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BILLITON AUSTRALIA  
 THE METALS DIVISION OF  
 THE SHELL COMPANY OF AUSTRALIA LIMITED

LUINA JOINT VENTURE

E.L. 34/82

Progress Report for the Period 1/11/86 to 31/10/87

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 4. Billiton Australia, Devonport

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## 1.0 INTRODUCTION

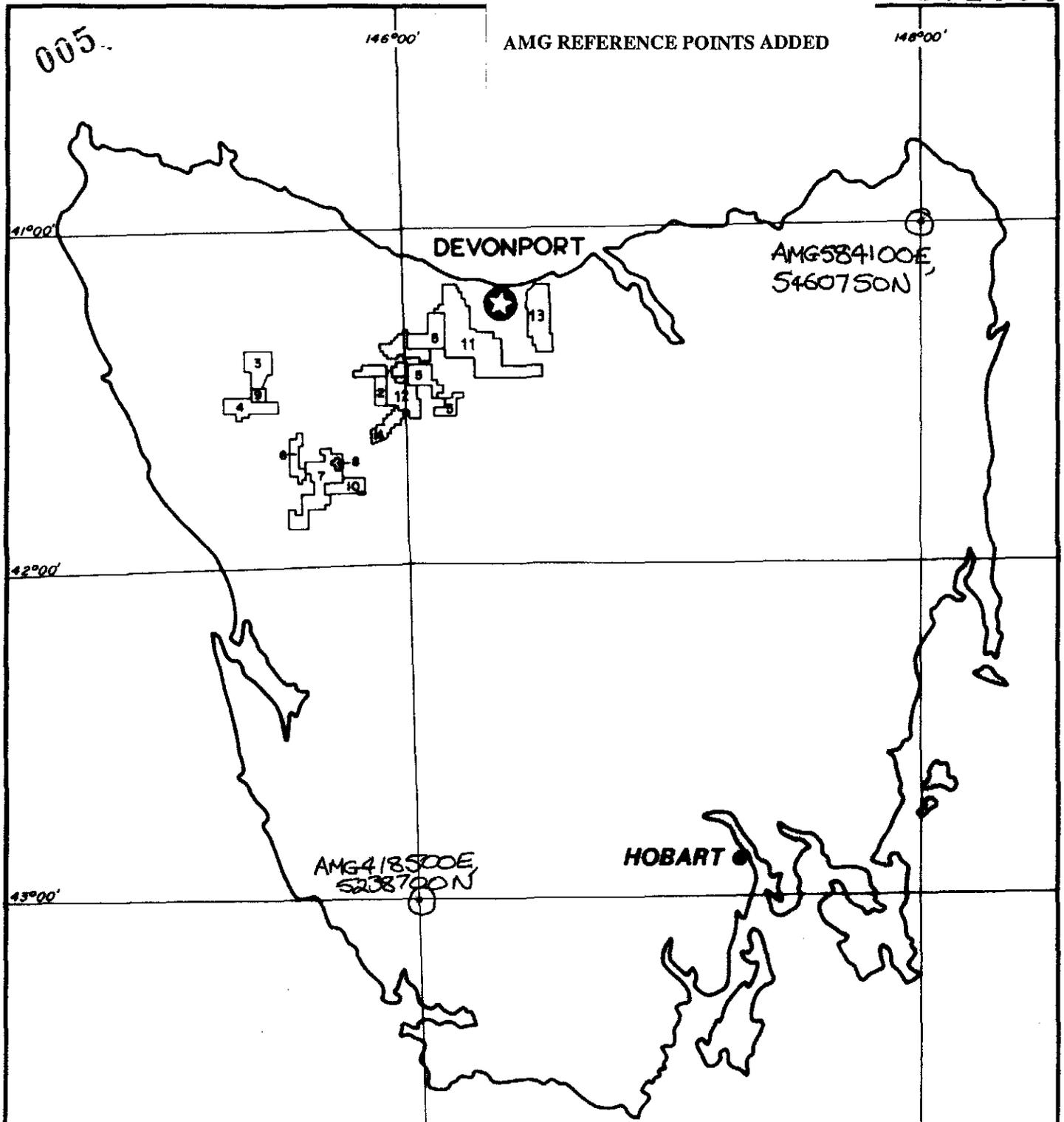
This report details exploration carried out by Billiton Australia within Exploration Licence 34/82 for the period ending 31st October 1987. Billiton entered into a joint venture agreement with Aberfoyle Resources Limited on 1st October, 1986 whereby Billiton would act as manager and carry out exploration within E.L. 34/82 and ML 84M/84 (excluding a defined zone around the Cleveland mine).

## 2.0 LOCATION

The exploration licence of 25 sq km is centred around the township of Luina, 12 kilometres west of Waratah and 90 kilometres west-south-west of Devonport and surrounds the now closed Cleveland tin(-copper) mine. (Figure 1). The Corinna-Waratah road transects the northern portion of the licence whilst access to the southern areas is restricted to numerous old logging tracks, some negotiable by 4WD vehicle, others completely overgrown. The south eastern area is not blessed with vehicular access and few old grid lines remain.

## 3.0 REGIONAL SETTING

E.L. 34/82 lies within the Dundas Trough, a north-south trending early Palaeozoic eugeosynclinal feature located between areas of Proterozoic basement. (Figure 2). An unfossiliferous volcano-sedimentary sequence interpreted to be equivalent to



AMG REFERENCE POINTS ADDED

AMG584100E  
5460750N

AMG418500E  
5238700N

EXPLORATION OFFICE

5 cm

0 60 km

- |                        |                            |                 |          |
|------------------------|----------------------------|-----------------|----------|
| 2. CATTLEY RANGE       | : E.L. 39/83               |                 |          |
| 3. MT. CLEVELAND       | : E.L. 20/85               |                 |          |
| 4. MT STEWART          | : E.L. 31/85               |                 |          |
| 5. MOINA J.V.          | : E.L. 7/74, 6/77, 36/79   |                 |          |
| 6. MARIONOAK J.V.      | : E.L. 22/74               |                 |          |
| 7. ROSEBERY EAST J.V.  | : E.L. 1/62                |                 |          |
| 8. FARRELL J.V.        | : M.L. 11065M, M.L. 91M/74 |                 |          |
| 9. LUINA JV            | : E.L. 34/82, M.L.         |                 |          |
| 10. STERLING VALLEY JV | : E.L. 4/73                |                 |          |
| 11. LOWER WILMOT       | : E.L.A.                   | 13. PORT SORELL | : E.L.A. |
| 12. BOND RANGE         | : E.L.A.                   | 14. BACK PEAK   | : E.L.A. |

|                                    |            |                 |      |
|------------------------------------|------------|-----------------|------|
|                                    |            |                 |      |
| Project <b>TASMANIA</b>            |            |                 |      |
| Title <b>PROJECT LOCATION PLAN</b> |            |                 |      |
| Author D. B.H.                     | Date 6/86  | Scale 1:1500000 |      |
| Drawn H. M.R.                      | Office AHO | Revised         | Date |
| Drawing No                         | MT24/1159  | Fig No          | 1    |

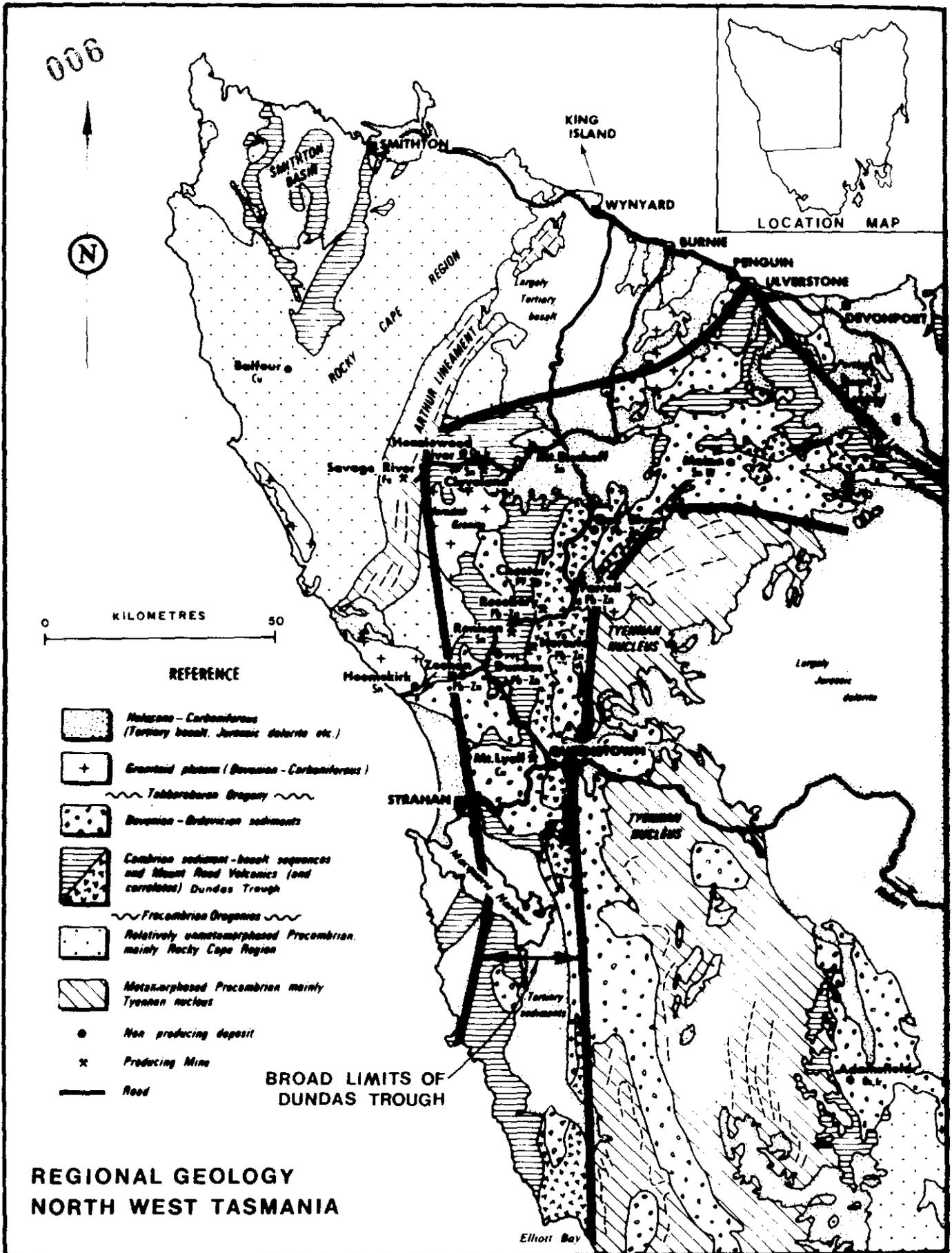


FIG. 2

5 cm

007

the Crimson Creek Formation occurs within the licence. This sequence is intruded by fault-bounded, partially serpentinised mafic and ultramafic units which are related to the Cambrian Heazlewood Complex. The whole region underwent a period of major deformation in the early-middle Devonian, followed by intrusion of late tectonic, high level granitic plutons in the late Devonian to early Carboniferous. Metalliferous hydrothermal activity genetically related to these granitic bodies is believed to have formed the zoned mineralisation in the district, with quartz-wolframite-cassiterite-molybdenite-bismuthinite near and within granitic plutons, and development of argentiferous galena fissure veins away from the granite contacts.

#### 4.0 LOCAL GEOLOGICAL SETTING

The stratigraphy within the EL generally strikes NE-SW and dips steeply to the north-west, (Figures 3 & 4), although previous workers have involved complex anticlinal and synclinal closures, faulted offsets and dip reversals to accommodate their own particular interpretation. The gross stratigraphic succession from north-west to south-east, which is also coincident with stratigraphic top to bottom is as follows:

- 1) Heazlewood Complex: Cambrian mafic to ultramafic intrusives that have been thrust up into the volcano-sedimentary succession.
  
- 2) Crescent Spur Sandstone: A uniformly massive, olive green to orange, dirty micaceous sandstone or greywacke. Interbedding with fissile graphitic siltstones is common. This unit forms a gradational boundary with the unit below, reflecting a change in paleo environmental conditions from mass flow turbiditic settings to quieter deep marine and sometimes euxinic conditions.
  
- 3) Halls Formation: This unit forms the host to the Cleveland mineralisation, is variable in thickness (70-200 metres) and consists of a variety of massive to laminated siltstones, cherts, dolomitic siltstones and fine sandstones. A basaltic sub member, Henry's Volcanics, occupies the upper stratigraphic portion of the Halls Formation but is represented by discontinuous lenses that vary along strike and give way to mafic tuffaceous volcanoclastics.

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- 4) Deep Creek Volcanics: Massive dark green basaltic lavas containing interbedded siltstones, sandstones and cherts. Their areal distribution is not completely understood but may well occupy 25% of the licence area.

Mineralisation within the licence area is represented by the Cleveland orebody, a series of mineralised sulphide lenses composed of complex combinations of pyrrhotite, pyrite, cassiterite, quartz, carbonate, fluorite, chlorite and tourmaline, with accessory arsenopyrite, sphalerite, hematite and stannite. The controls on the mineralisation are apparently almost entirely stratigraphic, with mineralisation restricted to discrete layers within a well-defined shale and chert sequence. The distribution of ore within the mineralised layers is apparently controlled by some form of zoning.

The Cleveland deposit is interpreted to represent a metasomatic replacement of finely layered calcareous shales and shaley limestone by mineralising solutions associated with a late igneous phase of the Devonian Tabberabberan orogeny.

Other styles of mineralisation are represented by the Confidence and Washington-Hay deposits. These are essentially fissure fill Ag-Pb-Zn zones, typical of many such deposits in Western Tasmania, related to late stage mineralised fluids emanating from Devonian granites. The Farrell and Magnet deposits are probably of this type, and each has been a significant producer.

## 5.0 PREVIOUS WORK

The following extract from an Aberfoyle Resources memo summarizes the exploration history of the licence area. A detailed bibliography of previous exploration reports is present after this account.

"E.L. 1/63 of 57 sq kms was granted to Aberfoyle Tin Development Partnership in August 1963. The initial reconnaissance phase from 1963-1968 (Cox, 1969) focussed on the belt from the Godkin lead-zinc workings, through Cleveland to the Magnet lead-silver-zinc deposits. This exploration work involved extensive grid cutting and mapping (42 line km) ground fluxgate magnetometry (21 line km), self potential surveys (8 line km) and soil geochemistry. Thirteen target areas were selected, which either exhibited outcropping Cleveland host stratigraphy and/or major regional faulting capable of influencing cassiterite-sulphide replacement mineralisation.

Follow-up work through to 1976, included geological mapping, soil, bedrock, stream sediment and water geochemistry, some ground and airborne magnetics, self potential and 25m or 50m dipole-dipole induced polarisation surveys. Cominco Exploration Pty Ltd through acquisition of a 54% equity in Aberfoyle Ltd in August 1971, were appointed geological consultants to Cleveland Tin and undertook this work. No outcropping mineralisation was found outside the mine environs, however statistical analysis of all soil geochemical data showed that the Halls Formation-Eastern Sediments sequences were the most prospective packages for further exploration.

E.L. 1/63 was reduced to 47 skm in 1977 by relinquishing a portion of the eastern segment between Cleveland and Wombat Flat. The licence was then left in two parts.

To permit escalation of exploration within the Cleveland Mine Lease area, a suspension of the work commitment on E.L. 1/63 was granted by the Director of Mines from January 1978 to February 1979. Ore reserves at the mine were subsequently increased by approximately one million tonnes during this period.

In late 1978 exploration in the EL resumed, with surface mapping in the southern area, diamond drilling 500 metres north of the mine, and a UTEM survey (4 loops) over the prospective Halls Formation stratigraphy both north and south of the mine (Tulp and Eadie, 1979). The UTEM survey (Webster, 1979) delineated several weak conductors.

During 1979-1980 several anomalous areas were investigated (Ellis, 1980). After detailed mapping in the Washington Hay area two diamond drill holes were completed to test the anomalous geochemical zone. A weakly mineralised, brecciated fault zone was intersected. Mapping to the east and south of the mine revealed an apparently barren sequence of shales, sandstones and volcanics. A DIGHEM survey of the granite contact zone in the eastern part of the licence produced one anomaly, later found to be due to gravels beneath Tertiary basalt cover.

A new grid was cut in the northern portion of the licence on the Magnet Range between Corinna Road and the licence boundary during early 1981. Mapping located a largely uninterrupted succession of ultrabasics, sandstone, cherts and volcanics with only minor anomalous soil geochemistry. New photography was flown over the entire licence with colour print production at 1:15,000 and 1:30,000 scales (Ellis, 1981). Later in 1981, a stratigraphic diamond hole sited 500 metres south of the then limit of underground information, intersected barren limestone horizons within the Eastern Sediments, but was abandoned at 397m due to excessive deviation and before intersecting Halls Formation (McArthur, 1981). A DIGHEM survey completed over the entire licence (McArthur, 1982) revealed very little of significance and failed to detect the remnant Cleveland crown pillar at surface. A new interpretation of the licence geology was completed at 1:10,000 scale.

From 1982 to the end of 1984 surface exploration on the Cleveland licence was virtually suspended while expenditure was diverted to evaluation of the Foley Zone mineralisation in the central footwall of the mine sequence within the Mining Leases. A two year exemption from expenditure commitments on the licence was granted by the Director of Mines to accommodate this work. As part of this arrangement E.L. 34/82 was granted to Cleveland Tin Ltd for a 12 month period, with annual renewal by application on the October 30 anniversary. This licence was largely within the boundaries of the original E.L. 1/63 but

smaller in area. Part of E.L. 1/63 was retained over the Magnet Range, north-east of E.L. 34/82, but was forfeited to Geopeko following a pegging challenge. Shortly thereafter Geopeko relinquished the area and it has since remained open ground.

Completion of the Foley Zone programme in mid-1983 permitted some limited work on the licence. Four areas, Crescent Spur, Foley Lineament, Whyte River alluvials and Eastern Sediments/South Halls Formation were partially gridded, mapped and sampled.

During 1985, Aberfoyle Exploration assumed responsibility for surface exploration on the licence from Cleveland Tin Ltd. The 1979 UTEM survey data was re-examined and two conductive trends south of the Celveland Mine were recognised as significant and requiring further work. This involved more UTEM to relocate and refine the conductors, trenching and bedrock geochemistry. Both conductors were confirmed with the eastern response being recommended for testing by drilling (Dronseika, 1985).

E.L. 34/82 was renewed until October 30, 1986 based on a programme of re-gridding and ground magnetics to locate stratigraphic targets in favourable structural sites. Drilling of the UTEM response was deferred.

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## 6.0 EXPLORATION COMPLETED 1986-87

A recent compilation of previous work by Dronseika (1985) was used to formulate targets that warranted additional work. This work was formalized into a set of plans showing geology, structure, geochemical and geophysical coverage (Figures 3 and 4).

Geological consultants, Roy Cox & Associates, were engaged to provide a brief resume of work to date and to advise on exploration potential. A copy of their report is included as Appendix 1.

### 6.1 South Falls Creek

This area is located approximately 2.5 kms to the south west of Cleveland Mine and was originally recognized by Aberfoyle as prospective.

A UTEM survey carried out in 1979 by Aberfoyle Exploration had covered the interpreted strike extensions of the Cleveland Mine sequence (Halls Formation) both to the north-east and south of the mine. Several conductive trends were detected but none were considered worthy of follow up at that time. Subsequently, forestry operations destroyed much of this grid and hence it became difficult to locate any of these trends on the ground. A reinterpretation of this UTEM data by Aberfoyle in 1983, resulted in their

decision to regrid the area to the south of the mine and to repeat the UTEM survey. This latter survey confirmed the presence of a strike extensive, consistent, moderate conductor at the interpreted contact of the Crescent Spur Sandstone and Halls Formation. Geophysical evidence suggested a stronger response in the south in the vicinity of South Falls Creek and hence follow up was concentrated in this area. Costeaning exposed the surface expression of this conductor on line 2880N, but channel sampling in the costean and surrounding tracks failed to produce any anomalous geochemical response.

Aberfoyle's decision not to drill the conductor was a result of other priorities and did not necessarily reflect the technical merit of the anomaly.

Re-mapping and sampling of the costean and road cuts was carried out by Billiton, and samples analysed for Sn, W, Rb, Cu, Pb, Zn, Ag, As, (F, B). Auger sampling and ground magnetics were completed on four lines (the only lines re-gridded) surrounding the anomaly. These results are presented in figures 5-8 and Appendix 2. No Sn or W anomalism was recorded although narrow (5-15m) wide zones of anomalous Cu, Zn, Rb, B do occur, particularly at or near the contact of Crescent Spur Sandstone with Halls Formation siltstones. XRD results from samples of supposed calcareous

nature did not verify this assumption and hence it may be concluded that either there is no carbonate mineral in the sample or weathering and degradation of the carbonate species has occurred. The latter conclusion was accepted as the most probable and was indeed verified in later drilling. A Max-Min EM survey over the costean line (figures 9-10) indicated that the UTEM anomaly was a genuine conductor, and not due to a lithological response (graphitic and dolomitic siltstone/shale was mapped in the costean). Ground magnetics and mapping suggested that basaltic volcanics occurred approximately 200 metres east of the costean indicating an apparent thickness of Halls Formation of 200-250 metres.

Computer modelling and manual interpretation of UTEM Anomaly A confirmed a depth to top of about 60m at a position of 5340E  $\pm$ 12 metres on line 2880N. The dip appears to be about 80°W in agreement with known geology. This means that the conductor is not well coupled to the transmitter loop, which may explain the fairly weak response. Modelling suggests that the source may however be moderately conductive, comparable with that expected from Cleveland type mineralisation. The recent Max-Min work, although noisy on the In-Phase due to steep topography, indicates no conductor on the Out-of-Phase over the UTEM conductor. This seems to confirm that the 'possibly graphitic' siltstones in the costean on line 2880N are not conductive certainly within the top 25 metres. Lack of any Dighem response tends to support this since it would respond to any near-surface conductor.

The lack of a ground magnetic response over Anomaly A is a negative factor, but only a weak anomaly (max 30-40nT) would be expected, even if the conductor was pyrrhotite-rich. A similar situation to the Cleveland ore-body, which is pyrite-rich in the upper levels, would effectively mean an undetectable magnetic anomaly over the conductor. It is apparent from the stacked magnetic profiles (figure 11) that UTEM anomaly 'A' on line 2700N is very close to (but not coincident with) an intense near surface magnetic anomaly. This has previously been attributed to an ultramafic unit, but its isolation (and absence on the Dighem aeromag) suggests it may be something else. Its dip is not obviously conformable with the country rocks however, so it may be an intrusion.

Drill hole LD 86-1 was designed with two objectives:

- 1) To intersect the source of the UTEM anomaly on line 2880N at an interpreted depth of 60-80 metres.
- 2) To continue through Halls Formation to the contact with Deep Creek Volcanics at approximately 390 metres down hole depth.

Details are presented below and in figure 12, Appendix 3.

A summary geological log is as follows:

- 0 - 62m Crescent Spur Sandstone  
Poorly bedded (40-60°LCA) micaceous sandstone with interbedded siltstone. Trace very fine disseminated pyrite, pyrrhotite blebs.
- 62- 76m Halls Formation.  
Purple brown variably laminated siltstone.
- 76-107m Halls Formation.  
Interbedded graphitic dolomite, dolomitic siltstone and well laminated chert. Contorted truncated bedding, scouring, slumping with consistent up hole facing direction, Extremely fine pyrite (pyrrhotite increases down hole) dusting throughout, abundance trace to 15%.
- 107-130m Halls Formation.  
Poorly laminated red purple siltstone, rare pyrrhotite and galena blebs.
- 130-342m Deep Creek Volcanics.  
Fine grained vesicular basaltic flows with numerous interflow cherts and tuffaceous siltstones. Irregular weakly dispersed pyrrhotitic blebs.

The log indicates the UTEM source is most probably due to graphitic dolomitic siltstones with fine pyrrhotitic sulphides at down hole depths of 76.8-106.2m. The graphitic content is variable (up to 5%), as is the sulphide content (up to 20%), but there appears to be sufficient abundance of both to explain the UTEM anomaly. Core from this zone has been split into approximately one metre intervals and assayed for a large suite of elements. Maximum values are listed below but none are considered to be anomalous.

|     |    |        |    |        |    |        |    |           |
|-----|----|--------|----|--------|----|--------|----|-----------|
| viz | Sn | 7ppm   | Cu | 100ppm | Ag | 0.5ppm | Au | <0.008ppm |
|     | W  | 15ppm  | Pb | 45ppm  | As | 140ppm |    |           |
|     | Rb | 120ppm | Zn | 145ppm | B  | 90ppm  |    |           |

The log also indicates that the Halls Formation has a true thickness of only 65 metres, compared to an expected thickness of 200 metres. Neither ground magnetics nor mapping suggested this fact which was essentially the reason for continuing the drill hole. Intercalations of Henry's Volcanics (also basaltic) occur at Cleveland and it was therefore assumed at the time of drilling that a similar sequence was being encountered.

Facing evidence from graded beds and cross bedding within Halls Formation sediments all suggest an up hole facing i.e. Crescent Spur Sandstone overlies Halls Formation which in turn overlies the Deep Creek Volcanics. This is in agreement with P. Collins (Mines Dept.) interpretation but is at odds with previous workers (Cox, Glasson).

Dolomitic units occur within the upper Halls Formation from 76.8-106.2m down hole depth, and are intercalated with cherts, siltstones, and shales. The true thickness of this package is 27 metres and it can be estimated to contain approximately 50-70% dolomitic siltstone. However, later calcite veining does obscure the core as it occurs as a fine network of veinlets, often with sulphide species. Although graphite was not observed whilst logging, its presence was suspected in the core at surface and it also has been positively identified in several thin section descriptions. Abundances up to 5% graphite have been noted by the petrologist.

The presence of significant amounts of sulphide is noteworthy, as is the recognition of a replacement origin for at least some of the sulphide assemblages. Typically the sulphide occurs as a very fine dusting on laminae, but there are also numerous zones of later remobilized sulphide forming irregular blebs and stringers. Pyrite is dominant towards the top of the hole but pyrrhotite becomes more significant at depth. Accessory sphalerite and galena is also noted. Sulphide abundances range from trace to 20% but the mean abundance can be estimated at 3-5%.

Despite a lack of anomalous geochemistry drill hole LD 86-1 provided encouragement to continue exploration in the South Falls Creek area. A lithological sequence identical to the Cleveland Mine sequence was confirmed, and prospective dolomitic host units identified. These units are intercalated with cherty layers, as at Cleveland, and contain significant amounts of sulphide, some of which is recognizably of replacement origin. Sericitic and chloritic alteration and calcite veining also occurs.

The overall competency of the units in the sequence is a negative factor, as some structural preparation of the ground would be required to enable replacement mechanisms to operate successfully. Further work would be required to locate structurally complex areas that display characteristics similar to those observed at the Cleveland mine.

At Anomaly B, limited geological mapping and sampling confirmed the barren nature of the ultramafics, as suggested by Aberfoyle. No further work is recommended here.

## 6.2 Falls Creek

This area is located approximately 1 kilometre north of the South Falls Creek, area where previous exploration had identified a major transverse offset of the Crescent Spur Sandstone - Halls Formation contact. Detailed geological mapping (figures 13, 14, 15), and rock chip and auger sampling (Appendix 4), has been carried out to define the nature of this area more closely and it is suggested that numerous step faults have accounted for the major displacement. Evidence for these structures is limited by poor outcrop and few structural measurements, but observed strikes of bedding support this interpretation. Auger sampling resulted in the definition of several slightly elevated Cu, Pb, Zn and Sn values, but these are typically single point values and not considered significant. Minor outcrops of basaltic volcanics within Halls Formation may account for several weakly anomalous Cu values, reflecting weak remobilization or sweating out from the host volcanics.

Rock chip sampling and mapping on a logging track near line RA4 (figure 16) revealed a zone of thin ferruginous quartz vein stockworks, occurring in a sequence of dolomitic siltstones, grey to red massive siltstones and minor fine sandstones. Exposure is limited to one track where shallow excavations reveal a potential sequence of 30 metre width. The best coincident geochemistry is from



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The anomalous levels of Sn, Cu, Pb, Zn, Ag indicate some degree of hydrothermal activity along quartz vein conduits but the observed width of the anomalous zone and lack of anomalous geochemistry in the host rocks does not suggest the presence of a substantial system. The lack of anomalous UTEM response is a downgrading factor. It is more likely that the area represents the surface expression of base metal mineralisation peripheral to the main Cleveland event as observed at Washington-Hay. No further work is recommended.

### 6.3 Foley Zone East

This area includes the extension of the Foley Lineament, a photo linear whose surface expression correlates well with the projected up dip extent of the Foley quartz porphyry dyke. In the area of interest, a wedge of Eastern Sediments (or faulted Halls Formation) is transected perpendicularly by the Foley Lineament, (Figure 13). Eleven drill holes have been collared in this wedge to test deeper levels of the Cleveland Mine but have also intersected three stratigraphic levels that contain limestone units. Sampling of these units had not been carried out by Aberfoyle although geological logs record the presence of pyritic sulphides throughout. A previous UTEM survey extends to within 150 metres south of the Foley Lineament but no anomalies were recorded on the northernmost line.

Construction of a longitudinal projection (figure 20) allows a visual assessment of the intersection points of the limestone horizons in relation to the Foley Lineament and the Foley Zone at depth within the Cleveland Mine. This demonstrates that scope exists to develop Cleveland-style mineralisation within all three horizons, and that sufficient room exists to develop an economic size deposit.

It is important to note that opposing views exist in relation to the timing of the Foley Zone emplacement. Aberfoyle geologists clearly interpret the intrusion of the Foley Dyke and associated W-Bi-F quartz vein stockwork as post-replacement mineralisation. The Foley Lineament may have been a prime feeder for the hydrothermal cassiterite-sulphide bearing fluids that replaced limestones within Halls Formation, but Aberfoyle claim underground evidence irrefutably places Foley mineralisation post-Cleveland Sn, due to greisenization of Henry's Lode by fluids moving through the Foley Lineament.

P. Collins in his doctorate study of Cleveland, sees a paragenetic evolution that places the Foley mineralisation as pre-dating the cassiterite bearing fluids.

Surface mapping was carried out along numerous logging tracks to determine the extent of calcareous horizons and to sample zones of ferruginization and quartz

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veining. Few dolomitic siltstones were mapped and selected rock chip sampling did not produce any anomalous values. Detailed mapping and rock chip sampling was carried out along a track that is close to the projected surface position of the Foley Lineament. Results are shown in Figure 13 and Appendix 6, but no lithologies/geochemistry of significance are present.

Drill core from holes that intersected the calcareous horizons were located and sampled by core splitting. Brief examination of the core indicated that the limestones were essentially massive, with no replacement features and only trace amounts of fine disseminated pyrite. Assay values are background only (Appendix 7), although it should be noted that some core could not be located. In particular drill hole C953 has been previously logged and the presence of a 3 metre wide zone of strongly sulphidic limestone was recorded. Although some sampling of this zone was reported, the assays could not be located.

The results of all this preliminary mapping and sampling are disappointing and do not support any perceived potential for mineralisation development in the Foley Zone East area. No further work is planned.

## 7.0 CONCLUSIONS

Exploration carried out on three target areas south of the Cleveland Mine has not resulted in the discovery of additional mineralisation of significance. In the South Falls Creek area, one drill hole tested a UTEM anomaly without intersecting any tin mineralisation although the presence of weakly sulphidic dolomitic siltstones was confirmed. At Falls Creek, weak development of a tin-base metal anomalous quartz vein stockwork within dolomitic siltstones occurs and has been extensively sampled. The magnitude of this zone and the geochemical response is however not considered likely to lead to economic mineralisation. Sampling and mapping in the Foley Zone East area failed to support supposed potential for replacement mineralisation surrounding the extension of the Foley Lineament.

The compilation of previous exploration data by both Aberfoyle and Billiton had identified several areas worthy of additional follow up. It is considered that these areas have been sufficiently tested to preclude the possibility of economic mineralisation at depths to 250 metres below surface. However, it is obvious that almost all previous exploration has concentrated on the immediate strike extensions of the Cleveland stratigraphy and that little work has been carried out to the south east of the mine. Some reconnaissance mapping and traversing has indicated the presence of basic volcanics, laminated siltstones, cherts and sandstones, but detailed evaluation has not been carried out. Scope therefore

exists for the development of mineralisation in areas peripheral to structural conduits e.g. the Foley Lineament.

#### 8.0 RECOMMENDATIONS

It is suggested that future exploration would need to evaluate the potential for economic mineralisation in the area to the south east of the Cleveland Mine. This area is virtually unexplored and would require systematic grass roots exploration to effectively cover all possibilities. Access is very limited but as an initial phase, broad spaced grid lines could be cut (500m spacing) and subsequently, ground magnetics, mapping, auger/Wacker sampling carried out. A decision to further expand the grid would be dependant upon the perception of the lithological character of the sequence and the level of geochemical response.

In view of the current situation in the international tin market, and the perceived short to medium term outlook, it is not considered prudent to embark on a major grassroots exploration programme.

APPENDIX 1

An Assessment of the Exploration Potential of the  
Cleveland Tenements of Aberfoyle Limited

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**Roy Cox & Associates**

Pty. Limited

CONSULTANTS IN ECONOMIC & MINING GEOLOGY

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AN ASSESSMENT OF THE EXPLORATION POTENTIAL OF  
THE CLEVELAND TENEMENTS OF ABERFOYLE LIMITED

by

ROY COX

30th May, 1986.

Prepared for:

Billiton Australia,  
30 Mersey Main Road,  
Spreyton,  
DEVONPORT. Tas. 7310.

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1. INTRODUCTION

Billiton Australia, the Metals Division of The Shell Company of Australia Limited, commissioned Roy Cox & Associates Pty. Ltd.

to:

- ( i ) carry out an assessment of previous work, results and value and to assess the potential of the Cleveland tenements of Aberfoyle Limited; and to
- ( ii ) recommend a programme of work to further explore the tenements, under Contractor Order No. 87566/BXH/TAS dated 23rd May, 1986.

The results of this project are presented briefly below.

2. PREVIOUS EXPLORATION

The Aberfoyle group of companies, including Aberfoyle Tin Development Partnership (ATDP), Aberfoyle Management Pty. Ltd. (AMPL), Cleveland Tin N.L. (CTNL), Cleveland Tin Limited (CTL), Cominco Exploration Pty. Ltd. (CEPL), Abminco N.L. and Aberfoyle Exploration Pty. Ltd. (AEPL), have undertaken more or less continuous exploration of the Cleveland mine and surrounding exploration licence (no. E.L. 1/63, from 1963-82; no. E.L. 34/82 from 1982 to date) for the past 23 years.

The initial work, from 1963 to 1969, was associated with the exploration, evaluation and bringing into production of the Cleveland tin-copper deposits (Australia's second largest tin producer) in 1968. This work involved extensive line cutting, surveying, geochemical, soil sampling and ground magnetometer, SP and EM traversing between the old Washington Hay, Cleveland and Magnet mines (Cox, 1965, 1966, 1967, 1968, 1969).

There was a hiatus in exploration from 1969 through to 1971, at the time of the Mineral Securities debacle. Cominco acquired a 54% equity in Aberfoyle in August 1971, and recommenced regional exploration.

From October 1971 to December 1977 exploration consisted of a series of annual programmes involving line cutting, gridding and surveying, geological mapping, stream sediment and water geochemical surveys, SP and IP surveys, together with a helicopter-borne aeromagnetic survey of the entire E.L. The results of this work have been summarized by McWatt (1971), Sale (1972), Ransom & Hunt (1972), Ransom (1973), Ransom & Simpson (1973), Ransom (1973), Sale (1974), Stuart-Smith (1974), Palmer (1975 a,b), Ransom (1976 a,b), Gentle (1976) and Ransom (1977 a,b). This work lacks continuity of effort and personnel (none of whom were resident in the district, being based initially in Adelaide and later in Melbourne), and is of variable quality. No ore grade mineralization was found outside of the mine area and it was concluded at that time (Gentle, 1976) that the exploration potential of the E.L. (outside the mine area) is extremely limited with no prospects of drill targets.

There was again a hiatus in regional exploration throughout most of 1978, when all efforts were concentrated on mine exploration. From December, 1978 to 1984 regional exploration was under the care of Cleveland Mine geologists. During this period work comprised more line cutting, gridding and surveying, with limited geochemical soil, ground magnetometer and UTEM surveys, costeaning, two shallow drill holes near the old Washington Hay Pb-Ag mine, and a Dighem II survey along the eastern boundary of the E.L. 1/63. In addition, the entire E.L. was covered with aerial photography/photogrammetry and a Dighem II survey. The results of this work are summarized by Lemontagne (1979), Tulp & Eadie (1979), Webster (1979), Ellis (1980 a,b), Fraser & Dvorak (1980), Dvorak & Vergos (1981), Ellis (1981), McArthur (1981, 1982), Hesp (1983 a, b, c) and Dronseika (1985). No ore grade mineralization was found outside the mine area, and it has been generally concluded by Aberfoyle that the potential of the E.L. for shallow, near-surface Sn-Cu mineralization is extremely low.

Since taking over regional exploration of the Cleveland area in 1984, Aberfoyle Exploration Pty. Ltd. have collated most of the exploration

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results onto a set of 1:10,000 scale composite plans (Figures 2-11), dated August, 1985. The stream sediment geochemistry results are presented as Figures 12-16. Good quality 1:15,000 and 1:30,000 colour aerial photos are also available.

3. MINERALIZATION CONTROLS

The major stratabound tin deposits of western Tasmania (viz Renison, Cleveland, Mt. Bischoff) show strong evidence of lithologic and structural controls of mineralization, both on the local and regional scales. Cassiterite (+ stannite) occurs in calcareous sediments in close spatial association with massive sulphides (pyrrhotite, pyrite) and tourmaline, topaz, fluorite, quartz, arsenopyrite, chalcopyrite, sphalerite, etc. These sediments pass along strike into limestone.

The three major stratabound tin deposits occur on the flanks of a major granite body, the Meredith Batholith, and are each closely associated spatially with high-level granite/quartz-porphyry dykes which show variable hydrothermal alteration/mineralization.

3.1 Regional Controls

The major regional controls on the localization of the stratabound Sn-Cu deposits at Cleveland Mine are:

- ( i ) major ENE-trending crustal linement (herein called the Cleveland Lineament (Fig. 4), as evidenced by LANDSAT images, localizing from WSW to ENE the Mt. Youngbuck scheelite-magnetite-pyrrhotite skarn, Godkin, Confidence and Washington Hay Pb-Zn-Ag veins, Cleveland stratabound Sn-Cu(+Zn) and stock-work W-Mo-Bi-F deposits, Magnet Mine Pb-Zn-Ag veins, Mt. Bischoff stratabound and porphyry dyke tin deposits and the Kara wolframite vein deposit.

- ( ii ) subordinate NW-trending cross-structures approximately perpendicular to the Cleveland lineament (viz Foley and North Foley Lineaments, Fig. 4).

It is the intersection of the Cleveland and Foley lineaments which have formed a suitable structural "channel-way" for the emplacement of a granite cupola and associated high-level quartz-porphyry dykes at Cleveland Mine, on the northern flank of the Meredith Granite.

### 3.2 Local Controls

The most important local controls on the Cleveland deposits are:

- ( i ) the local development of calcareous sediments (limestones) within Halls Formation (Fig. 4).
- ( ii ) the local development of quartz-stockwork veins (Foley Zone) adjacent to the NW-trending quartz-porphyry dyke (Fig. 17).

It is the local development of the calcareous Lode Beds (Halls, Henrys, Khaki, Lucks) in close proximity to the Cleveland Lineament/Foley Lineament "channel-way", which controlled the high-level emplacement of a granite cupola, quartz-porphyry dyke(s) and high temperature, greisen stockwork veins containing quartz, wolframite, molybdenite, bismuthinite, etc.), which is responsible for the replacement of the limestones by silica, iron sulphides, tourmaline, topaz, fluorite and chalcopyrite, sphalerite, arsenopyrite, etc. The stratabound deposits show well-developed metal, mineralogical and alteration zoning patterns concentrically about the cross-cutting Foley Zone, (Fig. 17).

Post-mineralization faulting is responsible for the development of several fault windows in the Cleveland strata-bound ore bodies (Fig. 17).

#### 4. EXPLORATION POTENTIAL

After a more or less continuous exploration effort over the past 23 years by a wide variety of experienced geologists, geochemists and geophysicists, it can be fairly said that the near-surface potential of the exploration licence 34/82 and enclosed mineral lease 84M/84 has been thoroughly prospected and explored by a wide variety of techniques appropriate to tin-sulphide mineralization. Although the individual programmes often lacked an on-going continuity of effort, ideas/concepts and personnel, and the work is of variable quality, these comments do not invalidate, nor are they intended to be critical of, the quality of work. In geochemical soil sampling for example, different surveys sampled different horizons, used different sample preparation and/or analytical procedures, etc, hence care must be exercised in assessing such results so as to compare like with like.

As a result of the writer's brief (5 man-days) assessment of the results of the Cleveland exploration results, it is concluded that 2 areas having potential for near-surface Sn-Cu(<sup>+</sup>Zn-Pb-Ag) mineralization of the Cleveland-type are untested/inadequately tested and warrant follow-up exploration, considering their favourable geological features and locations (close to Cleveland mill, roads, power lines etc.). These two areas are:

##### 4.1 Washington Hay - Confidence - Godkin

This area covers a strike length of approximately 2km southwest of the Cleveland Mine. It has the following favourable geological features:

- ( i ) lies within the major ENE-trending Cleveland Lineament. (Fig. 4).
- ( ii ) is traversed by a number of NW-trending cross-faults perpendicular to the Cleveland Lineament (Figs. 4 & 18).

- (iii) contains a lithological sequence of chocolate brown shales, cherts, mica sandstones and basic volcanics which are petrologically and in outcrop indistinguishable from the Cleveland Mine stratigraphy (Figs. 18 & 19). Limestone/calcareous sediments have not, however, yet been located.
- (iv) streams draining the area show anomalous tin, copper, lead, zinc and fluoride ion values (Figs. 6 & 12-16).
- (v) soils over the north-eastern portion (Washington Hay - Confidence) show anomalous, more or less coincident, tin and copper (Figs. 9 & 18) values, with anomalous lead and zinc (Figs. 10 & 11) values to the north-east along strike. Lead-zinc-silver mineralization occurs in the old Godkin Mine, southwest along strike.
- (vi) weak positive aeromagnetic anomaly to the immediate northeast of the Godkin Mine (Fig. 5).

These features indicate Sn-Cu-Pb-Zn mineralization in a favourable lithological/structural environment. The spatial distribution patterns of metals in soils suggests the possibility of metal zoning similar to that developed at Cleveland Mine, with a central Sn-Cu core surrounded by an outer Zn-Pb-Ag zone.

The prospective area has been partially explored to date. Two diamond drill holes (C1510, C1515, Fig. 18) sited to test soil/weak IP anomalies intersected Pb-Zn-Ag mineralization (up to 0.64m @ 5.5% Pb, 1.5% Zn, 180g/t Ag, 0.07% Sn, 0.01% Cu) in subvertical, ENE-trending (axial plane) faults. However, both drill holes failed to test the prominent eastern Sn-Cu soil anomalies (viz Fig. 18), referred to under (v) above. This area is only 1-2km southwest of the Cleveland Mill!

4.2 Anomaly G12

This area has the following favourable geological features:

- ( i ) lies within the major ENE-trending Cleveland Lineament (Fig. 4).
- ( ii ) is close to a major swing in the trend of Crescent Spur (Fig. 3) which may reflect the effect of a major cross-fold/cross-fault (Figs. 4 & 20).
- ( iii ) contains a discrete positive aeromagnetic anomaly (Fig. 5).
- ( iv ) contains a lithological sequence of grey-chocolate brown shales, cherts, mica sandstones and basic volcanics which correlate with the Cleveland Mine stratigraphy (Figs. 4, 19 & 20). Limestone/calcareous sediments have not, however, yet been located.
- ( v ) a stream draining the area shows anomalous tin, copper and fluorite ion values (Figs. 6, 12, 13 & 16).

The results of Aberfoyle's early soil sample/SP/ground magnetometer surveys on lines G11, G12 and G13 in the vicinity of this anomaly have not yet been located. Features (i) to (v) above, however, indicate a favourable lithological/structural environment for the possible development of Cleveland-type Sn-Cu mineralization. The area has not been investigated by field work since the preliminary reconnaissance of the writer in the mid-1960's (Cox, 1969). Soil sample results are not available and no drilling has been undertaken. The anomaly is readily accessible, being only 2.5km northeast of the Cleveland mill and 200m south of the Waratah-Luina road (Fig. 5).

5. PROGRAMME OF WORK

It is recommended that the two anomalous areas referred to in Section 4 above be explored thoroughly by detailed programmes involving:

- ( i ) line cutting, gridding and surveying (lines initially at 50m centres; 25m where follow up is warranted).
- ( ii ) geochemical soil sampling (C horizon, -80# fraction, analyse for Sn, Cu, Pb, Zn, Ag, <sup>+</sup>W) and ground magnetometer traversing on 50m by 10m grid; 25m by 5m where more detailed follow-up is warranted.
- (iii) costeaning to bedrock across anomalous Sn-Cu(<sup>+</sup>Pb-Zn-Ag) soil zones to obtain detailed geological (lithology, structure, mineralization) and chemical (by channel sampling) data.
- ( iv ) preliminary shallow diamond drilling of favourable target zones, where developed.

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7. FIGURES

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APPENDIX 2

South Falls Creek  
Costean sample results and auger sampling results

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The Australian  
Mineral Development  
Laboratories

# amdel

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In reply quote:

22 October 1986

GS 3/114/0

The Shell Company of Australia Limited,  
Metals Division,  
P.O. Box 860,  
DEVONPORT, TAS. 7310

ATT: MR. J. RANDELL

REPORT G 6897/87

|                 |                                                 |
|-----------------|-------------------------------------------------|
| YOUR REFERENCE: | Order o. 08346/LJ10/JPR                         |
| IDENTIFICATION: | 13103-16, 13121-22                              |
| MATERIAL:       | Sixteen weathered siltstones                    |
| DATE RECEIVED:  | 15 October 1986                                 |
| WORK REQUIRED:  | Semiquantitative X-ray diffraction<br>analysis. |

Investigation and Report by: Michael Till

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X-RAY DIFFRACTION ANALYSIS OF SIXTEEN SILTSTONES

## 1. INTRODUCTION

Sixteen weathered siltstones were received from Mr. J. Randell of The Shell Company of Australia Limited, Devonport, Tasmania with a request for semi-quantitative X-ray diffraction analysis specifically for carbonate minerals.

## 2. PROCEDURE

The samples were air-dried, pulverised and analysed by X-ray powder diffractometry. In these samples no X-ray diffraction peak interference problems were encountered with regard to the minerals magnesite, dolomite and calcite.

## 3. RESULTS

The results are given in Table 1.

TABLE 1: X-RAY DIFFRACTION ANALYSIS OF SIXTEEN WEATHERED SILTSTONES

| 13103 |    | 13104 |    | 13105 |      | 13106 |      | 13107 |    | 13108 |    |
|-------|----|-------|----|-------|------|-------|------|-------|----|-------|----|
| Q     | D  | Q     | D  | Q     | D    | Q     | D    | Q     | D  | Q     | D  |
| M     | SD | M     | A  | M     | A-SD | M     | Tr-A | C     | A  | M     | SD |
| C     | A  | C     | Tr | C     | Tr   | C     | Tr   | M     | A  | C     | A  |
| ?G    | Tr | ?P    | Tr | F'    | Tr   |       |      | F     | Tr |       |    |
| F'    | Tr | F'    | Tr |       |      |       |      |       |    |       |    |
|       |    | F     | Tr |       |      |       |      |       |    |       |    |

| 13109 |      | 13110 |         | 13111 |    | 13112 |    | 13113 |      | 13114 |   |
|-------|------|-------|---------|-------|----|-------|----|-------|------|-------|---|
| Q     | D    | Q     | D       | Q     | D  | Q     | D  | Q     | D    | Q     | D |
| M     | SD   | M     | Tr-A    | M     | A  | M     | A  | M     | SD   | C     | A |
| C     | Tr-A | C     | Tr      | C     | A  | C     | Tr | K     | Tr-A | F'    | A |
| F'    | Tr   | Cal   | Tr(<1%) | G     | A  | ?P    | Tr | F'    | Tr   | F     | A |
|       |      |       |         | F'    | Tr | F'    | Tr | ?Al   | Tr   | Ma    | A |

| 13115 |    | 13116 |    | 13121 |      | 13122 |      |
|-------|----|-------|----|-------|------|-------|------|
| Q     | D  | Q     | D  | Q     | D    | Q     | D    |
| M     | SD | M     | SD | M     | A    | M     | A    |
| C     | A  | C     | A  | Al    | Tr-A | K     | Tr-A |
|       |    | F'    | Tr | K     | Tr-A | ?G    | Tr   |

Mineral Key

Al Alunite  
 C Chlorite  
 Cal Calcite  
 P Plagioclase feldspar  
 F' K-feldspar  
 G Goethite  
 K Kaolinite  
 M Muscovite  
 Q Quartz  
 P Paragonite

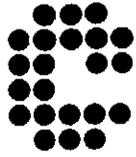
SEMIQUANTITATIVE ABBREVIATIONS:

D = Dominant. Used for the component apparently most abundant, regardless of its probable percentage level.  
 CD = Co-dominant. Used for two (or more) predominating components, both or all of which are judged to be present in roughly equal amounts.  
 SD = Sub-dominant. The next most abundant component(s) providing its percentage level is judged above about 20%.  
 A = Accessory. Components judged to be present between the levels of roughly 5 and 20%.  
 Tr = Trace. Components judged to be below about 5%.

053

843

871052



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305 South Road, Mile End South, South Australia 5031 Telephone (08) 43 5722 Telex LABCOM AA89323 Facsimile No. (08) 234 0321



NATA REGISTERED No. 1526

COM861847

OUR REF.

YOUR REF: 08347/LJ10/JPR

Mr. J. Randell  
The Shell Co. of Aust. Ltd.  
30 Mersey Main Rd  
Spreyton  
DEVONPORT  
TAS 7310

November 7, 1986

Dear Jeff

RE: JOB COM861847

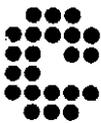
Enclosed are the assays for the samples delivered to our laboratory on October 22, 1986

Yours Sincerely,  
COMLABS SERVICES PTY LTD

per 

c.c.: Shell - J. Randell No. of copies : 1

Report Length 15 pages



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871053



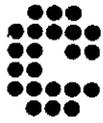
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ANALYTICAL REPORT

JOB COM861847

O/N : 08347/LJ10/JPR

| SAMPLE        | Cu   | Zn   | Ag   | Mo   | F     | B     |
|---------------|------|------|------|------|-------|-------|
| 2880N/ 0.0 m  | 18   | 22   | 1    | <4   | 0.02  | 70    |
| 2880N/ 2.7 m  | 14   | 18   | <1   | <4   | 0.01  | 40    |
| 2880N/ 4.7 m  | 16   | 20   | 1    | <4   | <0.01 | 80    |
| 2880N/ 6.0 m  | 9    | 8    | <1   | 6    | <0.01 | 20    |
| 2880N/ 6.6 m  | 28   | 26   | 1    | 4    | <0.01 | 70    |
| 2880N/ 8.6 m  | 38   | 44   | 1    | <4   | <0.01 | 90    |
| 2880N/10.6 m  | 36   | 30   | 1    | <4   | <0.01 | 70    |
| 2880N/11.5 m  | 28   | 26   | <1   | 4    | <0.01 | 50    |
| 2880N/13.3 m  | 24   | 18   | <1   | <4   | <0.01 | 190   |
| 2880N/15.4 m  | 30   | 28   | 1    | 4    | <0.01 | 60    |
| 2880N/16.85 m | 48   | 44   | 1    | <4   | <0.01 | 50    |
| 2880N/19.3 m  | 70   | 12   | 1    | 4    | <0.01 | 110   |
| 2880N/21.3 m  | 20   | 8    | 1    | <4   | <0.01 | 110   |
| 2880N/23.3 m  | 30   | 20   | 1    | <4   | <0.01 | 90    |
| 2880N/25.3 m  | 30   | 20   | 1    | <4   | <0.01 | 90    |
| 2880N/26.2 m  | 28   | 22   | 1    | <4   | <0.01 | 50    |
| 2880N/28.2 m  | 28   | 48   | 1    | <4   | <0.01 | 100   |
| 2880N/30.2 m  | 32   | 55   | 1    | <4   | <0.01 | 100   |
| 2880N/31.2 m  | 16   | 32   | <1   | 4    | <0.01 | 50    |
| 2880N/33.2 m  | 12   | 36   | <1   | 4    | <0.01 | 30    |
| 2880N/34.6 m  | 18   | 30   | <1   | <4   | <0.01 | 120   |
| 2880N/37.0 m  | 16   | 75   | 1    | <4   | <0.01 | 100   |
| 2880N/39.0 m  | 20   | 80   | 1    | <4   | <0.01 | 130   |
| 2880N/41.0 m  | 14   | 60   | 1    | <4   | <0.01 | 100   |
| 2880N/43.0 m  | 10   | 48   | 1    | <4   | <0.01 | 100   |
| UNITS         | ppm  | ppm  | ppm  | ppm  | %     | ppm   |
| SCHEME        | AAS1 | AAS1 | AAS3 | AAS3 | SIE2  | COL10 |



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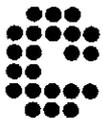
## ANALYTICAL REPORT

JOB COM861847

O/N : 08347/LJ10/JPR

| SAMPLE       | Cu   | Zn   | Ag   | Mo   | F     | B     |
|--------------|------|------|------|------|-------|-------|
| 2880N/45.0 m | 6    | 14   | <1   | 4    | <0.01 | 310   |
| 2880N/46.4 m | 85   | 85   | 1    | <4   | <0.01 | 190   |
| 2880N/48.4 m | 20   | 50   | 1    | <4   | <0.01 | 250   |
| 2880N/49.4 m | 12   | 24   | 1    | <4   | <0.01 | 320   |
| 2880N/50.8 m | 14   | 75   | 1    | <4   | <0.01 | 140   |
| 2880N/52.8 m | 12   | 65   | 1    | <4   | 0.01  | 130   |
| 2880N/77.8 m | 55   | 55   | <1   | <4   | <0.01 | 130   |
| 2880N/79.8 m | 55   | 65   | 1    | 4    | 0.01  | 120   |
| 2880N/82.1 m | 30   | 85   | 1    | <4   | 0.01  | 60    |
| 2880N/84.1 m | 40   | 90   | 1    | <4   | 0.01  | 60    |
| 2880N/86.1 m | 60   | 105  | 1    | <4   | 0.01  | 90    |
| 2880N/87.1 m | 46   | 16   | 1    | <4   | <0.01 | 190   |
| 2880N/89.1 m | 42   | 16   | 1    | <4   | <0.01 | 160   |
| 2880N/91.1 m | 34   | 24   | 1    | <4   | <0.01 | 160   |
| 2880N/93.1 m | 42   | 14   | 1    | <4   | <0.01 | 150   |
| 2880N/95.1 m | 26   | 28   | 1    | <4   | <0.01 | 210   |
| 3060N/ 0.0 m | 60   | 48   | 1    | <4   | <0.01 | 80    |
| 3060N/ 2.2 m | 70   | 42   | 1    | <4   | <0.01 | 120   |
| 3060N/ 3.6 m | 24   | 16   | 1    | 4    | <0.01 | 150   |
| 3060N/ 4.7 m | 30   | 16   | <1   | 10   | <0.01 | 160   |
| 3060N/ 6.7 m | 55   | 65   | 1    | <4   | <0.01 | 110   |
| 3060N/ 8.0 m | 50   | 60   | 1    | <4   | <0.01 | 100   |
| 3060N/ 9.2 m | 90   | 26   | 1    | <4   | <0.01 | 130   |
| 3060N/11.2 m | 85   | 26   | 1    | 16   | <0.01 | 150   |
| 3060N/13.2 m | 75   | 28   | 1    | 10   | <0.01 | 120   |
| UNITS        | ppm  | ppm  | ppm  | ppm  | %     | ppm   |
| SCHEME       | AAS1 | AAS1 | AAS3 | AAS3 | SIE2  | COL10 |

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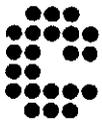
## ANALYTICAL REPORT

JOB COM881847

O/N : 08347/LJ10/JPR

| SAMPLE       | Cu   | Zn   | Ag   | Mo   | F     | B     |
|--------------|------|------|------|------|-------|-------|
| 3060N/14.7 m | 70   | 38   | 1    | <4   | <0.01 | 150   |
| 3060N/16.7 m | 55   | 50   | 1    | <4   | <0.01 | 100   |
| 3060N/18.8 m | 115  | 38   | 1    | 6    | <0.01 | 120   |
| 3060N/20.6 m | 170  | 48   | 1    | 22   | <0.01 | 130   |
| 3060N/22.3 m | 70   | 20   | 1    | 4    | <0.01 | 150   |
| 3060N/23.5 m | 70   | 20   | 1    | <4   | <0.01 | 120   |
| 3060N/25.1 m | 120  | 26   | 1    | 4    | <0.01 | 180   |
| 3060N/26.6 m | 75   | 12   | 1    | <4   | <0.01 | 120   |
| 3060N/28.0 m | 95   | 36   | 1    | 6    | <0.01 | 70    |
| 3060N/29.5 m | 60   | 22   | 1    | <4   | <0.01 | 100   |
| 3060N/30.7 m | 100  | 36   | 1    | 4    | <0.01 | 90    |
| 3060N/32.7 m | 135  | 38   | 1    | 4    | <0.01 | 110   |
| 3060N/34.0 m | 105  | 48   | 1    | 4    | <0.01 | 80    |
| 3060N/35.7 m | 85   | 46   | 1    | <4   | <0.01 | 100   |
| 3060N/37.3 m | 42   | 32   | 1    | <4   | <0.01 | 110   |
| 3060N/39.3 m | 44   | 32   | 1    | <4   | <0.01 | 110   |
| 3060N/41.3 m | 40   | 42   | 1    | <4   | <0.01 | 100   |
| 3060N/43.3 m | 38   | 46   | 1    | <4   | 0.01  | 120   |
| 3060N/45.3 m | 32   | 55   | 1    | <4   | 0.01  | 120   |
| 3060N/47.3 m | 38   | 50   | 1    | <4   | 0.01  | 130   |
| 3060N/49.0 m | 40   | 44   | 1    | <4   | 0.01  | 140   |
| 3060N/50.7 m | 50   | 46   | 1    | <4   | 0.01  | 120   |
| 3060N/52.3 m | 55   | 75   | 1    | <4   | <0.01 | 120   |
| 3060N/54.2 m | 40   | 70   | 1    | <4   | <0.01 | 90    |
| 3060N/56.2 m | 30   | 55   | 1    | <4   | <0.01 | 110   |
| UNITS        | ppm  | ppm  | ppm  | ppm  | %     | ppm   |
| SCHEME       | AAS1 | AAS1 | AAS3 | AAS3 | SIE2  | COL10 |

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ANALYTICAL REPORT

JOB COM861847

O/N : 08347/LJ10/JPR

| SAMPLE       | Cu   | Zn   | Ag   | Mo   | F     | B     |
|--------------|------|------|------|------|-------|-------|
| 3060N/58.2 m | 34   | 42   | 1    | <4   | <0.01 | 110   |
| 3060N/59.8 m | 55   | 90   | 2    | <4   | <0.01 | 100   |
| 3060N/75.3 m | 50   | 55   | 1    | <4   | <0.01 | 150   |
| 3060N/77.3 m | 42   | 26   | 1    | <4   | <0.01 | 210   |
| 3060N/79.3 m | 60   | 55   | 1    | 4    | <0.01 | 180   |
| 3060N/80.8 m | 28   | 50   | 1    | 4    | <0.01 | 200   |
| 3060N/82.8 m | 50   | 75   | 1    | 4    | <0.01 | 110   |
| 3060N/84.2 m | 32   | 85   | 1    | <4   | <0.01 | 90    |
| 13101        | 20   | 10   | 1    | 4    | <0.01 | 90    |
| 13102        | 14   | 14   | <1   | 8    | <0.01 | 50    |
| 13117        | 55   | 20   | 1    | 4    | <0.01 | 120   |
| 13118        | 120  | 44   | 1    | 4    | <0.01 | 90    |
| 13119        | 180  | 55   | 2    | 6    | <0.01 | 130   |
| 13120        | 170  | 48   | 1    | 10   | <0.01 | 110   |
| 21994        | 14   | 24   | <1   | 4    | <0.01 | <20   |
| 21995        | 2    | 16   | <1   | 4    | <0.01 | 50    |
| UNITS        | ppm  | ppm  | ppm  | ppm  | %     | ppm   |
| SCHEME       | AAS1 | AAS1 | AAS3 | AAS3 | SIE2  | COL10 |

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## ANALYTICAL REPORT

JOB COM861847

O/N : 08347/LJ10/JPR

| SAMPLE        | Pb   | Sn   | W    | Rb   | As   |
|---------------|------|------|------|------|------|
| 2880N/ 0.0 m  | 20   | 14   | <10  | 105  | 10   |
| 2880N/ 2.7 m  | 26   | <4   | 10   | 80   | 9    |
| 2880N/ 4.7 m  | 20   | 8    | <10  | 105  | 9    |
| 2880N/ 6.0 m  | 14   | 8    | <10  | 55   | 5    |
| 2880N/ 6.6 m  | 18   | 6    | <10  | 165  | 6    |
| 2880N/ 8.6 m  | 14   | 4    | <10  | 170  | 6    |
| 2880N/10.6 m  | 16   | 6    | <10  | 135  | <2   |
| 2880N/11.5 m  | 10   | <4   | <10  | 95   | 7    |
| 2880N/13.3 m  | 12   | <4   | <10  | 200  | 7    |
| 2880N/15.4 m  | 14   | <4   | <10  | 60   | 6    |
| 2880N/16.85 m | 8    | 10   | <10  | 70   | 12   |
| 2880N/19.3 m  | 34   | 6    | <10  | 155  | 55   |
| 2880N/21.3 m  | 70   | <4   | <10  | 145  | 18   |
| 2880N/23.3 m  | 22   | <4   | <10  | 160  | 10   |
| 2880N/25.3 m  | 18   | 4    | <10  | 140  | 9    |
| 2880N/26.2 m  | 30   | 6    | <10  | 125  | 26   |
| 2880N/28.2 m  | 16   | <4   | <10  | 130  | 90   |
| 2880N/30.2 m  | 18   | 4    | <10  | 150  | 40   |
| 2880N/31.2 m  | 10   | <4   | <10  | 75   | 9    |
| 2880N/33.2 m  | 16   | 6    | 15   | 90   | 8    |
| 2880N/34.6 m  | 10   | 6    | 10   | 200  | 8    |
| 2880N/37.0 m  | 22   | <4   | <10  | 120  | 4    |
| 2880N/39.0 m  | 16   | 6    | 10   | 155  | 7    |
| 2880N/41.0 m  | 18   | <4   | 10   | 125  | 4    |
| 2880N/43.0 m  | 26   | 10   | <10  | 135  | 9    |
| UNITS         | ppm  | ppm  | ppm  | ppm  | ppm  |
| SCHEME        | XRF1 | XRF1 | XRF1 | XRF1 | XRF1 |

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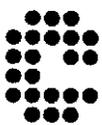
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## ANALYTICAL REPORT

JOB COM861847

O/N : 08347/LJ10/JPR

| SAMPLE       | Pb   | Sn   | W    | Rb   | As   |
|--------------|------|------|------|------|------|
| 2880N/45.0 m | 14   | 8    | <10  | 240  | 14   |
| 2880N/46.4 m | 12   | 6    | <10  | 240  | 9    |
| 2880N/48.4 m | 36   | <4   | <10  | 240  | 9    |
| 2880N/49.4 m | 32   | 4    | <10  | 290  | 9    |
| 2880N/50.8 m | 16   | 4    | <10  | 135  | 20   |
| 2880N/52.8 m | 14   | <4   | <10  | 135  | 5    |
| 2880N/77.8 m | 48   | 12   | <10  | 195  | 12   |
| 2880N/79.8 m | 36   | 12   | <10  | 210  | 7    |
| 2880N/82.1 m | 44   | 6    | <10  | 120  | 9    |
| 2880N/84.1 m | 36   | 6    | <10  | 135  | 5    |
| 2880N/86.1 m | 50   | <4   | <10  | 155  | 14   |
| 2880N/87.1 m | 32   | 6    | <10  | 230  | 22   |
| 2880N/89.1 m | 34   | <4   | <10  | 195  | 14   |
| 2880N/91.1 m | 34   | 10   | <10  | 210  | 12   |
| 2880N/93.1 m | 44   | 6    | <10  | 240  | 10   |
| 2880N/95.1 m | 55   | 4    | <10  | 230  | 24   |
| 3060N/ 0.0 m | 32   | 6    | <10  | 80   | 12   |
| 3060N/ 2.2 m | 36   | 8    | <10  | 130  | 7    |
| 3060N/ 3.6 m | 34   | 8    | <10  | 95   | 16   |
| 3060N/ 4.7 m | 75   | <4   | <10  | 110  | 22   |
| 3060N/ 6.7 m | 20   | <4   | 15   | 100  | 22   |
| 3060N/ 8.0 m | 14   | <4   | <10  | 85   | 18   |
| 3060N/ 9.2 m | 20   | <4   | <10  | 120  | 44   |
| 3060N/11.2 m | 100  | 4    | 10   | 135  | 32   |
| 3060N/13.2 m | 110  | 6    | <10  | 120  | 22   |
| UNITS        | ppm  | ppm  | ppm  | ppm  | ppm  |
| SCHEME       | XRF1 | XRF1 | XRF1 | XRF1 | XRF1 |



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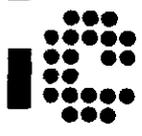
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ANALYTICAL REPORT

JOB COM861847

O/N : 08347/LJ10/JPR

| SAMPLE       | Pb   | Sn   | W    | Rb   | As   |
|--------------|------|------|------|------|------|
| 3060N/14.7 m | 24   | 6    | <10  | 165  | 18   |
| 3060N/16.7 m | 48   | <4   | <10  | 105  | 12   |
| 3060N/18.8 m | 190  | <4   | <10  | 125  | 65   |
| 3060N/20.6 m | 190  | <4   | 10   | 85   | 100  |
| 3060N/22.3 m | 60   | <4   | <10  | 115  | 20   |
| 3060N/23.5 m | 28   | <4   | 15   | 115  | 24   |
| 3060N/25.1 m | 60   | <4   | <10  | 125  | 20   |
| 3060N/26.6 m | 30   | 4    | <10  | 130  | 8    |
| 3060N/28.0 m | 18   | <4   | <10  | 100  | 26   |
| 3060N/29.5 m | 6    | <4   | <10  | 115  | 18   |
| 3060N/30.7 m | 16   | 6    | 10   | 125  | 22   |
| 3060N/32.7 m | 14   | 6    | 10   | 135  | 14   |
| 3060N/34.0 m | 32   | 10   | <10  | 120  | 36   |
| 3060N/35.7 m | 90   | 4    | <10  | 120  | 60   |
| 3060N/37.3 m | 30   | 6    | <10  | 125  | 28   |
| 3060N/39.3 m | 22   | 4    | 10   | 145  | 24   |
| 3060N/41.3 m | 12   | 10   | <10  | 170  | 14   |
| 3060N/43.3 m | 12   | 8    | <10  | 195  | 14   |
| 3060N/45.3 m | 10   | 6    | <10  | 240  | 7    |
| 3060N/47.3 m | 14   | 4    | <10  | 230  | 12   |
| 3060N/49.0 m | 6    | 6    | <10  | 220  | 10   |
| 3060N/50.7 m | 14   | <4   | <10  | 240  | 9    |
| 3060N/52.3 m | 75   | <4   | <10  | 155  | 14   |
| 3060N/54.2 m | 16   | <4   | <10  | 135  | 6    |
| 3060N/56.2 m | 10   | <4   | <10  | 175  | 5    |
| UNITS        | ppm  | ppm  | ppm  | ppm  | ppm  |
| SCHEME       | XRF1 | XRF1 | XRF1 | XRF1 | XRF1 |



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871060

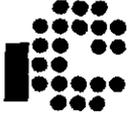
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ANALYTICAL REPORT

JOB COM861847

O/N : 08347/LJ10/JPR

| SAMPLE       | Pb   | Sn   | W    | Rb   | As   |
|--------------|------|------|------|------|------|
| 3060N/58.2 m | 8    | 6    | 10   | 220  | 2    |
| 3060N/59.8 m | 14   | 6    | <10  | 190  | 6    |
| 3060N/75.3 m | 55   | 8    | <10  | 230  | 14   |
| 3060N/77.3 m | 46   | <4   | <10  | 250  | 90   |
| 3060N/79.3 m | 48   | 8    | <10  | 230  | 65   |
| 3060N/80.8 m | 80   | 12   | <10  | 175  | 44   |
| 3060N/82.8 m | 70   | 4    | <10  | 175  | 24   |
| 3060N/84.2 m | 40   | 6    | <10  | 130  | 9    |
| 13101        | 320  | 42   | 10   | 260  | 12   |
| 13102        | 32   | 6    | 15   | 80   | 16   |
| 13117        | 55   | <4   | 10   | 160  | 90   |
| 13118        | 30   | 4    | <10  | 65   | 115  |
| 13119        | 310  | <4   | <10  | 100  | 145  |
| 13120        | 220  | <4   | 10   | 80   | 115  |
| 21994        | 6    | 4    | <10  | 150  | 8    |
| 21995        | 20   | 8    | <10  | 115  | 8    |
| UNITS        | ppm  | ppm  | ppm  | ppm  | ppm  |
| SCHEME       | XRF1 | XRF1 | XRF1 | XRF1 | XRF1 |



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871061

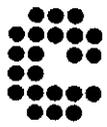
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ANALYTICAL REPORT

JOB COM861847

O/N : 08347/LJ10/JPR

| SAMPLE      | Cu   | Zn   | Ag   | Pb   | Sn   | W    | Rb   |
|-------------|------|------|------|------|------|------|------|
| 2700N/4950E | 165  | 105  | 2    | 14   | 10   | <10  | 24   |
| 2700N/4960E | 145  | 80   | 1    | 6    | 4    | <10  | 14   |
| 2700N/4970E | 110  | 60   | 2    | 6    | <4   | <10  | 18   |
| 2700N/4980E | 130  | 55   | 2    | <4   | <4   | <10  | 12   |
| 2700N/4990E | 140  | 100  | 2    | <4   | <4   | <10  | 12   |
| 2700N/5000E | 190  | 100  | 2    | 4    | <4   | <10  | 18   |
| 2700N/5010E | 230  | 75   | 2    | 12   | 6    | <10  | 26   |
| 2700N/5020E | 105  | 60   | 2    | 8    | 4    | <10  | 65   |
| 2700N/5030E | 110  | 55   | 2    | 4    | <4   | <10  | 18   |
| 2700N/5040E | 110  | 50   | 2    | 6    | <4   | <10  | 18   |
| 2700N/5050E | 125  | 60   | 2    | 4    | <4   | <10  | 20   |
| 2700N/5060E | 135  | 60   | 2    | 10   | <4   | 15   | 22   |
| 2700N/5070E | 95   | 50   | 2    | 8    | <4   | <10  | 18   |
| 2700N/5080E | 95   | 90   | 1    | 8    | <4   | <10  | 14   |
| 2700N/5090E | 95   | 80   | 1    | 32   | 4    | 10   | 60   |
| 2700N/5100E | 75   | 55   | 1    | 32   | <4   | <10  | 85   |
| 2700N/5110E | 100  | 85   | 1    | 42   | <4   | <10  | 100  |
| 2700N/5120E | 75   | 65   | 1    | 38   | 6    | <10  | 125  |
| 2700N/5350E | 18   | 22   | 1    | 32   | 10   | <10  | 95   |
| 2700N/5360E | 14   | 12   | 1    | 12   | <4   | 10   | 85   |
| 2700N/5370E | 16   | 32   | 1    | 12   | 10   | <10  | 75   |
| 2700N/5380E | 20   | 14   | 1    | 28   | 8    | <10  | 65   |
| 2700N/5390E | 10   | 7    | <1   | 6    | 6    | 15   | 40   |
| 2700N/5400E | 24   | 14   | <1   | 10   | <4   | <10  | 80   |
| 2700N/5410E | 18   | 16   | 1    | 22   | 12   | <10  | 65   |
| UNITS       | ppm  |
| SCHEME      | AAS1 | AAS1 | AAS3 | XRF1 | XRF1 | XRF1 | XRF1 |



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871062

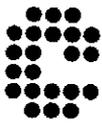
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## ANALYTICAL REPORT

JOB COM861847

O/N : 08347/LJ10/JPR

| SAMPLE      | Cu   | Zn   | Ag   | Pb   | Sn   | W    | Rb   |
|-------------|------|------|------|------|------|------|------|
| 2700N/5420E | 22   | 22   | 4    | 18   | 4    | <10  | 110  |
| 2700N/5430E | 18   | 22   | 1    | 28   | 6    | 10   | 95   |
| 2700N/5440E | 16   | 18   | 1    | 26   | <4   | <10  | 125  |
| 2700N/5450E | 14   | 18   | 1    | 26   | 10   | <10  | 95   |
| 2880N/5070E | 100  | 145  | 1    | 8    | <4   | <10  | 36   |
| 2880N/5080E | 75   | 70   | 1    | 110  | 8    | <10  | 150  |
| 2880N/5090E | 85   | 70   | 1    | 60   | 10   | <10  | 175  |
| 2880N/5100E | 55   | 34   | 1    | 55   | 10   | 10   | 115  |
| 2880N/5300E | 16   | 16   | <1   | 22   | 6    | <10  | 135  |
| 2880N/5375E | 16   | 14   | <1   | 28   | 4    | <10  | 80   |
| 2880N/5390E | 12   | 12   | 1    | 22   | <4   | <10  | 70   |
| 2880N/5400E | 12   | 16   | <1   | 14   | 4    | 10   | 65   |
| 2880N/5410E | 55   | 65   | 1    | 28   | 12   | <10  | 160  |
| 2880N/5420E | 26   | 16   | 1    | 26   | 6    | <10  | 120  |
| 2880N/5430E | 42   | 16   | 1    | 28   | 4    | <10  | 80   |
| 2880N/5440E | 44   | 28   | 1    | 18   | 6    | <10  | 100  |
| 2880N/5450E | 20   | 20   | 1    | 36   | 4    | <10  | 60   |
| 3060N/5280E | 28   | 20   | 1    | 28   | 12   | <10  | 140  |
| 3060N/5290E | 20   | 20   | 1    | 28   | 10   | <10  | 120  |
| 3060N/5300E | 26   | 22   | 1    | 26   | 4    | <10  | 115  |
| 3060N/5310E | 16   | 16   | 1    | 44   | 4    | <10  | 175  |
| 3060N/5320E | 18   | 28   | 1    | 26   | 4    | <10  | 115  |
| 3060N/5330E | 30   | 16   | 1    | 36   | <4   | 10   | 100  |
| 3060N/5340E | 12   | 9    | 1    | 42   | 6    | <10  | 60   |
| 3060N/5350E | 16   | 22   | 1    | 20   | <4   | <10  | 90   |
| UNITS       | ppm  |
| SCHEME      | AAS1 | AAS1 | AAS3 | XRF1 | XRF1 | XRF1 | XRF1 |



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871063

ANALYTICAL REPORT

JOB COM861847

O/N : 08347/LJ10/JPR

| SAMPLE      | Cu   | Zn   | Ag   | Pb   | Sn   | W    | Rb   |
|-------------|------|------|------|------|------|------|------|
| 3060N/5360E | 18   | 14   | 1    | 22   | <4   | <10  | 100  |
| 3060N/5380E | 44   | 14   | 1    | 36   | <4   | <10  | 115  |
| 3060N/5390E | 32   | 14   | 1    | 30   | <4   | <10  | 75   |
| 3060N/5400E | 20   | 7    | <1   | 42   | <4   | <10  | 46   |
| 3060N/5410E | 14   | 22   | 1    | 34   | 4    | <10  | 125  |
| 3060N/5420E | 26   | 20   | <1   | 20   | <4   | <10  | 160  |
| 3060N/5430E | 80   | 34   | 1    | 30   | 4    | 10   | 165  |
| 3060N/5440E | 12   | 16   | <1   | 12   | 6    | 10   | 95   |
| 3060N/5450E | 36   | 9    | <1   | 70   | <4   | <10  | 65   |
| 3060N/4980E | 85   | 46   | 1    | 24   | <4   | <10  | 24   |
| 3060N/4990E | 48   | 30   | 1    | 6    | <4   | 10   | 90   |
| 3060N/5000E | 44   | 22   | 1    | 8    | 4    | <10  | 180  |
| 3240N/5250E | 12   | 18   | 1    | 20   | <4   | 10   | 110  |
| 3240N/5260E | 12   | 14   | 1    | 22   | 8    | <10  | 135  |
| 3240N/5270E | 28   | 14   | 1    | 20   | <4   | <10  | 155  |
| 3240N/5280E | 24   | 16   | 1    | 34   | 4    | 15   | 150  |
| 3240N/5290E | 12   | 24   | <1   | 22   | <4   | 10   | 115  |
| 3240N/5300E | 5    | 9    | <1   | 16   | 8    | <10  | 115  |
| 3240N/5310E | 7    | 14   | 1    | 20   | 6    | <10  | 115  |
| 3240N/5320E | 5    | 4    | 1    | 14   | 4    | <10  | 110  |
| 3240N/5330E | 6    | 9    | <1   | 14   | 4    | 15   | 100  |
| 3240N/5340E | 9    | 5    | 1    | 20   | <4   | <10  | 180  |
| 3240N/5350E | 8    | 12   | <1   | 20   | 6    | <10  | 90   |
| 3240N/4820E | 18   | 12   | 1    | 18   | 10   | <10  | 65   |
| 3240N/4830E | 50   | 34   | 1    | 34   | 6    | <10  | 105  |
| UNITS       | ppm  |
| SCHEME      | AAS1 | AAS1 | AAS3 | XRF1 | XRF1 | XRF1 | XRF1 |

065

871064

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## ANALYTICAL REPORT

JOB COM861847

O/N : 08347/LJ10/JPR

| SAMPLE      | Cu   | Zn   | Ag   | Pb   | Sn   | W    | Rb   |
|-------------|------|------|------|------|------|------|------|
| 3240N/4840E | 50   | 34   | 1    | 28   | 8    | <10  | 95   |
| 3240N/4850E | 50   | 34   | 1    | 34   | 8    | <10  | 120  |
| 3240N/4860E | 85   | 55   | 1    | 26   | 8    | 15   | 135  |
| 3240N/4870E | 80   | 46   | 1    | 20   | <4   | <10  | 130  |
| 3240N/4880E | 50   | 30   | 1    | 20   | 8    | <10  | 105  |
| 3240N/4890E | 20   | 36   | 1    | 16   | 10   | <10  | 115  |
| 3240N/4900E | 22   | 34   | 1    | 16   | 6    | <10  | 115  |
| 3240N/4910E | 85   | 38   | 1    | 16   | <4   | <10  | 120  |
| 3240N/4920E | 210  | 120  | 2    | 16   | <4   | 10   | 28   |
| 3240N/4930E | 135  | 90   | 1    | 10   | 8    | <10  | 32   |
| UNITS       | ppm  |
| SCHEME      | AAS1 | AAS1 | AAS3 | XRF1 | XRF1 | XRF1 | XRF1 |

APPENDIX 3

Diamond Drillhole LD 86-1  
Geological Log and Petrological Descriptions

068

871066

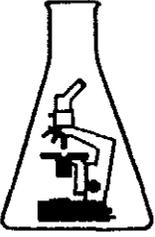
# Geochempet Services

PETROLOGICAL and GEOCHEMICAL CONSULTANTS

REGISTERED IN QUEENSLAND

Principal : A.S. Joyce B.Sc. (Hons), Ph.D.  
200 Chapel Hill Road  
Chapel Hill, Qld. 4069

Telephone: (07) 375 5258  
A/H 378 6467



PETROLOGICAL REPORT ON THIRTEEN SAMPLES

*File  
LJ10-1848*

prepared for

BILLITON AUSTRALIA

Order Code : 08350/LJ10/JPR

Ref : J.P. Randell

*Stan Joyce*

A. S. Joyce, B.Sc.(Hons), Ph.D.

21st January, 1987.

GENERAL COMMENTS

1. The eleven samples labelled 25.6 to 220.0 do correspond petrographically with the variety of lithologies anticipated in passing through a sequence equivalent to the Halls Formation at Cleveland.

The micaceous sandstone which constitutes the sample at 50.0 and forms a thin layer at 25.6 seems to match the type of sandstone east of the lode-bearing unit at Cleveland.

The samples from 156.0 (basaltic and tuffaceous turbidite), 169.4 (amygdaloidal basalt) and 220 (reworked, probably basaltic vitric tuff) are likely to correspond with the basic volcanic unit west of the lode-bearing unit.

The other six samples submitted include four cherts, a graphitic dolomite (77.4) and a reddish laminated shale (120.6).

The cherts are impure, carrying various amounts of sericite, carbonate, graphite and quartz silt. There is no reason to doubt that they are of sedimentary origin.

The presence of the dolomite at 77.4 is noteworthy, as it would constitute a favourable host for replacement mineralization.

Small amounts of apparently introduced sulphides occur in many of the samples, the greatest abundance being disseminated pyrrhotite in the impure chert at 85.8. No tourmaline or cassiterite was seen.

All samples show some fracturing and associated veining which commonly features chlorite, calcite, quartz and graphite.

2. Both of the samples from Mt Black are intensely altered and primary textures and mineralogy have been considerably obscured. Both rocks carried phenocrysts or phenoclasts of feldspar, but not quartz, suggesting intermediate chemistry. Sample 13123 may have been a lava, porphyry or tuff, but 13124 was probably a pumiceous tuff. A subaerial origin is quite possible, but there are no positive criteria displayed. Both rocks are sericitized, silicified and pyritized, and some probable pumiceous clasts in 13124 are chloritized.

Sample Number : 25.6

Identification : Argillite with a weakly sulphide mineralized, disrupted layer of micaceous sandstone

Description :

The sample is a drill core specimen of medium dark grey argillite with a contorted and disrupted layer of sandstone about 5mm thick.

In thin section the mudstone displays silt-sized subangular clasts of quartz (mainly about 0.01 to 0.02mm in size) and generally finer specks of hematite scattered through a matrix of moderately aligned sericite. Some hematite occurs as larger plates and small aggregates, up to 0.1mm in size. There are faulted and disrupted remnants of some silty laminations. An approximate mode is :

|          |          |
|----------|----------|
| 85-90%   | sericite |
| 10-15%   | quartz   |
| 0.2-0.3% | hematite |

The sandstone layer displays moderately sorted, densely packed, angular and subangular clasts, about 0.05 to 0.5mm in size. Most of the clasts are unstrained or faintly strained quartz. Other conspicuous components are plagioclase, microcline, muscovite, brown biotite and chlorite. There is a minor sericitic matrix. Sulphides have partly replaced some clasts (especially biotite) : both pyrite and translucent reddish brown sphalerite are recognisable. An approximate mode is :

|          |                                                         |
|----------|---------------------------------------------------------|
| 70-80%   | quartz and quartzite clasts                             |
| 8-10%    | feldspar clasts (plagioclase and microcline)            |
| 2-3%     | muscovite clasts                                        |
| 1-2%     | biotite clasts                                          |
| 0.2-0.3% | chlorite clasts                                         |
| 10-15%   | matrix sericite                                         |
| 0.2-0.3% | replacement sulphides (including pyrite and sphalerite) |

Comments and Interpretations :

This sample is considered to display a disrupted layer of weakly sulphide mineralized micaceous sandstone (or subgreywacke) hosted by argillite with disrupted remnants of silty laminations.

The argillite is too indurated for description as mudstone and lacks the bedding plane fossilility typical of shale.

Pyrite and sphalerite occur as replacement components in the sandstone but are absent from the argillite. Thus, it seems likely that mineralizing fluids have migrated along the more permeable sandstone layer and replaced labile clasts, such as biotite.

071

871069

Sample Number : 50.0

Identification : Micaceous sandstone

Description :

The sample is a drill core specimen of massive, medium grey, micaceous, sandy textured rock.

A staining test revealed minor K-feldspar as sand grains.

In thin section the sample displays poorly to moderately sorted, densely packed, angular and subangular clasts, about 0.05 to 1mm in size.

The most common clasts are unstrained or mildly strained quartz; a few are composite grains of quartzite style. There are many detrital flakes of mica, both muscovite and brown biotite, and a few of chlorite. Feldspar clasts are conspicuous, including twinned and untwinned plagioclase and twinned microcline : both types are commonly fresh, but a few are lightly sericitized or carbonated. There are a few detrital grains of opaque oxide, some leucoxenized. Sericite and minor calcite occur as matrix minerals.

A few specks of sulphide (including reddish brown sphalerite and possibly galena) are present as aggregates of small grains variously replacing biotite and calcite.

An approximate mode is :

|          |                                                       |
|----------|-------------------------------------------------------|
| 65-75%   | clasts of quartz and quartzite                        |
| 5-8%     | clasts of plagioclase                                 |
| 3-4%     | clasts of microcline                                  |
| 3-4%     | clasts of muscovite                                   |
| 2-3%     | clasts of biotite                                     |
| 0.1-0.3% | clasts of chlorite                                    |
| 0.1%     | clasts of opaque oxide and leucoxene                  |
| 10-12%   | matrix sericite                                       |
| 1-2%     | calcite as a matrix mineral and replacing some clasts |
| rare     | sulphides (sphalerite and possibly galena)            |

Comments and Interpretations :

This sample is identified as micaceous sandstone (or subgreywacke). Its detrital assemblage of quartz, plagioclase, microcline, muscovite, biotite and opaque oxide indicates a granitoid source area. The angular textures and incomplete sorting are consistent with turbidite deposition.

There are rare aggregates of sulphide grains present as replacements of biotite and calcite. Thus the abundances are lower, but the mineralizing style similar to that seen in the sample from 25.6m.

072

871070

Sample Number : 75.8

Identification : Chert

Description :

The sample is a drill core specimen of medium grey, hard chert. A sawn surface reveals a pattern of planar fine laminations with an inclination of about 26° to the core axis. There is also an irregular pattern of dark fractures.

In thin section the sample is seen to consist mainly of microcrystalline quartz (about 0.005mm in grainsize). There are many randomly orientated tiny flecks of sericite and disseminated tiny specks of a black opaque mineral which is too fine for positive identification in thin section or hand specimen : it is probably graphite. There are rare specks of calcite.

The laminar pattern is seen to be attributable to finely crenulated stylolites, carrying sericite and opaque minerals. Some of the dark fractures are similarly stylolitic. Others are thin (less than 0.3mm) fissure veins containing quartz and a core of calcite and the opaque mineral.

An approximate mode is :

|          |                                   |
|----------|-----------------------------------|
| 85-90%   | cherty quartz                     |
| 10-15%   | sericite                          |
| 0.2-0.3% | opaque grains (probably graphite) |
| rare     | disseminated calcite              |
| 0.3-0.4% | stylolites                        |
| 0.3-0.4% | veins of quartz-calcite-opaque    |

Comments and Interpretations :

This sample is considered to represent chert. It carries some sericite and specks of an opaque mineral which is probably graphite. There are rare disseminated grains of calcite and several fissure veinlets carrying quartz, calcite and the opaque mineral (all probably mobilized from the chert by diagenetic or incipient metamorphic processes).

073

Sample Number : 77.4

Identification : Graphitic dolomite with replacement nodules of pyrite in the vicinity of deformed dolomite veins

Description :

The sample is a drill core specimen of moderately hard, finely crystalline, medium grey carbonate rock with some irregular veins of medium light grey carbonate. There are inhomogeneously distributed specks of brassy sulphide.

In thin section the sample is seen to consist mainly of anhedral carbonate with grainsizes of about 0.02 to 0.1mm and optical properties consistent with dolomite. There are numerous disseminated specks and wisps of black carbonaceous matter (probably graphite), including a few relatively large clasts (1 to 2mm) : most specks are about 0.01 to 0.1mm. There are inconspicuous angular sand grains of quartz (up to 0.1mm) and a few muscovite clasts.

Irregular deformed fissure veins, about 0.1 to 5mm wide, carry coarser, anhedral dolomite (up to 0.5mm grainsize). Mainly in the vicinity of the coarsest veins there are subspherical aggregates (up to 0.5mm in size) composed of subhedral pyrite crystals (about 0.02 to 0.1mm in size). Several pyrite aggregates occur in the veins. A deformed thin layer of argillite occurs in the veined regime.

An approximate mode is :

|        |                  |
|--------|------------------|
| 75-85% | fine dolomite    |
| 4-5%   | graphite         |
| 3-4%   | quartz clasts    |
| rare   | muscovite clasts |
| 10-12% | vein dolomite    |
| 1-2%   | argillite layer  |
| 0.5-1% | pyrite           |

Comments and Interpretations :

This rock is interpreted to have originated as carbonaceous dolomite, containing minor quartz sand, a few muscovite clasts and a thin layer of shale.

Dolomite fissure veins formed and were mildly deformed and disrupted. Small nodules of pyrite are developed mainly in the vicinity of the veins, suggesting introduction of mineralizing fluids along the same fractures which filled with dolomite of possibly local, mobilized origin.

Sample Number : 85.8

Identification : Chert with disseminated pyrrhotite

Description :

The sample is a drill core specimen of medium dark grey, massive mudstone liberally speckled with fine, magnetic, bronze sulphide. There are a few thin veins carrying carbonate, graphite and sulphide.

In polished thin section the sample displays textures consistent with fractured impure chert. It is rich in microcrystalline quartz (less than 0.01mm grainsize), but liberally speckled with very fine sericite, carbonate and probable graphite. There are also silt grains of quartz.

An irregular fracture pattern is delineated by accumulations of very fine graphite and by thin fissure veins (less than 0.5mm thick) carrying calcite, quartz and graphite.

Sulphides are unevenly but pervasively disseminated through the sample. They are mainly weakly anisotropic, subhedral and anhedral grains of pyrrhotite, about 0.1 to 0.3mm in size. There are also several subhedral grains of pyrite of similar size, in chert and in a quartz-calcite vein. Most of the sulphide is within the cherty host rock, but a few grains occur in the quartz-calcite veins and there is one massive very thin vein of pyrrhotite.

An approximate mode is :

|          |                                             |
|----------|---------------------------------------------|
| 80-85%   | cherty and silty quartz                     |
| 5-10%    | sericite                                    |
| 3-4%     | fine carbonate                              |
| 0.1-0.2% | fine graphite                               |
| 3-4%     | veins carrying graphite, quartz and calcite |
| 5-8%     | pyrrhotite, mainly disseminated             |
| 0.1%     | pyrite                                      |

Comments and Interpretations :

This sample is interpreted to be fractured, impure chert, liberally impregnated with pyrrhotite. The impurities are carbonate, sericite and graphite.

The pyrrhotite is thought to have been introduced as a replacement mineral on the grounds that it is a high temperature mineral, has porphyroblastic textures and is inhomogeneously distributed. Some sulphide also occurs in fracture veins which carry quartz, calcite and graphite.

075  
Sample Number : 111.5

Identification : Chert

Description :

The sample is a drill core specimen of medium dark grey, faintly reddish, hard, cherty rock. A subtle, irregular fracture pattern is delineated by dark minerals.

In thin section the bulk of the specimen displays cherty, microcrystalline quartz (less than 0.01mm in grainsize), many tiny flecks of sericite, tiny specks of an opaque mineral (probably graphite) and rare specks of calcite. There are disseminated siliceous spheres, about 0.1mm in size, resembling radiolarian fossils. Variations in pigmentation suggest lamination.

The fracture pattern in some cases is delineated by very thin, black accumulations (0.01mm wide) of probable graphite. In other cases there are thicker (up to 0.4mm) fissure veins composed of fine, anhedral quartz (up to 0.1mm grainsize) and a discontinuous core of calcite and graphite. The coarsest grains of graphite are about 0.2mm and identification is based on hand specimen properties investigated with the assistance of binocular microscopy.

An approximate mode is :

|          |                                                      |
|----------|------------------------------------------------------|
| 85-90%   | cherty quartz                                        |
| 10-15%   | sericite                                             |
| 0.1-0.2% | disseminated probable graphite                       |
| rare     | disseminated calcite                                 |
| 0.5-1%   | fracture veins carrying quartz, calcite and graphite |

Comments and Interpretations :

This sample is considered to represent chert which is similar to that from 75.8m, but very faintly reddish (no hematite pigment detected in section). It has faint lamination and carries some tiny siliceous spheres which resemble radiolarian fossils. A sedimentary origin is the most probable.

Graphite is present as tiny disseminated grains and within fracture veinlets where it commonly occurs with calcite in the core of quartz veins. The veins are probably of diagenetic or incipient metamorphic origin and their components are probably derived from the host chert.

Sample Number : 120.6  
Identification : Reddish laminated shale  
Description :

The sample is a drill core specimen of laminated greyish red shale. The laminations are orientated approximately normal to the core axis and there is a bedding plane fissility.

In thin section the sample displays shaley textures and planar to locally mildly folded sedimentary laminations, about 0.5 to 12mm thick. The laminations variously show abrupt or graded variations in hematitic pigmentation, but little other obvious variation in composition.

The components are sericite of detrital appearance, earthy hematite, inconspicuous silt grains of quartz and rare grains of calcite. Typical grainsizes are a few microns to about 0.02mm. Hematite also forms a few small nodules (up to 0.2mm and occupies a few fractures). Calcite also occurs in a 0.5mm segment of a hematitic fracture and alone in a 0.05mm wide fracture vein.

An approximate mode is :

|        |          |
|--------|----------|
| 90-95% | sericite |
| 4-6%   | hematite |
| 2-5%   | quartz   |
| rare   | calcite  |

Comments and Interpretations :

This sample is considered to represent hematitic, laminated shale. It has experienced mild folding and fracturing. There are no sulphides and no recognisable characteristics of hydrothermal alteration.

Calcite is present as a rare component of the shale and with several very thin fracture veins.

077

871075

Sample Number : 130.0

Identification : Laminated chert with some dolomitic or ankeritic layers

Description :

The sample is a drill core specimen of cherty, fine-grained rock which displays greenish grey and faintly reddish grey bands orientated at about 75 degrees to the core axis. Microfaulting and fracturing is visible. There is no bedding plane fissility.

In thin section the greenish grey bands (about 5 to 20mm thick) are seen to consist of microcrystalline quartz (finer than 0.01mm) finely flecked with sericite and finely speckled with anhedral carbonate with a colour and relief suggestive of dolomite or ankerite. Faint laminations are expressed by subtle variations in composition. A generalized mode is :

|        |           |
|--------|-----------|
| 90-95% | quartz    |
| 4-6%   | sericite  |
| 2-3%   | carbonate |

The faintly reddish bands (about 15mm thick) consist of similarly cherty rock, but with a greater abundance of the fine dolomitic or ankeritic carbonate (about 0.01mm and finer). There is also some pale green chlorite visible and some silt grains of quartz. An approximate mode is :

|        |           |
|--------|-----------|
| 65-75% | quartz    |
| 20-30% | carbonate |
| 1-2%   | sericite  |
| 2-3%   | chlorite  |

Irregular thin fracture veins are occupied by quartz, chlorite and rare calcite.

Comments and Interpretations :

This sample is considered to represent laminated chert, composed of greenish siliceous layers alternating with faintly reddish layers which carry significant amounts of fine dolomite or ankerite and some silt grains of quartz.

The rock is micro-faulted and there are thin fissure veins of quartz, chlorite and traces of calcite.

There are no sulphides or graphite.

Sample Number : 156.0

Identification : Chloritized and carbonated, basaltic and tuffaceous turbidite

Description :

The sample is a drill core specimen which displays many dark greenish grey clasts, a fraction of a millimetre to about 7mm in size, and a few light grey clasts of carbonate, dispersed through a greenish grey, chloritic matrix with a probable bedding plane foliation orientated at about 80 degrees to the core axis.

In thin section the lithic clasts are seen to be subangular and subrounded fragments of chloritized and carbonated basalt and amygdaloidal basalt with varied textural styles. In most cases albitized plagioclase laths persist but mafic silicates have been converted to chlorite and calcite and opaque oxides have been lightly altered in some cases to sphene and leucoxene. Amygdales are composed of chlorite and calcite. Several clasts consist of finely crystalline carbonate, but it is unclear whether they represent clasts of limestone or fragments of amygdaloidal carbonate. There are a few small, broken corroded grains of quartz of phenoclastic style.

The matrix between the lithic and mineral clasts now consists mainly of fine chlorite clouded probably by leucoxene. However, there are ghosted textures strongly suggestive of platy, unwelded vitric clasts.

Fine, subhedral pyrite (0.05 to 0.2mm in grainsize) forms a few disseminated grains and small aggregates, both in basaltic clasts and in the matrix.

There are a few thin fissure veins of calcite and chlorite.

An approximate mode is :

|          |                                             |
|----------|---------------------------------------------|
| 30-35%   | clasts of chloritized and carbonated basalt |
| 0.2-0.3% | carbonate clasts                            |
| 0.1-0.2% | quartz phenoclasts                          |
| 65-70%   | cloudy chloritized, vitroclastic matrix     |
| tr       | disseminated pyrite                         |
| 0.3-0.4% | veins of chlorite and calcite               |

Comments and Interpretations :

This sample is considered to represent a turbidite composed of fragments of amygdaloidal basalt dispersed through an unwelded matrix of former vitric shards. The basaltic fragments are chloritized and carbonated and the vitroclastic matrix is chloritized. There are traces of disseminated pyrite and some thin fissure veins of calcite and chlorite.

Sample Number : 169.4

Identification : Lightly chloritized, amygdaloidal basalt with veins carrying chlorite and other minerals, including sulphides

Description :

The sample is a drill core specimen of greenish grey, fine-grained, crystalline rock, cut by a few dark veins of chlorite and bronze pyrrhotite which is distinctly magnetic.

In thin section the sample displays amygdaloidal, hypidiomorphic, crystalline basaltic textures, with grainsizes mainly around 0.2 to 0.3mm.

The amygdales are sparse, subspherical, about 2 to 3mm in size, and composed of chlorite with a few grains of quartz and calcite. The basalt itself displays laths of plagioclase with light illitic or sericitic clouding, fresh clinopyroxene prisms, platy opaque oxides (many leucoxenized), interstitial chlorite and minor calcite and a few grains of apparently primary quartz.

Irregular, fracture-controlled but partly replacement style veins carry greenish brown biotite, chlorite, calcite and quartz, commonly discontinuously zoned in that paragenetic sequence. Some veins are thinly lined with anhedral, fine grains of opaque oxide (probably magnetite) and some chloritic segments are associated with replacement patches (up to 1mm) of pyrrhotite with traces of translucent reddish brown sphalerite. The veins range in thickness from about 0.05 to 2mm.

An approximate mode is :

|          |                                                                                                       |
|----------|-------------------------------------------------------------------------------------------------------|
| 40-50%   | plagioclase                                                                                           |
| 30-35%   | clinopyroxene                                                                                         |
| 8-10%    | opaque oxide and leucoxene                                                                            |
| 5-10%    | interstitial chlorite                                                                                 |
| 0.1-0.3% | interstitial quartz                                                                                   |
| 4-6%     | veins and amygdales carrying magnetite, biotite, chlorite, pyrrhotite, sphalerite, calcite and quartz |

Comments and Interpretations :

This sample is considered to represent basalt of probably tholeiitic style. The presence of amygdales suggests that it is a lava.

The rock has been lightly chloritized and fissure veined by an assemblage with an apparent paragenetic sequence from magnetite to biotite, chlorite, pyrrhotite and sphalerite, calcite and then quartz.

Sample Number : 220.0

Identification : Reworked vitric tuff, altered to chlorite-calcite-sericite-leucoxene and impregnated with traces of sulphide

Description :

The sample is a drill core specimen of greenish grey, massive, sandy textured rock. Near one end of the core there is a crenulated 1 to 2mm wide vein of light grey carbonate.

In thin section the sample displays well sorted, densely packed, waterworn former vitric shards and a few mineral clasts. There is a minor cement of chlorite and fine sericite.

The former vitric clasts are about 0.1 to 0.4mm in size and vary in shape from ovoid to platy and cusped. They are now outlined by leucoxene and altered to fine chlorite and subordinate sericite, and less commonly to calcite.

The sparse mineral clasts include angular and smoothly corroded quartz (up to 0.3mm) and subhedral plagioclase (albitized and partly sericitized).

A few tiny aggregates (up to 0.2mm) of brassy, unidentified sulphide are present as partial replacements of a few vitric clasts. There are several barren fissure veinlets of calcite.

In terms of original components the rock is estimated to have consisted of about :

|        |                                 |
|--------|---------------------------------|
| 88-92% | vitric clasts                   |
| 3-5%   | feldspar and quartz phenoclasts |
| 5-7%   | cement                          |

In terms of current mineralogy the rock is estimated to consist of about :

|        |           |
|--------|-----------|
| 60-70% | chlorite  |
| 15-20% | sericite  |
| 5-10%  | calcite   |
| 4-6%   | leucoxene |
| 0.5-1% | quartz    |
| 0.5-1% | albite    |
| 0.1%   | sulphides |

Comments and Interpretations :

Remnant textures plainly indicate that this rock originated as a sandy, waterworn accumulation of vitric shards and a few related phenoclasts. The source magma was probably basaltic, but the mineralogy has been adjusted by diagenetic and/or incipient metamorphic processes to mainly chlorite-sericite-calcite-leucoxene.

Traces of fine sulphide have partly replaced a few vitric clasts. There are several barren calcite fissure veins.

Sample Number : 13123

Identification : Weathered, formerly pyritic, intensely silicified and sericitized, porphyritic lava, porphyry or tuff

Description :

The sample is a moderately weathered, mottled pale red and light brownish hand specimen of moderately hard, fine-grained rock with some indistinct phenocrysts or clasts.

A cobaltinitrite staining test revealed no K-feldspar.

In thin section the sample is seen to be intensely silicified and sericitized and primary textures have been largely destroyed. There are disseminated tabular structures interpretable as former feldspar phenocrysts or clasts about 1 to 1.5mm in size, but they have been pseudomorphed by aggregates of quartz (about 0.1 to 0.2mm in size). The groundmass or matrix now consists of a mosaic of anhedral quartz (about 0.05 to 0.1mm in grain size) and aggregates of very fine sericite.

There are disseminated pores lined with goethite and probably representing former subhedral to euhedral pyrite grains about 0.1 to 0.4mm in size. Probably related limonitic staining occurs in nearby sericite and in a web of weathering fractures.

An approximate mode is :

|        |                                                                |
|--------|----------------------------------------------------------------|
| 8-10%  | quartz pseudomorphs of inferred feldspar phenocrysts or clasts |
| 50-60% | groundmass/matrix quartz                                       |
| 30-35% | groundmass/matrix sericite                                     |
| 1-2%   | pores, goethite and limonite                                   |

Comments and Interpretations :

The rock has been intensely silicified and sericitized and impregnated with about 1 to 2% pyrite, then moderately weathered.

The alteration has greatly obscured the original textures. It can be stated with confidence that originally there were subhedral phenocrysts or phenoclasts of feldspar set in a fine groundmass or matrix, but additional conclusions are quite speculative. The absence of quartz phenocrysts suggests an intermediate source magma. Texturally the possibilities include lava, a subvolcanic intrusion or a tuff. No sedimentary features are apparent.

Sample Number : 13124

Identification : Weathered, formerly pyritic, sericitized and chloritized, probable pumiceous tuff

Description :

The sample is a greyish orange, heavily weathered, deeply pitted hand specimen of vaguely tuffaceous appearance. There are some wispy chloritic structures resembling former pumice, up to about 15mm in size, and some small feldspar phenocrysts or clasts.

A cobaltinitrite staining test revealed no K-feldspar.

In thin section the sample displays corroded and subhedral phenocrysts or phenoclasts of twinned albite (0.5 to 2mm in size) occurring alone or in small aggregates dispersed through a microcrystalline groundmass or matrix of quartz and sericite. The albite grains have been cracked by weathering processes, but are otherwise unaltered. There are also ill-defined chloritic patches vaguely resembling devitrified pumice and carrying some of the plagioclase phenocrysts. Several less obvious sericitic structures, without phenocrysts, also resemble ragged, but undeformed pumice.

The bulk of the rock consists of fine quartz and possibly untwinned albite (about 0.02mm grainsize) along with some fine sericite, minor chlorite, fine secondary rutile or sphene and limonite pigment. A stringy, incipient foliation is shown by some sericite.

Irregularly disseminated dark limonitic aggregates and a few pores suggest the former existence of subhedral fine pyrite, commonly about 0.02 to 0.03mm in size.

An approximate mode is :

|          |                                 |
|----------|---------------------------------|
| 8-10%    | phenocrysts or clasts of albite |
| 45-55%   | sericite                        |
| 30-35%   | fine quartz and possibly albite |
| 4-5%     | chlorite                        |
| 2-3%     | limonite                        |
| 0.1-0.3% | sphene or rutile                |

Comments and Interpretations :

Intense alteration, incipient foliation and recent weathering have obscured the primary features of this rock, but it seems likely that it originated as unwelded pumiceous tuff, probably of intermediate composition (no quartz phenocrysts). A subaerial origin is possible but there are no conclusive textural characteristics.

The plagioclase phenocrysts are now albite, but may have been more calcic when deposited. The inferred pumiceous and possibly other vitric components have been intensely altered to sericite, chlorite and quartz. Disseminated fine pyrite seems to have existed prior to weathering.



SHLMET SYSTEM  
METRIC  
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited  
METALS DIVISION

DRILL LOG SHEET

CONTINUATION SHEET

|           |             |             |         |
|-----------|-------------|-------------|---------|
| PROJECT   | LUINA       | HOLE NAME   | LD 86-1 |
| LOGGED BY | J. Randall. | TOTAL DEPTH | 342 m.  |

| DISTANCE FROM COLLAR | TO TOP |           | Sn | W   | Rb  | Cu  | Pb | Zn  | Mg  | As | SAMPLE NO | CORE ANGLE | ROCK TYPE | DIAM | DESC CODE | GRAPHIC LOG | DESCRIPTIVE LOG                                |
|----------------------|--------|-----------|----|-----|-----|-----|----|-----|-----|----|-----------|------------|-----------|------|-----------|-------------|------------------------------------------------|
|                      | TO TOP | TO BOTTOM |    |     |     |     |    |     |     |    |           |            |           |      |           |             |                                                |
| 19.0                 |        |           | 4  | <10 | 110 | 25  | 10 | 90  | 0.5 | 8  | 190       |            |           |      |           |             | of silty veinlets.                             |
| 21.0                 |        |           | 4  | <10 | 110 | 30  | 25 | 90  |     | 5  | 210       |            |           |      |           |             | 16.0-25.1: silty sandy clasts, angular but     |
| 23.0                 |        |           | 4  | 15  | 110 | 30  | 25 | 90  |     | 5  | 230       |            |           |      |           |             | defining a vague bedding 60-70° LCA. Rare      |
| 25.1                 |        |           | 10 | <10 | 230 | 90  | 15 | 125 |     | 42 | 251       |            |           |      |           |             | clark siltstone angular clasts. No obvious     |
| 26.6                 |        |           | 4  | <10 | 210 | 110 | 15 | 130 |     | 42 | 266       |            |           |      |           |             | mineral flecks in clasts up or down hole.      |
| 28.1                 |        |           | 8  | <10 | 130 | 20  | 30 | 80  |     | 42 | 281       |            |           |      |           |             | Contacts obscured.                             |
| 29.8                 |        |           | 10 | <10 | 280 | 70  | 20 | 115 |     | 15 | 298       |            |           |      |           |             | 25.1-28.1: GREY MASSIVE ARGILLACEOUS           |
| 32.4                 |        |           | 8  | <10 | 200 | 30  | 25 | 155 |     | 20 | 324       |            |           |      |           |             | SILTSTONE.                                     |
| 34.0                 |        |           | 8  | <10 | 170 | 30  | 30 | 90  |     | 5  | 340       |            |           |      |           |             | Very fine grained, non laminated,              |
| 36.0                 |        |           | 10 | <10 | 220 | 45  | 35 | 210 |     | 65 | 360       |            |           |      |           |             | some calcite. Minor large (1-3cm) clasts       |
| 38.0                 |        |           | 43 | <10 | 200 | 30  | 35 | 125 |     | 35 | 380       |            |           |      |           |             | of grey sandstone. Trace py on fracture planes |
| 40.0                 |        |           | 3  | <10 | 140 | 30  | 15 | 90  |     | 5  | 400       |            |           |      |           |             | towards bottom, very large (~5cm) angular      |
| 42.0                 |        |           | 6  | 15  | 120 | 30  | 25 | 95  |     | 7  | 420       |            |           |      |           |             | sandstone clasts occur. Moderately broken.     |
| 44.2                 |        |           | 7  | <10 | 200 | 70  | 25 | 135 |     | 20 | 442       |            |           |      |           |             | Contacts obscured.                             |
| 45.8                 |        |           | 5  | <10 | 120 | 30  | 8  | 80  |     | 5  | 458       |            |           |      |           |             | 28.1-29.8: GREY MASSIVE SANDSTONE.             |
| 48.0                 |        |           | 9  | <10 | 110 | 25  | 30 | 80  |     | 42 | 480       |            |           |      |           |             | Minor zones of soft white angular              |
| 50.0                 |        |           | 6  | 15  | 95  | 25  | 10 | 75  |     | 4  | 500       |            |           |      |           |             | sandy clasts of argillaceous sediment.         |
| 52.0                 |        |           | 9  | <10 | 130 | 40  | 30 | 90  |     | 6  | 520       |            |           |      |           |             | Contacts obscured.                             |
| 53.5                 |        |           | 7  | <10 | 140 | 40  | 15 | 80  |     | 4  | 535       |            |           |      |           |             | 29.8-32.4: GREY GREEN MASSIVE SILTSTONE        |
| 55.0                 | 56.4   |           | 7  | <10 | 230 | 45  | 45 | 100 | 0.5 | 42 | 550       |            |           |      |           |             | Very fine grained non bedded                   |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | with minor 2-3cm angular clasts of grey        |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | argillaceous sandstone. One clast contains     |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | 5-7% medium grained pink blk. bi. Towards      |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | bottom are several 10-15cm bands of grey       |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | fine calcareous siltstone. Banding 70-90°      |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | LCA.                                           |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | 32.4-39.0: MIXED GREY SILTSTONE AND            |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | SANDSTONE.                                     |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | Now bedded with numerous                       |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | clasts of each. Gradational changes,           |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | strongly broken con.                           |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | 39.0-44.2: GREY ARGILLACEOUS SANDSTONE         |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | Wendy quartz veined (50-80° LCA)               |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | with arenaceous part here. Becomes more        |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | impure ~ 42m. often with rounded clasts        |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | of calcareous sandstone. Contacts diffuse      |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | but appear to be 75-80° LCA.                   |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | 44.2-45.8: BLACK FINE SILTSTONE.               |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | Very finely bedded, defined by 0.6             |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | 1.0mm bands of grey green to black calcite     |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | rich siltstone. Bedding 80-90° LCA. Rare       |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | po. blebs (0.3cm). Fine carbonate veinlets.    |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | 45.8-55.0: GREY MASSIVE MILLENEOUS SANDSTONE   |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | Generally massive but with                     |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | numerous irregular clasts of effluvia          |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | carbonate sands. Lower contact 80° LCA.        |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | 53.0-53.8: Black fine grained siltstone with   |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | thin carbonate veinlets. Contacts @            |
|                      |        |           |    |     |     |     |    |     |     |    |           |            |           |      |           |             | 45° LCA.                                       |

TWIN SECTION 50.0m.  
Milleeneous sandstone.  
Poorly sorted, 75% qtz,  
8% plg 10% siltst. k.  
Rare sph, gal.

TWIN SECTION 25.6m.  
Argillite with weakly  
sulphidic (py) calcareous  
sandstone layer. Some  
replacement sulphide.

08A

871082

SHLMET SYSTEM  
METRIC  
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited  
METALS DIVISION  
DRILL LOG SHEET

PROJECT **LUINA** HOLE NAME **LD 36-1**  
LOGGED BY **J. Randell** TOTAL DEPTH **342m**

CONTINUATION SHEET

| F | DISTANCE FROM COLLAR |           | Sn | W   | Rb  | Cu  | Pb | Zn  | Mg  | Al | SAMPLE NO. | B    | Au  | DIAM. | DESC CODE | GRAPHIC LOG | DESCRIPTIVE LOG                                                                                                                                                                                                                                                     |
|---|----------------------|-----------|----|-----|-----|-----|----|-----|-----|----|------------|------|-----|-------|-----------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | TO TOP               | TO BOTTOM |    |     |     |     |    |     |     |    |            |      |     |       |           |             |                                                                                                                                                                                                                                                                     |
|   | 56.4                 |           | <3 | <10 | 160 | 20  | <5 | 95  | 0.5 | <2 | 564        |      |     |       |           |             | 55.0-56.4: BLACK NON LAMINATED SILTSTONE                                                                                                                                                                                                                            |
|   | 58.0                 |           | <3 | <10 | 150 | 5.0 | 40 | 105 |     | 6  | 580        |      |     |       |           |             | MASSIVE non bedded with few thin carbonate veins. Lower contact @ 55° LCA.                                                                                                                                                                                          |
|   | 60.0                 |           | 6  | <10 | 200 | 85  | 25 | 140 |     | 60 | 600        |      |     |       |           |             |                                                                                                                                                                                                                                                                     |
|   | 62.4                 |           | 6  | <10 | 260 | 50  | <5 | 100 |     | <2 | 624        |      |     |       |           |             |                                                                                                                                                                                                                                                                     |
|   | 64.0                 |           | 5  | 10  | 220 | 20  | <5 | 110 |     | <2 | 640        |      |     |       |           |             | 56.4-62.4: INTERBEDDED MICACEOUS SANDSTONE AND FINE BLACK SILTSTONE.                                                                                                                                                                                                |
|   | 66.0                 |           | 8  | <10 | 230 | 25  | <5 | 100 |     | <2 | 660        |      |     |       |           |             |                                                                                                                                                                                                                                                                     |
|   | 68.6                 |           | 4  | <10 | 170 | 100 | 20 | 110 |     | 3  | 686        |      |     |       |           |             |                                                                                                                                                                                                                                                                     |
|   | 71.0                 |           | 5  | 15  | 110 | 70  | 15 | 100 |     | 25 | 710        |      |     |       |           |             |                                                                                                                                                                                                                                                                     |
|   | 73.0                 |           | 5  | <10 | 110 | 70  | 20 | 110 |     | 15 | 730        |      |     |       |           |             |                                                                                                                                                                                                                                                                     |
|   | 75.4                 |           | 4  | <10 | 50  | 25  | 5  | 50  |     | 10 | 754        | 38.0 | 008 |       |           |             | generally sharp contacts of variable width. Contacts 60-80° LCA. Fine carb. matrix thinning but matrix appears to be non calcareous. Sub-massive carbonate rich clasts in siltstone. Often contains ~1% very fine disseminated pyrobitite. Lower contact @ 80° LCA. |
|   | 76.8                 |           | <3 | <10 | 40  | 40  | <5 | 10  |     | 30 | 768        | 24   |     |       |           |             |                                                                                                                                                                                                                                                                     |
|   | 77.8                 |           | 3  | <10 | 45  | 30  | 5  | 30  |     | <2 | 778        | 30   |     |       |           |             |                                                                                                                                                                                                                                                                     |
|   | 78.8                 |           | <3 | <10 | 35  | 25  | <5 | 75  |     | 15 | 788        | 25   |     |       |           |             |                                                                                                                                                                                                                                                                     |
|   | 80.0                 |           | 4  | 10  | 40  | 25  | 6  | 70  |     | <2 | 800        | 26   |     |       |           |             |                                                                                                                                                                                                                                                                     |
|   | 81.0                 |           | <3 | <10 | 25  | 20  | 9  | 65  |     | <2 | 810        | 12   |     |       |           |             | 62.4-68.6: PURPLE BROWN SILTSTONE                                                                                                                                                                                                                                   |
|   | 82.0                 |           | <3 | <10 | 25  | 20  | 15 | 60  |     | <2 | 820        | 18   |     |       |           |             |                                                                                                                                                                                                                                                                     |
|   | 83.0                 |           | <3 | <10 | 40  | 25  | <5 | 70  |     | <2 | 830        | 26   |     |       |           |             |                                                                                                                                                                                                                                                                     |
|   | 84.0                 |           | <3 | <10 | 35  | 25  | <5 | 75  |     | 2  | 840        | 26   |     |       |           |             |                                                                                                                                                                                                                                                                     |
|   | 84.7                 | 85.4      | <3 | <10 | 40  | 25  | <5 | 70  |     | 4  | 847        | 14   |     |       |           |             | Generally massive but minor bands of grey non laminated siltstone occur. Contacts sharp @ 55-70° LCA. Minor zones of nodular carbonate veining, minor chert. At 85.0m, small zone of finely laminated grey/purple siltstone with bedding 55-60° LCA.                |

ASSAY INFORMATION

THIN SECTION 75.8m.  
Chert. Finely laminated.  
Rare graphitic + stylolitic.  
90% quartz 10% calcite.  
Rare calcite.

THIN SECTION 77.4m.  
Graphitic Dolomite.  
Replacement pyrite. Coarse vein dolomite. 75% dolomite.  
5% graphitic 4% quartz.

68.6-75.4: GREY MASSIVE SILTSTONE  
Non laminated or banded, uniform composition but with few small zones of carbonate? clasts veining (6-80° LCA).  
Upper contact gradational over 10cm. No identifiable carbonate. Lower contact brecciated and diffuse.

75.4-76.8: GREY FINE LAMINATED CHERT.  
Very finely laminated (30-45° LCA) chert or cherty siltstone, strongly fractured and filled with fine network of clastic veins. No discernable carbonate overprint.  
Non magnetic. Lower contact 40° LCA.

76.8-85.4: IRREGULARLY BEDDED GRANITE  
DOLomite, WEAKLY PYRITIC WITH THIN SILTY INTERBEDS AND BRECCIAS.  
Fry mottled bedded dolomite with minor thin dyke-like and lens-like fine laminated siltstone beds. Fine dusting of pyrite throughout as well as 2-4% coarse (0.2cm) pyrite. Variably magnetic. Minor finely bedded strongly pyritic (10-20%) laminae. Bedding variable 55-80°.  
81-84m. Bedding well developed @ 45° LCA with increasing pyrobitite down hole.

085

871083

086

SHLMET SYSTEM  
METRIC  
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited  
METALS DIVISION  
**DRILL LOG SHEET**  
CONTINUATION SHEET

|           |             |             |         |
|-----------|-------------|-------------|---------|
| PROJECT   | LUINA       | HOLE NAME   | LD 86-1 |
| LOGGED BY | J. Randell. | TOTAL DEPTH | 342m    |

| DISTANCE FROM COLLAR<br>TO TOP | DISTANCE FROM COLLAR<br>TO BOTTOM | Sn | W   | Rb  | Cu  | Pb | Zn  | Ag  | As  | SAMPLE NO | CORE ANGLE | ROCK TYPE | DIAM | OESC CODE | GRAPHIC LOG | DESCRIPTIVE LOG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------|-----------------------------------|----|-----|-----|-----|----|-----|-----|-----|-----------|------------|-----------|------|-----------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                |                                   |    |     |     |     |    |     |     |     |           |            |           |      |           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 85.4                           |                                   | <3 | <10 | 60  | 40  | <5 | 75  | 0.5 | 2   | 854       | 300        | 008       |      |           |             | 85.4-89.0: INTERBEDDED GREY DOLMITE, CALCITE VEINED SILTSTONE AND CHERT SILTSTONE. Banding variable from 10-50 cms. Chert bands and possible faunal carbonates indicating up hole facies. (grading, cross bedding) Very fine pyrobitic dusting throughout with concentrations in silty laminae. Some secondary coarse pyrite. Increasing chert + silty component down hole.                                                                                                                                                                                                                                         |
| 86.0                           |                                   | <3 | 10  | 45  | 35  | <5 | 65  |     | 2   | 860       | 21         |           |      |           |             | Impure chert with replacement pyrobitic as veins and clasts, graphitic.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 87.0                           |                                   | <3 | <10 | 65  | 45  | 8  | 105 |     | 2   | 870       | 30         |           |      |           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 88.0                           |                                   | <3 | <10 | 55  | 70  | 5  | 105 |     | 13  | 880       | 30         |           |      |           |             | POLISHED THIN SECTION 85.8m.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 89.0                           |                                   | 6  | <10 | 55  | 50  | 6  | 75  |     | 2   | 890       | 30         |           |      |           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 90.0                           |                                   | <3 | <10 | 40  | 30  | <5 | 60  |     | 6   | 900       | 28         |           |      |           |             | Impure chert with replacement pyrobitic as veins and clasts, graphitic.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 91.0                           |                                   | <3 | <10 | 30  | 20  | <5 | 40  |     | 2   | 910       | 18         |           |      |           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 92.0                           |                                   | 4  | <10 | 55  | 40  | 10 | 75  |     | 19  | 920       | 21         |           |      |           |             | Very fine pyrobitic dusting throughout with concentrations in silty laminae. Some secondary coarse pyrite. Increasing chert + silty component down hole.                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 93.0                           |                                   | <3 | <10 | 70  | 55  | 5  | 65  |     | 16  | 930       | 32         |           |      |           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 94.0                           |                                   | <3 | <10 | 80  | 75  | <5 | 90  |     | 17  | 940       | 44         |           |      |           |             | 89.0-106.2: MIXED DOLMITE, CALCAREOUS SILTSTONE AND CHERT. Gradual increase in chert bands. Sharp but irregular contacts 45-80° LCA. Sparsely silty constricted and slow strong truncation of beds both part-dependent and perhaps due to primary slumping. Minor coarse sands embedded with chert. Extremely fine pyrobitic throughout, more coarse granular pyrite. Several grading sets (grading cross bedding) suggest an up hole facies. Prominent bedding throughout generally 50-55° LCA. Dolomite content decreases down hole, sparse bands like more cherty. Several intraformational breccia zones occur. |
| 95.0                           |                                   | <3 | <10 | 35  | 45  | <5 | 45  |     | 13  | 950       | 19         |           |      |           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 96.0                           |                                   | <3 | <10 | 50  | 30  | <5 | 55  |     | 13  | 960       | 25         |           |      |           |             | 106.2-113.0: GREY BANDED CHERT. Irregularly banded (45-60° LCA) non calcareous, non magnetic. No sulphide visible. Minor carbonate veining. Variable composition from black fine grained siltstone to siliceous chert silt and medium tuffaceous silt. Rare graded bedding indicate an up hole facies.                                                                                                                                                                                                                                                                                                              |
| 97.0                           |                                   | <3 | 10  | 30  | 25  | <5 | 45  |     | 2   | 970       | 15         |           |      |           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 98.0                           |                                   | <3 | 15  | 45  | 25  | 6  | 60  |     | 2   | 980       | 16         |           |      |           |             | THIN SECTION 111.5m<br>Chert. Radiolarian spherules<br>Graphitic-carbonate veins<br>85% chert, 10% silt, 5% graphitic.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 99.0                           |                                   | <3 | <10 | 85  | 55  | 10 | 65  |     | 2   | 990       | 50         |           |      |           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 100.0                          |                                   | <3 | <10 | 110 | 60  | 15 | 145 |     | 140 | 1000      | 90         |           |      |           |             | 113.0-117.0: POORLY BANDED SILTSTONE<br>Silty nearly siliceous, poorly laminated, uniform grain size. Intraformational contacts.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 101.0                          |                                   | <3 | <10 | 80  | 60  | 35 | 90  |     | 2   | 1010      | 59         |           |      |           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 102.0                          |                                   | 7  | <10 | 55  | 35  | 25 | 60  |     | 2   | 1020      | 33         |           |      |           |             | THIN SECTION 120.6m<br>Red laminated shale.<br>Hematitic, no sulphide, no at location. 90% silt, 4% hematitic, 5% quartz.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 103.0                          |                                   | 3  | <10 | 55  | 35  | 15 | 55  |     | 2   | 1030      | 30         |           |      |           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 104.0                          |                                   | <3 | <10 | 45  | 30  | <5 | 60  |     | 5   | 1040      | 13         |           |      |           |             | 117.0-126.4: RED PURPLE MASSIVE SILTSTONE<br>Generally massive but with minor sections of fine laminated black siltstone, bedding 70-80° LCA. Little disruption to beds, non magnetic.                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 105.0                          |                                   | 4  | <10 | 55  | 100 | 45 | 60  |     | 10  | 1050      | 33         |           |      |           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 106.2                          |                                   | 4  | <10 | 120 | 90  | <5 | 70  |     | 10  | 1062      | 52         |           |      |           |             | 126.4-128.0: GREY GREEN SILICEOUS CARBONATE VEINED SILTSTONE<br>Disrupted bedding, nodular carbonaceous veining, very fine pyrobitic and rare blubby type. Rare galena blbs, variably magnetic and siliceous.                                                                                                                                                                                                                                                                                                                                                                                                       |
| 107.0                          |                                   | 8  | <10 | 95  | 170 | 65 | 125 |     | 5   | 1070      |            |           |      |           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 108.0                          |                                   | 5  | <10 | 90  | 60  | 5  | 85  |     | 2   | 1080      |            |           |      |           |             | 113.0-117.0: POORLY BANDED SILTSTONE<br>Silty nearly siliceous, poorly laminated, uniform grain size. Intraformational contacts.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 111.0                          |                                   | 5  | <10 | 85  | 40  | 15 | 80  |     | 2   | 1110      |            |           |      |           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 113.0                          |                                   | 6  | <10 | 370 | 115 | <5 | 105 |     | 2   | 1130      |            |           |      |           |             | 117.0-126.4: RED PURPLE MASSIVE SILTSTONE<br>Generally massive but with minor sections of fine laminated black siltstone, bedding 70-80° LCA. Little disruption to beds, non magnetic.                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 115.0                          |                                   | 9  | <10 | 200 | 40  | <5 | 140 |     | 2   | 1150      |            |           |      |           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 117.0                          |                                   | 9  | <10 | 220 | 15  | <5 | 125 |     | 2   | 1170      |            |           |      |           |             | 126.4-128.0: GREY GREEN SILICEOUS CARBONATE VEINED SILTSTONE<br>Disrupted bedding, nodular carbonaceous veining, very fine pyrobitic and rare blubby type. Rare galena blbs, variably magnetic and siliceous.                                                                                                                                                                                                                                                                                                                                                                                                       |
| 119.0                          |                                   | 10 | <10 | 210 | 10  | 7  | 120 |     | 2   | 1190      |            |           |      |           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 121.0                          |                                   | 7  | <10 | 220 | 10  | <5 | 105 |     | 2   | 1210      |            |           |      |           |             | 113.0-117.0: POORLY BANDED SILTSTONE<br>Silty nearly siliceous, poorly laminated, uniform grain size. Intraformational contacts.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 123.0                          |                                   | 8  | 10  | 210 | 90  | 10 | 120 |     | 2   | 1230      |            |           |      |           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 125.0                          |                                   | 9  | <10 | 190 | 55  | 6  | 125 |     | 2   | 1250      |            |           |      |           |             | 117.0-126.4: RED PURPLE MASSIVE SILTSTONE<br>Generally massive but with minor sections of fine laminated black siltstone, bedding 70-80° LCA. Little disruption to beds, non magnetic.                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 126.4                          |                                   | 4  | 10  | 85  | 220 | 30 | 165 |     | 2   | 1264      |            |           |      |           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 127.0                          | 128.0                             | 4  | <10 | 130 | 50  | 35 | 75  | 0.5 | 2   | 1270      |            |           |      |           |             | 126.4-128.0: GREY GREEN SILICEOUS CARBONATE VEINED SILTSTONE<br>Disrupted bedding, nodular carbonaceous veining, very fine pyrobitic and rare blubby type. Rare galena blbs, variably magnetic and siliceous.                                                                                                                                                                                                                                                                                                                                                                                                       |

ASSAY INFORMATION

871084

SHLMET SYSTEM  
METRIC  
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited  
METALS DIVISION  
**DRILL LOG SHEET**

PROJECT LUINA HOLE NAME LD86-1  
LOGGED BY J. Randall TOTAL DEPTH 342m

CONTINUATION SHEET

| ASSAY INFORMATION | DISTANCE FROM COLLAR |           | Sn | W   | Rb  | Cu  | Pb   | Zn  | Ag  | As | SAMPLE NO | CORE ANGLE | ROCK TYPE | DIAM | DESC CODE | GRAPHIC LOG | DESCRIPTIVE LOG                                                                                                                                                                 |
|-------------------|----------------------|-----------|----|-----|-----|-----|------|-----|-----|----|-----------|------------|-----------|------|-----------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   | TO TOP               | TO BOTTOM |    |     |     |     |      |     |     |    |           |            |           |      |           |             |                                                                                                                                                                                 |
| S                 | 128.0                |           | <3 | <10 | 180 | 50  | 10   | 75  | 0.5 | 5  | 1280      |            |           |      |           |             | 128.0 - 129.8 : GREY SILICEOUS SILTSTONE                                                                                                                                        |
| S                 | 129.0                |           | 5  |     | 45  | 55  | <5   | 110 |     | <2 | 1290      |            |           |      |           |             | generally massive, rarely laminated (bedding disrupted 75° LCA)                                                                                                                 |
| S                 | 129.8                |           | <3 |     | 45  | 25  | 5    | 65  |     | <2 | 1298      |            |           |      |           |             | Rare pyrite blebs.                                                                                                                                                              |
| S                 | 130.6                |           | 7  |     | 15  | 40  | <5   | 90  |     | 6  | 1306      |            |           |      |           |             | 129.8 - 131.2 : GREEN SILICEOUS CHERT                                                                                                                                           |
| S                 | 131.2                |           | 3  |     | 40  | 330 | <5   | 125 |     | 3  | 1312      |            |           |      |           |             | SILTSTONE.                                                                                                                                                                      |
| F                 | 133.0                |           | 7  |     | 25  | 325 | <5   | 115 |     | <2 | 1330      |            |           |      |           |             | Very finely laminated with minor coarse beds. Strongly fractured.                                                                                                               |
| F                 | 135.0                |           | 8  |     | 40  | 300 | <5   | 110 |     | <2 | 1350      |            |           |      |           |             | carbonate veined. Becoming more cherty towards bottom. Lower contact 50° LCA.                                                                                                   |
| F                 | 137.2                |           | <3 |     | 25  | 220 | 20   | 95  |     | <2 | 1372      |            |           |      |           |             | 131.2 - 137.2 : FINE GRAINED BASALT.                                                                                                                                            |
| F                 | 139.0                |           | 6  |     | 15  | 205 | <5   | 95  |     | <2 | 1390      |            |           |      |           |             | Weakly vesicular & strongly crackle veined with minor carbonate veinlets.                                                                                                       |
| F                 | 141.0                |           | 3  |     | 20  | 215 | <5   | 95  |     | <2 | 1410      |            |           |      |           |             | Rare pyroclastic blebs. Weakly magnetic. Lower contact irregular to LCA.                                                                                                        |
| F                 | 143.0                |           | <3 |     | 35  | 205 | 20   | 90  |     | <2 | 1430      |            |           |      |           |             | 137.2 - 137.6 : FLOW TOP TUFFACEOUS BRECCIA                                                                                                                                     |
| F                 | 145.0                |           | 3  |     | 35  | 225 | <5   | 85  |     | <2 | 1450      |            |           |      |           |             | Poorly and irregularly banded.                                                                                                                                                  |
| F                 | 147.0                |           | 4  |     | 40  | 195 | <5   | 75  |     | <2 | 1470      |            |           |      |           |             | grey green buffaceous dolerite with angular pyroclastic fragments.                                                                                                              |
| F                 | 149.0                |           | <3 |     | 35  | 195 | <5   | 85  |     | <2 | 1490      |            |           |      |           |             | 137.6 - 137.7 : FINE GRAINED BASALT                                                                                                                                             |
| S                 | 151.5                |           | <3 |     | 25  | 160 | <5   | 95  |     | 2  | 1515      |            |           |      |           |             | generally massive but strongly crackle veined and carbonated veinlets. Minor vesicular portions.                                                                                |
| S                 | 152.5                |           | 9  |     | 25  | 225 | <5   | 95  |     | 3  | 1525      |            |           |      |           |             | 151.5 - 153.3 : Increasing bleaching chlorite clots and carbonate crackle veining. Trace pyrite. Lower contact @ 40° LCA.                                                       |
| S                 | 153.3                |           | 6  | <10 | 10  | 245 | <5   | 65  |     | <2 | 1533      |            |           |      |           |             | 153.3 - 155.7 : VERY FINE POORLY BEDDED TUFF                                                                                                                                    |
| S                 | 154.0                |           | <3 |     | 10  | 20  | 7.25 | <5  | 85  | <2 | 1540      |            |           |      |           |             | Minor laminated (90° LCA) but generally massive very fine tuff with chloritic matrix.                                                                                           |
| S                 | 155.0                |           | 3  | <10 | 40  | 100 | <5   | 100 |     | <2 | 1550      |            |           |      |           |             | 155.7 - 156.5 : BASALTIC TUFFACEOUS TURBIDITE                                                                                                                                   |
| S                 | 155.7                |           | 4  |     | 50  | 340 | <5   | 100 |     | <2 | 1557      |            |           |      |           |             | Strongly carbonated veined at 90° angular to subrounded basaltic fragments up to 1.2cm in roughly bedded chloritic-siliceous bed. Vague layering @ 70° LCA. Rare blebby pyrite. |
| S                 | 156.5                |           | <3 |     | 55  | 105 | 25   | 95  |     | <2 | 1565      |            |           |      |           |             | 156.5 - 158.4 : WELL BEDDED FINE MARL                                                                                                                                           |
| S                 | 157.5                |           | 6  |     | 40  | 120 | <5   | 105 |     | <2 | 1575      |            |           |      |           |             | TUFF                                                                                                                                                                            |
| S                 | 158.4                |           | 3  |     | 40  | 115 | <5   | 125 |     | <2 | 1584      |            |           |      |           |             | Finely laminated (65-70° LCA) and trace very fine pyrite dusting.                                                                                                               |
| F                 | 160.0                |           | <3 |     | 35  | 65  | <5   | 130 |     | 2  | 1600      |            |           |      |           |             | 158.4 - 176.7 : FINE ANGYDALOIDAL BASALT.                                                                                                                                       |
| F                 | 162.0                |           | 5  |     | 20  | 40  | <5   | 130 |     | <2 | 1620      |            |           |      |           |             | Fine grained massive chlorite crackle veined, weakly magnetic.                                                                                                                  |
| F                 | 164.0                |           | <3 |     | 15  | 40  | <5   | 125 |     |    | 1640      |            |           |      |           |             | 158.9 - 159.1 : Brecciated fine mafic tuff. Becoming slightly coarser down hole, minor pyroclastic blebs irregularly distributed.                                               |
| F                 | 166.0                |           | <3 |     | 25  | 40  | <5   | 140 |     |    | 1660      |            |           |      |           |             | From 168.0, tuff becomes increasingly angydaloidal (chlorite and pyroclastic blebs).                                                                                            |
| F                 | 168.0                |           | <3 |     | 25  | 40  | <5   | 125 |     |    | 1680      |            |           |      |           |             |                                                                                                                                                                                 |
| F                 | 170.0                |           | <3 |     | 15  | 55  | <5   | 110 |     |    | 1700      |            |           |      |           |             |                                                                                                                                                                                 |
| F                 | 172.0                |           | <3 |     | 15  | 45  | <5   | 125 |     |    | 1720      |            |           |      |           |             |                                                                                                                                                                                 |
| F                 | 174.0                | 176.7     | 10 | <10 | 15  | 50  | 25   | 110 | 0.5 | <2 | 1740      |            |           |      |           |             |                                                                                                                                                                                 |

THIN SECTION 130.0  
Laminated chert with dolomite/jankovite layers. Reddish siliceous bands. No graphite or sulphide

THIN SECTION 156.0m  
Chloritic carbonated basaltic buffaceous turbidite fragments of amygdaloidal basalt, trace alb. in pyrite.

THIN SECTION 169.5m  
Chlorite amygdaloidal basalt. Thakiriite composition.

037

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088

SHLMET SYSTEM  
METRIC  
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited  
METALS DIVISION

DRILL LOG SHEET  
CONTINUATION SHEET

PROJECT LUINA HOLE NAME LD 86-1  
LOGGED BY J. Randall TOTAL DEPTH 342m

| F | DISTANCE FROM COLLAR |           | Sn | W   | Rb | Cw  | Pb | Zn     | As | SAMPLE NO | CORE ANGLE | ROCK TYPE | DIAM | DESC CODE | GRAPHIC LOG | DESCRIPTIVE LOG                                                                                                                                                                                                                                                                                                                                                |
|---|----------------------|-----------|----|-----|----|-----|----|--------|----|-----------|------------|-----------|------|-----------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | TO TOP               | TO BOTTOM |    |     |    |     |    |        |    |           |            |           |      |           |             |                                                                                                                                                                                                                                                                                                                                                                |
| F | 176.7                |           | 3  | <10 | 7  | 135 | <5 | 65 0.5 | <2 | 1767      |            |           |      |           |             | 176.7-178.5 : POORLY BEDDED TUFFACEOUS<br>CHERT<br>Very fine grained massive<br>becoming more cherty from 178m<br>Strongly fractured chert towards bottom<br>with vague banding (45° LCA). Trace<br>irregular blocky pyroclastic. Fine carbonate<br>veining throughout. Lower contact 45° LCA.                                                                 |
| F | 178.5                |           | 3  | <10 | 15 | 175 | <5 | 80 0.5 | <2 | 1785      |            |           |      |           |             | 178.5-193.3 : FINE TO MEDIUM GRAINED BASALT<br>Generally massive, moderately<br>chloritic, crackle veined and some calc-<br>onate veining. Minor blocky pyroclastic<br>irregularly scattered throughout. Lower<br>contact @ 50° LCA.                                                                                                                           |
| F | 180.0                |           | <3 | 10  | 25 | 190 | <5 | 95 0.5 | <2 | 1800      |            |           |      |           |             | 193.3-199.3 : GREY GREEN SILICEOUS MAFIC<br>TUFF<br>Very fine grained massive<br>but strongly chloritic and crackle veined.<br>Vague bedding in places (45° LCA). Some<br>grading from 0.3m to very fine sand. Up<br>hole facies improved. Minor irregular<br>blebs of pyroclastic, pyrite and the Zn<br>and lead peg at 198.5m. Lower<br>contact gradational. |
| F | 182.0                |           | <3 | <10 | 20 | 170 | <5 | 80 0.5 | <2 | 1820      |            |           |      |           |             | 199.3-211.7 : MEDIUM GRAINED BASALT<br>Fine to medium grained<br>crackle veined with some carbonate<br>veinlets.                                                                                                                                                                                                                                               |
| F | 184.0                | 186.0     | <3 | <10 | 30 | 170 | <5 | 75 0.5 | <2 | 1840      |            |           |      |           |             | 211.7-212.9 : GREY GREEN SILICEOUS<br>POORLY LAMINATED TUFF.<br>Very fine grained, minor<br>lamination (50-55° LCA). Lower contact<br>brecciated.                                                                                                                                                                                                              |
|   |                      |           |    |     |    |     |    |        |    |           |            |           |      |           |             | 212.9-215.4 : MEDIUM GRAINED POORLY<br>BEDDED TUFF WITH BASALT<br>POLYMIC EPICLASTIC.<br>Generally uniform grain size<br>with minor carbonatic veining. Well<br>rounded epiclastic unit with grey cherty<br>pebbles.                                                                                                                                           |
|   |                      |           |    |     |    |     |    |        |    |           |            |           |      |           |             | 215.4-221.5 : NON BEDDED EPICLASTIC<br>Medium grained with<br>subrounded chert fragments in fine basaltic<br>matrix. No sulphide, weakly magnetic.<br>Minor carbonate-chlorite veins at 217m.<br>220.5-221.5. Disrupted fine cherty<br>sediment with medium grained upper<br>epiclastic. Moderate carbonate-chlorite<br>veining.                               |

THIN SECTION 220.0m  
Reworked vitric tuff.  
Originally sandy with worm  
accumulation of vitric sand  
Trace Fe sulphide.

ASSAY INFORMATION

871086

SHLMEY SYSTEM  
METRIC  
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited  
METALS DIVISION  
**DRILL LOG SHEET**  
CONTINUATION SHEET

PROJECT *LUINA* HOLE NAME *LD 86-1*  
LOGGED BY *J. Randell* TOTAL DEPTH *342 m*

| DISTANCE FROM COLLAR | TO TOP |   | TO BOTTOM |   | SAMPLE NO | CORE ANGLE | ROCK TYPE | DIAM | DESC CODE | GRAPHIC LOG | DESCRIPTIVE LOG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------|--------|---|-----------|---|-----------|------------|-----------|------|-----------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      | 2      | 3 | 5         | 6 |           |            |           |      |           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                      |        |   |           |   |           |            |           |      |           |             | <p>221.5 - 235.0: FINE GRAINED BASALT<br/>Weakly carbonatic chlorite<br/>veined, minor carbonatic filled<br/>amygdalae.</p> <p>230.0 - 232.0. Increasing fracturing,<br/>chlorite infilling. Disrupted coarse<br/>epilotic bands towards bottom,<br/>composed of rounded grey cherty pebbles<br/>in a chloritic matrix.</p> <p>235.0 - 237.7: MIXED BASALT AND<br/>CHERTY INTERFLOW SEDIMENT.<br/>Upper contact 45° Lower<br/>contact 60° LCA. Strongly fractured chlorite<br/>infilled chert sediment with irregular<br/>distribution of medium grained massive<br/>basalt. Trace pyrite blebs.</p> <p>237.7 - 247.2: MASSIVE FINE GRAINED BASALT<br/>Fine to medium grained with<br/>minor chlorite and carbonate veinlets.</p> <p>241.3 - 242.5. Trace blobby pyrobitic in<br/>basalt. Zones of carbonated - chloritic<br/>cherty brecciated basalt with 3-5%<br/>disseminated pyrobitic.</p> <p>247.2 - 250.1: MIXED FINE CHERTY AND<br/>TUFFACEOUS SEDIMENT.<br/>Strongly fractured and<br/>moderately carbonatic quartz veined/<br/>trace blobby pyrobitic. Minor zones<br/>of basaltic flow often brecciated.</p> <p>250.1 - 258.0: CRACKLE VEINED VESICULAR<br/>BASALT.<br/>Fine grained chloritic crackle<br/>veined basalt with irregular zones<br/>of fine chlorite - quartz filled vesicles.</p> <p>258.0 - 274.5: POORLY BEDDED TUFFACEOUS<br/>AND CHERTY INTERFLOW<br/>SEDIMENTS.<br/>Upper siliceous sediments<br/>with rare pyrobitic growth blebs, grades<br/>into fine non laminated tufaceous<br/>sediment with minor coarse diffusely<br/>graded beds. (45-50° LCA)<br/>From 263m, strongly siliceous sediment.<br/>Minor pyrobitic blebs, variable fine<br/>laminations (45° LCA), minor chlorite<br/>veinlets.</p> <p>267.6 - 270.2. Fine grained non bedded<br/>tufaceous sediment with gradual coar-<br/>sening of grain size down hole.</p> <p>270.2 - 272.0. Strongly siliceous grey cherty<br/>sediment.</p> |

ASSAY INFORMATION

039

871087

SHEMET SYSTEM  
METRIC  
DECIMAL POINTS AS REQUIRED

The Shell Company of Australia Limited  
METALS DIVISION  
**DRILL LOG SHEET**  
CONTINUATION SHEET

|           |             |             |         |
|-----------|-------------|-------------|---------|
| PROJECT   | LUINA       | HOLE NAME   | LD 86-1 |
| LOGGED BY | J. Randall. | TOTAL DEPTH | 342m    |

090

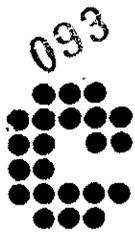
| DISTANCE FROM COLLAR | TO TOP |           | TO BOTTOM |           | SAMPLE NO | CORE ANGLE | ROCK TYPE | DIAM | DESC CODE | GRAPHIC LOG | DESCRIPTIVE LOG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------|--------|-----------|-----------|-----------|-----------|------------|-----------|------|-----------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      | TO TOP | TO BOTTOM | TO TOP    | TO BOTTOM |           |            |           |      |           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                      |        |           |           |           |           |            |           |      |           |             | <p>Sediment, variably laminated (45° LCA)<br/>Moderate chlorite fracture veining.<br/>272.0-274.5. Fine to medium grained<br/>poorly banded tuffaceous sediment.<br/>Moderately epidotized towards bottom<br/>along fractures.<br/>274.5-315.4: FINE GRAINED BASALT.<br/>Massive fine grained, weak<br/>to moderate carbonate veining.<br/>278.0-278.8. Poorly bedded (50° LCA)<br/>siliceous grey green sediment.<br/>291-294. Strongly brecciated and<br/>chlorite veined.<br/>297.4-298. Interflow brecciated sediment.<br/>Coarse banding (30° LCA) and strong carbonate<br/>quartz banding.<br/>298-308. Moderately chlorite crackle<br/>veined.<br/>308-315.4. Moderately vacuolar basalt.<br/>315.4-326.0: FINE GREY TUFFACEOUS<br/>SEDIMENTS, MINOR SILICEOUS.<br/>Fine grained variably bedded<br/>(40-45° LCA). Variable cherty component<br/>and cherty bands throughout. Trace<br/>pyrrhotite laminae.<br/>326.0-329.4: FINE GRAINED BASALT.<br/>Fine grained massive, minor<br/>carbonate veining.<br/>329.4-342.0: MIXED INTERFLOW<br/>SEDIMENT AND BASALT.<br/>Variably siliceous, moderately<br/>banded (40° LCA) in tuffaceous sediment.<br/>Intercalated basaltic bands and flows.<br/><br/>E.O.H. 342m.</p> |

ASSAY INFORMATION

871088

APPENDIX 4

Falls Creek  
Rock Chip Sampling, Auger Sampling



845  
871090

# COMLABS SERVICES PTY. LTD.

305 South Road, Mile End South, South Australia 5031 Telephone (08) 435722 Telex LABCOM AA89323 Facsimile No. (08) 234 0321



NATA REGISTERED No 1526

COM870284

OUR REF.

YOUR REF: 11602/LJ10/JPR

Mr. J. Randell  
The Shell Co. of Aust. Ltd.  
30 Mersey Main Rd  
Spreyton  
DEVONPORT  
TAS 7310

February 23, 1987

Dear Jeff

RE: JOB COM870284

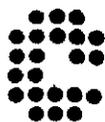
Enclosed are the assays for the samples delivered to our  
Laboratory on February 17, 1987

Yours Sincerely,  
COMLABS SERVICES PTY LTD

per :

Report Length 2 pages

094



COMLABS SERVICES PTY. LTD.



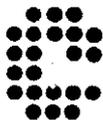
871091  
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## ANALYTICAL REPORT

JOB COM870284

O/N : 11602/LJ10/JPR

| SAMPLE | Cu   | Zn   | Ag   | Mo   | Co   | Fe            | Mn            |
|--------|------|------|------|------|------|---------------|---------------|
| 13127  | 100  | 310  | 7    | <4   | 80   | 5.60          | 1.46%         |
| 13128  | 55   | 200  | 2    | <4   | 38   | 6.65          | 1650          |
| 13129  | 75   | 220  | 2    | 18   | 175  | 4.25          | 8450          |
| 13130  | 110  | 125  | 2    | 24   | 145  | 3.95          | 7250          |
| 13131  | 46   | 230  | 1    | 4    | 24   | 5.90          | 770           |
| 13132  | 38   | 400  | 2    | 6    | 22   | 6.40          | 3300          |
| 13133  | 150  | 1150 | 18   | <4   | 60   | 13.2          | 1.76%         |
| 13134  | 175  | 180  | 3    | 6    | 340  | 5.55          | 9900          |
| 13135  | 110  | 60   | 2    | <4   | 165  | 10.9          | 3050          |
| 13136  | 32   | 22   | 3    | 6    | 22   | 1.06          | 95            |
| 13137  | 16   | 28   | 1    | <4   | 12   | 3.15          | 500           |
| 13138  | 18   | 90   | 1    | 4    | 14   | 4.40          | 840           |
| 13139  | 16   | 44   | 1    | 4    | 14   | 4.50          | 520           |
| 13140  | 22   | 60   | 1    | <4   | 22   | 4.25          | 1950          |
| 13141  | 18   | 55   | 1    | 4    | 14   | 2.60          | 1000          |
| UNITS  | ppm  | ppm  | ppm  | ppm  | ppm  | %             | ppm           |
| SCHEME | AAS1 | AAS1 | AAS3 | AAS3 | AAS1 | AAS2<br>AAS2A | AAS2<br>AAS2A |



095

COMLABS SERVICES PTY. LTD.

- 2 -

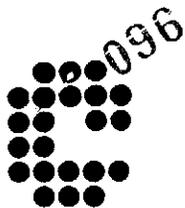


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ANALYTICAL REPORT

JOB COM870284  
O/N : 11602/LJ10/JPR

| SAMPLE | As   | Pb   | Sn   | W    | Rb   |
|--------|------|------|------|------|------|
| 13127  | 410  | 200  | 10   | 15   | 290  |
| 13128  | 38   | 42   | 8    | <10  | 260  |
| 13129  | 75   | 640  | 34   | 10   | 135  |
| 13130  | 75   | 680  | 30   | <10  | 110  |
| 13131  | 22   | 90   | 6    | 10   | 190  |
| 13132  | 38   | 740  | 42   | <10  | 120  |
| 13133  | 400  | 1900 | 300  | 10   | 220  |
| 13134  | 48   | 380  | 16   | <10  | 70   |
| 13135  | 60   | 70   | 6    | <10  | 125  |
| 13136  | 75   | 380  | 6    | 20   | 150  |
| 13137  | 8    | 26   | 4    | <10  | 105  |
| 13138  | 10   | 90   | 4    | <10  | 120  |
| 13139  | 10   | 70   | 8    | <10  | 125  |
| 13140  | 8    | 16   | <4   | <10  | 140  |
| 13141  | 8    | 22   | 6    | <10  | 110  |
| UNITS  | ppm  | ppm  | ppm  | ppm  | ppm  |
| SCHEME | XRF1 | XRF1 | XRF1 | XRF1 | XRF1 |



871093 845

# COMLABS SERVICES PTY. LTD.

305 South Road, Mile End South, South Australia 5031 Telephone (08) 43 5722 Telex LABCOM AA89323 Facsimile No. (08) 234 0321



NATA REGISTERED No. 1526

OUR REF. COM870541

YOUR REF. 11603/LJ10/JPR

Mr. J. Randell,  
The Shell Co. of Aust. Ltd.  
30 Mersey Main Rd  
Spreyton  
DEVONPORT  
TAS 7310

March 30, 1987

Dear Jeff,

RE: JOB COM870541

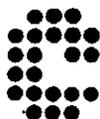
Enclosed are the assays for the samples delivered to our laboratory on March 17, 1987

Yours Sincerely,  
COMLABS SERVICES PTY LTD

per :

Report Length 7 pages

097



COMLABS SERVICES PTY. LTD.

- 2 -



871094

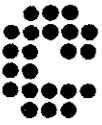
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## ANALYTICAL REPORT

JOB COM870541

O/N : 11603/LJ10/JPR

| SAMPLE    | Cu   | Zn   | Ag   |
|-----------|------|------|------|
| RA4- 1    | 60   | 140  | 1    |
| RA4- 2    | 55   | 105  | 1    |
| RA4- 3    | 85   | 260  | 2    |
| RA4- 4    | 65   | 135  | 1    |
| RA4- 5    | 44   | 38   | 1    |
| RA4- 6    | 40   | 46   | 1    |
| RA4- 7    | 46   | 38   | 1    |
| RA4- 8    | 60   | 26   | 1    |
| RA4- 9    | 46   | 22   | 1    |
| RA4-10    | 60   | 16   | 1    |
| RA4-11    | 55   | 38   | 1    |
| RA4-12    | 28   | 44   | 1    |
| RA4-13    | 65   | 55   | 1    |
| RA4-14    | 32   | 28   | 1    |
| RA4-15    | 80   | 65   | 1    |
| RA4-16    | 95   | 70   | 1    |
| RA4-17    | LNR  | LNR  | LNR  |
| RA4-18    | LNR  | LNR  | LNR  |
| RA4-19    | LNR  | LNR  | LNR  |
| RA4-20    | LNR  | LNR  | LNR  |
| RA2 5050E | 65   | 95   | 1    |
| RA2 5075E | 40   | 125  | 1    |
| RA2 5100E | 95   | 60   | 1    |
| RA2 5125E | 220  | 95   | 2    |
| RA2 5150E | 145  | 125  | 2    |
| UNITS     | ppm  | ppm  | ppm  |
| SCHEME    | AAS1 | AAS1 | AAS3 |



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COMLABS SERVICES PTY. LTD.

- 3 -



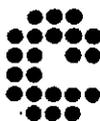
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## ANALYTICAL REPORT

JOB COM870541

O/N : 11603/LJ10/JPR

| SAMPLE    | Cu   | Zn   | Ag   |
|-----------|------|------|------|
| RA2 5175E | 70   | 80   | 1    |
| RA2 5200E | 60   | 90   | 1    |
| RA2 5225E | 18   | 32   | <1   |
| RA2 5250E | 18   | 26   | 1    |
| RA2 5275E | 14   | 20   | 1    |
| RA2 5300E | 9    | 24   | 1    |
| RA5 5050E | 55   | 60   | 1    |
| RA5 5075E | 36   | 36   | 1    |
| RA5 5100E | 50   | 50   | 1    |
| RA5 5125E | 40   | 36   | 1    |
| RA5 5150E | 48   | 42   | 1    |
| RA5 5175E | 85   | 46   | 1    |
| RA5 5200E | 110  | 160  | 2    |
| RA5 5225E | 16   | 28   | 1    |
| RA5 5250E | 10   | 18   | 1    |
| RA5 5275E | 8    | 14   | 1    |
| RA5 5300E | 16   | 9    | <1   |
| RA8 5050E | 24   | 450  | 3    |
| RA8 5075E | 32   | 135  | 2    |
| RA8 5100E | 42   | 90   | 2    |
| RA8 5125E | 40   | 42   | 1    |
| RA8 5150E | 18   | 46   | 1    |
| RA8 5175E | 42   | 75   | 1    |
| RA8 5200E | 80   | 60   | 1    |
| RA8 5225E | 12   | 55   | 1    |
| UNITS     | ppm  | ppm  | ppm  |
| SCHEME    | AAS1 | AAS1 | AAS3 |



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COMLABS SERVICES PTY. LTD.

- 4 -



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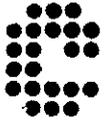
871096

ANALYTICAL REPORT

JOB COM870541

O/N : 11603/LJ10/JPR

| SAMPLE    | Cu   | Zn   | Ag   |
|-----------|------|------|------|
| RA8 5250E | 46   | 50   | 1    |
| RA8 5275E | 22   | 28   | 1    |
| RA8 5300E | 12   | 16   | 1    |
| 13142     | 55   | 1150 | 8    |
| 13143     | 100  | 840  | 4    |
| RA5 5000E | 30   | 65   | 1    |
| RA5 5025E | 30   | 125  | 1    |
| RA7 5050E | 18   | 250  | <1   |
| RA7 5075E | 28   | 180  | 3    |
| RA7 5100E | 50   | 46   | 2    |
| RA7 5125E | 26   | 38   | 1    |
| RA7 5150E | 85   | 340  | 2    |
| RA7 5175E | 390  | 175  | 2    |
| RA7 5200E | 130  | 46   | 1    |
| RA7 5225E | 16   | 26   | 1    |
| RA7 5250E | 16   | 24   | 1    |
| RA7 5275E | 28   | 16   | 1    |
| RA7 5300E | 7    | 14   | <1   |
| UNITS     | ppm  | ppm  | ppm  |
| SCHEME    | AAS1 | AAS1 | AAS3 |

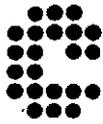


## ANALYTICAL REPORT

JOB COM870541

O/N : 11603/LJ10/JPR

| SAMPLE    | Pb   | As   | Sn   | W    | Rb   |
|-----------|------|------|------|------|------|
| RA4- 1    | 95   | 40   | 4    | 10   | 210  |
| RA4- 2    | 90   | 22   | <4   | <10  | 200  |
| RA4- 3    | 70   | 20   | 8    | <10  | 130  |
| RA4- 4    | 500  | 75   | 20   | 15   | 270  |
| RA4- 5    | 120  | 115  | 6    | 15   | 150  |
| RA4- 6    | 16   | 14   | <4   | <10  | 150  |
| RA4- 7    | 60   | 60   | 8    | <10  | 110  |
| RA4- 8    | 65   | 60   | 4    | <10  | 95   |
| RA4- 9    | 14   | 36   | 4    | <10  | 75   |
| RA4-10    | 30   | 34   | 10   | <10  | 105  |
| RA4-11    | 65   | 32   | 4    | <10  | 85   |
| RA4-12    | 55   | 8    | 4    | <10  | 105  |
| RA4-13    | 36   | 20   | 6    | <10  | 120  |
| RA4-14    | 46   | 18   | 8    | <10  | 85   |
| RA4-15    | 42   | 22   | 18   | <10  | 60   |
| RA4-16    | 22   | 20   | <4   | <10  | 55   |
| RA4-17    | LNR  | LNR  | LNR  | LNR  | LNR  |
| RA4-18    | LNR  | LNR  | LNR  | LNR  | LNR  |
| RA4-19    | LNR  | LNR  | LNR  | LNR  | LNR  |
| RA4-20    | LNR  | LNR  | LNR  | LNR  | LNR  |
| RA2 5050E | 65   | 10   | 8    | <10  | 200  |
| RA2 5075E | 125  | 44   | 12   | 35   | 220  |
| RA2 5100E | 38   | 20   | 12   | <10  | 130  |
| RA2 5125E | 34   | 32   | <4   | <10  | 95   |
| RA2 5150E | 48   | 30   | 6    | <10  | 150  |
| UNITS     | ppm  | ppm  | ppm  | ppm  | ppm  |
| SCHEME    | XRF1 | XRF1 | XRF1 | XRF1 | XRF1 |



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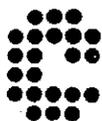
871098

ANALYTICAL REPORT

JOB COM870541

O/N : 11603/LJ10/JPR

| SAMPLE    | Pb   | As   | Sn   | W    | Rb   |
|-----------|------|------|------|------|------|
| RA2 5175E | 20   | 8    | 6    | 10   | 260  |
| RA2 5200E | 20   | 26   | <4   | <10  | 210  |
| RA2 5225E | 18   | 20   | 6    | <10  | 95   |
| RA2 5250E | 230  | 125  | 14   | <10  | 120  |
| RA2 5275E | 50   | 28   | 8    | <10  | 105  |
| RA2 5300E | 55   | 32   | 8    | <10  | 160  |
| RA5 5050E | 60   | 36   | 6    | <10  | 140  |
| RA5 5075E | 50   | 48   | 12   | 10   | 115  |
| RA5 5100E | 34   | 14   | <4   | 10   | 200  |
| RA5 5125E | 34   | 32   | 10   | 10   | 140  |
| RA5 5150E | 32   | 18   | 12   | <10  | 145  |
| RA5 5175E | 50   | 24   | <4   | <10  | 120  |
| RA5 5200E | 110  | 80   | 8    | <10  | 95   |
| RA5 5225E | 80   | 18   | 4    | <10  | 125  |
| RA5 5250E | 32   | 12   | <4   | <10  | 155  |
| RA5 5275E | 28   | 5    | 6    | <10  | 70   |
| RA5 5300E | 55   | 22   | 8    | <10  | 95   |
| RA8 5050E | 550  | 36   | 175  | 10   | 320  |
| RA8 5075E | 270  | 85   | 14   | <10  | 175  |
| RA8 5100E | 175  | 220  | 16   | <10  | 145  |
| RA8 5125E | 16   | 12   | 4    | <10  | 135  |
| RA8 5150E | 10   | 8    | <4   | <10  | 85   |
| RA8 5175E | 38   | 70   | <4   | 10   | 70   |
| RA8 5200E | 48   | 14   | <4   | <10  | 160  |
| RA8 5225E | 26   | 12   | 8    | <10  | 125  |
| UNITS     | ppm  | ppm  | ppm  | ppm  | ppm  |
| SCHEME    | XRF1 | XRF1 | XRF1 | XRF1 | XRF1 |



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871099  
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ANALYTICAL REPORT

JOB COM870541

O/N : 11603/LJ10/JPR

| SAMPLE    | Pb   | As   | Sn   | W    | Rb   |
|-----------|------|------|------|------|------|
| RA8 5250E | 40   | 18   | 10   | <10  | 85   |
| RA8 5275E | 32   | 14   | 10   | 10   | 80   |
| RA8 5300E | 6    | 8    | 6    | <10  | 60   |
| 13142     | 4850 | 1500 | 95   | <10  | 450  |
| 13143     | 270  | 155  | 115  | <10  | 210  |
| RA5 5000E | 44   | 7    | 6    | 35   | 300  |
| RA5 5025E | 70   | 34   | 12   | <10  | 220  |
| RA7 5050E | 24   | 6    | 6    | <10  | 165  |
| RA7 5075E | 280  | 50   | 20   | <10  | 170  |
| RA7 5100E | 95   | 44   | 4    | <10  | 95   |
| RA7 5125E | 28   | 8    | 8    | <10  | 185  |
| RA7 5150E | 6    | 14   | <4   | <10  | 20   |
| RA7 5175E | 24   | 18   | 4    | <10  | 28   |
| RA7 5200E | 34   | 16   | 6    | <10  | 125  |
| RA7 5225E | 55   | 14   | 6    | <10  | 200  |
| RA7 5250E | 110  | 22   | <4   | 10   | 135  |
| RA7 5275E | 60   | 18   | 6    | <10  | 115  |
| RA7 5300E | 22   | 6    | 8    | 10   | 55   |
| UNITS     | ppm  | ppm  | ppm  | ppm  | ppm  |
| SCHEME    | XRF1 | XRF1 | XRF1 | XRF1 | XRF1 |

APPENDIX 5

Falls Creek  
Coastal Channel Sampling

871101

COMLABS SERVICES PTY. LTD.

305 South Road, Mile End South, South Australia 5031 Telephone (08) 435722 Telex LABCOM AA89323 Facsimile No (08) 234 0321



NATA REGISTERED No 1526

OUR REF: COM871503

YOUR REF: 11611/LJ10/JPR

Mr. J. Randell,  
The Shell Co. of Aust. Ltd.  
30 Mersey Main Rd  
Spreyton  
DEVONPORT  
TAS 7310

July 17, 1987

Dear Jeff,

RE: JOB COM871503

Enclosed are the assays for the samples delivered to our laboratory on July 2, 1987

Yours Sincerely,  
COMLABS SERVICES PTY LTD

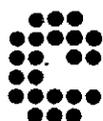
per :

c.c.: Shell - Devonport

No. of copies : 1

Report Length 6 pages

FC1 = Costan RA4.  
FC2 = " 4070N.  
FC3 = " RA2.



COMLABS SERVICES PTY. LTD.



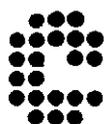
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## ANALYTICAL REPORT

JOB COM871503

O/N : 11611/LJ10/JPR

| SAMPLE   | Cu   | Zn   | Ag   | Au    |
|----------|------|------|------|-------|
| FC1 0    | 55   | 32   | 1    | <0.01 |
| FC1 1.5  | 40   | 28   | 1    | 0.02  |
| FC1 4.5  | 70   | 16   | 1    | <0.01 |
| FC1 7.0  | 44   | 20   | 1    | <0.01 |
| FC1 9.2  | 65   | 100  | 2    | <0.01 |
| FC1 11.2 | 70   | 105  | 2    | <0.01 |
| FC1 13.1 | 90   | 230  | 2    | <0.01 |
| FC1 13.8 | 22   | 38   | 1    | <0.01 |
| FC1 15.8 | 20   | 70   | 1    | <0.01 |
| FC1 16.5 | 44   | 480  | 2    | <0.01 |
| FC1 18.5 | 46   | 310  | 3    | <0.01 |
| FC1 20.0 | 30   | 165  | 2    | 0.02  |
| FC1 21.5 | 38   | 165  | 1    | 0.04  |
| FC1 23.5 | 65   | 120  | 2    | <0.01 |
| FC1 25.0 | 40   | 40   | 1    | <0.01 |
| FC1 27.0 | 36   | 65   | 2    | <0.01 |
| FC1 29.0 | 44   | 125  | 2    | <0.01 |
| FC1 31.0 | 46   | 110  | 1    | <0.01 |
| FC1 32.4 | 105  | 140  | 1    | <0.01 |
| FC1 33.0 | 55   | 70   | 2    | <0.01 |
| FC1 33.8 | 80   | 130  | 1    | <0.01 |
| FC1 35.8 | 60   | 115  | 1    | <0.01 |
| FC1 40.0 | 70   | 85   | 1    | <0.01 |
| FC2 0    | 70   | 130  | 2    | <0.01 |
| FC2 2    | 85   | 165  | 2    | 0.02  |
| UNITS    | ppm  | ppm  | ppm  | ppm   |
| SCHEME   | AAS1 | AAS1 | AAS3 | FAS1  |



COMLABS SERVICES PTY. LTD.

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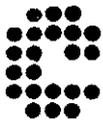
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## ANALYTICAL REPORT

JOB COM871503

O/N : 11611/LJ10/JPR

| SAMPLE   | Cu   | Zn   | Ag   | Au    |
|----------|------|------|------|-------|
| FC2 4    | 70   | 120  | 1    | 0.02  |
| FC2 5.6  | 85   | 130  | 1    | <0.01 |
| FC2 7.6  | 55   | 70   | 1    | <0.01 |
| FC2 9.6  | 70   | 90   | 1    | <0.01 |
| FC2 11   | 90   | 135  | 1    | <0.01 |
| FC2 12.4 | 55   | 140  | 1    | <0.01 |
| FC2 14.4 | 95   | 120  | 1    | <0.01 |
| FC2 16.0 | 60   | 105  | 1    | <0.01 |
| FC2 17.5 | 95   | 130  | 1    | <0.01 |
| FC2 18.9 | 75   | 95   | 1    | 0.03  |
| FC2 20.9 | 90   | 200  | 2    | <0.01 |
| FC2 22.7 | 65   | 115  | 2    | <0.01 |
| FC2 24.7 | 50   | 70   | 2    | <0.01 |
| FC2 26.5 | 34   | 95   | 1    | <0.01 |
| FC2 27.7 | 36   | 65   | 2    | <0.01 |
| FC2 29.4 | 230  | 1800 | 12   | <0.01 |
| FC2 30.6 | 65   | 185  | 4    | 0.02  |
| FC2 32.6 | 30   | 200  | 2    | <0.01 |
| FC2 34.6 | 46   | 105  | 2    | <0.01 |
| FC2 36.6 | 65   | 135  | 3    | <0.01 |
| FC2 38.8 | 28   | 70   | 1    | 0.02  |
| FC2 40.8 | 20   | 60   | <1   | <0.01 |
| FC2 42.8 | 22   | 46   | <1   | <0.01 |
| FC2 44.8 | 28   | 55   | 1    | <0.01 |
| FC2 46.6 | 95   | 190  | 2    | <0.01 |
| UNITS    | ppm  | ppm  | ppm  | ppm   |
| SCHEME   | AAS1 | AAS1 | AAS3 | FAS1  |



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COMLABS SERVICES PTY. LTD.

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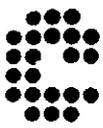
871104

ANALYTICAL REPORT

JOB COM871503

O/N : 11611/LJ10/JPR

| SAMPLE   | Cu   | Zn   | Ag   | Au    |
|----------|------|------|------|-------|
| FC2 48.6 | 60   | 55   | 2    | <0.01 |
| FC2 50.2 | 30   | 40   | 1    | <0.01 |
| FC3 0    | 240  | 145  | 2    | <0.01 |
| FC3 2    | 260  | 165  | 3    | <0.01 |
| FC3 4    | 270  | 180  | 3    | <0.01 |
| FC3 6    | 250  | 165  | 2    | <0.01 |
| FC3 8    | 200  | 210  | 3    | <0.01 |
| FC3 9    | 125  | 180  | 3    | <0.01 |
| FC3 11   | 125  | 360  | 4    | <0.01 |
| FC3 13   | 165  | 195  | 3    | <0.01 |
| FC3 15   | 180  | 480  | 4    | <0.01 |
| FC3 17   | 115  | 530  | 3    | <0.01 |
| FC3 19   | 110  | 410  | 3    | <0.01 |
| 13150    | 12   | 42   | <1   | <0.01 |
| 13151    | 5    | 26   | <1   | <0.01 |
| 13152    | 5    | 48   | <1   | <0.01 |
| 13153    | 7    | 80   | 1    | <0.01 |
| 13154    | 5    | 190  | 1    | <0.01 |
| 13155    | 70   | 95   | 1    | <0.01 |
| 13156    | 60   | 350  | 2    | <0.01 |
| 13157    | 65   | 180  | 10   | <0.01 |
| 13158    | 125  | 185  | 8    | <0.01 |
| UNITS    | ppm  | ppm  | ppm  | ppm   |
| SCHEME   | AAS1 | AAS1 | AAS3 | FAS1  |



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COMLABS SERVICES PTY. LTD.

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871105

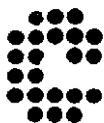
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ANALYTICAL REPORT

JOB COM871503

O/N : 11611/LJ10/JPR

| SAMPLE   | Pb   | As   | Ba   | Sn   | W    |
|----------|------|------|------|------|------|
| FC1 0    | 20   | 26   | 200  | 6    | <10  |
| FC1 1.5  | 14   | 14   | 230  | 4    | <10  |
| FC1 4.5  | 22   | 14   | 290  | <4   | <10  |
| FC1 7.0  | 22   | 18   | 250  | <4   | <10  |
| FC1 9.2  | 60   | 34   | 270  | <4   | 10   |
| FC1 11.2 | 100  | 55   | 220  | 12   | <10  |
| FC1 13.1 | 290  | 190  | 160  | 30   | <10  |
| FC1 13.8 | 95   | 34   | 140  | 8    | <10  |
| FC1 15.8 | 115  | 50   | 210  | 12   | <10  |
| FC1 16.5 | 290  | 120  | 330  | 160  | 10   |
| FC1 18.5 | 80   | 60   | 360  | 8    | <10  |
| FC1 20.0 | 250  | 55   | 230  | 18   | <10  |
| FC1 21.5 | 220  | 60   | 380  | 55   | 10   |
| FC1 23.5 | 150  | 34   | 450  | 10   | <10  |
| FC1 25.0 | 46   | 5    | 390  | <4   | 20   |
| FC1 27.0 | 50   | 12   | 380  | 6    | 25   |
| FC1 29.0 | 55   | 9    | 490  | 10   | 25   |
| FC1 31.0 | 55   | 7    | 400  | 4    | 15   |
| FC1 32.4 | 50   | 14   | 360  | 4    | <10  |
| FC1 33.0 | 60   | 24   | 360  | <4   | <10  |
| FC1 33.8 | 40   | 18   | 320  | <4   | <10  |
| FC1 35.8 | 55   | 28   | 350  | 8    | <10  |
| FC1 40.0 | 60   | 32   | 380  | 8    | <10  |
| FC2 0    | 65   | 16   | 360  | 8    | 10   |
| FC2 2    | 50   | 18   | 440  | 4    | 10   |
| UNITS    | ppm  | ppm  | ppm  | ppm  | ppm  |
| SCHEME   | XRF1 | XRF1 | XRF1 | XRF1 | XRF1 |

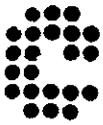


## ANALYTICAL REPORT

JOB COM871503

O/N : 11611/LJ10/JPR

| SAMPLE   | Pb   | As   | Ba   | Sn   | W    |
|----------|------|------|------|------|------|
| FC2 4    | 44   | 5    | 330  | 8    | 15   |
| FC2 5.6  | 48   | 12   | 310  | 8    | 15   |
| FC2 7.6  | 38   | 9    | 175  | 4    | 15   |
| FC2 9.6  | 26   | 10   | 185  | 6    | <10  |
| FC2 11   | 95   | 14   | 240  | 4    | <10  |
| FC2 12.4 | 60   | 8    | 240  | 6    | 10   |
| FC2 14.4 | 95   | 10   | 150  | 4    | 10   |
| FC2 16.0 | 100  | 12   | 270  | 12   | <10  |
| FC2 17.5 | 70   | 9    | 185  | 8    | <10  |
| FC2 18.9 | 70   | 10   | 350  | 8    | <10  |
| FC2 20.9 | 160  | 10   | 350  | <4   | <10  |
| FC2 22.7 | 90   | 12   | 350  | 6    | <10  |
| FC2 24.7 | 145  | 24   | 320  | 6    | 10   |
| FC2 26.5 | 185  | 12   | 260  | 14   | <10  |
| FC2 27.7 | 460  | 50   | 220  | 28   | <10  |
| FC2 29.4 | 4100 | 380  | 340  | 470  | 10   |
| FC2 30.6 | 1850 | 55   | 270  | 155  | 10   |
| FC2 32.6 | 320  | 48   | 330  | 55   | <10  |
| FC2 34.6 | 270  | 75   | 280  | 24   | <10  |
| FC2 36.6 | 1700 | 125  | 250  | 75   | <10  |
| FC2 38.8 | 330  | 6    | 145  | 4    | <10  |
| FC2 40.8 | 12   | 8    | 105  | 6    | <10  |
| FC2 42.8 | 14   | 12   | 115  | <4   | <10  |
| FC2 44.8 | 12   | 30   | 135  | <4   | <10  |
| FC2 46.6 | 30   | 36   | 230  | 6    | 10   |
| UNITS    | ppm  | ppm  | ppm  | ppm  | ppm  |
| SCHEME   | XRF1 | XRF1 | XRF1 | XRF1 | XRF1 |



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COMLABS SERVICES PTY. LTD.

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## ANALYTICAL REPORT

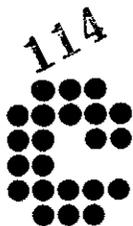
JOB COM871503

O/N : 11611/LJ10/JPR

| SAMPLE   | Pb   | As   | Ba   | Sn   | W    |
|----------|------|------|------|------|------|
| FC2 48.6 | 55   | 30   | 180  | <4   | <10  |
| FC2 50.2 | 6    | 20   | 165  | 4    | <10  |
| FC3 0    | <4   | 9    | 500  | <4   | 105  |
| FC3 2    | <4   | 12   | 440  | <4   | 120  |
| FC3 4    | <4   | 18   | 300  | <4   | 670  |
| FC3 6    | <4   | 20   | 350  | <4   | 50   |
| FC3 8    | <4   | 24   | 800  | <4   | 65   |
| FC3 9    | 12   | 8    | 480  | <4   | 220  |
| FC3 11   | <4   | 42   | 5300 | <4   | 410  |
| FC3 13   | 24   | 70   | 1150 | 4    | 20   |
| FC3 15   | 430  | 75   | 1700 | <4   | 70   |
| FC3 17   | 55   | 28   | 1350 | <4   | 20   |
| FC3 19   | 110  | 22   | 750  | <4   | 105  |
| 13150    | 38   | 10   | 230  | <4   | <10  |
| 13151    | 22   | 6    | 310  | 8    | <10  |
| 13152    | 38   | 9    | 760  | 4    | <10  |
| 13153    | 26   | 4    | 290  | <4   | <10  |
| 13154    | 14   | 4    | 440  | <4   | <10  |
| 13155    | 105  | 3    | 85   | 4    | <10  |
| 13156    | 190  | 65   | 75   | 65   | <10  |
| 13157    | 1350 | 55   | 220  | 20   | <10  |
| 13158    | 2100 | 90   | 190  | 280  | 10   |
| UNITS    | ppm  | ppm  | ppm  | ppm  | ppm  |
| SCHEME   | XRF1 | XRF1 | XRF1 | XRF1 | XRF1 |

APPENDIX 6

Foley Zone East  
Track Rock Chip Sampling



871109

245

## COMLABS SERVICES PTY. LTD.

305 South Road, Mile End South, South Australia 5031 Telephone (08) 43 5722 Telex LABCOM AA89323 Facsimile No. (08) 234 0321



NATA REGISTERED No. 1526

OUR REF: COM870777

YOUR REF: 11604/LJ10/JPR

Mr. J. Randell,  
The Shell Co. of Aust. Ltd.  
30 Mersey Main Rd  
Spreyton  
DEVONPORT  
TAS 7310

May 4, 1987

Dear Jeff,

RE: JOB COM870777

*Sample Number refer  
to metrage commencing  
from north eastern sector  
of track.*

Enclosed are the assays for the samples delivered to our  
Laboratory on April 16, 1987

Yours Sincerely,  
COMLABS SERVICES PTY LTD

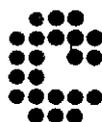
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c.c.: DEVONPORT

No. of copies : 1

Report Length 4 pages

115



COMLABS SERVICES PTY. LTD.

871110



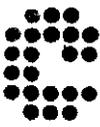
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## ANALYTICAL REPORT

JOB COM870777

O/N : 11604/LJ10/JPR

| SAMPLE  | Cu   | Zn   | Ag   |
|---------|------|------|------|
| FZE- 0  | 250  | 36   | 1    |
| FZE- 4  | 155  | 30   | <1   |
| FZE- 26 | 26   | 20   | <1   |
| FZE- 28 | 28   | 34   | <1   |
| FZE- 34 | 34   | 36   | <1   |
| FZE- 43 | 55   | 85   | <1   |
| FZE- 50 | 75   | 130  | <1   |
| FZE- 58 | 55   | 140  | 2    |
| FZE- 68 | 44   | 55   | 1    |
| FZE- 82 | 12   | 40   | <1   |
| FZE- 92 | 10   | 40   | <1   |
| FZE-109 | 10   | 20   | <1   |
| FZE-119 | 8    | 24   | <1   |
| FZE-129 | 16   | 32   | <1   |
| FZE-137 | 70   | 28   | <1   |
| FZE-154 | 70   | 60   | <1   |
| FZE-162 | 34   | 18   | <1   |
| FZE-172 | 34   | 28   | <1   |
| FZE-190 | 65   | 48   | <1   |
| FZE-221 | 38   | 16   | <1   |
| FZE-245 | 90   | 95   | <1   |
| FZE-255 | 70   | 80   | <1   |
| FZE-264 | 110  | 115  | 1    |
| FZE-272 | 36   | 38   | <1   |
| FZE-315 | 20   | 40   | <1   |
| UNITS   | ppm  | ppm  | ppm  |
| SCHEME  | AAS1 | AAS1 | AAS3 |



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COMLABS SERVICES PTY. LTD.

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871111

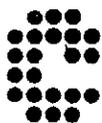
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ANALYTICAL REPORT

JOB COM870777

O/N : 11604/LJ10/JPR

| SAMPLE  | Cu   | Zn   | Ag   |
|---------|------|------|------|
| FZE-322 | 16   | 46   | <1   |
| FZE-340 | 28   | 80   | <1   |
| FZE-345 | 46   | 46   | <1   |
| FZE-356 | 75   | 70   | <1   |
| FZE-366 | 24   | 40   | <1   |
| FZE-383 | 30   | 34   | <1   |
| FZE-417 | 12   | 38   | <1   |
| FZE-445 | 140  | 105  | <1   |
| FZE-448 | 360  | 220  | 1    |
| FZE-458 | 490  | 220  | 1    |
| FZE-468 | LNR  | LNR  | LNR  |
| UNITS   | ppm  | ppm  | ppm  |
| SCHEME  | AAS1 | AAS1 | AAS3 |



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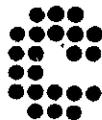
871112

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## ANALYTICAL REPORT

JOB COM870777  
O/N : 11604/LJ10/JPR

| SAMPLE  | As   | Pb   | Rb   | Sn   | W    |
|---------|------|------|------|------|------|
| FZE- 0  | 9    | 6    | 70   | <4   | <10  |
| FZE- 4  | 9    | 12   | 135  | <4   | <10  |
| FZE- 26 | 12   | 60   | 230  | <4   | <10  |
| FZE- 28 | 18   | 120  | 175  | 4    | <10  |
| FZE- 34 | 8    | 165  | 175  | 8    | <10  |
| FZE- 43 | 36   | 480  | 145  | 18   | <10  |
| FZE- 50 | 14   | 1200 | 160  | 80   | <10  |
| FZE- 58 | 10   | 260  | 155  | 12   | <10  |
| FZE- 68 | 10   | 190  | 170  | 6    | 10   |
| FZE- 82 | 12   | 28   | 140  | 6    | <10  |
| FZE- 92 | 10   | 32   | 135  | 6    | 10   |
| FZE-109 | 7    | 18   | 185  | 4    | <10  |
| FZE-119 | 9    | 20   | 250  | 16   | <10  |
| FZE-129 | 5    | 20   | 130  | 4    | <10  |
| FZE-137 | 8    | 14   | 100  | 4    | <10  |
| FZE-154 | 3    | 30   | 140  | 6    | <10  |
| FZE-162 | 22   | 24   | 165  | 4    | <10  |
| FZE-172 | 10   | 24   | 105  | 4    | <10  |
| FZE-190 | 30   | 320  | 100  | 6    | <10  |
| FZE-221 | 38   | 185  | 125  | 4    | <10  |
| FZE-245 | 24   | 36   | 75   | 8    | <10  |
| FZE-255 | 34   | 30   | 110  | 4    | <10  |
| FZE-264 | 115  | 70   | 150  | 8    | 10   |
| FZE-272 | 36   | 34   | 135  | 4    | <10  |
| FZE-315 | 24   | 155  | 85   | 14   | <10  |
| UNITS   | ppm  | ppm  | ppm  | ppm  | ppm  |
| SCHEME  | XRF1 | XRF1 | XRF1 | XRF1 | XRF1 |



## ANALYTICAL REPORT

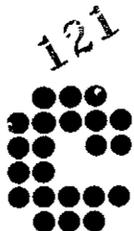
JOB COM870777

O/N : 11604/LJ10/JPR

| SAMPLE  | As   | Pb   | Rb   | Sn   | W    |
|---------|------|------|------|------|------|
| FZE-322 | 28   | 200  | 95   | 10   | <10  |
| FZE-340 | 20   | 105  | 230  | 18   | <10  |
| FZE-345 | 48   | 175  | 155  | 8    | <10  |
| FZE-356 | 40   | 190  | 120  | 4    | <10  |
| FZE-366 | 22   | 260  | 120  | 6    | <10  |
| FZE-383 | 20   | 90   | 90   | 12   | 10   |
| FZE-417 | 10   | 48   | 210  | 4    | <10  |
| FZE-445 | 5    | 42   | 250  | 4    | 10   |
| FZE-448 | 3    | 50   | 90   | 55   | <10  |
| FZE-458 | 12   | 8    | 50   | 4    | <10  |
| FZE-468 | LNR  | LNR  | LNR  | LNR  | LNR  |
| UNITS   | ppm  | ppm  | ppm  | ppm  | ppm  |
| SCHEME  | XRF1 | XRF1 | XRF1 | XRF1 | XRF1 |

APPENDIX 7

Foley Zone East  
Drill Core Analyses



871115

245

# COMLABS SERVICES PTY. LTD.

305 South Road, Mile End South, South Australia 5031 Telephone (08) 43 5722 Telex LABCOM AA89323 Facsimile No. (08) 234 0321



NATA REGISTERED No. 1526

OUR REF:

YOUR REF: COM871012

11605/LJ10/JPR

The Chief Geologist  
The Shell Co. of Aust. Ltd.  
30 Mersey Main Rd  
Spreyton  
DEVONPORT  
TAS 7310

May 29, 1987

Dear Sir

RE: JOB COM871012

Enclosed are the assays for the samples delivered to our laboratory on May 14, 1987

Yours Sincerely,  
COMLABS SERVICES PTY LTD

per :

Report Length 6 pages



COMLABS SERVICES PTY. LTD.

871116



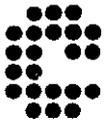
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ANALYTICAL REPORT

JOB COM871012

O/N : 11605/LJ10/JPR

| SAMPLE      | Cu   | Zn   | Ag   |
|-------------|------|------|------|
| C1135 37.5  | 60   | 610  | 1    |
| C1135 39.5  | 32   | 65   | <1   |
| C1135 54    | 16   | 65   | 1    |
| C1135 55.5  | 28   | 65   | 1    |
| C1135 57    | 32   | 105  | <1   |
| C1135 58.5  | 30   | 115  | 1    |
| C1135 60    | 40   | 330  | 1    |
| C1135 61.6  | 28   | 95   | <1   |
| C1135 62.5  | 75   | 1950 | 1    |
| C1250 128.8 | 100  | 145  | <1   |
| C1250 130.4 | 85   | 60   | <1   |
| C1250 132.4 | 28   | 60   | <1   |
| C1250 133.7 | 55   | 145  | <1   |
| C1250 134.7 | 32   | 85   | <1   |
| C1250 136   | 28   | 70   | <1   |
| C1250 138   | 28   | 165  | <1   |
| C1250 140   | 26   | 80   | <1   |
| C1250 142   | 24   | 60   | <1   |
| C1250 143.5 | 18   | 80   | <1   |
| C1250 202   | 110  | 180  | 1    |
| C1250 203   | 430  | 4750 | 65   |
| C1250 203.5 | 26   | 470  | 3    |
| C1255 98    | 24   | 95   | 1    |
| C1255 99.5  | 30   | 1150 | 12   |
| C1255 101.6 | 32   | 250  | 1    |
| UNITS       | ppm  | ppm  | ppm  |
| SCHEME      | AAS1 | AAS1 | AAS3 |



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- 2 -



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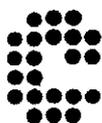
871117

## ANALYTICAL REPORT

JOB COM871012

O/N : 11605/LJ10/JPR

| SAMPLE        | Cu   | Zn   | Ag   |
|---------------|------|------|------|
| C1255 103.4   | 38   | 75   | <1   |
| C1255 105.2   | 40   | 65   | 1    |
| C1255 106.4   | 48   | 890  | 1    |
| C1255 202     | 28   | 220  | 1    |
| C1255 203.5   | 34   | 250  | 1    |
| C1155 59      | 32   | 70   | <1   |
| C1155 60      | 22   | 75   | <1   |
| C1155 60.8    | 22   | 85   | 1    |
| C1155 61.6    | 42   | 310  | 1    |
| C1155 62.6    | 380  | 2650 | 2    |
| C1610 135.2   | 36   | 2300 | 2    |
| C1610 136.5   | 80   | 1750 | 16   |
| C1610 137.6   | 26   | 165  | 2    |
| C1610 139     | 34   | 140  | 1    |
| C612 188      | 80   | 110  | 1    |
| C612 196      | 105  | 160  | <1   |
| C1295/2 148.9 | 60   | 60   | <1   |
| C1295/2 150   | 80   | 38   | <1   |
| C1295/2 184   | 24   | 290  | 1    |
| C1295/2 186   | 26   | 1000 | 2    |
| C1530 464.8   | 12   | 185  | <1   |
| C1530 466     | 18   | 185  | <1   |
| C1530 467.4   | 5    | 160  | <1   |
| C1530 468.6   | 7    | 160  | <1   |
| C1530 480.35  | 32   | 140  | <1   |
| UNITS         | ppm  | ppm  | ppm  |
| SCHEME        | AAS1 | AAS1 | AAS3 |



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871118

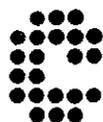
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ANALYTICAL REPORT

JOB COM871012

O/N : 11605/LJ10/JPR

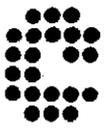
| SAMPLE      | Cu   | Zn   | Ag   |
|-------------|------|------|------|
| C1530 501.7 | 490  | 790  | 2    |
| C1530 503   | 460  | 1150 | 2    |
| C1530 504   | 260  | 1250 | 1    |
| C1530 505.1 | 1350 | 1300 | 3    |
| C1530 505.6 | 410  | 145  | 1    |
| UNITS       | ppm  | ppm  | ppm  |
| SCHEME      | AAS1 | AAS1 | AAS3 |



## ANALYTICAL REPORT

JOB COM871012  
O/N : 11605/LJ10/JPR

| SAMPLE      | As   | Pb           | Rb   | Sn   | W    |
|-------------|------|--------------|------|------|------|
| C1135 37.5  | 80   | 280          | 135  | 6    | <10  |
| C1135 39.5  | 22   | 55           | 65   | 8    | <10  |
| C1135 54    | 18   | 18           | 50   | <4   | <10  |
| C1135 55.5  | 30   | 10           | 65   | <4   | <10  |
| C1135 57    | 18   | 6            | 65   | 6    | <10  |
| C1135 58.5  | 22   | 50           | 85   | 6    | <10  |
| C1135 60    | 22   | 42           | 80   | 22   | <10  |
| C1135 61.6  | 24   | 32           | 75   | <4   | <10  |
| C1135 62.5  | 55   | 170          | 75   | 22   | <10  |
| C1250 128.8 | 26   | 12           | 90   | 6    | <10  |
| C1250 130.4 | 10   | 6            | 105  | 4    | <10  |
| C1250 132.4 | 7    | 6            | 90   | 6    | <10  |
| C1250 133.7 | 14   | 18           | 110  | 10   | <10  |
| C1250 134.7 | 20   | 42           | 65   | 6    | <10  |
| C1250 136   | 20   | 28           | 75   | <4   | <10  |
| C1250 138   | 20   | 20           | 65   | <4   | <10  |
| C1250 140   | 18   | 12           | 65   | <4   | <10  |
| C1250 142   | 14   | 8            | 75   | 10   | <10  |
| C1250 143.5 | 120  | 8            | 65   | <4   | <10  |
| C1250 202   | 22   | 145          | 270  | 8    | <10  |
| C1250 203   | 10   | 4.55%        | 330  | 330  | 45   |
| C1250 203.5 | 42   | 350          | 60   | 10   | <10  |
| C1255 98    | 30   | 70           | 105  | <4   | <10  |
| C1255 99.5  | 24   | 580          | 105  | 100  | <10  |
| C1255 101.6 | 55   | 16           | 120  | 6    | <10  |
| UNITS       | ppm  | ppm          | ppm  | ppm  | ppm  |
| SCHEME      | XRF1 | XRF1<br>XRF2 | XRF1 | XRF1 | XRF1 |



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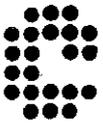
871120

ANALYTICAL REPORT

JOB COM871012

O/N : 11605/LJ10/JPR

| SAMPLE        | As   | Pb   | Rb   | Sn   | W    |
|---------------|------|------|------|------|------|
| C1255 103.4   | 24   | 16   | 105  | 4    | <10  |
| C1255 105.2   | 18   | 65   | 110  | 14   | <10  |
| C1255 106.4   | 22   | 75   | 125  | <4   | <10  |
| C1255 202     | 38   | 85   | 80   | 4    | <10  |
| C1255 203.5   | 46   | 150  | 80   | 4    | <10  |
| C1155 59      | 16   | 30   | 105  | 4    | <10  |
| C1155 60      | 24   | 32   | 120  | 12   | 10   |
| C1155 60.8    | 34   | 26   | 85   | 4    | <10  |
| C1155 61.6    | 70   | 34   | 140  | 10   | <10  |
| C1155 62.6    | 16   | 115  | 75   | 18   | <10  |
| C1610 135.2   | 390  | 530  | 130  | 20   | <10  |
| C1610 136.5   | 1250 | 380  | 180  | 24   | <10  |
| C1610 137.6   | 55   | 65   | 100  | <4   | <10  |
| C1610 139     | 140  | 65   | 100  | <4   | <10  |
| C612 188      | 18   | 390  | 140  | 4    | <10  |
| C612 196      | 34   | 340  | 130  | 10   | <10  |
| C1295/2 148.9 | 22   | 10   | 38   | 10   | 10   |
| C1295/2 150   | 26   | 18   | 36   | 4    | <10  |
| C1295/2 184   | 28   | 90   | 80   | <4   | <10  |
| C1295/2 186   | 28   | 330  | 90   | 10   | <10  |
| C1530 464.8   | 20   | 18   | 210  | 18   | <10  |
| C1530 466     | 7    | 44   | 220  | 250  | <10  |
| C1530 467.4   | 12   | 12   | 230  | 32   | <10  |
| C1530 468.6   | 22   | 18   | 250  | 14   | 10   |
| C1530 480.35  | <2   | 32   | 170  | 180  | <10  |
| UNITS         | ppm  | ppm  | ppm  | ppm  | ppm  |
| SCHEME        | XRF1 | XRF1 | XRF1 | XRF1 | XRF1 |



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- 6 -



871121

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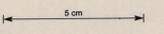
JOB COM871012

O/N : 11605/LJ10/JPR

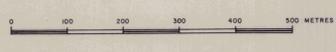
| SAMPLE      | As   | Pb   | Rb   | Sn   | W    |
|-------------|------|------|------|------|------|
| C1530 501.7 | 4    | 38   | 220  | 155  | <10  |
| C1530 503   | 3    | 34   | 95   | 80   | <10  |
| C1530 504   | <2   | 32   | 370  | 160  | 15   |
| C1530 505.1 | <2   | 90   | 120  | 460  | <10  |
| C1530 505.6 | 4    | 22   | 160  | <4   | <10  |
| UNITS       | ppm  | ppm  | ppm  | ppm  | ppm  |
| SCHEME      | XRF1 | XRF1 | XRF1 | XRF1 | XRF1 |

|           |       |             |           |         |        |
|-----------|-------|-------------|-----------|---------|--------|
| Author    | JPR   | Dept.       | T&S       | Scale   | 1:5000 |
| Drawn     | AS    | Date        | 8/87      | Revised |        |
| Checked   |       | Date        |           | S'ced   |        |
| Sheet No. | FIG 3 | Drawing No. | LJ10/1009 |         |        |

87-2717 871122



- CRESCENT SPUR SANDSTONE: dirty orange green micaceous sandstone/greywacke
- HALLS FORMATION: fine massive to laminated brown siltstones, grey cherts, dolomitic siltstones, minor sandstones
- DEEP CREEK VOLCANICS: dark green massive basaltic lavas
- HEAZLEWOOD ULTRAMAFIC COMPLEX: undifferentiated mafic gabbro, talc-carbonate schists
- Cleveland ore lenses
- Sn soil anomaly
- Sample location
- UTEM anomaly
- DIGHEM anomaly
- Diamond drill hole
- Costean
- Stream sediment anomaly



WASHINGTON-HAY  
Pb Ag fissure

CLEVELAND ORE LENSES

HEAZLEWOOD ULTRAMAFIC COMPLEX

CRESCENT SPUR CREEK SANDSTONE

HALLS FORMATION

FALLS CREEK  
- weak qtz vein st work  
- anomalous Sn 300 ppm  
- 3 costeans

SOUTH FALLS CREEK  
- UTEM anomaly  
- costeaning  
- 1 DDH: 25m carb. minor S= barren

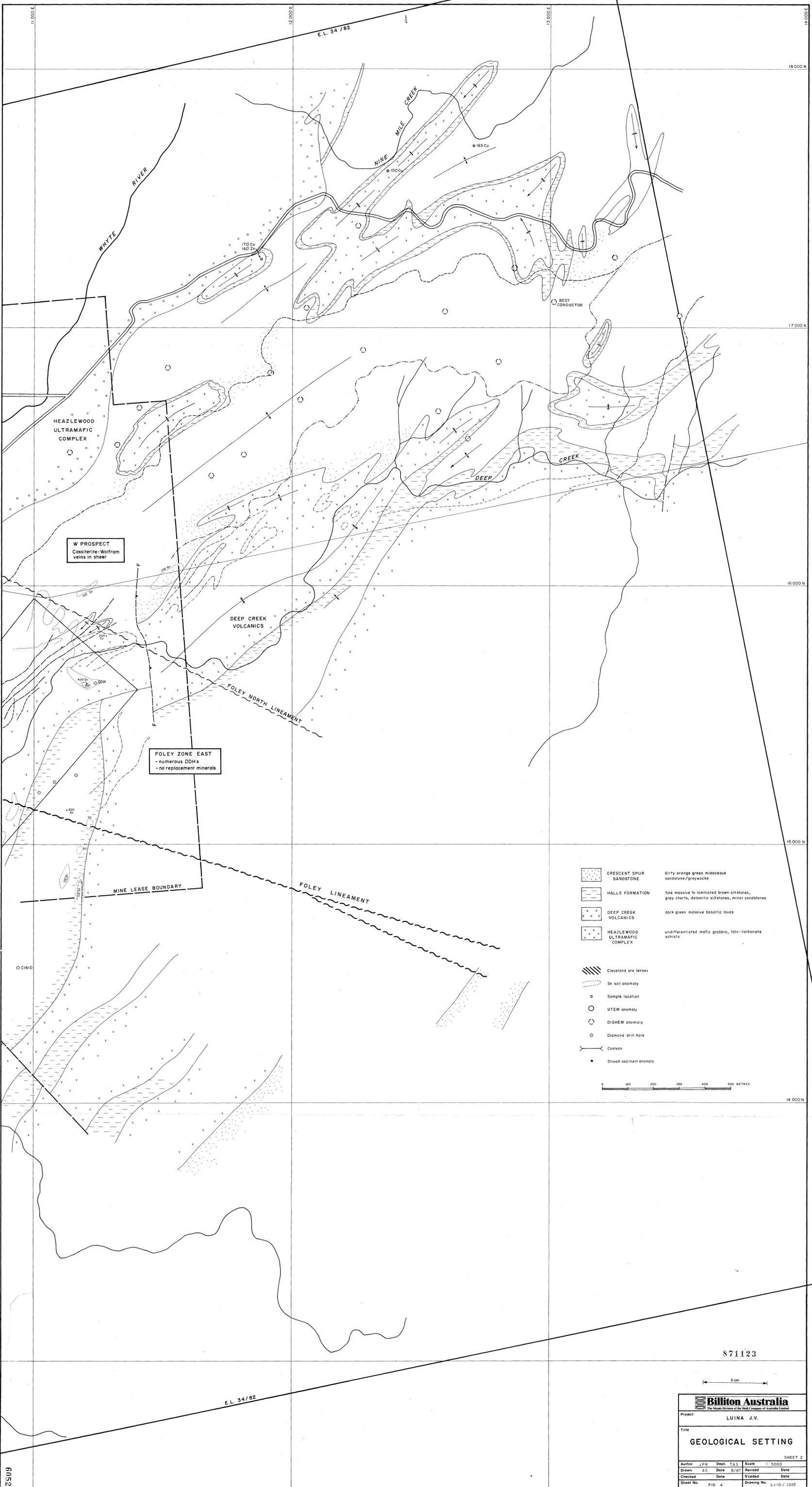
EASTERN SEDIMENTS OR FAULTED HALLS

FALLS CREEK

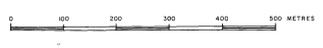
SOUTH

FALLS CREEK

E.L. 34/82



- CRESCENT SPUR SANDSTONE  
dirty orange green micaceous sandstone/greywacke
- HALLS FORMATION  
fine massive to laminated brown siltstones, grey cherts, dolomitic siltstones, minor sandstones
- DEEP CREEK VOLCANICS  
dark green massive basaltic lavas
- HEAZLEWOOD ULTRAMAFIC COMPLEX  
undifferentiated mafic gabbro, talc-carbonate schists
- Cleveland ore lenses
- Sn soil anomaly
- Sample location
- UTEM anomaly
- DIGHEM anomaly
- Diamond drill hole
- Costeon
- Stream sediment anomaly



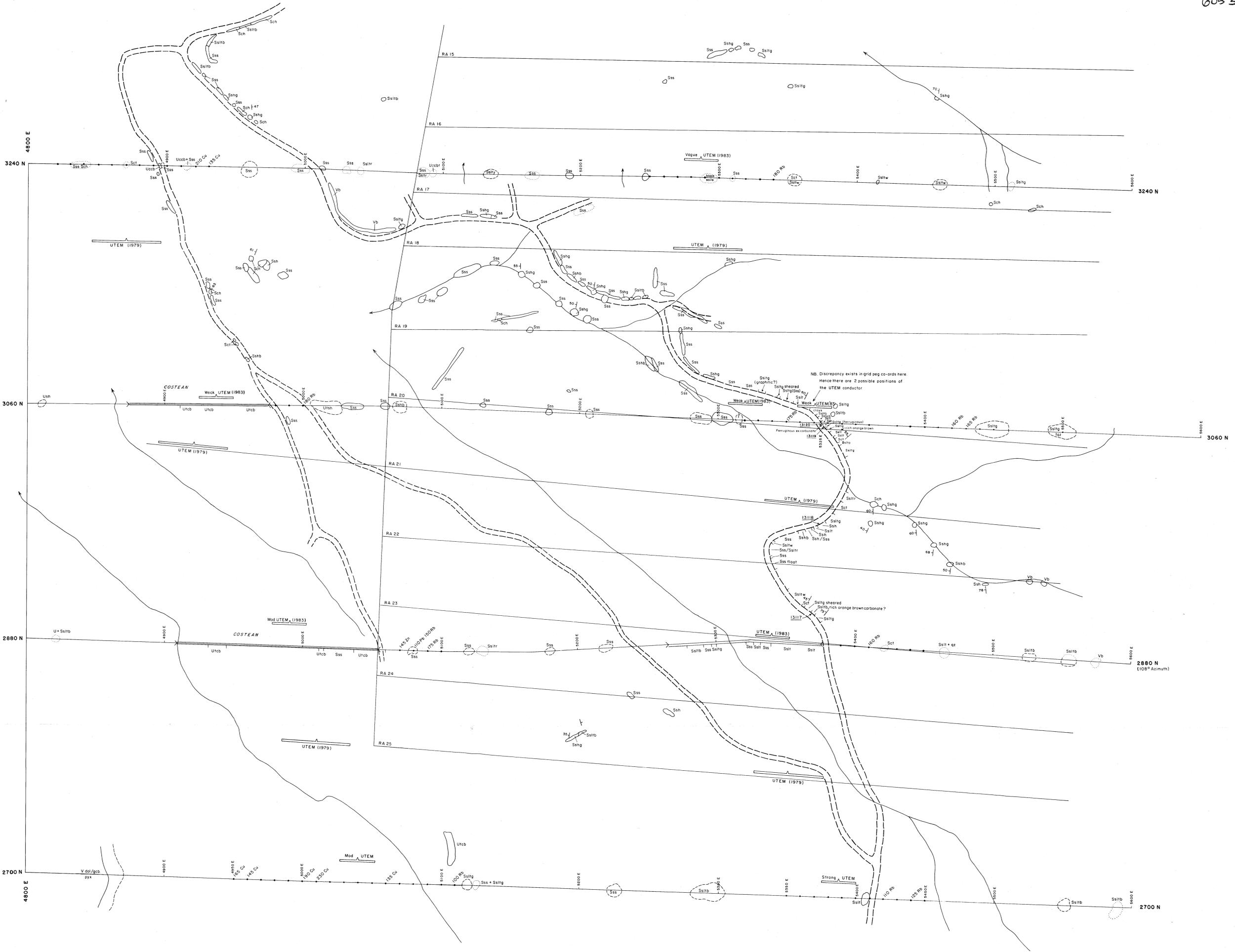
871123



|                                                                                                           |        |             |              |
|-----------------------------------------------------------------------------------------------------------|--------|-------------|--------------|
| <b>Billiton Australia</b><br><small>The Metals Division of the Shell Company of Australia Limited</small> |        |             |              |
| Project<br>LUINA J.V.                                                                                     |        |             |              |
| Title<br><b>GEOLOGICAL SETTING</b>                                                                        |        |             |              |
| SHEET 2                                                                                                   |        |             |              |
| Author                                                                                                    | JPR    | Dept. T&S   | Scale 1:5000 |
| Drawn                                                                                                     | AS     | Date 8/87   | Revised Date |
| Checked                                                                                                   | Date   | Checked     | Date         |
| Sheet No.                                                                                                 | FIG. 4 | Drawing No. | LJ10/1010    |

87-2717

6503



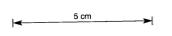
- Ssllt Fine poorly laminated siltstone of various colours grey (lg), brown (lb), red (r), orange (o). Variable fissility observed and tends to grade into shales.
- Ssh Strongly fissile siltstones as above.
- Sct Siliceous grey poorly banded units. Their true chemical precipitate character is in doubt.
- Sss Dirty poorly sorted non laminated orange-olive green fine sandstone.
- Utcb Weathered orange-brown talcose, carbonated ultramafic.
- Ucamp Fresh dark green massive chlorite-amphibole-non magnetic ultramafic.
- Vb Dark green massive basaltic unit.

- Costean
- UTEM anomaly
- Auger sample
- Outcrop
- Subcrop
- Flot
- Strike / Dip bedding
- Creek
- Track

N.B. Grid lines labelled RA ... no longer exist on the ground.



871124



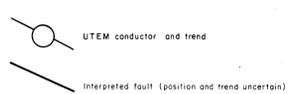
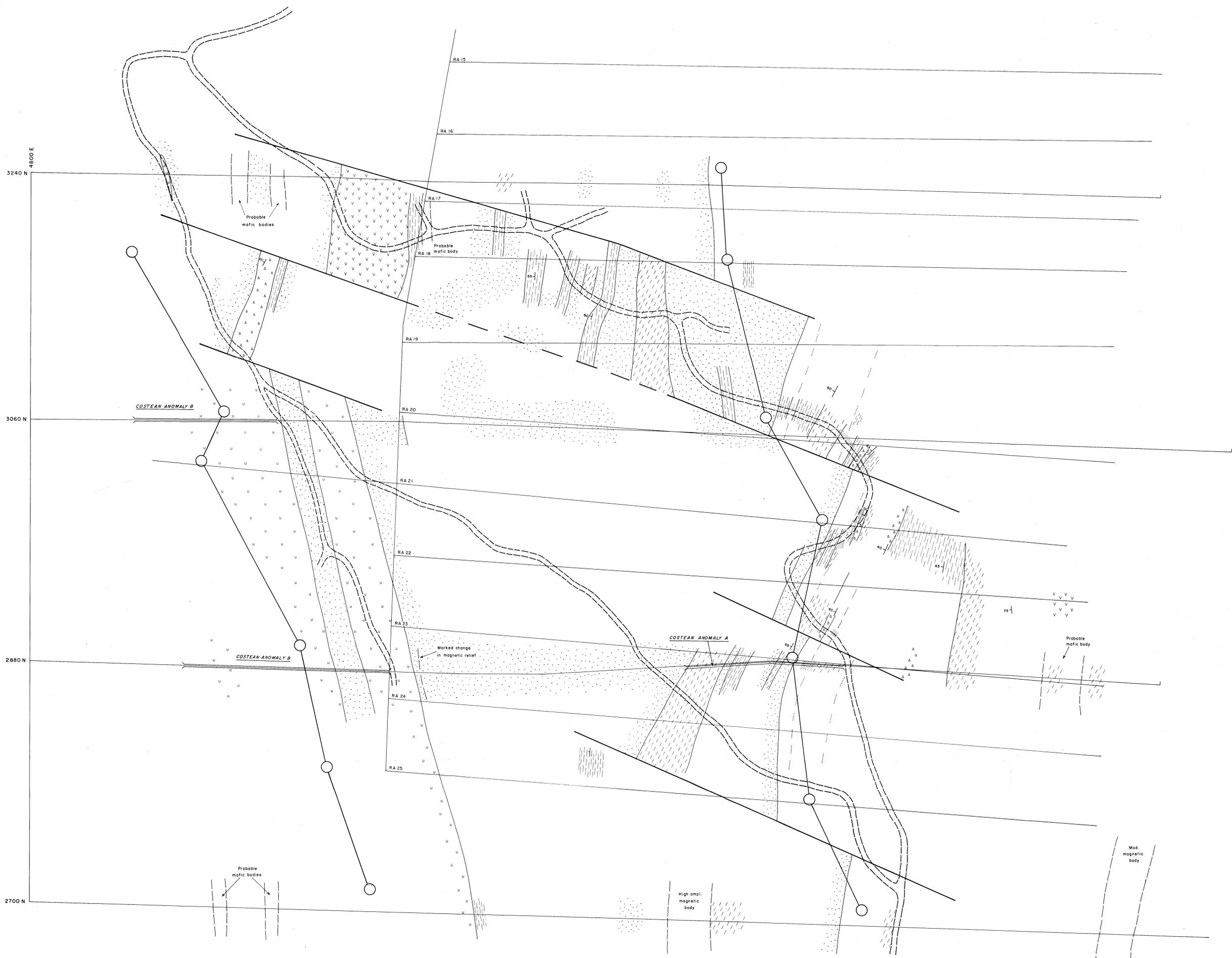
87-2717

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

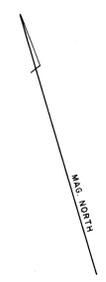
Project: LUINA J.V. TASMANIA

Title: SOUTH FALLS CREEK GEOLOGICAL FACT MAP WITH UTEM AND GEOCHEMICAL ANOMALIES

|           |        |             |            |         |        |
|-----------|--------|-------------|------------|---------|--------|
| Author    | JR     | Dept.       | TAS        | Scale   | 1:1000 |
| Drawn     | AS     | Date        | 11/86      | Revised | Date   |
| Checked   | Date   | Scaled      | Date       |         |        |
| Sheet No. | FIG. 5 | Drawing No. | LJ107/1000 |         |        |



-  **CRESCENT SPUR SANDSTONE** Fine micaceous dirty sandstone
-  Probable calcareous silts or cherty dolomite horizons
-  **HALLS FORMATION** Fine orange brown silts
-  Grey bleached fissile siltstone and shales
-  Siliceous siltstones and chemical chert
-  **DEEP CREEK VOLCANICS** Fine grained basaltic volcanics
-  Variably weathered talcose carbonated ultramafic. Fresh chloritic amphibole varieties also.

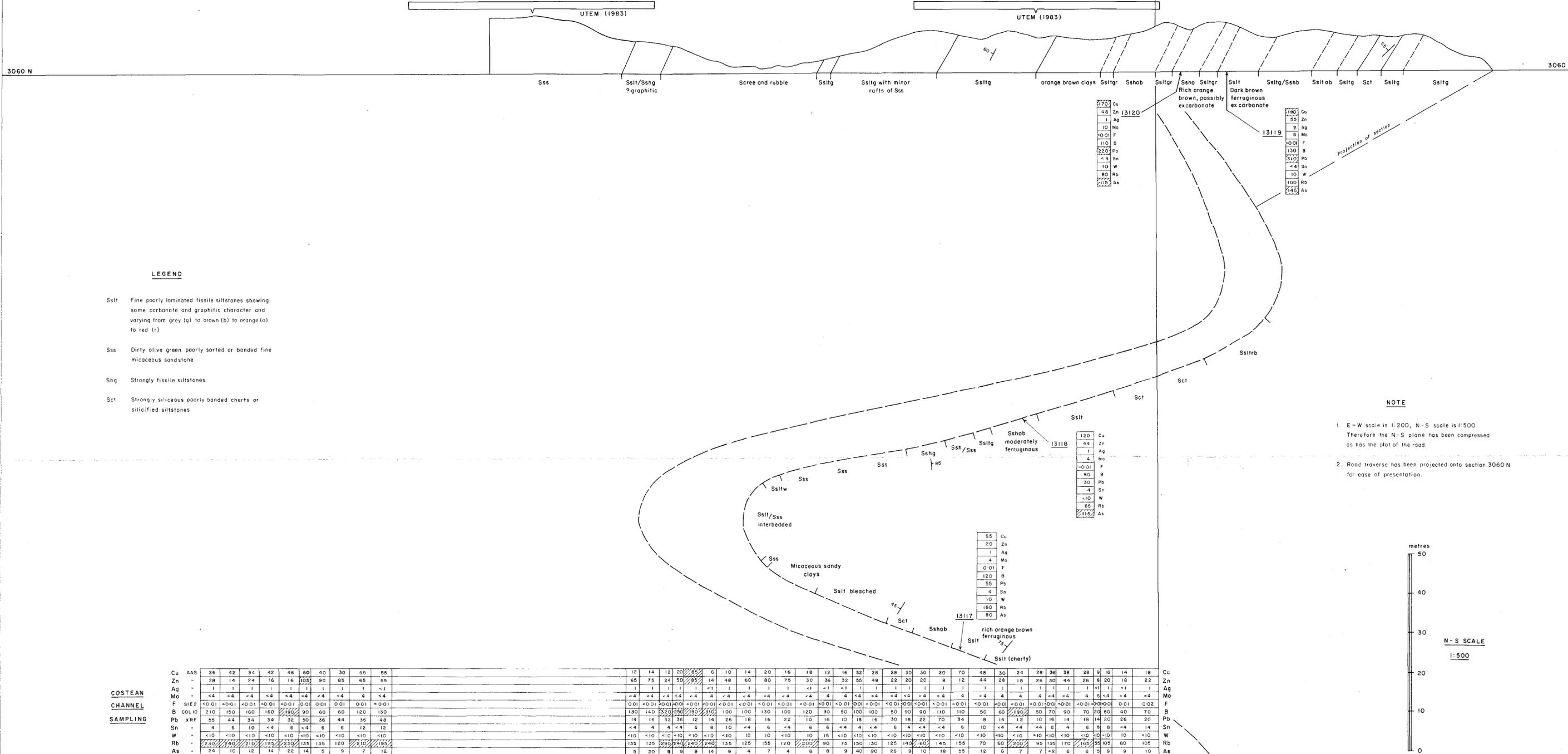


871125  
5 cm

87-2717

|                                                                                                           |        |             |           |
|-----------------------------------------------------------------------------------------------------------|--------|-------------|-----------|
| <b>Billiton Australia</b><br><small>The Metals Division of the Shell Company of Australia Limited</small> |        |             |           |
| Project<br><b>LUNA J.V. TASMANIA</b>                                                                      |        |             |           |
| Title<br><b>SOUTH FALLS CREEK<br/>GEOLOGICAL<br/>INTERPRETATION</b>                                       |        |             |           |
| Author                                                                                                    | J.R.   | Dept.       | TAS       |
| Scale                                                                                                     | 1:1000 |             |           |
| Drawn                                                                                                     | A.S.   | Date        | 11/86     |
| Revised                                                                                                   | Date   |             |           |
| Checked                                                                                                   | Date   | Scaled      | Date      |
| Sheet No.                                                                                                 | FIG. G | Drawing No. | LJ10/1001 |

| Element  | 32    | 50    | 28    | 60    | 42    | 50    | 55    | 34    | 30    | 40    | 55    | 50    | 40    | 38    | 32    | 38    | 40    | 44    | 42    | 85    | 105   | 135   | 100   | 60    | 95    | 75    | 120   | 70    | 70    | 110   | 115   | 55    | 70    | 75    | 85    | 90    | 50    | 30    | 24    | 70    | 60 |    |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----|----|
| Cu AAS   | 32    | 50    | 28    | 60    | 42    | 50    | 55    | 34    | 30    | 40    | 55    | 50    | 40    | 38    | 32    | 38    | 40    | 44    | 42    | 85    | 105   | 135   | 100   | 60    | 95    | 75    | 120   | 70    | 70    | 110   | 115   | 55    | 70    | 75    | 85    | 90    | 50    | 30    | 24    | 70    | 60 |    |
| Zn       | 85    | 75    | 58    | 55    | 26    | 55    | 30    | 42    | 55    | 70    | 75    | 46    | 44    | 50    | 55    | 46    | 42    | 32    | 32    | 46    | 48    | 38    | 36    | 22    | 36    | 12    | 26    | 20    | 20    | 48    | 38    | 50    | 38    | 28    | 26    | 26    | 60    | 65    | 16    | 16    | 42 | 48 |
| Ag       | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1  | 1  |
| Mo       | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4 |    |
| F SIE 2  | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |    |    |
| B COL 10 | 90    | 110   | 220   | 180   | 210   | 150   | 100   | 110   | 110   | 90    | 120   | 120   | 140   | 130   | 120   | 100   | 110   | 110   | 100   | 80    | 110   | 90    | 100   | 70    | 120   | 180   | 120   | 150   | 130   | 120   | 100   | 150   | 120   | 150   | 130   | 100   | 110   | 160   | 150   | 120   | 80 |    |
| Pb XRF   | 40    | 70    | 80    | 48    | 46    | 55    | 14    | 8     | 10    | 16    | 75    | 14    | 6     | 14    | 10    | 12    | 12    | 22    | 30    | 90    | 32    | 14    | 16    | 6     | 18    | 30    | 60    | 28    | 60    | 150   | 150   | 48    | 24    | 110   | 100   | 20    | 14    | 75    | 34    | 36    | 32 |    |
| Sn       | 6     | 6     | 12    | 8     | <4    | 8     | 6     | 6     | <4    | <4    | <4    | <4    | 6     | 4     | 5     | 8     | 10    | 4     | 6     | 4     | 10    | 6     | 6     | <4    | <4    | <4    | <4    | <4    | <4    | <4    | 6     | 6     | 4     | <4    | <4    | <4    | <4    | <4    | 8     | 6     | 6  |    |
| W        | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   |    |    |
| Rb       | 130   | 175   | 175   | 230   | 250   | 230   | 190   | 220   | 175   | 135   | 155   | 245   | 230   | 230   | 245   | 170   | 145   | 125   | 120   | 120   | 135   | 125   | 115   | 100   | 130   | 125   | 116   | 115   | 85    | 125   | 105   | 165   | 120   | 135   | 120   | 85    | 100   | 110   | 95    | 130   | 80 |    |
| As       | 9     | 24    | 44    | 65    | 90    | 14    | 6     | 2     | 5     | 6     | 14    | 9     | 10    | 12    | 7     | 14    | 14    | 24    | 28    | 60    | 36    | 14    | 22    | 18    | 26    | 8     | 20    | 24    | 20    | 100   | 65    | 12    | 18    | 22    | 32    | 44    | 18    | 22    | 22    | 16    | 7  | 12 |

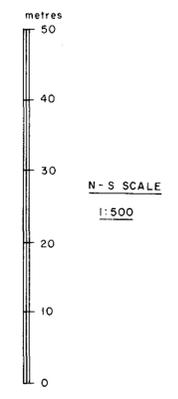


**LEGEND**

- Ssilt Fine poorly laminated fissile siltstones showing some carbonate and graphitic character and varying from grey (g) to brown (b) to orange (o) to red (r)
- Sss Dirty olive green poorly sorted or banded fine micaceous sandstone
- Shg Strongly fissile siltstones
- Sct Strongly siliceous poorly banded cherts or silicified siltstones

**NOTE**

- E-W scale is 1:200, N-S scale is 1:500. Therefore the N-S plane has been compressed as has the plot of the road.
- Road traverse has been projected onto section 3060 N for ease of presentation.



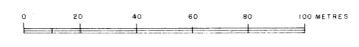
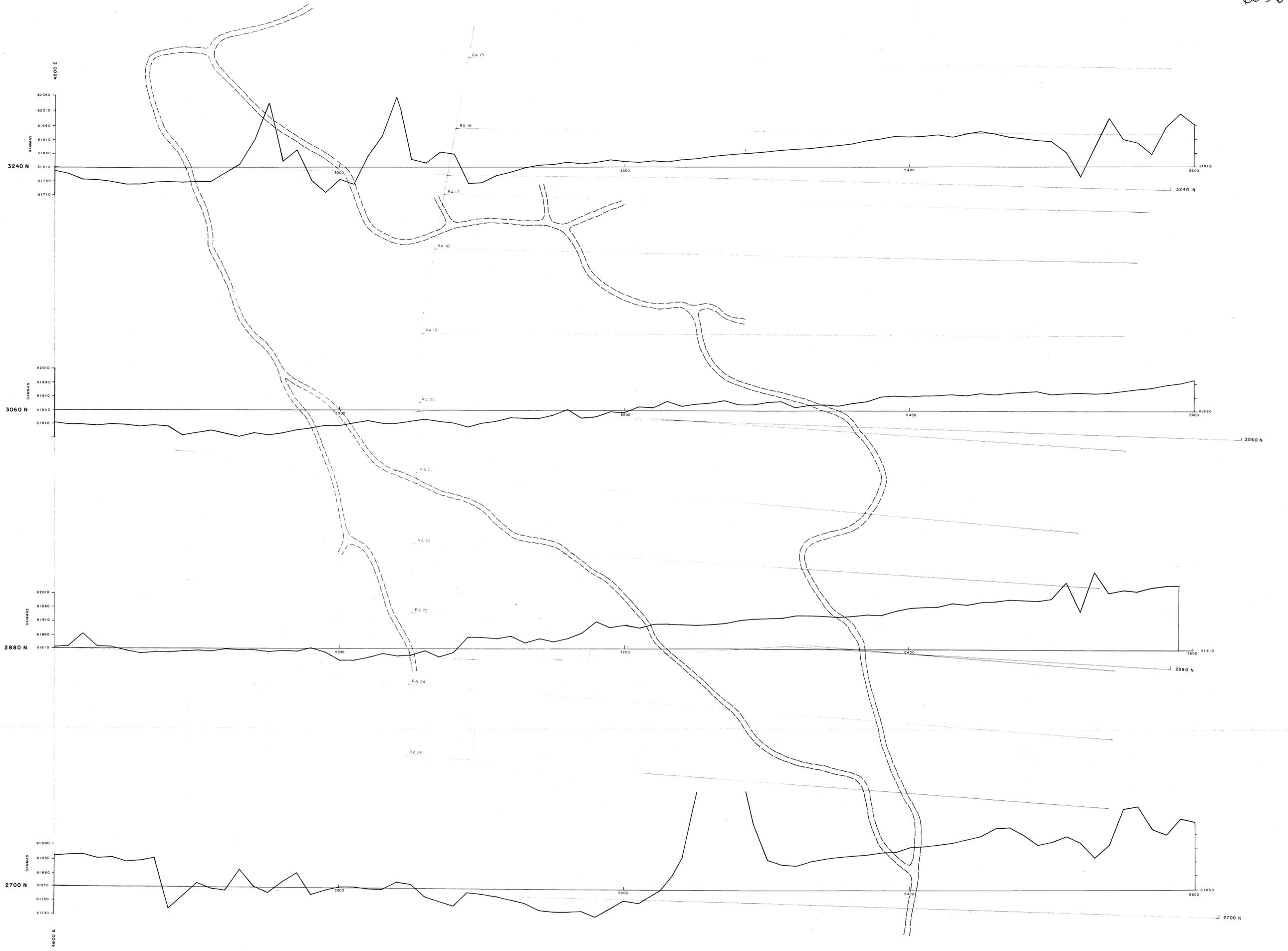
| Element  | 26    | 42    | 34    | 42    | 46    | 60    | 40    | 30    | 55    | 55    | 12    | 14    | 12    | 20    | 65    | 6     | 10    | 14    | 20    | 16    | 18    | 12    | 16    | 32    | 28    | 28    | 30    | 20    | 70    | 48    | 30    | 24    | 28    | 36    | 38    | 28    | 9     | 16    | 14    | 18  |    |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|----|
| Cu AAS   | 26    | 42    | 34    | 42    | 46    | 60    | 40    | 30    | 55    | 55    | 12    | 14    | 12    | 20    | 65    | 6     | 10    | 14    | 20    | 16    | 18    | 12    | 16    | 32    | 28    | 28    | 30    | 20    | 70    | 48    | 30    | 24    | 28    | 36    | 38    | 28    | 9     | 16    | 14    | 18  |    |
| Zn       | 28    | 14    | 24    | 16    | 16    | 100   | 90    | 85    | 65    | 55    | 65    | 75    | 24    | 50    | 85    | 14    | 48    | 60    | 80    | 75    | 30    | 36    | 32    | 55    | 48    | 22    | 20    | 20    | 8     | 12    | 44    | 28    | 18    | 26    | 30    | 44    | 26    | 8     | 20    | 18  | 22 |
| Ag       | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | <1    | 1     | 1     | 1     | 1     | 1     | <1    | 1     | 1     | 1     | <1    | <1    | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1   | 1  |
| Mo       | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4    | <4  |    |
| F SIE 2  | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |     |    |
| B COL 10 | 210   | 150   | 160   | 160   | 180   | 90    | 60    | 60    | 120   | 130   | 130   | 140   | 230   | 230   | 230   | 100   | 100   | 130   | 100   | 120   | 30    | 50    | 100   | 100   | 50    | 90    | 90    | 110   | 110   | 50    | 60    | 90    | 90    | 70    | 20    | 80    | 40    | 70    |       |     |    |
| Pb XRF   | 55    | 44    | 34    | 34    | 32    | 50    | 36    | 44    | 36    | 48    | 14    | 16    | 32    | 36    | 12    | 14    | 26    | 18    | 16    | 32    | 10    | 16    | 10    | 16    | 30    | 18    | 22    | 70    | 34    | 8     | 14    | 12    | 10    | 16    | 14    | 16    | 14    | 20    | 25    | 20  |    |
| Sn       | 4     | 6     | 10    | <4    | 6     | <4    | 6     | 6     | 12    | 12    | <4    | 4     | 4     | <4    | 6     | 8     | 10    | <4    | 6     | <4    | 6     | 6     | <4    | 4     | <4    | 6     | 4     | <4    | 6     | 10    | <4    | <4    | 6     | 6     | 8     | 8     | <4    | 14    |       |     |    |
| W        | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   |     |    |
| Rb       | 235   | 245   | 245   | 210   | 235   | 240   | 240   | 240   | 240   | 240   | 135   | 135   | 230   | 230   | 240   | 240   | 135   | 125   | 155   | 120   | 100   | 90    | 75    | 100   | 130   | 125   | 140   | 160   | 145   | 155   | 70    | 60    | 200   | 95    | 135   | 170   | 165   | 105   | 80    | 105 |    |
| As       | 24    | 10    | 12    | 14    | 22    | 14    | 5     | 9     | 7     | 15    | 5     | 20    | 9     | 9     | 14    | 9     | 4     | 7     | 4     | 6     | 8     | 9     | 40    | 90    | 26    | 9     | 10    | 18    | 55    | 12    | 6     | 7     | 7     | <2    | 6     | 6     | 5     | 9     | 9     | 10  |    |

871126

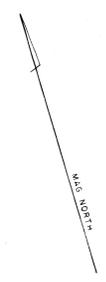
87-2717

**Billiton Australia**  
 Project: LUINA J.V.  
 Title: SOUTH FALLS CREEK COSTEAN 2880N AND ROAD CUT SECTIONS  
 Author: JPR Dept: TAS Scale: 1:200/1:500  
 Drawn: AS Date: 12/86 Revised: Date  
 Checked: Date S'ced: Date  
 Sheet No. FIG.7 Drawing No. LJ 10/1003

6055



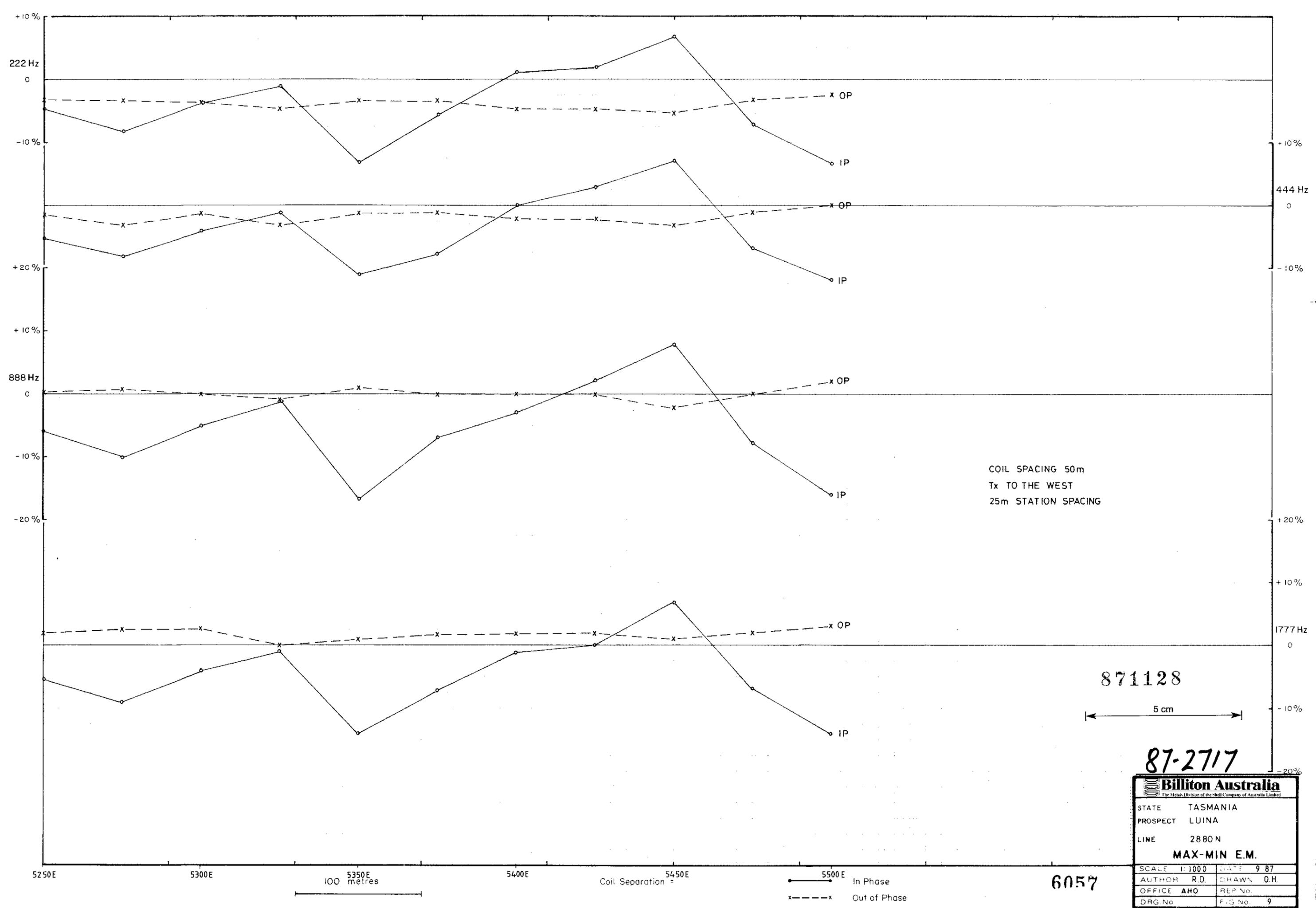
N.B. Grid lines labelled RA... no longer exist on the ground.



871127  
5 cm

87-2717

|                                 |               |               |           |
|---------------------------------|---------------|---------------|-----------|
| <b>Billiton Australia</b>       |               |               |           |
| Project: LUINA J.V. TASMANIA    |               |               |           |
| SOUTH FALLS CREEK               |               |               |           |
| <b>GROUND MAGNETIC PROFILES</b> |               |               |           |
| Author: JR                      | District: TAS | Scale: 1:1000 | Date:     |
| Drawn: AS                       | Date: 11/86   | Reviewed:     | Date:     |
| Checked:                        | Date:         | Approved:     | Date:     |
| Sheet No:                       | FIG. 8        | Drawn No:     | LJ10/1002 |

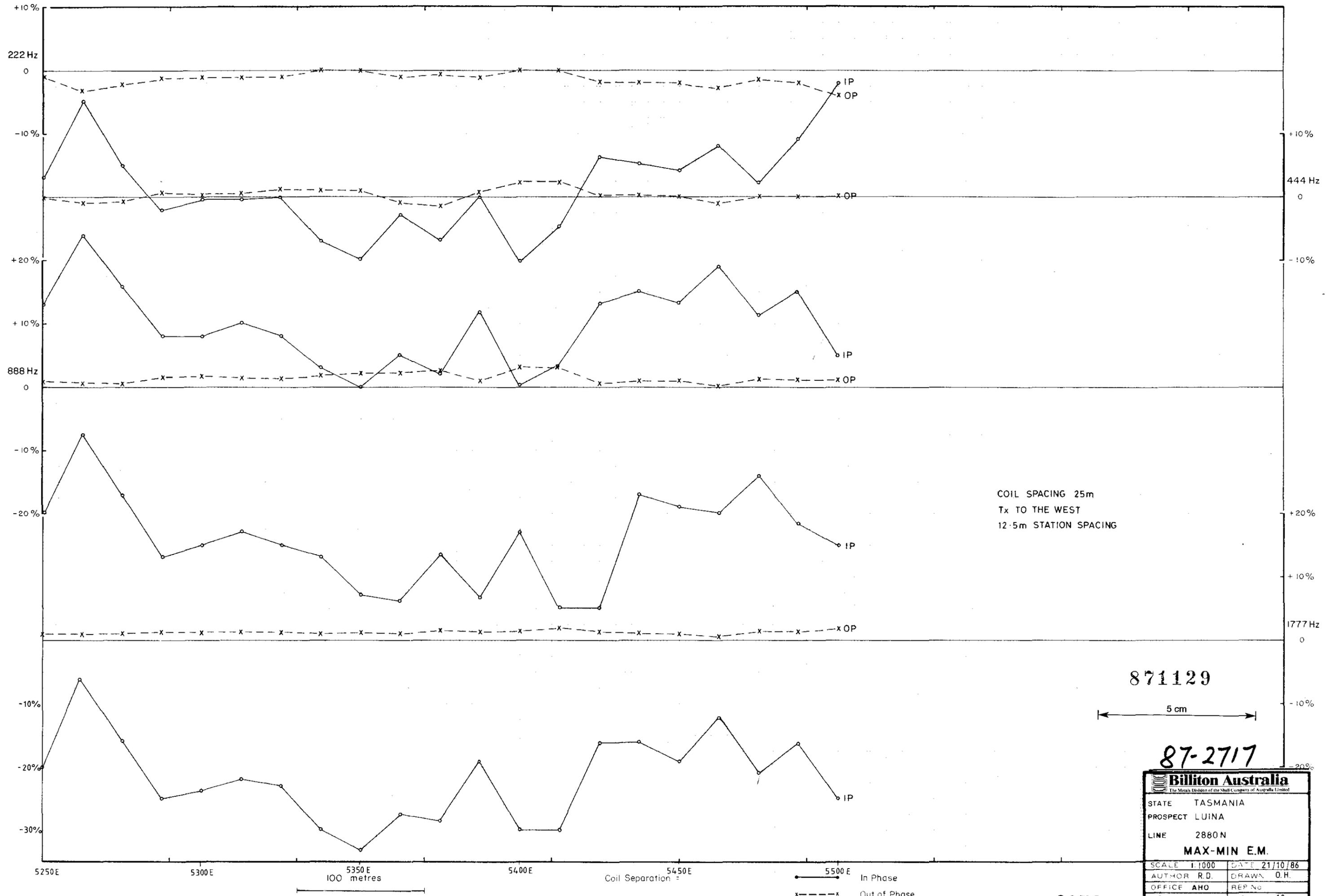


871128

87-2717

|                                                                                                           |            |
|-----------------------------------------------------------------------------------------------------------|------------|
| <b>Billiton Australia</b><br><small>The Metals Division of the Shell Company of Australia Limited</small> |            |
| STATE                                                                                                     | TASMANIA   |
| PROSPECT                                                                                                  | LUINA      |
| LINE                                                                                                      | 2880 N     |
| <b>MAX-MIN E.M.</b>                                                                                       |            |
| SCALE 1:1000                                                                                              | DATE 9 87  |
| AUTHOR R.D.                                                                                               | DRAWN O.H. |
| OFFICE AHO                                                                                                | REP No.    |
| DRG No                                                                                                    | FIG No 9   |

6057



COIL SPACING 25m  
Tx TO THE WEST  
12.5m STATION SPACING

871129

5 cm

87-2717

|                                                                                                           |          |
|-----------------------------------------------------------------------------------------------------------|----------|
| <b>Billiton Australia</b><br><small>The Metals Division of the Shell Company of Australia Limited</small> |          |
| STATE                                                                                                     | TASMANIA |
| PROSPECT                                                                                                  | LUINA    |
| LINE                                                                                                      | 2880 N   |
| <b>MAX-MIN E.M.</b>                                                                                       |          |
| SCALE                                                                                                     | 1:1000   |
| AUTHOR                                                                                                    | R.D.     |
| OFFICE                                                                                                    | AHO      |
| DRG.No.                                                                                                   | 10       |
| DATE                                                                                                      | 21/10/86 |
| DRAWN                                                                                                     | O.H.     |
| REP.No.                                                                                                   |          |
| FIG.No.                                                                                                   | 10       |

6058

5250E      5300E      5350E      5400E      5450E      5500E  
100 metres      Coil Separation = 5500E  
●——● In Phase  
- - - - - Out of Phase



SHELL COMPANY OF AUSTRALIA

METALS DIVISION

R.O.C.S. - PROTEM

N.W. TASMANIA

LUINA J.V.

GROUND MAGNETICS

Base 62000, 50nT/cm

SCALE 1 : 5000

FIG No : 11

LEGEND

DATE : 10/86

AUTHOR :

OFFICE :

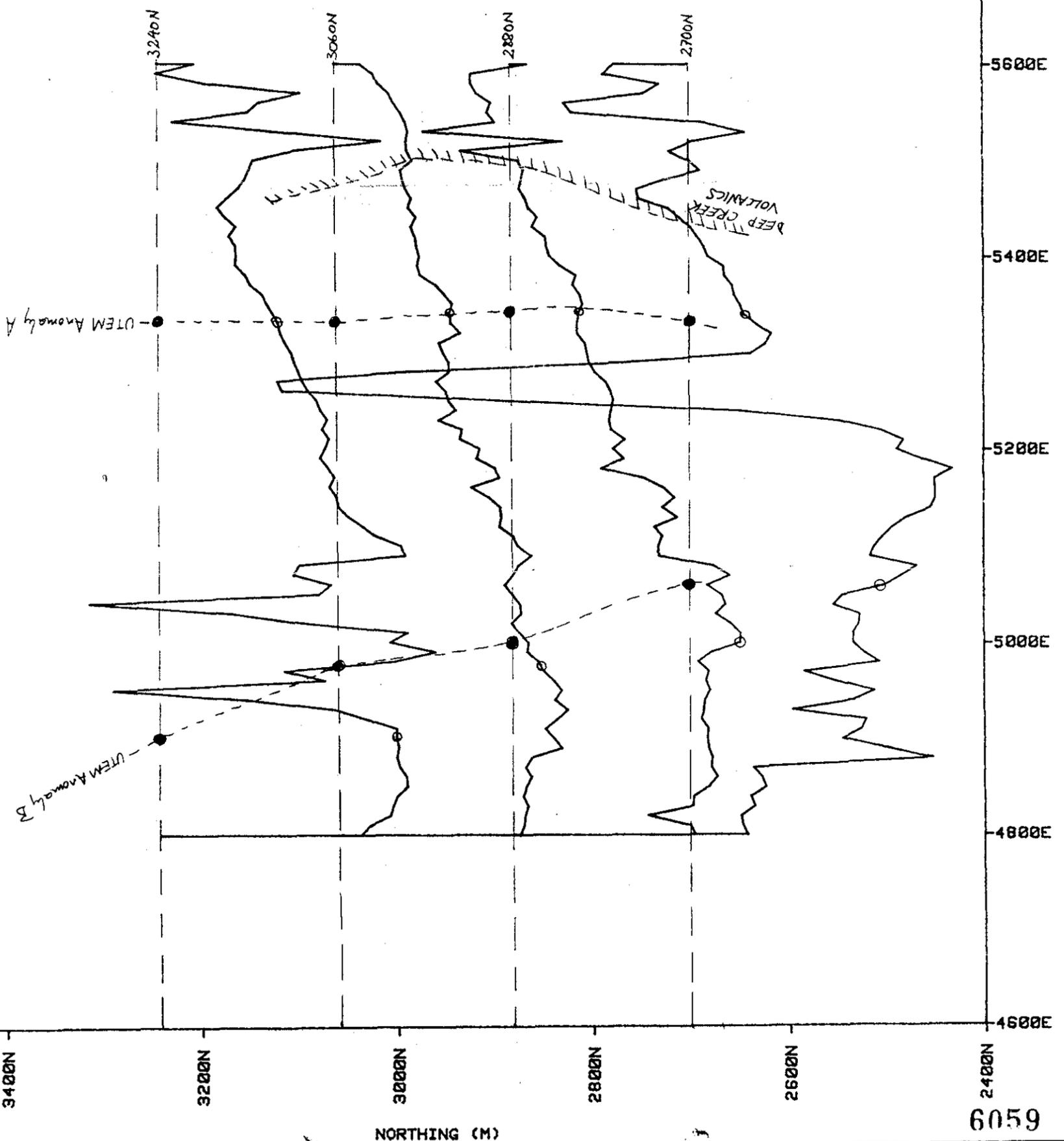
DRAWN :

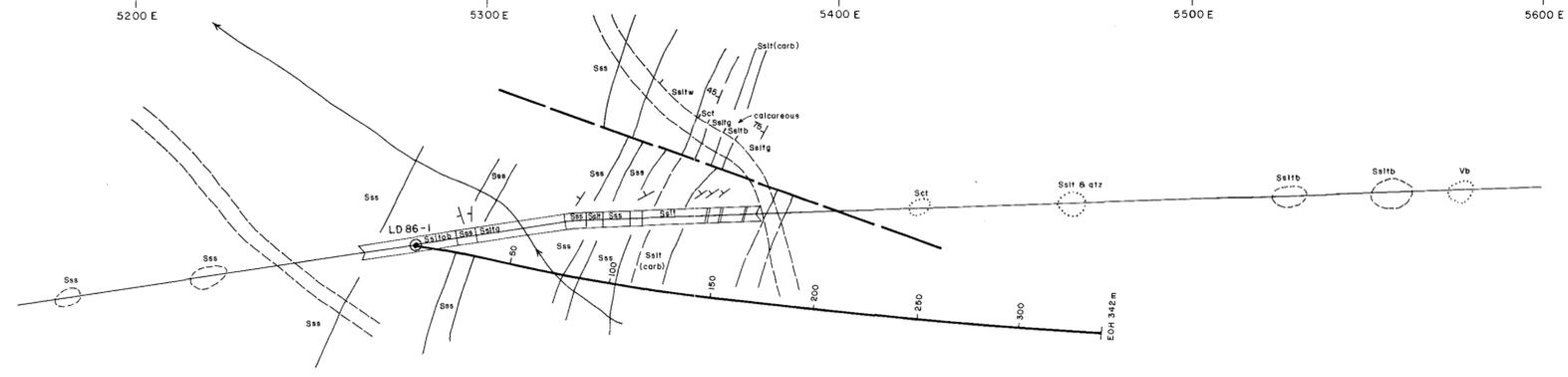
87-2717

871130

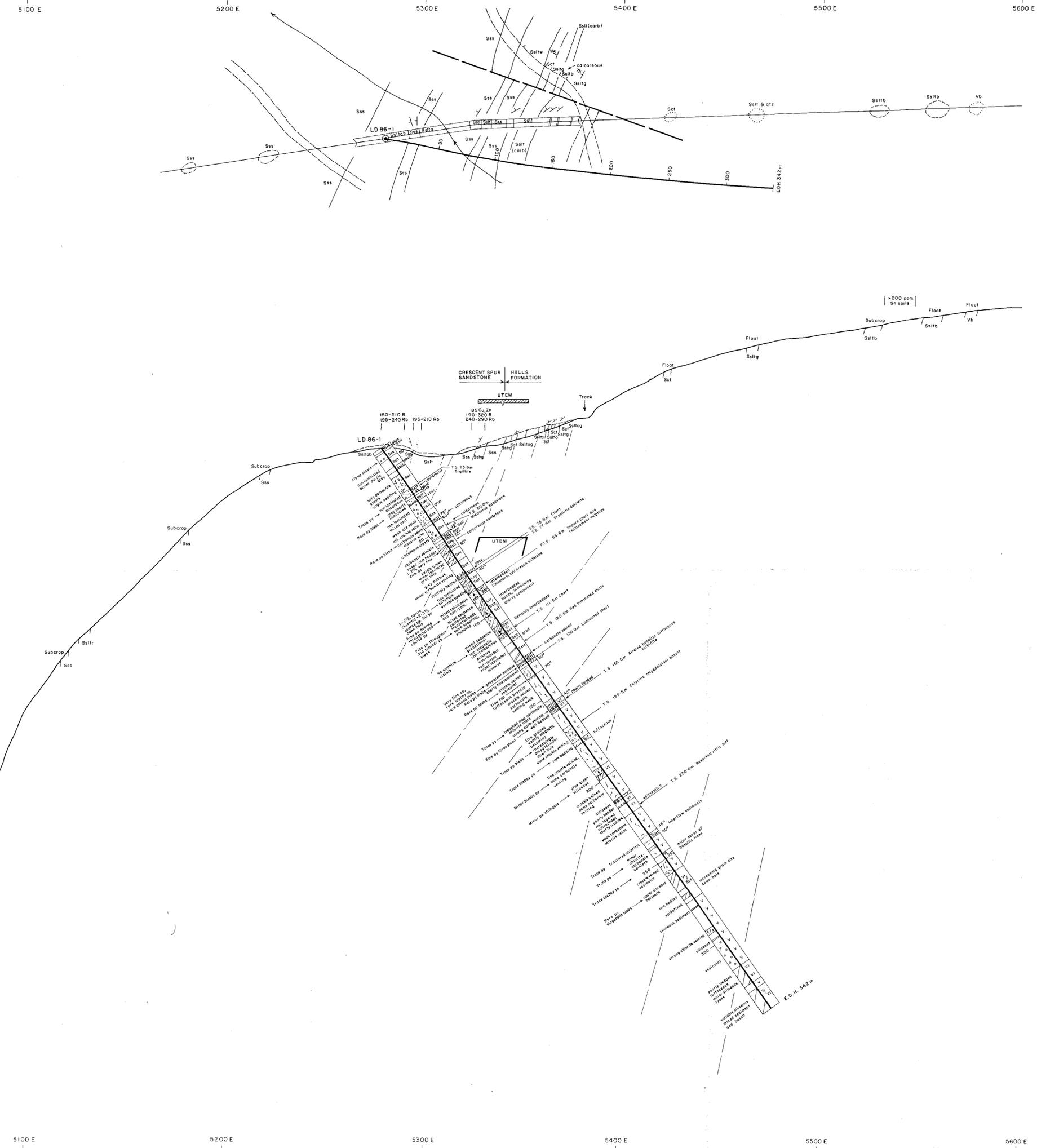
● - UTEM CONDUCTOR AXIS  
○ - CONDUCTOR POSITION ON MAG PROFILE

5 cm





00m RL  
-100m RL  
-200m RL  
-300m RL



**LEGEND**

- Sss Micaceous Sandstone: Poorly bedded, sometimes graded, micaceous sandstone/greywacke often finely carbonate veined.
- Sst Siltstone / Shale: Grey green or red variably laminated sediment, often siliceous and may grade into cherty sediments.
- Sct Chert: Grey finely laminated, usually regularly bedded, variably siliceous.
- Lst Dolomite: Grey poorly laminated dolomitic siltstone with up to 5% graphite, often with crackle carbonate veinlets.
- VI Mafic Tuff: Poorly sorted dirty tuffaceous siltstone often showing graded bedding. Variably chloritic and carbonate veined.
- V Basalt: Dark green vesicular or amygdaloidal tholeiitic basalt, often carbonate veined.
- po Pyrrhotite
- py Pyrite
- Facing direction (graded bedding, cross bedding)
- Bedding (dip relative to core axis showing)
- △△ Brecciation
- Crackle veining
- Sulphide disseminations (type and amount shown)
- T.S. Thin section
- PTS. Polished thin section

**SAMPLING**

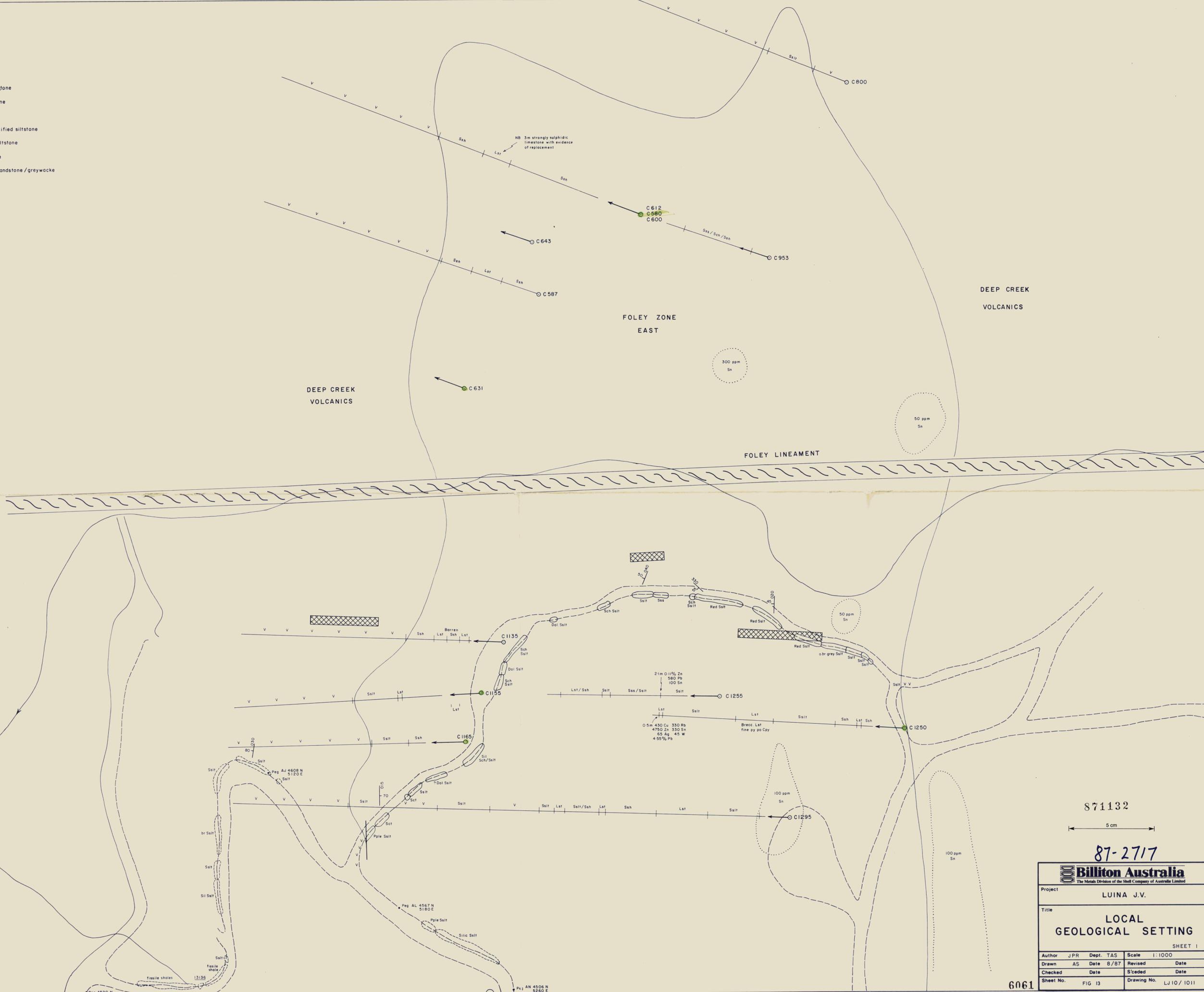
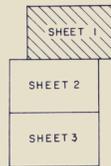
Core sampled by filletting or splitting from 0-186.0 metres down hole.  
 Elements analysed include - Sn, W, Rb, Cu, Pb, Zn, Ag, As, B, Ni  
 Elemental ranges  
 Sn <3 to 90 ppm  
 W <10 to 20 ppm  
 Rb 7 to 370 ppm  
 Cu 10 to 725 ppm  
 Pb <5 to 65 ppm  
 Zn 10 to 210 ppm  
 Ag <0.5 to 1.5 ppm  
 As <2 to 140 ppm  
 B 13 to 90 ppm  
 Au <0.008 ppm

871131  
5 cm

87-2717

|                                                                                                               |        |              |              |
|---------------------------------------------------------------------------------------------------------------|--------|--------------|--------------|
| <b>Billiton Australia</b><br><small>The Metals Division of The Steel Corporation of Australia Limited</small> |        |              |              |
| Project <b>LUINA J.V.</b>                                                                                     |        |              |              |
| Title <b>SOUTH FALLS CREEK</b>                                                                                |        |              |              |
| <b>DIAMOND DRILL SECTION LD86-1</b>                                                                           |        |              |              |
| <b>2880 N</b>                                                                                                 |        |              |              |
| Author                                                                                                        | J.P.P. | Dept. T.A.S. | Scale 1:1000 |
| Drawn                                                                                                         | AS     | Date 2/87    | Revised Date |
| Checked                                                                                                       |        | Date         | Checked Date |
| Sheet No.                                                                                                     | FIG 12 | Drawing No.  | LJ10/100B    |

- Sss Yellow massive dirty sandstone
- SsIt Brown, red massive siltstone
- Sct Massive grey chert
- Sch Fine laminated chert / silicified siltstone
- Dol Silt Orange brown dolomitic siltstone
- Ssh Grey fissile graphitic shale
- Sgw Orange green micaceous sandstone / greywacke
- Vt Dark green mafic tuff
- BAUS mapping
- Previous mapping
- Auger sample
- UTEM anomaly
- 13134 BAUS sample



871132

5 cm

87-2717

|                                                                                            |                                 |
|--------------------------------------------------------------------------------------------|---------------------------------|
| <b>Billiton Australia</b><br>The Metals Division of the Shell Company of Australia Limited |                                 |
| Project                                                                                    | LUINA J.V.                      |
| Title                                                                                      | LOCAL<br>GEOLOGICAL SETTING     |
| SHEET 1                                                                                    |                                 |
| Author                                                                                     | JPR Dept. TAS Scale 1:1000      |
| Drawn                                                                                      | AS Date 8/87 Revised Date       |
| Checked                                                                                    | Date S'ced Date                 |
| Sheet No.                                                                                  | FIG 13 Drawing No. LJ 10 / 1011 |

6061

- Sss Yellow massive dirty sandstone
- SsIt Brown, red massive siltstone
- Sct Massive grey chert
- Sch Fine laminated chert / silicified siltstone
- Dol SsIt Orange brown dolomitic siltstone
- Ssh Grey fissile graphitic shale
- Sgw Orange green micaceous sandstone / greywacke
- Vt Dark green mafic tuff

- BAUS mapping
- Previous mapping

- Auger sample
- UTEM anomaly
- BAUS sample



LINE RA 2

| EASTING | Sn | W   | Cu  | Pb  | Zn  | Ag | As  | Rb  |
|---------|----|-----|-----|-----|-----|----|-----|-----|
| 5050    | 6  | <10 | 65  | 65  | 95  | 1  | 10  | 200 |
| 75      | 12 | 35  | 40  | 125 | 125 | 1  | 44  | 220 |
| 100     | 12 | <10 | 95  | 38  | 60  | 1  | 20  | 130 |
| 125     | <4 | <10 | 220 | 34  | 95  | 2  | 32  | 95  |
| 150     | 6  | <10 | 145 | 48  | 125 | 2  | 30  | 150 |
| 175     | 6  | 10  | 70  | 20  | 80  | 1  | 8   | 260 |
| 200     | <4 | <10 | 60  | 20  | 90  | 1  | 26  | 210 |
| 225     | 6  | <10 | 18  | 18  | 32  | <1 | 20  | 95  |
| 250     | 14 | <10 | 18  | 230 | 26  | 1  | 125 | 120 |
| 275     | 8  | <10 | 14  | 50  | 20  | 1  | 28  | 105 |
| 300     | 8  | <10 | 9   | 55  | 24  | 1  | 32  | 160 |

| SAMPLE | Cu  | Zn   | Ag | Mo | Co  | Fe   | Mn   | As  | Pb   | Sn  | W  | Rb  | Description                             |
|--------|-----|------|----|----|-----|------|------|-----|------|-----|----|-----|-----------------------------------------|
| 13131  | 46  | 230  | 1  | 4  | 24  | 5.90 | 770  | 22  | 90   | 6   | 10 | 190 | Quartz vein stockwork siltstone         |
| 13132  | 38  | 400  | 2  | 6  | 22  | 6.40 | 3300 | 38  | 740  | 42  | 10 | 120 | Quartz vein open space & tourmaline     |
| 13133  | 150 | 1150 | 18 | 4  | 60  | 13.2 | 1.76 | 400 | 1900 | 300 | 10 | 220 | Ferruginous quartz veining in siltstone |
| 13134  | 175 | 180  | 3  | 6  | 340 | 5.55 | 9900 | 48  | 380  | 16  | 10 | 70  | Weathered dolomite siltstone            |
| 13143  | 100 | 840  | 4  |    |     |      |      | 155 | 270  | 115 | 10 | 210 | Ferruginous veined white siltstone      |

LINE RA 5

| EASTING | Sn | W   | Cu  | Pb  | Zn  | Ag | As | Rb  |
|---------|----|-----|-----|-----|-----|----|----|-----|
| 5050    | 6  | <10 | 55  | 60  | 60  | 1  | 36 | 140 |
| 75      | 12 | 10  | 36  | 50  | 36  | 1  | 48 | 115 |
| 100     | <4 | 10  | 50  | 34  | 50  | 1  | 14 | 200 |
| 125     | 10 | 10  | 40  | 34  | 36  | 1  | 32 | 140 |
| 150     | 12 | <10 | 48  | 32  | 42  | 1  | 18 | 145 |
| 175     | <4 | <10 | 85  | 50  | 46  | 1  | 24 | 120 |
| 200     | 8  | <10 | 110 | 110 | 160 | 2  | 80 | 95  |
| 225     | 4  | <10 | 16  | 80  | 28  | 1  | 18 | 125 |
| 250     | <4 | <10 | 10  | 32  | 18  | 1  | 12 | 155 |
| 275     | 6  | <10 | 8   | 28  | 14  | 1  | 5  | 70  |
| 300     | 8  | <10 | 16  | 55  | 9   | 1  | 22 | 95  |

871133  
5 cm

87-2717

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

Project: LUINA J.V.

Title: LOCAL GEOLOGICAL SETTING

SHEET 2

|           |        |             |              |         |        |
|-----------|--------|-------------|--------------|---------|--------|
| Author    | JPR    | Dept.       | TAS          | Scale   | 1:1000 |
| Drawn     | AS     | Date        | 8/87         | Revised | Date   |
| Checked   | Date   | S'ced       | Date         |         |        |
| Sheet No. | FIG 14 | Drawing No. | LJ 10 / 1012 |         |        |

6062

- Sss Yellow massive dirty sandstone
- Sslt Brown, red massive siltstone
- Sct Massive grey chert
- Sch Fine laminated chert/ silicified siltstone
- Dol Silt Orange brown dolomitic siltstone
- Ssh Grey fissile graphitic shale
- Sgw Orange green micaceous sandstone/greywacke
- Vt Dark green mafic tuff
- BAUS mapping
- Previous mapping
- Auger sample
- UTEM anomaly
- 13134 BAUS sample

LINE RA 7

| EASTING | Sn | W   | Cu  | Pb  | Zn  | Ag | As | Rb  |
|---------|----|-----|-----|-----|-----|----|----|-----|
| 5050    | 6  | <10 | 18  | 24  | 250 | <1 | 6  | 165 |
| 75      | 20 | <10 | 28  | 280 | 180 | 3  | 50 | 170 |
| 100     | 4  | <10 | 50  | 95  | 46  | 2  | 44 | 95  |
| 125     | 8  | <10 | 26  | 28  | 38  | 1  | 8  | 185 |
| 150     | <4 | <10 | 85  | 6   | 340 | 2  | 14 | 20  |
| 175     | 4  | <10 | 390 | 24  | 175 | 2  | 18 | 28  |
| 200     | 6  | <10 | 130 | 34  | 46  | 1  | 16 | 125 |
| 225     | 6  | <10 | 16  | 55  | 26  | 1  | 14 | 200 |
| 250     | <4 | <10 | 16  | 110 | 24  | 1  | 22 | 135 |
| 275     | 6  | <10 | 28  | 60  | 16  | 1  | 18 | 115 |
| 300     | 8  | <10 | 7   | 22  | 14  | <1 | 6  | 55  |

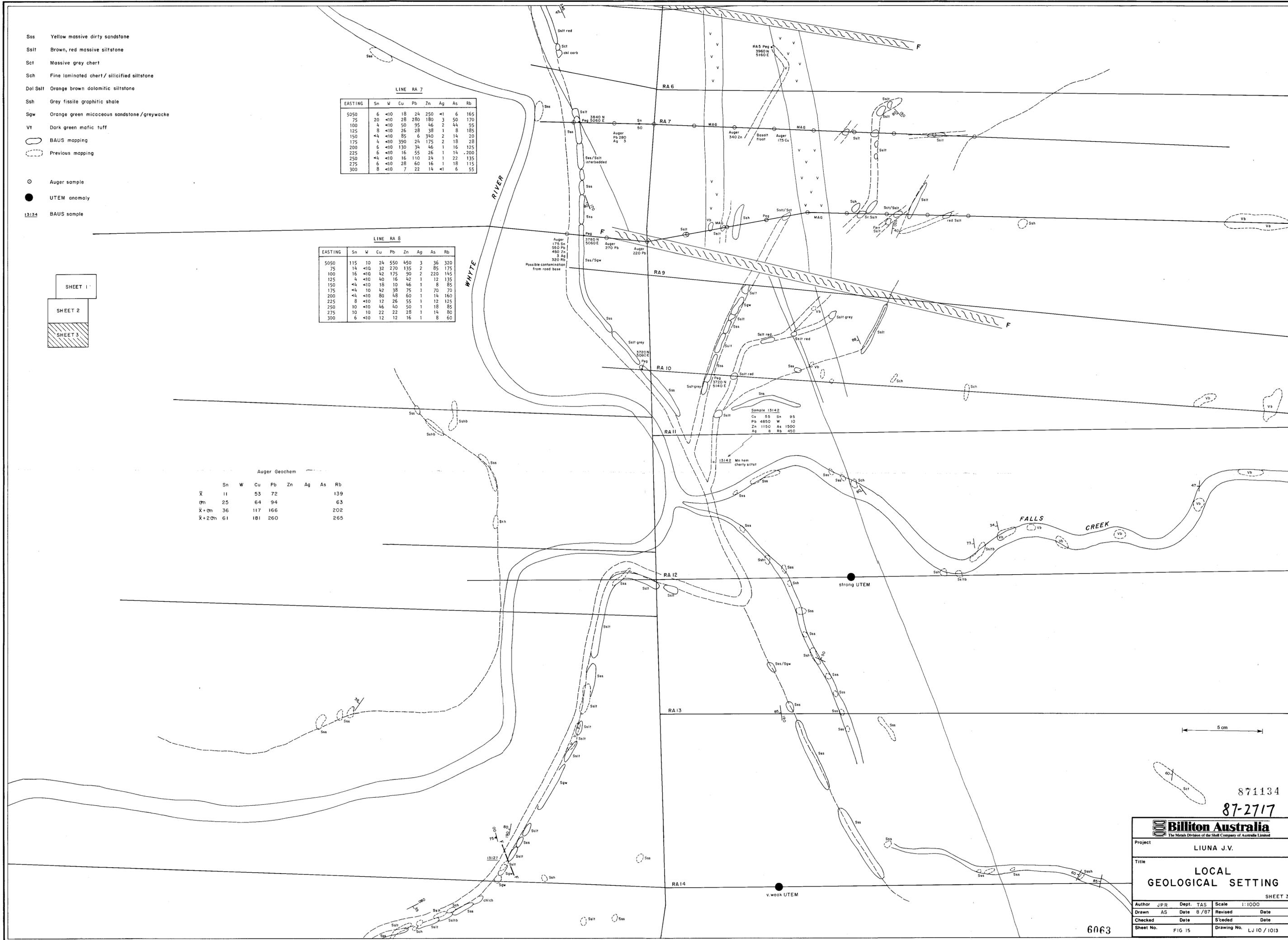
LINE RA 8

| EASTING | Sn  | W   | Cu | Pb  | Zn  | Ag | As  | Rb  |
|---------|-----|-----|----|-----|-----|----|-----|-----|
| 5050    | 115 | 10  | 24 | 550 | 450 | 3  | 36  | 320 |
| 75      | 14  | <10 | 32 | 270 | 135 | 2  | 85  | 175 |
| 100     | 16  | <10 | 42 | 175 | 90  | 2  | 220 | 145 |
| 125     | 4   | <10 | 40 | 16  | 42  | 1  | 12  | 135 |
| 150     | <4  | <10 | 18 | 10  | 46  | 1  | 8   | 85  |
| 175     | <4  | 10  | 42 | 38  | 75  | 1  | 70  | 70  |
| 200     | <4  | <10 | 80 | 48  | 60  | 1  | 14  | 160 |
| 225     | 8   | <10 | 12 | 26  | 55  | 1  | 12  | 125 |
| 250     | 10  | <10 | 46 | 40  | 50  | 1  | 18  | 85  |
| 275     | 10  | 10  | 22 | 22  | 28  | 1  | 14  | 80  |
| 300     | 6   | <10 | 12 | 12  | 16  | 1  | 8   | 60  |

- SHEET 1
- SHEET 2
- SHEET 3

Auger Geochem

|                       | Sn | W | Cu  | Pb  | Zn | Ag | As | Rb  |
|-----------------------|----|---|-----|-----|----|----|----|-----|
| $\bar{x}$             | 11 |   | 53  | 72  |    |    |    | 139 |
| $\sigma_m$            | 25 |   | 64  | 94  |    |    |    | 63  |
| $\bar{x} + \sigma_m$  | 36 |   | 117 | 166 |    |    |    | 202 |
| $\bar{x} + 2\sigma_m$ | 61 |   | 181 | 260 |    |    |    | 265 |



871134  
87-2717

6063

5 cm

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

Project: LIUNA J.V.

Title: LOCAL GEOLOGICAL SETTING

SHEET 3

|           |        |             |              |         |        |
|-----------|--------|-------------|--------------|---------|--------|
| Author    | JPR    | Dept.       | TAS          | Scale   | 1:1000 |
| Drawn     | AS     | Date        | 8/87         | Revised | Date   |
| Checked   | Date   | S'ced       | Date         |         |        |
| Sheet No. | FIG 15 | Drawing No. | LJ 10 / 1013 |         |        |

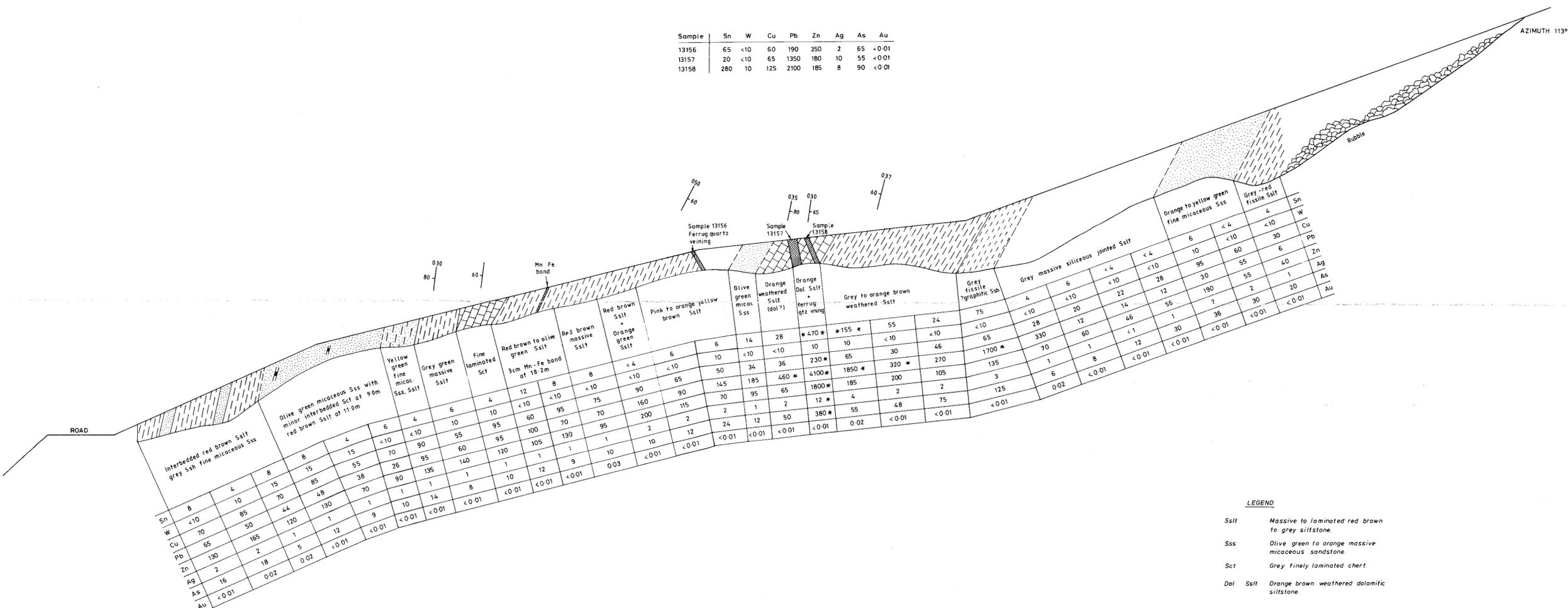




5030 E 5035 E 5040 E 5045 E 5050 E 5055 E 5060 E 5065 E 5070 E 5075 E 5080 E 5085 E 5090 E 5095 E

| Sample | Sn  | W   | Cu  | Pb   | Zn  | Ag | As | Au    |
|--------|-----|-----|-----|------|-----|----|----|-------|
| 13156  | 65  | <10 | 60  | 190  | 350 | 2  | 65 | <0.01 |
| 13157  | 20  | <10 | 65  | 1350 | 180 | 10 | 55 | <0.01 |
| 13158  | 280 | 10  | 125 | 2100 | 185 | 8  | 90 | <0.01 |

AZIMUTH 113°



| Sn    | W    | Cu   | Pb    | Zn    | Ag    | As    | Au    |
|-------|------|------|-------|-------|-------|-------|-------|
| 8     | 10   | 8    | 15    | 8     | 1     | 1     | 1     |
| <10   | 85   | 44   | 85    | 38    | 26    | 95    | 140   |
| 70    | 50   | 120  | 1     | 9     | 10    | 14    | 10    |
| 65    | 165  | 1    | 12    | <0.01 | <0.01 | <0.01 | <0.01 |
| 130   | 2    | 5    | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| 2     | 18   | 0.02 | 0.02  | <0.01 | <0.01 | <0.01 | <0.01 |
| 16    | 0.02 | 0.02 | 0.02  | <0.01 | <0.01 | <0.01 | <0.01 |
| <0.01 |      |      |       |       |       |       |       |

**LEGEND**

Sslt Massive to laminated red brown to grey siltstone.

Sss Olive green to orange massive micaceous sandstone.

Sct Grey finely laminated chert.

Dol Sslt Orange brown weathered dolomitic siltstone.

Analyses: Cu } AAS } XRF  
 Zn }  
 Ag }  
 Au } F.A. }  
 Pb }  
 As }  
 Sn }  
 W }

Anomalous value (subjective)

0 5 Metres  
Scale

871137

5 cm

87-2717

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

Project: LUINA

Title: FALLS CREEK AREA  
COSTEAN PROFILE 4070N

|           |         |             |                 |         |
|-----------|---------|-------------|-----------------|---------|
| Author    | J.P.R.  | Dept.       | Scale           | 1:100   |
| Drawn     | O.H.    | Date        | 8/87            | Revised |
| Checked   |         | Date        |                 | S'ced   |
| Sheet No. | FIG. 18 | Drawing No. | D / LJ 10 / 004 |         |

6066

5030 E 5035 E 5040 E 5045 E 5050 E 5055 E 5060 E 5065 E 5070 E 5075 E 5080 E 5085 E

5075E 5080E 5085E 5090E 5095E 5100E 5105E 5110E 5115E 5120E



0 5 Metres  
Scale

871138

5 cm

87-2717

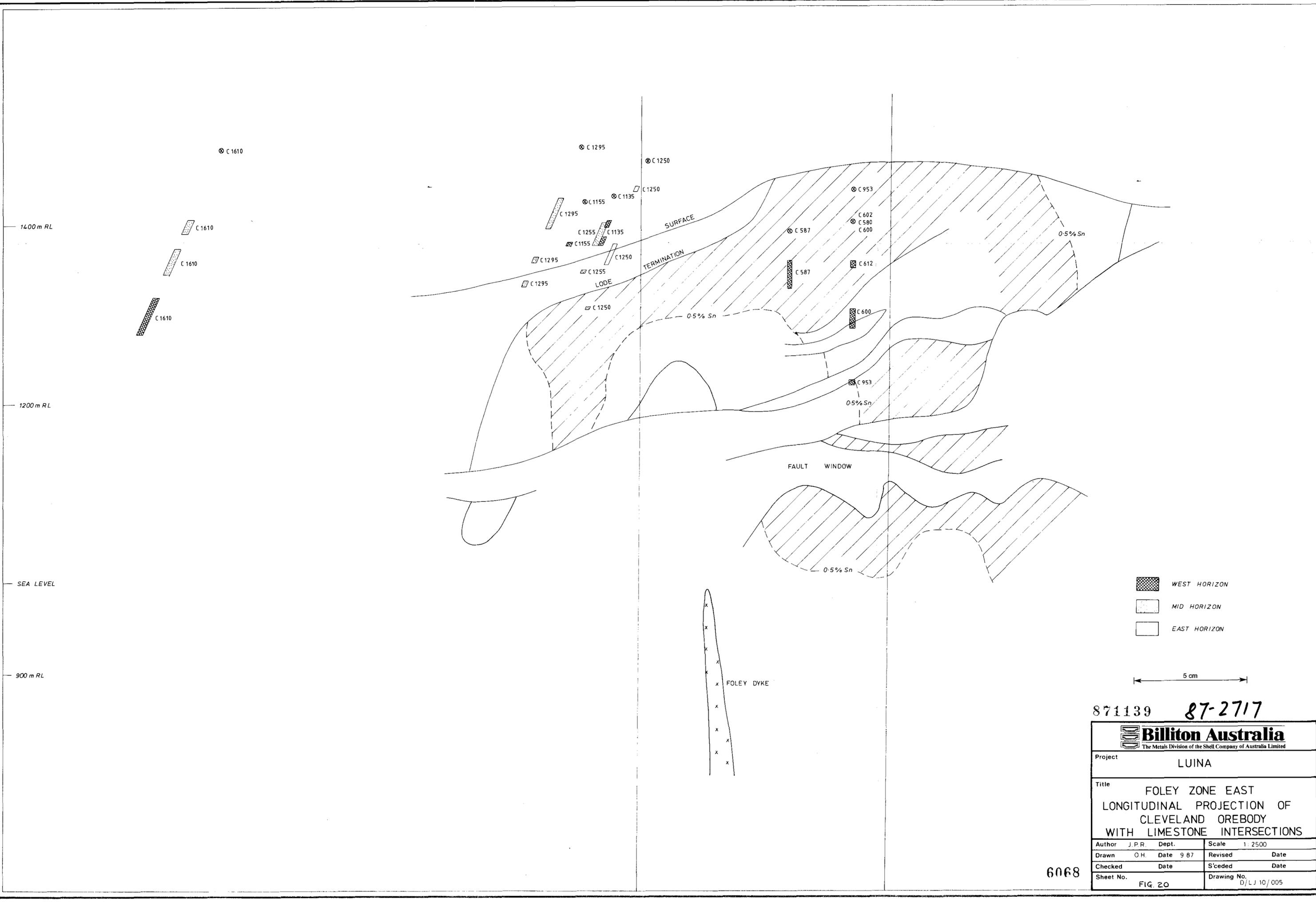
**Billiton Australia**  
The Metals Division of the Shell Company of Australia Limited

Project: LUINA

Title: FALLS CREEK AREA  
COSTEAN PROFILE RA2

|           |         |             |               |         |       |
|-----------|---------|-------------|---------------|---------|-------|
| Author    | J.P.R.  | Dept.       | TAS           | Scale   | 1:100 |
| Drawn     | O.H.    | Date        | 8/87          | Revised | Date  |
| Checked   | Date    | S'ceded     | Date          |         |       |
| Sheet No. | FIG. 19 | Drawing No. | D/LJ 10 / 002 |         |       |

5075E 5080E 5085E 5090E 5095E 5100E 5105E 5110E 5115E 5120E



1400 m RL  
1200 m RL  
SEA LEVEL  
900 m RL

 WEST HORIZON  
 MID HORIZON  
 EAST HORIZON

5 cm

871139 87-2717

|                                                                                                                                                        |         |           |                         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------|-------------------------|
| <br>The Metals Division of the Shell Company of Australia Limited |         |           |                         |
| Project                                                                                                                                                |         | LUINA     |                         |
| Title                                                                                                                                                  |         |           |                         |
| FOLEY ZONE EAST<br>LONGITUDINAL PROJECTION OF<br>CLEVELAND OREBODY<br>WITH LIMESTONE INTERSECTIONS                                                     |         |           |                         |
| Author                                                                                                                                                 | J.P.R.  | Dept.     | Scale 1:2500            |
| Drawn                                                                                                                                                  | O.H.    | Date 9 87 | Revised Date            |
| Checked                                                                                                                                                | Date    | S'ceded   | Date                    |
| Sheet No.                                                                                                                                              | FIG. 20 |           | Drawing No. D/LJ 10/005 |

6068