DRIFFIELD MINING PTY LTD

FINAL REPORT

EL 7157

PREPARED BY

MINING MANAGEMENT SERVICES PTY LTD

15 April 1994

CONTENTS

1.0 INTRODUCTION

Exploration Licence (EL) 7157 was granted to The Shell Company of Australia Limited (Billiton) for a period of three (3) years, on the 17 December 1990.

In accordance with statutory requirements, this report documents all work conducted during the period of tenure to 17 December 1993 in respect to that portion of the tenement relinquished and not subject to retention by way of Applications for Mineral Claims.

Exploration Licence 7157 originally comprised four graticular blocks covering an area of approximately 13 sq km. The area was reduced to two blocks as a result of compulsory relinquishment at the end of the first year. Driffield Mining Pty Ltd ("Driffield") marked out 9 Mineral Claims, each 39.063 hectares in area, within the boundary of Exploration Licence 7157 prior to the expiration of the third year (MCN 4714 to 4722 inclusive). The balance of the area was relinquished on expiration of the period of tenure.

The license is located approximately 50 kilometres east of Pine Creek, 24 kilometres north east of Zapopan's Batman gold deposit (Mt Todd) and 15 kilometres north of the historic Driffield gold mining area. Access to the area is via a gravel road which turns off the Stuart Highway 3.5 km northeast of the Edith River crossing. Access within the area is via bush tracks and generally difficult.

An application to transfer ownership of the tenement to Driffield Mining Pty Ltd was lodged in November 1992.

This report details all work conducted within the boundaries of Exploration License 7157 during the period of tenure, with the exception of work conducted during the third year of tenure by Driffield within the boundaries of the Mineral claims applied for by Driffield.

2.0 GEOLOGY

2.1 Regional Geology

Exploration licence 7157 is situated in the southern portion of the Pine Creek Geosyncline. Burrell Creek Formation outcrops in the southern, eastern and northern portions of the original licence area.

The unit is comprised predominantly of greywacke, siltstone and minor conglomerate. Deformation and regional greenschist facies metamorphism of the geosynclinal sediments occurred subsequent to intrusion by granitoids of the Cullen Batholyth. An isolated cupola, designated part or the Wolfram Hill Granite, is considered to belong to the Cullen Batholyth and is exposed over approximately 70 per cent of the original tenement area. Upon intrusion of the granitic phases, the adjacent metasediments were contact metamorphosed to hornblende facies.

2.2 Local Geology

During the three years to 17 December 1994, reconnaissance mapping was conducted over a grid approximately 1.8 km long by 1.0 km wide, which was intended to allow ground followup of the aeromagnetic anomaly discovered in the course of a regional airborne geophysical survey conducted by Billiton Australia in April 1990. One main north easterly trending aeromagnetic anomaly (the Batman trend) was outlined from the survey. This anomaly extends from the southern margin of the original licence area over a strike length of approximately 900 meters. This anomaly was considered to be highly significant as it occurred along a north easterly trend, near the margin of a large intrusive body. The major part of the anomaly is within the boundaries of the 9 Mineral Claims, each 39.063 hectares in area marked out by Driffield.

2.2.1 Stratigraphy

In addition to the silicified and often chloritized greywacke and siltstone typical of the metasediments of the Burrell Creek Formation, weakly banded to disseminated magnetite bearing lithologies were observed in the grid area. These rocks appear to have been locally contact metamorphosed to hornblende - hornfels facies, evidenced by the existence of relict cordrite porphyroblasts up to at least 1 kilometre south of the granite/metagranite contact.

2.2.2 Structure

Although visible stratigraphic layering is largely obliterated within the hornblende - hornfels facies zone, there were indications that bedding generally dips 80 to 140 degrees north of grid 10900N, contrary to the observed bedding orientations south of grid 10900N in which bedding generally dips 65 to 210-250 degrees. Accordingly a steep, southerly plunging antiformal structure was interpreted. A strong, pervasively developed, southerly dipping cleavage was also observed, suggesting an additional east - west trending phase of folding may also have occurred in the region.

3.0 MINING HISTORY

The Wolfram Hill and Hidden Valley regions have been moderate sized centres for metal production in the past, in particular tungsten, tin and copper with minor lead and silver. Historically gold has not been mined economically in the area but anomalous results have been recorded from a number of prospects.

Tin mining and economic mineralisation in the area has been confined to the Hidden Valley area, south of the Wolfram Hill Granite. Tin occurs as fine grained disseminated cassiterite in kaolinitic and limonitic fault breccias of hornfelsed greywacke of the Burrell Creek Formation. The fault breccias trend between 100 to 140 degrees and dip steeply north, crosscutting bedding which strikes 300 degrees. The tin lodes often occur as narrow discontinuous systems which pinch out at shallow depths.

4.0 EXPLORATION HISTORY

Exploration License 7157 was strategically located over a historic mining field in which little systematic exploration had been conducted up to recent times. Whilst the region was a centre for tin, tungsten and minor lead/silver mining in the early 1900's, no gold production had been recorded and no real attempt to explore for gold had been made.

The are lies within a much larger gold-mineralised region (the Batman-Moline area) and the potential for economic grade gold mineralisation was reassessed in the light of the discoveries made at batman to the south west, Driffield to the south and Moline to the north.

The first large scale exploration program in the area was conducted by the Northern Territory Geophysical Survey Team in 1938. That program focussed on the northern contact of the Wolfram Hill granite, in the vicinity of the Wolfram Hill tungsten mine and surrounding area. The immediate aim of the survey was to trace probable continuation of the main tungsten bearing reef. The survey used Potential Ratio, Magnetic and Self Potential geophysical techniques.

Geopeko conducted a small exploration program in the area in 1968 but received little encouragement.

Driffield undertook a selective rockchip sampling and reconnaissance program over the old mine workings and prospective areas in 1988 (Exploration Licence 4730). The program carried out in 1988 included:

- a regional west-east rock chip geochemistry program from the main north south access road (which passes through the centre of the original area of Exploration Licence 7157) to the contact with the Wolfram Hill Granite 2.5 kilometres to the east.

- mapping and sampling of the Kelly's tin prospect.

Gold results for the regional traverse were low (80 ppb) and appeared to downgrade the potential for large scale economic grade gold mineralisation in the area. Results suggested an association of gold with anomalous tungsten values. The area within Exploration Licence 7157 exhibits poor outcrop however and these results should be interpreted in that context.

No work was conducted by Driffield in that portion of EL 4730 subsequently encompassed by EL 7157 during 1989. The Shell Company of Australia Limited ("Shell") entered into a joint venture agreement with Driffield in respect to Exploration License 4730 on October 1989 and thereafter Billiton Australia, (the Metals Division of Shell) became the managers. The area of EL 4730 subsequently encompassed by EL 7157 was relinquished by the joint venture in January 1990.

Following identification of the aeromagnetic anomaly as part of a regional campaign by Shell in 1990, Shell (in its own name and not as manager of the joint venture) made application for and was granted EL 7157 for a period of three (3) years, on the 17 December 1990.

5.0 EXPLORATION CONDUCTED DURING THE TERM OF EL 7157

Work completed during the first year of tenure (1991) included airborne geophysical and ground magnetic surveying, stream sediment, soil sediment and rock chip sample exploration geochemistry and reconnaissance geological mapping. The results of these programs were reported in the Annual Report for EL 7157, prepared by Billiton, and dated November 1991 which appears as Appendix 1. The main results were as follows:-

- aeromagnetic identified a northeastly trending aeromagnetic anomaly, extending from the southern margin of the tenement over a strike length of approximately 900 meters

- a ground magnetic survey designed to further define the anomaly delineated from the aeromagnetic survey. The magnetic anomaly was shown to strike approximately grid north south and modelling indicated that the source may have a top depth of 150 to 200 meters and variable but probably steep dips.

- soil geochem (on 5 to 100 meter composite samples) identified four anomalous zones.

- within the grid (11000 to 11200N), the magnetic anomalies are coincident with soil anomalies of upto 102 ppb Au. No surface expression of significant gold mineralisation was observed at this location. Composite and selective rock chip sampling of vein and host rock material within this area has recorded consistently anomalous values of upto 1.27 gpt Au.

- weakly banded to disseminated magnetite bearing lithologies were observed proximal to the position of the ground magnetic anomaly and are a possible source for the anomalies.

- a line of ground electromagnetic was completed across the main geochemically anomalous zone and the magnetic anomaly. The key objective was to determine if the magnetic and geochemical responses reflected a gold bearing pyrrhotite - quartz vein system, similar to that at Mt Todd. The TEM profiles did not indicate the presence of any "economic- sized" conductors. The survey line was sub-parallel to geological strike and thus thin conductors parallel to geological strike may not have detected. It was concluded that there were no conductors associated with the magnetic and geochemical anomalies.

- the grid northeast trending soil anomaly in the southeastern portion of the grid appears to be derived from a series of weakly and sporadically mineralised (0.2 to 2.0 gpt Au), narrow (0.1 to 2 meters wide), bedding concordant, sulphide poor quartz veins and ferruginous breccias which have limited strike (50 to 100 meters). Minor weakly mineralised, sulphide poor stockwork and sheeted veining, stratigraphical confined to intensely chloritised and silicified greywacke units, also appears to occur in narrow (2 to 3 meter wide) zones

- the grid northwest trending soil anomaly in the southeastern portion of the grid was coincident with rock chip samples returning values of between 0.06 to 0.15 gpt Au. No obvious coincident trending zone was observed.

- the grid northeast trending soil anomaly in the southwestern portion of the grid was coincident with composite rock chip samples returning values between 0.04 and 3.64 gpt Au.

Work completed during the second year of tenure (1992) focussed of the presence of strong soil anomalies which, in Driffield's opinion, warranted further investigation despite the results of the 1991 program which targeted a recurrence of Mt Todd style mineralisation. This possibility was suggested by the aeromagnetic anomaly, favourable local setting and coincident soil anomalies. Although TEM appeared to have ruled out this type of mineralisation exploration during the 1991 year completed sought to identify the source of the anomalous results. As a result of some uncertainty in respect to transfer of the tenement to its present owners there was some delay in commencement of the program and follow up reconnaissance drilling planned for the period completed was deferred.

A program of detailed soil sampling and chip sampling of outcrop in the area of soil anomalies identified by Shell was conducted. As this area is within the boundaries of Mineral Claims applied for by Driffield, the results of this program remain confidential. Based on the results obtained it is intended that a program of reconnaissance drilling be undertaken.

No further exploration work was undertaken in the areas not now subject of Mineral Claims during the third year of tenure (1993).

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

ANNUAL REPORT FOR EXPLORATION ON E.L. 7157 - MOUNTAIN VIEW

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C O N T E N T S

L I S T O F F I G U R E S

LIST OF APPENDICES

SUMMARY

Tenure of Exploration Licence (EL) 7157 - Mountain View was granted to The Shell Company of Australia Ltd for a period of three (3) years, on the 17th December 1990. The tenement comprises an area of 13 square kilometres which is located approximately 60 kms due north of Katherine, NT.

The area was originally part of the Wolfram Hill JV, but was dropped as part of a compulsory half area reduction on Wolfram Hill due to negative results.

During 1990 a regional aeromagnetic survey was flown over the Mountain View region. The results of this survey showed a significant magnetic high occurring to the immediate southwest of the Wolfram Hill Granite. This anomaly occurs approximately 25kms to the northeast of Mt Todd.

Early Proterozoic, turbiditic metasediments of the Burrell Creek Formation outcrop in the southern, eastern and northern extremities of the tenement area. The metasediments appear to have been deformed by at least two generations of folding in which the first produced folds with north-south trending axis and the second produced east-west trending folds which accompanied development of a strong, pervasively developed, fracture cleavage.

Following regional greenschist facies metamorphism and synchronous deformation, the geosynclinal metasediments were intruded by syn to post orogenic granitoids of the Cullen Batholith. An isolated cupola, designated part of the Wolfram Hill Granite, is considered to belong to the Cullen Batholith and outcrops over the majority of the licence area.

Upon intrusion of the granitic phases the adjacent metasediments were contact metamorphosed to hornblende hornfels facies.

Several relatively small mining prospects occur within and proximal to EL 7157 from which gold, copper, tungsten, tin, lead and silver was produced.

1.0 INTRODUCTION

Tenure of Exploration Licence (E.L.) 7157 - Mountain View was granted to The Shell Company of Australia Limited for a period of three (3) years, on the 17th December 1990. In accordance with statutory requirements, this report documents all work conducted on the tenement up to the first anniversary, the 17th December 1991, and details proposed exploration within EL 7157 in the second year of tenure.

Exploration Licence 7157 is comprised of four (4) graticular blocks which cover an area of 13 square kilometres. The tenement is located approximately 60 kms due north of Katherine, Northern Territory (Figure 1).

Access is gained via a vehicle track which turns off the Edith Falls Road, approximately 7km due east from the Edith Falls Road - Stuart Highway turn-off.

The topography of the tenement strongly reflects the geology of the tenement in which the area encompassing the Wolfram Hill granite is characterized by generally low relief but to the contrary, the surrounding contact metamorphosed metasediments define well dissected terrain of high relief.

2.0 GEOLOGY

2.1 Regional Geology

Exploration Licence 7157 is situated in the southern portion of the Pine Creek Geosyncline. The Burrell Creek Formation, which is the youngest unit of the Early Proterozoic geosynclinal sequence, outcrops in the southern, eastern and northern portions of the licence area (Figure 2).

The unit represents a turbiditic sequence, predominantly comprising of greywacke, siltstone and minor conglomerate. Deformation and regional greenschist facies metamorphism of the geosynclinal sediments occurred subsequent to intrusion by syn to post-orogenic granitoids of the Cullen Batholith. An isolated cupola, designated part of the Wolfram Hill Granite, is considered to belong to the Cullen Batholith and is exposed over approximately 70% of the tenement area. The granite is described as being a pink, coarse, equigranular biotite leucogranite.

Upon intrusion of the granitic phases the adjacent metasediments were contact metamorphosed to hornblende hornfels facies.

2.2 Local Geology

Reconnaissance mapping was conducted over a grid approximately 1.8 km long x 1.0 km wide which was designed to allow ground followup of the aeromagnetic anomaly (discussed in Section 4.1.1). The baseline of the grid is orientated towards 042^0 magnetic with crosslines being orientated perpendicular to this at 132^0 magnetic.

2.2.1 Stratigraphy

Metasediments of the Burrell Creek Formation, which predominate throughout the grid area, generally comprise of silicified and often chloritized greywacke and siltstone, of which the latter is commonly strongly cleaved. In addition to these rocks weakly banded to disseminated magnetite bearing lithologies have been observed in the grid area (Grid coordinates 1100N 10630E, Figure 3) - (Refer to Section 4.2 Ground Magnetics).

These rocks appear to have been locally contact metamorphosed to hornblende-hornfels facies, evidenced by the existence of relict corderite porphyroblasts up to at least 1km south of the granite/metasediment contact. The approximate contact metamorphic boundary is shown in Figure 3.

2.2.2 Structure

Although visible stratigraphic layering is largely obliterated within the hornblende hornfels facies zone, there is indications that bedding generally dips 80^0 -> 140^0 (ie. strike 050^0) grid north of 10900N, 10500E. This is contrary to observed bedding orientations grid south of 10900N in which bedding generally dips 65^0 -> 210^0-250^0 (ie. strike 120^0-160^0). From this apparent difference in bedding orientation a steep, southerly plunging antiformal structure is interpreted, as shown in Figure 3. A strong, pervasively developed, southerly dipping cleavage (-70 -> 115^0) was observed suggests, an additional, east-west trending phase of folding may have occurred in the Mountain View region (see Figure 2 - contour stereoplot)

3.0 MINING AND EXPLORATION HISTORY

Historically, several, relatively small mining prospects occur within and proximal to EL 7157 from which copper, tungsten, tin, lead, silver and gold was produced.

From within the metasediments, on the south western side of the Wolfram Hill Granite, a small amount of tungsten concentrate has been produced from the Mountain View mine between 1918 and 1920. The ore (wolframite) occurs in small elongate and discontinuous shoots or as isolated crystals within intensely kaolinised pegmatitic veins, which vary in width between 0.5cm - 0.5m. The veins consistently dip 35^0 -> 070 (ie. strike 160^0) for which grades of up to 60% W have been reported.

A small amount of tin and tungsten was also produced from within the Wolfram Hill Granite.

4.0 WORK COMPLETED

Work completed on EL 7157, during the first year of tenure, included airborne geophysical and ground magnetic surveying, stream sediment, soil and rock chip sample exploration geochemistry and reconnaissance geological mapping.

4.1 Airborne Geophysics

An airborne geophysical survey was completed over the Mountain View area, as part of a larger regional programme in April, 1990. Both aeromagnetic and radiometric data was acquired for which contoured plans at 1:50 000 scale are shown in Figures 4 & 5, respectively. The survey was conducted by Austirex for which the specifications are as follows:

- Flight line spacing 300 metres
- Survey height 80 metres
- Flight line directions EW
- Spectrometer 33.6 litres

Image processing was carried out by GeoImage, Brisbane and inhouse at Billiton, Melbourne.

4.1.1 Aeromagnetics

One main north easterly trending aeromagnetic anomaly was outlined from the survey which extends from the southern margin of the licence area over a strike length of approximately 900m (Figure 4). This anomaly was considered to be highly significant as it occurred along a north easterly trend, near the margin of a large intrusive body.

4.1.2 Airborne Radiometrics

Total count contour plans, shown in Figure 5, clearly display the strong response given by the Wolfram Hill Granite, which is exposed near the central southern margin of the licence area. This response is probably generated from the reported U-rich nature of the granite and varied K and Th content.

4.2 Ground Magnetics

A ground magnetic survey was conducted over the Mountain View grid area in order to further define the anomaly delineated from the aeromagnetic survey. Magnetic responses were recorded at 10m intervals along 100-200m spaced traverses, for which the filtered and contoured data is shown in Figure 6. The magnetic anomaly is shown to strike approximately grid north-south and modelling of the sources along lines 11000N and 11200N indicates that they may have a top depth of 150 - 200m and variable but probably steep dips.

Within close proximity to grid coordinates 11000N, 10500E and 11200N, 10500E the magnetic anomalies are coincident with 100m composite soil anomalies of up to 102ppb Au (Refer to Section 4.5 - Soil Geochemistry). However, no surface expression of significant gold mineralization was observed at that location.

Weakly banded to disseminated magnetite bearing lithologies were observed proximal to the position of the ground magnetic anomaly (Grid coordinates 10630E, 11000N) and are considered to be a possible source for the anomalies.

4.3 Ground Electromagnetics

A line of ground electromagnetics was completed across the main geochemically anomalous zone and the magnetic anomaly on the Mountain View grid. The key objective being to determine if the magnetic and geochemical responses reflected a gold bearing pyrrhotite-quartz vein system, similar to that at Mt Todd, at depth. The survey specifications and results are given in Appendix I.

4.4 Stream Sediment Sample Geochemistry

Active stream sediment samples were collected from 12 locations within and proximal to the margin of EL 7157, between May to August 1990 (Figure 7).

From each site a 5kg sample of material sieved to -14 mesh was analysed for gold. The analysis was conducted by Australian Assay Laboratories at Pine Creek using the bottle roll cyanide leach method. Additionally, a 200g sample of -80 mesh material was analysed for Ag, Zn, Pb, Cu, (AAS) and Sn, W, Bi and As (XRF).

Results of up to 23.9 ppb Au were received for samples screening the south western portion of EL 7157, however this sample was one of a batch of samples that returned extremely anomalous values. One such sample, near the eastern boundary of the tenement, returned a value of 2600 ppb Au.

Due to the extremely high values received, both proximal to EL 7157 and within adjacent tenements during the regional sample program, AAL, Pine Creek, were asked to check the results by:

1) refiltering of the liquor and reassay
2) pulverising the residue of the sample not used in the original BLEG determination followed by low level FAS assay.

On checking the liquors, the pH of some samples was found to be below the desired level. This can theoretically lead to the retention of some Fe^{3+} ions in solution which then are concentrated in the ketone layer during a DIBK extraction.

As Fe has a very similar band to Au in AAS determinations this can result in effectively an Fe + Au assay.

To check this AAL added additional lime to some liquors, refiltered and repeated the extraction and assays.

Additionally routine checks were conducted on field assistant sampling methods, jewellery and other likely causes of contamination. No methodology or contamination problems were uncovered.

Key points that evolved out of the investigation were:-

1) The repeat assays of the liquor and the increased pH liquors confirmed the original results. No evidence of Fe contamination.

2) The FAS values were substantially lower than the BLEG results.

3) No single field assistant took all of the anomalous samples.

Due to the discrepancy between BLEG and FAS results resampling of some of the anomalous stream sites was undertaken. This methodology was implemented as part of a regional check on highly anomalous sample results, within the region, as part of the earlier regional sampling program.

Resampling drastically downgraded the prospectivity of the licence area and the surrounding region, however, due to the anomalous geophysical response from the Mountain View area followup was considered justified and was subsequently implemented with soil sample geochemistry.

4.5 Soil and Rock Chip Sample Geochemistry

Soil sampling was conducted over the Mountain View grid in which 2kg composite (5 into 100m) samples, sieved to -10 mesh were taken along 0.1 - 0.2 km spaced, 1.0 - 1.4 km long traverses. The analysis was conducted by Classic Laboratories at Darwin NT. using the bottle roll bulk cyanide leach method. A contour plot of soil sample gold concentrations is shown in Figure 8.

Anomalous results (up to 102 ppb Au) received between and inclusive of lines 10900N and 11200N generally show good correlation with sites of old tungsten workings (refer to Figure 3 - Mountain View Grid Geology).

Composite and selective rock chip sampling of vein/host rock material within this area has recorded consistently anomalous, however subeconomic, assay values of up to 1.27 g/t Au.

Two anomalous trends (grid northwest and grid northeast) are evident in the central eastern portion of the grid and south of Line 10900N. Rock chip samples taken in the former received values of between 0.06 - 0.15 ppm Au and although no obvious grid northeasterly trending zone was observed, appears to explain the source of the anomaly.

It appears that the laterally extensive grid northwesterly trending soil anomaly in the southeastern portion of the grid area is derived from a series of weakly and sporadically mineralized (o.2 - 2.0 ppm Au), narrow (0.1 - 2.0m wide), bedding concordant sulphide poor quartz veins and ferruginous breccias which have limited strike extents (50 - 100m). Minor weakly anomalous generally sulphide poor, stockwork and sheeted veining also appears to occur in narrow zones (2 - 3m) which are stratigraphically confined to intensely chloritized and silicified greywacke units.

Composite rock chip sample in the area encompassing the grid northeasterly trending soil anomaly (~20ppb), in the southwestern portion of the grid, has returned values of 0.04 - 3.64 ppm Au.

Resampling of the site from which the 3.64 ppm Au result was recorded failed to repeat this assay value with individual repeat samples recording values of 0.04 and 0.06 ppm Au, respectively. In addition, sampling in close proximity, both along strike and perpendicular to strike, generally downgraded the initial high result with only background values of <0.01 ppm Au being recorded.

Sample material generally comprised of chloritized and silicified greywacke, massive, milky white, anhedral quartz and minor quartz-goethite veining.

5.0 CONCLUSION

Exploration involving airborne and ground based geophysics, stream sediment, soil and rock chip sample exploration geochemistry and reconnaissance geological mapping has been conducted within Exploration Licence 7157 - Mountain View, during the first year of tenure.

6.0 EXPENDITURE STATEMENT

EL 7157 - MOUNTAIN VIEW
PERIOD FROM 17.12.90 TO 16.12.91

	$
Staffing - Regional office	24,213
Support - Regional office	9,618
Tenement	20
Geophysical Surveys	4,464
Analyses	3,255
Geological Engineering, Drafting, & Computer Costs	-
Overheads	4,157
TOTAL EXPENDITURE	**$45,727**

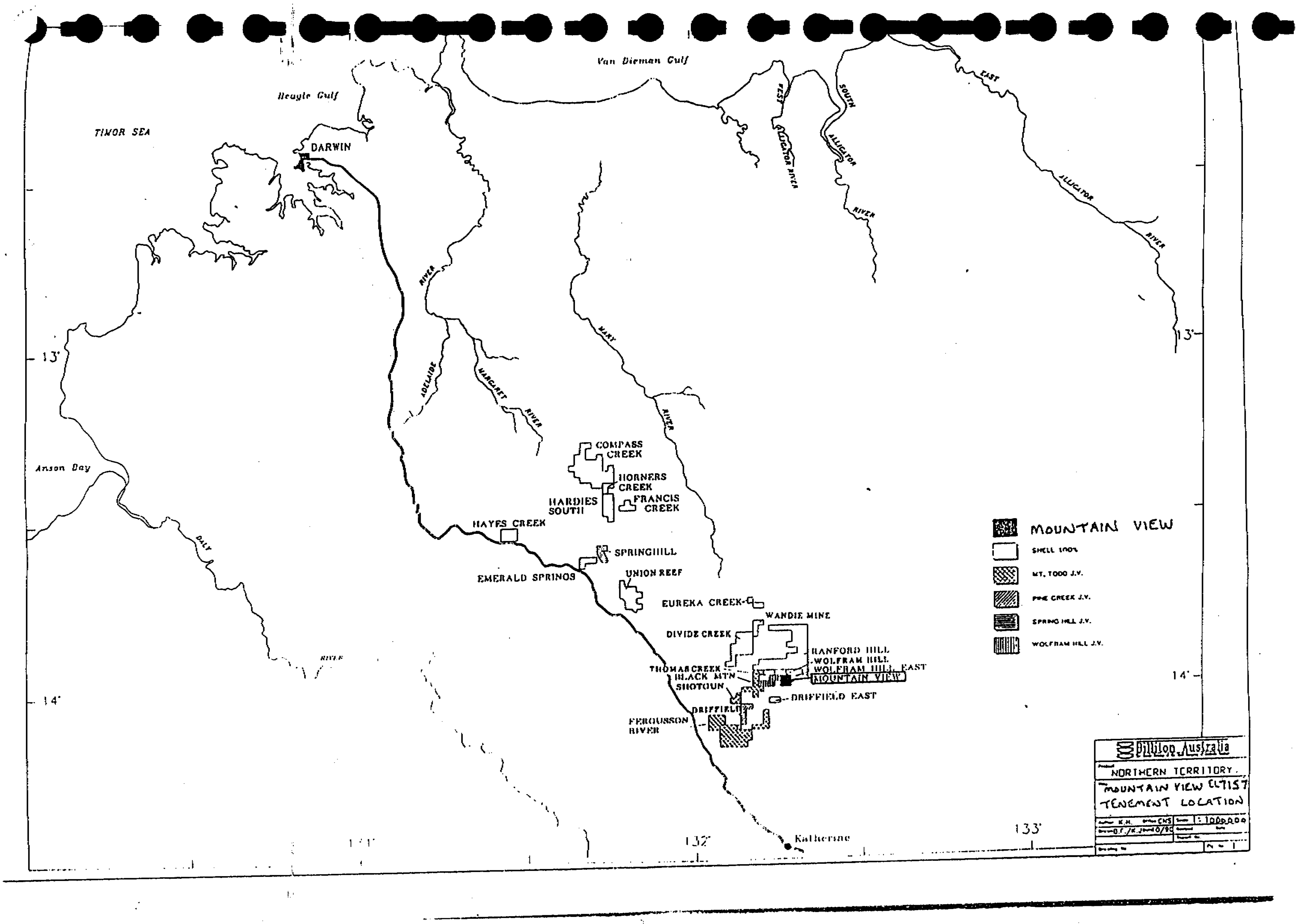
7.0 PROPOSED EXPENDITURE & EXPLORATION

The exploration program proposed for the second year of the licence (Licence 7157) will focus on the areas of identified soil and geomagnetic anomalies.

Whilst the prospectivity of the area has been downgraded int he light of the results of the first year's program, the area does warrant further investigation. Accordingly, the program proposed for the second year will consist of:-

- detailed geological mapping
- followup rock chip sampling
- reconnaissance drilling
- bedrock sampling.

The budget proposed for these activities is $15,000.



Van Dieman Gulf
Beagle Gulf
TIMOR SEA
DARWIN
EAST
WEST
SOUTH
ALLIGATOR RIVER
ALLIGATOR
RIVER
RIVER
ALLIGATOR
RIVER
MARY
RIVER
ADELAIDE
RIVER
MARGARET
RIVER
Anson Bay
DALY
RIVER
COMPASS CREEK
HORNERS CREEK
HARDIES SOUTH
FRANCIS CREEK
HAYES CREEK
SPRINGHILL
EMERALD SPRINGS
UNION REEF
EUREKA CREEK
WANDIE MINE
DIVIDE CREEK
RANFORD HILL
WOLFRAM HILL
WOLFRAM HILL EAST
THOMAS CREEK
BLACK MTN
MOUNTAIN VIEW
SHOTGUN
DRIFFIELD EAST
DRIFFIELD
FERGUSSON RIVER
Katherine
13°
14°
132°
133°
MOUNTAIN VIEW
SHELL 100%
MT. TODD J.V.
PINE CREEK J.V.
SPRING HILL J.V.
WOLFRAM HILL J.V.
Billiton Australia
NORTHERN TERRITORY.
MOUNTAIN VIEW EL7157
TENEMENT LOCATION
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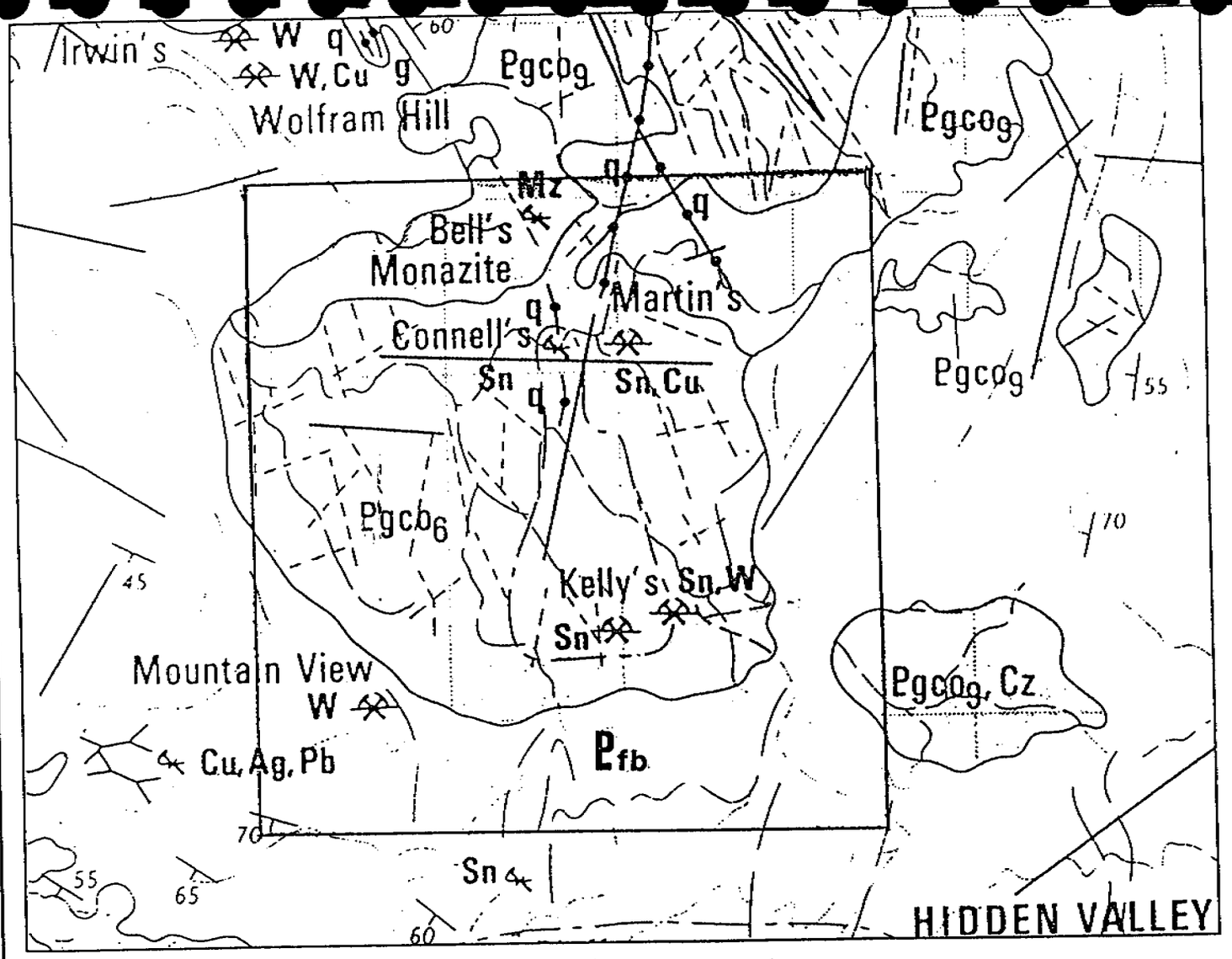


LEGEND

- Geological boundary
- Fault, containing br – breccia, q – quartz, qb – quartz breccia
- Shear zone
- Dyke or vein: sp – aplite, d – dolerite, f – felsite, g – greisen, lp – lamprophyre, peg – pegmatite, q – quartz, qb – quartz breccia, sy – syenite

- Strike and dip of strata
- Vertical strata
- Horizontal strata
- Strike and dip of overturned strata
- Strike and dip of strata, dip 5° to 15°
- Strike and dip of strata, dip 15° to 45°
- Trend line
- Lineament
- Joint pattern

(airphoto interpretation)

- Prospect or mine with little production
- Abandoned prospect, no production
- Abandoned mine: ps – position approximate
- Abandoned alluvial workings
- Treatment plant, not operating
- Costean
- Limit of extensive workings

Ag – Silver, Au – Gold, Bi – Bismuth, Cd – Cadmium, Co – Cobalt, Cu – Copper, Mz – Monazite, Pb – Lead, Sn – Tin, U – Uranium, W – Tungsten, Zn – Zinc

SYN–OROGENIC TO POST–OROGENIC GRANITOID INTRUSIONS

Pgco$_6$ — *Pink coarse equigranular biotite leucogranite*

GEOSYNCLINAL STRATA (2000–1870 Ma)

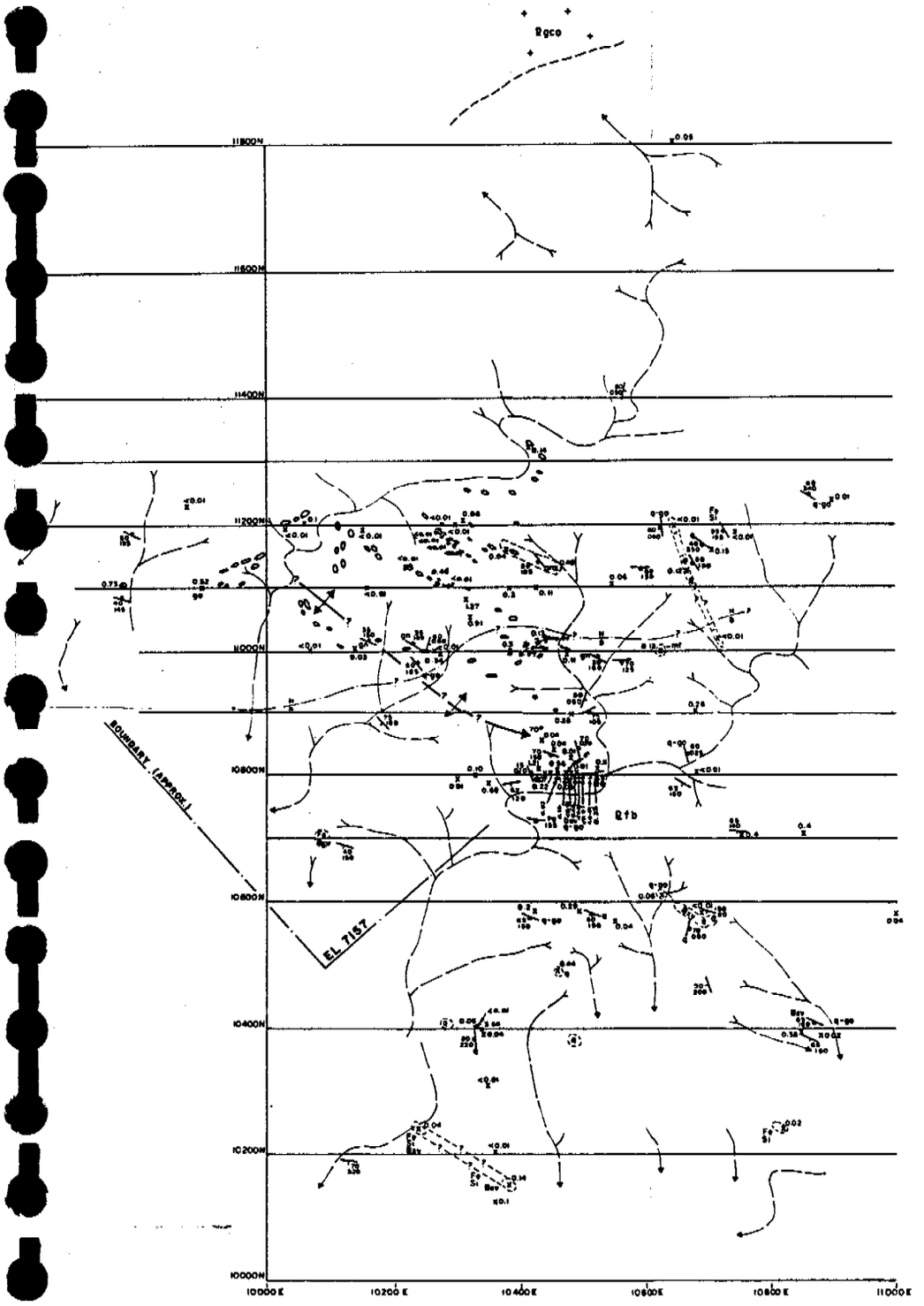
Pfb — *Grey-brown phyllite, slate, and siltstone, fine to coarse feldspathic greywacke; rare volcanolithic pebble conglomerate, and banded green chlorite–magnetite ironstone. Micaceous andalusite and cordierite hornfels common near granite*

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

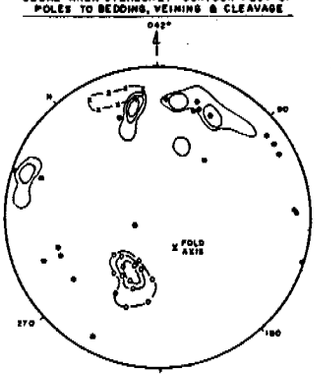
Project: MOUNTAIN VIEW EL 7157

Title: REGIONAL GEOLOGY

Author DK	Date	Scale 1:25000	
Drawn	Office	Revised	Date
Drawing No.		Fig. No. 2	



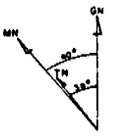
EQUAL AREA STEREONET CONTOUR PLOT OF POLES TO BEDDING, VEINING & CLEAVAGE



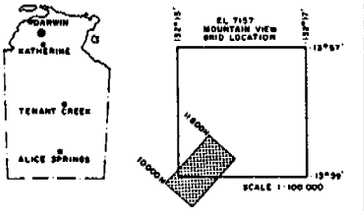
- BEDDING
- CLEAVAGE
- VEINS - QUARTZ, - MUSCOVITE, ± WOLFRAMITE
- POLES TO QUARTZ-SCHEELITE VEINS (NOT CONTOURED)

LEGEND

- STRIKE & DIP OF BEDDING
- STRIKE & DIP OF CLEAVAGE
- STRIKE & DIP OF VEINING
- Qm - GREISEN
- Q-Sc - QUARTZ-SCHEELITE VEIN
- Brx - BRECCIATED VEIN
- STRIKE & DIP OF DOMINANT JOINTING
- WOLFRAMITE WORKING
- STREAM
- INFERRED ANTICLINAL AXIS SHOWING PLUNGE
- CONTACT METAMORPHIC BOUNDARY (APPROX.)
- H - HORNBLENDE HORNFELS FACIES
- B - ALBITE-EPIDOTE FACIES
- PROTEROZOIC: Rgco - WOLFRAM HILL GRANITE; Rfb - BURRELL CREEK FORMATION
- GEOLOGICAL BOUNDARY — P — F INFERRED
- mt - MAGNETITE (WEAKLY BANDED &/OR DISSEMINATED)
- Fe-Si - ALTERATION - Fe - FERRUGINOUS; Si - SILICIFICATION
- ROCK CHIP SAMPLE LOCATION & GOLD RESULT (ppm)



LOCATION DIAGRAM



0 100 200 300 m

Billiton Australia Gold Pty. Ltd.

Project: MOUNTAIN VIEW EL 7157 NORTHERN TERRITORY

Title: GRID GEOLOGY

Author	DK	Date	10/91	Scale	1:5000
Drawn	MS	Office	KATH	Approved	Date
Drawing No.				File No.	3

RANFORD HILL

AIRBORNE GEOPHYSICAL SURVEY

BILLITON AUSTRALIA

Surveyed and compiled by AUSTREX INTERNATIONAL LIMITED
MARCH – MAY 1990
Job No. 2105

austirex

Scale 1:50 000

1 0 1 2 3 4 5 km

AUSTRALIAN MAP GRID

AIRCRAFT
VH-MEH ROCKWELL SHRIKE COMMANDER 500S

MAGNETOMETER
SPLIT BEAM CESIUM SCINTREX V201
RESOLUTION 0.01 nanoTesla
CYCLE RATE 0.2 seconds
SAMPLE INTERVAL 13 metres

SPECTROMETER
256 channel GEOMETRICS GR800B
VOLUME 33.56 litres
CYCLE RATE 1.0 seconds
SAMPLE INTERVAL 65 metres

DATA ACQUISITION
8 CHANNEL WATANABE MC 6700 CHART RECORDER
HEWLETT PACKARD COMPUTER
AUSTIREX DIGITAL ACQUISITION SYSTEM

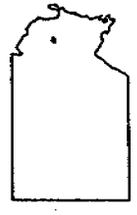
FLIGHT LINE SPACING
TRAVERSE LINES 300 metres
TIE LINES 3000 metres

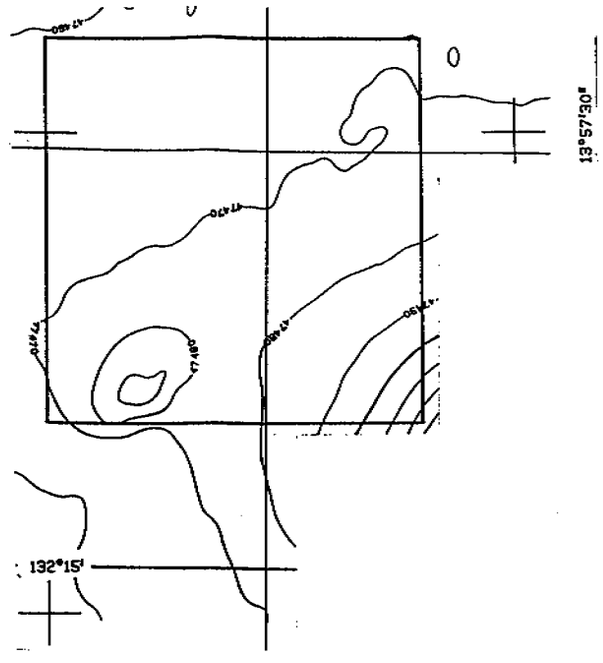
FLIGHT LINE DIRECTION
TRAVERSE LINES 090 – 270 050 – 230 degrees
TIE LINES 180 – 360 140 – 320 degrees

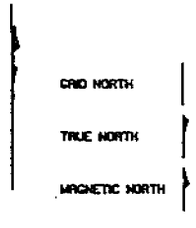
SURVEY HEIGHT
80 metres – MEAN TERRAIN CLEARANCE

NAVIGATION
VISUAL FROM PLANNED FLIGHT STRIPS

FLIGHT PATH RECOVERY
ONTO A.M.G. CONTROLLED PHOTOGRAPHS







North point relationships are shown for the centre of the map. Magnetic north is true for 1990.

GRID/MAGNETIC ANGLE 4°25'39"
GRID CONVERGENCE −0°40'5.83"
SECULAR VARIATION 0°0'18" west per i

TOTAL MAGNETIC INTENSITY

DATA PROCESSING
REGIONAL FIELD IGRF MODEL 1985 REMOVED
GRID CELL SIZE 80 metres
CONTOUR INTERVAL 10 nanoTeslas
PARALLAX CORRECTION 9.98 fiducials
BASE VALUE ADDED 47480 nanoTeslas

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

Project: MOUNTAIN VIEW EL 7157
NORTHERN TERRITORY

Title: AEROMAGNETICS

Author DK	Date 10/91	Scale 1:50 000	
Drawn	Office DRW	Revised	Date
Drawing No.			Fig. No. 4

RANFORD HILL
AIRBORNE GEOPHYSICAL SURVEY
BILLITON AUSTRALIA

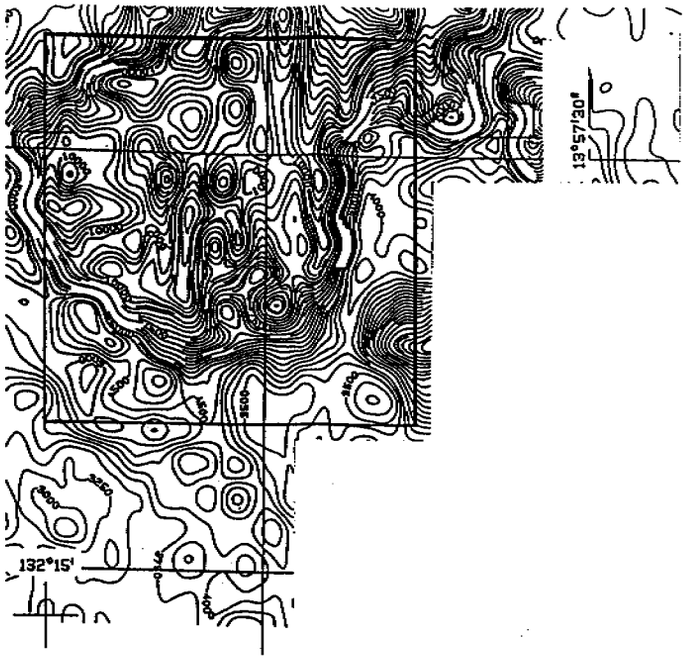
Surveyed and compiled by AUSTIREX INTERNATIONAL LIMITED
MARCH – MAY 1990
Job No. 2105

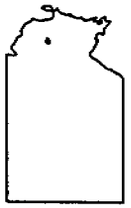
austirex

Scale 1:50 000

1 0 1 2 3 4 5 km

AUSTRALIAN MAP GRID





AIRCRAFT
VH-MEH ROCKWELL SHRIKE COMMANDER 500S

MAGNETOMETER
SPLIT BEAM CESIUM SCINTREX V201
RESOLUTION 0.01 nanoTesla
CYCLE RATE 0.2 seconds
SAMPLE INTERVAL 13 metres

SPECTROMETER
256 channel GEOMETRICS GR800B
VOLUME 33.56 litres
CYCLE RATE 1.0 seconds
SAMPLE INTERVAL 65 metres

DATA ACQUISITION
8 CHANNEL WATANABE MC 6700 CHART RECORDER
HEWLETT PACKARD COMPUTER
AUSTIREX DIGITAL ACQUISITION SYSTEM

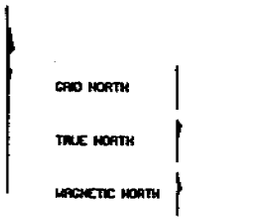
FLIGHT LINE SPACING
TRAVERSE LINES 300 metres
TIE LINES 3000 metres

FLIGHT LINE DIRECTION
TRAVERSE LINES 090 – 270 050 – 230 degrees
TIE LINES 180 – 360 140 – 320 degrees

SURVEY HEIGHT
80 metres – MEAN TERRAIN CLEARANCE

NAVIGATION
VISUAL FROM PLANNED FLIGHT STRIPS

FLIGHT PATH RECOVERY
ONTO A.M.G. CONTROLLED PHOTOGRAPHS



North point relationships are shown for the centre of the map. Magnetic north is true for 1988.

GRID/MAGNETIC ANGLE 4°25'39"
GRID CONVERGENCE -0°40'5.83"
SECULAR VARIATION 0°0'18" west per y

TOTAL COUNT

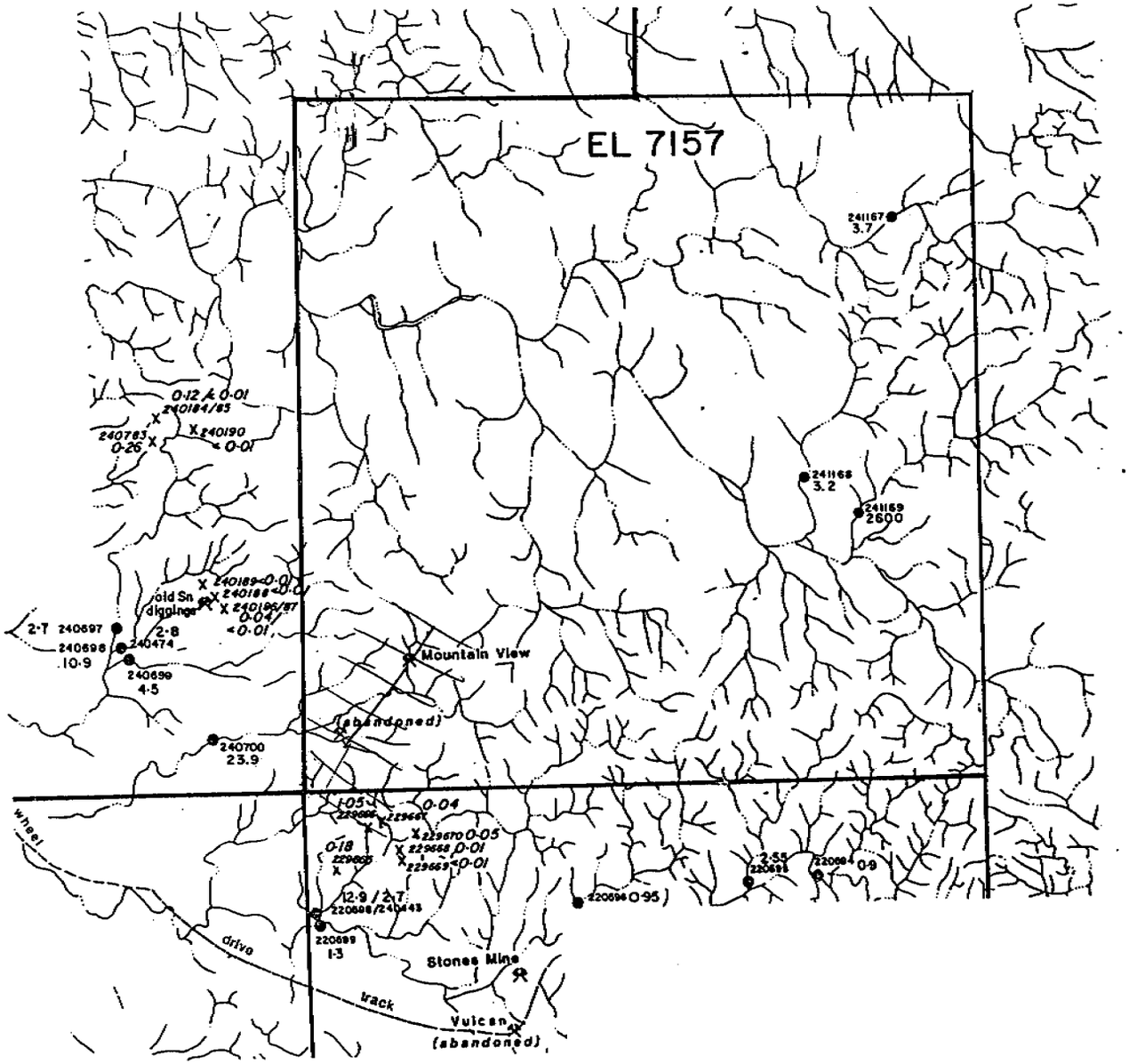
DATA PROCESSING
GRID CELL SIZE 80 metres
CONTOUR INTERVAL 250 counts
PARALLAX CORRECTION 9.98
The total count data have been corrected for aircraft background, atmospheric background, altitude variation and micro levelled.

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

Project: MOUNTAIN VIEW EL 7157
NORTHERN TERRITORY

Title: RADIOMETRICS

Author DK	Date 10/91	Scale	1:50000
Drawn	Office DRW	Revised	Date
Drawing No.			Fig. No. 5



STREAM SEDIMENT RESULTS (ppm)

Sample No.	Cu	Pb	Zn	Ag	As	Sn	Bi	W
220594	16	<5	6	1	120	10	–	–
220595	39	<5	12	1	345	20	–	–
220596	30	<5	18	<1	370	80	–	–
220598	46	26	54	<1	240	30	–	–
220599	31	<5	24	<1	225	335	–	–
240443	–	–	–	–	–	–	–	–
240474	55	130	105	1	125		4	
240697					21	16	<10	17
240699	36	78	78	<1	26	14	<10	12
240700	56	141	83	<1	119	31	50	33
241167					6	149	<10	13
241168					28	66	<10	9
241169					4	48	<10	8

LEGEND:

● - STREAM SEDIMENT SAMPLE LOCATION, NUMBER & GOLD RESULT (ppb)
220598
12.9

X - ROCK CHIP SAMPLE LOCATION, NUMBER & GOLD RESULT (ppm)
229656
1.05

0 0.5 1.0 1.5K

LOCATION PLAN

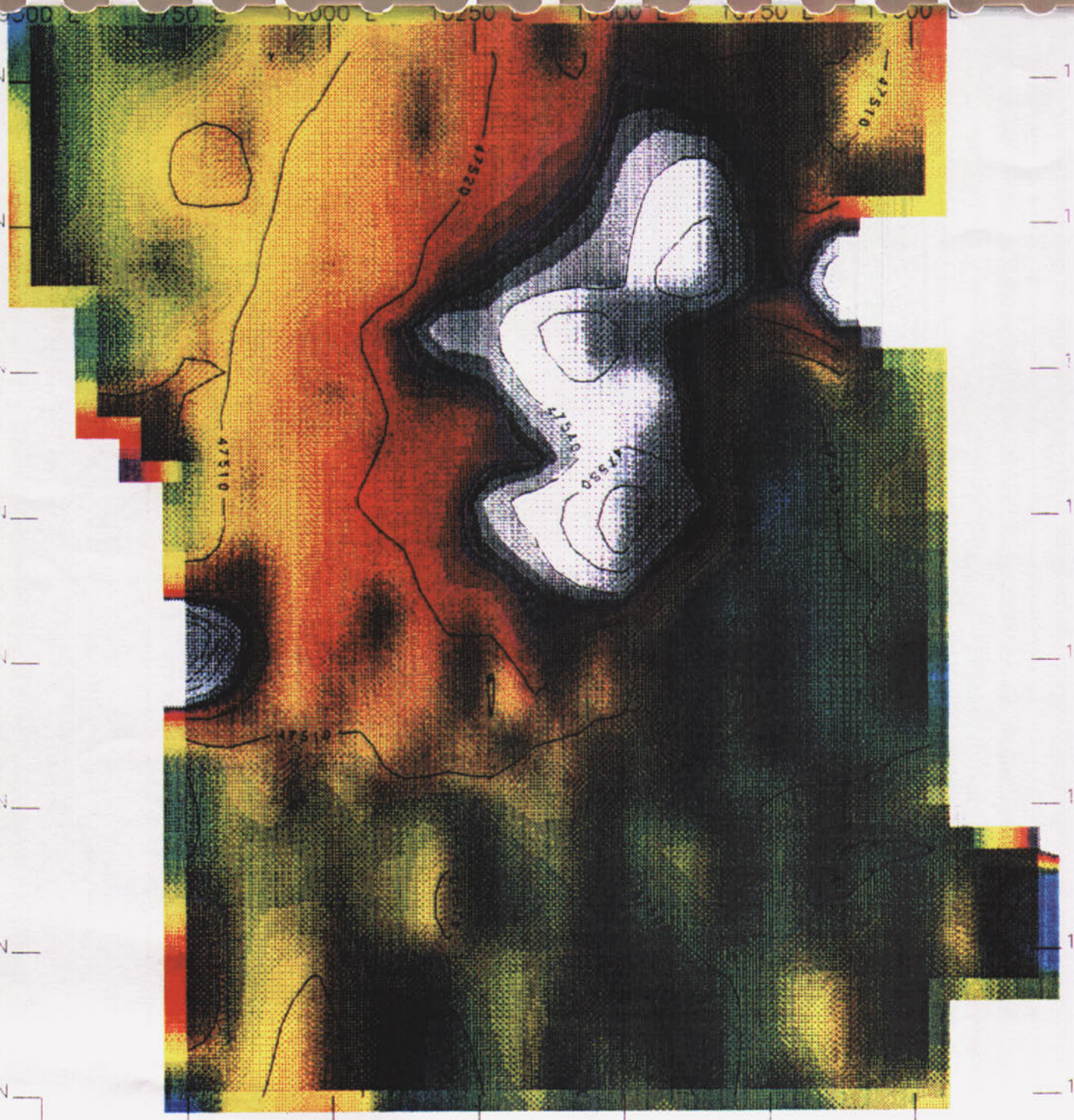
N

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

Project: MOUNTAIN VIEW EL 7157
NORTHERN TERRITORY

Title: STREAM SEDIMENT SAMPLE LOCATIONS AND RESULTS

Author	DK	Date	Scale 1:25000
Drawn		Office	Revised Date 9/91
Drawing No.			Fig. No. 8



Scale 1:10000

100 0 100 200

(metres)

BILLITON AUSTRALIA

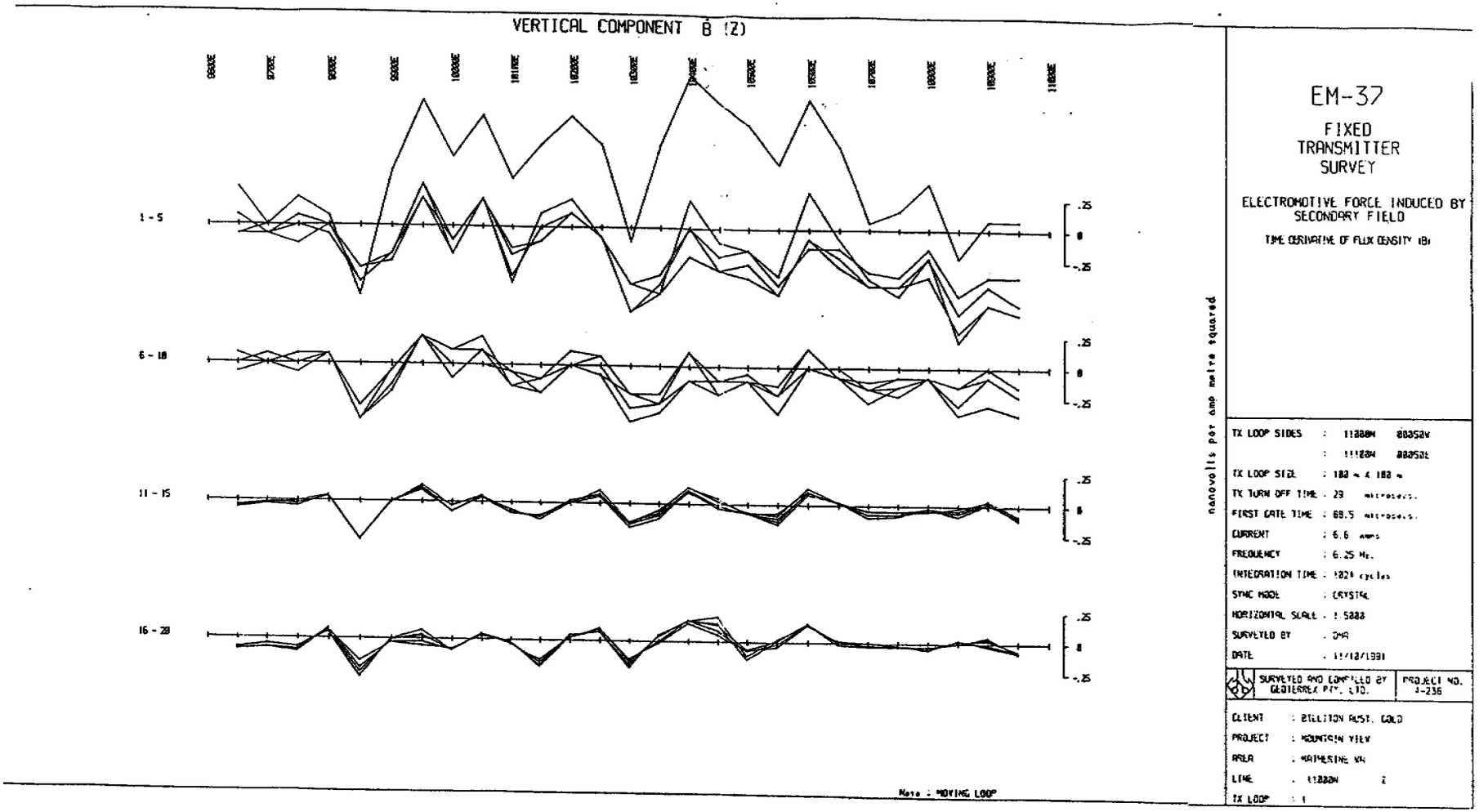
MOUNTAIN VIEW
GROUND MAGNETICS

CI=10nT
75x75m mesh
SHADE:D=270,I=40

BXN 7/91

APPENDIX I

MOUNTAIN VIEW TEM



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (Bz)

TX LOOP SIDES	: 11388N	88352W
	: 11128N	88353E
TX LOOP SIZE	: 180 m X 180 m	
TX TURN OFF TIME	: 29 microsecs.	
FIRST GATE TIME	: 68.5 microsecs.	
CURRENT	: 6.6 amps	
FREQUENCY	: 6.25 Hz.	
INTEGRATION TIME	: 1024 cycles	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: DHA	
DATE	: 11/12/1991	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD. | PROJECT NO. J-236

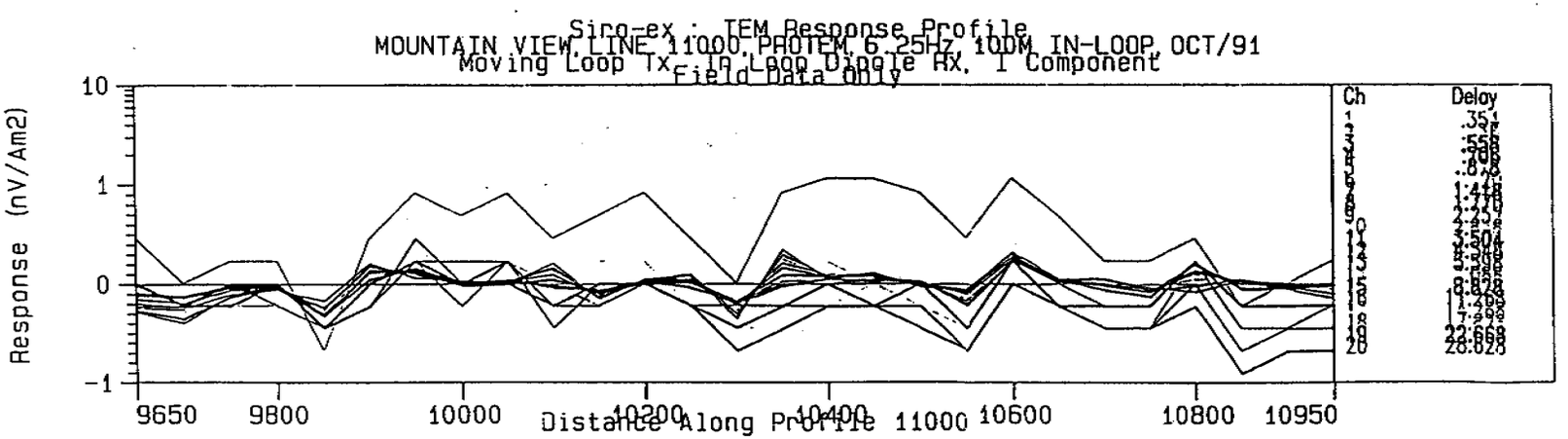
CLIENT : BILLITON AUST. GOLD

PROJECT : MOUNTAIN VIEW

AREA : MATHESON VA

LINE : 11332N Z

TX LOOP : 1


Sirq-ex : TEM Response Profile
MOUNTAIN VIEW. LINE 11000. PROTEM 6.25Hz, 100M IN-LOOP, OCT/91
Moving Loop Tx, in Loop Dipole RX. I Component
Field Data Only
Response (nV/Am2)
10
1
0
-1
9650
9800
10000
10200
10400
10600
10800
10950
Distance Along Profile 11000
Ch
Delay

SHELL METALS REPORT DATABASE

DATA INPUT SHEET

CHAPTER
NAME:_____
(Office use only)

==========

TITLE : Annual Report for Exploration on Exploration Licence 7157 - Mountain View.

DATE : December 1991

AUTHOR : Damien Koerber

SOURCE : N.A.

(If Non-SCOA)

DESCRIPTOR : N.A.

(Not indexed)

PROSPECT/PROJECT : Mountain View - Exploration Licence 7157

KEYWORDS : Ground Electromagnetics, Early Proterozoic, Aeromagnetic survey, Stream Sediment Sample Geochemistry.

LOCATION : NORTHERN TERRITORY

SHEET NAME : (1:250,000) Mt Evelyn (SD 53/5)

REPORT NO. : (Not Indexed) 08.5616

DATE R'ED	28 OCT 1991
PASS TO	Ken
COPY FOR	
For Action by	
REPLIED	
FILE	HE1841.

MEMORANDUM

DATE: 22 October 1991

FROM: BXN \ MLB

TO: BXH \ DWN (K.H.)

SUBJECT: MOUNTAIN VIEW TEM

A line of TEM was carried out over combined geochemical and magnetic anomalies.

This line (11000N) was 1300 metres long, with station spacing of 50 metres. The system used was the PROTEM receiver and EM-37 transmitter operated at 6.25 Hz. The survey configuration was a 100 x 100m transmitter loop and a central GEONICS receivercoil (in-loop).

The loop and frequency were selected in order to investigate the nature of the magnetic source, modelled to be at about 150 metres depth, (magnetic models attached).

The TEM profiles (linear-linear and log-linear plots) do not indicate the presence of any economic-sized conductors. The data are noisy, possibly due to magnetic storms and/or spherics. The very low amplitudes and negative responses are indicative of a very resistive ground. The survey line is sub-parallel to geological strike (but perpendicular to magnetic strike). Thus any thin conductors parallel to geological strike may not have been detected.

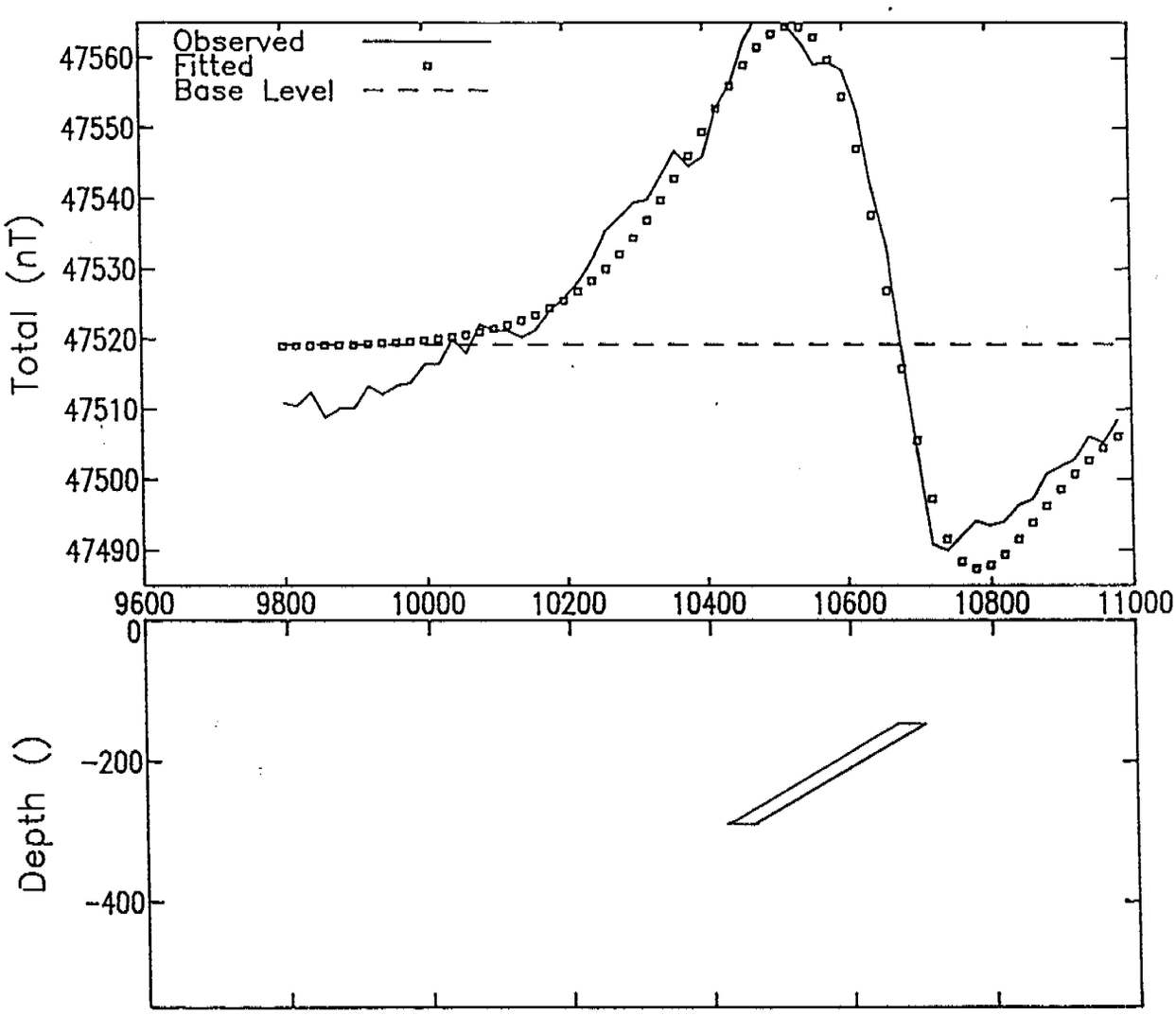
It must be concluded that the magnetic anomaly is due to magnetite rather than pyrrhotite. No conductors are associated with the geochemical anomalies.

NIGEL HUNGERFORD.

91102201.WP5

MOUNTAIN VIEW,NT

GROUND MAG,11000N



MODEL PARAMETERS:

Model Type		Tabular2
Depth	F	148
Half Width	L	20.1
Half Length	X	200
Offset	X	0
Dip	F	149 deg
Thickness	F	143
Susceptibility	F	0.0127 emu
Remnance Ratio	X	0
Remnance Incl	X	0 deg
Remnance Decl	X	0 deg
Main Position	F	10684.44
Cross Position	X	11000
Base Level	F	47519.26 nT
Base Slope	X	0 nT/

GEOMAGNETIC FIELD:

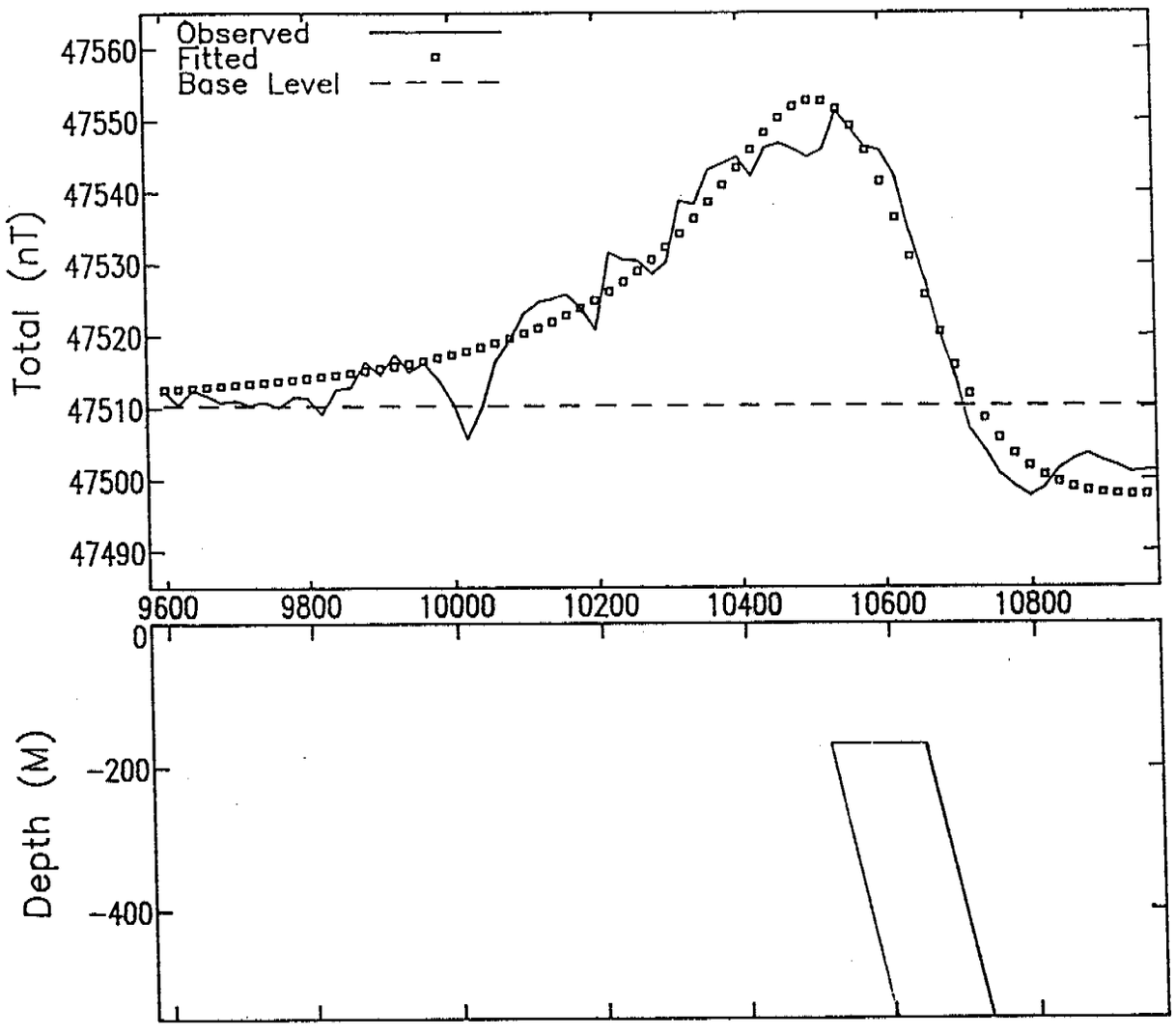
Field Strength	47500 nT
Inclination	-44 deg
Declination	4 deg

COORDINATES:

Sensor Height	2
Strike Perp	124 deg
Line Direction	124 deg
Main Direction	124 deg
Main Offset	
Cross Direction	
Cross Offset	

MOUNTAIN VIEW,NT

GROUND MAG,11200N



MODEL PARAMETERS:

Model Type		Tabular2
Depth	F	169 M
Half Width	F	67.1 M
Half Length	X	690 M
Offset	X	0 M
Dip	F	77 deg
Thickness	F	3096 M
Susceptibility	F	0.00138 emu
Remnance Ratio	X	0
Remnance Incl	X	0 deg
Remnance Decl	X	0 deg
Main Position	F	10582.43 M
Cross Position	X	11200 M
Base Level	F	47510.36 nT
Base Slope	X	0 nT/M

GEOMAGNETIC FIELD:

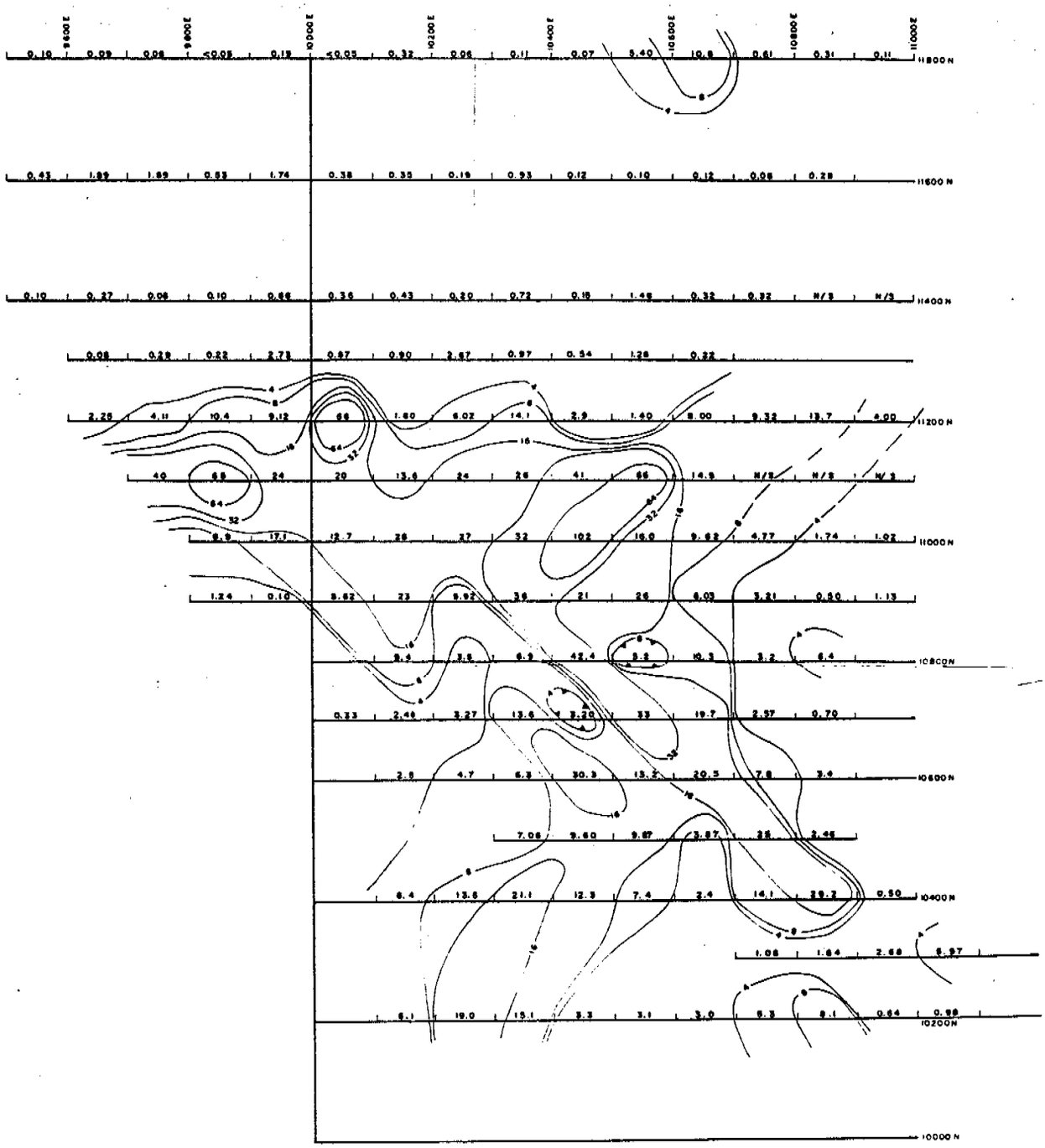
Field Strength	47500 nT
Inclination	-44 deg
Declination	4 deg

COORDINATES:

Sensor Height	2 M
Strike Perp	124 deg
Line Direction	124 deg
Main Direction	124 deg
Main Offset	
Cross Direction	
Cross Offset	

Geosoft MAGMOD-3 Modeling Result

91/09/11



LEGEND:

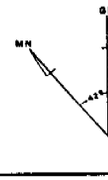
16 — BLEG SOIL SAMPLE CONTOUR VALUE

102 — BCL SOIL SAMPLE RESULT ppb Au

N/S - NOT SAMPLED

0 100 200 300m

LOCATION PLAN



Billiton Australia Gold Pty. Ltd.

Project: MOUNTAIN VIEW EL 7157
NORTHERN TERRITORY

Title: BLEG 100m COMPOSITE SOIL SAMPLE LOCATIONS AND RESULTS

Author: DK	Date: 10/91	Scale: 1:5000	
Drawn: MS	Office: DRW	Revised:	Date:
Drawing No.			Fig. No. 8

DRIFFIELD MINING PTY LTD

ANNUAL RELINQUISHMENT REPORT

EL 7157

PREPARED BY

MINING MANANGEMENT SERVICES PTY LTD

25 May 1993

CONTENTS

1.0 INTRODUCTION

Exploration Licence (EL) 7157 was granted to The Shell Company of Australia Limited (Billiton) for a period of three (3) years, on the 17 december 1990.

In accordance with statutory requirements, this report documents work conducted on that portion of the tenement relinquished for the year to the 17th December 1992.

Exploration Licence 7157 originally comprised four graticular blocks covering an area of approximately 13 sq km.The area was reduced to two blocks as a result of compulsory relinquishment at the end of the first year of tenure.

The license is located approximately 50 kilometres east of Pine Creek, 24 kilometres north east of Zapopan's Batman gold deposit (Mt Todd) and 15 kilometres north of the historic Driffield gold mining area. Access to the area is via a gravel road which turns off the Stuart Highway 3.5 km northeast of the Edith River crossing. Access within the area is via bush tracks and generally difficult.

An application to transfer ownership of the tenement to Driffield Mining Pty Ltd was lodged in November 1992.

2.0 GEOLOGY

2.1 Regional Geology

Exploration licence 7157 is situated in the southern portion of the Pine Creek Geosyncline. Burrell Creek Formation outcrops in the southern, eastern and northern portions of the original licence area.

The unit is comprised predominantly of greywacke, siltstone and minor conglomerate. Deformation and regional greenschist facies metamorphism of the geosynclinal sediments occurred subsequent to intrusion by granitoids of the Cullen Batholyth. An isolated cupola, designated part or the Wolfram Hill Granite, is considered to belong to the Cullen Batholyth and is exposed over approximately 70 per cent of the original tenement area.Upon intrusion of the granitic phases, the adjacent metasediments were contact metamorphosed to hornblende facies.

2.2 Local Geology

During the previous reporting period, reconnaissance mapping was conducted over a grid approximately 1.8 km long by 1.0 km wide, which was intended to allow ground followup of the aeromagnetic anomaly discovered in the course of a regional airborne geophysical survey conducted by Billiton Australia in April 1990. One main north easterly trending aeromagnetic anomaly (the Batman trend) was outlined from the survey. This anomaly extends from the southern margin of the present licence area over a strike lenght of approximately 900 meters. This anomaly was considered to be highly significant as it occurred along a north easterly trend, near the margin of a large intrusive body.

2.2.1 Stratigraphy

In addition to the silicified and often chloritized greywacke and siltstone typical of the metasediments of the Burrell Creek Formation, weakly banded to disseminated magnetite bearing lithologies were observed in the grid area. These rocks appear to have been locally contact metamorphosed to hornblende - hornfels facies, evidenced by the existence of relict cordrite porphyroblasts up to at least 1 kilometre south of the granite/metagranite contact.

2.2.2 Structure

Although visible stratigraphic layering is largely obliterated within the hornblende - hornfels facies zone, there were indications that bedding generally dips 80 to 140 degrees north of grid 10900N, contrary to the observed bedding orientations south of grid 10900N in which bedding generally dips 65 to 210-250 degrees. Accordingly a steep, southerly plunging antiformal structure was interpreted. A strong, pervasively developed, southerly dipping cleavage was also observed, suggesting an additional east - west trending phase of folding may also have occurred in the region.

3.0 MINING HISTORY

The Wolfram Hill and Hidden Valley regions have been moderate sized centres for metal production in the past, in particular tungsten, tin and copper with minor lead and silver. Historically gold has not been mined economically in the area but anomalous results have been recorded from a number of prospects.

Tin mining and economic mineralisation in the area has been confined to the Hidden Valley area, south of the Wolfram Hill Granite. tin occurs as fine grained disseminated cassiterite in kaolinitic and limonitic fault breccias of hornfelsed greywacke of the Burrell Creek Formation. The fault breccias trend between 100 to 140 degrees and dip steeply north, crosscutting bedding which strikes 300 degrees. The tin lodes often occur as narrow discontinuous systems which pinch out at shallow depths.

4.0 PREVIOUS EXPLORATION

Exploration Licence 7157 is strategically located over a historic mining field in which up to recent times has seen very little systematic exploration. The region was the centre of tin, tungsten and minor lead/silver mining in the early 1900's. However, no gold production has been recorded and indeed no real attempt to explore for gold had been made.

The area lies within a much larger gold -mineralised region (the Batman - Moline area) and the potential for economic grade gold mineralisation is high.

No large scale exploration programs were conducted over the Wolfram Hill area until recent times.

A grid based geophysical survey was undertaken in 1938 by the Northern Territory Geophysical Survey Team. The program was focussed on the northern contact of the Wolfram Hill Granite, in the vicinity of the Wolfram Hill Mine and surrounding area. The aim of the survey was to trace probable continuation of the main tungsten bearing reef through the sandy bed of Wolfram Creek and on its northern bank. Three main geophysical techniques were employed

Potential Ratio
Magnetic
Self Potential

The survey concluded that it had been successful in tracing a continuation of the main reef through the bed of Wolfram creek and for a short distance on its northern bank.

Geopeko conducted a small exploration program in 1968 but received little encouragement.

Driffield undertook a selective rock chip sampling and reconnaissance fact - finding program over the old mine workings and prospective areas in 1988. Driffield concluded that the preliminary evaluation and rock chip survey confirmed the region's potential for gold mineralisation and that a detailed comprehensive rock - chip sampling program was justified.

Exploration carried out by Driffield in 1988 included

a regional west east rock chip geochem program from the main north south access road which passes through the centre of the present tenement area, to the contact with the Wolfram Hill granite 2.5 kilometres to the east.

mapping and sampling of the Kelly's tin prospect

Gold results for the regional traverse were low (80 ppb) and thus downgraded the potential for large scale economic grade gold mineralisation in the area. Results suggested an association of gold with anomalous tungsten values. As the area presently under investigation exhibits poor outcrop

In April 1990 Shell discovered several aeromagnetic anomalies in the course of a regional airborne geophysical survey. One main north easterly trending aeromagnetic anomaly extends from the south eastern margin of the present tenement area.

Prominent northeasterly trends, discordant with the known geology of the area, were regarded by Billiton exploration geologists as significant locations for gold mineralisation within the Pine Creek Geosyncline (Creagh & Hungerford 1991)

Work completed during the first year of tenure included airborne geophysical and ground magnetic surveying, stream sediment, soil sediment and rock chip sample exploration geochemistry and reconnaissance geological mapping. The results of these programs were reported in the Annual Report for EL 7157, prepared by Billiton, and dated November 1991. The main results were as follows

* aeromagnetic identified a northeastly trending aeromagnetic anomaly, extending from the southern margin of the tenement over a strike length of approximately 900 meters

* a ground magnetic survey designed to further define the anomaly delineated from the aeromagnetic survey. The magnetic anomaly was shown to strike approximately grid north south and modelling indicated that the source may have a top depth of 150 to 200 meters and variable but probably steep dips.

* soil geochem (on 5 to 100 meter composite samples) identified four anomalous zones.

* within the grid (11000 to 11200N), the magnetic anomalies are coincident with soil anomalies of upto 102 ppb Au [SA1] . No surface expression of significant gold mineralisation was observed at this location. Composite and selective rock chip sampling of vein and host rock material within this area has recorded consistently anomalous values of upto 1.27 gpt Au.

* weakly banded to disseminated magnetite bearing lithologies were observed proximal to the position of the ground magnetic anomaly and are a possible source for the anomalies.

* a line of ground electromagnetic was completed across the main geochemically anomalous zone and the magnetic anomaly. The key objective was to determine if the magnetic and geochemical responses reflected a gold bearing pyrrhotite - quartz vein system, similar to that at Mt Todd. The TEM profiles did not indicate the presence of any

"economic- sized" conductors. The survey line was sub-parallel to geological strike and thus thin conductors parallel to geological strike may not have detected. It was concluded that there were no conductors associated with the magnetic and geochemical anomalies.

* the grid northeast trending soil anomaly [SA2] in the southeastern portion of the grid appears to be derived from a series of weakly and sporadically mineralised (0.2 to 2.0 gpt Au), narrow (0.1 to 2 meters wide), bedding concordant, sulphide poor quartz veins and ferruginous breccias which have limited strike (50 to 100 meters). Minor weakly mineralised, sulphide poor stockwork and sheeted veining, stratigraphical confined to intensely chloritised and silicified greywacke units, also appears to occur in narrow (2 to 3 meter wide) zones

* the grid northwest trending soil anomaly in the southeastern portion of the grid was coincident with rock chip samples returning values of between 0.06 to 0.15 gpt Au. No obvious coincident trending zone was observed.[SA 3]

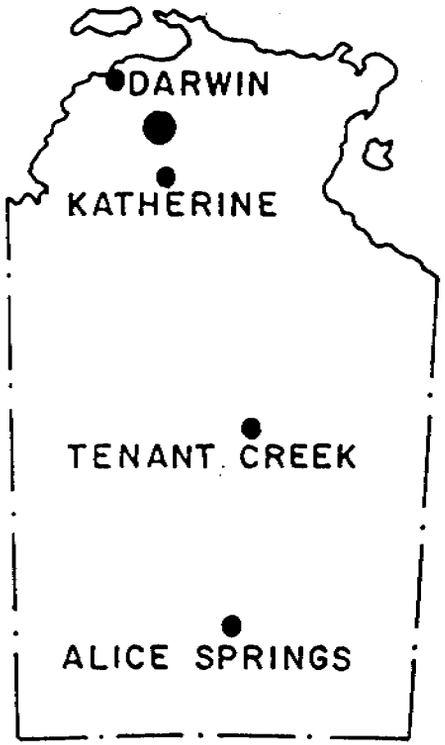
* the grid northeast trending soil anomaly in the southwestern portion of the grid was coincident with composite rock chip samples returning values between 0.04 and 3.64 gpt Au.[SA 4]

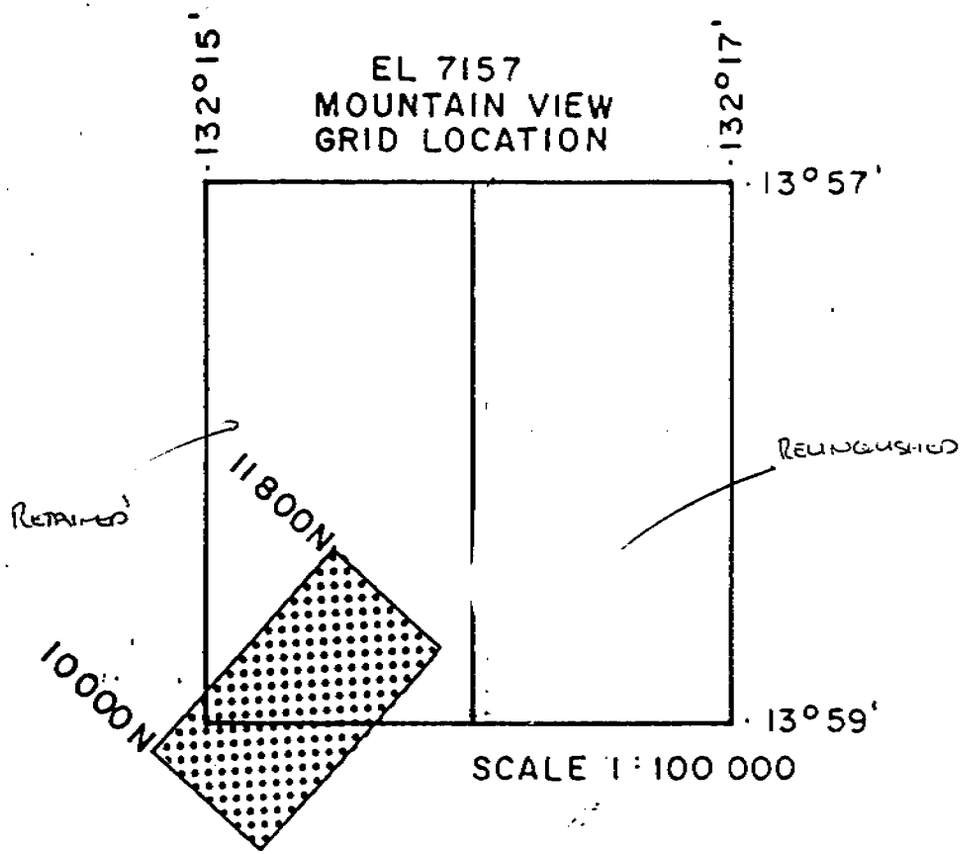
5.0 EXPLORATION COMPLETED

The focus of previous exploration was a recurrence of the Mt Todd style mineralisation, the possibility of which was suggested by the aeromagnetic anomaly, favourable local setting and coincident soil anomalies. TEM appears to have ruled out this type of mineralisation. The presence of strong soil anomalies warranted further investigation. Exploration in the year completed sought to identify the source of the anomalous results.

Following a review of all previous exploration data, activity during the year was confined to attempting to define drill targets for a small scale reconnaissance RAB drilling program in the area of the strong NE trending magnetic anomaly, by using soil sample geochemistry. The balance of the area did not appear sufficiently prospective to warrant further work. As the magnetic anomaly was outside the boundary of the graticular block surrendered, no substantive work was conducted within the surrendered blocks.

LOCATION DIAGRAM





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

WOLFRAM HILL JOINT VENTURE
PROGRESS REPORT FOR THE PERIOD TO 31ST MARCH, 1990

AUTHOR: K J HELLSTEN
DATE: APRIL, 1990

DISTRIBUTION:

Original: Driffield Mining
Copy 1: Billiton - Melbourne
2: Billiton - Cairns
3: Billiton - Darwin

C O N T E N T S

1.0 INTRODUCTION

This report details the work completed and results gained by Billiton Australia, The Metals Division of The Shell Company of Australia Limited on behalf of the Wolfram Hill Joint Venture for the period till 31st March, 1990.

Field work has been severely limited by access difficulties during the wet season.

2.0 TENEMENTS

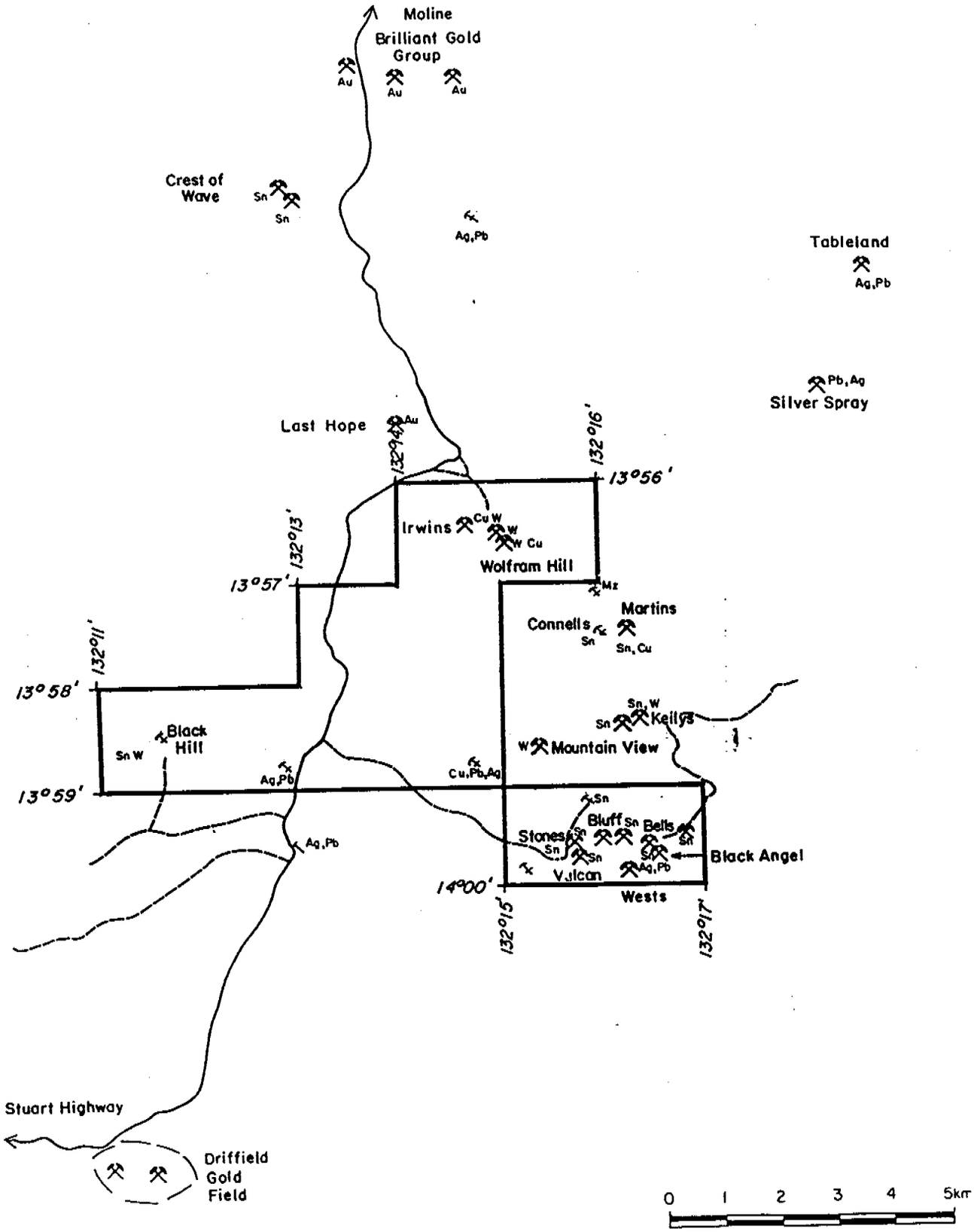
The joint venture involves Exploration Licence (EL) 4730 in the Wolfram Hill area 60 km north of Katherine. A compulsory half area reduction was due for EL4730 on 19th January, 1990, per the NT Mining Act. However following a submission by Billiton on behalf of the joint venture a deferral for 1 year on the reduction of 3 blocks was approved by the NT Department of Mines and Energy.
Subsequently EL 4730 has been reduced to 10 blocks (see Figure 1) and renewed for 1 year with an annual covenant of $38,500.

3.0 WORK COMPLETED AND RESULTS

During December 1989 and March 1990 a regional stream sediment sampling programme was completed over the entire licence area. Large (5kg) samples were despatched to Australian Laboratory Services in Townsville for gold determination using the bulk cyanide leach method. A -80# sample was analysed for copper, lead and zinc, via Atomic Absorption Spectrometry and tin, arsenic using the XRF method.

A 13 ppb Au value draining an area centred on the old Hidden Valley tin workings warrants ground checking, however all other results were at background levels.

A regional grid has been established over a large magnetic anomaly on the BMR 1:250,000 data which is coincident with some small lead/silver workings near the Fergusson River. Detailed ground magnetics using a 10 metre station spacing on 200 metre spaced lines is 60% complete but has been delayed due to severe rain storms in the area. The survey will be completed along with detailed processing and interpretation during the following quarter. Geological mapping will also be conducted, however exposure is very limited with the bulk of the grid being covered by black soil plains and alluvials from the Fergusson River.



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

Project: WOLFRAM HILL J.V. EL437
NORTHERN TERRITORY

Title

LOCATION AND ACCESS

Author	S.M.	Date 3/90.	Scale 1:100 000		
Drawn	B.F.	Office CNS	Revised	Date	
Drawing No.				Fig. No. 1	

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

EL 4730 - WOLFRAM HILL JOINT VENTURE

ANNUAL REPORT FOR PERIOD ENDING 15 MARCH 1990

AUTHOR: SCOTT MARSH
REPORT NO: 08.4980
DATE: 13/3/90
COPY NO:

DISTRIBUTION
1. NTDME - Darwin
2. Driffield Mining Pty Ltd
3. Billiton - MLB
4. Billiton - CNS
5. Billiton - KTH
6. Billiton - DWN

SUMMARY

The Shell Company of Australia Limited entered into a Joint Venture (J.V.) Agreement with Driffield Mining Ltd over Exploration Licence 4730 on the 28th October 1989.

Billiton Australia, The Metals Division of The Shell Company of Australia Limited are managers and operators of the Joint Venture.

The tenement overlies two historical mining areas, namely the Wolfram Hill and Hidden Valley group of mines which were operated in the early 1900's. Tin, tungsten, and minor copper, lead and silver were mined from these two areas.

The Early Proterozoic Burrell Creek Formation is the dominant rock type in the area and is host to the mineralisation. Early Proterozoic Tollis Formation occurs in the northeastern corner of the licence adjacent to the Wolfram Hill Granite. The granite is also exposed on the eastern boundary of the licence and has caused extensive contact metamorphism to albite-epidote hornfels facies of the adjacent rocks.

Stream sediment sampling in the southeastern corner of the tenement has defined an anomalous gold and arsenic zone draining the southern margin of the Wolfram Hill Granite. Three anomalous tin results were recorded but the streams drain old tin workings and thus not considered significant.

A second stream sediment sampling programme has been completed over the half of the tenement. The results are awaited. A ground magnetic survey over an aeromagnetic anomaly has been partially completed on the western side of the tenement.

Follow up stream sediment sampling in anomalous areas has been proposed for the first half of 1990 with a provision for gridding, soil geochemistry and detailed mapping.

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2	Stream Sediment sample locations and results	1: 25 000	-

1.0 INTRODUCTION

Exploration Licence (EL) 4730 was initially granted to Top End Mineral Ventures Pty Ltd on the 15 February 1988 for a period of six years. Immediately after granting, the licence was subsequently transferred to G B Scrimegor on the 18 February 1988. Further to this a second transfer was registered by the Northern Territory Department of Mines on 8 September 1988 between G B Scrimegor and Driffield Mining Pty Ltd.
On the 28 October 1989, Billiton Australia - The Metals Division of The Shell Company of Australia Ltd entered into a Joint Venture Agreement (JV) with Driffield Mining Pty Ltd with Billiton being managers and operators of the Joint Venture.

A half area reduction was required over the licence by January 1990. Unfortunately though, field work was restricted in December due to wet weather and thus a partial deferral of three blocks was granted by the NT Dept. of Mines and Energy. The licence is now made up of ten graticular blocks.

Exploration Licence 4730 is located approximately 50 Kms southeast of Pine Creek and 22 Kms northeast of the Batman gold deposit which is operated and managed by Billiton Australia. Access to the area is via a gravel road which turns off the Stuart Highway 3.5 Kms northwest of the Edith River crossing.

Access within the area is via bush tracks and off-road driving (Figure 1). The western half of the tenement has a flat topography thus making off-road access easy but impassable in the Wet Season. The eastern half of the tenement is steep and inaccessable in 4WD vehicles.

This report encompasses a summary of the exploration and mining history of the Wolfram Hill area followed by a brief description of regional geology, work completed to date, proposed work and conclusions.

2.0 MINING AND EXPLORATION HISTORY

2.1 Mining

Wolfram Hill and Hidden Valley are historically known for tin, tungsten, copper, lead and silver mining in the early 1900's. Most of the mines were worked on a small scale on today's standards, with the Wolfram Hill group of mines being the largest mines in the region.

Prior to the final closure of the Wolfram Hill Mine in 1953 a number of shafts and open cut operations were completed over the Main Line and Western Line (Irwins) for 739.6t W concentrate, with an average of 70% WO_3, and 258t Cu ore grading 30% Cu (EEE., 1989).

Also included in the Wolfram Hill group of mines are the Mountain View mine, 4 kms south-southeast of Wolfram Hill, and the Black Hill Prospect 7 Kms west of Mountain View Mine (Figure 1). Production from the Black Hill Prospect was 0.1 tonnes of tin concentrate (Bagas, 1983). Production for the Mountain View Mine is included in the Wolfram Hill mine.

The Hidden Valley Group of mines include; Vulcan, Black Angel, Bells, Stones, Bluff, Harveys, Williams and Quality (Kleeman, 1938;Figure 1). They were discovered in 1905, with intermittent mining being carried out until 1927 and 1930 (EEE,1989). A total of 51t Sn concentrate was produced from these mines from open cuts, adits and shafts down to 20m (Walpole *etal.*, 1968)

2.2 Exploration

No large scale exploration programmes were conducted over the Wolfram Hill area in the early 1900's.

A grid-based geophysical survey was undertaken though over the Wolfram Hill Mine and surrounds in 1938 by the Northern Territory Geophysical Survey team. The aim of the survey was to trace probable continuation of the main reef, in which mineralisation occurred, through the sandy bed of Wolfram Creek and on its northern bank, and if possible, to indicate the presence of quartz-wolfram lenses (Thyer *etal.*, 1938). Three different geophysical techniques were used:

(1) Potential Ratio;
(2) Magnetic; and
(3) Self-Potential method.

The following conclusion was made:
"....The survey appears, therefore, to have been successful in tracing a continuation of the main reef through the bed of Wolfram Creek and for a short distance on its northern bank..." (Thyer *etal.*, 1938. p20).

Little systematic exploration has been carried out in the area in the recent past. Geopeko conducted a small exploration programme in 1968 but received negative results.

Driffield Mining Pty Ltd undertook a selective rock chip sampling and reconnaisance fact-finding programme over old mine workings and prospective areas in 1988. They concluded that the preliminary evaluation and rock chip survey confirmed the region's potential for gold mineralisation, and a detailed comprehensive rock chip sampling programme of the region was justified.

3.0 GEOLOGY AND MINERALISATION

3.1 Regional Geology

Exploration Licence 4730 overlies the Burrell Creek Formation and small sections of Tollis Formation and Wolfram Hill Granite in the north east corner of the tenement.

The Burrell Creek Formation, which occupies approximately ninety percent of the tenement, is the only member of the Finniss River Group, and the youngest unit of the Early Proterozoic Geosynclinal sequence (Stuart-Smith *etal.*, 1988). Away from the granite the formation consists of interbedded phyllite, siltsone and feldspathic greywacke striking in a north westerly direction.

Regional-scale F_1 folding throughout the region, prior to granite emplacement, produced a penetrative and slaty to phyllitic cleavage parallel to fold axes which can easily be identified in siltstone and greywacke units. Folding within the area is typically symmetrical and upright with southward plunging axes (Stuart-Smith *etal.*, 1988; Kleeman, 1938).

A second generation of folding (F_2) also occurs in the area but is mainly confined to areas north of the Wolfram Granite, in the younger Tollis Formation (Stuart-Smith *etal.*, 1988).

Within the vicinity of the Wolfram Granite (<1 Km) the Burrell Creek Formation has been contact metamorposed to albite-epidote hornfels facies with a narrower, minor continuous zone of hornblende hornfels facies adjacent to the granite (Stuart-Smith *etal.*, 1988). Kleeman (1938) reports that all primary and secondary textures within the contact metamorphic aureole have been totally obliterated.

The Tollis Formation, as mapped by the BMR, consists of interbedded metasiltstone, slate, greywacke, pale green argillite and various pyroclastic units (Stuart-Smith *etal.*, 1988).

Kleeman (1938) mentions the occurrence of numerous large anticlines and synclines north east of Wolfram Hill which pitch steeply to the south east. These folds correspond with the F_2 - age series which have been mapped in the Tollis Formation by Stuart-Smith *etal.* (1988).

North of the Wolfram Hill Granite the Tollis Formation has been contact metamorphosed to albite-epidote hornfels facies with spotted and micaceous varieties of rocks occuring.

The width of the aureole around the Wolfram Hill Granite, and distribution of hornblende and biotite isograds within the region indicate that granite has shallow dipping margins, and is joined at shallow depths to the main body of the Cullen Batholith (~ 15 Kms west; Stuart-Smith *etal.*, 1988).

The Wolfram Hill Granite occupies a subrectangular area of some 6 Kms by 3 Kms with several small adjacent apophyses. It contains grey fine equigranular leucogranite and pink medium to coarse equigranular biotite leucogranite (Stuart-Smith *etal.*, 1988). Both types of granite are extensively altered.

Extensive zones of muscovite-quartz greisen and quartz veins are common, especially in adjacent hornfels where they are associated with tungsten, tin and copper mineralisation (Stuart-Smith *etal.*, 1988).

3.2 Mineralisation Styles

The Wolfram Hill and Hidden Valley regions have been a major centre for metal production in the past, in particular tungsten, tin and copper with minor lead and silver. Historically gold has not been mined economically in the area but anolmalous results have been recorded from a number of prospects.

Tungsten mineralisation at Wolfram Hill Mine is mainly constrained to two lines of lode:

(1) the Main Line; and
(2) the Western Line (Irwins).

The lodes are in quartz-biotite feldspar pegmatite-filled shear zones parallel to bedding in hornfelsed greywacke and siltstone of the Burrell Creek Formation (Stuart-Smith *etal.*, 1988; Kleeman, 1938).
At the Mountain View mine wolframite occurs in small elongate and discontinuous shoots of kaolinised pegmatite veins (Stuart-Smith *etal.*, 1988; Kleeman, 1938).

Tin mining and economic mineralisation in the area has been confined to the Hidden Valley area south of the Wolfram Hill Granite. Tin occurs as fine grained disseminated cassiterite in kaolinitic and limonitic fault breccias of hornfelsed greywacke of the Burrell Creek Formation (Stuart-Smith *etal.*, 1988; Kleeman, 1938).

The fault breccias trend between 100 - 140° and dip steeply north, crosscutting bedding which strikes 300°. Kleeman (1938) describes the tin lodes as sometimes being difficult to distinguish from country rock and often occuring as narrow discontinuous systems which pinch out at shallow depths.

4.0 WORK COMPLETED AND RESULTS

Work completed by Billiton Australia will only be reported on in this section. Work completed by Driffield Mining in the 1988 field season has been documented in their Annual Report of January 1988 - January 1989. No work was conducted by the joint venture partners in the 1989 field season.

A small-scale BCL stream sediment sampling programme was carried out within the tenement in December 1989. Stream sediment samples weighing approximately 5 Kg were collected and sieved to - 8# for analysis of gold using the Bulk Cyanide Leach (BCL) method. A -80# portion of the sample was also collected for analysis of base metals and tin by Atomic Absorption Spectrometry (AAS) and X-Ray Fluorescence (XRF), respectively. Results from this programme are listed below.

A second stream sediment sampling programme was completed in February 1990. Results are awaited. A ground magnetic survey was conducted over a aeromegnetic high which was identified from reprocessed BMR data but due to heavy storms and a rapid rise in the level of the Fergusson River this programme is only 60% complete. Results from this survey are also awaited.

Results

Results from the first stream sediment sampling programme (See Appendices) outlined a 12.9 ppb Au anomaly draining the Mountain View mine area. This is supported by a 1.3 ppb Au anomaly from the adjoining creek. A second, low-order anomaly (2.5 ppb Au) was also identified from a stream draining the Kelly's tin and tungsten workings.

Consistently high arsenic values (105 - 370 ppm As) were recorded in streams draining the area immediately north of the Hidden Valley tin field (coincident with the gold anomalies), on the southern margin of the Wolfram Hill Granite. In comparison samples taken from streams draining the Hidden Valley Tin Field contained relatively low arsenic results (15 - 85 ppm As).

Three anomalous tin areas were also identified but unfortunately the streams drain directly from old tin workings. No anomalous results of copper, lead, zinc or silver were detected in any of the streams.

Two rock chip samples were collected from an old mullock dump near the Vulcan tin mine (Figure 1). One sample contained anomalous concentrations of tin (6500 ppm Sn) whereas gold and arsenic values were low for both samples.

5.0 PROPOSED WORK

Exploration proposed for the first six months of 1990 includes follow-up stream sediment sampling over anomalous areas and reconnaisance mapping. A provision for gridding, soil geochemistry and detailed mapping over prospective areas has also been included. In addition, a detailed low-level aeromagnetic survey has been planned to cover the Wolfram Hill area. The aim of the survey is to further aid in exploring prospective ground, and further define and locate geophysical anomalies identified from the BMR aeromegnetic data.

6.0 CONCLUSION

Exploration Licence 4730 is strategically located over a historic mining field in which up until recently there has been very little systemic exploration. The region was the centre of tin, tungsten and minor lead - silver mining in the early 1900's. However, no gold production/mining has been recorded in the past and indeed, no real attempt has been made to explore for gold.
Considering the area lies within a much larger gold-mineralised region (Batman - Moline area), the potential for economic grade gold mineralisation is very high.

Anomalous gold and arsenic results were recorded from streams that drain the southern margin of the Wolfram Hill Granite. These will be followed up in the following field season.

Other prospective areas are also being targeted based on geophysical anomalies and known occurrences of mineralisation within the tenement.

7.0 EXPENDITURE STATEMENT

Wolfram Hill - Exploration Licence 4730

Period 15.2.89 - 15.2.90

	$
Tenement Administration	400
Legal Fees	1000
Staffing - Regional Office	5611
Support - Regional Office	3758
Analyses	1094
Miscellaneous	200
Head Office Management, Administration, Technical services	1210
	$13273
Overheads	1327
TOTAL	14600

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EUPENE EXPLORATION ENTERPRISES PTY LTD. 1989. Tin, Tantalum and Tungsten Deposits of the Northern Territory. Department of Mines and Energy, Northern Territory Geological Survey.

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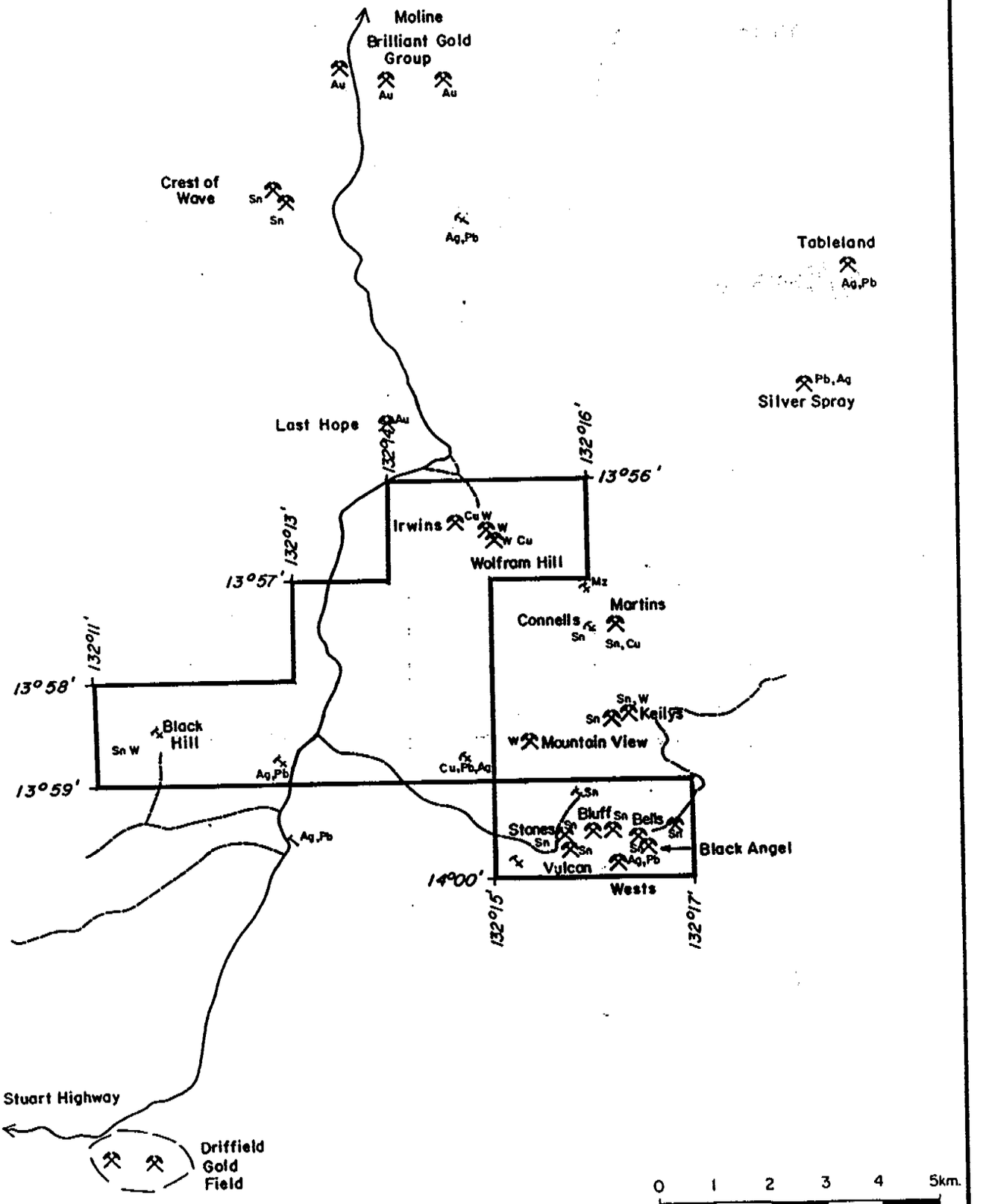
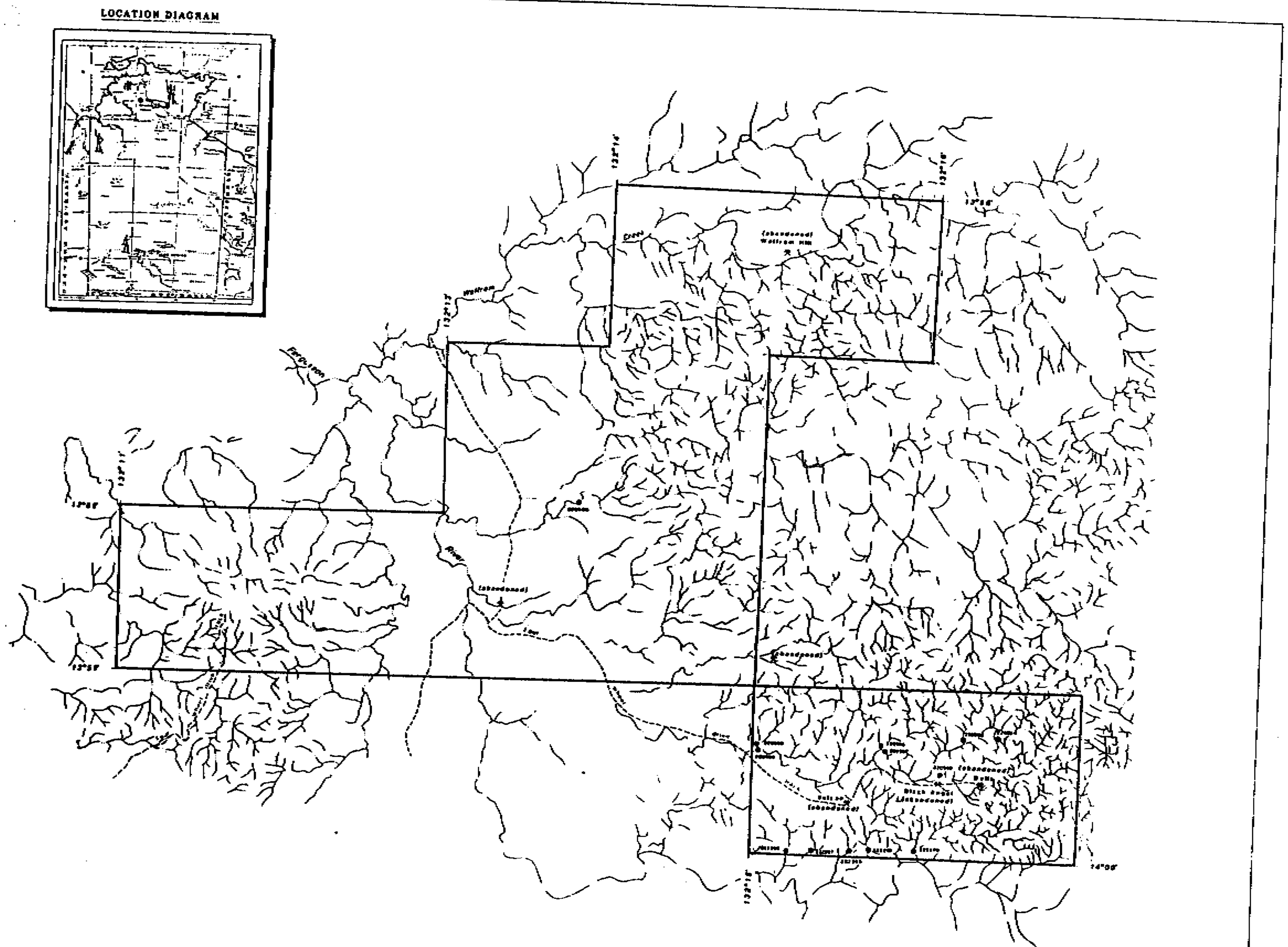


Billiton Australia
The Metals Division of the Shell Company of Australia Limited

Project: WOLFRAM HILL J.V. EL4370
NORTHERN TERRITORY

Title: LOCATION AND ACCESS

Author S.M.	Date 3/90	Scale 1:100 000	
Drawn B.F.	Office CNS	Revised	Date
Drawing No.			Fig. No.



SAMPLE NUMBER	AU ppt PM216	S.Dt Kg	Cu	Pb	Zn	Ag	Ba	As
220593	200	5.36	42	<5	22	<1	40	150
220594	900	2.31	16	<1	8	1	10	120
220595	2350	2.14	39	<5	17	1	20	343
220596	950	3.47	30	<5	11	<1	80	170
220597	1300	4.13	35	<5	20	1	210	100
220598	12.9 ppb	2.84	40	26	34	<1	30	140
220599	1300	3.96	31	<5	21	<1	335	275
220600	300	3.42	22	<5	26	<1	10	105
222265	350	5.09	81	29	85	<5	115	30
222266	200	7.27	14	24	56	<1	20	20
222267	300	4.13	21	8	30	<1	80	20
222268	100	5.54	13	<5	54	<1	21	65
222269	210	6.20	17	<1	67	<1	8	13
222270	350	4.80	16	<5	65	<1	<5	15

0 0.5 1.0 1.5km

Billiton Australia

Project: WOLFRAM HILL J.V. EL 4730
NORTHERN TERRITORY

Title: STREAM SEDIMENT SAMPLE LOCATIONS & RESULTS

Author: S.M.	CHS	Scale: 1:25000	
Drawn: B.F.	Date: 2/90	Revised	Date
Checked	Date	Traced	Date
Sheet No.		Drawing No.	

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

WOLFRAM HILL JOINT VENTURE - EL 4730

RELINQUISHMENT REPORT

AUTHOR: SCOTT MARSH REPORT NO: 08.5071
DATE: 15.5.90 COPY NO: 1

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5: Billiton - Darwin

HJ60.74/.03

SUMMARY

The Shell Company of Australia Limited entered into the Wolfram Hill Joint Venture (J.V.) Agreement with Driffield Mining Ltd covering Exploration Licence 4730 on the 28th October 1989. Billiton Australia, The Metals Division of The Shell Company of Australia Limited are managers and operators of the Joint Venture.

In accordance with reduction requirements on Exploration Licences with the NT Mining Act, a reduction of seven blocks was required in January, 1990. A deferment of the reduction of three blocks for one year was subsequently granted by the N.T. Dept. of Mines and Energy. This report details the work completed and results within the four relinquished blocks of E.L. 4730.

The relinquished area over lies the Early Proterozoic Wolfram Hill Granite and hornfelsed Burrell Creek Formation. Numerous tin/tungsten prospects exist within the relinquished area. The mineralised lodes are of the vein-type located in faults, shear zones and fractures within the Wolfram Hill Granite and Burrell Creek Formation.

Exploration carried out in the relinquished block by Driffield Mining Pty Ltd in 1988 included; (i) a regional west-east gold rock chip sampling programme across the tenement, and (ii) mapping and bedrock sampling of the Kelly's tin prospect. Gold results for the regional rock chip traverse were low (0.008 g/t Au), and thus downgraded the potential for gold mineralisation of the area. Results from Kelly's prospect were also low indicating that most of the mineral production has come from eluvial/alluvial workings rather than hardrock.

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LIST OF FIGURES

1.0 INTRODUCTION

Exploration Licence (EL) 4730 was initially granted to Top End Mineral Ventures Pty Ltd on the 15th February, 1988 for a period of six (6) years. Immediately after granting, the licence was transferred to G B Scrimegor on the 18th February, 1988. A second transfer was registered by the Northern Territory Department of Mines on 8th September, 1988 between G B Scrimegor and Driffield Mining Pty Ltd.

On the 28th October, 1989 The Shell Company of Australia Limited entered into the Wolfram Hill Joint Venture Agreement (JV) with Driffield Mining Pty Ltd with Billiton Australia - The Metals Division of The Shell Company of Australia Ltd being managers and operators of the joint venture.

Initially the licence consisted of fourteen graticular blocks or approximately 45 km2. Due to half-term reduction requirements, seven graticular blocks were to be relinquished in January 1990. A deferment of the reduction of three blocks was granted for one year by the NT Dept. of Mines and Energy therefore an area of four graticular blocks was relinquished for EL 4730 on 15th January, 1990.

The tenement is located approximately 50kms southeast of Pine Creek and 22kms northeast of the Batman gold deposit which is operated and managed by Billiton Australia Gold Pty Ltd (Figure 1). Access to the area is via a gravel road which turns off the Stuart Highway 3.5kms northwest of the Edith River crossing. Access within the area is via bush tracks and off-road driving.

This report encompasses a description of the regional geology, work completed and results of exploration within the relinquished area for the period 15 February 1988 to 14 January 1990.

2.0 GEOLOGY AND MINERALISATION

2.1 GEOLOGY

The relinquished blocks lie over hornfelsed Burrell Creek Formation and the syn- to post-orogenic Wolfram Hill Granite which occupies a subrectangular area of some 6kms by 3kms with several small adjacent apophyses. The Granite comprises grey fine equigranular leucogranite and pink medium to coarse equigranular biotite leucogranite (Stuart-Smith *etal.*, 1988). Both types of granite are extensively altered; plagioclase is replaced by microcline or white mica, and biotite is commonly altered to chlorite.

The Burrell Creek Formation is the youngest sequence of the Early Proterozoic geosynclinal sequence and is the only member of the Finniss River Group. The unit has been contact metamorposed to albite-epidote hornfels facies with a narrower, minor continuous zone of hornblende hornfels facies adjacent to the granite (Stuart-Smith *etal.*, 1988). Kleeman (1938) reports that all primary and secondary textures within the contact metamorphic aureole have been totally obliterated.

Extensive zones of muscovite-quartz greisen and quartz veins are common adjacent to the Granite, and are associated with tungsten, tin and copper mineralisation (Stuart-Smith *etal.*, 1988).

2.2 MINERALISATION

The Wolfram Hill and Hidden Valley regions (Figure 1) have been moderate sized centres for metal production in the past, in particular tungsten, tin and copper with minor lead and silver. Historically gold has not been mined economically in the area but anomalous results have been recorded from a number of prospects.

Tin mining and economic mineralisation in the area has been confined to the Hidden Valley area, south of the Wolfram Hill Granite. Tin occurs as fine grained disseminated cassiterite in kaolinitic and limonitic fault breccias of hornfelsed greywacke of the Burrell Creek Formation (Stuart-Smith *etal.*, 1988; Kleeman, 1938). The fault breccias trend between 100-140^0 and dip steeply north, crosscutting bedding which strikes 300^0. Kleeman (1938) described the tin lodes as sometimes being difficult to distinguish from country rock and often occuring as narrow discontinuous systems which pinch out at shallow depths.

3.0 WORK COMPLETED AND RESULTS

Driffield Mining Ltd in 1988 completed a rock chip sampling programme within the relinquished area. Samples were collected from various tin, tungsten and base metal occurrences as a means of following up results obtained by Geopeko in 1968.

The Kelly's workings (Figures 1 & 3) were mapped and sampled and the Mountain View mine was visited but no detailed work was undertaken. A preliminary west-east rock chip survey was carried out from the main north-

south access road to the contact of the Wolfram Hill Granite and Burrell Creek Formation in the east. Samples were collected at 100-200m intervals except where there was a lack of outcrop. A total of 13 samples were collected from the 2.5 km traverse.

Results from the regional rock chip sampling program within the relinquished area were low with the three samples containing 0.008 g/t Au (Figure 2).The poor gold results and unfavourable geology (granite) within this area has downgraded the potential for large-scale, economic-grade gold mineralisation.

Results from samples collected from bedrock at Kelly's prospect are listed below:

TABLE 1

Results of samples taken from Kelly's Prospect.

SAMPLE NUMBER	W ppm	Sn ppm	Ta ppm
7002	37	100	<20
7003	52	65	<20
7006	5470	17	89
7007	559	8	<20
7008	672	23	<20

The results are low and indicate that most of the mineral production has come from eluvial/alluvial workings rather than hardrock-hosted lodes (Driffield Mining:Annual Report, 1988).

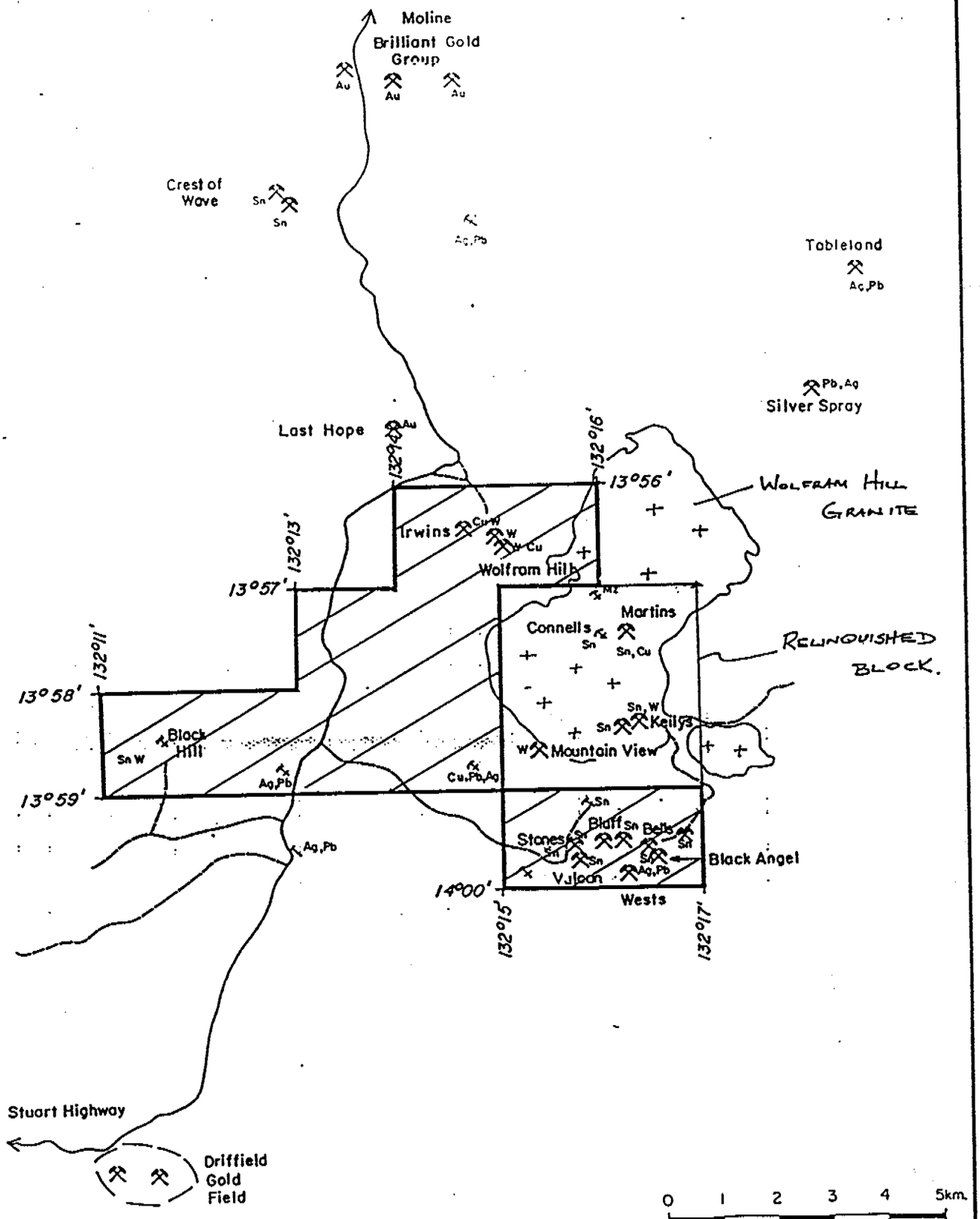
4.0 CONCLUSIONS

The relinquished area lies over the Lower Proterozoic Wolfram Hill Granite and hornfelsed Burrell Creek Formation in the south. Several tin, tungsten and associated copper deposits have been worked within the granite and metasediments, but recent exploration results downgrade the potential for large economic-grade mineralisation to exist. As a consequence the area was relinquished.

REFERENCES

KLEEMAN A. W. 1938. No. 33. The Wolfram Hill - Hidden Valley Areas, Pine Creek District. Aerial, geological and Geophysical Survey of Northern Australia.

STUART-SMITH P.G., BAGAS L. & NEEDAM R.S. 1988. Ranford Hill - 1:100 000 Geological Map Commentary, Northern Territory. Australian Government Publishing Service.



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

Project: WOLFRAM HILL J.V. EL4370
NORTHERN TERRITORY

Title:

LOCATION AND ACCESS

Author S.M.	Date 3/90	Scale 1:100 000	
Drawn B.F.	Office CNS	Revised	Date
Drawing No.			Fig. No. 1

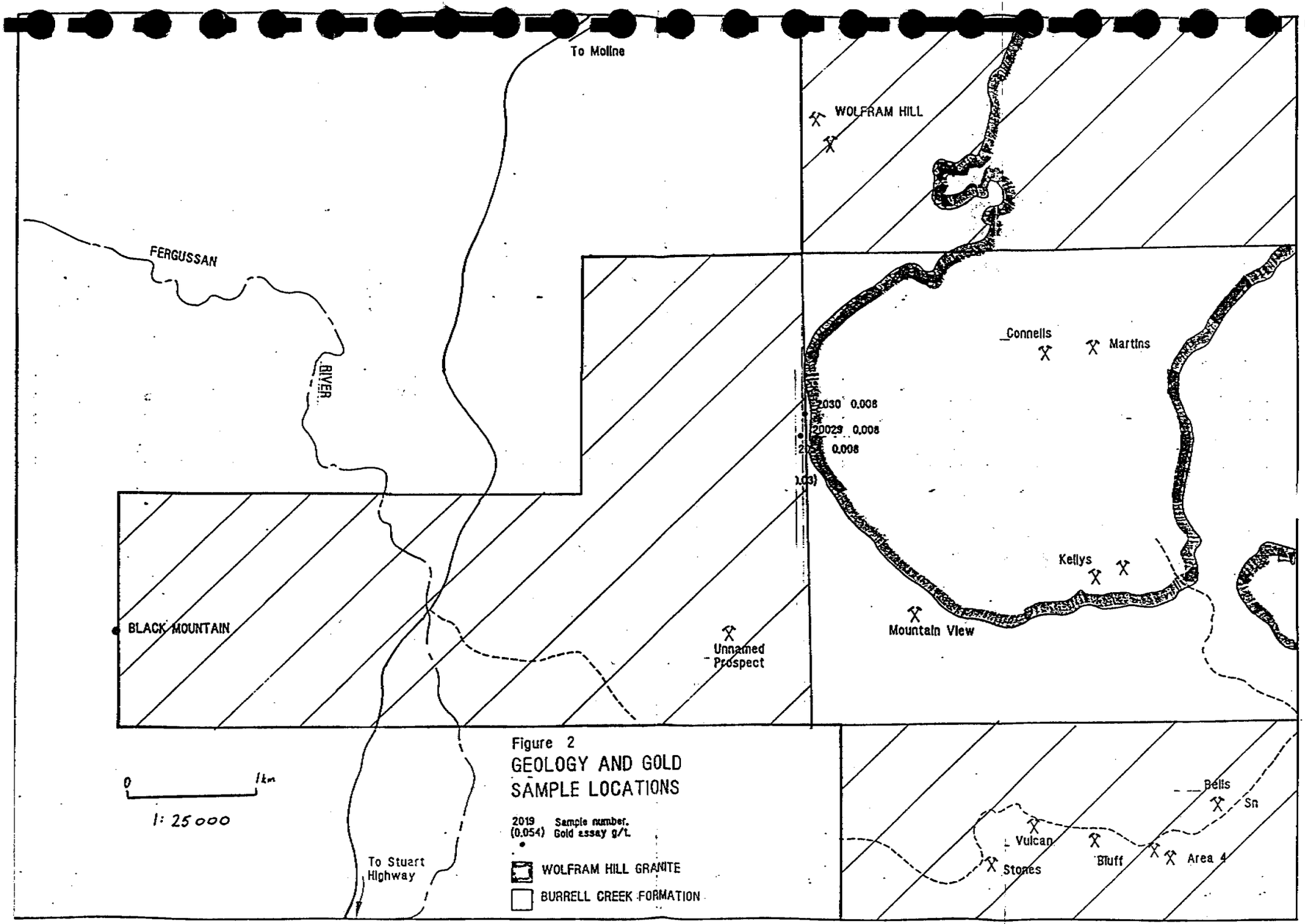


Figure 2
GEOLOGY AND GOLD SAMPLE LOCATIONS

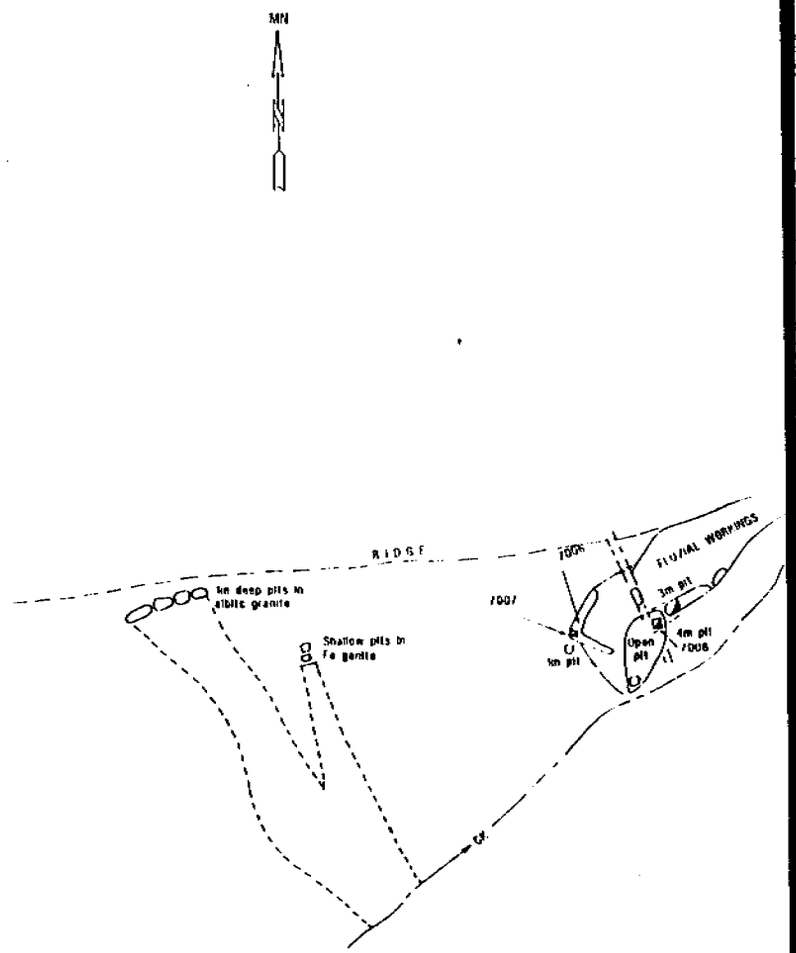


Fig #3

WOLFRAM HILL PROJECT

KELLY'S PROSPECT

SCALE 1 : 1,000

By Mining Management Services Pty Ltd

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

WOLFRAM HILL JOINT VENTURE
PROGRESS REPORT FOR THE QUARTER TO 30TH JUNE, 1990

AUTHOR: SCOTT MARSH
DATE: JULY, 1990

DISTRIBUTION:
Original : Driffield Mining
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HJ60.74/.04

C O N T E N T S

1.0 INTRODUCTION

This report details the work completed and results gained by Billiton Australia, The Metals Division of The Shell Company of Australia Limited on behalf of the Wolfram Hill Joint Venture for the quarter till 30th June, 1990.

2.0 TENEMENT STATUS

The joint venture involves Exploration Licence (EL) 4730 in the Wolfram Hill area, approximately 60km north of Katherine. The licence comprises 10 graticular blocks on the western side of the Wolfram Hill Granite (Figure 1).

3.0 WORK COMPLETED AND RESULTS

Work completed during the quarter to June 30 included ground follow up of a 13 ppb Au stream sediment anomaly in the Hidden Valley tin field, flying of detailed airborne magnetics, completion of the ground magnetic grid survey west of the Wolfram Hill Granite, and preliminary mapping and rock chip sampling of the grid.

Follow up of the 13 ppb Au stream anomaly included taking a repeat stream sample and reconnaissance mapping in the headwaters of the stream (Figure 2). The repeat stream sample contained 2.7 ppb Au, appreciably lower than the initial sample. Five rock chip samples, taken from buck quartz blows

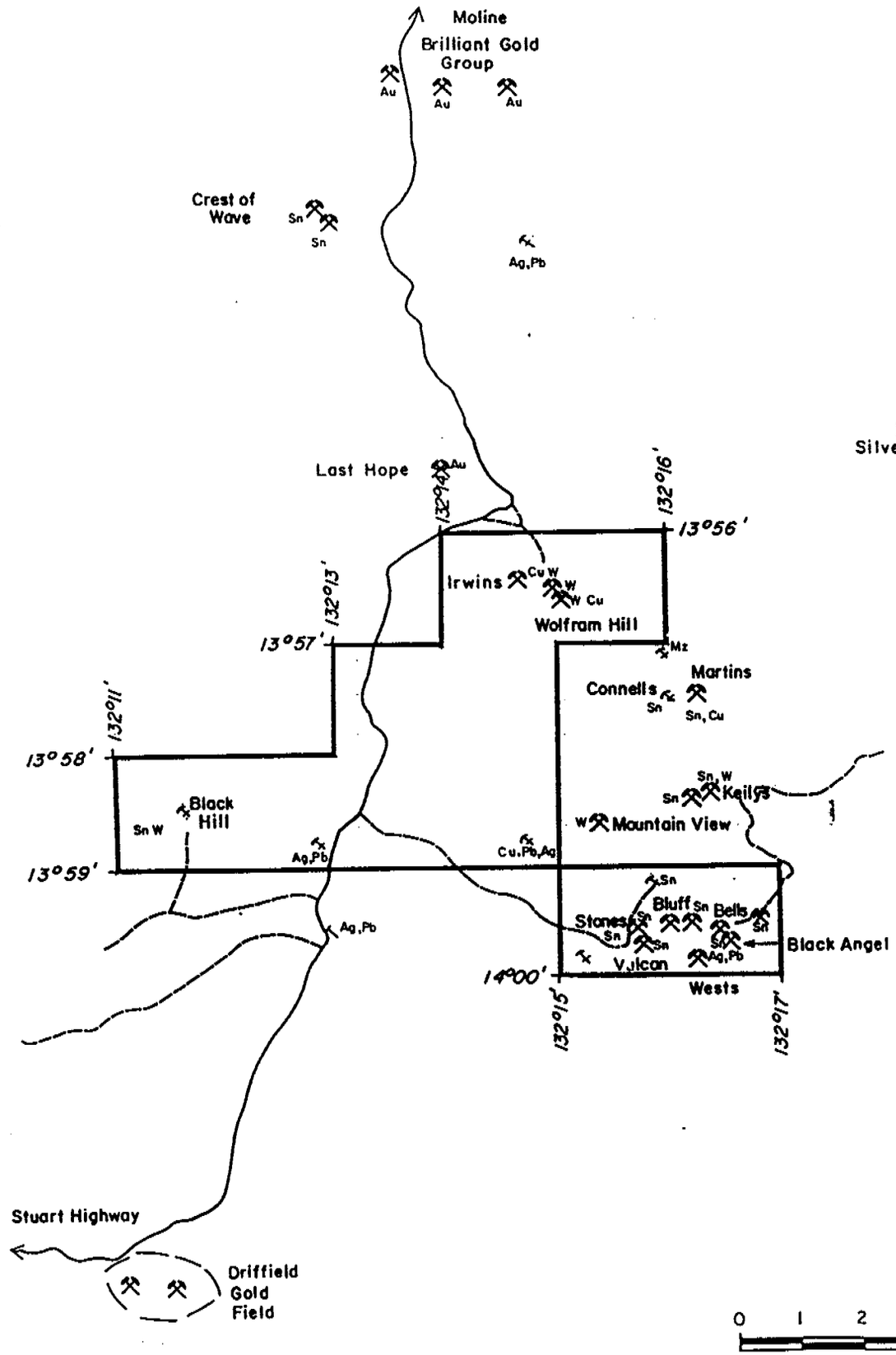

FIGURE 1

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

Project: WOLFRAM HILL J.V. EL4370
NORTHERN TERRITORY

Title: LOCATION AND ACCESS

Author S.M.	Date 3/90	Scale 1:100 000	
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Drawing No.			Fig. No. 1

related veining up stream contained <0.1 ppm Au, with one sample containing 1.05 g/t Au (See Table 2). Therefore, considering the relatively low repeat stream sample result and low prospectivity of the buck quartz systems to contain economic-grade gold mineralisation the gold anomaly has been downgraded.

TABLE 2

Sample	Au ppm	Au(R) ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sn ppm	W ppm	Bi ppm
229665	0.18		130	173	370	1100	86	14	51
229666	1.05	1.10	85	1120	71	1090	68	10	37
229667	0.04		261	2300	970	1000	207	16	50
229668	0.01		267	197	200	1300	108	16	40
229669	<0.01		198	132	317	1420	42	12	55
229670	0.05		123	68	110	850	140	10	32

A geological traverse was also carried out around the old tin workings in the Hidden Valley area. Five rock chip samples were taken from the Black Angel and Bells tin mines (Table 3). Interestingly, one sample from Bells mine contained 0.55 g/t Au and 1.53% Sn, indicating the possibility of a Au/Sn association in the area. However, another sample from Bells mine contained 4.12% Sn but no gold. Arsenic is strongly anomalous throughout the area.

TABLE 3

Sample	Au	Cu	Pb	Zn	As	Sn	W	Bi
229671	0.05	115	92	40	980	4302	39	35
229672	0.55	80	69	36	1750	1.53%	50	44
229673	<0.01	68	23	12	1400	1.12%	31	20
229674	<0.01	1460	169	85	1.00%	1680	31	127
229675	0.05	1400	530	70	1.60%	3157	23	430

All results in ppm.

As part of a regional survey detailed airborne magnetic and radiometric data was acquired over E.L. 4730. To date only preliminary magnetic contours are available. A detailed interpretation will be conducted on receipt of the data tape and completion of image processing of the geophysical and Landsat data.

The ground magnetics survey was completed in April. The profiles and contours are shown in Figures 3 & 4.

Preliminary mapping of the ground mag grid has been completed.
Only a small area of in situ bedrock is exposed over the grid with the remaining area being covered by residual soil or alluvium.

Much of the exposed bedrock, which exists in the middle of the grid, is highly fractured and consists of deep red to brown shale, BIF and minor siltstone of the Burrell Creek Formation. Laminated silica-and magnetite-rich units in the BIF are commonly well exposed with well preserved primary sedimentary structures. The magnetite units are 0.5-1m wide and are traceable along strike up to 20m.

Structurally the area is complex with two episodes of folding; the first episode (F1) produced tight to isoclinal NW-trending folds which control the orientation of the stratigraphy; and the second episode (F2) produced broad NE-striking folds which rotate the F1 fold axes between 300^0 - 360^0.

A NW-striking isoclinal anticline has been mapped between 10800N and 11000N (Figures 3 & 4). Cleavage-bedding relationships (vergence) indicate the fold has a steep westerly dipping fold axis with overturned bedding on the

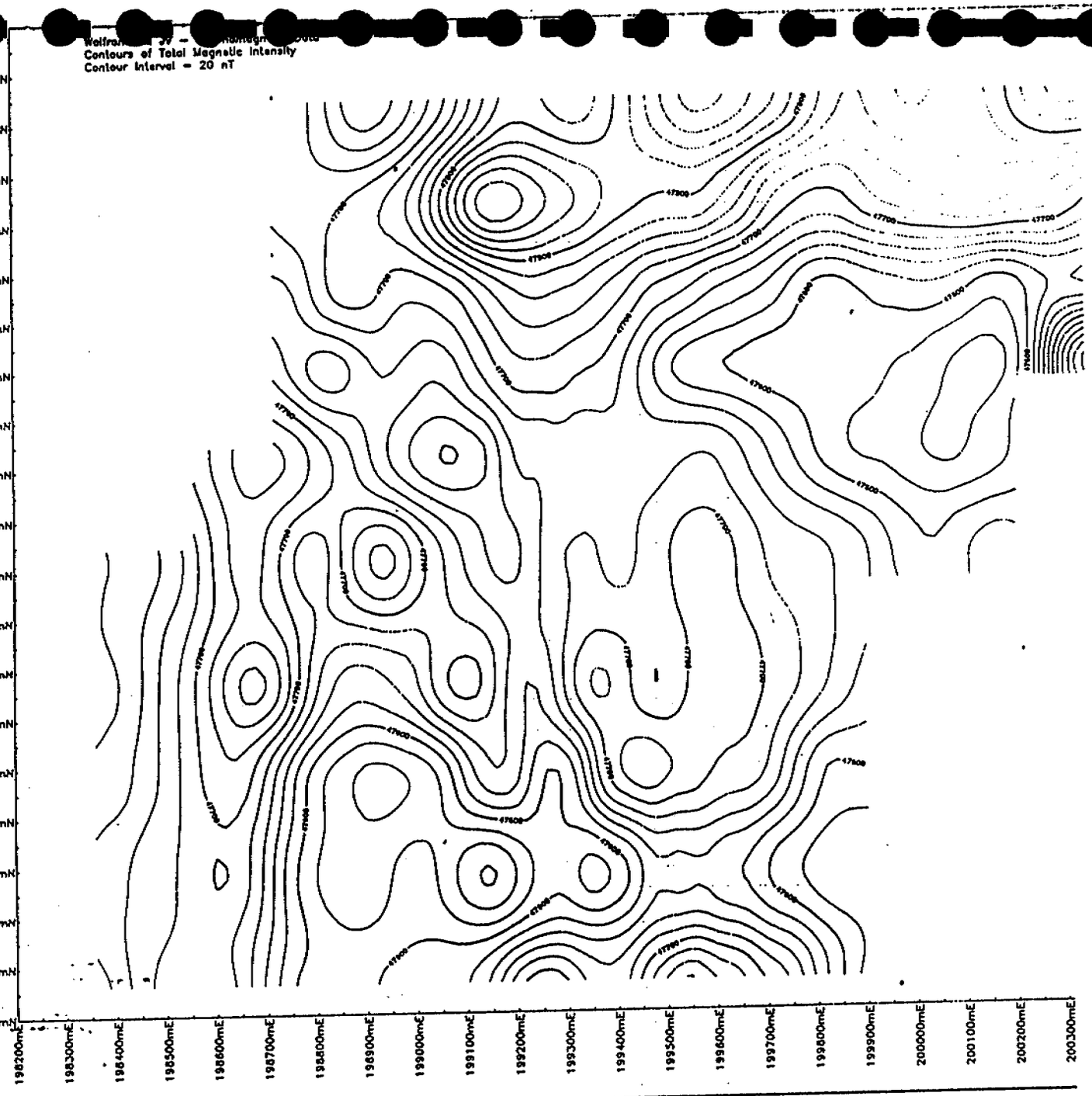
eastern limb. A small syncline exists approximately 50m east of the anticline.

Mapping along the southern most line has also identified the presence of numerous NW-striking folds with wavelengths of ~20m. The intensity and frequency of the folds is indicative of the structural complexity of the area. Further detailed mapping will be required to fully evaluate the area.

Rock chip samples taken from the BIF's did not contain any anomalous results.

It is proposed in the next quarter to complete a soil sampling programme over the grid to possibly identify any subsurface mineralisation, and complete the stream sediment sampling programme on the western margin of the Wolfram Hill Granite.

Contours of Total Magnetic Intensity
Contour Interval = 20 nT



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Project	WOLFRAM HILL JV.		
Title	GROUND MAG CONTOURS		
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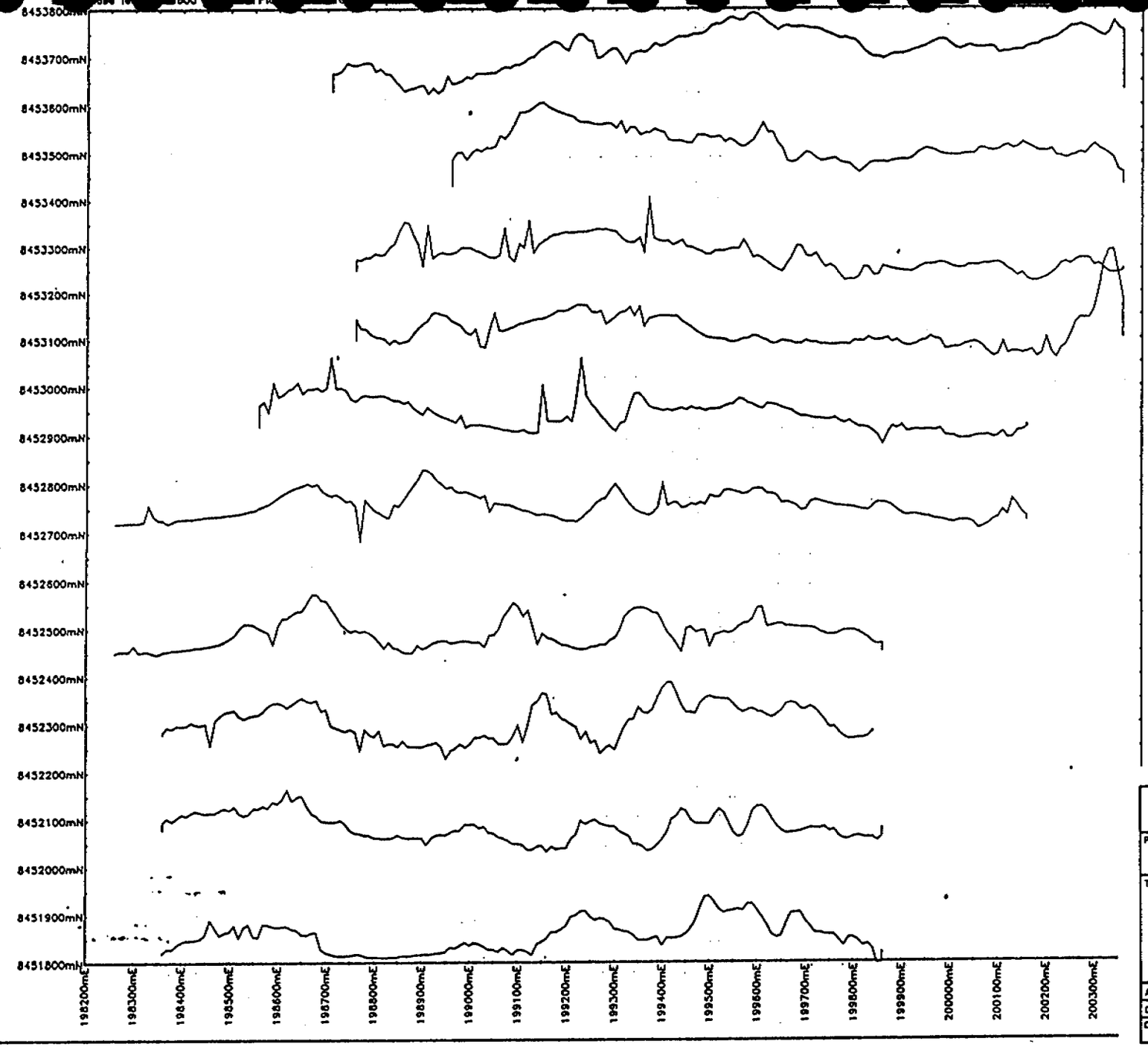
Drawing No.		Fig. No.	3



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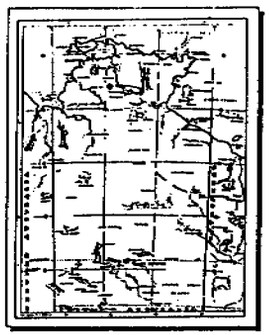
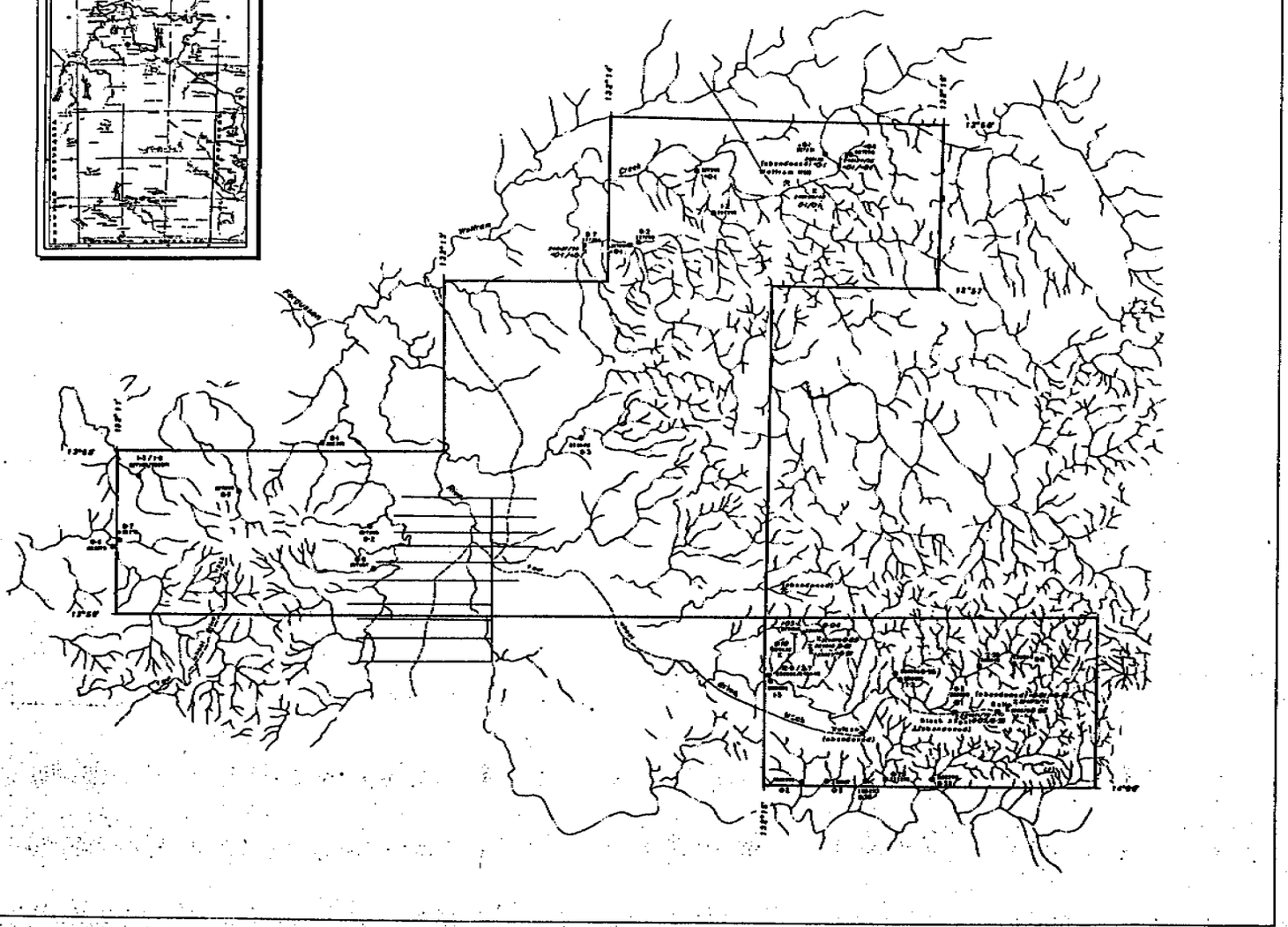
Project: WOLFRAM HILL J.V.

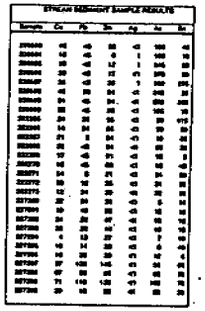
Title: GROUND MAG PROFILES

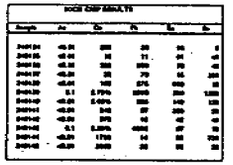
Author SM	Date	Scale	
Drawn	Office	Revised	Date
Drawing No.			Fig. No. 4

LOCATION DIAGRAM









Billiton Australia

Project: WOLFRAM HILL J.V. EL 4750
NORTHERN TERRITORY

Title: STREAM SEDIMENT & ROCK CHIP LOCATIONS & RESULTS

Author: S.M.	Origin: CNS	Scale: 1:25000	
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Sheet No. 2		Drawing No.	