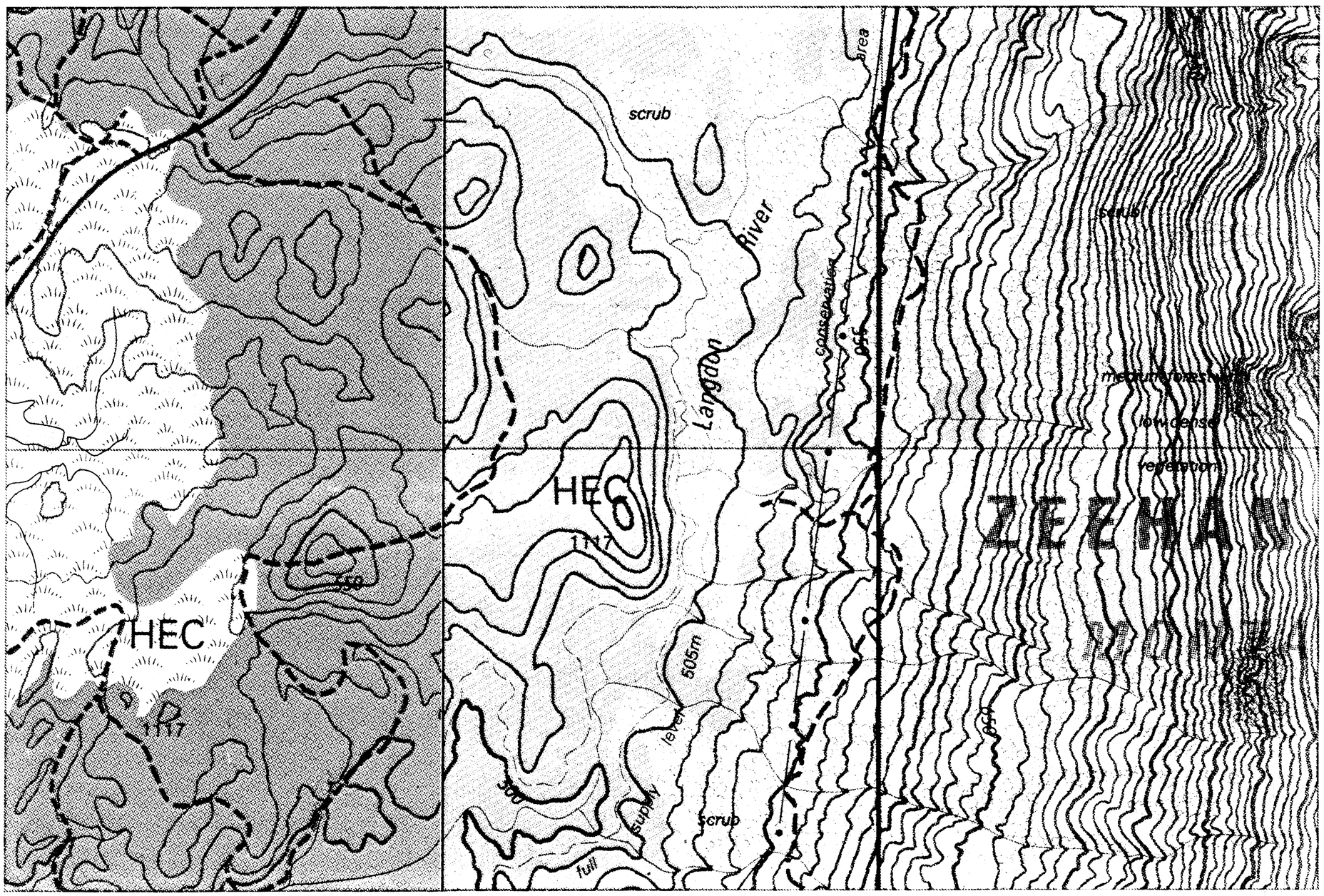
5 cm

Billiton Australia
The Metals Division of the Shell Company of Australia Limited

Project	BASIN LAKE
Title	BASE MAP
	SHEET 1

Author CJC	Dept. TAS	Scale 1:5000	
Drawn OH	Date 2/90	Revised	Date
Checked	Date	S'ceded	Date
Sheet No. FIG 4		Drawing No. D/LD 57/026	

9330



512100

0 100 200 300m

1:5000

5 cm

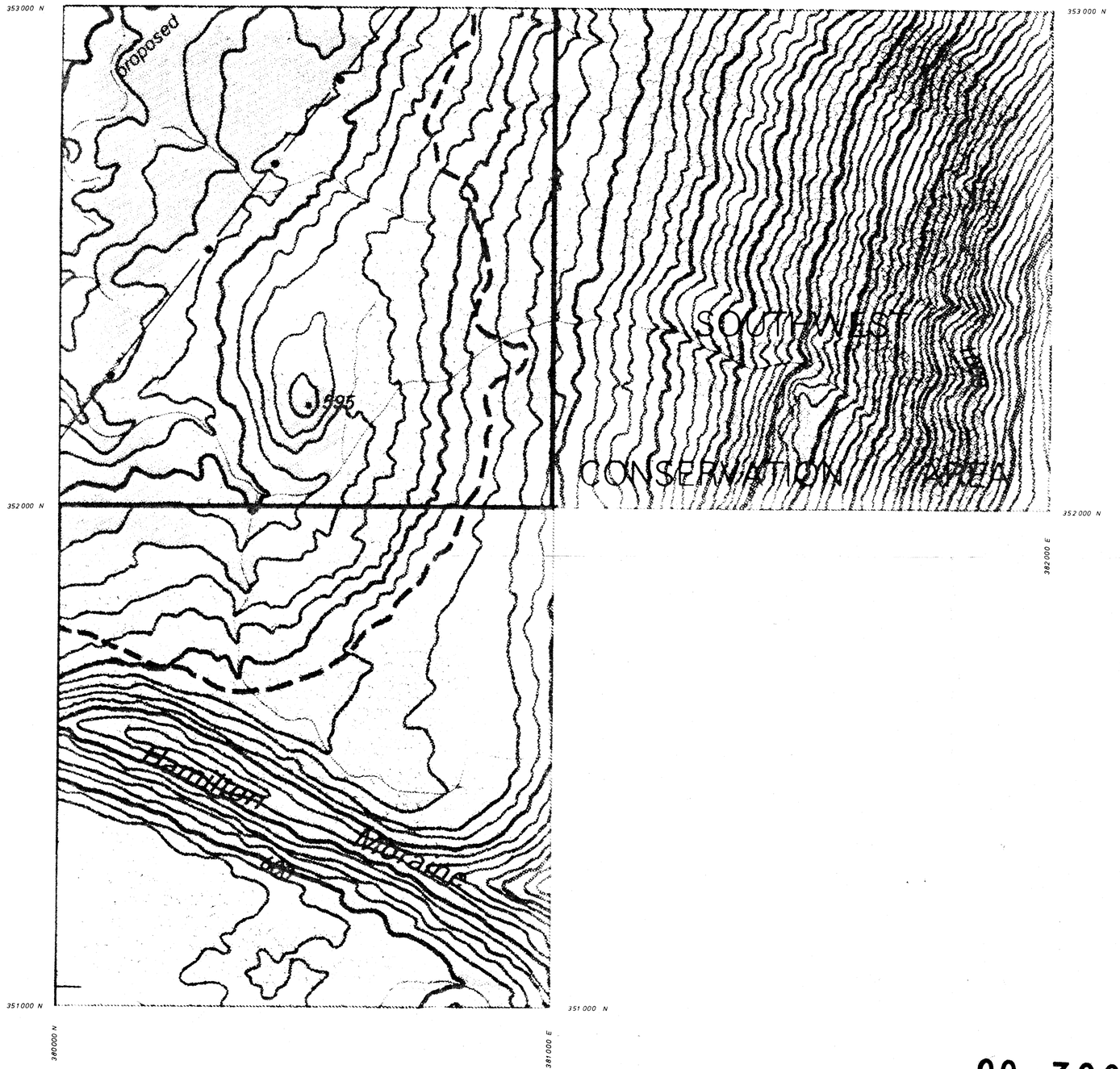
90-3099

Billiton Australia
The Metals Division of the Shell Company of Australia Limited

Project	BASIN LAKE
Title	BASE MAP
	SHEET 2

Author CJC	Dept. TAS	Scale 1:5000	
Drawn OH	Date 2/90	Revised	Date
Checked	Date	S'ceded	Date
Sheet No. FIG 5		Drawing No. D/LD 57/027	

9332



512101

0 100 200 300m
1:5000

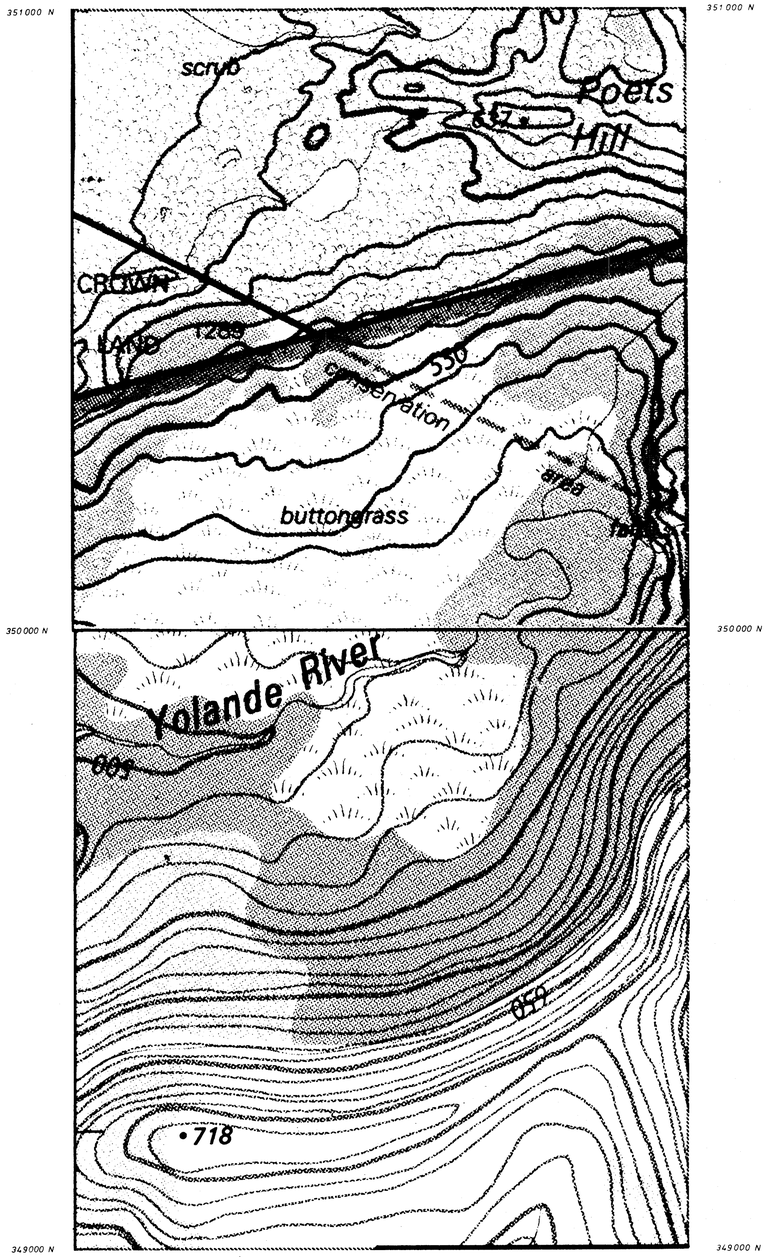
5 cm

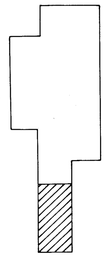
90-3099

Billiton Australia
The Metals Division of the Shell Company of Australia Limited

Project	BASIN LAKE		
Title	BASE MAP		
	SHEET 3		
Author CJC	Dept. TAS	Scale 1:5000	
Drawn OH	Date 2/90	Revised	Date
Checked	Date	S'ceded	Date
Sheet No. FIG 6		Drawing No. D/LD 57/028	

9333





512102

0 100 200 300m
1:5000

5 cm

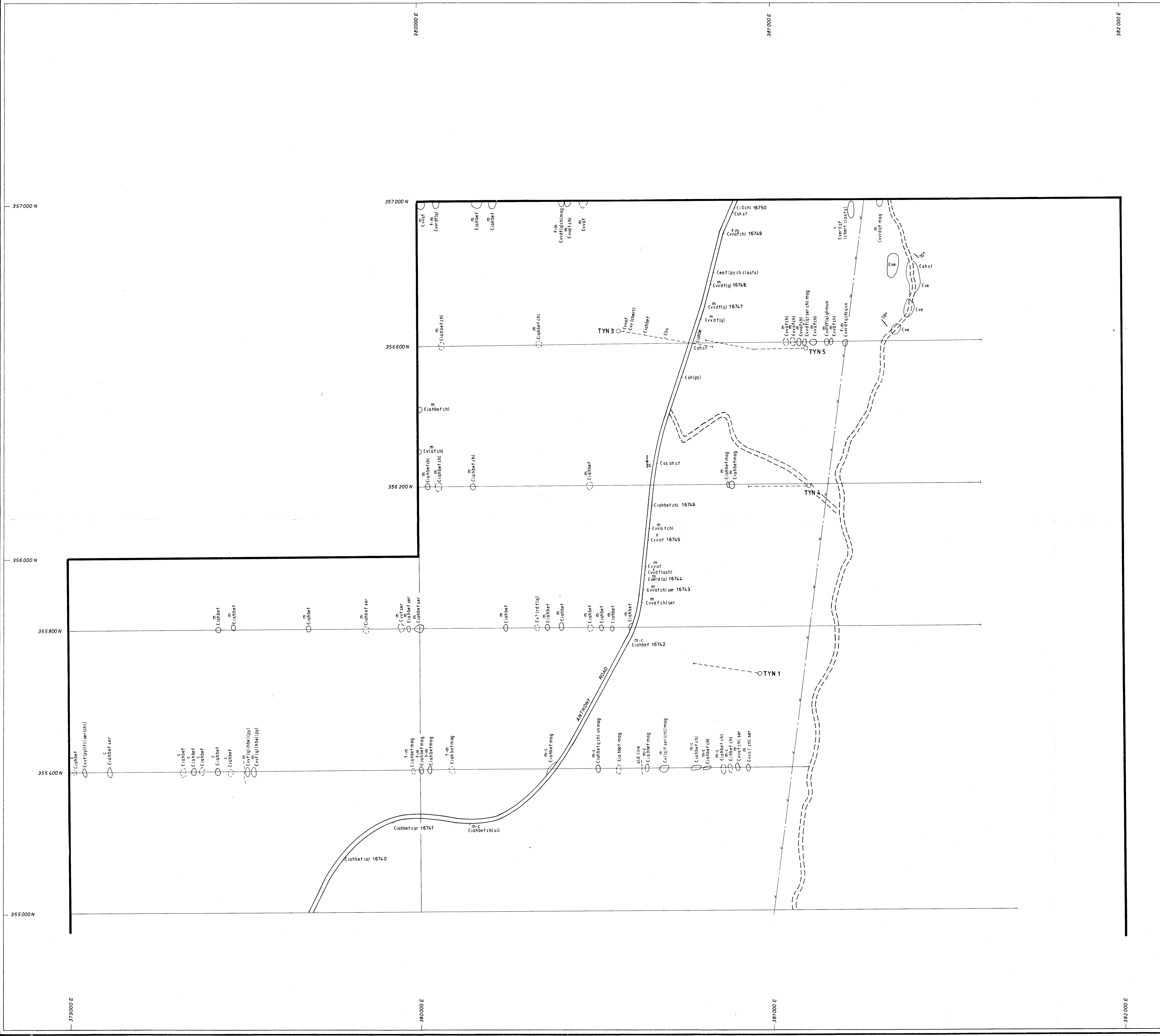
90-3099

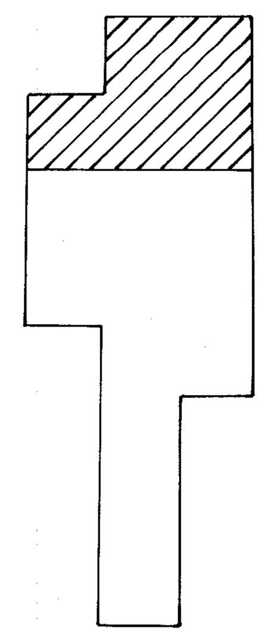
Billiton Australia
The Metals Division of the Shell Company of Australia Limited

Project	BASIN LAKE
Title	BASE MAP
	SHEET 4

Author CJC	Dept. TAS	Scale 1:5000	
Drawn OH	Date 2/90	Revised	Date
Checked	Date	S'ceded	Date
Sheet No. FIG 7		Drawing No. D/LD 57/029	

9224





LEGEND

Є	Cambrian
r	rhyolite
rd	rhyodacite
d	dacite
a	andesite
o	diorite
qvn	quartz vein
car	carbonate alteration
py	disseminated pyrite
sil	silification
ser	sericite alteration
chl	chlorite alteration
mag	magnetic
fl	fluorite
( )	minor/trace
st	siltstone
ss	sandstone
sh	shale
i	intrusive
e	epiclastic
l	lava
v	volcanic
vv	volcaniclastic
Єvvf (vf)	very fine grained
Єvvf (f)	fine grained
Єvvf (m)	medium grained
Єvvf (c)	coarse grained
16734	sample no.
	Outcrop
	Subcrop
	float
	Dip and strike of foliation
	facing
	Dip and strike of stratigraphy
TYN 1	Diamond drill hole
	Access track
	Transmission line
	BAUS grid line
F	Fault inferred position
	EL boundary

0 200 400m
1:5000

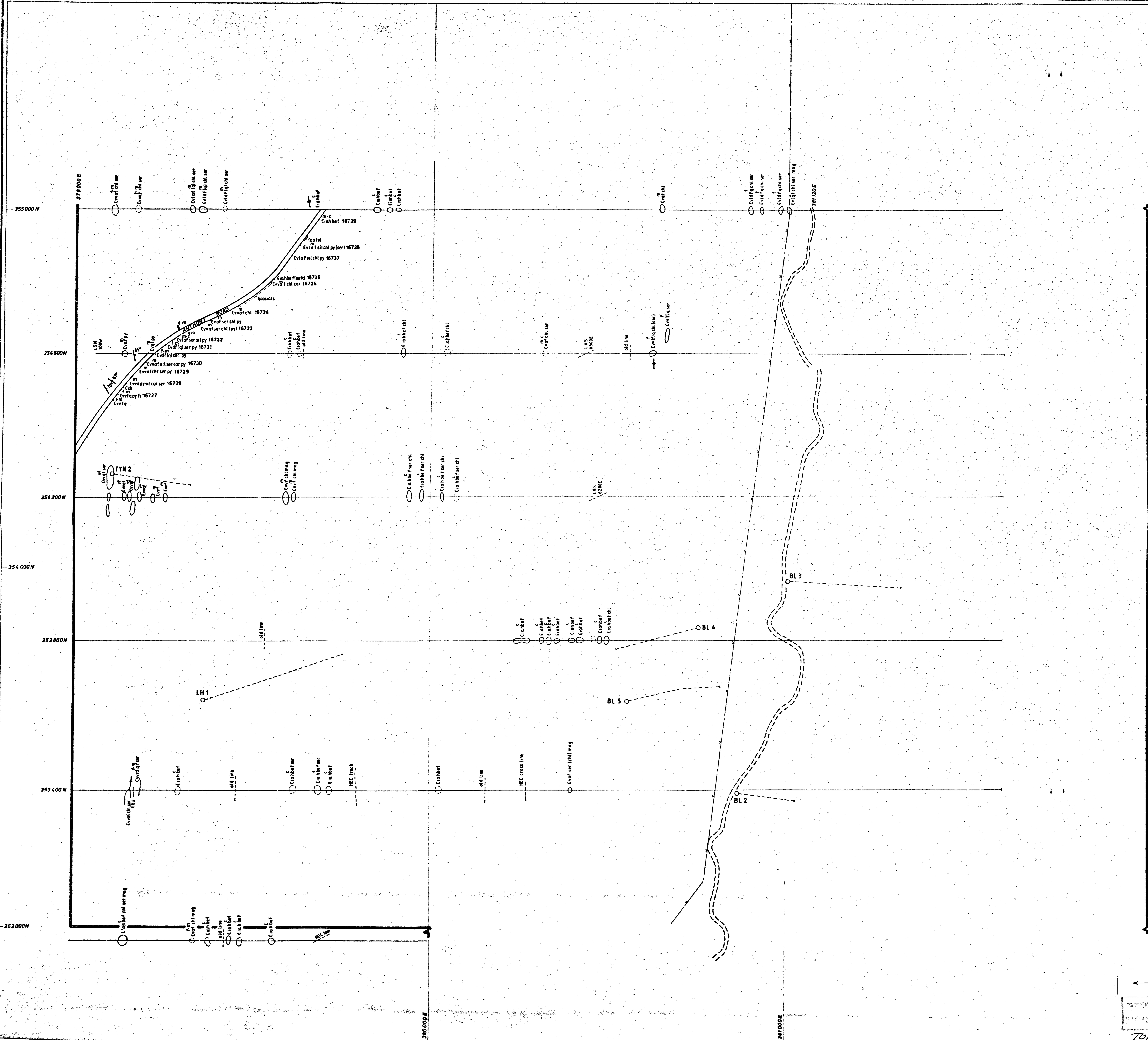
512103 -
90-3099

Billiton Australia
The Metals Division of the Shell Company of Australia Limited

Project	BASIN LAKE
Title	GEOLOGY FACT MAP
	SHEET 1

Author CJC	Dept. TAS	Scale 1:5000	
Drawn OH	Date 2/90	Revised	Date
Checked	Date	S'ceded	Date
Sheet No. FIG. 8		Drawing No. D/LD 57/024	

9335



LEGEND

Є	Cambrian
r	rhyolite
rd	rhyodacite
d	dacite
a	andesite
o	diorite
qvn	quartz vein
car	carbonate alteration
py	disseminated pyrite
sil	silification
ser	sericite alteration
chl	chlorite alteration
mag	magnetic
fl	fluorite
( )	minor / trace
st	siltstone
ss	sandstone
sh	shale
i	intrusive
e	epiclastic
l	lava
v	volcanic
vv	volcaniclastic
Cvvf (vf)	very fine grained
Cvvf (f)	fine grained
Cvvf (m)	medium grained
Cvvf (c)	coarse grained
16734	sample no
	Outcrop
	Subcrop
	float
	Dip and strike of foliation
	facing
	Dip and strike of stratigraphy
TYN1	Diamond drill hole
	Access track
	Transmission line
	BAUS grid line
F	Fault inferred position
	EL boundary

0 200 400m
1:5000

512104

90-3099

Billiton Australia
The Metals Division of the Shell Company of Australia Limited

Project: BASIN LAKE

Title: GEOLOGY FACT MAP

SHEET 2

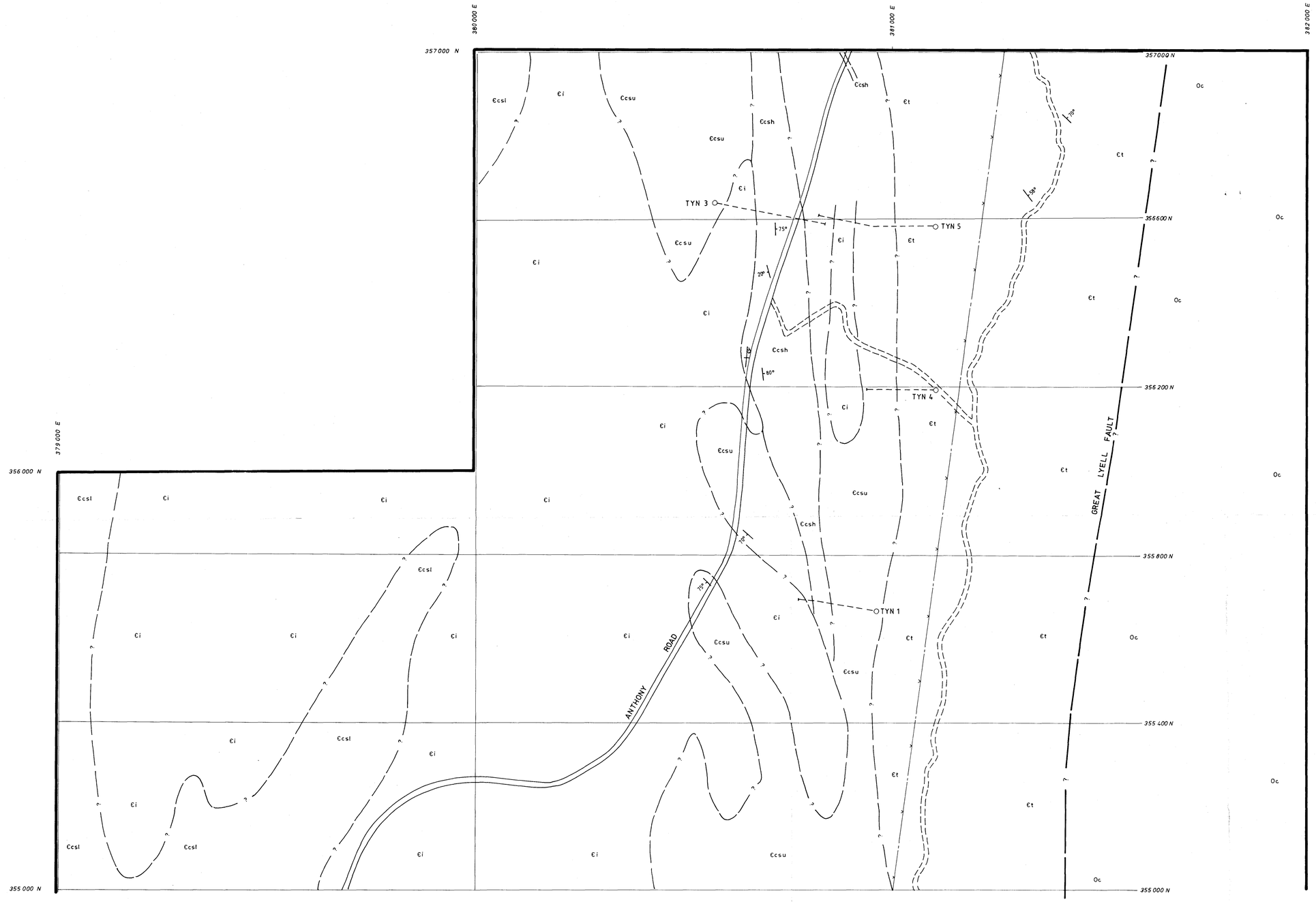
Author	CJC	Dept. TAS	Scale	1:5000	
Drawn	OH	Date 2/90	Revised		Date
Checked		Date	S'ceded		Date
Sheet No.		FIG 9	Drawing No.	D/LD 57/025	

5 cm

FIGURE No. 5

TOP LEFT

9336



LEGEND

Quaternary	Qg	Glacial sediments and alluvials
Ordovician	Oc	Owen Conglomerate
Cambrian	Et	Tyndall Group. Predominantly felsic volcaniclastics, epiclastics and lavas. Base marked by mixed intermediate and felsic volcanics. Includes Comstock Tuff.
	Ei	Dacitic-andesitic shallow level intrusives. Autobrecciated along margins. Majority possibly sills. Lavas increasing towards east. Pyritic towards margins.
	Ccsh	Interbedded sandstones, siltstones and black shales (partly graphitic)
	Ccsu	Central Volcanic Sequence upper. Includes Basin Lake sulphide zone. Predominantly intermediate volcanics with felsic content increasing towards the east. Abundant disseminated pyrite in parts. Minor stratiform pyrite lenses.
	Ccsl	Central Volcanic Sequence lower. Predominantly intermediate volcanics with minor felsic volcanic lenses incorporated. Disseminated pyrite common.
	Ews	Western Volcanosedimentary Sequence. Mixed felsic-intermediate volcaniclastic sequence.

- Access track
- Power line
- Grid line
- Geological boundary inferred
- Fault inferred location
- Diamond drill hole
- E.L. boundary
- Bedding
- Facing

NOTE: OUTCROP WITHIN THE E.L. BOUNDARY IS SPARCE. THE MAJORITY OF THE LICENCE IS COVERED BY QUATERNARY GLACIALS, SEDIMENTS.

0 100 200 300m
1:5000

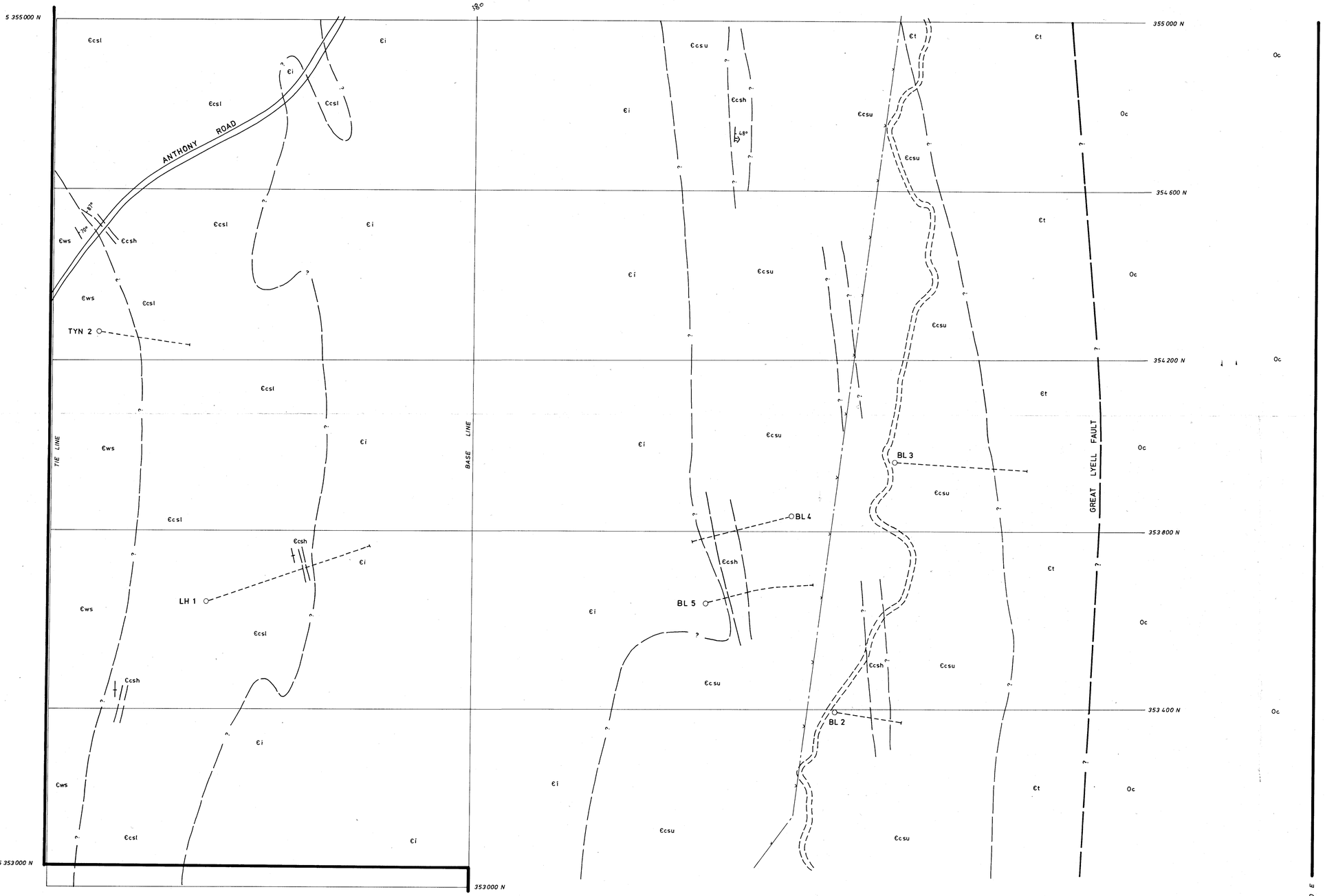
512105

90-3099

Billiton Australia
The Metals Division of the Shell Company of Australia Limited

Project	BASIN LAKE		
Title	GEOLOGICAL INTERPRETATION		
	SHEET 1		
Author CJC	Dept. TAS	Scale 1:5000	
Drawn OH	Date 2/90	Revised	Date
Checked	Date	S'ceded	Date
Sheet No. FIG 10		Drawing No. D/LO 57/030	

9337



LEGEND

Quaternary	Qg	Glacial sediments and alluvials
Ordovician	Oc	Owen Conglomerate
Cambrian	Et	Tyndall Group. Predominantly felsic volcaniclastics, epiclastics and lavas. Base marked by mixed intermediate and felsic volcanics. Includes Comstock Tuff.
	Ei	Dacitic-andesitic shallow level intrusives. Autobrecciated along margins. Majority possibly sills. Lavas increasing towards east. Pyritic towards margins.
	Ecsh	Interbedded sandstones, siltstones and black shales (partly graphitic)
	Ecsu	Central Volcanic Sequence upper. Includes Basin Lake sulphide zone. Predominantly intermediate volcanics with felsic content increasing towards the east. Abundant disseminated pyrite in parts. Minor stratiform pyrite lenses.
	Ecsl	Central Volcanic Sequence lower. Predominantly intermediate volcanics with minor felsic volcanic lenses incorporated. Disseminated pyrite common.
	Ews	Western Volcanosedimentary Sequence. Mixed felsic-intermediate volcaniclastic sequence.

- Access track
- Power line
- Grid line
- Geological boundary inferred
- Fault inferred location
- Diamond drill hole
- E.L. boundary
- Bedding
- Facing

NOTE OUTCROP WITHIN THE E.L. BOUNDARY IS SPARCE. THE MAJORITY OF THE LICENCE IS COVERED BY QUATERNARY GLACIALS, SEDIMENTS.

512106

0 100 200 300m
1:5000

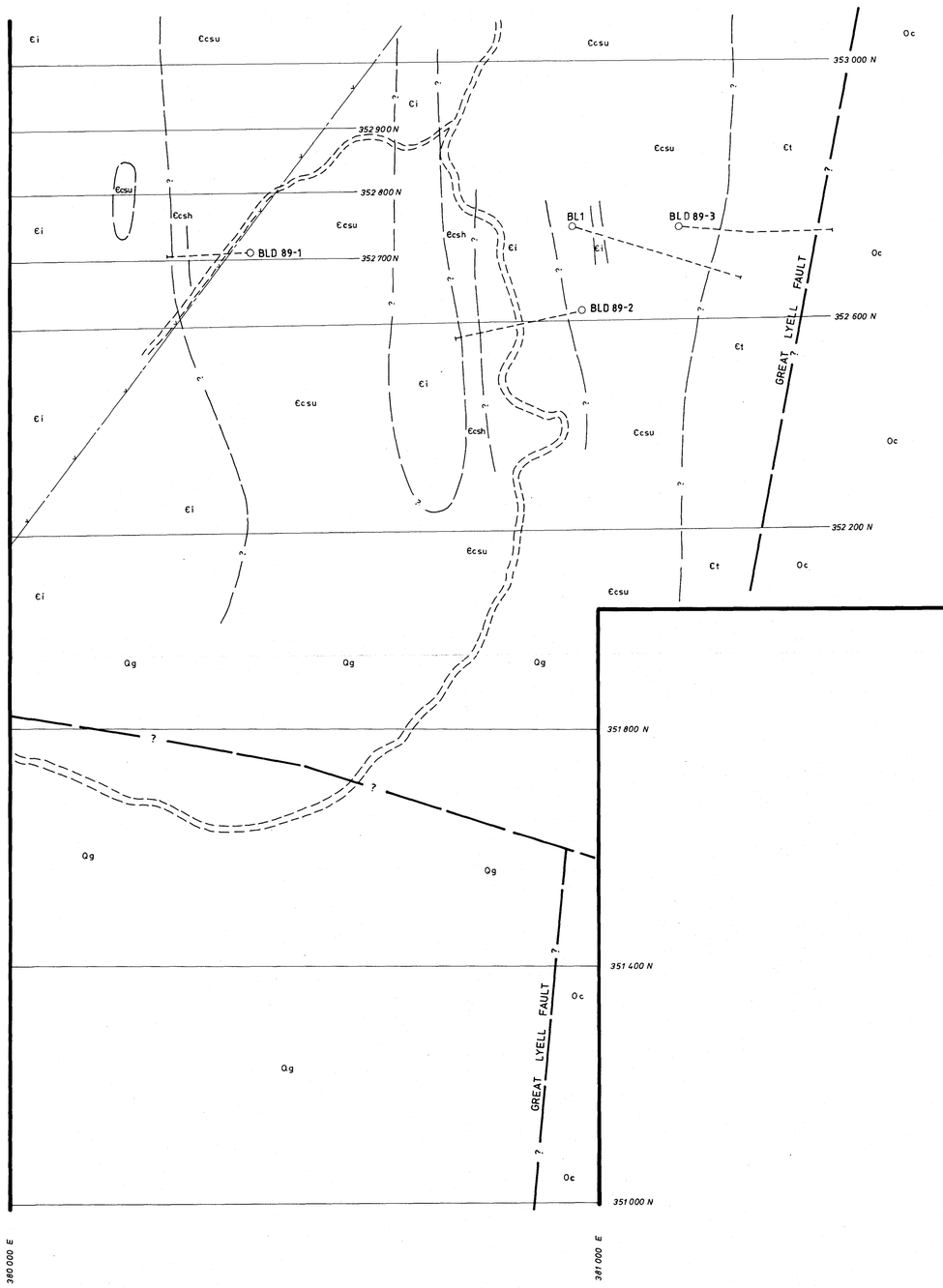
5 cm

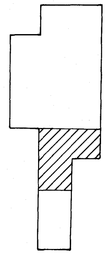
90-3099

Billiton Australia
The Metals Division of the Shell Company of Australia Limited

Project	BASIN LAKE		
Title	GEOLOGICAL INTERPRETATION		
			SHEET 2
Author CJC	Dept. TAS	Scale 1:5000	
Drawn OH	Date 2/90	Revised	Date
Checked	Date	S'ceded	Date
Sheet No. FIG 11		Drawing No. D/LD 57/031	

9228





5 353 000 N

5 352000N

382000 E

LEGEND

Quaternary	Qg	Glacial sediments and alluvials
Ordovician	Oc	Owen Conglomerate
Cambrian	Ct	Tyndall Group. Predominantly felsic volcaniclastics, epiclastics and lavas. Base marked by mixed intermediate and felsic volcanics. Includes Comstock Tuff.
	Ei	Dacitic-andesitic shallow level intrusives. Autobrecciated along margins. Majority possibly sills. Lavas increasing towards east. Pyritic towards margins.
	Ccsh	Interbedded sandstones, siltstones and black shales (partly graphitic)
	Ccsu	Central Volcanic Sequence upper. Includes Basin Lake sulphide zone. Predominantly intermediate volcanics with felsic content increasing towards the east. Abundant disseminated pyrite in parts. Minor stratiform pyrite lenses.
	Ccsl	Central Volcanic Sequence lower. Predominantly intermediate volcanics with minor felsic volcanic lenses incorporated. Disseminated pyrite common.
	Cws	Western Volcanosedimentary Sequence. Mixed felsic-intermediate volcaniclastic sequence.

- Access track
- Power line
- Grid line
- Geological boundary inferred
- Fault inferred location
- Diamond drill hole
- E.L. boundary
- Bedding
- Facing

NOTE :- OUTCROP WITHIN THE E.L. BOUNDARY IS SPARCE. THE MAJORITY OF THE LICENCE IS COVERED BY QUATERNARY GLACIALS, SEDIMENTS.

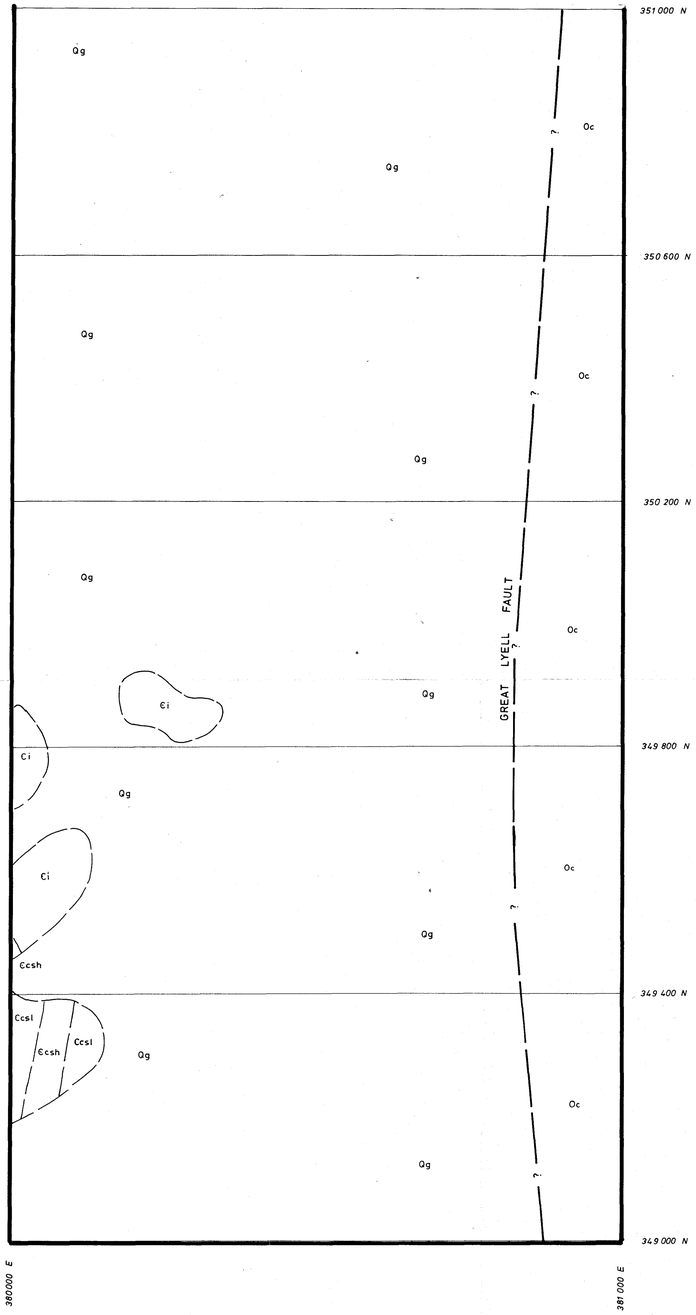
0 100 200 300m
1:5000

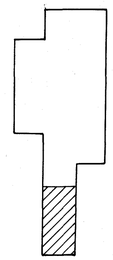
5 cm

Billiton Australia
The Metals Division of the Shell Company of Australia Limited

Project	BASIN LAKE		
Title	GEOLOGICAL INTERPRETATION		
	SHEET 3		
Author C.J.C	Dept. TAS	Scale 1:5000	
Drawn O.H	Date 2/90	Revised	Date
Checked	Date	S'ceded	Date
Sheet No. FIG 12		Drawing No. D/LD 57/032	

9239





LEGEND

Quaternary	Qg	Glacial sediments and alluvials
Ordovician	Oc	Owen Conglomerate
Cambrian	€t	Tyndall Group. Predominantly felsic volcaniclastics, epiclastics and lavas. Base marked by mixed intermediate and felsic volcanics. Includes Comstock Tuff.
	€i	Dacitic-andesitic shallow level intrusives. Autobrecciated along margins. Majority possibly sills. Lavas increasing towards east. Pyritic towards margins.
	€csh	Interbedded sandstones, siltstones and black shales (partly graphitic)
	€csu	Central Volcanic Sequence upper. Includes Basin Lake sulphide zone. Predominantly intermediate volcanics with felsic content increasing towards the east. Abundant disseminated pyrite in parts. Minor stratiform pyrite lenses.
	€csl	Central Volcanic Sequence lower. Predominantly intermediate volcanics with minor felsic volcanic lenses incorporated. Disseminated pyrite common.
	€ws	Western Volcanosedimentary Sequence. Mixed felsic-intermediate volcaniclastic sequence.

- Access track
- Power line
- Grid line
- Geological boundary inferred
- Fault inferred location
- Diamond drill hole
- E.L. boundary
- Bedding
- Facing

NOTE: OUTCROP WITHIN THE E.L. BOUNDARY IS SPARCE. THE MAJORITY OF THE LICENCE IS COVERED BY QUATERNARY GLACIALS, SEDIMENTS.

512108

0 100 200 300m
1:5000

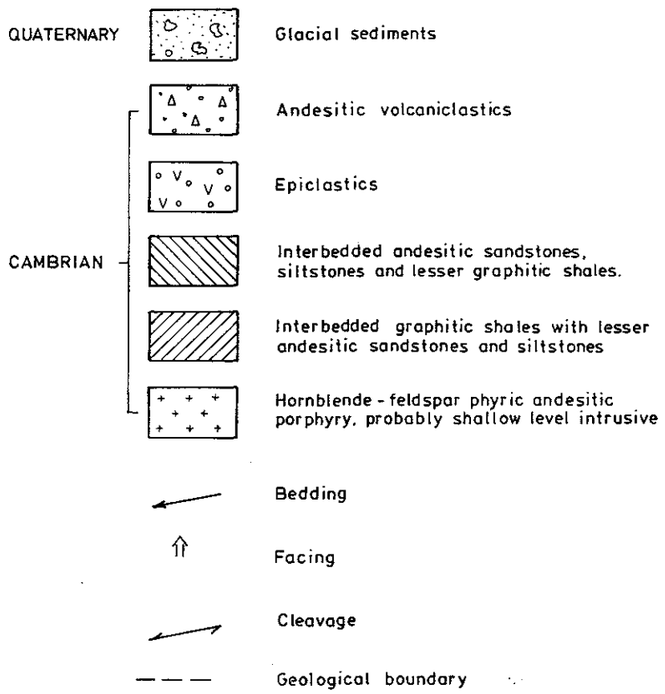
5 cm

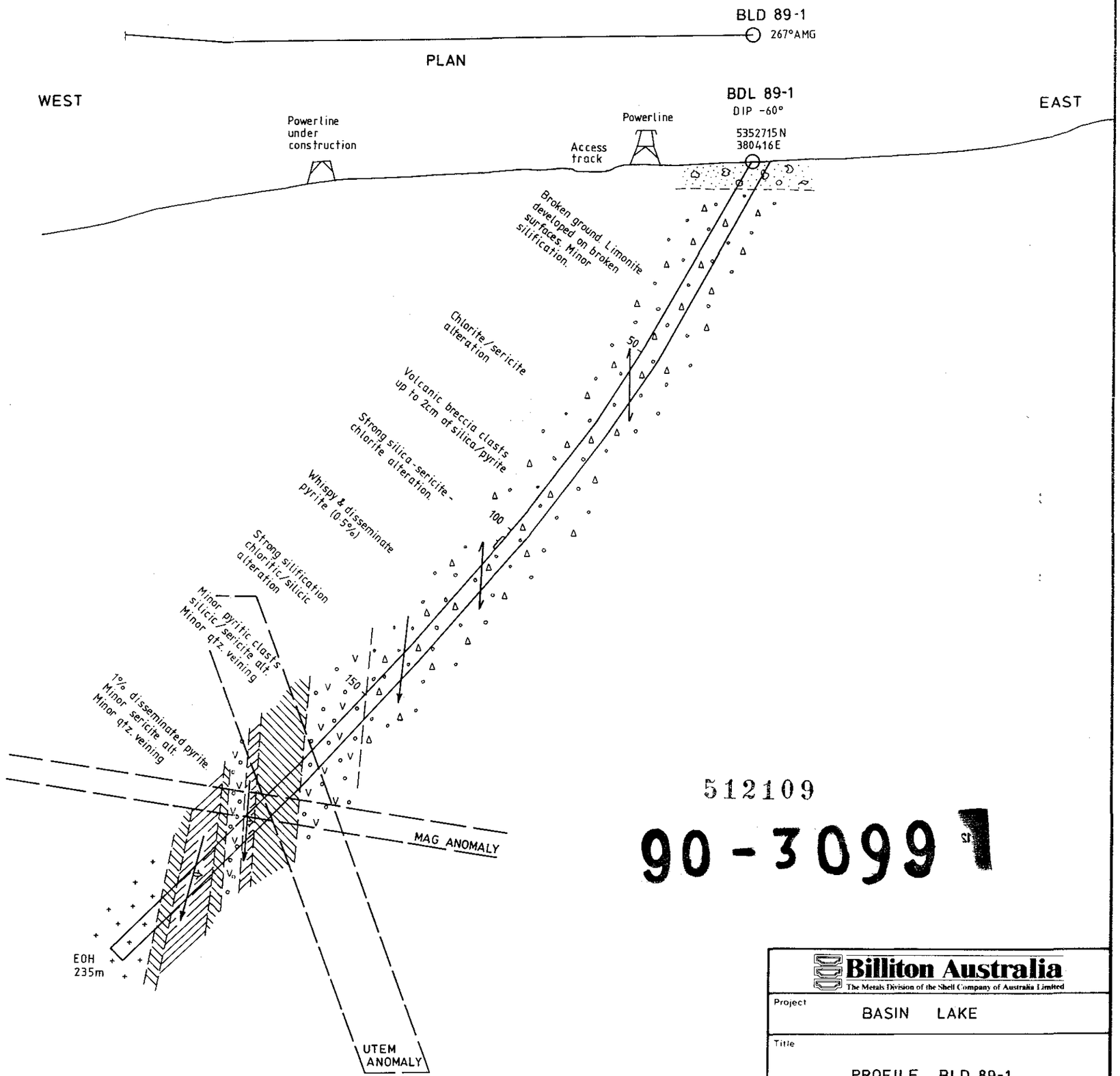
90-3099

Billiton Australia
The Metals Division of the Shell Company of Australia Limited

Project	BASIN LAKE		
Title	GEOLOGICAL INTERPRETATION		
	SHEET 4		
Author CJC	Dept. TAS	Scale 1:5000	
Drawn OH	Date 2/90	Revised	Date
Checked	Date	S'ceded	Date
Sheet No. FIG 13		Drawing No. D/LO 57/033	

9340





512109

90-3099

Billiton Australia
The Metals Division of the Shell Company of Australia Limited

Project	BASIN LAKE		
Title	PROFILE BLD 89-1 ALONG 267° AMG		
Author	CJC	Date 9/89	Scale 1:1000
Drawn	OH	Office TAS	Revised / Date
Drawing No.	D/LD 57/010		Fig. No. 14

WEST

BLD 89-2

262°

EAST

381000E BASE LINE

BLD 89-2
352615N
380985E

Access track

50

100

150

200

10% disseminated pyrite

Increased silification with 2% disseminated pyrite

Increased silification with <5% disseminated pyrite
15-20% disseminated pyrite in chalcedonic quartz
166·4 - 167·2m and 182·5 - 183·0m

Upper contact fine grained, brecciated and moderately silicified

EOH
250m

MAX MIN EM AND UTEM ANOMALY

Weak to moderate silicic and chloritic alteration throughout with accompanying fine grained disseminated pyrite (<1%)

GROUND MAGNETIC ANOMALY

QUATERNARY — Glacial sediments

CAMBRIAN — Hornblende-feldspar phyric andesitic porphyry, probably shallow level intrusive

CAMBRIAN — Graphitic black shales interbedded with volcanic sandstones & siltstones - finely laminated.

Bedding

Facing

Shear zone

5 cm

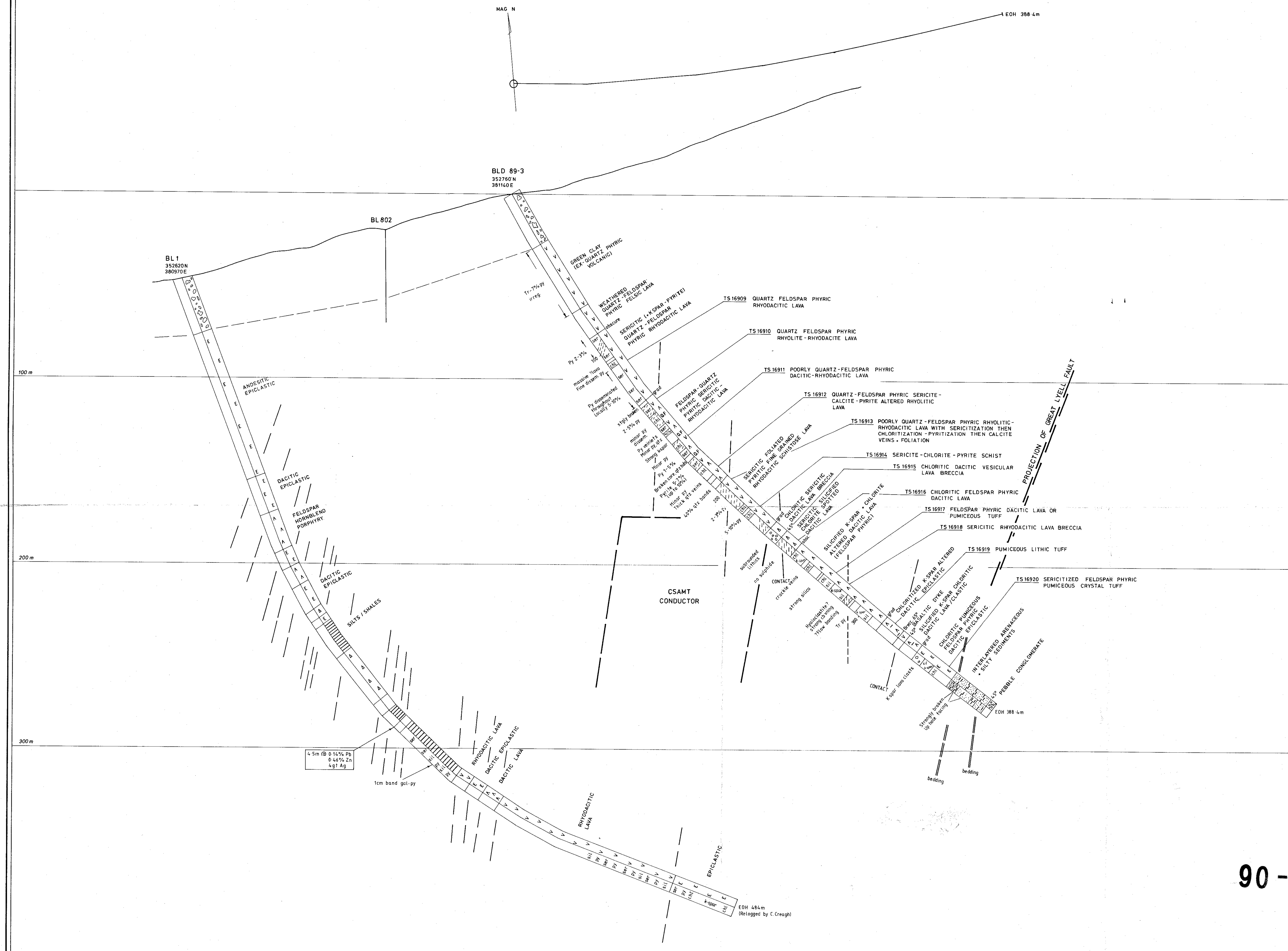
Billiton Australia
The Metals Division of the Shell Company of Australia Limited

Project: BASIN LAKE

Title: BDL 89-2 PROFILE
ALONG 262°AMG

Author C J C	Date 9/89	Scale 1:1000	
Drawn O H	Office TAS	Revised	Date
Drawing No. D / LD 57 / 011		Fig. No. 15	

9342



MAG N
EOH 388·4m
BLD 89-3
352760 N
381140 E
BL 802
BL 1
352620 N
380970 E
100 m
200 m
300 m
GREEN CLAY (EX-QUARTZ PHYRIC VOLCANIC)
WEATHERED QUARTZ-FELDSPAR PHYRIC FELSIC LAVA
SERICITIC (+K-SPAR-PYRITE) QUARTZ-FELDSPAR PHYRIC RHYODACITIC LAVA
FELDSPAR-QUARTZ PHYRIC SERICITIC PYRITIC DACITIC RHYODACITIC LAVA
SERICITIC FOLIATED PYRITIC FINE GRAINED RHYODACITIC SCHISTOSE LAVA
TS 16909 QUARTZ FELDSPAR PHYRIC RHYODACITIC LAVA
TS 16910 QUARTZ FELDSPAR PHYRIC RHYOLITE-RHYODACITE LAVA
TS 16911 POORLY QUARTZ-FELDSPAR PHYRIC DACITIC-RHYODACITIC LAVA
TS 16912 QUARTZ-FELDSPAR PHYRIC SERICITE-CALCITE-PYRITE ALTERED RHYOLITIC LAVA
TS 16913 POORLY QUARTZ-FELDSPAR PHYRIC RHYOLITIC-RHYODACITIC LAVA WITH SERICITIZATION THEN CHLORITIZATION-PYRITIZATION THEN CALCITE VEINS + FOLIATION
TS 16914 SERICITE-CHLORITE-PYRITE SCHIST
TS 16915 CHLORITIC DACITIC VESICULAR LAVA BRECCIA
TS 16916 CHLORITIC FELDSPAR PHYRIC DACITIC LAVA
TS 16917 FELDSPAR PHYRIC DACITIC LAVA OR PUMICEOUS TUFF
TS 16918 SERICITIC RHYODACITIC LAVA BRECCIA
TS 16919 PUMICEOUS LITHIC TUFF
TS 16920 SERICITIZED FELDSPAR PHYRIC PUMICEOUS CRYSTAL TUFF
PROJECTION OF GREAT LYELL FAULT
CSAMT CONDUCTOR
ANDESITIC EPICLASTIC
DACITIC EPICLASTIC
FELDSPAR HORNBLEND PORPHYRY
DACITIC EPICLASTIC
SILTS / SHALES
RHYODACITIC LAVA
DACITIC EPICLASTIC
DACITIC LAVA
RHYODACITIC LAVA
EPICLASTIC
4.5m @ 0·14% Pb 0·46% Zn 4g/t Ag
1cm band gal-py
EOH 484m (Relogged by C.Creagh)
CHLORITIZED K-SPAR ALTERED DACITIC EPICLASTIC
BASALTIC DYKE
SILICIFIED K-SPAR CHLORITIC DACITIC LAVA/CLASTIC
CHLORITIC PUMICEOUS FELDSPAR PHYRIC DACITIC EPICLASTIC
INTERLAYERED ARENACEOUS + SILTY SEDIMENTS
PEBBLE CONGLOMERATE
SILICIFIED K-SPAR + CHLORITE ALTERED DACITIC LAVA (FELDSPAR PHYRIC)
SERICITIC SILICIFIED CHLORITE SPOTTED DACITIC LAVA
CHLORITIC SERICITIC DACITIC LAVA BRECCIA
CONTACT
bedding
EOH 388·4m
5 cm

512111

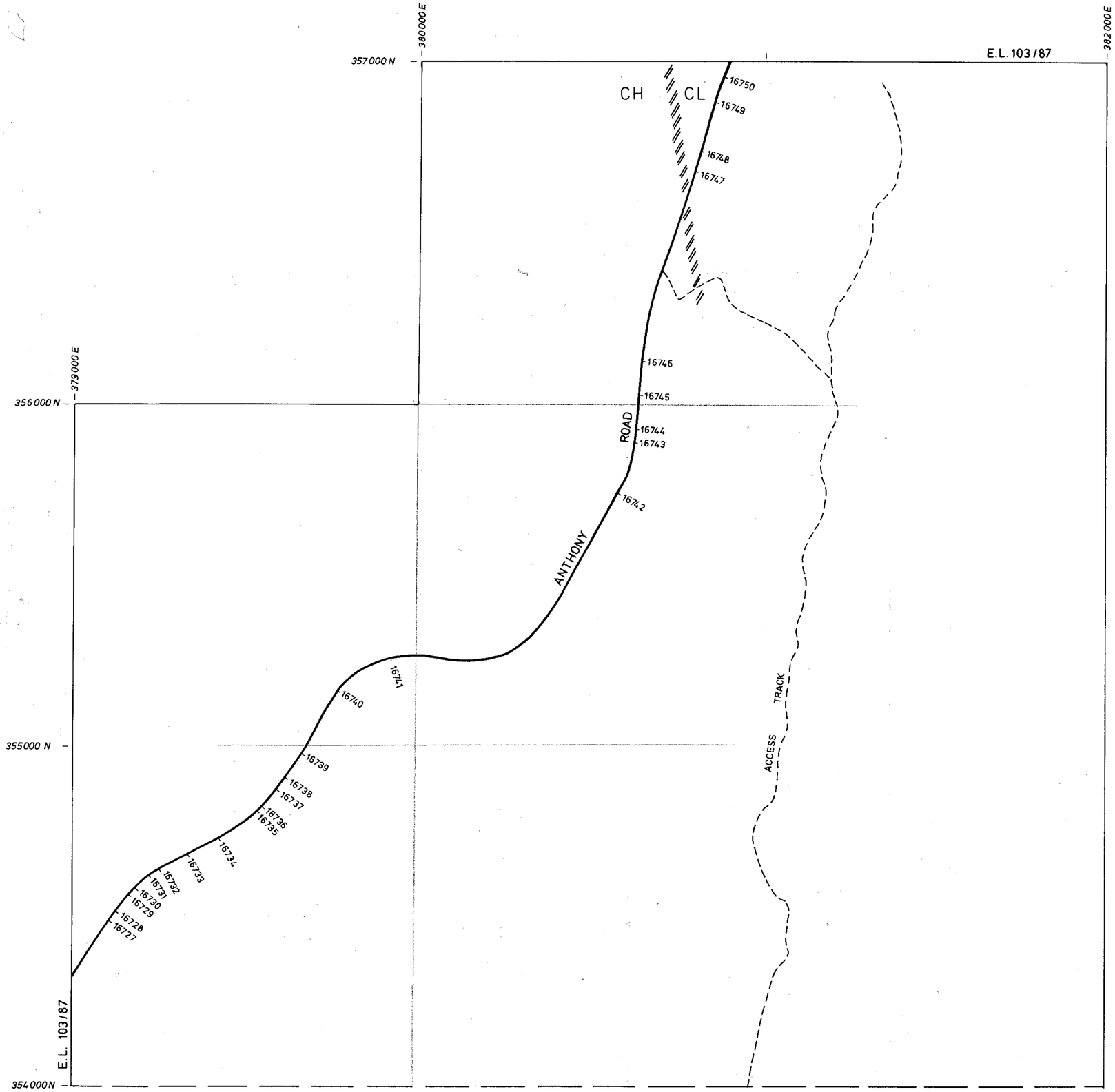
90-3099

Billiton Australia
The Metals Division of the Shell Company of Australia Limited

Project	BASIN LAKE
Title	DIAMOND DRILL SECTION BLD 89-3, BL 1

Author JPR	Dept. TAS	Scale 1:1000	
Drawn OH	Date 12/89	Revised	Date
Checked	Date	S'ceded	Date
Sheet No. FIG 16		Drawing No. D/LD 57/012	

9343



512112

5 cm

0 100 200 300 400

1:10,000

90-3099

Billiton Australia
The Metals Division of the Shell Company of Australia Limited

Project	BASIN LAKE
Title	LITHOGEOCHEMICAL SAMPLE LOCATION SITES

Author CJC	Dept. TAS	Scale 1:10,000	
Drawn OH	Date 1/90	Revised	Date
Checked	Date	S'ceded	Date
Sheet No.		Drawing No. FIG. 17	

9344

381000 E

LEGEND

- Glacial moraine
- Feldspar - hornblende phyric andesitic lava
- Feldspar phyric andesitic lava
- Andesitic volcaniclastics
- Shallow level Hornblende-feldspar phyric andesitic intrusive porphyry
- Lithological contact
- Foliation
- Shear zone
- Carbonate - quartz ± epidote ± chlorite ± haematite ± pyrite fine grained alteration and veining.

Alteration

carb	carbonate
sil	siliceous
ser	sericitic
chl	chloritic
py	pyrite
haem	haematite

0 10 20 30 40 50m
1:1000

512113

5 cm

90-3099

Billiton Australia
The Metals Division of the Shell Company of Australia Limited

Project: BASIN LAKE

Title: PROFILE DDH TYN 5
ALONG 356600N AT 090°AMG

Author CJC	Dept. TAS	Scale 1:1000	
Drawn OH	Date 2/90	Revised	Date
Checked	Date	S'ceded	Date
Sheet No. FIG 18		Drawing No. D/LD 57/023	

9345

380600 E 381000 E 381000 E 381200 E

354000 N

BL 3
AZIMUTH 100°AMG

PLAN

600m ASL

550m ASL

500m ASL

450m ASL

Power line

BL 3
5353990 N
280985E

Access track

chl ser

chl ser

chl ser

100m

chl ser

chl ser

chl ser

chl ser sepl

chl ser sil sepl

200m

chl ser

chl sil haem

ser sil chl sepl

300m

ser chl

chl

ser

chl sil sepl carb

400m

chl carb sil

ser chl

451·0m

LEGEND

- Glacial sediments and alluvials
- Clays
- Feldspar-hornblende phyric dacitic-andesitic lava
- Andesitic volcaniclastics
- Volcanic breccia
- Shallow level hornblende-feldspar phyric dacitic-andesitic intrusive porphyry
- Shales
- Sandstones, siltstones & shales

ALTERATION

carb	carbonate
epi	epidote
sil	siliceous
chl	chloritic
ser	sericitic
haem	haematitic

0 10 20 30 40 50m
1:1000

5cm

512114

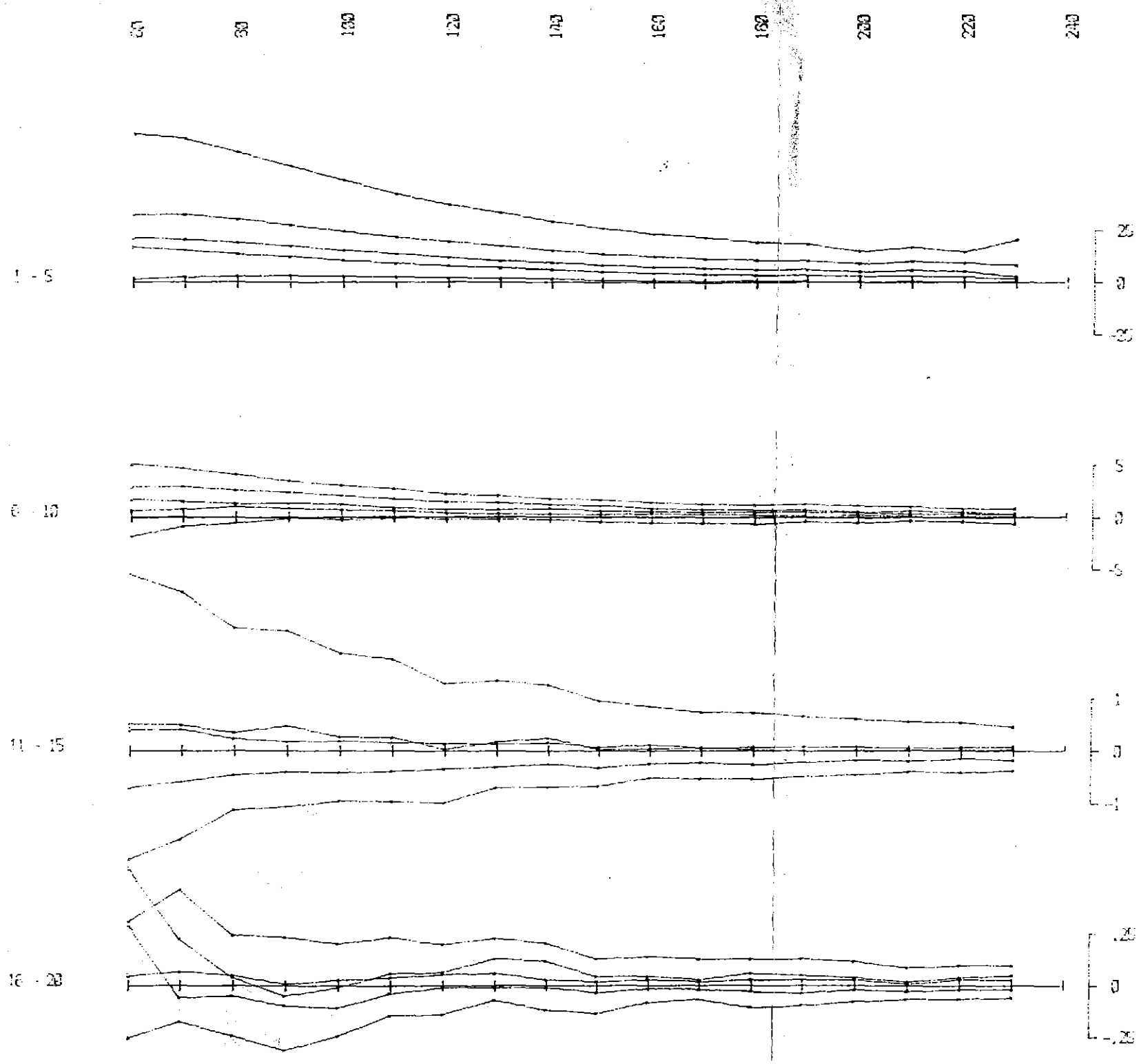
90-3099

Billiton Australia
The Metals Division of the Shell Company of Australia Limited

Project	BASIN LAKE
Title	PROFILE DDH BL 3 ALONG 100° AMG
Author CJC	Dept. TAS
Drawn OH	Date 2/90
Checked	Date
Sheet No. FIG 19	
Scale 1:1000	
Revised	Date
S'ceded	Date
Drawing No. D/LD57/043	

9346

AXIAL COMPONENT $\dot{B}$ (Z)



EM-37

BOREHOLE SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

512115

TX LOOP SIDES	:	52400N 80300E
		52700N 80400E
TX LOOP SIZE	:	100 m X 100 m
TX TURN OFF TIME	:	322 microsecs.
FIRST GATE TIME	:	80.5 microsecs.
CURRENT	:	15.6 amps
FREQUENCY	:	25 Hz.
INTEGRATION TIME	:	4096 cycles
SYNC MODE	:	
HORIZONTAL SCALE	:	1:1000
SURVEYED BY	:	PD
DATE	:	11/11/1989

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 4-14

CLIENT : BILLITON AUST

PROJECT : BOREHOLE EM37

AREA : BASIN LAKE

BOREHOLE : BLD 89-1 A

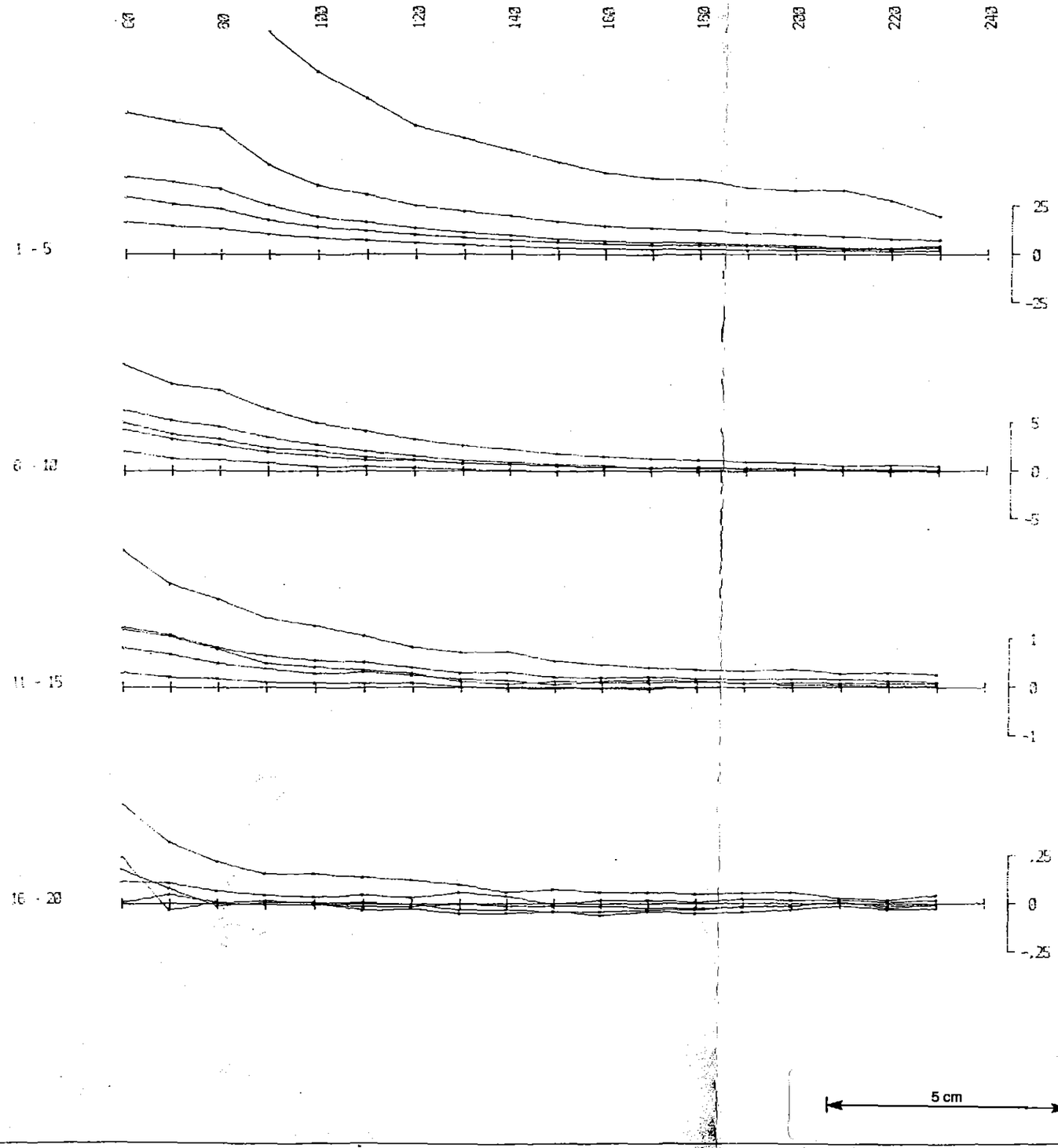
TX LOOP : 1

FIG 20

90-3069

9347

AXIAL COMPONENT B (Z)



nanovolts per amp metre squared

EM-37

BOREHOLE SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

512116

TX LOOP SIDES	: 52800N	50350E
	: 52700N	50450E
TX LOOP SIZE	: 100 m X 100 m	
TX TURN OFF TIME	: 802 microsecs.	
FIRST GATE TIME	: 66.5 microsecs.	
CURRENT	: 15.0 amps	
FREQUENCY	: 25 Hz.	
INTEGRATION TIME	: 4096 cycles	
SYNC MODE	:	
HORIZONTAL SCALE	: 1:1000	
SURVEYED BY	: PG	
DATE	: 11/11/1989	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 4-14

CLIENT : BILLITON AUST

PROJECT : BOREHOLE EM37

AREA : BASIN LAKE

BOREHOLE : BLD991 A

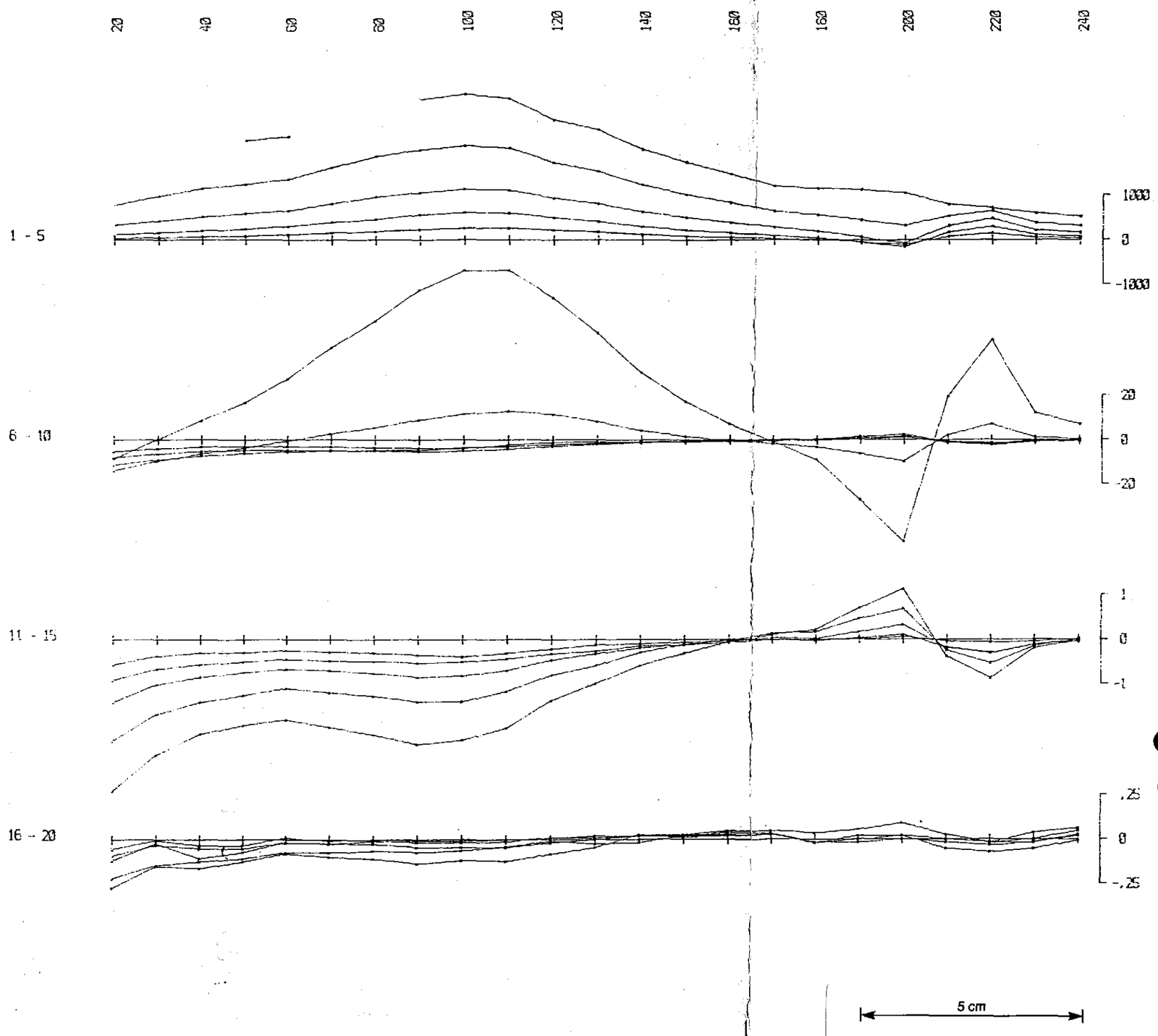
TX LOOP : 2

FIG 21

90-306

9348

AXIAL COMPONENT B (Z)



nanovolts per amp metre squared

EM-37

BOREHOLE SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

512117

TX LOOP SIDES	: 52400N	30350E
	: 52600N	31050E
TX LOOP SIZE	: 200 m X 200 m	
TX TURN OFF TIME	: 140 microsecs.	
FIRST GATE TIME	: 66.5 microsecs.	
CURRENT	: 16.5 amps	
FREQUENCY	: 25 Hz.	
INTEGRATION TIME	: 1024 cycles	
SYNC MODE	:	
HORIZONTAL SCALE	: 1:1000	
SURVEYED BY	: BG	
DATE	: 12/11/1989	

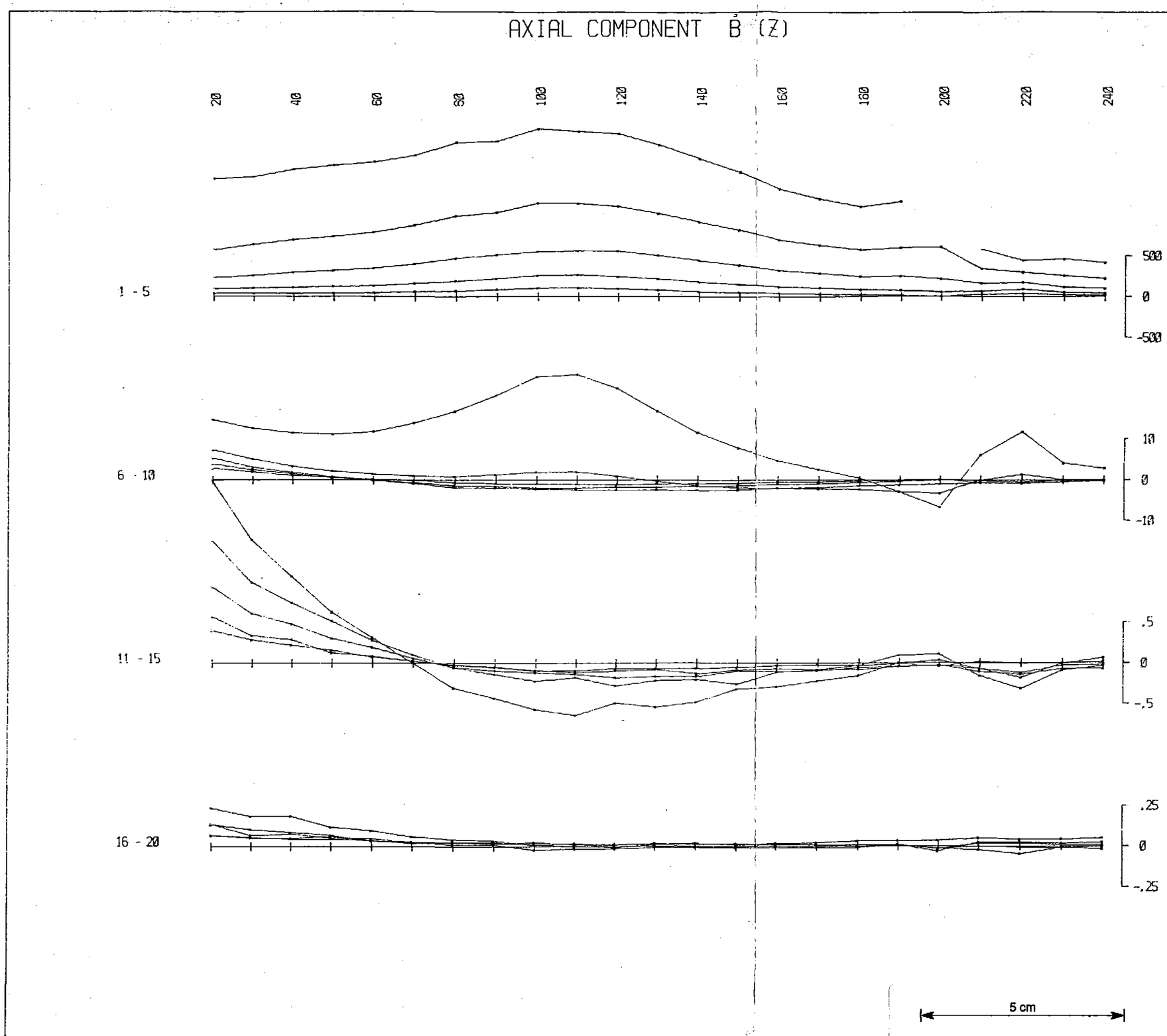
SURVEYED AND COMPILED BY GEOTERREX PTY. LTD. | PROJECT NO. 4-14

CLIENT	: BILLITON AUST
PROJECT	: BOREHOLE EM37
AREA	: BASIN LAKE
BOREHOLE	: BLD892 A
TX LOOP	: 1 (SOUTH).

FIG 22

90-306

9349



90-3096

EM-37

BOREHOLE SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

512118

TX LOOP SIDES	:	52800N 60850E
	:	52600N 61050E
TX LOOP SIZE	:	200 m X 200 m
TX TURN OFF TIME	:	120 microsecs.
FIRST GATE TIME	:	58.5 microsecs.
CURRENT	:	19.0 amps
FREQUENCY	:	25 Hz.
INTEGRATION TIME	:	1024 cycles
SYNC MODE	:	
HORIZONTAL SCALE	:	1:1000
SURVEYED BY	:	BG
DATE	:	12/11/1989

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. d-14.

CLIENT : BILLITON AUST

PROJECT : BOREHOLE EM37

AREA : BASIN LAKE

BOREHOLE : BLD892 A

TX LOOP : 2 (NORTH)

FIG 23