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E.L.9/66 - TYNDALL AREA, TASMANIA

ANNUAL REPORT 1986/87

(EXCLUDING HENTY PROSPECT)

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SUMMARY

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Exploration Licence 9/66, Tyndall Area, Western Tasmania, comprises four separate blocks, designated Parts I to IV on the EL schedule, which cover parts of the Cambrian Mt. Read Volcanics north and south of Queenstown. A major program of exploration was carried out over Parts I, II and III during 1986-87 to complete testing of remaining targets prior to the EL relinquishment date on 5th August, 1987. This report does not include any of the work carried out over the Henty Prospect in Part I of the EL during the period, which is covered in a separate report.

The results from the 1986-87 program were quite disappointing; no significant mineralization worthy of further investigation was discovered. Four separate prospect areas were explored as follows:

1. **WHITE SPUR:** One drill hole (WSP3) was completed at 360.3m to test for Rosebery-style volcanogenic massive sulphides in this favourable block, but with negative results. Down-hole EM surveys also failed to indicate potential economic mineralization at depth.
2. **BASIN LAKE:** The three most promising untested geophysical targets over the large belt of altered and sulphic volcanics here were investigated for massive sulphide mineralization. This work included geological mapping, petrophysical testing, drilling two holes (TYN4 and TYN5) for a total of 623.1m and down-hole EM surveying. This effort produced quite discouraging results and no further exploration is recommended.
3. **WEST SEDGWICK:** A moderately weak EM anomaly was tested at Zig Zag Hill by a helicopter-supported drill hole (WS4, 229.8m). The target was high grade Mt. Lyell-style Cu-Ag-Au mineralization or massive sulphides, however no indications of the occurrence of such ore bodies were found in this area.
4. **JUKES PROPRIETARY:** A fifth drill hole (JP4) was completed at 225.5m to test the remaining potential for economic mineralization at this Cu-Au prospect. The mineralized zone was intersected, as expected, with moderate copper grades, but the gold content was very low viz 7m (down-hole) at 0.55% Cu and only 0.08g/t Au. It now appears that this prospect is much too restricted in size to be of economic interest.

The 1986-87 program cost \$ 178,480 (to the end of May, 1987) to complete.

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1. INTRODUCTION

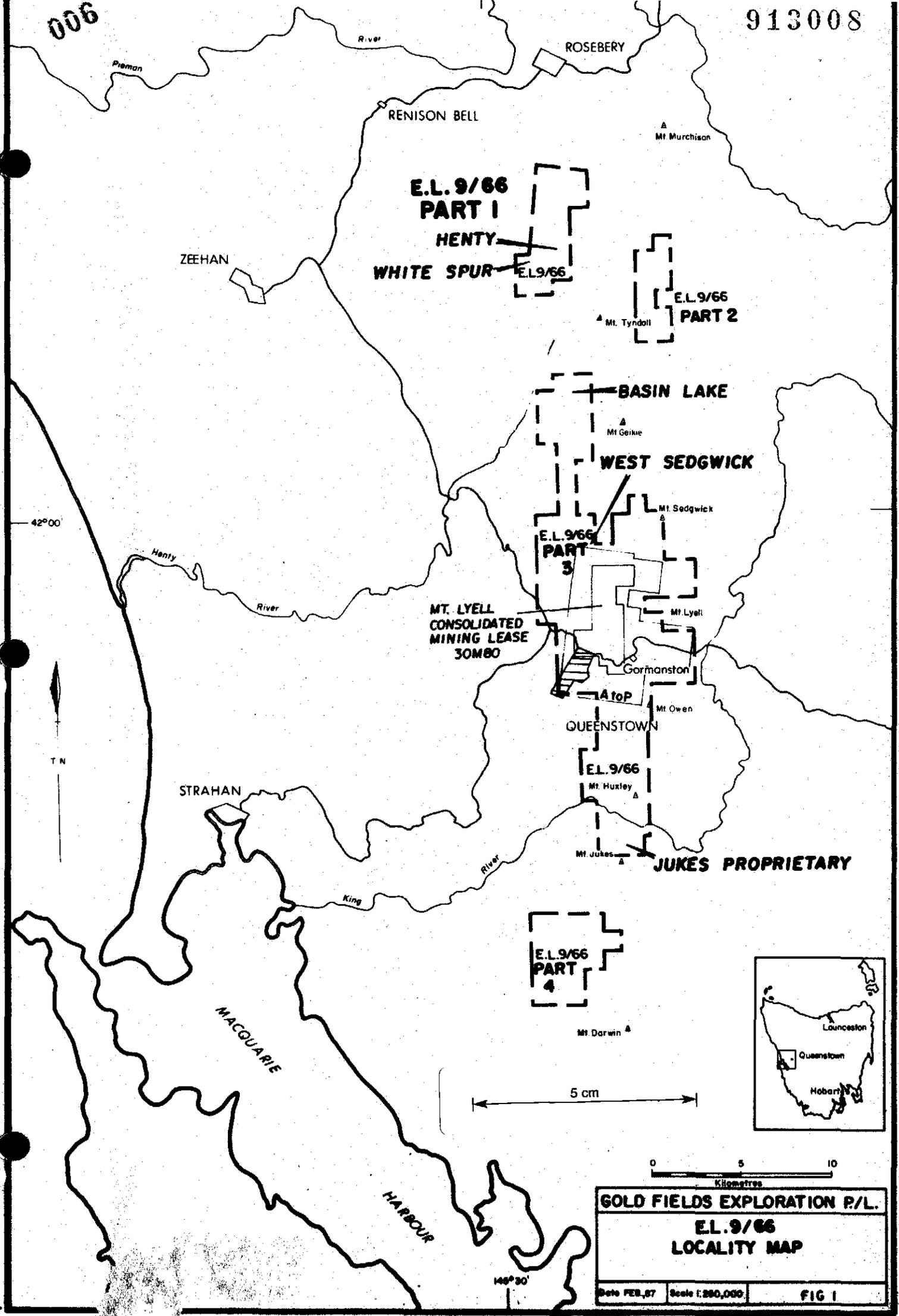
The Tyndall Licence, E.L.9/66, covers an area of 124 km² in four separate blocks, designated Parts I to IV, which lie between Mt. Read near Rosebery in the north and Mt. Darwin, east of Macquarie Harbour in the south (see Figure 1). This report details the results of the exploration carried out during 1986-87 on all of those parts of the E.L. apart from work on the Henty Prospect. Exploration over the Henty area is reported separately (see Cartwright, 1987).

EL9/66 covers parts of the Cambrian Mt. Read Volcanic belt in Western Tasmania which is host to the major volcanogenic massive sulphide deposits of Rosebery, Hercules, Que River and Hellyer as well as the large copper ore bodies in the Mt. Lyell Field. Systematic and sustained exploration has been carried out every year since the licence was granted 21 years ago in 1966. This work has been largely directed towards the discovery of economic volcanogenic massive sulphides, Mt. Lyell-style copper ore bodies and, especially during the last five years, gold mineralization. This exploration has involved extensive airborne geophysical surveys and comprehensive and intense geological, geochemical and ground geophysical surveys leading to the completion of 107 diamond drill holes for a total of approximately 32,500m (to the end of May, 1987).

During 1986-87 the exploration effort was directed towards the final evaluation of remaining prospect areas within the E.L. prior to relinquishment on 5th August, 1987. This work was essentially diamond drill testing of massive sulphide or Cu-Au targets at White Spur, Basin Lake, West Sedgwick and Jukes Proprietary with some accompanying down-hole geophysical surveys. A total of 4 diamond drill holes were completed for 1439m (excluding Henty) during 1986-87. This program cost \$178,480 (to 31st May, 1987) and brings the total expenditure of the EL since 1966 up to approximately \$6.2 million (see Appendix A).

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ZEEHAN

RENISON BELL

ROSEBERY

**E.L. 9/66
PART 1**

HENTY

WHITE SPUR

E.L. 9/66

A Mt. Murchison

**E.L. 9/66
PART 2**

A Mt. Tyndall

BASIN LAKE

A Mt. Geikie

WEST SEDGWICK

A Mt. Sedgwick

**E.L. 9/66
PART 3**

**MT. LYELL
CONSOLIDATED
MINING LEASE
30880**

A Mt. Lyell

Gormanston

A to P

QUEENSTOWN

A Mt. Owen

E.L. 9/66

A Mt. Huxley

STRAHAN

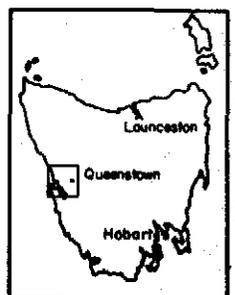
A Mt. Jukes

JUKES PROPRIETARY

**E.L. 9/66
PART 4**

A Mt. Darwin

5 cm



0 5 10
Kilometres

GOLD FIELDS EXPLORATION P/L.
EL. 9/66
LOCALITY MAP

Date FEB 87 Scale 1:250,000 FIG 1

146°30'

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2. LAND TENURE

EL9/66 Tasmania was granted to Renison Limited in 1966. Over the next ten years a further three licences were granted to the Mt. Lyell Mining and Railway Company in the general Queenstown area, namely EL's 10/69, 41/71 and 21/76. These were all amalgamated into the one licence, EL9/66, in 1978. In 1983 the licence area was reduced from 637 km² to 446 km². Then in August 1984 the EL was further reduced to four separate blocks totalling 124 km² in area in compliance with the Mines Department regulations governing exploration licences (see Figure 1).

Gold Fields Exploration Pty. Limited, a division of Renison Goldfields Consolidated, has carried out the work on the EL since 1982. In 1976 a Joint Venture Agreement was signed with Getty Oil Development Co. Ltd. over EL9/66. In 1985 Getty sold their interest to Little River Goldfields NL. Little River Goldfields did not contribute to the 1985-86 exploration expenditure but resumed payments for the 1986-87 program. Current equity in EL9/66 is RGC 64.7%; Little River 35.3%.

Under the present EL tenure conditions, the licence must be relinquished by 5th August, 1987.

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3. WHITE SPUR

3.1 INTRODUCTION

The White Spur area forms the south-western part of block I of EL9/66 adjacent to the Henty Prospect. This area is the only portion of the licence which lies within Mt. Read Volcanics to the north and west of the Henty Fault Zone. Corbett (1986) considers that the Henty Fault is a major dividing structure within the volcanic belt and that the volcanics on either side of this fundamental feature are not directly related. In this context White Spur is situated within that belt of the volcanics which host the Hercules, Rosebery, Que River and Hellyer deposits.

Previous exploration over the White Spur area has been directed specifically towards the discovery of similar volcanogenic massive sulphide mineralization. A detailed account of this work is given by FitzGerald (1984 and 1985). Briefly, geological mapping has outlined favourable potential host rocks, namely abundant laminated tuffaceous shales and siltstones overlain by felsic pyroclastics similar to the sequence at Rosebery (see Figure 3). Weak to moderate hydrothermal alteration of this sequence has been identified along with some encouraging but scattered Pb/Zn geochemical anomalies. Prior to this season only one drill hole had been completed within this belt of rocks, which extend over more than 1km along strike to the EL boundary. Hole WSP1, drilled in 1979 to test a moderate IP anomaly, encountered a weakly mineralized epiclastic and pyroclastic sequence (best assays: 2m at 0.76% Zn, 0.05% Pb and 2m at 0.63% Zn, 0.13% Pb). A histogram plot of the zinc number $[100Zn/(Zn+Pb)]$ from WSP1 assays is quite similar to the plot for Rosebery (see Appendix B). Work by Large and Huston (1986) would indicate that the weak mineralization in WSP1 could be interpreted as volcanogenic in origin.

Subsequent airborne EM (DIGHEM) and detailed ground EM (UTEM) surveys in 1983 and 1985 respectively failed to locate any significant conductors which could be related to massive sulphides.

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Despite the generally negative results from the exploration to date it was felt that a sufficient strike extent of favourable stratigraphy existed to host an economic massive sulphide orebody at depth (below the range of the geophysics) and which warranted an additional drill test.

3.2 WORK COMPLETED 1986-87

3.2.1 DHEM WSP1

It was decided to carry out a down-hole EM survey of hole WSP1, drilled in 1979, to assist with the possible siting of a proposed hole to be drilled during this season. It was necessary to re-open this hole, which was blocked near the collar, using a Longyear 38 rig during October, 1986. PVC pipe was inserted to the end of the hole (382m). Solo Geophysics carried out the down-hole SIROTEM survey utilising a single transmitting loop 350m by 100m positioned over the hole (see Figure 6 in Appendix C). The loop was orientated to energize any along strike mineralization. Unfortunately the receiver probe could not penetrate deeper than 280m down-hole for reasons which are not immediately apparent.

Dr. J.R. Bishop of Mitre Geophysics interpreted the results from this survey. A detailed discussion along with the survey plots are included in his report in Appendix C. Only two features worthy of note were recorded by the survey: one, a broad low in early times between 140m and 180m, centred on a strong single point low at 150m down-hole, is coincident with the best (minor) Pb and Zn mineralization in the core and is interpreted as a small and very local off-hole occurrence of sulphides; the other a weak single point high recorded at 100m is indicative of a very local in-hole conductor, however the absence of any prominent mineralization in the core and any down-hole IP response (from a 1979 survey) suggest that this may be due to instrument noise.

3.2.2 Drilling WSP3

The down-hole EM survey on hole WSP1 did not indicate that any significant off-hole conductors exist in the vicinity of this hole, particularly to the south, and so it was decided to site the proposed hole, WSP3, roughly mid way along strike to the north between WSP1 and the EL boundary.

Hole WSP3 was drilled using a Longyear 38 rig by East Coast Drilling during October, 1986 and using existing logging tracks for access. The hole was designed to test for massive sulphide mineralization within the possible equivalent Rosebery Host Horizon sequence by traversing as much of this sequence as possible at a depth below the expected range of the UTEM survey viz >150m. In the event the hole flattened quite seriously and was completed at 360.3m with the end of hole approximately 140m below the surface. Details of drill hole WSP3, including a detailed geological log and assay results, are included in Appendix D and the location of the hole is shown on the geological interpretation map (Figure 3).

The results from the drill hole are disappointing; no significant mineralization was encountered. The hole intersected a weakly altered epiclastic sequence of predominantly grey tuffaceous siltstone, similar to Rosebery host lithologies, from 0.0- 214.5m, which carries only minor pyrrhotite-pyrite mineralization with a trace of galena-sphalerite in some units. The remainder of the hole intersected a bimodal volcanic sequence of felsic pyroclastics and basaltic intrusives which is similar to the hanging wall sequence at the Henty Prospect, 1.5 km to the east, and is similarly unmineralized. Limited sampling of the patchy sulphide mineralization was carried out but no significant assays were obtained (maximum values : 90ppm Cu, 580ppm Pb, 2400ppm Zn, 1ppm Ag and no gold above 0.01g/t).

3.2.3 DHEM WSP3

Upon completion of the drilling of hole WSP3, PVC pipe was inserted, with some difficulty, to the end of the hole. Solo Geophysics carried out a down-hole SIROTEM survey using a single transmitting loop 100m by 100m positioned behind the collar of the hole (see Figure 6 in Appendix C). The unexpected flattening of the drill-hole meant that the down-hole survey was vital in helping to assess the remaining potential for massive sulphide mineralization at White Spur. On this occasion Solo were able to read to the end of the hole (360m). The results from this survey, along with a detailed discussion by Dr. J.R. Bishop, are included in Appendix C.

Apart from the large amplitude response due to stuck NQ casing between 24m and 33m only one other prominent feature was recorded by the survey. This is a single strong negative reading at the bottom of the hole. Repeated checks indicate that this response is not likely to be due to instrument malfunction. This result could be interpreted as a conductor just off-hole, however the geology from the drill core is quite unfavourable for the occurrence of massive sulphides being a very uniform sequence of weakly altered and unmineralized felsic pyroclastics and basaltic intrusives. Bishop suggests that the only other explanation is that the source is a piece of metal or wire at the end of the hole, however the close control of both the drilling and the down-hole work makes this equally unlikely. This unusual response remains unexplained.

3.3 CONCLUSIONS

Geological interpretation indicates that the White Spur area has favourable lithologies for the occurrence of a Rosebery-style volcanogenic massive sulphide deposit. However, this somewhat restricted prospect area has now been intensely explored since 1976 including detailed geological mapping and sampling, gradient array and dipole-dipole IP, magnetics, airborne EM, UTEM, soil and rock geochemistry, two diamond drill holes (total 742m) and down-hole geophysics and no significant base

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or precious metal mineralization has been discovered. Any remaining potential within the White Spur block is now seriously down-graded by these negative results and no further exploration is warranted.

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4. BASIN LAKE

4.1 INTRODUCTION

The Basin Lake area forms part of a linear belt of andesitic volcanics which extend over 9km from north of Howards Anomaly to Basin Lake in the north-eastern part of block III of the EL (see Figure 2). Previous exploration here, including IP, magnetics, ground EM, soil geochemistry and 11 diamond drill holes has outlined an extensive zone of hydrothermal alteration and sulphide mineralization mostly beneath glacial moraine (see Figure 4). A detailed account of this work is given by FitzGerald (in Purvis et al 1983) and FitzGerald and Cartwright (1986).

Geological interpretation of this zone, based mainly on drill core data, indicates that the setting is favourable for the occurrence of an economic massive sulphide body. However, the widely spaced drilling to date has not intersected significant base metal mineralization. During 1985-86 an extensive UTEM survey was carried out over this prospective horizon and numerous anomalous zones were identified. A comprehensive compilation of all the previous exploration data, especially from the IP surveys, enabled many of the TEM anomalies to be correlated with known sources especially black shale units (see FitzGerald & Cartwright, 1986). However several geophysical (IP and EM) anomalies remained untested and, because of encouraging geochemical values and/or inferred favourable host lithologies it was recommended that these be investigated further, including diamond drill-testing, during the last year of tenure for the EL.

4.2 WORK COMPLETED 1986-87

4.2.1 Mapping/Petrophysics

Limited field investigations were carried out at the beginning of the 1986-87 season in the Basin Lake area. This work was planned to check all available geological outcrops in the vicinity of the three most encouraging untested massive sulphide targets described in Table 4.1.

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Table 4.1 UNTESTED MASSIVE SULPHIDE TARGETS
PRIOR TO 1986-87 - BASIN LAKE AREA

<u>Location*</u>	<u>Geophysical Features</u>	<u>Interpreted Geology</u>	<u>Geochemical Results</u>
Line 16N, 250mE	<ol style="list-style-type: none"> 1. Strong dipole-dipole IP anomaly not tested by hole TYN3 2. Weak UTEM response 	Pyritic volcanoclastics, adjacent to black shales intersected in TYN3	Up to 4000ppm Pb from outcrops 300m along strike to the south
Line 14.5N, 585mE	<ol style="list-style-type: none"> 1. Good UTEM anomaly 2. Relative IP resistivity low 3. No significant IP chargeability response 	Glacial cover of unknown thickness over inferred sulphidic volcanoclastics	Up to 4000ppm Pb from outcrops 170m west of (below?) the zone
Line 12N, 1000mE to 10.5N, 1100mE	<ol style="list-style-type: none"> 1. Strong gradient array IP chargeability anomaly 2. Moderately high IP resistivity 3. No EM survey coverage 	Hematite-carbonate [±] pyrite altered epiclastics adjacent to Tyndall Group tuffs.	Up to 500ppm Pb and 680ppm Cu in soils above the zone

* Note: All anomalies occur on the eastern side of East Tyndall Grid

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Scattered outcrops of massive quartz-phyric lavas and volcanoclastics and prominently hematitic and calcareous intermediate volcanoclastics could be readily correlated with the Tyndall Group and the "Oxide Facies" units respectively in the vicinity of line 16N (East Tyndall Grid) east of 250mE and substantially confirmed the geological interpretation (Figure 4). However, the bedrock overlying both the weak UTEM response and the strong dipole-dipole IP anomaly at 250mE is completely obscured by button grass and glacial moraine. Similarly, the good UTEM anomaly on line 14.5N, 585mE is underlain by an extensive area of glacial moraine of unknown thickness. Recent test pitting by the HEC in this vicinity, as part of their Henty-Anthony Project investigations, showed that the glacial deposits are more than 8m thick and are composed of siliceous sands as well as unconsolidated Owen Conglomerate cobbles and boulders:

The third potential massive sulphide target is a zone of anomalous chargeability between lines 10.5N, 1100mE and 12N, 1000mE. This area was not covered by the 1985 UTEM survey because of interference from the overhead transmission line. The previous geological interpretation over this area suggested that it may be along strike from the inferred "Sulphide Facies" horizon at the above two targets. However, a brief geological reconnaissance over this zone revealed that the few, scattered outcrops are all weakly altered felsic lavas which are readily correlated with the Tyndall Group as shown in Figure 4. Apart from probable deuteric chlorite-epidote alteration the only feature worthy of note was the presence of strong, possibly magmatic disseminated magnetite. Three samples of this material were collected for petrophysical tests to see if this magnetite could be the source of the chargeability anomaly. (See Figure 1 in Appendix C for location).

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The results (see Table 1 in Appendix C), however, could not account for the readings in the field and this anomaly remains unexplained.

4.2.2 Drilling: TYN4 and TYN5

Two geophysical anomalies were proposed for diamond drill testing in the Basin Lake area during 1986-87. Both targets lie within an inferred sulphidic volcanoclastic sequence and both are obscured by a cover of glacial moraine estimated to be between 5 and 20m thick. A total of 623.1m of diamond drilling (holes TYN4 & 5) was completed between July and September, 1986 by East Coast Drilling utilizing a Longyear 38 rig. Some limited bulldozing was required to access the TYN5 site 250m off an existing 4WD track. This new access was rehabilitated using an excavator at the completion of the program in November, 1986.

Details of the two holes, including complete geological logs are included in Appendix D and the locations are shown on Figure 4. Unfortunately neither hole intersected significant sulphidic mineralization and it appears that the hematite-carbonate rich volcanoclastics and marls of the "Oxide Facies" extend further west beneath the glacial moraine than previously inferred. The revised geological interpretation is shown in Figure 4 and the results from each hole are discussed below.

Drill hole TYN4 was designed to test for massive sulphides with a moderately shallow UTEM anomaly on line 14.5N at 585mE adjacent to anomalous Ag-Pb-Zn geochemistry. The hole intersected a thicker than expected layer of waterlogged, glacially derived sands and grits (27m true thickness at the drill collar) before passing into a sequence of chlorite-magnetite rich andesitic lavas and hematite-carbonate altered epiclastics including marls. The hole ended in this intermediate volcanic sequence without encountering any sulphide mineralization. The source of the UTEM

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anomaly is almost certainly a conductive horizon within a deep glacially filled trough overlying bedrock (see section 4.2.3).

Drill hole TYN5 was similarly designed to test for massive sulphides associated with a dipole-dipole IP anomaly on line 16N at 250mE. The anomaly occurs 120m east of an adjacent IP anomaly tested by hole TYN3 in 1975 and found to be due to pyritic black shales within an altered, sulphidic andesitic sequence. Hole TYN5 intersected a sequence of hematite-carbonate altered epiclastics, including marls, and chlorite-magnetite[±]epidote altered andesitic lavas and breccias similar to that in TYN4. Despite being pushed on to cross the complete sequence between holes TYN3 and TYN5 (the holes were drilled towards each other), no graphitic black shale units were intersected and only very minor disseminated pyrite was encountered in the basal 90m of TYN5. (See Figure 5)

Detailed logging of these drill holes has led to the following geological interpretation of this part of the Basin Lake area. It appears that the lithological sequence here is rather high within the Mt. Read Volcanic stratigraphy and it is quite likely that the prominent hematite altered intermediate composition volcanics conformably underlie similarly altered felsic volcanics which are correlated with the Tyndall Group. Genetically, the sequence appears to be derived from andesitic lavas, which were deuterically altered by chlorite and epidote, and which flowed into a shallow marine environment containing marls and limestones. Phreatic brecciation, especially of lava flow margins occurred with the development of carbonate-hematite cement. It is probable that much of the magmatic magnetite within the lavas was also oxidized to hematite at this time. There is little evidence that deposition of hydrothermal sulphides occurred in this part of the sequence. Later, probably during regional metamorphism, chlorite, epidote, carbonate and hematite was remobilized to form cross-cutting veins. This lower green

schist facies metamorphism may have included minor potassic alteration as well.

4.2.3 Down-hole EM; TYN4, TYN5 and BL4

Upon completion of drilling both holes TYN4 and TYN5 were lined with PVC pipe in preparation for down-hole geophysics. Solo Geophysics carried out down-hole EM surveys on three holes in the Basin Lake area during September 1986 using SIROTEM equipment. A single transmitting loop was used for each hole and in each case this was positioned behind the collar of the drill hole. The loop locations are shown on Figure 1 in Appendix C. The adjacent high tension power lines did not appear to interfere significantly with the quality of the results obtained. Detailed plots of these surveys and a comprehensive discussion of this work by consultant geophysicist Dr. J.R. Bishop, Mitre Geophysics, is presented in Appendix C.

Unfortunately the results from this down-hole geophysics were quite disappointing and there is now little encouragement for the occurrence of economic massive sulphide mineralization in the vicinity of these holes.

The results from TYN4 were rather noisy, probably due to proximity of the adjacent power line. However, Bishop is quite confident that no discrete conductors were defined. He noted that the migration of the positive to negative cross-over in the profile (see Figure 2 in Appendix C) is consistent with a conductive overburden. It is probable that the source of the UTEM anomaly is water-saturated unconsolidated glacially derived sands and gravels which are at least 30m thick and may fill part of an elongated trough along the axis of the anomaly. Bishop goes on to suggest that large fixed transmitting loop TEM surveys, such as UTEM, are particularly susceptible to recording spurious "anomalies" such as weakly conductive formational contacts e.g. the base of water-logged unconsolidated glacial deposits. He recommends that smaller loop moving TEM methods should be used to check any of these anomalies.

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The results from TYN5 are rather more enigmatic. This hole was first recommended by Bishop in 1982 who interpreted that the dipole-dipole IP survey on line 16N had defined two separate sources (see Figure 3 in Appendix C). Bishop has a detailed discussion of the results of these earlier surveys in Appendix C. The western of these anomalies was tested by TYN3 in 1975 and was clearly explained by pyritic black shales, however, no immediate source for the eastern, and better (Bishop, this report) anomaly was intersected by TYN5. The down-hole EM survey in fact defined a clear off-hole anomaly at the bottom of the hole. The form of the profile (see Figures 4a and 4b in Appendix C) suggests that the source is in fact adjacent to the hole and is probably due to the expected black shales intersected in TYN3. If this is the case then it is likely that some structural complications, such as fault off-sets have occurred. The strong response near the top of the hole is due to the stuck NQ casing between 14.3 and 26.3m.

Apart from these distinct responses the DHEM log for TYN5 also shows a series of depressions in early time channels at 170m, 230m and 290m. Bishop believes that these are real and related to weak off-hole conductors. The response at 170m corresponds closely with the weak UTEM anomaly on line 16N, 325mE and could be related to a minor fault which carries trace chalcopyrite in the core. The location of the response at 230m is close to the interpreted source of the eastern IP anomaly, however, Bishop suggests that only a small, depth limited body, possibly to the north of the hole, is indicated. Computer modelling would be required to confirm this hypothesis. Nevertheless it is quite clear that no significant off-hole conductors indicative of potentially economic sized massive sulphide mineralization have been detected by the down-hole survey.

While the down-hole EM gear was available a survey was attempted on hole BL4 which was drilled in 1981 and intersected 16m of massive and semi-massive pyrite mineralization. Unfortunately the hole was blocked at 62m depth, within the massive sulphide zone. Consequently no meaningful interpretation of the results

and possible extensions to the massive sulphide body could be made. Bishop also carried out some petrophysical measurements on samples of the massive sulphide and the black shale units intersected by BL4. The results, which are shown in Table 1 in Appendix C, indicate that the massive pyrite is reasonably chargeable and moderately conductive whereas the shales are quite resistive. This is in marked contrast to the numerous IP and TEM surveys which have been carried out along the surface trace of the drill hole (see FitzGerald, 1986). Both methods responded well to the black shales but failed to record any resistivity response over the massive pyrite. The last readings on the down-hole EM profile (Figure 5 in Appendix C) suggest that the massive sulphides are responding to the DHEM survey, however it would be necessary to reposition a drill rig over the hole to re-open it and permit a complete survey in order to determine the along strike extent of this body.

4.3 CONCLUSIONS

A total of 13 diamond drill holes, including two Pickands Mather holes and the Mines Department Leech Hill hole, have now been completed for 4140m over the Basin Lake area and only minor base metal sulphide mineralization has been discovered. In addition, a further 8 drill holes have been completed for 2072m in the strike extension of this volcanic belt over the adjacent Howards Anomaly area with similar discouraging results. The area has been intensively explored by ground geophysical surveys which date back to the late 1950's (Rio Tinto and Pinkands Mather as well as Mt. Lyell) and all the major anomalies have been tested, either by costeaning or diamond drilling. Whilst it is acknowledged that large parts of the area are obscured by glacial moraine and alluvium and that much of the diamond drilling is quite widely spaced, the general paucity of base metal mineralization within this large hydrothermally altered sulphidic belt is discouraging. Apart from costly stratigraphic drilling of this belt it is difficult to identify further targets that warrant additional investigation in the area.

5. WEST SEDGWICK

5.1 INTRODUCTION

The West Sedgwick area lies to the north and northwest of the Mt. Lyell Mining Field within the Mt. Read Volcanics (see Figure 2). Considerable prospecting at the turn of the century and more recent exploration over this area in search for extensions to the Lyell mineralization, particularly along the inferred Great Lyell Fault, have yielded little direct encouragement. However, a moderately weak EM anomaly was outlined by Rio Tinto Exploration in 1958 and confirmed by a SIROTEM survey carried out last year (see Figure 7).

This feature occurs over a potentially very interesting structural and stratigraphic area of volcanics, namely within inferred altered volcanics of the central sequence at the intersection of the northern continuation of the Great Lyell Fault and a major WNW trending structure, the Sedgwick Fault. Recent detailed geological investigations over the main Mt. Lyell area show that this setting is favourable for the occurrence of high grade Cu-Ag mineralization. The widespread occurrence of hydrothermally altered fine grained epiclastic units exposed through windows in the extensive cover of scree and glacial moraine further north, possibly along strike (see Figure 6) also indicate potential for the occurrence of massive sulphide bodies in this area.

Geophysical interpretation of the main EM anomaly suggested a relatively shallow source which could be due to sulphidic mineralization (Staltari in FitzGerald and Cartwright, 1986). Since the area is completely covered by Owen Conglomerate scree and talus a short diamond drill hole was proposed as the most effective test of this anomaly. A comprehensive discussion of the geology over the West Sedgwick area is given by FitzGerald in Purvis et al (1983) and a detailed account of all the previous exploration here is presented in FitzGerald and Cartwright (1986).

5.2 WORK COMPLETED 1986-87

5.2.1 Drilling WS4

DDH WS4 was drilled to a final depth of 229.8m using helicopter support during January, 1987. The hole was designed to test for massive sulphide or high grade Cu±Ag±Au mineralization associated with an EM anomaly 100m beneath 381,400E, 7,000N (Comstock Grid) adjacent to the inferred Sedgwick Fault. The hole is located on Zig Zag Hill just north of the Mt. Lyell Mining Lease (see Figure 6). It should be noted that the position of the drill hole is accurately shown with respect to the AMG co-ordinates on the geophysical anomaly plan (Figure 7). However, due to significant errors in the positioning of the non-slope corrected cut grids the position of the EM anomalies, which are tied to these lines, is incorrect. In fact hole WS4 was collared 85m (horizontally) from the SIROTEM response at 7,000N on line 381,400E and has thoroughly tested this anomaly. A detailed log of the drill hole, including assay results, is presented in Appendix D.

The results from the drill hole are disappointing; no significant mineralization was encountered. The hole intersected two major structural zones between 117.3-140.6m and 182.2-193.8m within weakly altered andesitic volcanoclastics. These broad fault zones are interpreted as parts of the Sedgwick Fault and no mineralization is associated with this structure here. The hole then passed through a sedimentary sequence of dark grey tuffs and minor graphitic shales and a possible thin dolomitic carbonate unit. This sequence, which is weakly altered and carries only minor disseminated and stringer pyritic mineralization, may be part of the Tyndall Group as similar lithologies are well known from the adjacent Comstock area. The hole ended in unmineralized hematitic andesitic lava which appears to underlie the sedimentary sequence and could be part of the uppermost Central Volcanic Sequence of Corbett (1986). Limited assaying for Cu, Pb, Zn, Ag and Au of the most interesting sections of core failed to yield any significant results.

The proposed down-hole EM survey of WS4 was not carried out because of the complete lack of encouraging mineralization. It appears that the thick bands of puggy clay fault gouge are the probable source of the EM anomaly, the trend of this anomaly is parallel to the inferred position of the Sedgwick Fault (compare Figures 6 and 7). The occurrence of thin weakly pyritic and graphitic shale units within the sequence also appear to satisfactorily explain the source of the weak chargeability anomaly (Figure 7).

5.3 CONCLUSIONS

The proximity of the West Sedgwick area to the Mt. Lyell Mining Field has resulted in considerable prospecting and exploration activity over the years but no mineralization has been discovered. Whilst much of the inferred prospective area, centred along the northern extension of the Great Lyell Fault, is obscured by glacial moraine and talus cover, geophysical surveys, particularly IP and EM have effectively explored most of this belt and no significant untested anomalies exist. The results from DDH WS4, which was targeted on the best of these anomalies, are especially discouraging. It is difficult to justify any further geological investigations over the West Sedgwick area and it should be relinquished.

6. JUKES PROPRIETARY

6.1 INTRODUCTION

Jukes Proprietary is a copper-gold prospect which is located high on the steep southern slopes of the King River gorge just beneath Proprietary Peak at the southern end of block III of EL9/66 (see Figure 2). Copper mineralization was first discovered late last century by prospectors, working south from the Mt. Lyell Field, who developed numerous workings here. There have been repeated investigations of this copper mineralization subsequently by several exploration companies but all have concluded that the indicated grades and tonnage did not warrant further work.

In 1980-81 Mt. Lyell first recognized the gold potential of the prospect when high grade copper dump samples returned assays up to 9.3g/t Au. This discovery led to detailed investigations including the completion of three diamond drill holes (JP1 & 2 in 1982, JP3 in 1984). Surface and adit sampling outlined a mineralized zone 10-20m wide with grades between 1-2g/t Au and 1-2% Cu along a strike extent of approximately 200m immediately adjacent to the Jukes Proprietary Fault (see Figure 8). However, only hole JP2, which passed just 20m ahead of the mineralized face of the No. 3 Adit intersected significant Cu-Au mineralization (viz 10m true width of 1.6g/t Au and 1.6% Cu).

Recent developments in geological understanding of the Queenstown area and major changes to access of the Jukes area by works associated with the HEC King River Power Development Scheme led to a re-evaluation of the Jukes Pty Cu-Au deposit. It was also apparent that the HEC tunnel, currently being driven to pass 400m beneath the old workings, would not intersect any down dip extensions of the mineralized zone before the licence tenure expired in August 1987. Consequently it was proposed to drill a fifth hole to test the mineralized zone 100m below the encouraging intersection in hole JP2.

6.2 PREVIOUS EXPLORATION

Purvis in Purvis et al (1983) presents a useful geological review of

previous exploration over the Jukes Pty area and Cartwright (Roberts and Cartwright, 1984) updates the geological interpretation. A brief summary of the exploration history of this prospect is presented below.

Following discovery of copper mineralization around 1897 extensive prospecting activity, including the driving of 3 main adits and numerous smaller tunnels and trenches, and some possible small scale mining occurred up to 1903. Between 1901 and 1918 the Mt. Lyell company carried out chip sampling of the main workings as part of their detailed evaluation of outlying copper prospects. Then, during 1953-56, Mt. Lyell returned to carry out detailed investigations of these and other workings south of Queenstown. From 1956 to 1962 the Lyell-EZ-Explorations Joint Venture carried out a comprehensive examination of the general Jukes-Darwin area. Detailed ground magnetics, geological mapping and adit sampling was completed at Jukes Pty but no positive recommendations on the prospectivity here were made.

In 1964 the U.S. Metals Refining Co. carried out limited field work in the area, including some mapping, sampling and SP. In 1965 BHP acquired the ground and their exploration activity up to 1972 included further ground magnetics and rock chip sampling over Jukes Pty. From 1972 to 1974 BHP joint ventured EL13/65 with International Nickel who carried out a thorough exploration program, which included air-borne EM and magnetic surveys, pole-dipole IP, and detailed mapping and sampling over 5 main prospect areas including Jukes Pty. INAL drilled one hole, Z142003 to 224.5m beneath the main workings at Jukes Pty and intersected only moderate levels of copper mineralization (best assays: 6m at 0.59% Cu). The EZ Co. joined the joint venture in 1974 but all of their exploration was conducted over the Clarke and Garfield Valleys.

In 1976 the Mt. Lyell Company acquired EL21/76 which covered the entire Jukes-Darwin block of the Mt. Read Volcanics. This licence was amalgamated with EL9/66 in 1978. Apart from a detailed review of the previous exploration by Reid (1977) no work was carried out over the Jukes Pty area until 1980-81 when a preliminary assessment of the gold potential of the prospect was made by sampling high

grade copper mineralization on the main dumps. During the following season a detailed grid was established over the workings and soil and rock chip geochemistry, gradient array and dipole-dipole IP, magnetics and Genie EM surveys were completed. In addition the 3 Jukes Pty adits and cross cuts were channel sampled and a detailed geological mapping program was carried out by consultant Dr. C.J. Eastoe. Two diamond drill holes: JP1 (141.5m) and JP2 (158.3m) were put down to test the copper-gold mineralization at depth. All of this work was helicopter supported. JP2 intersected the mineralized zone returning assays of 13.4m at 1.6% Cu and 1.6g/t Au. Hole JP1, 150m along strike to the north intersected an equivalent zone but no significant assays were obtained apart from minor copper mineralization within rhyolitic lavas beneath the "ore zone".

A comprehensive geological review of the Jukes Pty prospect carried out by GFEL during 1983. This study concluded that, while only a small tonnage of Cu-Au mineralization had been outlined here to date, sufficient potential existed down dip to the south to contain an economic deposit. Two drill holes were recommended to test this potential. In 1984 detailed rock chip geochemistry was carried out across the outcropping, strongly chloritized zone immediately above the workings. This confirmed that the zone is 10-20m wide and carried gold grades of up to 3.4g/t Au over 11m, however copper sulphides appear to have been partially leached from the surface. A third, helicopter-supported hole, JP3 (351.0m) was drilled to test the Cu-Au mineralized zone along strike to the south-west from the JP2 intersection, and while encouraging copper mineralization was encountered the gold content was disappointingly low (viz 12m at 0.65% Cu and 0.08g/t Au). This hole was pushed on for 80m to test the margins of the rhyolite lava complex and a broad zone of low level copper mineralization with very minor gold was intersected (32m at 0.28% Cu, 0.06g/t Au).

The main elements of the geology at Jukes Pty are shown in Figure 8. These are: a rhyolitic lava flow-dome complex which is typically chloritic and hematitic with prominent chlorite-magnetite-hematite stockworks and variable chalcopyrite-pyrite vein style mineralization

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22.

to the west; a thin, typically intensely chloritic volcanoclastic sequence, which appears to be genetically related to the rhyolitic lava margin and hosts the main Cu-Au mineralization on the south-eastern flanks of these lavas; a sequence of less altered and unmineralized rhyolitic volcanics which occur further east and are separated by the Jukes Pty Fault (a major structure which appears to post-date, in part, the main mineralization). This sequence is unconformably overlain by Jukes Breccia and Owen Conglomerate to the south-east and is in faulted contact with Owen Conglomerate to the north-east.

6.3 WORK COMPLETED 1986-87

6.3.1 Sampling

During the re-evaluation of the Jukes Pty Cu-Au potential earlier this year a field inspection was conducted along the recently excavated HEC Newell to Crotty Road. This road, which crosses the saddle just north of the main workings at Jukes Pty (see Figure 8), exposes a complete section of the geology through the prospect. Two continuous chip samples were collected from across the "mineralized zone" west of the Jukes Pty Fault and submitted for assay. The sample details and results are presented in Appendix E.

The assay results are disappointing being: 8.2m at 0.09% Cu and 0.02g/t Au and 6.6m at 0.17% Cu and 0.03g/t Au. These confirm earlier conclusions that the mineralization decreases in strength significantly to the north along the main chloritic zone.

6.3.2 Drilling JP4

DDH JP4 was drilled to a final depth of 225.5m during January and February, 1987 by East Coast Drilling using a Longyear 38 rig. The hole was accessed off the recently opened HEC Newell-Crotty Road along old exploration tracks. The hole was designed to test for high grade Cu-Au mineralization at RL 500m beneath the encouraging JP2 and Jukes Pty No.1

and No. 3 Adit intersections. Details of the drill hole including geological log and assay data are presented in Appendix D and the location of the hole is shown on Figure 8.

Hole JP4 intersected the "mineralized zone" on the footwall of the Jukes Pty Fault as expected, and, whilst encouraging copper mineralization was encountered, the gold values were disappointingly low. This sericitic-carbonate breccia zone, which correlates well with the mineralized intersection in hole JP2 (see composite cross section, Figure 9), averaged 7m at 0.55% Cu and only 0.08g/t Au between 193.5 and 200.5m. In fact the highest gold assay obtained from JP4 was from within chloritic altered rhyolitic lavas below the mineralized breccia zone viz 220.5-222.5m, 2m at 0.73g/t Au with 0.10% Cu.

The JP4 intersection has been plotted on the amended longitudinal projection through the mineralized zone (Figure 10) where it can be seen that the result is quite similar to that obtained in JP3 100m to the south-west at the same RL. A study of this projection quickly reveals the restricted area of better grade Cu-Au mineralization around JP2 and the No. 1 and No. 3 Adits with drill intersections spaced 100m, or less, apart. A map showing the structure contours of the hanging wall of the mineralized zone, which follows the footwall of the Jukes Pty Fault, is presented in Figure 11. This plan demonstrates the regularity of this structure in the vicinity of the workings and also outlines the extent of the mineralization.

Finally, it is interesting to note on Figure 11 the significant Cu and Au values obtained from channel sampling in Adit No. 2 during 1981-82 viz: 2m at 2.40% Cu, 1.7g/t Au; 4m at 0.75% Cu, 2.3g/t Au and 6m at 0.58% Cu, 1.3g/t Au. This mineralization, which occurs within the rhyolitic lava complex west of the main "mineralized zone" has not been investigated further and could represent another Cu-Au mineralized zone within the prospect area. The most likely explanation, however, is that these values reflect a higher grade expression of the impersistent copper-gold veins which pervade the lava complex.

6.4 CONCLUSIONS

The Jukes Pty Cu-Au prospect has been explored in detail since its discovery late last century including the completion of 5 diamond drill holes for a total of 1102m. Whilst some encouraging copper and gold mineralization has been outlined at relatively shallow levels (within 50m of the surface), this work has failed to indicate significant potential for an economic-sized ore body either along strike or at depth.

The geology within the HEC tunnel, currently being driven to pass roughly 400m beneath the workings should be monitored as it crosses the down dip projection of the mineralized zone. However, no other exploration is warranted over the Jukes Pty prospect.

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APPENDIX A

EXPENDITURE DETAILS FOR 11 MONTHS

JUNE 1986 - MAY 1987

032

GOLD FIELDS EXPLORATION PTY. LIMITED

913034

EL9/66 - TYNDALL, EXCLUDING HENTY PROSPECT

EXPENDITURE FOR 11 MONTHS TO END OF MAY, 1987

	\$
Salaries, Wages and On Costs	34,492
Travel and Accomodation	653
Consultants and Contractors	19,628
Assaying	906
Drilling	104,040
Stores	956
Vehicles/Plant	3,058
Tenement Costs	2,838
Computing	426
Field Office Costs	1,246
Administration Charges	10,237
	<hr/>
TOTAL	\$178,480
	<hr/>

033

APPENDIX B

PROPOSED DIAMOND DRILLING FOR WHITE SPUR

MEMO BY P.A. ROBERTS

MAY, 1986

034

MEMORANDUM

To L.A. Newnham cc: F.G. FitzGerald
From P.A. Roberts
Subject Proposed Diamond Drilling, White Spur
Date 15th May, 1986.

PAR/9510/4

Further to our recent discussions, I would like to commit to paper our reasons for wishing to diamond drill one hole at White Spur in the north-western section of E.L.9/66. This memorandum will subsequently be used to form part of the conclusions and recommendations sections of the Tyndall Annual Report.

1. INTRODUCTION

White Spur is located in the north-western block of E.L.9/66, west of the Henty Project area (Figure 1). It is the only "live" prospect on the E.L. north-west of the Henty Fault and has been the focus of recurrent interest over the past decade primarily because it is underlain by the probable southern extension of the Rosebery host horizon (Figure 1).

Three phases of exploration effort have been completed over the prospect during the life of the E.L., viz:

- (1) 1975-79 Mt. Lyell carried out gridding, ground magnetics, I.P. and soil geochemical surveys, followed by the completion of one 382m long diamond drill hole, WSP1.
- (2) 1983-84 Getty Oil covered the area in a DIGHEM airborne E.M. survey and subsequently geologically mapped the prospect in detail.
- (3) 1985 In February, 1985, the grid was surveyed with the UTEM ground E.M. system, unfortunately with negative results.

2. REVIEW OF PREVIOUS WORK

2.1 Geology (Figure 2)

FitzGerald's (1984) detailed mapping of the prospect revealed a complex sequence of variably altered (sericitized) pyroclastics and epiclastics together with essentially unaltered basic volcanics and/or intrusives and felsic intrusives. Of particular interest is a coherent, thick horizon of altered epiclastics 100m to 400m wide, which stretches from the E.L. boundary to south of Howards Road over a strike length of 1.3 km; the southern termination of this zone is abrupt and unexplained, however it is probably the result of either a fault or a fold closure.

Alteration of the sequence is variable however it generally becomes more intense to the north and is strongest within or on the margins of the epiclastic horizon.

Little mineralization is observed in surface exposures, however drill hole WSP1, which tested a gradient array I.P. anomaly, did obtain very minor pyrite, pyrrhotite and base metal sulfides (1-2%) disseminated through much of the core.

There is little evidence of facing in surface outcrops however a number of facings were recorded by A. Walter in the WSP1 drill log; these are predominantly up hole (west facing) in the upper part of the hole but are mixed deeper down (around 160m) possibly indicating tight folding and conceivably an isoclinal anticline axis (thus explaining the abrupt southern termination of the epiclastic horizon - a south plunging anticline?)

2.2 Geochemistry

Soil geochemistry results are generally patchy over this prospect, however some high base metal values were obtained (maxima: 1460 ppm Zn and 1850 ppm Pb). The patchiness of these results may be explained in part by the presence of a thin discontinuous veneer of glacials over the area. The best values obtained in the drill hole were 2m at 0.76% Zn, 0.05% Pb and 2m at 0.63% Zn and 0.13% Pb.

Calculations of the zinc number ($[\frac{Zn}{Zn+Pb}] \times 100$) from WSP1 assays resulted in a histogram plot strongly similar to the plot for Rosebery (see Figure 3). Following Ross Large's recent work on this parameter, this result can be interpreted as an indication that the weak mineralization in WSP1 is probably volcanogenic in origin.

2.3 Geophysics

Gradient array I.P. surveys obtained a 900 x 200 m² anomaly (≥ 15 msec). The latter coincides with the southern part of the epiclastic unit (see Figure 2).

Although the UTEM survey obtained a number of weak superficial anomalies, no responses indicative of massive sulfide mineralization were obtained (Bishop, 1985).

2.4 Discussion

Positive features of this prospect are:

- (1) The epiclastic sequence is probably a time equivalent of the Rosebery host horizon. In other volcanogenic massive sulfide districts (e.g. Kuroko, Abitibi), the deposits commonly occur along one or two distinct chronostratigraphic horizons.
- (2) Only one drill hole has been completed to test this zone despite the fact that it is over 1 km long.

- (3) The prospect lies on the north side of the Henty Fault. The only volcanogenic massive sulfide orebodies discovered to date in the Mt. Read Volcanics have been found north of this structure.
- (4) There is significant sericitic alteration within and around the epiclastic sequence, which may represent footwall-style alteration peripheral to a buried massive sulfide body.
- (5) The geochemical results were mildly encouraging, especially the zinc number calculations alluded to previously.

Negative features of the prospect are:

- (1) The failure of WSP1 to obtain a massive sulfide intersection from the best part of the I.P. anomaly.
- (2) The generally low level of sulfides and relative weakness of the alteration compared to that observed in the immediate vicinity of the Rosebery and Que River orebodies.
- (3) The absence of a reasonable UTEM anomaly.

The UTEM results imply that any massive sulfide body concealed within this prospect must be either relatively small (maximum size around that of Que River) and buried beneath at least 100m of cover or larger and more deeply buried (>200m?). If the target orebody is moderately to deeply concealed beneath the surface then the negative features of this prospect can simply be explained away as being the result of only the periphery of the system being exposed. If the Hellyer orebody was tipped on its side and buried 100-200m beneath the surface, the alteration and mineralization on the surface in the vicinity of the host horizon would probably be weaker than that seen at White Spur. Consequently, given the extreme paucity of previous drilling on this prospect and its strongly prospective stratigraphic position further drilling is definitely warranted.

3. RECOMMENDATIONS

- 3.1 One diamond drill hole should be completed north of WSP1. The preferred position of this hole is half way to the E.L. boundary (i.e. 500m north of WSP1), however the presence of felsic and possible basic intrusives outcropping in this area may reflect larger masses of such intrusives at depth which would have displaced the prospective epiclastic horizon. Consequently a hole 350m north of WSP1 is recommended (Figures 2 and 4). This hole should pass south of the aforementioned intrusives and traverse the entire epiclastic sequence, intersecting the section beneath the (presumably sulfidic) zone anomalous in chargeability approximately 200m below the surface.

The hole collar shown on Figure 2 is near an old access track which can be readily upgraded to four wheel drive standard.

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3.2 Both the new hole and WSP1 should be surveyed with downhole I.P. and E.M. The I.P. is recommended here, contrary to normal practice, because it is felt that if a massive sulfide intersection is not obtained in the proposed hole, the drill density on this highly prospective horizon will be so sparse that the maximum amount of information must be extracted from the two drillholes. In addition, it is always possible that the target orebody will be sphalerite-rich and copper-poor and therefore non-conductive (even to modern multi-frequency E.M. systems) but still strongly chargeable.



P.A. Roberts

Encl:

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038

5,378,000=N

380,000=E

Rosebery

Stirling Valley

Owen Conglomerate

ROSEBERY FAULT

HENTY FAULT

LEGEND

Es Shales, epiclastics within the Mt Read Volcanics

Fault

X Anticlinal axis

X Currently operating mine

X Prospect

5 cm

GOLD FIELDS EXPLORATION PTY. LIMITED

WHITE SPUR PROSPECT LOCALITY MAP

DRAWN BY: PFR

DRAFTSMAN:

DATE: 05/86

REVISIONS:

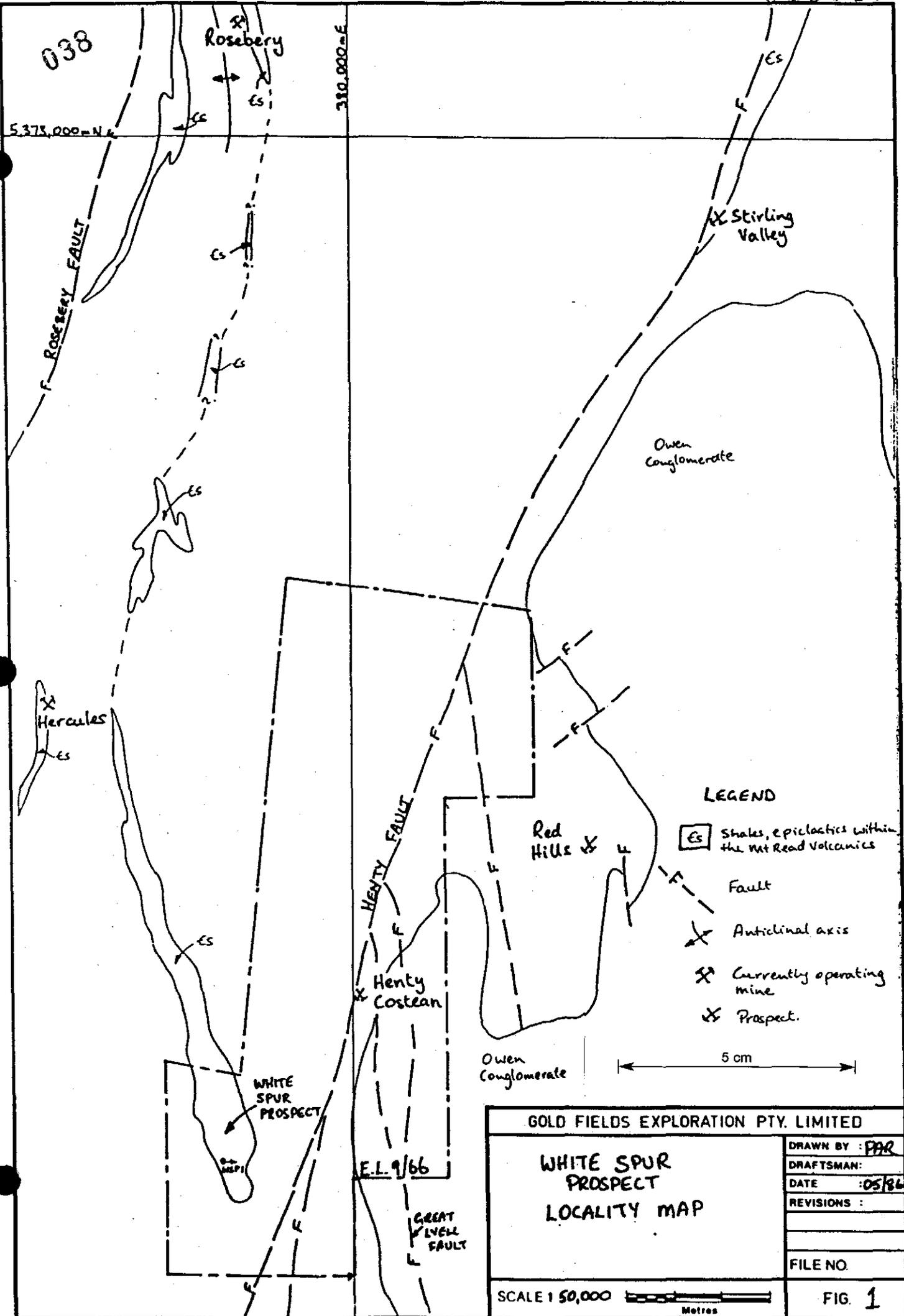
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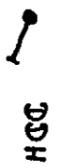
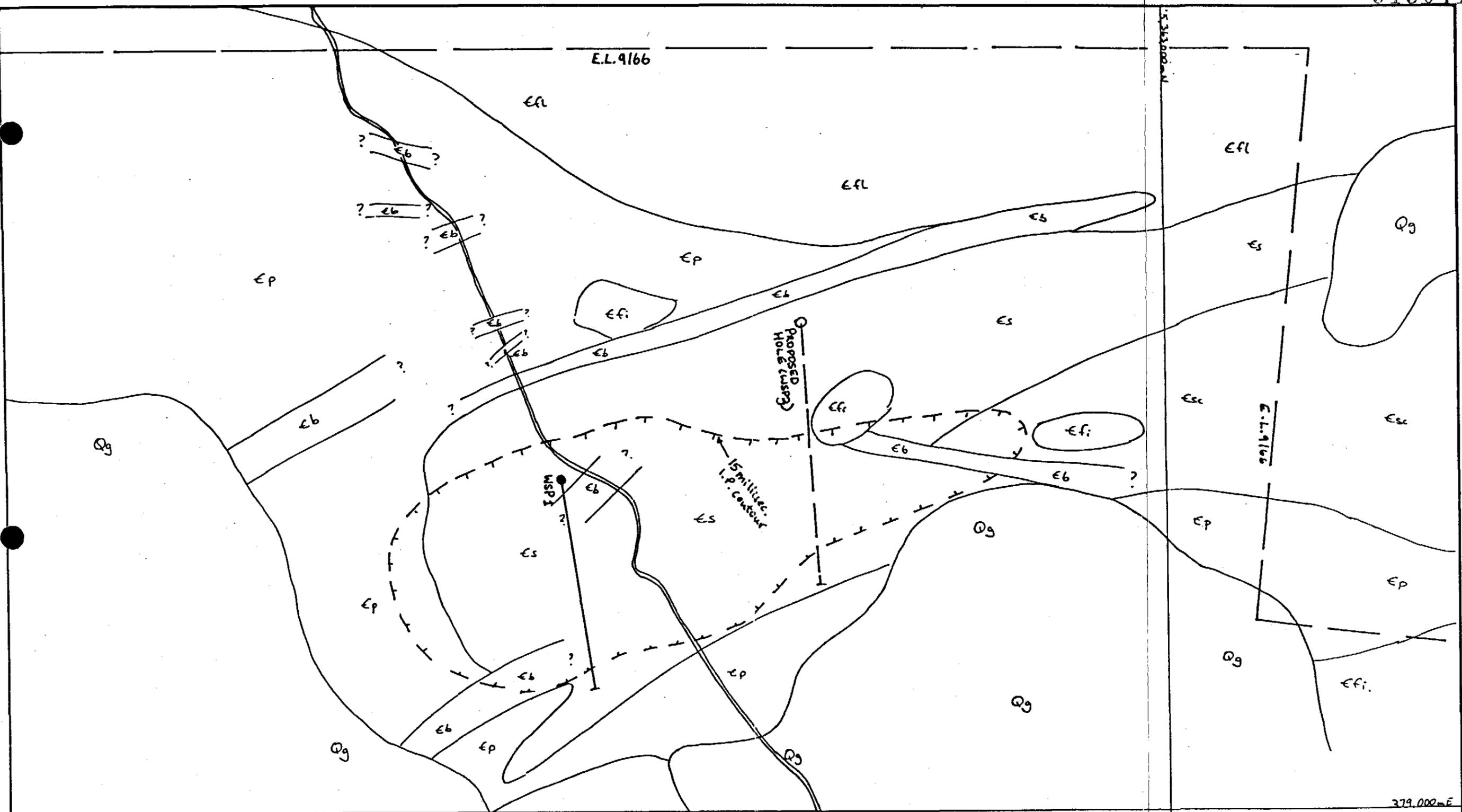
SCALE 1:50,000



Metres

FIG. 1





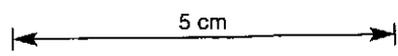
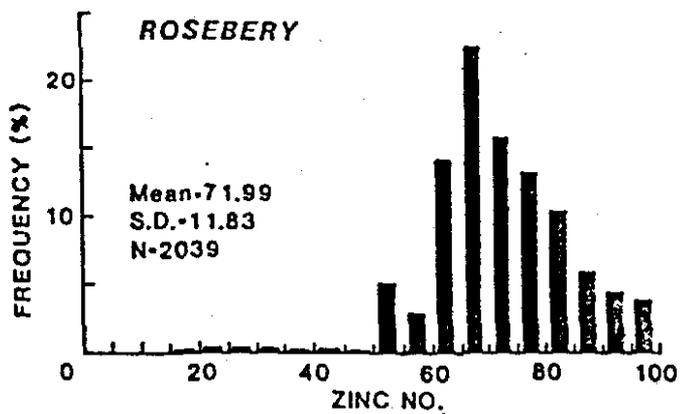
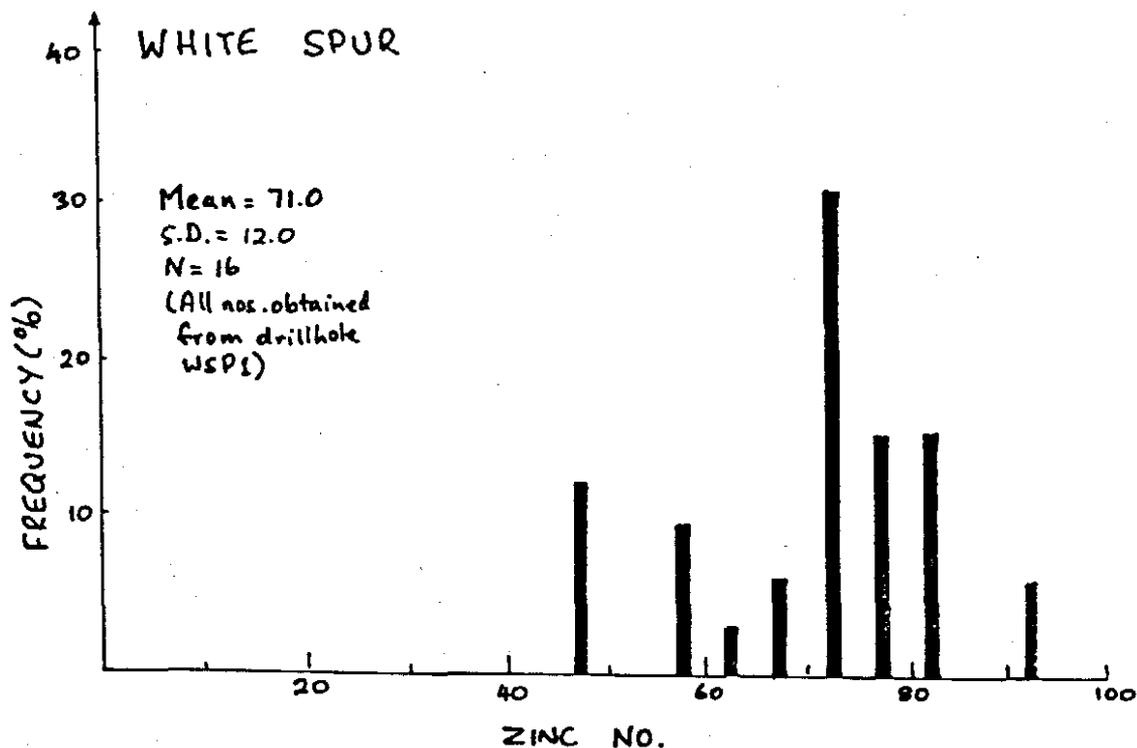
- LEGEND**
- Qg Glacial deposits.
 - Efc Felsic lavas, lava breccias.
 - Epi Felsic pyroclastics.
 - Es Epiclastic.
 - Ep Quartz-sericite schists.
 - Eb Basic lavas or intrusives.
 - Efi Felsic-intermediate sub-volcanic intrusives.

Note: geological mapping by F.A. Fitts-Gerald

GOLD FIELDS EXPLORATION PTY. LIMITED	
WHITE SPUR PROSPECT	DRAWN BY : PAR
GEOLOGY AND PROPOSED DRILLING	DRAFTSMAN:
	DATE : 05/86
	REVISIONS :
	FILE NO.
SCALE 1 5,000	FIG. 2

5 cm
Metres

630



GOLD FIELDS EXPLORATION PTY. LIMITED	
WHITE SPUR PROSPECT ZINC No. ($\frac{Zn}{Zn+Pb} \times 100$) HISTOGRAM	DRAWN BY : PAR
	DRAFTSMAN:
	DATE : 05/86
	REVISIONS :
SCALE 1	Metres
	FILE NO.
	FIG. 3

913043

041

> 15 millisecc I.P. anomaly

WSP3

TUFFACEOUS EPICLASTIC SEQUENCE

WEAKLY TO MODERATELY ALTERED PYROCLASTICS

DRILL HOLE SPECIFICATIONS

Collar co-ords.: 5,362,496 mN , 378,356 mE (AMA)

Bearing: 086° (AMA)

Collar angle: -45°

Hole size: NQ/BQ

400m

5 cm

GOLD FIELDS EXPLORATION PTY. LIMITED

WHITE SPUR PROSPECT
PROPOSED DRILL HOLE

DRAWN BY : PAR
DRAFTSMAN:
DATE : 05/86
REVISIONS :

FILE NO.

SCALE 1 2000



FIG. 4

042

APPENDIX C

COMMENTS ON DOWN-HOLE EM SURVEYS EL9/66, 1986-87

BY DR. J.R. BISHOP, MITRE GEOPHYSICS

JANUARY, 1987

043

913045



MITRE GEOPHYSICS PTY LTD

MINERAL EXPLORATION AND ENGINEERING CONSULTANTS

BUGGS LANE ELLIOTT TASMANIA 7325 PHONE 004-363143

COMMENTS ON DOWN-HOLE ELECTROMAGNETIC SURVEYS

WITHIN E.L. 9/66, 1986-1987.

for

Gold Fields Exploration Pty Ltd

by

Dr J.R. Bishop

GF/MG87/01
Jan., 1987



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Figure 8. /	DHEM profile: DDH WSP3.	

**SUMMARY**

A number of down-hole electromagnetic (DHEM) surveys were carried out down diamond drill holes within E.L. 9/66 during the 1986/87 field season. The results from some of the holes have been interpreted with more than the usual uncertainty, however none are considered to indicate a prospective conductor.



INTRODUCTION

A number of DHEM surveys were carried out within E.L. 9/66 during the 1986/87 field season. These included the routine surveying of all of the recently drilled holes, plus the surveying of one old hole (WSP1) which was reamed out and cased for the purpose and the attempted surveying of another previously drilled hole, BL4. The surveys were carried out by Solo Geophysics using Sirotem.

All of the holes were drilled to locate base metal massive sulphides within the Mt Read Volcanics. This report presents the DHEM data and offers some comments on the results and on the criteria upon which some of the holes were placed. Some petro-physical results are also given.

(1) DDH TYN4.

This hole was drilled to test a well-defined, but short time-constant UTEM anomaly overlying Pleistocene moraine. The hole was correctly targeted, but failed to intersect any mineralisation. The lack of IP responses on adjacent lines was a strong negative factor for the area, however the (interpreted) prospective geology and adjacent anomalous base metal geochemistry were overriding positive factors. The lack of any down-hole response suggests that the UTEM anomaly was most likely due to current gathering at the base of the glacials. This phenomena of current channelling from the host rock into a 'conductor', rather than by induction from within the body often occurs when large transmitting loops are placed adjacent to faults, weathered zones, conductive strata, etc. It appears to be more frequent at longer distances from the loop.

The DHEM survey used a single 125m x 125m transmitting loop to the east of the collar (see Figure 1) and reached to 240m in the 250m long hole. Response levels were high, but no discrete conductors were defined (Figure 2). The rather high noise levels can probably be attributed to the adjacent power line. However the large fluctuations at the top of the hole are due to steel casing between 10.5 and 37.5m. The migration of the positive to negative cross-over in the DHEM profile is considered to be consistent with a conductive overburden. The glacials intersected by this hole, were unusual in that they consisted almost entirely of sand and the hole 'made water' at the base of the glacials. Thus a porous, weakly conductive environment is indicated which reinforces the above interpretation. That is, the smaller loop used for the DHEM survey has not 'energised' the source of the original response (see further comments in Conclusions and Recommendations).

(2) DDH TYN5

This hole was drilled following a recommendation by Bishop (1982) who had suggested that the dipole-dipole IP surveys on line 16N



had defined two separate sources. The IP coverage on this line consisted of 30.5m, 61m and 91.5m (ie, 100ft, 200ft & 300ft) dipole surveys carried out in 1968 and a 50m dipole survey carried out in 1981: the latter survey confirming the results of the earlier ones. The metal factor parameter clearly shows two sources, with the better response on the eastern side (Figure 3). IP surveys were carried out on the adjacent lines 15N, 17N and 18N by Scintrex in 1981 (Bishop, 1982). This data shows two separate sources on lines 17N as well as 16N; both sources plunging to the north. DDH TYN3 on line 16N had tested the western anomaly only and had intersected black shales. The 1985 UTEM survey responded to the black shales, but not to the eastern IP anomaly (Bishop, 1986). Although this indicated that the source was not massive sulphides, it was considered that the possibility of disseminated sulphides beneath the glacial cover should be investigated and DDH TYN5 was drilled to test the anomaly. The hole failed to intersect any mineralisation, or other source for the IP response (ie, black shales). It also failed to intersect the black shales located by DDH TYN3, which were expected at the end of the hole. A DHEM survey was carried out, using early times, which logged to 370m of the 373m hole. The results for channels 7 to 15 are given in Figure 4a (log-linear) and 4b (linear-linear). The strong response near the top of the hole is due to casing stuck between 14.3 and 26.3m. The well-defined, off-hole anomaly at the bottom of the hole is interpreted to be due to the expected black shales. The profile shows slightly more than half of the width of the response, suggesting that the source is adjacent to the hole, not beyond it (?suggesting faulting).

The DHEM log also shows a series of 'depressions' at early times (channels 7 to 10) at 170m, 230m and at 290m. These are not well defined, but are believed to be real, indicating the presence of weak, off-hole conductors. The down-hole depth of the shallowest response agrees with the expected position of a poor UTEM anomaly recorded on line 16N at 325E, assuming a steep dip and is presumably due to a fault or contact. The location of the second response is in agreement with the interpreted source of the eastern IP anomaly. Only a small body is indicated and it seems likely that the IP source is a depth limited body between the hole and the surface. It is also possible that the hole (and the IP survey) are off the southern end of the body. This latter suggestion is perhaps supported by the cross-cutting fault indicated on the geological map (Figure 1) and which was intersected in the upper part of the drill hole. Much of the above is conjecture: computer modelling should confirm that a polarisable source of limited depth or off-line, would give results comparable to the observed data. In retrospect, such modelling should have been done prior to the drilling. Given the limited room left for an economic deposit, there is now little interest in the source of this anomaly.



(3) GRADIENT ARRAY IP ZONE 10.5N/1100E TO 12N/1000E.

This anomalous chargeability zone was broadly along strike from the UTEM and IP responses subsequently tested by DDH's TYN4 and TYN5 respectively. It has not been drilled, but has associated anomalous base metal geochemistry. The coincident high resistivities indicate that massive sulphides are not the cause of the IP response, but the presence of a power line (Figure 1) meant that this area was not investigated for a deep seated deposit by the UTEM survey. A number of samples were taken from outcrop in the area to find the source of the IP. The results, which are given in Table 1, indicate that the source has not been determined.

(4) DDH BL4

This hole was surveyed to see if a significant conductor existed within the 'pyritic sequence' intersected by the hole. Unfortunately the DHEM survey was only able to log the top 62m of this 289m hole. One loop was used for the survey (see Figure 1) and the results are complex and probably noisy (see Figure 5). The migration down the hole of the negative trough from early to later times, is comparable to the results recorded down DDH TYN4 and a poorly conducting glacial overburden is again suggested as the cause of this behaviour. The sudden positive gradient defined by the last two stations on the log is consistent with the probe at the edge of an intersected conductor; ie, the massive to semi-massive pyrite.

Table 1 lists resistivity, IP and conductivity measurements for core samples of pyrite and the adjacent black shales. The measurements suggest that the pyrite is reasonably chargeable and moderately conductive and that the shales are quite resistive. This is somewhat in contrast to the field IP and TEM surveys both of which responded to the black shales (ie, conductive and chargeable), but which did not record a resistivity response over the pyrite (ie, resistive and (?)moderately chargeable). A down-hole IP survey (Meares et al, 1981) recorded no values between 60m and 120m, presumably because of extreme (too conductive; too chargeable) values associated with the pyrite. These results suggest that although the sulphides are chargeable and (probably) moderately conductive, there may be an insufficient volume to be detected from large-scale surface IP and EM surveys.

(5) DDH WSP1

This hole, on the White Spur grid, was drilled in 1979 to test an IP response with associated anomalous geochemistry. No significant mineralisation was intersected, but promising Pb and Zn values were obtained from sections of the core. The hole was reamed and a DHEM survey carried out to test for off-hole mineralisation below the level of investigation of the (disappointing) 1985 UTEM survey (Bishop, 1985). The survey extended down to 280m where the probe stopped (end of hole at 382m). A



loop size of approximately 100m x 350m was used (Figure 6), the longer side length being employed to energise any along-strike mineralisation. The results are shown in Figure 7. A weak, single point high was recorded at 100m. A strong, single point low was recorded at 150m. The latter, which is part of a broader, early time low is coincident with the best Pb & Zn values assayed from the core and the results are consistent with a small and very local off-hole occurrence of sulphides. The broader trough (140m to 180m) defined by the early time channels 2, 3 & 4 indicates a very weakly conductive zone below or around the mineralization.

The single peak positive high at 100m is indicative of a very local in-hole conductor. This is not supported by the geological log or by the down-hole IP (which extended to only 140m; Howland-Rose, 1979), although slightly higher than average total sulphide values were assayed here. The 'response' may be due to instrumental noise.

(6) DDH WSP3

This hole was designed to test the favourable geological horizon north of DDH WSP1. Since this area had previously been surveyed with UTEM without locating any significant responses (Bishop, 1985), a deep hole was planned. WSP3 intersected weakly altered epiclastics in the upper section of the hole, with barren, unmineralised rocks in the lower part. The latter consist of felsic pyroclastics and basaltic intrusives similar to the unprospective hanging wall rocks at the Henty Prospect 1.5kms further east (ie, no mineralisation is predicted between the lower sections of WSP3 and the Henty Prospect). The DHEM survey used a single loop (see Figure 6 for location) and was logged to the end of the hole at 360m (Figure 7). A piece of casing between 24 and 33m produced a large amplitude response at shallow depth. A strong negative response was tantalisingly recorded on the last reading at the bottom of the hole. This could be the beginning of an anomaly due to a conductor beyond the hole, but the gradient suggests a close source and the geology is unfavourable. Therefore, the response is interpreted to be due to an unexplained and unexpected piece of metal at the end of the hole.

CONCLUSIONS AND RECOMMENDATIONS

A number of DHEM surveys have been carried out to test the ground around the holes for massive sulphides: a search radius of 100-150m is expected for a deposit of economic size in a resistive host. Problems were encountered surveying two of the holes. No attempt was made to clear BL4 prior to survey and only the top 62m were logged. WSP1 was reamed out seven years after drilling and cased with PVC piping. The probe inexplicably jammed at 280m down the 382m hole. Because of the problems with WSP1, the probe was pumped down the last section of WSP3 using the drill's water supply pump with a stuffing box attached. Although not necessary



in this case, the operation was successful and demonstrated that horizontal or perhaps even up-dipping holes could be logged using this technique.

Two of the holes discussed above, TYN4 and TYN5, were drilled on geophysical criteria. Neither hole intersected the source of the geophysical anomaly. TYN4 was drilled on a UTEM anomaly. No conductor was intersected by the hole, nor was one located by the DHEM survey. It is therefore likely that the source of the TEM anomaly is a large formational, weak conductor such as a fault or contact. In this case I have suggested the base of the glacials. Such features will respond to TEM surveys using large fixed transmitting loops. While this layout is needed for depth penetration and for reasonable productivity, the experience gained from this and other surveys indicates that anomalies of this type should be checked prior to drilling with a single traverse of moving loop TEM; since the smaller loop used by this technique will generally not induce a response from a weak formational conductor.

DDH TYN5 was drilled to test a proposed second IP source adjacent to (drilled) black shales. No coincident UTEM anomaly was recorded over the IP anomaly, but the site was considered geologically favourable. The lack of a UTEM anomaly was rationalised by postulating a low concentration of sulphides (although there was a well defined resistivity anomaly). The DHEM survey recorded a 'response' at the expected location, but its amplitude was much less than one would expect from a substantial body of sulphides. Thus the geophysical results from this region have not been thoroughly explained by the drilling. I do not believe that the second source is fictitious and merely the misinterpretation of the distorted eastern arm of a single 'pants leg' anomaly, since this would put the source at least 100m to the east of its recorded position on the Anthony Road. Also, a similar pattern occurs on the next line to the north. I suggested above that the IP traverse and drill hole may be off the end of the body. The lesson re-learned from this experience, is to check for continuity of an anomaly by detailed surveying on either side of the proposed target. Further, computer modelling prior to drilling, would give better constraints on the drill target.

J.R. Bishop
Jan., 1987.



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- Bishop, J.R., 1985. Interpretation of the White Spur UTEM survey (E.L. 9/66). Mitre Geophysics report 85/06 for Gold Fields.
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- Howland-Rose, A.W., 1979. A report on additional geophysical surveys over the White Spur grid (E.L. 9/66). Scintrex report TAS-054B for Mt Lyell.
- Meares, R.M.D., Hutton, M.J. & Komysan, P., 1981. E.L. 9/66 annual report 1980-81. Mt Lyell company report.



Table 1
PETROPHYSICAL MEASUREMENTS

(1) Gradient array IP zone 10.5N/1100E to 12N/1000E.

SAMPLE NO.	LOCATION	MAGNETIC SUSCEPTIBILITY $\times 10^{-6}$ CGS	DRY BULK DENSITY (t/c.m.)	RESISTIVITY (ohm-m)	PHASE (milliradians)	PETROLOGY
29/1 (T2621)	50m sth of 1050E/11N	800 - 1500	2.73 - 2.78	4,370	14.	Tyndall Grp; wkly altered felsic lava; magnetic; trace py.
29/2 (T2622)	75m sth of 1050E/12N	600 - 2500	2.78	3,518	14	Tyndall Grp felsic lava; wk pervasive chlorite; magnetic.
29/3 (T2623)	"	2900 - 3500	2.72	6,514	10	Tyndall Grp felsic lava; pervasive chlorite-epidote alteration; magnetic.

n.b. The IP effect obtained from these samples does not explain the anomaly recorded in the field.

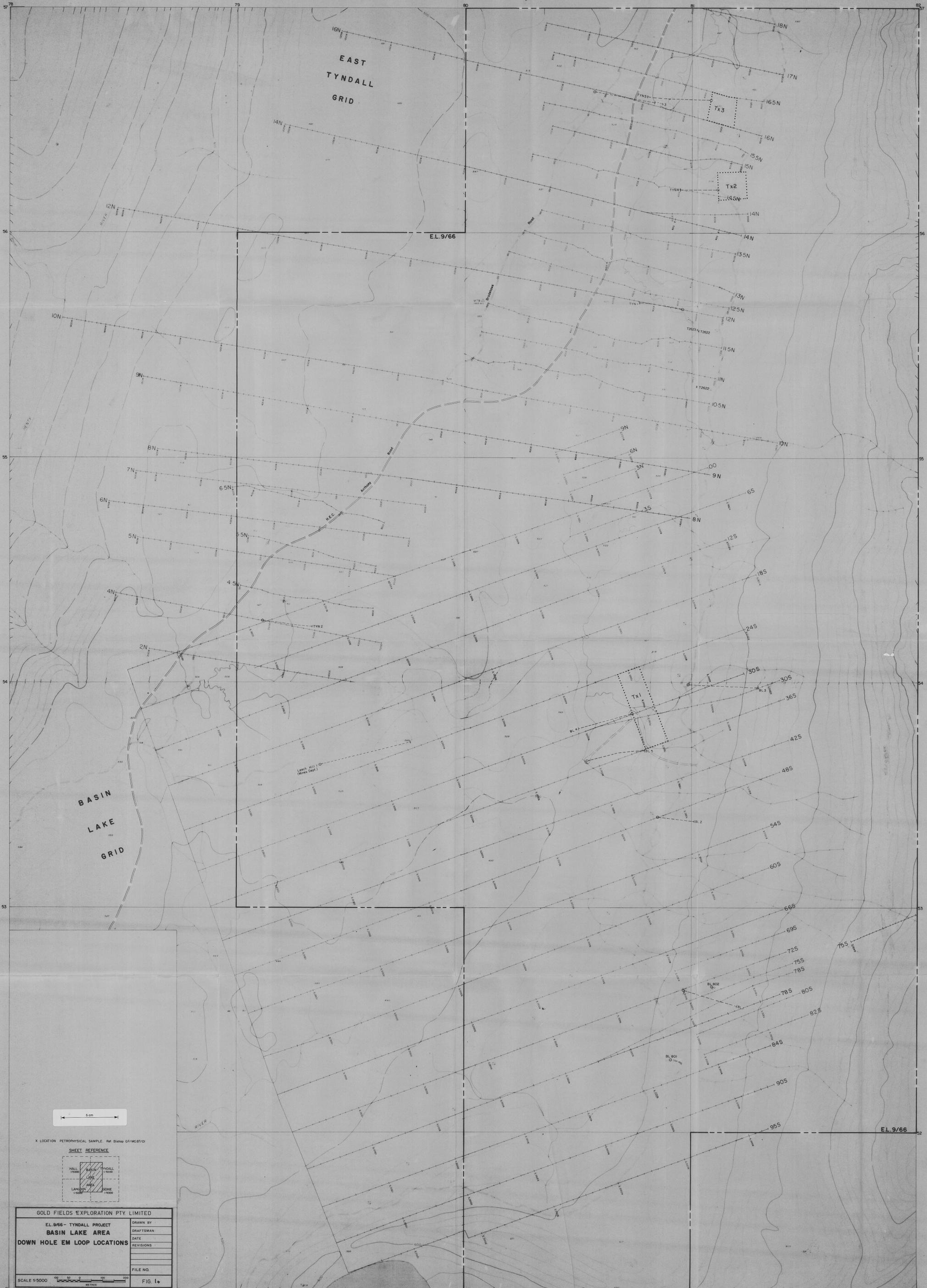
(2) DDH BL4

SAMPLE NO.	DEPTH DOWN HOLE (m)	-----WATER BATH-----		-----SURFACE SCAN-----		CONDUCTIVITY (S/m @ 2.5MHz)	PETROLOGY
		RESISTIVITY (ohm-m)	PHASE (milliradians)	RESISTIVITY (ohm-m)	PHASE (milliradians)		
30/1	65.3	94.	423.	0.4	0.0	2.7	massive py.
30/2	69.7	127.	67.	7.	115.	1.7	"

n.b. Dry bulk density measurements of 4.2 & 4.1 t/c.m. suggest about 65% pyrite.
Low IP effects with surface scan due to direct contact with sulphides.

32/1	118.9			416.	48.	~0	black shales
32/2	142.3			3.1 (1Hz)	3. (1Hz)	~0	" "
32/3	153.4			28.	0.	~0	

Resistivity/IP measurements made at 0.1Hz. 1milliradian = 1mv/v.



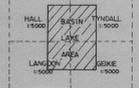
EL. 9/66

EL. 9/66

5 cm

X LOCATION PETROPHYSICAL SAMPLE Ref: Bishop GF/MG87/01

SHEET REFERENCE



GOLD FIELDS EXPLORATION PTY LIMITED

EL. 9/66 - TYNDALL PROJECT

BASIN LAKE AREA

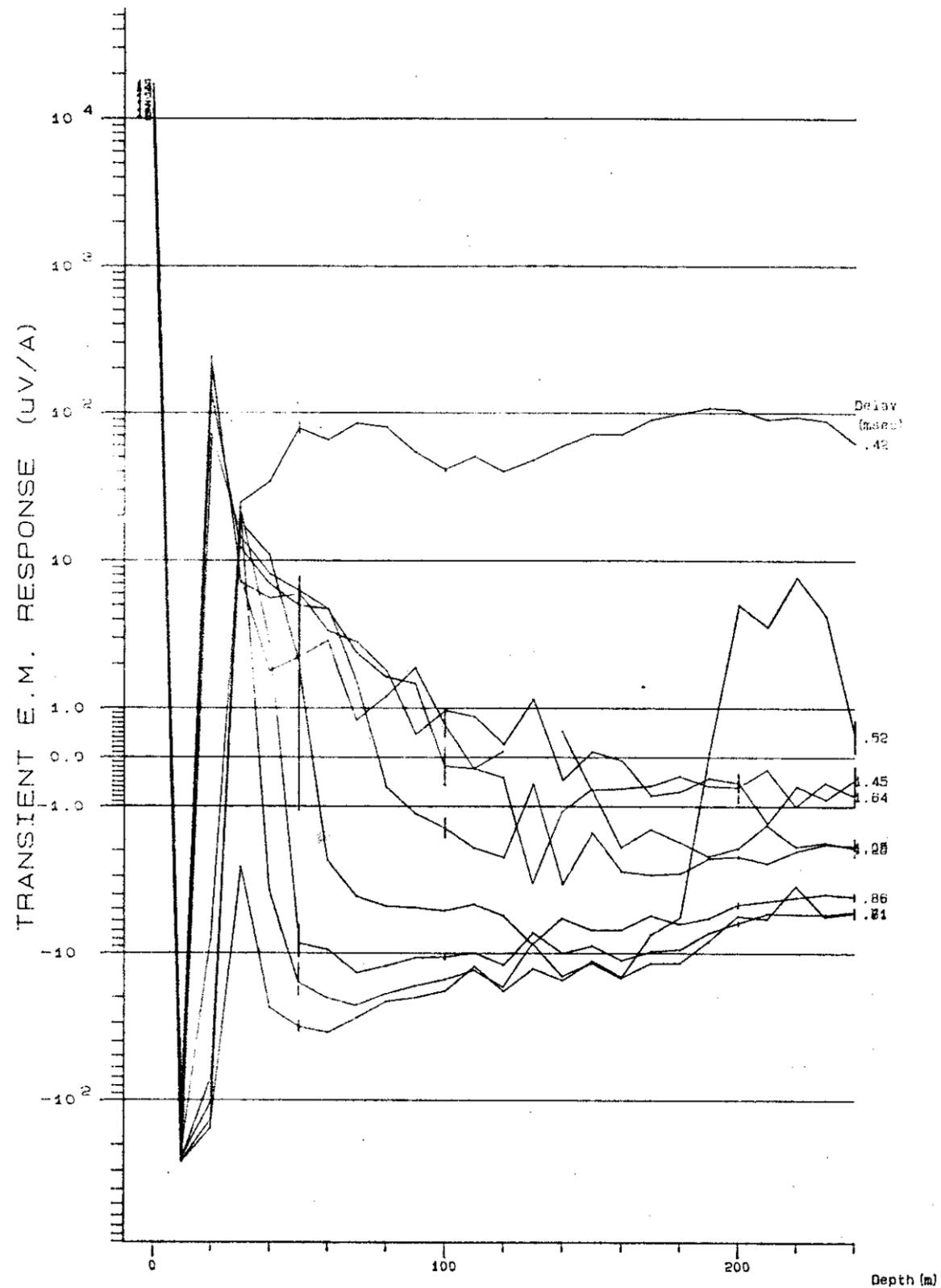
DOWN HOLE EM LOOP LOCATIONS

DRAWN BY	
DRAFTSMAN	
DATE	
REVISIONS	
FILE NO.	

SCALE 1:5000

FIG. 1

87-2674



5 cm

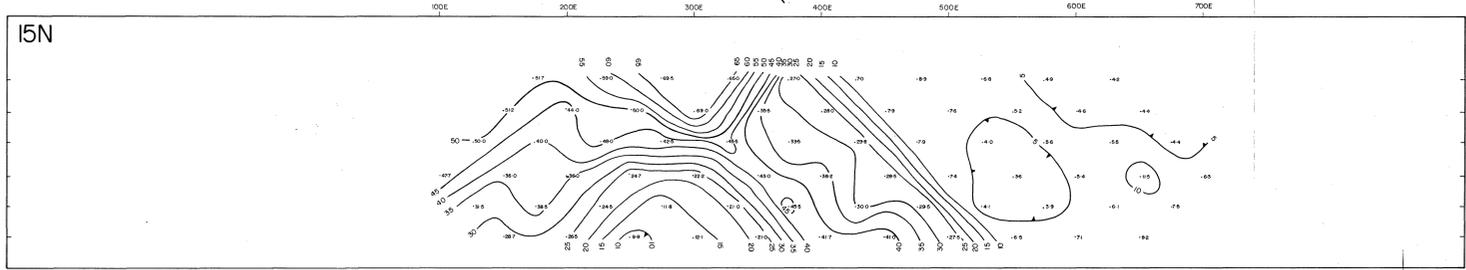
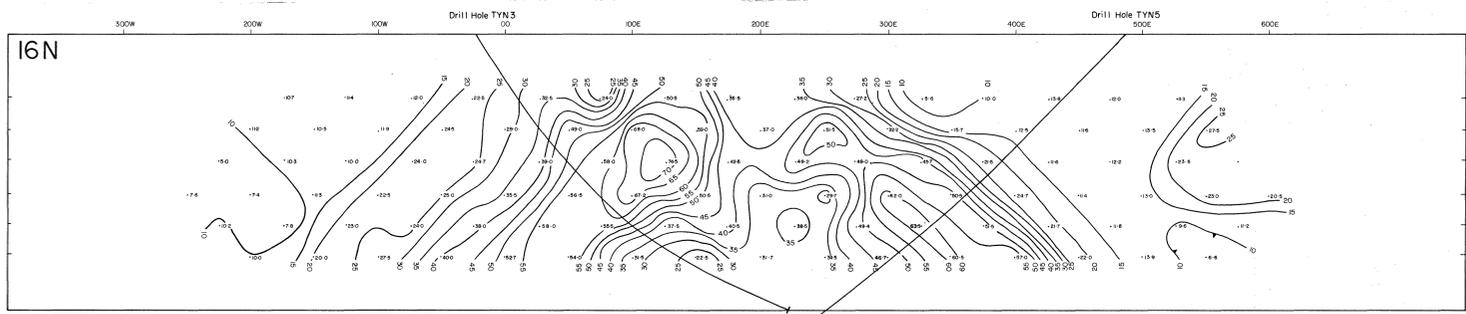
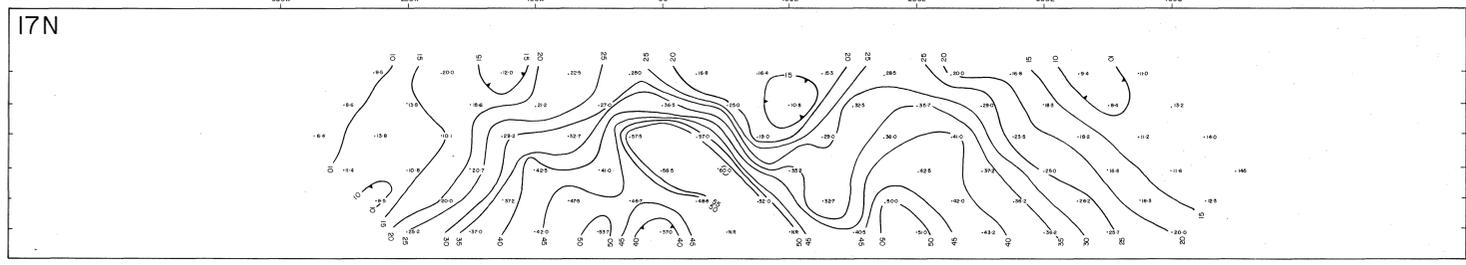
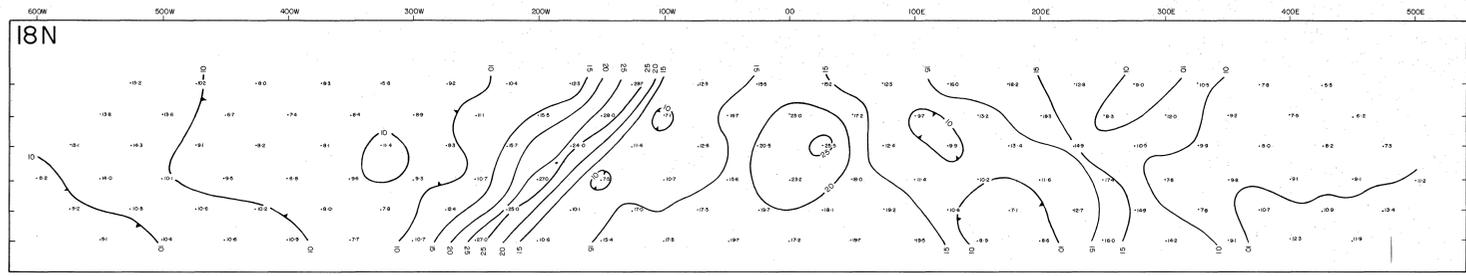
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 SIROTEM Survey by SOLO Geophysics & Co. 11/ 9/86
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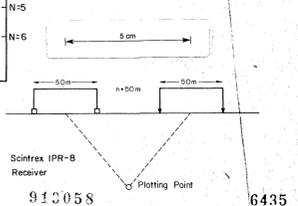
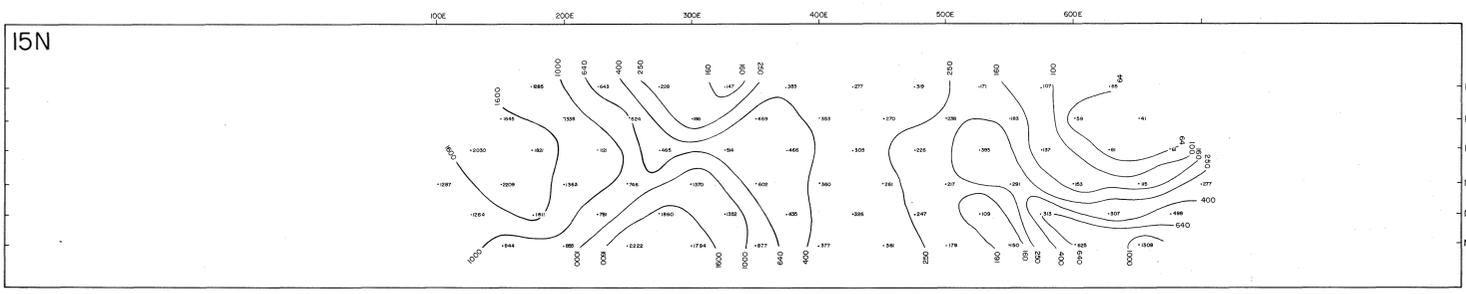
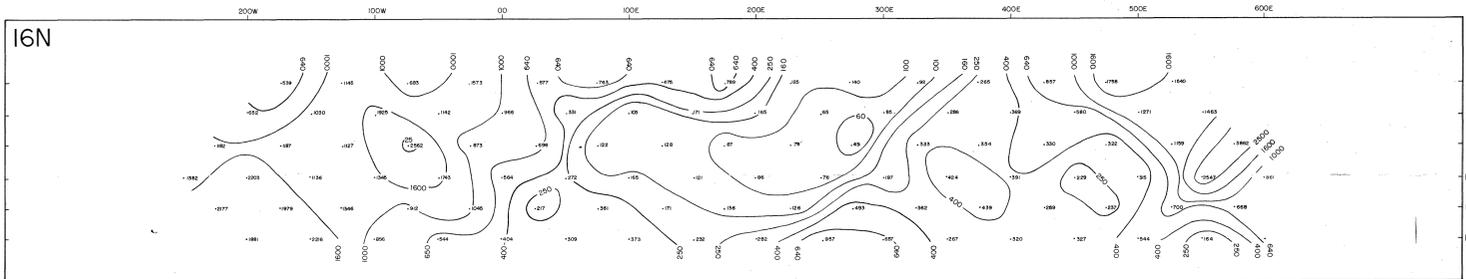
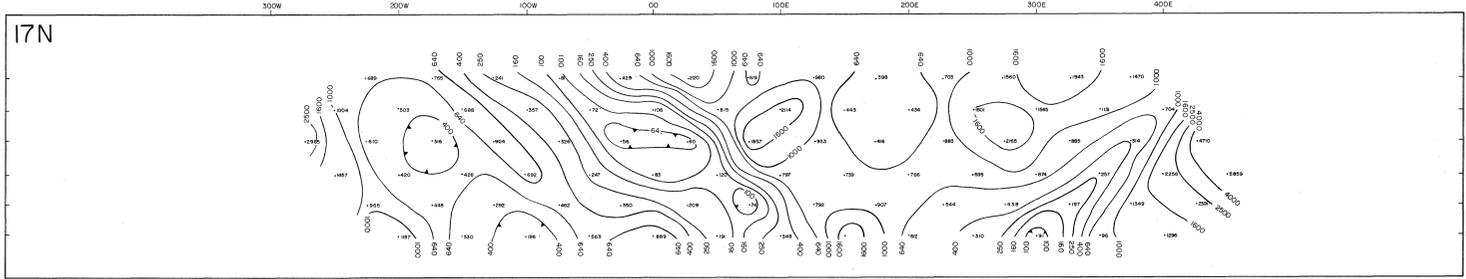
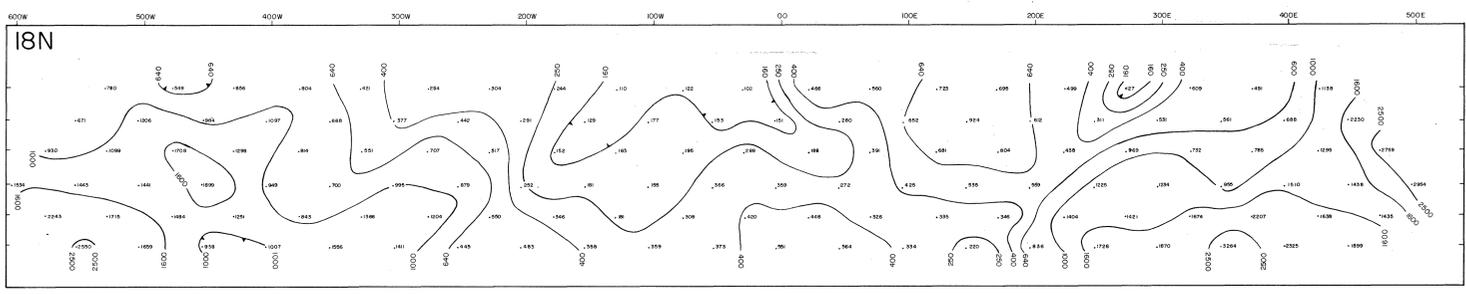
913057 6434

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	DRAFTSMAN:
Ref: GF/MG87/01	DATE Jun'87
	REVISIONS :
SCALE 1:2000	FILE NO.
Metres	FIG. 2+

CHARGEABILITY (mV/V)



RESISTIVITY (ohm-metre)



Survey by Scintrex Pty Ltd
Survey dates May 1981

87-2674

913058
Profiles positioned relative to regional strike of 359°GN

THE MOUNT LYELL MINING & RAILWAY COMPANY LTD

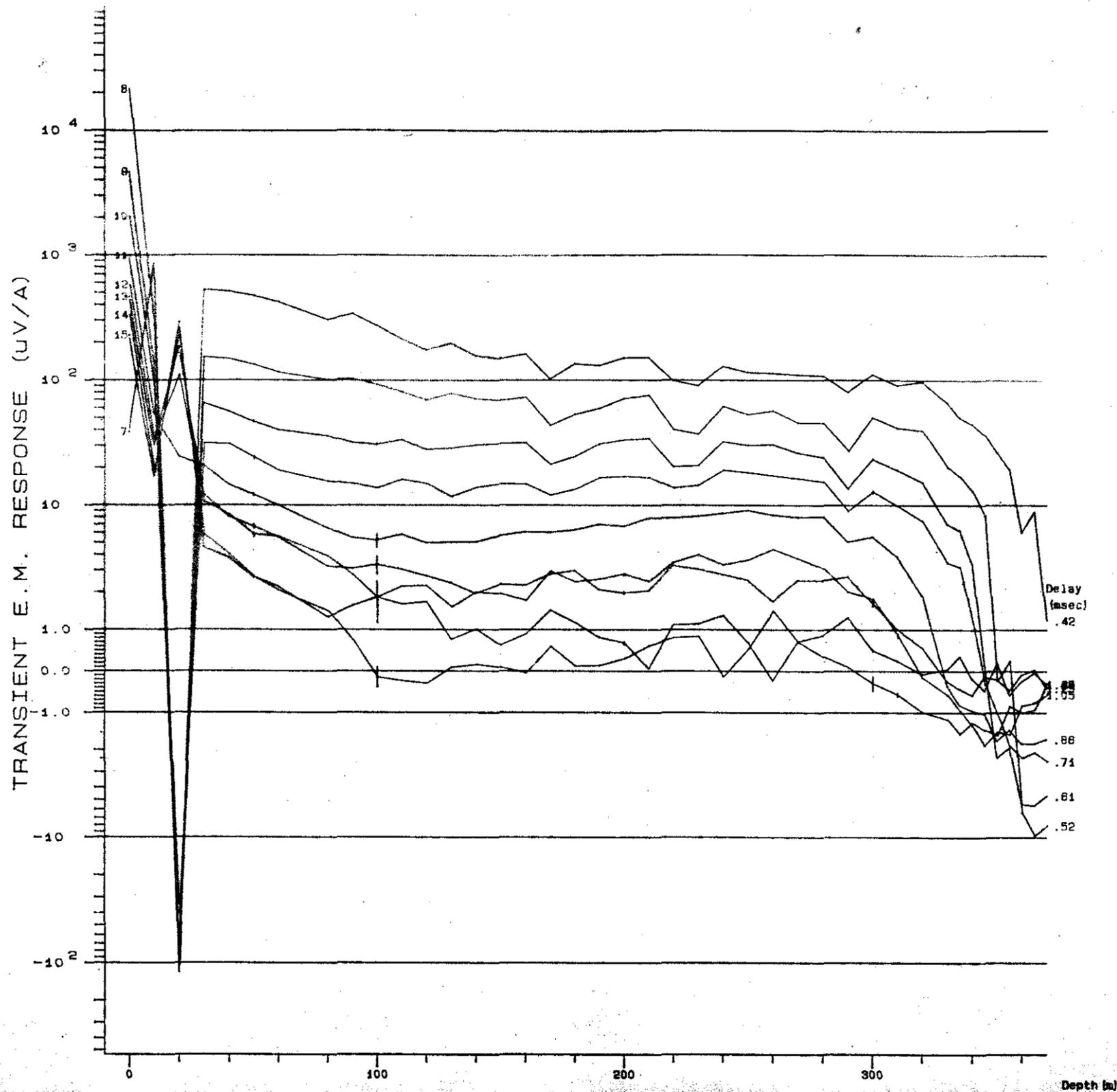
**EAST TYNDALL
DIPOLE - DIPOLE E.I.P.
LI5N-18N
CHARGEABILITY & RESISTIVITY
PSEUDO SECTIONS**

Chargeability C.I. = 5mv Resistivity C.I. = Logarithmic

Scale: 1:2000
Date: 25/5/81
Drawn by: J.C.K.
Checked by: H.D.J.

FIG 3

A0460



913059

5 cm

6436

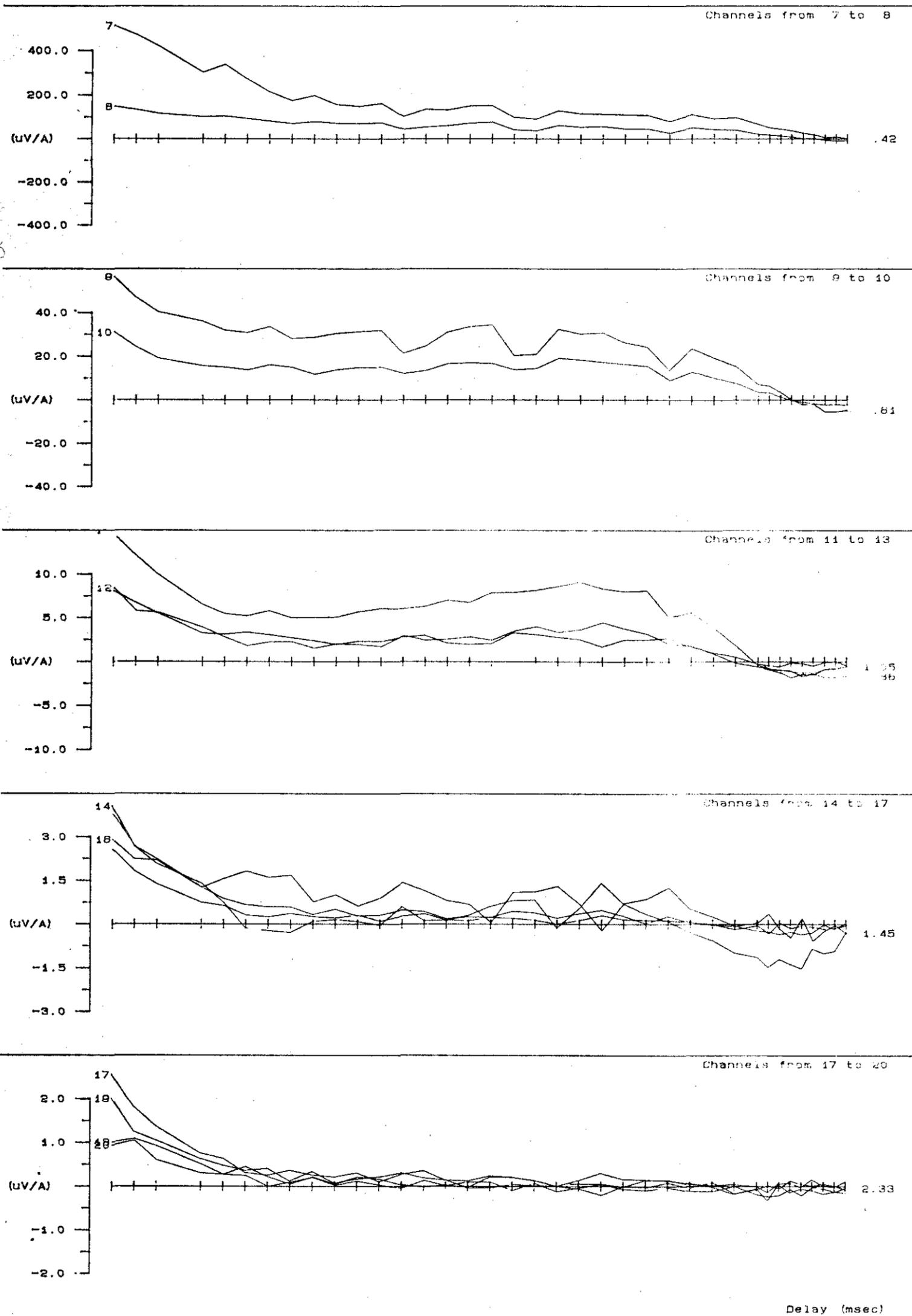
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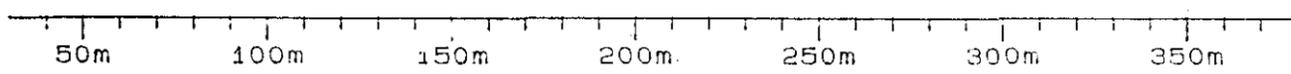
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TYN 5	DRAFTSMAN:
	DATE Jan '87
DHEM PLOT	REVISORS :
	FILE NO.
Ref: GF/MG87/01	
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	FIG. 4a

054
87-9674

TRANSIENT E.M. RESPONSE

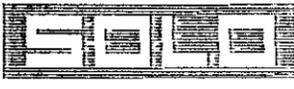


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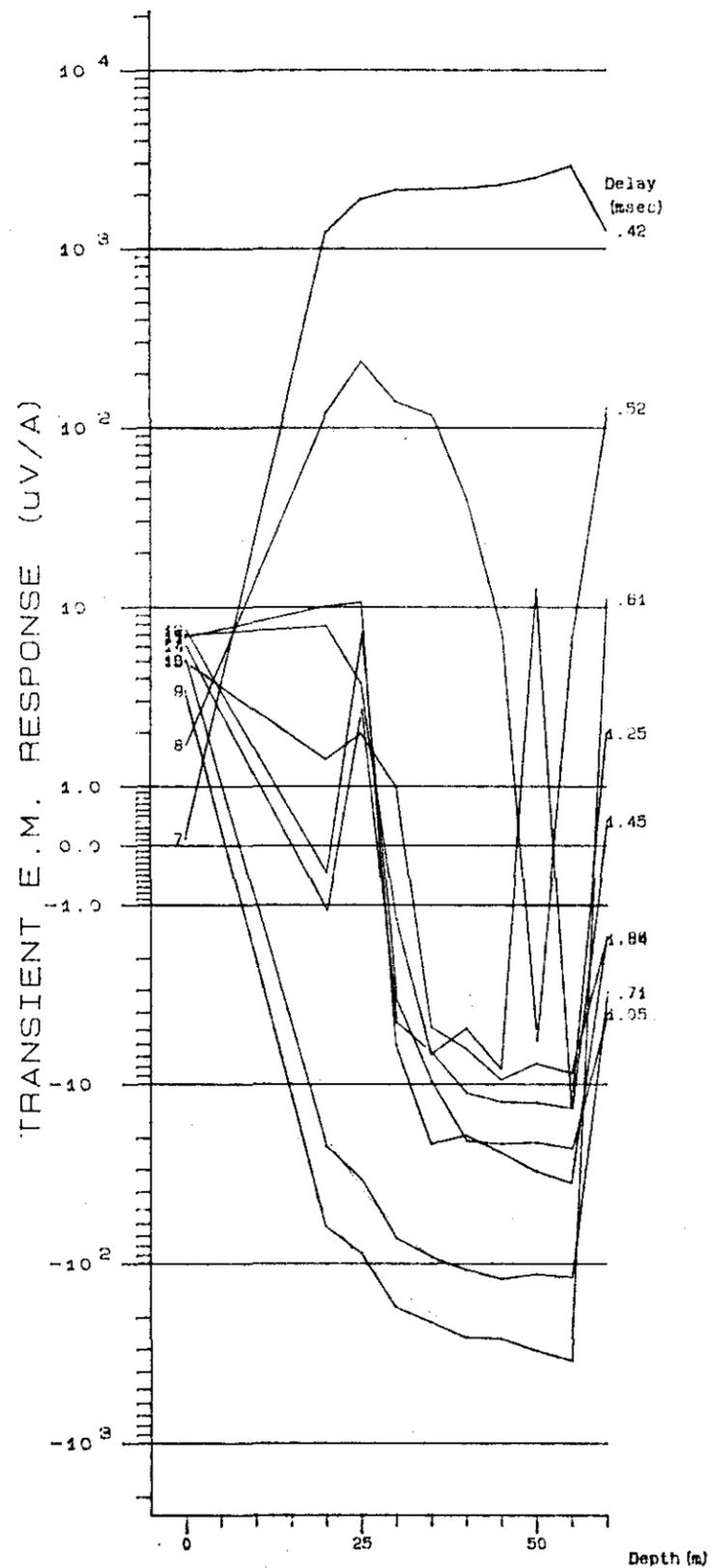


GOLDFIELDS EXPLORATION PTY. LTD.
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LOOP configuration : Drill hole
Plotted : 2:52 PM 16/ 1/87

5 cm



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EL9/66 TYNDALL	
TYN 5	
DHEM PLOT	
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DRAFTSMAN :	REVISIONS :



913061

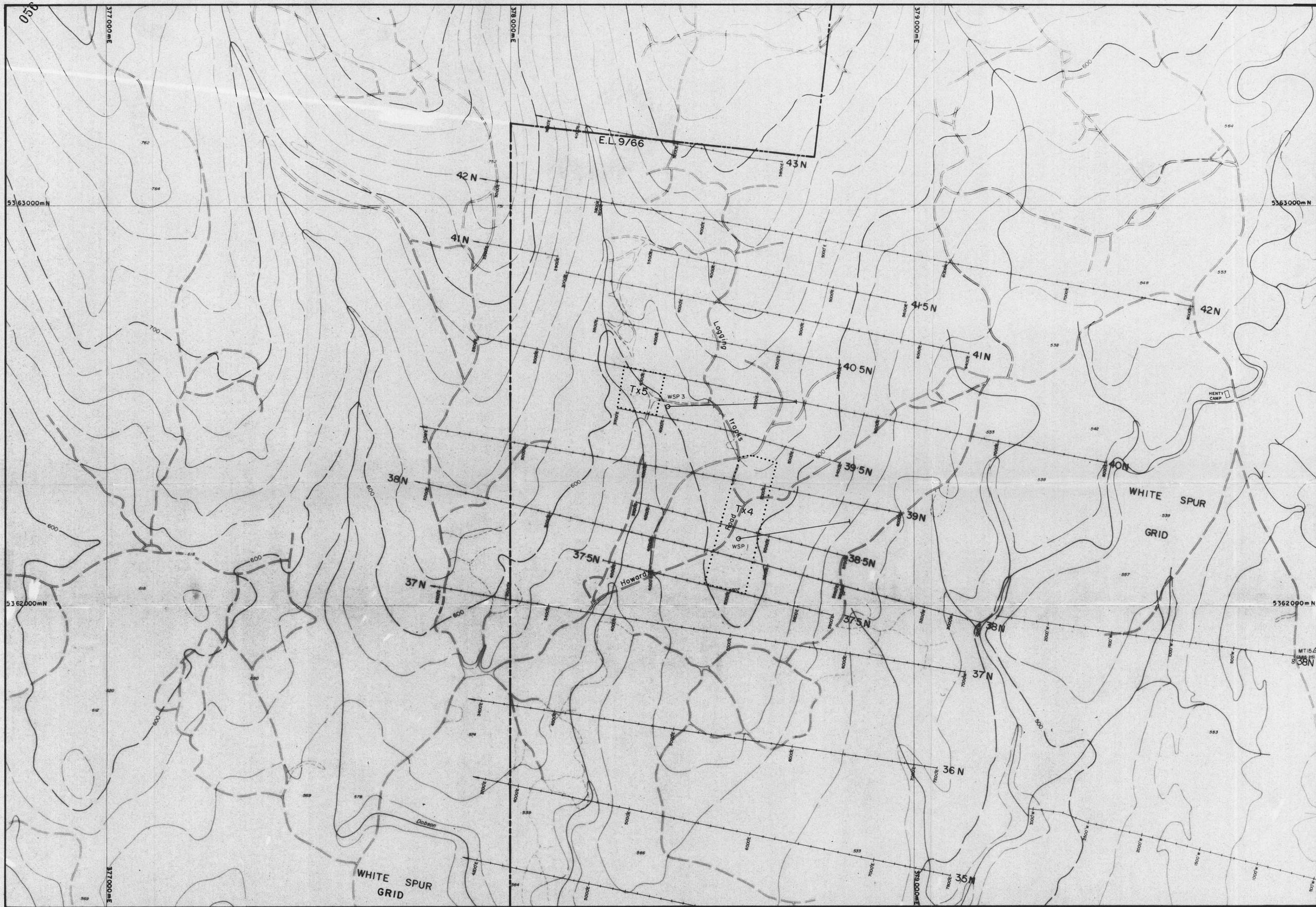
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SOLO

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EL9/66 TYNDALL BL4 DHEM PLOT	DRAWN BY : SOLO
	DRAFTSMAN :
Ref: GF/MG87/01	DATE : Jan '87
	REVISIONS :
SCALE 1:1000	FILE NO.
Metres	FIG. 5

050



913062

GOLD FIELDS EXPLORATION PTY LIMITED

E.L. 9/66 - TYNDALL PROJECT

WHITE SPUR

DOWN-HOLE EM LOOP LOCATIONS

DRAWN BY : F.G.F.

DRAFTSMAN : G.M.B.

DATE : May '87

REVISIONS :

F.G.F. May '87

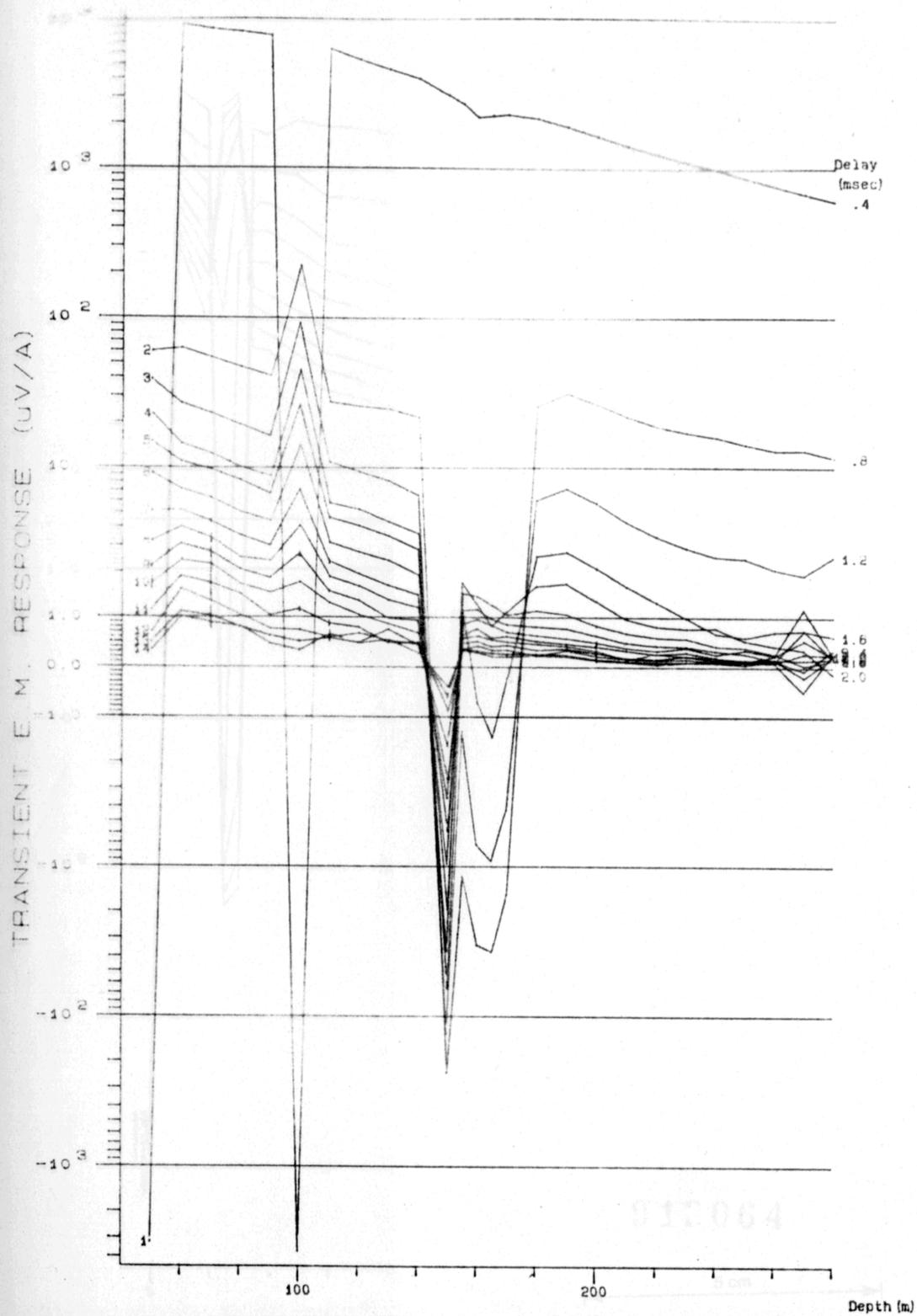
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FIG. 6

SCALE 1:

NOTE: Some discrepancies between A.M.G. location of drill holes and topographic/cut grids data.

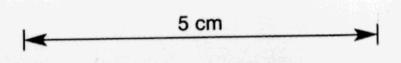
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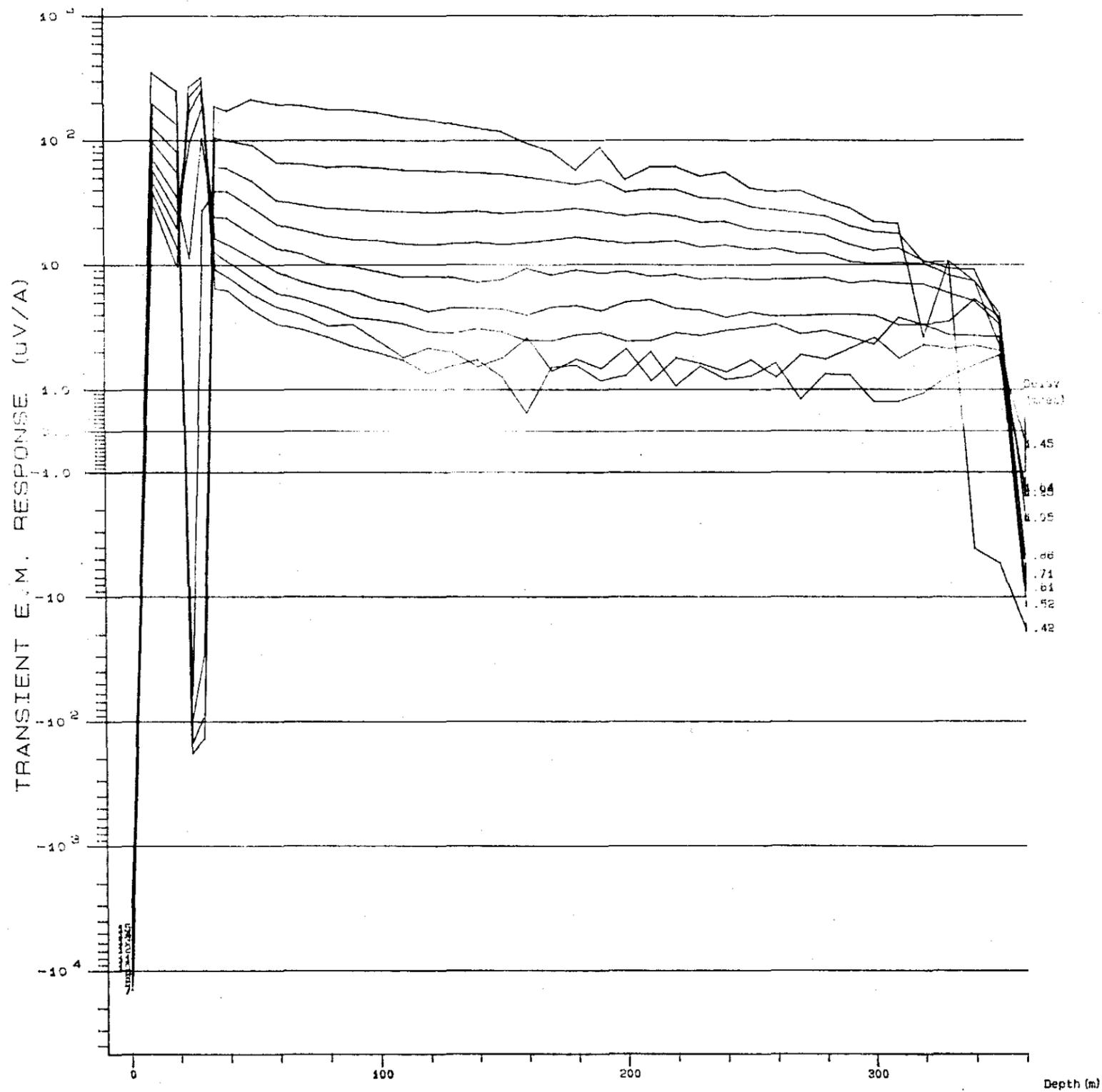
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SOLO

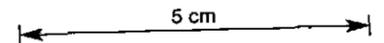
913063



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WSP I	DRAFTSMAN:
DHEM PLOT	DATE Jan '87
Ref GF/MG87/01	REVISIONS :
SCALE 1:2000	FILE NO.
Metres	FIG. 7



913064



GOLDFIELDS EXPLORATION PTY. LTD.
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 SOLO hole ref.201 Reading interval 5.0 m
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 LOOP configuration : Drill hole
 Plotted : 11: 40 AM 12/ 1/87

SOLO

GOLD FIELDS EXPLORATION PTY. LIMITED	
EL9/86 TYNDALL WSP 3 DHEM PLOT	DRAWN BY : SOLO
	DRAFTSMAN :
Ref GF/MG87/01	DATE Jan '87
	REVISIONS :
SCALE 1:2000	FILE NO.
Metres	FIG. 8

850

059

APPENDIX D

DIAMOND DRILL HOLE LOGS

WSP3, TYN4, TYN5, WS4 AND JP4

GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL CORE RECORD

060

HOLE NO. : WSP3
STATE : TASMANIA

JLV. PRESS

PROJECT	EL9/66 TYNDALL	PURPOSE To test for massive sulphide mineralization within equivalent Rosebery Host Horizon sequence 400m north of hole WSP1 (drilled in 1979).
DESIGNED BY	F.G. FITZGERALD	
LOGGED BY	F.G. FITZGERALD	
COMMENCED	10.10.86	
COMPLETED	29.10.86	

LOG SUMMARY	Hole intersected weakly altered epiclastic sequence, predominantly grey tuffaceous siltstone, from 0-214.5m, containing several lenses of weakly altered massive felsic pyroclastics. Minor pyrrhotite-pyrite with rare galena-sphalerite occurs within some units. Rest of hole is bimodal volcanic sequence of felsic pyroclastics and basaltic intrusives which are both virtually unmineralized.
GENERAL COMMENTS	

ASSAY SUMMARY

INTERVAL												COMMENTS
From	To											
												No significant assay results.

LOCATION

NORTHING	5362496.0
EASTING	378391.0
R.L.	602.4m
GRID	AMG
LENGTH	360.3m

HOLE CONDITION

SIZE	
Hole Size	Depth
NQ	33.0m
BQ	360.3m

SIGNIFICANT CORE LOSS INTERVALS		
From	To	% Lost
145.5	147.3	18

POOR GROUND CONDITION ZONES		
From	To	Condition
146.3	146.6	Major fault, rubble, making water.

HOLE CONDITIONS AFTER COMPLETION
Hole caving at 146.5m. Hole cemented at this depth, re-drilled and re-opened to end of hole. PVC pipe (32mm) inserted to end of hole (360.3m). NQ casing stuck, 9m between 24m and 33m left in hole. Hole making water.

SURVEY DATA (Note: Bearing type must be same as Project Grid Type)

SURVEY			INTERVAL			VERTICAL		HORIZONTAL		SURVEY			INTERVAL			VERTICAL		HORIZONTAL	
Depth	Bearing	Dip	From	To	Distance	D.Sin.Dip	R.L.	D.Cos.Dip	Prog.Total	Depth	Bearing	Dip	From	To	Distance	D.Sin.Dip	R.L.	D.Cos.Dip	Prog.Total
Collar	088°	-50°	0.0	25.0	25.0	19.15	583.25	16.07	16.07										
50m	086°	-38°	25.0	75.0	50.0	30.78	552.47	39.40	55.47										
100m	084°	-29.5°	75.0	125.0	50.0	24.62	527.85	43.52	98.99										
150m	?	-27°	125.0	162.0	37.0	16.80	511.05	32.97	131.96										
174m	088°	-26°	162.0	186.5	24.5	10.74	500.31	22.02	153.98										
199m	092°	-25°	186.5	220.5	34.0	14.37	485.94	30.81	184.79										
240m	086°	-21°	220.5	260.0	39.5	14.16	471.78	36.88	221.67										
280m	087°	-18°	260.0	300.0	40.0	12.36	459.42	38.04	259.71										
320m	088°	-16°	300.0	340.0	40.0	11.03	448.39	38.45	298.16										
360m	088°	-15°	340.0	360.3	20.3	5.25	443.16	19.61	317.77										

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GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL CORE LOG AND ASSAY DATA

PROJECT: EL9/66 TYNDALL

HOLE NUMBER: WSP3

Page: 1

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INTERVAL		RECOVERY		DESCRIPTION	ASSAY DATA																	
From	To	m	%		Sample No.	From	To	Rec. %														
0.0	67.8	62.4	92	<p>TUFFACEOUS SILSTONE-SANDSTONE SEQUENCE</p> <p>Very uniform sequence of pale green-grey with fawn tinges of medium grained epiclastics, locally medium-coarse grained arenaceous or less commonly finer grained argillaceous units. Rock is made up of strongly foliated fabric of feldspar and minor quartz crystals < 2mm in size set in an ashy matrix. Crude banding (bedding?) defined by cream coloured shaley layers, also dark vitric "streaks" eg 63° to LCA at 19.8m, 48° to LCA at 28.8m. From 30m onwards this banding becomes less obvious and sequence is very uniform and massive.</p> <p><u>Alteration:</u> Overall quite weak. Subtle pervasive sericite, dominated by supergene clay above 34m. Minor quartz-carbonate veins.</p> <p><u>Mineralization:</u> Virtually unmineralized apart from rare medium grained pyrite in gash veinlets.</p> <p><u>Structure:</u> Weak - moderate cleavage sub parallel to foliation viz 45-60° to LCA. 0- 4.3m rubbly weathered core</p> <p style="padding-left: 40px;">7.3- 7.9m quartz rubble</p> <p style="padding-left: 40px;">10.9-11.3m quartz rubble</p> <p style="padding-left: 40px;">24.0-24.6m small crush zone</p> <p style="padding-left: 40px;">33.5-33.9m rubble zone</p>																		
67.8	111.3	43.5	100	<p>MASSIVE PYROCLASTIC SEQUENCE</p> <p>Medium grained, locally coarse grained, uniform massive sequence of grey probable primary pyroclastics. Contact with upper possible epiclastic sequence is quite gradational. Sequence is made up of: evenly distributed pinkish sub-hedral feldspar and minor quartz crystals; scattered white streaks and patches 2-10mm in size (now carbonate-sericite); and minor dark green flecks, some with remnant glass shard morphologies set in an ashy (vitric?) groundmass. Locally, coarser textures enhanced by pink feldspar crystals 3-5mm in a darker green (relict vitric) groundmass. Also minor fine grained bands eg 89.3m at 75° to LCA. Moderate foliation (or cleavage over-print) developed throughout the sequence with orientation of crystals and carbonate "streaks" mostly at approx. 60° to LCA. Foliation is less pronounced down hole.</p> <p><u>Alteration:</u> Overall quite weak apart from metamorphogenic weak sericite±chlorite alteration of vitric groundmass. Widely</p>																		

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GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL CORE LOG AND ASSAY DATA

PROJECT: EL9/66 TYNDALL

HOLE NUMBER: WSP3

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INTERVAL		RECOVERY		DESCRIPTION	ASSAY DATA (ppm)														
From	To	m	%		Sample No	From	To	Rec. %	Cu	Pb	Zn	Ag	Au						
				scattered quartz-carbonate ± pink K feldspar ± chlorite veins <u>Mineralization:</u> Virtually unmineralized apart from rare to trace disseminated pyrite. <u>Structure:</u> Massive and uniform throughout.															
11.3	121.5	10.2	100	TUFFACEOUS SILTSTONE-SHALE SEQUENCE Grey fine-medium grained tuffaceous siltstone with minor dark grey shales sequence. Upper contact with coarse grained possible pyroclastics is sharp at 67° to LCA, however 2 small lenses 2-3cm thick of siltstone occur within the basal 50cm of the pyroclastic. Primary layering within epiclastics mostly 65° to LCA. Appears to be sequence of fairly well sorted argillites and arenites which grade up in grain size uniformly down hole in 2 cycles viz. 111.3-117.3, 117.3-121.5m. <u>Alteration:</u> Generally fairly weak. Some carbonate alteration "haloes" around quartz "augen" structures 5-8mm in size, especially 119.5-121.5m. Common quartz-carbonate ± chlorite gash veins and pods throughout. Veins both at high and low angles to LCA. <u>Mineralization:</u> Minor veinlets and blebs of sphalerite > galena throughout but less than 0.5% total volume. Relatively common blebs and veins of brownish pyrrhotite, locally 1-2% volume <u>Structure:</u> Massive core which is only weakly jointed.	T7001	111.5	113.5	100	15	235	460	0.5	<0.01						
					T7002	113.5	115.5	100	30	200	950	0.5	<0.01						
					T7003	115.5	117.5	100	25	40	190	<0.5	<0.01						
					T7004	117.5	119.5	100	10	10	90	<0.5	<0.01						
121.5	141.6	20.1	100	MASSIVE PYROCLASTICS (?) Dark grey coarse grained massive sequence of possible pyroclastics made up of feldspar and minor quartz crystals with abundant dark green flecks and streaks which all define a moderate foliation at approx. 75-80° to LCA. Upper contact is quite gradational making distinction between definite epiclastic and probable pyroclastic lithologies quite difficult. The sequence appears to increase down hole to about 136m then decrease evenly in grain size to the lower boundary. This contact is similarly indistinct into clear epiclastic lithologies. <u>Alteration:</u> Sequence is very weakly altered apart from weak sericite devitrification and metamorphogenic alteration of the groundmass. Virtually no veins are present.															

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GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL CORE LOG AND ASSAY DATA

PROJECT: EL 9/66 TYNDALL

HOLE NUMBER: WSP3

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INTERVAL		RECOVERY		DESCRIPTION	ASSAY DATA (ppm)																
From	To	m	%		Sample No.	From	To	Rec %	Cu	Pb	Zn	Ag	Au								
				<p><u>Mineralization:</u> Essentially unmineralized.</p> <p><u>Structure:</u> Quite massive and structureless.</p>																	
141.6	214.5	72.2	99	<p><u>MIXED EPICLASTIC SEQUENCE</u></p> <p>Grey to dark grey tuffaceous siltstone sequence with some shaley interbeds and minor tuffaceous sandstone lenses. Sequence is well bedded throughout with common intraformational slump folds and cross-bedding, however facing evidence is contradictory, perhaps due to tight folds. Bedding is mostly 70-90° to LCA. The sequence is predominantly tuffaceous siltstone-sandstone but some local coarse grained possible airfall crystal tuff bands occur with typically sharp contacts e.g. 174.2m at 87°; 202.3m at 80° to LCA. Elsewhere these contacts are more gradational suggesting that the material, which contains grains up to 7mm in size, is reworked in part. In general, bedding is less well developed down hole. Some of the shale units appear to be weakly graphitic e.g. 145.5-146.0m.</p> <p><u>Alteration:</u> Generally weakly altered apart from metamorphic sericite-quartz. Some prominent quartz-carbonate-chlorite veins up to 20cm thick.</p> <p><u>Mineralization:</u> Minor very fine-grained disseminated pyrite and pyrrhotite throughout. Some coarser grained blebs of pyrrhotite mostly associated with quartz-carbonate veins. These clots may be 2-5cm diameter e.g. 152.7m, 174.0m. Total sulphide is mostly less than 1% volume but increasing down hole. From 155m onwards pyrrhotite > pyrite. 205.5-205.8m 3-5% pyrrhotite in fine grained bands. Very minor sphalerite veinlets and blebs with trace galena and chalcopyrite.</p> <p><u>Structure:</u> Major fault zone at 146.3-146.6m. Much core loss, hole caving here in rubble/crush zone. The rest of the section is relatively structureless apart from fissile nature of shaley units.</p>	T7005	141.5	143.5	99	45	100	220	<0.5	<0.01								
					T7006	143.5	145.5	98	55	80	330	0.5	<0.01								
					T7007	145.5	147.5	82	45	580	2400	1.0	<0.01								
					T7008	173.0	175.0	100	90	10	75	<0.5	<0.01								
					T7009	175.0	177.0	100	60	50	170	<0.5	<0.01								
					T7010	177.0	179.0	100	30	120	620	<0.5	<0.01								
					T7012	179.0	181.0	100	20	220	380	<0.5	0.01								
					T7013	181.0	183.0	100	20	25	85	<0.5	<0.01								
214.5	221.4	6.9	100	<p><u>BASALTIC INTRUSIVE</u></p> <p>Fine-medium grained dark green-grey uniform crystalline basalt. Both</p>																	

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GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL CORE LOG AND ASSAY DATA

PROJECT: EL 9/66 TYNDALL

HOLE NUMBER: WSP3

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INTERVAL		RECOVERY		DESCRIPTION	ASSAY DATA															
From	To	m	%		Sample No	From	To	Rec. %												
				upper and lower contacts are sharp at 85-90° to LCA. Minor quartz-carbonate amygdales(?) up to 7mm in size. The unit is generally coarser grained towards the central part with no definite chilled top. The core is non-magnetic.																
				<u>Alteration:</u> Weak chloritic alteration of groundmass. Scattered pale yellow-green epidote ± carbonate ± chlorite patches especially 220.4-220.6m. Feldspar crystals appear to be essentially unaltered.																
221.4	281.4	60.0	100	MASSIVE PYROCLASTICS																
				Very uniform sequence of grey medium grained volcaniclastics which become fine-medium grained fawn-pinkish coloured between 241 and 261m.																
				This structureless sequence is made up of prominent weakly altered feldspar crystals up to 5mm in size, minor quartz grains and dark irregular (relict vitric?) clasts set in a gritty matrix. There is no evidence of primary layering or foliation which suggests that the sequence is predominantly pyroclastic rather than epiclastic. Upper contact zone has scattered subrounded lithic clasts of cream and pink felsic lava up to 2cm in diameter. Lower contact zone, from 278.5m onwards becomes increasingly finer grained and grey and appears to be dense vitric ash. There are diffuse patches of pink-red hard potassic(?) altered material up to 4cm in size e.g. 281.0m.																
				<u>Alteration:</u> Overall quite weakly altered. Some pinkish potassic(?) alteration of feldspar crystals especially in basal section. Weak pervasive chlorite-sericite alteration of groundmass. Very minor and scattered quartz-carbonate ± chlorite veins. Micro fractures of cream carbonate + quartz are common between 240.0-261.5m and are sub parallel at 65° to LCA. These appear to be associated with fawn-pinkish coloured zone.																
				<u>Mineralization:</u> Very minor to trace pyrite as discrete grains up to 4mm in size throughout. Also rare scattered thin veinlets of pyrite.																
				<u>Structure:</u> Very massive and structureless with only minor clean joints.																
281.4	308.6	27.2	100	BASALTIC LAVA(?)																
				Dark green-grey fine-medium grained crystalline basalt. Upper contact																

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GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL CORE LOG AND ASSAY DATA

PROJECT: EL 9/66 TYNDALL

HOLE NUMBER: WSP3

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INTERVAL		RECOVERY		DESCRIPTION	ASSAY DATA															
From	To	m	%		Sample No	From	To	Rec. %												
				<p>is sharp at 60° to LCA with no evidence for a chilled margin. Lower contact also sharp at 80° to LCA but appears to be chilled i.e. becoming very fine grained indicating possible down hole (east) facing. The core is non-magnetic and relatively uniform.</p> <p><u>Alteration:</u> Weak-moderate pervasive chlorite. Some zones or diffuse patches of pink-red K feldspar alteration e.g. 286.0-289.4m. Common carbonate-epidote ± chlorite ± hematite veins up to 1cm thick mostly 1-3mm. Some diffuse zones of pale yellow-green epidote alteration typically forming selvages around carbonate rich veins.</p> <p><u>Mineralization:</u> Trace to very minor fine grained disseminated pyrite.</p> <p><u>Structure:</u> Homogeneous and relatively structureless with only weak joints.</p>																
308.6	321.9	13.3	100	<p>FELSIC PYROCLASTICS AND BASALTIC INTRUSIVES</p> <p>Mixed bimodal volcanic sequence of medium and fine grained grey-buff coloured massive felsic pyroclastics (as above) with common thin fine grained dark green-grey basaltic units - probably intrusive (as above). This sequence is very similar to the Henty Fault hanging wall lithologies. Basalts form approx. 25% of sequence especially 310.6-312.9m, 316.8-317.6m. Contacts are sharp but often irregular and disrupted. Upper body has chilled contact with fine-medium grained core, lower body is more uniformly fine grained throughout.</p> <p><u>Alteration:</u> 1. Felsic Pyroclastics. Common pervasive pink potassic(?) alteration of groundmass on both margins of basalts or as diffuse patches. Weak pervasive chlorite-sericite alteration of groundmass. White carbonate gash veins and irregular breccia-fill on the margins of the basalts is relatively common.</p> <p>2. Basalts. Moderate pervasive chlorite, minor carbonate gash veins.</p> <p><u>Mineralization:</u> Weak-minor pyrite as thin veinlets and some disseminated grains in both Pyroclastics and basalts. Estimate overall <0.5% pyrite.</p> <p><u>Structure:</u> Massive, structureless with only weak joints.</p>																

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GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL CORE LOG AND ASSAY DATA

PROJECT: EL9/66 TYNDALL

HOLE NUMBER: TYN.4

Page: 1

INTERVAL		RECOVERY		DESCRIPTION	ASSAY DATA														
From	To	m	%		Sample No	From	To	Rec. %											
0.0	36.4	0.69	98	<p>GLACIAL MORAINE</p> <p>Boulders and cobbles of Owen Conglomerate from 0-6m then pink quartzite sand derived from Owen Conglomerate to base of moraine. Hole is making water from base of moraine cover.</p>															
36.4	65.6	27.85	95	<p>CALCAREOUS EPICLASTICS-LIMESTONE</p> <p>Upper section (36.4-39.4m) coarse breccio-conglomerate made up of sub-angular to rounded clasts of quartz-phyric, chlorite-hematite altered, volcaniclastics set in a chlorite rich matrix which increases strongly down-hole.</p> <p>Rest of section is made up of a mixed sequence of chloritic andesitic epiclastics with abundant but variable calcareous-hematitic cement through to almost pure limestone, white-cream coloured but no evidence of fossils. Also includes "blocks" of dark green quartz-phyric lava which are moderately-strongly magnetic e.g. 49.6-49.9m, 59.3-62.1m. Some of the epiclastic bands carry minor disseminated pyrite which defines crude layering, e.g. 40° to LCA at 50.3m, also possible bedding, e.g. 35° to LCA at 55.1m.</p> <p><u>Alteration:</u> Appears to be complex over-printing relationship. chlorite-magnetite altered felsic lavas and andesitic(?) epiclastics possibly with carbonate-hematite cement, then much brecciation and remobilization of carbonate⁺ hematite to form veins and breccia fill. Grains of magnetite in "lavas" often replaced by hematite.</p> <p><u>Mineralization:</u> Only very minor fine grained pyrite within some epiclastic bands.</p> <p><u>Structure:</u> Core is only weakly jointed, despite common healed fractures and hydrothermal(?) brecciation.</p>															
65.6	74.2	8.48	99	<p>ANDESITE LAVA</p> <p>Green medium grained sub-porphyrific volcanic made up of weakly altered pinkish feldspar crystals 2-4mm and minor relict mafic phenocrysts (hornblende?) set in dark grey-green fine grained groundmass.</p> <p><u>Alteration:</u> Groundmass typically weak-moderate chlorite⁺minor epidote altered with moderate-strong magnetite.</p> <p>Quartz-carbonate veins up to 2 cm thick relatively</p>															

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070

GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL CORE LOG AND ASSAY DATA

PROJECT: EL9/66 TYNDALL

HOLE NUMBER: TYN.4

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INTERVAL		RECOVERY		DESCRIPTION	ASSAY DATA																
From	To	m	%		Sample No.	From	To	Rec. %													
				common. Minor hematite-carbonate and quartz-chlorite veins also.																	
				<u>Structure/Mineralization:</u> No sulphides visible. Core is relatively massive, only weakly jointed.																	
74.2	91.4	16.57	96	HEMATITIC CALCAREOUS SEDIMENTS (MARLS)																	
				Sequence of red and cream fine-medium grained foliated calcareous sediments with some coarser felsic lava blocks or volcanoclastics especially 74.2-78.3m. Well developed foliation defined by hematite-carbonate ⁺ weak chlorite bands which are typically 30-40° to LCA but can be as low as 0°. Relationship between lava "blocks" and sediments is unclear, contacts are often quite irregular but sharp. Lavas always strongly magnetic but sediments are non magnetic.																	
				<u>Alteration:</u> Strong pervasive hematite especially in upper section, abundant hematite-carbonate ⁺ chlorite forming crude bands. Later thin contorted veins with cream coloured calcareous cores and hematitic margins or selvages.																	
				<u>Structure/Mineralization:</u> No sulphides visible. Core is only weakly jointed.																	
91.4	128.7	34.22	91	ANDESITE LAVA																	
				Relatively uniform dark green to dark red medium to coarse grained porphyritic andesite (lava?) made up of weakly altered cream-pinkish feldspar phenocrysts 2-5mm in size and minor relict mafic phenocrysts set in a fine grained groundmass. Rock is relatively massive and structureless. Some finer grained lava zones may represent chilled margins of lava flows, e.g. 101.8m.																	
				<u>Alteration:</u> Complex overprinting relationships:																	
				1. pervasive chlorite-magnetite ⁺ minor epidote forming approx 30% of the section.																	
				2. over printed by pervasive hematite-minor carbonate forming the remaining 70% of the section, all magnetite replaced.																	
				3. later weak-moderate carbonate-quartz veins up to 2 cm.																	

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011

GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL CORE LOG AND ASSAY DATA

PROJECT: EL9/66 TYNDALL

HOLE NUMBER: TYN.4

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INTERVAL		RECOVERY		DESCRIPTION	ASSAY DATA															
From	To	m	%		Sample No.	From	To	Rec. %												
				Overall total carbonate content is much less than above epiclastic sequence but still moderate.																
				<u>Mineralization:</u> No visible sulphides.																
				<u>Structure:</u> Only weakly jointed apart from some low angle (<10° to LCA) clay filled fractures e.g. 103.2-104.4m, and the following structures:																
				91.4-92.6m drill "cavity" only rubble recovered																
				100.6m minor clay-filled fault zone																
				104.8-105.2 broken core																
				125.8m minor clay-filled fault zone.																
128.7	143.5	14.40	97	MIXED ANDESITIC LAVA AND EPICLASTICS																
				Mixed sequence of "blocks" of porphyritic andesitic lava (as above), which form approx. 25% volume in this section, and cream-green grey fine-medium grained calcareous-hematitic epiclastics (marls).																
				Contacts between these lithologies are often gradational or mixed over zones up to 10 cm wide. Some sedimentary zones almost "dirty" limestone, e.g. 130.0-140.1m.																
				Well developed foliation (possible primary layering?) defined by coloured banding, i.e. carbonate, hematite and chlorite rich zones within calcareous sediments, e.g. 35° to LCA at 128.9m, 38° at 130.8m, 35° at 143.3m.																
				<u>Alteration:</u> Overall much higher total carbonate content as pervasive alteration, veins, breccia-fill and primary(?) beds.																
				Moderate-strong hematite bands and later veins ⁺ chlorite.																
				Core is mostly weakly magnetic but less altered lava "blocks" are moderate-strongly magnetic.																
				<u>Mineralization:</u> No visible sulphides.																
				<u>Structure:</u> Core is moderately broken due to: several very low angle irregular fractures; moderate cleavage especially within marls sub parallel to foliation and possible fault zones or limestone "cavities" e.g. 131.7-132.5m, 137.1m, 138.6-138.8m.																

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GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL CORE LOG AND ASSAY DATA

PROJECT: EL9/66 TYNDALL

HOLE NUMBER: TYN.4

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INTERVAL		RECOVERY		DESCRIPTION	ASSAY DATA														
From	To	m	%		Sample No	From	To	Rec. %											
143.5	197.2	53.65	100	<p>ANDESITE LAVA</p> <p>Relatively uniform massive sequence of dark green and dark red porphyritic andesitic lavas as above with minor cream coloured calcareous "epiclastic" bands e.g. 161.6-162.4m. Core is mostly medium-coarse grained porphyritic texture but with some finer grained chilled(?) lava margins e.g. 172.6-179.2m.</p> <p><u>Alteration:</u> Overall the sequence is less altered than above lava sequence but with same overprinting styles, viz:</p> <ol style="list-style-type: none"> 1. chlorite-magnetite altered groundmass, approx 30%. 2. pervasive hematite-minor carbonate overprint, approx. 70%. 3. weak-moderate carbonate-quartz⁺epidote⁺chlorite gash veins and breccia fill. <p>183.2-183.5m zone of strong pale yellow-green epidote alteration within groundmass.</p> <p><u>Mineralization:</u> No sulphides visible.</p> <p><u>Structure:</u> Massive, structureless core with very few "clean" joints.</p>															
197.2	250.4	53.20	100	<p>MIXED ANDESITE LAVA AND MINOR EPICLASTICS</p> <p>Sequence of relatively massive uniform porphyritic andesitic lavas (as above) with zones of foliated hematite-carboante altered epiclastic bands e.g. 201.1-202.4m, 203.6-206.7m and 208.3-211.8m. Also relatively common zones of white carbonate breccia-fill enclosing angular clasts of andesite from a few mm to 5 cm in size, e.g. 197.2-199.0m, 217.6-217.8m, 218.4-221.0m, 235.2-242.8m and 249.5-250.4m.</p> <p>Some of these breccia zones appear to coincide with fine grained lava flow chilled margins and may indicate phreatic brecciation in a sub aqueous (marine) environment.</p> <p><u>Alteration:</u> Andesitic lava sections, which form approx. 60% of section, moderate-strongly magnetic with increasing pervasive chlorite alteration towards lower part of sequence e.g. 247.0-248.2m. Feldspar phenocrysts vary from relatively unaltered to pale green (sericite), whereas mafic(?) phenocrysts commonly replaced by red hematite. Moderate-strong hematite-carbonate alteration within "epiclastic" bands locally very strongly calcareous.</p>															

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PROJECT: **TYNDALL**

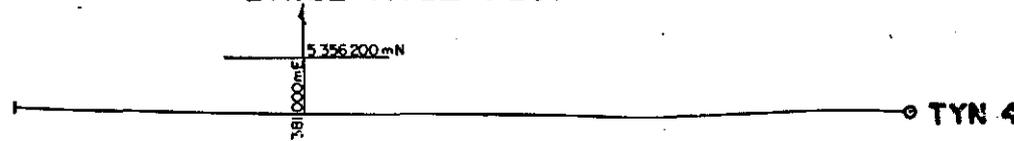
HOLE NO.: **TYN 4**

GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL HOLE PLOT

SCALE 1:

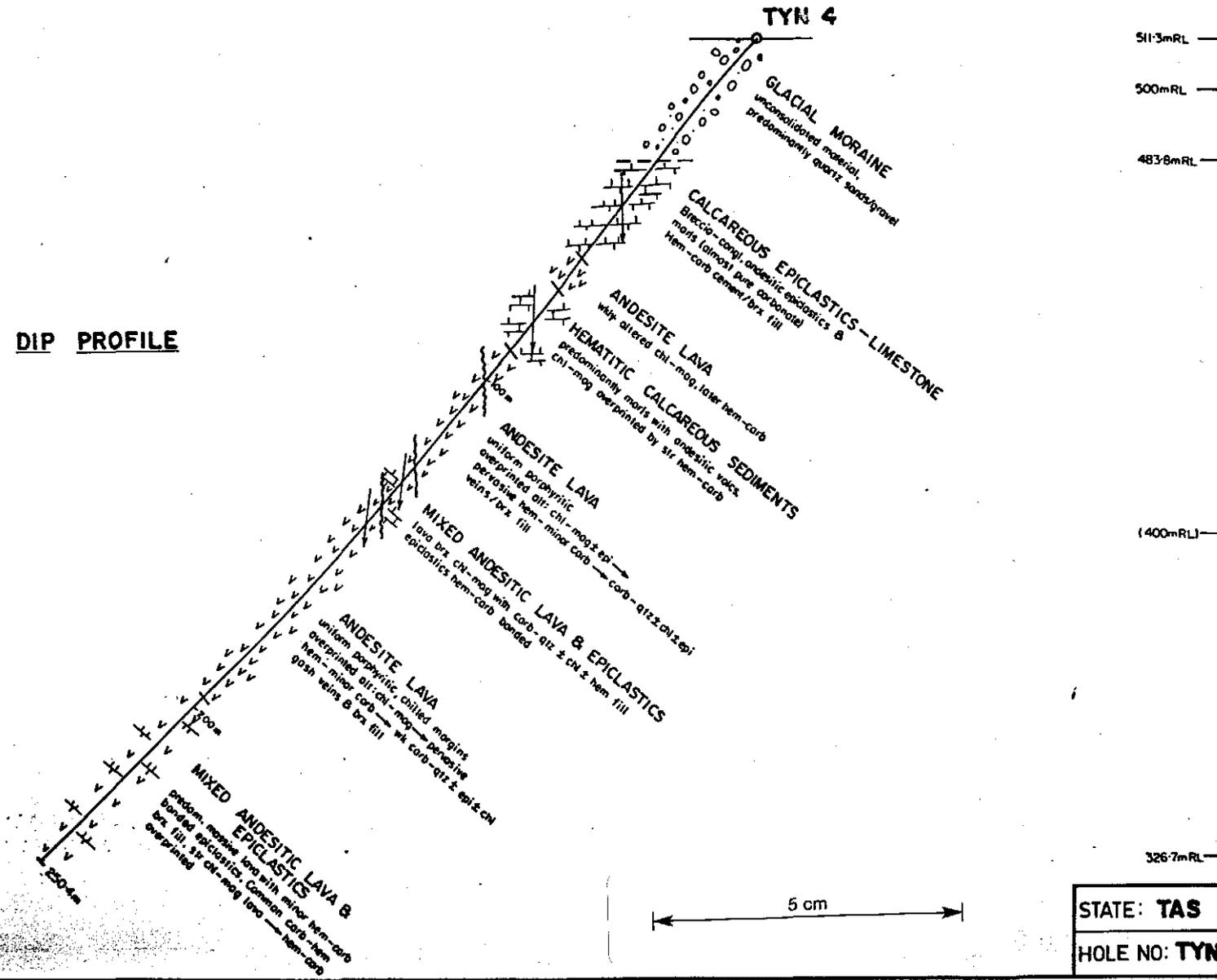


PLAN VIEW

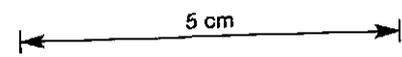


074

DIP PROFILE



- ALTERATION LEGEND**
- carb - carbonate (calcareous)
 - chl - chlorite
 - epi - epidote
 - hem - hematite
 - mag - magnetite
 - qtz - quartz
 - brx - breccia (hydrothermal-tectonic)
 - primary (?) banding - bedding showing orientation
 - prominent structure (fault)
 - no orientation inferred



STATE: **TAS**
HOLE NO.: **TYN 4**

913080

**GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL CORE RECORD**

**HOLE NO. : TYN 5
STATE : TASMANIA**

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PROJECT	EL9/66 TYNDALL	PURPOSE
DESIGNED BY	F.G. FITZGERALD	To test for massive sulphides associated with a dipole-dipole IP anomaly on line 16N at 250mE. The anomaly occurs 120m East of an adjacent IP anomaly tested by TYN3 in 1975. Sulphidic epiclastics were inferred to underlie glacial moraine at the target which is adjacent to pyritic black shales intersected in TYN3.
LOGGEC BY	F.G. FITZGERALD	
COMMENCED	8.8.1986	
COMPLETED	2.9.1986	

LOG SUMMARY	The entire hole drilled through a sequence of andesitic lava flows with significant bands of calcareous + hematitic sediments and phreatic(?) breccia-fill. The sequence is virtually unmineralized. No source for the IP anomaly was intersected.
GENERAL COMMENTS	

075

ASSAY SUMMARY

INTERVAL												COMMENTS
From	To											
												No core assayed

LOCATION

NORTH NG	5356587.7
EASTING	381083.1
E L	520.2
GRID	AMG
LENGTH	372.7m

HOLE CONDITION

SIZE	
Hole Size	Depth
HQ	26.3m
NQ	176.6m
BQ	372.7m

SIGNIFICANT CORE LOSS INTERVALS		
From	To	% Lost
0.0m	16.1m	58
57.7m	63.4m	53
87.7m	93.7m	42

POOR GROUND CONDITION ZONES		
From	To	Condition
0.0m	41.4m	Very broken rubble core, fault zone

HOLE CONDITIONS AFTER COMPLETION
HQ casing stuck, broke rod string at 15m leaving 12m (14.3-26.3m) in hole. Rest of casing recovered. PVC pipe (32mm) inserted to end of hole (372.7m).

SURVEY DATA (Note: Bearing type must be same as Project Grid Type)

SURVEY			INTERVAL			VERTICAL		HORIZONTAL		SURVEY			INTERVAL			VERTICAL		HORIZONTAL		
Depth	Bearing	Dip	From	To	Distance	D. Sin. Dip	R.L.	D. Cos. Dip	Prog. Total	Depth	Bearing	Dip	From	To	Distance	D. Sin. Dip	R.L.	D. Cos. Dip	Prog. Total	
Collar	272°	-45°	0.0	25.5	25.5	18.03	502.19	18.03	18.03											
51m	272°	-45°	25.5	75.5	50.0	35.36	466.83	35.36	53.39											
150m	272°	-44°	75.5	125.0	49.5	34.39	432.44	35.61	89.00											
150m	270°	-43°	125.0	175.5	50.5	34.44	398.00	36.93	125.93											
201m	271°	-42°	175.5	225.0	49.5	33.12	364.88	36.79	162.72											
249m	271°	-40°	225.0	274.5	49.5	31.82	333.06	37.92	200.64											
300m	275°	-37.5°	274.5	336.0	61.5	37.44	295.62	48.79	249.43											
372m	279°	-35°	336.0	372.7	36.7	21.05	274.57	30.06	279.49											

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GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL CORE LOG AND ASSAY DATA

PROJECT: TYNDALL E.L. 9/66

HOLE NUMBER: TYN 5

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INTERVAL		RECOVERY		DESCRIPTION	ASSAY DATA															
From	To	m	%		Sample No	From	To	Rec. %												
0.0	15.0	6.1	42	<p><u>HORNBLENDE ANDESITE</u></p> <p>Pale green-grey medium-coarse grained porphyritic andesitic lava made up of euhedral hornblende phenocrysts 4-8mm in size, some apparently zoned euhedral-subhedral pale green (sericitic) and cream feldspar phenocrysts 2-4mm, minor quartz crystals and scattered granular magnetite, set in a very fine grained crystalline groundmass. The core is strongly magnetic when not too weathered, some blocks are quite fresh.</p> <p><u>Alteration:</u> Appears relatively weak apart from sericitic alteration of feldspar crystals and minor thin quartz-carbonate ± hematite veinlets.</p> <p><u>Mineralization:</u> No visible sulphides. Common FeOx + clay on fractures.</p> <p><u>Structure:</u> Core is quite broken and rubbly, mainly due to weathering on fractures.</p> <p>7.0-15.0m major fault, much core loss + clay/FeOx.</p>																
15.0	64.1	39.7	81	<p><u>ANDESITIC VOLCANICS</u></p> <p>Green/grey-dark red medium-coarse grained porphyritic rock similar to above andesite but more altered and prominently foliated. Feldspar crystals are still common subhedral, often pale green and form up to 20% volume of rock. Relict mafic crystals (hornblende?) are now altered to hematite. Foliation due to aligned crystals e.g. 60° at 26.5m, 54° at 49.5m. Core is only weakly weathered, base of oxidation (fractures) is 33m.</p> <p><u>Alteration:</u> Overall moderately weak. Weak pervasive sericite > chlorite alteration of groundmass. From 45m onwards increase in pervasive chlorite. Feldspar crystals altered to sericite. Abundant hematite mainly after mafic crystals + fracture fill + irregular patches up to 1cm thick. Minor epidote veinlets. Minor carbonate gash veinlets usually associated with hematite from 49m onwards there is a marked increase in veins of chlorite-carbonate-epidote also as irregular patches up to 5cm thick. Some specularite associated with these veins e.g. 51.7m. Also scattered pink (K feldspar?) veinlets apparently predating epidote-carbonate and hematite alteration. Some diffuse zones of pinkish K feldspar e.g. 52.0-53.6m, 52.2-56.1m.</p> <p><u>Mineralization:</u> No visible sulphides.</p>																

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GOLD FIELDS EXPLORATION PTY. LIMITED

PROJECT: TYNDALL E.L. 9/66

DRILL CORE LOG AND ASSAY DATA

HOLE NUMBER: TYN 5

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INTERVAL		RECOVERY		DESCRIPTION	ASSAY DATA													
From	To	m	%		Sample No.	From	To	Rec. %										
				<p><u>Structure:</u> Core continues to be very broken and rubbly up to 42.5m. Major structures, crush zones often with substantial core loss as follows: 20.6-21.0, 28.8-29.4, 29.7-30.1, 32.4-32.8, 35.2-35.8, 39.4-40.0, 54.7-54.9, 58.5-58.6. 59.8-64.1 Major fault zone with clay, rubble and much core loss (approx. 75%).</p>														
64.1	157.0	90.2	97	<p><u>MIXED ANDESITIC VOLCANICS AND CALCAREOUS SEDIMENTS</u></p> <p>Mixed sequence of predominantly dark green and purple-red medium-coarse grained andesitic volcanics, which appear to be mostly porphyritic lava flows with chilled margins e.g. 79.8-81.2m, 82.9-84.8m, 97.0-99.6m and are quite similar to above units. Amongst these lavas are units of white-pinkish calcareous sediments which are often banded with hematite rich layers. Carbonate breccia-fill and cross-cutting veins are also abundant. Some of the blocks of andesite appear to be quite weakly altered and are composed of cream-pinkish euhedral feldspar crystals 1-4mm, relict mafic phenocrysts 2-4mm, minor quartz crystals and scattered magnetite grains up to 1mm in size all set in a fine grained crystalline groundmass. The rock is typically very uniform and massive with little apparent structure.</p> <p><u>Alteration:</u> Similar to above sequence, viz moderate-weak pervasive chlorite alteration of andesites. Subsequent breccia-fill of white carbonate and lesser epidote, chlorite and minor hematite. Carbonate may form 25% of core overall with several zones of pure carbonate which may be remobilized primary marls-limestones e.g. 76.6-77.4m, 84.8-88.0m, 107.1-108.7m, 115.5-118.5m.</p> <p><u>Mineralization:</u> Virtually unmineralized apart from an unusual occurrence of massive fine grained pyrite veins and breccia-fill forming bands up to 2cm thick at 132.2-133.5m.</p> <p><u>Structure:</u> Relatively structureless apart from healed breccia zones with calcareous cement. Core is weakly jointed. Some cavities and rubbly core zones, viz: 90.7-90.9m, 91.4-93.4m (cavity in carbonate, much core loss) 98.8-98.9m.</p> <p><u>Interpretation:</u> Deuterically altered (chlorite + epidote) andesite lava flows into shallow marine environment containing marls and</p>														

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GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL CORE LOG AND ASSAY DATA

PROJECT: TYNDALL E.L. 9/66

HOLE NUMBER: TYN 5

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INTERVAL		RECOVERY		DESCRIPTION	ASSAY DATA														
From	To	m	%		Sample No.	From	To	Rec. %											
				limestones with phreatic brecciation of flow margins and development of carbonate-hematite cement, then later chlorite-epidote-carbonate-hematite remobilized into over-printing veins perhaps during regional metamorphism.															
157.5	226.7	69.7	100	<u>ANDESITE VOLCANICS</u> Dark green and purple-red medium-coarse grained intermediate volcanics which are predominantly porphyritic andesitic lava flows as in the above sequence with identical textures and compositions. The main difference is the marked reduction in white carbonate breccia-fill and veins related to the minor occurrence of possible primary calcareous sediment with <10% carbonate overall. Some zones of possible reworked andesitic volcaniclastics over short intervals e.g. 207.7-208.3 although these may be carbonate rich rubbly breccia zones. The core varies from strongly magnetic to non magnetic depending upon intensity of hematite-carbonate over-print. <u>Alteration:</u> Chlorite-epidote alteration of lavas as above. Prominent pink carbonate and quartz associated with white carbonate-chlorite veins up to 50cm thick e.g. between 157.0-165.8m. Tendency for core to become more strongly hematitic downhole especially from 181m onwards with scattered specularite veinlets e.g. 205.7m but mainly fine grained alteration of groundmass with common hematite-carbonate breccia-fill and minor veinlets. 218.3-226.7m marked increase in carbonate breccia-fill ± hematite which may indicate base of lava flow unit and occurrence of primary(?) calcareous sediments. <u>Mineralization:</u> Virtually unmineralized apart from rare occurrence of chalcopyrite veins associated with late stage chlorite alteration at 173.3m. <u>Structure:</u> Uniform structureless sequence apart from common healed phreatic(?) brecciation of lavas. 180.5m 10cm wide minor fault with clay and rubble.															

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GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL CORE LOG AND ASSAY DATA

PROJECT: TYNDALL E.L. 9/66

HOLE NUMBER: TYN 5

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INTERVAL		RECOVERY		DESCRIPTION	ASSAY DATA															
From	To	m	%		Sample No.	From	To	Rec. %												
226.7	282.8	58.1	98	<p>MIXED ANDESITE LAVA AND CALCAREOUS SEDIMENTS</p> <p>Mixed sequence of predominantly dark green and purple-red medium grained porphyritic andesitic lava flows with common fine grained chilled margins several metres wide. Scattered throughout this lava sequence are units of light green-grey and red fine grained banded calcareous epiclastics. The contacts between these sediments and the lavas are typically very sharp but often quite disrupted, suggesting that lava flowed into a calcareous sedimentary sequence. The marl-limestone units vary from 10cm up to 1.7m thick viz: 239.1-239.3m, 243.9-245.0m, 247.8-247.9m etc. and form 10-15% of the sequence overall.</p> <p>The sediments are well banded with red (hematitic) and green (chloritic) layers possibly after primary bedding e.g. 58° at 244.1m, 46° at 255.2m, 54° at 266.2m, 45° at 270.2m, 72° at 279.1m. However this banding is often folded - perhaps soft sediment deformation.</p> <p>The andesites are very similar to the above sequences, and vary from medium-coarse grained distinctly porphyritic units with prominent pink feldspar phenocrysts 3-5mm and scattered altered mafic (hornblende?) phenocrysts 2-4mm; to relatively fine grained sub-porphyritic lavas with scattered cream-pink feldspar crystals 1-3mm and black hornblende(?) crystals 2-4mm (rarely up to 8mm long). Much of the apparent textural differences are due to enhancement by later pervasive hematitic alteration of the groundmass.</p> <p><u>Alteration:</u> Quite variable, from relatively weakly altered massive finer grained andesites with weak pervasive chlorite to strongly altered coarser carbonate-hematite rich andesites. Yellow-green epidote occurs as irregular patches up to 5cm thick e.g. 259.7m and later veins, but some epidote is syn-carbonate-chlorite veining. These are in turn overprinted by white and rarer pink, carbonate=chlorite=quartz veins up to 20cm thick e.g. 245.1m or local "crackle breccia". Some rare red albite(?) alteration e.g. 254.5m. Fibrous tremolite(?) vein/shear at 258.3m.</p> <p><u>Mineralization:</u> Virtually unmineralized apart from rare occurrences of chalcopryrite viz: 254.5m in quartz-chlorite-albite veins ;</p>																

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GOLD FIELDS EXPLORATION PTY. LIMITED

PROJECT: TYNDALL E.L. 9/66

DRILL CORE LOG AND ASSAY DATA

HOLE NUMBER: TYN 5

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INTERVAL		RECOVERY		DESCRIPTION	ASSAY DATA														
From	To	m	%		Sample No.	From	To	Rec. %											
				lava sequences higher up hole except that these have virtually no pervasive hematitic alteration. Minor "intercalated" beds of banded cream-pale green calcareous epiclastics also occur as before with sharp contacts to the surrounding lavas. Banding is well developed within the sediments typically 40°-70° to ICA but often disrupted. Major carbonate units are: 318.1-321.6m, 363.5-369.5m.															
				<u>Alteration:</u> Weak-moderate pervasive chloritic alteration of lavas, especially mafic phenocrysts. Scattered carbonate-quartz veins and irregular patches and breccia-fill up to 40cm thick but mostly thin and decreasing markedly downhole. Minor hematitic patches and veins occur within calcareous "sediments" e.g. 318.2-321.0m, 366.0-369.5m.															
				<u>Mineralization:</u> Very minor scattered medium grained pyrite concentrated in irregular veinlets or as isolated euhedra up to 4mm in size occur in the sequence. 317.3-317.6m zone with 5% fine grained pyrite veinlets in calcareous sediment.															
				<u>Structure:</u> Core is relatively structureless apart from scattered healed breccia zones as above.															
				END OF HOLE															

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PLAN VIEW

381000 mE

TYN 5

520.2 m R.L.

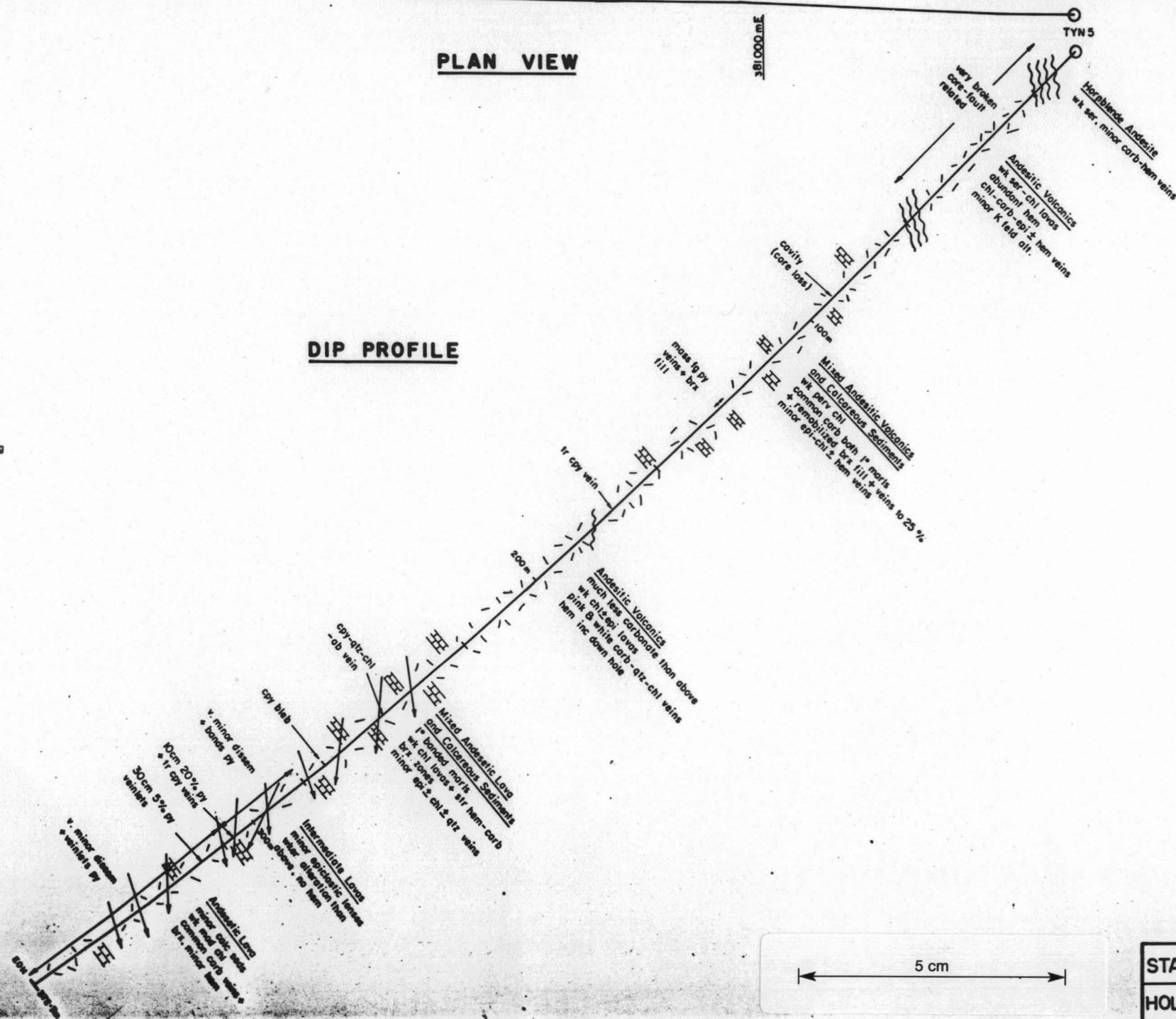
DIP PROFILE

LEGEND

-  Primary bedding
-  Prominent fault

ALTERATION TYPE

- ab Albite
- carb Carbonate
- chl Chlorite
- epi Epidote
- hem Hematite
- calc Calcareous



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GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL CORE LOG AND ASSAY DATA

PROJECT: EL 9/66 TYNDALL

HOLE NUMBER: W54

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INTERVAL		RECOVERY		DESCRIPTION	ASSAY DATA													
From	To	m	%		Sample No	From	To	Rec %										
0.0	12.4	2.8	23	<p>OWEN CONGLOMERATE SCREE</p> <p>Unconsolidated boulders of pink coarse grained siliciclastic conglomerate-Owen Conglomerate talus.</p>														
12.4	33.0	14.6	71	<p>WEATHERED MAFIC(?) VOLCANICS</p> <p>Completely weathered yellow-brown rock with relict medium to coarse grained crystal texture indicative of a volcanic or intrusive. The strong limonitic clay weathering products suggest a mafic-intermediate composition. Although core is very soft and friable due to deep weathering, it appears to be relatively massive with widely spaced fractures that typically have Fe and Mn oxides.</p> <p>The base of oxidation/weathering is relatively abrupt.</p>														
33.0	45.3	10.5	85	<p>FELSIC-INTERMEDIATE VOLCANICLASTICS</p> <p>Grey-green medium grained foliated volcaniclastics made up of sub-hedral feldspar crystals (some pinkish) set in a fine-medium grained vitroclastic matrix. The foliation is from subtle colour banding of disrupted pink and dark green bands.</p> <p><u>Alteration:</u> Weak-moderate (increasing down hole) pervasive chlorite especially of vitric components. Scattered cream-pink quartz-carbonate patches and bands.</p> <p><u>Mineralization:</u> Moderately pyritic with fine grained disseminated clots and grains, mostly <0.5% pyrite.</p> <p><u>Structure:</u> Moderately jointed with Fe oxide coating common, 44.6-45.3m Fault zone with rubble crushed core.</p>														
45.3	100.2	50.1	91	<p>ANDESITIC PYROCLASTICS(?)</p> <p>Green-grey coarse grained hornblende-feldspar crystal and lithic rich intermediate volcaniclastic. In places the unit appears to be quite uniform and crystalline, similar to a porphyritic lava. The rocks are similar to above sequence but distinguished by prominent euhedral hornblende phenocrysts up to 1cm long which are often zoned. The feldspar crystals are typically cream coloured, 2-4mm in size and weakly altered. Rare quartz crystals occur. The lithics are pink sub angular clasts of felsic(?) lava up to 3cm in size, although often the "lithic clasts" appear</p>														

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GOLD FIELDS EXPLORATION PTY. LIMITED

PROJECT: EL 9/66 TYNDALL

DRILL CORE LOG AND ASSAY DATA

HOLE NUMBER: W54

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INTERVAL		RECOVERY		DESCRIPTION	ASSAY DATA														
From	To	m	%		Sample No.	From	To	Rec. %											
				<p>to be similar in composition to the host rock. There are also distinct bands of pinkish more siliceous(?) material up to 25cm wide forming patches scattered throughout the sequence. These appear to post-date the main deuteritic alteration, in other places these appear to be disrupted giving "clast-like" texture. There is a tendency for finer grained clastic bands 10-30cm thick to occur. The core is moderately magnetic with prominent granular magnetite 1-2mm in size throughout.</p> <p><u>Alteration:</u> Weak-moderate pervasive chlorite ± minor epidote alteration of groundmass, possibly deuteritic. Minor quartz-carbonate ± chlorite ± pink K feldspar veins 1-5mm thick. Some hematite especially on fractures which increases down hole.</p> <p><u>Mineralization:</u> Virtually unmineralized.</p> <p><u>Structure:</u> Weakly jointed. Becoming more broken from 90m onwards. Numerous small faults marked by crushed core and clay-pug zones viz 62.4 (10cm), 62.7 (10cm), 90.2m (10cm), 93.5 (5cm), 94.8 (20cm) and 99.7 (10cm wide).</p>															
002	117.3	15.9	93	<p>INTERMEDIATE VOLCANICLASTICS</p> <p>Grey-green fine-medium grained relatively uniform foliated volcaniclastic. Compositionally this unit appears similar to the above sequence with finer grained cream and pinkish feldspar crystals, minor quartz crystals but hornblende crystals rare or absent apart from minor crystal fragments at 112.3-113.0m. Suggest that this unit is a primary pyroclastic because of apparent abundance of relict vitric groundmass and the lack of obvious epiclastic layering. The foliation may be cleavage related and is well developed e.g. 48° at 104.8m and 44° at 114.0m. The core is mostly non magnetic, but weakly magnetic locally. Some reworking of the andesitic pyroclastics may have occurred due to broken crystal fragments.</p> <p><u>Alteration:</u> Weak-moderate pervasive chlorite which is weaker than above sequence but stronger pervasive sericite. Common scattered quartz-carbonate-pink K feldspar veins and irregular gashes.</p> <p><u>Mineralization:</u> Weak disseminated pyrite, often as fine grained irregular stringers throughout, locally up to 1% pyrite but overall <0.5%.</p> <p><u>Structure:</u> Core is moderately broken which increases in intensity down-hole, mostly as open fractures and veins. 103.9m : small fault</p>															

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GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL CORE LOG AND ASSAY DATA

PROJECT: EL 9/66 TYNDALL

HOLE NUMBER: WS4

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INTERVAL		RECOVERY		DESCRIPTION	ASSAY DATA													
From	To	m	%		Sample No.	From	To	Rec. %										
				crush zone 5cm wide.														
117.3	140.6	17.4	74	<p><u>SEDGWICK FAULT ZONE (INTERMEDIATE VOLCANICS)</u> Major zone of structural disruption. Some blocks of relatively undisturbed core e.g. 129.8-131.9m, 135.2-139.8m are the same as the above sequence viz: fine-grained (locally coarse grained) grey-green intermediate volcaniclastics. <u>Alteration:</u> Apart from the clay/sericite alteration associated with the major fault zone shears the overall alteration style and intensity is similar to the above sequence viz: weak-moderate pervasive chlorite, moderate pervasive sericite, common quartz-carbonate-K feldspar veins and irregular patches. <u>Mineralization:</u> Virtually unmineralized apart from trace disseminated pyrite. <u>Structure:</u> Strongly broken core with common shears with slickensides and clay pug zones 10-40cm thick.</p>														
140.6	182.2	38.7	93	<p><u>INTERMEDIATE EPICLASTICS(?)</u> Fine-medium and locally coarse grained green moderately fissile tuffaceous volcanics of probable intermediate composition. The sequence appears quite similar to the rocks up hole but are more clearly "re-worked" with subhedral and broken feldspar crystals and rare hornblende(?) grains. There is no well developed sedimentary layering although some possible primary banding(?) is evident. A moderate foliation defined by orientation of crystal grains is developed e.g. 75° to LCA at 147.0m, 58° at 163.5m. This may be cleavage-related giving fissile character to the rock. <u>Alteration:</u> Moderate-strong pervasive chlorite > sericite which has substantially detextured the rock. Narrow bands and minor disrupted blocks of grey-pinkish more siliceous(?) core occurs throughout the sequence. Common veins and tension gash fill of quartz-carbonate ± pink K feldspar ± minor yellow siderite(?) occur, mostly 1-8mm. thick. Minor hematite is associated with these veins especially from 176m onwards. <u>Mineralization:</u> Virtually unmineralized apart from rare-trace disseminated pyrite. <u>Structure:</u> Overall the core is moderately broken. Much of the well developed cleavage giving the fissile character is probably</p>														

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GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL CORE LOG AND ASSAY DATA

PROJECT: EL 9/66 TYNDALL

HOLE NUMBER: WS4

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INTERVAL		RECOVERY		DESCRIPTION	ASSAY DATA															
From	To	m	%		Sample No.	From	To	Rec. %												
				related in proximity to the Sedgwick Fault zones. Specific small faults with clay pug and crushed core are 155.1m (10cm); 161.5 (2cm); 168.1 (2cm) and 169.3 (2cm thick).																
82.2	193.8	9.6	83	SEDGWICK FAULT ZONE (INTERMEDIATE VOLCANICS) Zone of major structural disturbance with rubble, clay pug and quartz veins etc. which includes blocks of less disrupted core up to 1m thick. These "blocks" appear to be broadly similar to the above intermediate volcaniclastic sequence viz : mostly medium grained strongly foliated feldspar crystal rich with common apparent "lithic" clasts of cream-pink more siliceous material. The presence of these suggests multiple phases of deformation and/or alteration. From 192.5m onwards blocks up to 20cm in size of dark grey siltstone are incorporated into the fault zone. <u>Alteration:</u> Weak-moderate pervasive sericite > chlorite with strong clay overprint related to tectonic brecciation. Scattered quartz-carbonate + sericite veins which are mostly broken by later faults. <u>Mineralization:</u> Very weakly mineralized, minor stringers of fine grained pyrite in places. <u>Structure:</u> Zone of major faulting with numerous structures defined by clay pug, and rubbly, crushed core in zones 0.1-1m thick. Well developed cleavage in residual blocks often deformed and disrupted indicative of multiple deformation associated with the fault zone.																
193.8	208.7	14.8	99	DARK GREY TUFACEOUS SEDIMENTS (TYNDALL GROUP?) Mixed sequence of dark grey to black fine grained tuffaceous shale-siltstone and coarse crystal rich tuffaceous sandstone. The sequence is relatively massive with no discernible primary layering although this may have been obscured by subsequent deformation. Some of the finer grained units appear moderately graphitic especially along shear planes e.g. 200.7-202.2m. These are 20-30° to LCA. The coarser crystal tuff bands are made up of abundant sub-angular cream and pink feldspar grains with lesser dark shale and siltstone chips up to 2cm in size (mostly 2-5mm) giving a greywacke appearance e.g. 202.6-208.2m. Subtle grainsize increase down hole may indicate facing uphole (to the south).																

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GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL CORE LOG AND ASSAY DATA

PROJECT: EL 9/66 TYNDALL

HOLE NUMBER: WS4

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INTERVAL		RECOVERY		DESCRIPTION	ASSAY DATA (ppm)															
From	To	m	%		Sample No.	From	To	Rec. %	Cu	Pb	Zn	Ag	Au							
				<u>Alteration:</u> Quite weak apart from common cream carbonate-quartz veins and irregular zones up to 10cm thick forming breccia fill.	T8083	193.8	195.8	100	10	40	75	0.5	0.010							
					T8084	195.8	197.8	98	45	150	110	<0.5	<0.008							
				<u>Mineralization:</u> Weakly mineralized. Rare clots of fine grained pyrite up to 1cm diameter e.g. 195.4m and minor disseminated and stringers fine grained pyrite locally up to 0.5% volume.	T8085	197.8	199.8	100	45	55	115	1.0	<0.008							
					T8086	199.8	201.8	99	20	60	105	0.5	<0.008							
					T8087	201.8	203.8	100	70	15	100	<0.5	<0.008							
				<u>Structure:</u> Moderately jointed. Common rehealed breccia (tectonic) but poorly developed cleavage. Minor structures with rubbly and broken core are: 195.7 (15cm), 200.7 (20cm), 202.5 (15cm), 205.4 (40cm).	T8088	203.8	205.8	97	35	125	315	<0.5	<0.008							
					T8090	205.8	207.8	74	80	40	75	1.0	<0.008							
					T8091	207.8	208.8	100	60	120	80	<0.5	<0.008							
208.7	210.8	1.9	92	<u>CARBONATE (TYNDALL GROUP)</u> Cream coloured dolomitic(?) carbonate which is crystalline and quite disrupted with stringers of dark grey graphitic shale along shear zones especially adjacent to the contacts. The contacts are relatively sharp viz 33° to LCA upper, 38° to LCA lower. Some pinkish tuffaceous material similar in texture to above sequence also occurs. Common crackle breccia with carbonate ± sericite veinlets is developed. The sequence is unmineralized.	T8092	208.8	210.8	92	40	130	135	<0.5	<0.008							
					Analytical Method				101	101	101	101	309							
212.8	229.8	18.8	99	<u>HEMATITIC ANDESITIC LAVA</u> Purple-red medium-coarse grained massive and uniform hematitic porphyritic andesite. The unit is made up of phenocrysts of pink and pale green feldspar crystals 3-5mm in size and hornblende crystals 3-7mm in size set in a very fine grained almost aphanitic dark purple groundmass which is moderate to strongly magnetic. Contact with above sediments is sharp (faulted?). <u>Alteration:</u> Core is weakly altered apart from pervasive hematite within the groundmass. Some patchy pervasive chlorite occurs locally. Carbonate ± quartz ± chlorite veins are common often with associated irregular hematite veins and clots. <u>Mineralization:</u> Unmineralized. <u>Structure:</u> Mostly massive and structureless. Some broken core intervals 10-30cm wide. 215.1-215.4m small fault zone with clay pug.																
				END OF HOLE																

913094

PROJECT: **TYNDALL**

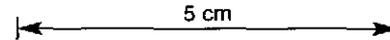
HOLE NO: **WS 4**

GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL HOLE PLOT

PLAN VIEW

WS 4

SCALE 1:



083

527.4mRL

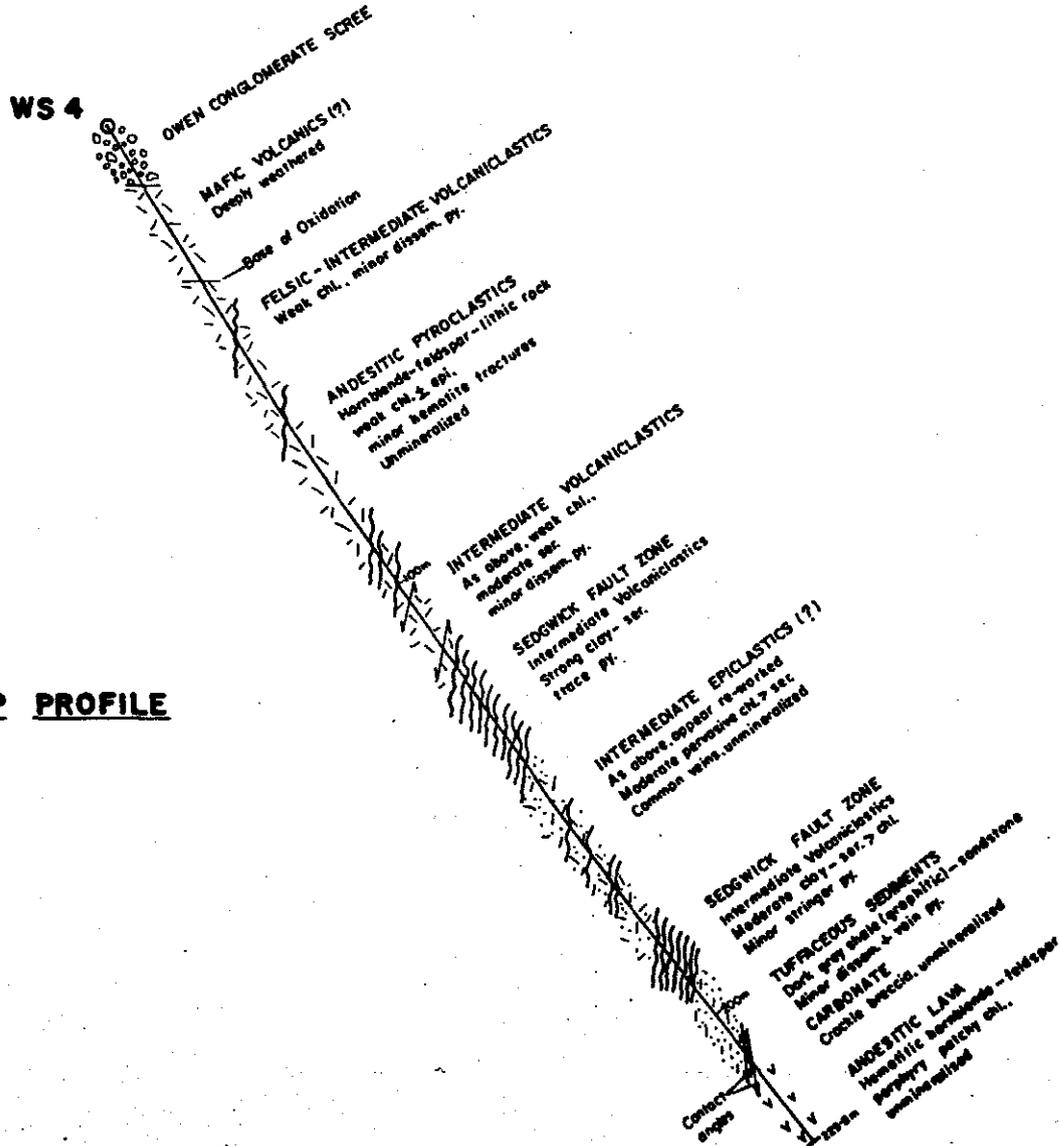
429.1mRL

368.2mRL

354.8mRL

339.8mRL

DIP PROFILE



KEY

CHLORITE	chl.
SERICITE	ser.
CARBONATE	carb.
EPIDOTE	epi.
POTASSIC	pot.
QUARTZ	qtz.
SILICIFIED	sil.
PYRITE	py.
PYRRHOTITE	po.
CHALCOPYRITE	cpy.

- PROMINENT FAULT
- BEDDING
- CLEAVAGE OR FOLIATION

913095

STATE: **TAS.**
HOLE NO: **WS 4**

**GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL CORE RECORD**

090
**HOLE NO. : JP4
STATE : TASMANIA**

ULV. PRESS

PROJECT	E.L.9/66 TYNDALL	PURPOSE To test for high grade Cu-Au mineralization at RL500m beneath the JP2 and Jukes Proprietary No. 3 Adit intersections.
DESIGNED BY	F.G. FITZGERALD	
LOGGED BY	F.G. FITZGERALD	
COMMENCED	30.1.87	
COMPLETED	17.2.87	

LOG SUMMARY	0.0-190.5m Quartz phyrific volcanoclastics and rhyolitic lavas, unmineralized. 190.5 Jukes Proprietary Fault.
GENERAL COMMENTS	190.5-200.2m Mineralized felsic volcanic sericitic breccia zone with carbonate ⁺ -chalcopyrite breccia fill. 200.2-225.5m Hematitic ± chloritic rhyolitic lavas with minor chalcopyrite.

ASSAY SUMMARY

INTERVAL		Au (g/t)	Cu (%)	Ag (g/t)															COMMENTS
From	To																		
193.5	200.5	0.08	0.55	1.0															Mineralized sericitic-carbonate breccia zone
201.5	206.5	0.08	0.42	1.8															Hematitic rhyolitic lava
220.5	222.5	0.73	0.10	<0.5															Chloritic rhyolitic lava - best gold assay

LOCATION

NORTHING	5330853.0
EASTING	383592.6
R.L.	648.5
GRID	AMG
LENGTH	225.5m

HOLE CONDITION

SIZE	
Hole Size	Depth
HQ	15.0m
NQ	39.2m
BQ	225.5m

SIGNIFICANT CORE LOSS INTERVALS		
From	To	% Lost
170.4	172.0	47
189.4	190.5	18

POOR GROUND CONDITION ZONES		
From	To	Condition
189.3	190.5	Jukes Proprietary Fault Zone

HOLE CONDITIONS AFTER COMPLETION
PVC pipe (32mm) inserted to end of hole (225.5m). All casing recovered from hole.

SURVEY DATA (Note: Bearing type must be same as Project Grid Type)

SURVEY			INTERVAL			VERTICAL		HORIZONTAL		SURVEY			INTERVAL			VERTICAL		HORIZONTAL	
Depth	Bearing	Dip	From	To	Distance	D. Sin. Dip	R.L.	D. Cos. Dip	Prog. Total	Depth	Bearing	Dip	From	To	Distance	D. Sin. Dip	R.L.	D. Cos. Dip	Prog. Total
Collar	306°	-50°	0.0	20.0	20.0	15.3	633.2	12.9	12.9										
40m	306.5°	-49.25°	20.0	60.0	40.0	30.3	602.9	26.1	39.0										
80m	306°	-47.5°	60.0	100.0	40.0	29.5	573.4	27.0	66.0										
120m	306°	-45°	100.0	140.0	40.0	28.3	545.1	28.3	94.3										
160m	306°	-42°	140.0	180.0	40.0	26.8	518.3	29.7	124.0										
200m	304°	-36°	180.0	225.5	45.5	26.7	491.6	36.8	160.8										

913096

GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL CORE LOG AND ASSAY DATA

PROJECT: EL 9/66

HOLE NUMBER: JP4

Page: 2092

INTERVAL		RECOVERY		DESCRIPTION	ASSAY DATA														
From	To	m	%		Sample No.	From	To	Rec. %											
				<p>and pinkish (dusty hematite or potassic) alteration of felsic components especially the groundmass. Perhaps both of these are diueteric in origin. Weak to locally strong pale green sericitic alteration especially of feldspar phenocrysts. Tendency for sericitic alteration to increase and chlorite alteration to decrease down-hole. Scattered quartz-carbonate ± chlorite ± Kfeldspar veins 1-10mm thick increasing down-hole.</p> <p><u>Mineralization:</u> Virtually unmineralized apart from rare-minor fine grained disseminated and blebs of pyrite.</p> <p><u>Structure:</u> Homogeneous sequence with moderate joints and open fractures, typically lined with Fe oxides. Small broken zones are: 76.3 (10cm), 76.5 (5cm), 105.5 (60cm wide).</p>															
108.3	134.8	26.4	99	<p><u>QUARTZ-PHYRIC RHYOLITIC LAVA</u></p> <p>Mostly grey medium-coarse grained quartz-phyric rhyolitic volcanics, as in the above sequence. This core has less common pink K-feldspar alteration zones and less noticeable purple-pink dusty hematite alteration. Lithologically the rock appears to be the same sub-porphyrific rhyolitic lava with scattered hydrothermal breccia-zones and some finer grained, possible pyroclastic (ashy) blocks. However, there appears to be less chloritic alteration and an increase in pervasive quartz-sericite alteration, especially pale green sericitic alteration of feldspar phenocrysts. There is also a noticeable increase in quartz-carbonate-chlorite ± Kfeldspar veins especially carbonate gash veins, up to 1-5cm thick. In general there is a slight increase in the minor sulphides, especially pyrite with rare chalcopyrite e.g. 125.6m. The core is weak-moderately magnetic and less fractured than above, with some Fe oxide coatings.</p>															
134.8	158.8	23.8	99	<p><u>QUARTZ-PHYRIC RHYOLITIC LAVA</u></p> <p>Striking pink medium grained quartz-phyric porphyritic rhyolite, part of the above sequence. The pink colouration, which may be fine dusty hematite and/or potassic alteration, often masks the mineralogy of the rock, apart from the enhanced quartz phenocrysts. These are 3-6mm in size and form 5-10% and locally 20% by volume of the rock.</p>															

913098

GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL CORE LOG AND ASSAY DATA

PROJECT: EL 9/66 TYNDALL

HOLE NUMBER: JP4

Page: 3

093

INTERVAL		RECOVERY		DESCRIPTION	ASSAY DATA (ppm)																
From	To	m	%		Sample No.	From	To	Rec. %	Au	Cu	Pb	Zn	Ag								
				<p><u>Alteration:</u> Patchy green-brown sericitic alteration of feldspar phenocrysts also along fractures and as (hydrothermal?) breccia-fill. Chloritic alteration almost absent. Scattered quartz-carbonate ± chlorite ± Kfeldspar veins occur but much less commonly than above unit.</p> <p><u>Mineralization:</u> No visible sulphides. Minor Fe oxides on major fractures. Core is weakly-non magnetic.</p> <p><u>Structure:</u> Relatively massive. Minor zones of broken core at 136.4m (15cm), 149.2m (10cm wide).</p>																	
158.8	190.5	31.0	98	<p>RHYOLITIC VOLCANICS</p> <p>Mixed pale green-grey and pink rhyolitic volcanics as above. However, different alteration styles results in different apparent textures, which may also reflect slightly different original lithologies e.g.:</p> <p>(1) moderate sericitic pyroclastic(?) textured rock with prominent pale green feldspar crystals</p> <p>(2) pink-grey granite-like textured rhyolite, quite coarse grained with prominent quartz and feldspar crystals in a sericitic groundmass</p> <p>(3) pink-grey hydrothermal(?) brecciated texture with pale green sericite breccia-fill.</p> <p>The contacts between these different alteration/textural types is mostly quite diffuse, however there are some sharp contacts e.g. the upper contact of this sequence with the strong pink rhyolitic lavas. This may suggest that the strong potassic alteration phase is over printed.</p> <p><u>Alteration:</u> Over all, the sequence is moderate-strongly altered with pervasive sericite in the groundmass and as breccia-fill. Scattered quartz-carbonate ± minor chlorite veins are not common.</p> <p><u>Mineralization:</u> The sequence is virtually unmineralized.</p> <p><u>Structure:</u> Only weakly jointed. The core becomes more strongly foliated and cleaved down hole especially from 189.3m onwards at 55° to LCA. This appears to be related to proximity to the Jukes Proprietary Fault. Several zones of broken core occur, all with associated Fe oxides on fracture surfaces viz:</p> <p>170.3m (50cm), 172.4 (20cm) 190.3m (20cm) - the Jukes</p>																	
					T8093	185.5	187.5	90	<0.008	5	<5	30	1.0								
					T8094	187.5	189.5	100	<0.008	15	45	65	0.5								
					T8095	189.5	190.5	82	<0.008	155	280	165	0.5								

913099

GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL CORE LOG AND ASSAY DATA

PROJECT: EL 9/66

HOLE NUMBER: JP4

Page: 4

03A

913100

INTERVAL		RECOVERY		DESCRIPTION	ASSAY DATA (ppm)															
From	To	m	%		Sample No.	From	To	Rec. %	Au	Cu	Pb	Zn	Ag							
				Proprietary Fault with some clay and rubble and lost core.																
190.5	200.2	9.7	100	MINERALIZED BRECCIA ZONE Dark grey, becoming green, breccia made up mostly of grey and pink medium grained felsic volcanoclastics similar to the above rhyolitic sequence although quartz crystals are much less obvious. There are also "bands" of finer grained vitric ash or tuffaceous siltstone. The whole sequence has been completely disrupted by tectonic brecciation with cream to fawn coloured carbonate cement often forming a stockwork of veins and making up to 25% volume of the rock. The disrupted blocks occur as fine chips as well as clasts up to several cm in size and are mostly quite angular in shape. However, there is a suggestion of multiple brecciation within the sequence from the subtle hydrothermal(?) brecciated rounded pinkish lava blocks which has been over-printed by the carbonate stockwork. The intensity of brecciation and alteration obscures the primary lithology which may have been either pyroclastic or epiclastic. The core is moderately magnetic becoming weaker down-hole. The upper contact of this sequence is marked by the Jukes Proprietary Fault whereas the lower contact is quite gradational. <u>Alteration:</u> Weak chloritic alteration becoming moderate down hole. Weak-moderate pervasive sericite decreasing in intensity down-hole. Both of these alterations are over-printed by strong carbonate ± quartz breccia fill and veinlet stockwork forming up to 25% volume of the rock. <u>Mineralization:</u> Moderately sulphidic throughout with pyrite occurring mostly within the volcanic "blocks" whereas chalcopyrite is largely confined to the carbonate breccia fill and cement i.e. is associated with the later phase of brecciation and alteration. The chalcopyrite mostly occurs as medium grained "splashes" in the cement, also as fracture-fill veinlets. In detail the mineralization is: 190.5-191.3m <0.1% sulphides, pyrite > chalcopyrite 191.3-194.8m average 0.5%, chalcopyrite > pyrite, locally 1-2% chalcopyrite over zones 10-30cm wide 194.8-198.4 average 1% chalcopyrite >> pyrite, locally	T8096	190.5	191.5	98	<0.008	640	60	355	1.0							
					T8097	191.5	192.5	100	<0.008	2030	35	350	<0.5							
					T8098	192.5	193.5	100	<0.008	535	160	265	<0.5							
					T8099	193.5	194.5	100	0.010	3300	230	310	<0.5							
					T8100	194.5	195.5	100	0.060	6600	190	350	1.5							
					T8101	195.5	196.5	100	0.060	7350	55	240	1.0							
					T8103	196.5	197.5	100	0.240	8050	145	355	0.5							
					T8104	197.5	198.5	100	0.070	5950	85	465	1.0							
					T8105	198.5	199.5	100	0.100	5600	350	535	2.0							
					T8106	199.5	200.5	100	0.050	1700	60	530	<0.5							

METHOD: 309 101 101 101 101

GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL CORE LOG AND ASSAY DATA

PROJECT: EL 9/66 TYNDALL

HOLE NUMBER: JP4

Page: 5

0965

INTERVAL		RECOVERY		DESCRIPTION	ASSAY DATA (ppm)														
From	To	m	%		Sample No.	From	To	Rec. %	Au	Cu	Pb	Zn	Ag						
				2-3% chalcopyrite over short intervals															
				198.4-200.2 average 0.5% chalcopyrite > pyrite															
				Structure: Apart from healed breccia and crackle veinlets the core is relatively structureless. Only weakly jointed.															
200.2	225.5	25.3	100	RHYOLITIC LAVA															
				Red becoming dark green medium-coarse grained quartz-phyric sub porphyritic rhyolitic lava. The rock is compositionally and texturally similar to the sequence up-hole of the Jukes Pty. Fault. It is made up of prominent quartz phenocrysts 3-6mm forming 10-20% of rock, pink and cream feldspar phenocrysts, often as corroded euhedra 2-4mm forming 10-20% of rock set in a red (purple-brown) and dark green fine grained almost aphanitic groundmass. Some variation in grain size is evident although alteration may be masking much of the primary texture. Appears to be mostly quite homogeneous with some scattered apparent lithic chips e.g. fine grained massive magnetite clast 1.5cm in size at 223.6m. The core is moderate-strongly magnetic.	T8107	200.5	201.5	100	<0.008	345	25	375	1.0						
					T8108	201.5	202.5	100	0.020	2400	30	165	0.5						
					T8109	202.5	204.5	98	0.100	5900	250	90	3.0						
					T8110	204.5	206.5	100	0.085	3400	60	85	1.0						
					T8111	206.5	208.5	100	0.010	470	50	70	<0.5						
					T8113	208.5	210.5	100	0.030	425	10	115	<0.5						
					T8114	210.5	212.5	100	0.150	705	<5	65	<0.5						
					T8116	212.5	214.5	86	0.090	950	15	65	0.5						
					T8117	214.5	216.5	100	0.010	1600	<5	50	0.5						
					T8118	216.5	218.5	98	0.020	665	<5	35	0.5						
					T8119	218.5	220.5	100	0.030	905	10	100	<0.5						
					T8120	220.5	222.5	100	0.730	985	<5	235	<0.5						
					T8121	222.5	224.5	98	0.050	350	<5	265	0.5						
					T8122	224.5	225.5	100	<0.008	590	<5	100	<0.5						
				Alteration: Variable red-purple pervasive dusty hematitic alteration of the groundmass and weak-moderate dark green pervasive chloritic alteration give a "blotchy" almost hydrothermal breccia appearance in places. Scattered quartz-carbonate-chlorite ± Kfeldspar veins up to 3cm thick occur. Locally forming a stockwork or breccia fill e.g. 214.0m.															
				Mineralization: Weak-moderate sulphides, predominantly chalcopyrite associated with carbonate-quartz veins and fracture-fill. Mostly <0.1% sulphides but locally up to 1% e.g. 203.4-204.3m. Also minor medium grained euhedral pyrite disseminated in the lava.															
				Structure: Relatively massive and uniform. Very weakly jointed.															
				END OF HOLE															

913101

PROJECT: **TYNDALL**

HOLE NO.: **JP 4**

GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL HOLE PLOT

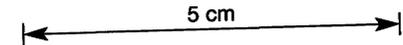
SCALE 1:



097



PLAN VIEW



○ **JP 4**

648.5mRL

○ **JP 4**

QUARTZ-PHYRIC VOLCANICLASTICS (LAVAS?)
Weak chl., especially breccia zones
Minor ser. alteration

Base of Oxidation

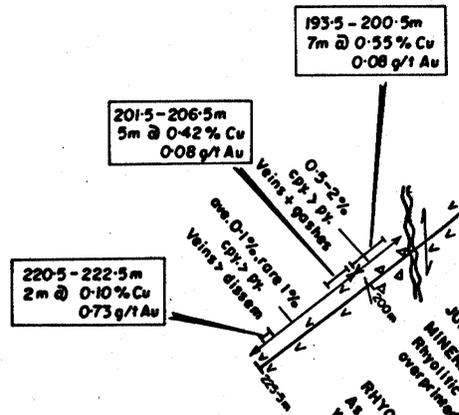
RHYOLITIC LAVA
Sub perphyritic, deuteric breccia zones
Weak pervasive chl., dusty hematite,
rare dissem. py.

RHYOLITIC LAVA
As above but weaker chl. &
stronger qtz. - sec alteration
Minor py., trace cpy.

RHYOLITIC LAVA
As above, striking pink color:-
dusty hematite & pot. alteration
unmineralized

RHYOLITIC VOLCANICS
Mixed lava - pyroclastics (?)
Mod. - strong pervasive ser.
brecciated pot. alteration
Unmineralized

JUKES PTY. FAULT
MINERALISED BRECCIA ZONE
Rhyolitic volcanic, mod. - mod. sec. chl.
overlain by strong carb. breccia - lit & cpy
RHYOLITIC LAVA
As above, mixed dusty hematite - chl.
Weak - mod. sulphides



193.5 - 200.5m
7m @ 0.55% Cu
0.08 g/t Au

201.5 - 206.5m
5m @ 0.42% Cu
0.08 g/t Au

220.5 - 222.5m
2m @ 0.10% Cu
0.73 g/t Au

- KEY**
- CHLORITE chl.
 - SERICITE ser.
 - CARBONATE carb.
 - EPIDOTE epi.
 - POTASSIC pot.
 - QUARTZ qtz.
 - SILICIFIED sil.
 - PYRITE py.
 - PYRRHOTITE ps.
 - CHALCOPYRITE cpy

DIP PROFILE

512.1mRL

506.4mRL

491.6mRL

913102

STATE: **TAS**

HOLE NO.: **JP 4**

PROJECT: **TYNDALL**

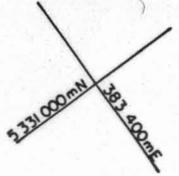
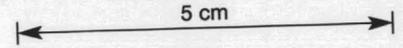
HOLE NO.: **JP 4**

GOLD FIELDS EXPLORATION PTY. LIMITED
DRILL HOLE PLOT

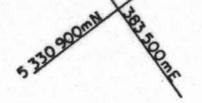
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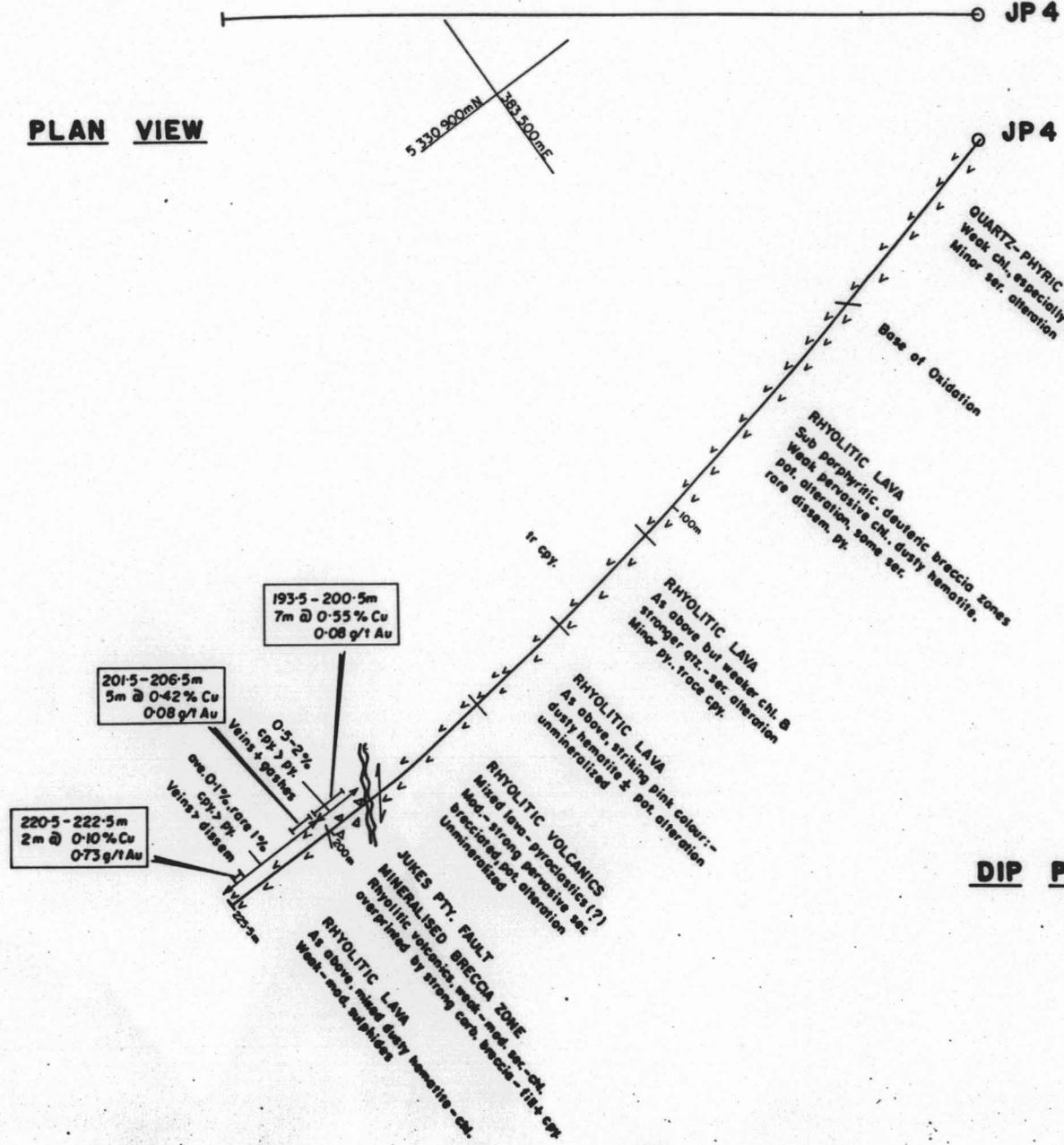
097



PLAN VIEW



648.5mRL



913102

512.1mRL

506.4mRL

491.6mRL

DIP PROFILE

- KEY**
- CHLORITE chl.
 - SERICITE ser.
 - CARBONATE carb.
 - EPIDOTE epi.
 - POTASSIC pot.
 - QUARTZ qtz.
 - SILICIFIED sil.
 - PYRITE py.
 - PYRRHOTITE ps.
 - CALCOPYRITE cpy

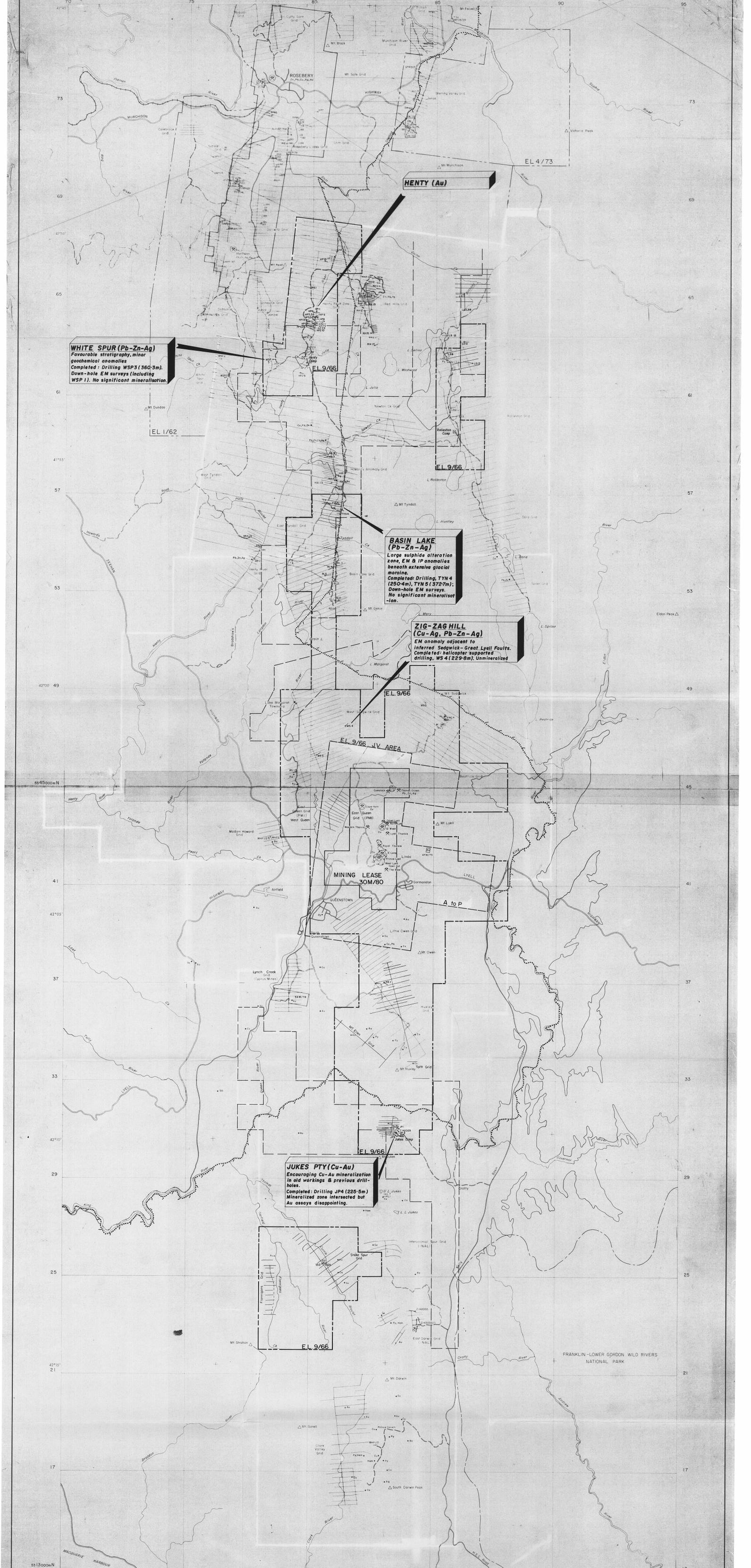
STATE: **TAS**

HOLE NO: **JP 4**

APPENDIX E

SAMPLE DESCRIPTIONS AND ASSAY RESULTS

JUKES PROPRIETARY



WHITE SPUR (Pb-Zn-Ag)
 Favourable stratigraphy, minor geochemical anomalies
 Completed: Drilling WSP3 (360-3m). Down-hole EM surveys (including WSP 1). No significant mineralisation.

HENTY (Au)

BASIN LAKE (Pb-Zn-Ag)
 Large sulphide alteration zone, EM & IP anomalies beneath extensive glacial moraine.
 Completed: Drilling, TYN 4 (250-4m), TYN 5 (372-7m); Down-hole EM surveys. No significant mineralisation.

ZIG-ZAG HILL (Cu-Ag, Pb-Zn-Ag)
 EM anomaly adjacent to inferred Sedgwick-Great Lyell Faults.
 Completed: helicopter supported drilling, WS 4 (229-9m). Unmineralized.

JUKES PTY (Cu-Au)
 Encouraging Cu-Au mineralization in old workings & previous drill-holes.
 Completed: Drilling JP4 (225-5m). Mineralized zone intersected but Au assays disappointing.

MINING LEASE 30M/80

EL 9/66 JV AREA

EL 9/66

EL 9/66

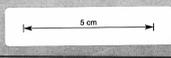
913105
 South-West Conservation Area Boundary
 H.E.C. Vested Areas (Proposed)



- LEGEND
- Main Road
 - Vehicular Track
 - River, Creek
 - Railway (abandoned)
 - - - E.L. Boundary
 - - - M.L. Boundary
 - ⊗ Major Mine Working
 - ⊗ Major Mine Abandoned
 - ⊗ Old Workings, Mineral Occurrence
 - ⊗ Alluvial Workings
 - ⊗ Drill Hole
 - ⊗ Exploration Camp
 - △ Prominent Peak

SCALE 1:50,000
 0 1 2 3 4 5
 KILOMETRES

E.L.9/66 - TYNDALL PROJECT
WORK COMPLETED 6437
1986-87
(Excluding Henty)



GRID DENOTES 1:5000 MAP SERIES BASED ON 1000METRE INTERVALS OF AUSTRALIAN MAP GRID ZONE 55



BIMODAL VOLCANIC SEQUENCE
Felsic lavas, ignimbrites and mafic-intermediate intrusives

SEDIMENTARY SEQUENCE
Interbedded greywacke, siltstone and mudstone, minor tuffs, conglomerates and carbonate-rich beds

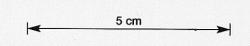
GEOLOGICAL LEGEND

- GLACIAL DEPOSITS:** Unconsolidated mostly thin veneer (<10m.)
- BASIC VOLCANICS:** Either fine grained basaltic dykes and possible lava flows or coarser grained doleritic dykes. Typically unaltered, strongly magnetic.
- SUB-VOLCANIC INTRUSIVES:** (quartz porphyry, dacites?) Small felsic-intermediate bodies, virtually unaltered and unmineralised.
- SCHISTS:** Possibly after epilitic and/or fine grained pyroclastic lithologies. Completely detextured, quartz-sericitic schists, minor disseminated sulphide min.

- EPICLASTIC ROCKS:** Predominantly finer grained grey shales and tuffaceous siltstones, minor interbedded coarser crystal tuffs-sandstones. Often finely laminated even cross-bedded, also massive, usually cleaved. Variable alteration, locally intense quartz-sericitic ± chlorite.
- PYROCLASTIC VOLCANICS (predominantly ignimbritic rocks):** Variable fine to coarse grained, sometimes lithic, often welded and massive or foliated. Variable alteration, locally moderate to strong sericitic ± chlorite, often quite cleaved. Minor disseminated and veinlet sulphide mineralisation.
- ASHY PYROCLASTICS:** Inferred air-fall pyroclastics. Often fine-grained vitric deposits, massive or finely layered occasional coarser lithic layers. Variable alteration mostly weak pervasive sericitic, mostly unmin.

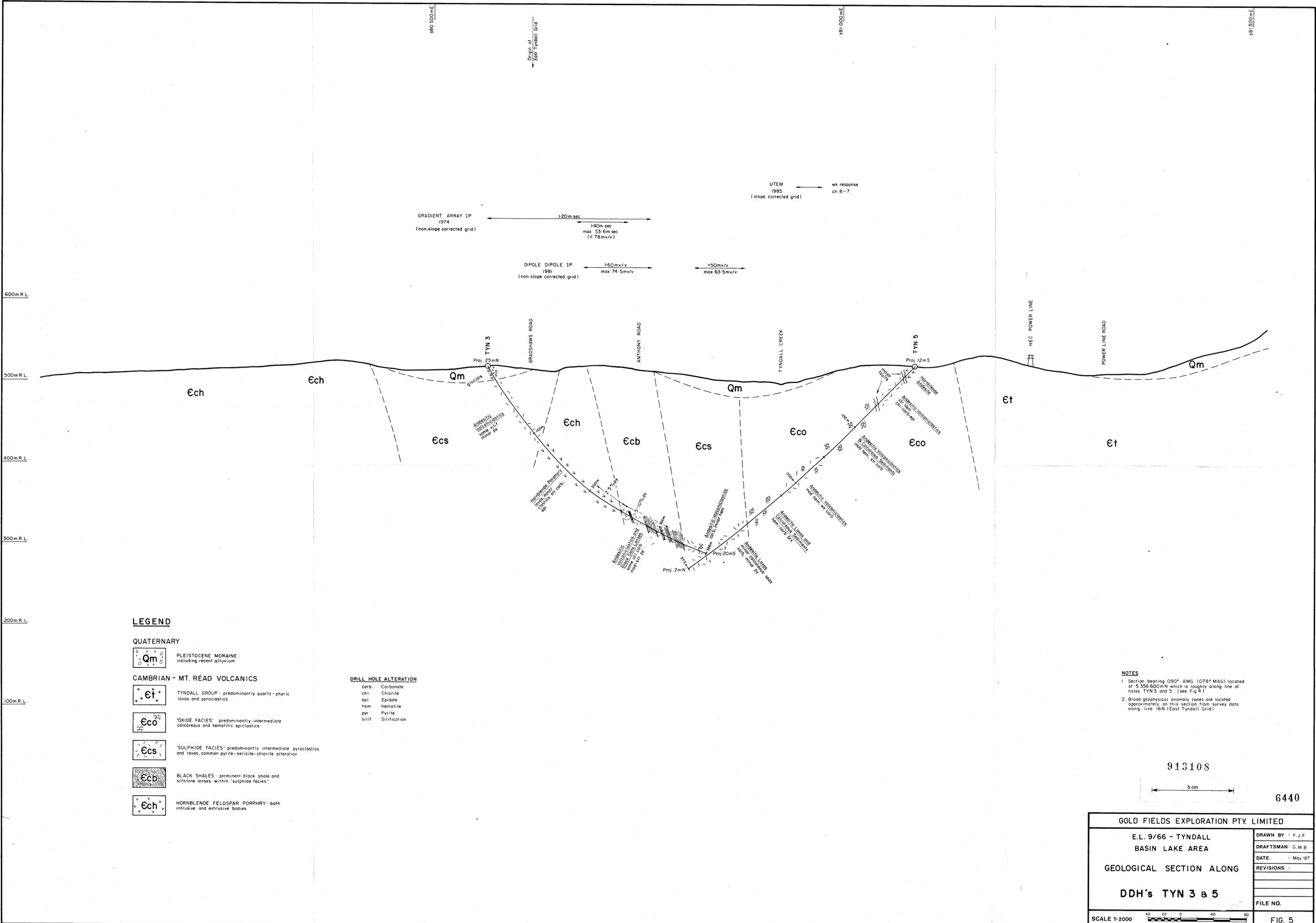
- FELSIC LAVA BRECCIAS - Massive pyroclastics:** Striking pink and dark green blotchy, massive hard outcrops. Much disruption of initial lava into blocks within vitric (?) matrix. Typically weakly altered and unmineralised.
- FELSIC LAVAS:** Massive, rhyolitic, sometimes flow-banded dome-like features, aphanitic, slightly porphyritic. Typically weakly altered and unmineralised.

- Bedding - strike and dip
- Cleavage and/or prominent foliation within pyroclastic lithologies
- Banding - prominent primary volcanic lineation



NOTE: Some discrepancies between A.M.G. location of drill holes and topographic /cut grids data.

GOLD FIELDS EXPLORATION PTY LIMITED	
E.L.9/66 - TYNDALL PROJECT	
WHITE SPUR	
GEOLOGICAL INTERPRETATION	
6438	
SCALE 1:5000	
DRAWN BY F.G.F. DRAFTSMAN T.G.D.S. DATE June '85 REVISIONS F.G.F. May '87	FILE NO. FIG 3



LEGEND

QUATERNARY

Qm PLEISTOCENE MORaine including recent alluvium

CAMBRIAN - MT. READ VOLCANICS

Ei TYNDALL GROUP: predominantly quartz - phytic lavas and pyroclastics

Eco 'OXIDE FACIES': predominantly intermediate calcareous and hematitic epicslastics

Ecs 'SULPHIDE FACIES': predominantly intermediate and lavas, common pyrite - sericite-chlorite alteration

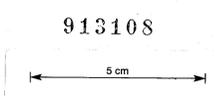
Ecb BLACK SHALES: prominent black shale and siltstone lenses within 'sulphide facies'

Ech HORNBLende FELDSPAR PORPHYRY: both intrusive and extrusive bodies

DRILL HOLE ALTERATION

- carb. Carbonate
- chl Chlorite
- epi Epidote
- hem Hematite
- pyr Pyrite
- siltf Silification

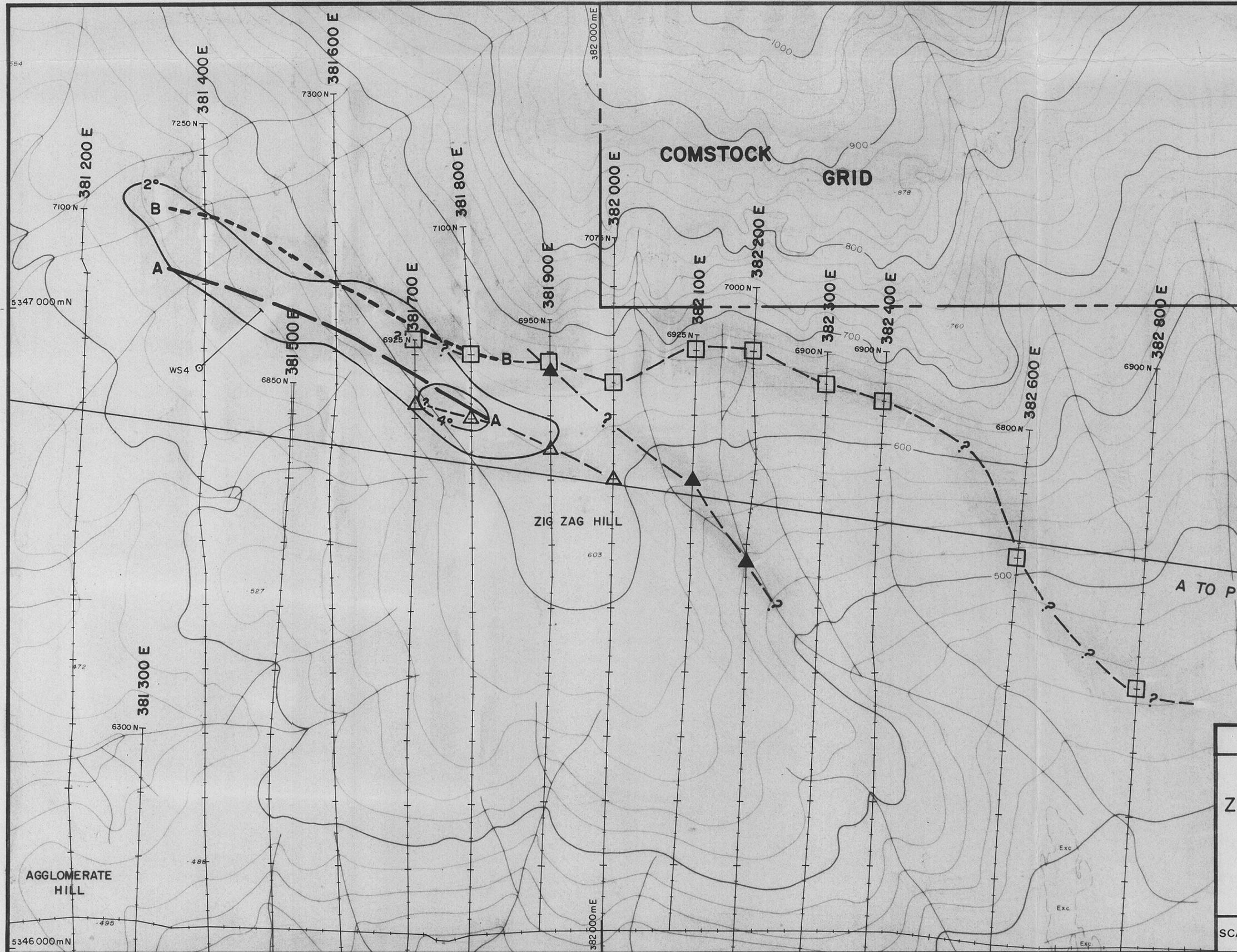
- NOTES**
- Section bearing 090° AMG (078° MAG) located at 5 356 600mN which is roughly along line of holes TYN 3 and 5. (see Fig 4)
 - Broad geophysical anomaly zones are located approximately on this section from survey data along line 16N (East Tyndall Grid)



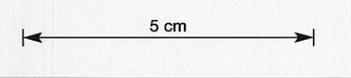
6440

GOLD FIELDS EXPLORATION PTY. LIMITED	
E.L. 9/66 - TYNDALL BASIN LAKE AREA	
GEOLOGICAL SECTION ALONG	
DDH's TYN 3 & 5	
SCALE 1:2000	FILE NO.
	FIG. 5

87 2074



LEGEND



- 1958 RIO TINTO TURAM EM SURVEY**
- \odot 2° Phase Difference contour, location approximate
- 1981 MT. LYELL, GRADIENT ARRAY IP SURVEY**
- \blacktriangle Narrow sharp increase in chargeability and drop in resistivity, possibly concealed Great Lyell Fault?
 - \triangle Weak-moderate chargeability high \pm drop in resistivity
 - \square Drop in resistivity \pm drop in chargeability adjacent to sharp rise in resistivity (Sedgwick Fault/Owen Conglomerate response)
- 1986 GFEL, SIROTEM EM SURVEY**
- A - - Sirotem response: shallow resistivity contrast - geological contact or ? Pb-Zn sulphides
 - B - - Sirotem response: near surface resistivity contrast - fault or geological contact (Sedgwick Fault?)
 - WS4 \circ Diamond drill hole, completed 1987

913110

NOTE: Due to poorly located cut grid lines, positions of geophysical anomalies are inaccurate with respect to DDH WS4

6442

GOLD FIELDS EXPLORATION PTY. LIMITED

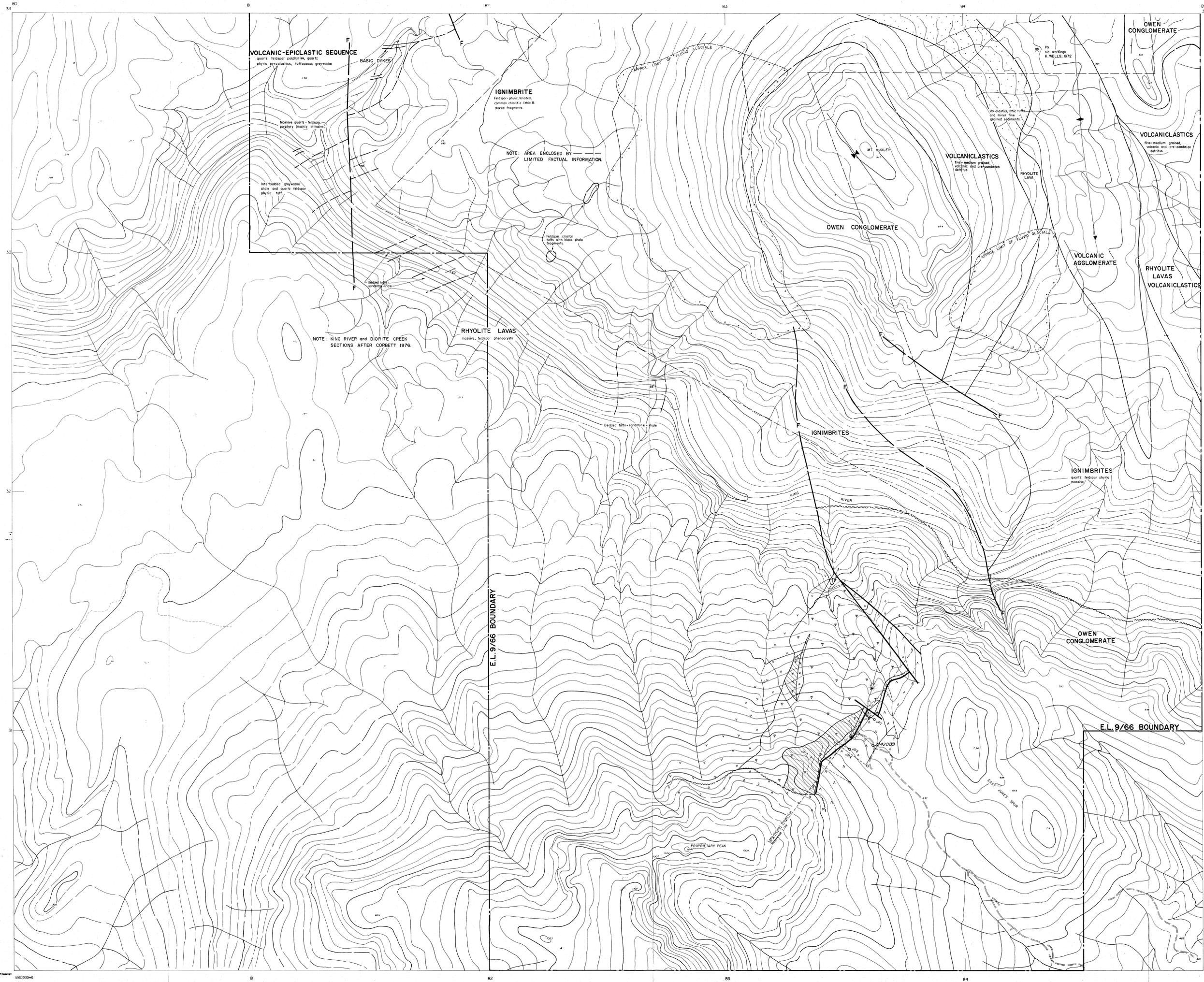
E.L. 9/66 TYNDALL

ZIG ZAG HILL, WEST SEDGWICK

GEOPHYSICAL INTERPRETATION

SCALE 1:5000 **FIG. 7**

DRAWN BY :	F.G.F.
DRAFTSMAN :	T.G.D.S.
DATE :	June '86
REVISIONS :	
	F.G.F. May '87
FILE NO.	



VOLCANIC-EPICLASTIC SEQUENCE
 quartz feldspar porphyry, quartz
 phric pyroclastics, fulfurous greywacke

IGNIMBRITE
 Feldspar phric, isolated
 common siliceous tuffic &
 shored fragments

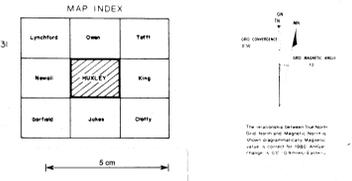
NOTE: AREA ENCLOSED BY
 LIMITED FACTUAL INFORMATION.

NOTE: KING RIVER and DIORITE CREEK
 SECTIONS AFTER CORBETT 1976.

- JUKES PTY. LEGEND**
- Owen Conglomerate
 - △ MT. READ VOLCANICS
 - Weakly sericitic + chloritic autoclastic
 tuff with minor pyroclastics
 - Intensely chloritised and
 mineralised volcanoclastics
 - Strongly hematitic-siliceous-chloritic brecciated
 tuffs with minor volcanoclastics
 - Moderately hematitic-siliceous-chloritic brecciated
 tuffs with minor volcanoclastics
 - Sericitic and chloritic tuff
 with minor volcanoclastics
 - Intrusive quartz porphyry
- Unconformity
 — Fault
 — Contact

- LEGEND**
- Geological boundary
 - - - - - Interpreted geological boundary
 - Fault
 - ~ ~ ~ ~ ~ Unconformity
- Bedding
 0-30°
 30-60°
 >60°
- Folds
 — Syncline
 — Anticline
 — Plunge
- Alteration
 Pyritic sericitic/chlorite
 Hematitic sericite

- SEALED ROAD BRIDGE
- VEHICULAR TRACK
- LOGGING TRACK BULLDOZER SCAR
- WALKING TRACK
- RAILWAY TRAMWAY ABANDONED
- △ PROMINENT PEAK
- TRIG STATION
- BENCH MARK
- SPOT ELEVATIONS
- RIVER CREEK
- LAKE
- SWAMP
- POWER LINE & PYLONS
- BUILDING
- FLYING FOX
- PIT
- COSTEAN TRENCH
- ADIT
- SHAFIT (Depth metre)
- OPEN CUT
- ALLUVIAL WORKINGS
- DUMP



Photography: Lands Department 1979-80
 South West Project F617
 Photogrammetry: Associated Aerial Surveys Pty Ltd 1980

Grid Lines are 1000 Metre intervals of the
 Australian Map Grid Zone 55
 Grid Values are Shown in Full Only at the
 South West Corner of the Map
 Horizontal Datum: Australian Geodetic Datum 1966
 Vertical Datum: Australian Height Datum (Farnham)
 Transverse Mercator Projection

913111
 GEOLOGICAL SOURCE: Hutton & Estlin 1982
 Garthoff 1984
 Potock 1984-85

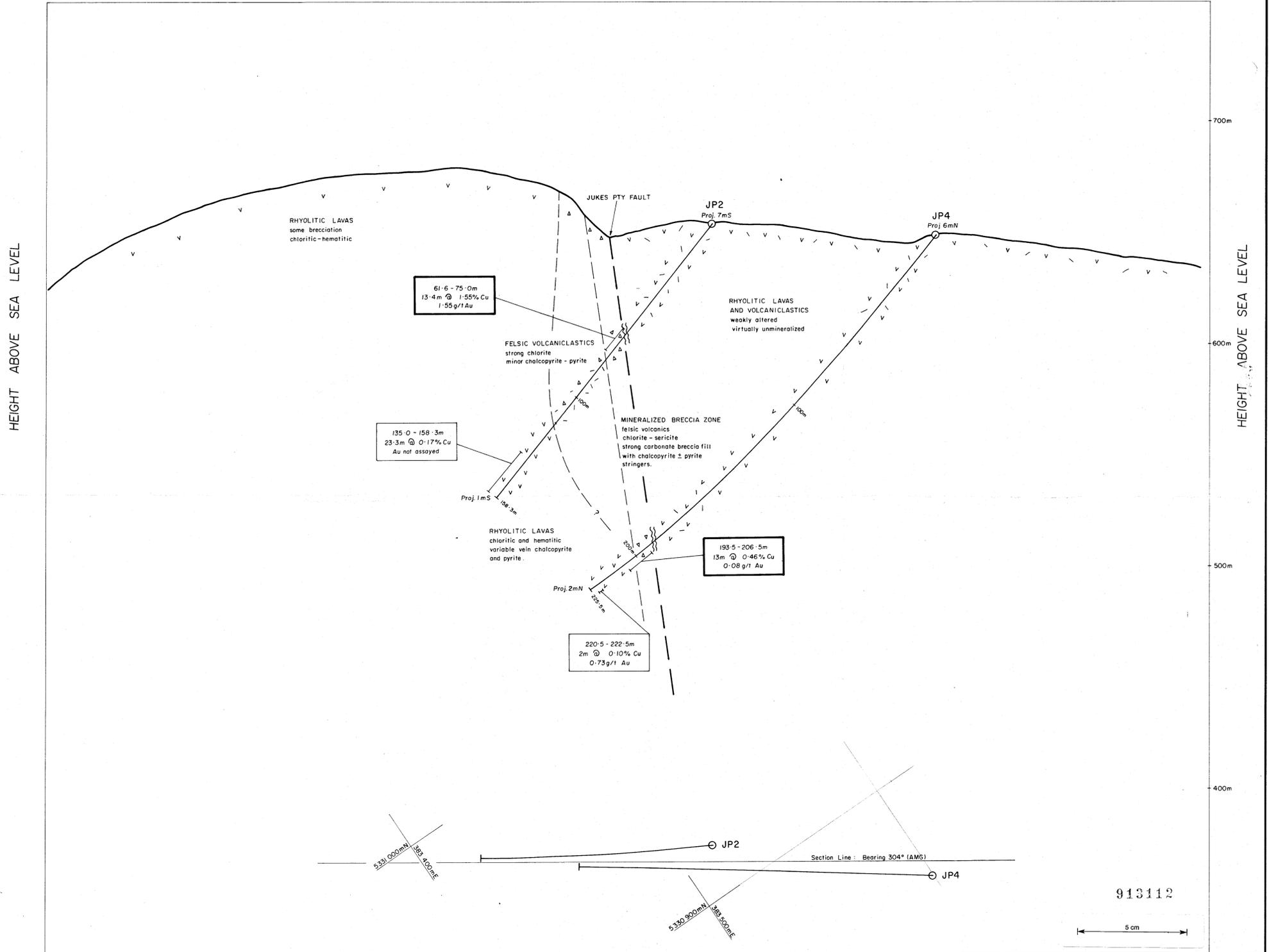
GOLD FIELDS EXPLORATION PTY LIMITED

TYNDALL - E.L. 9/66	DRAWN BY: A.J.C.
HUXLEY	DRAFTSMAN: T.G.S.
INTERPRETATIVE GEOLOGY	DATE: May 84
	REVISIONS:
	F.G.F. Apr 85
	F.G.F. May 87
	FILE NO.:

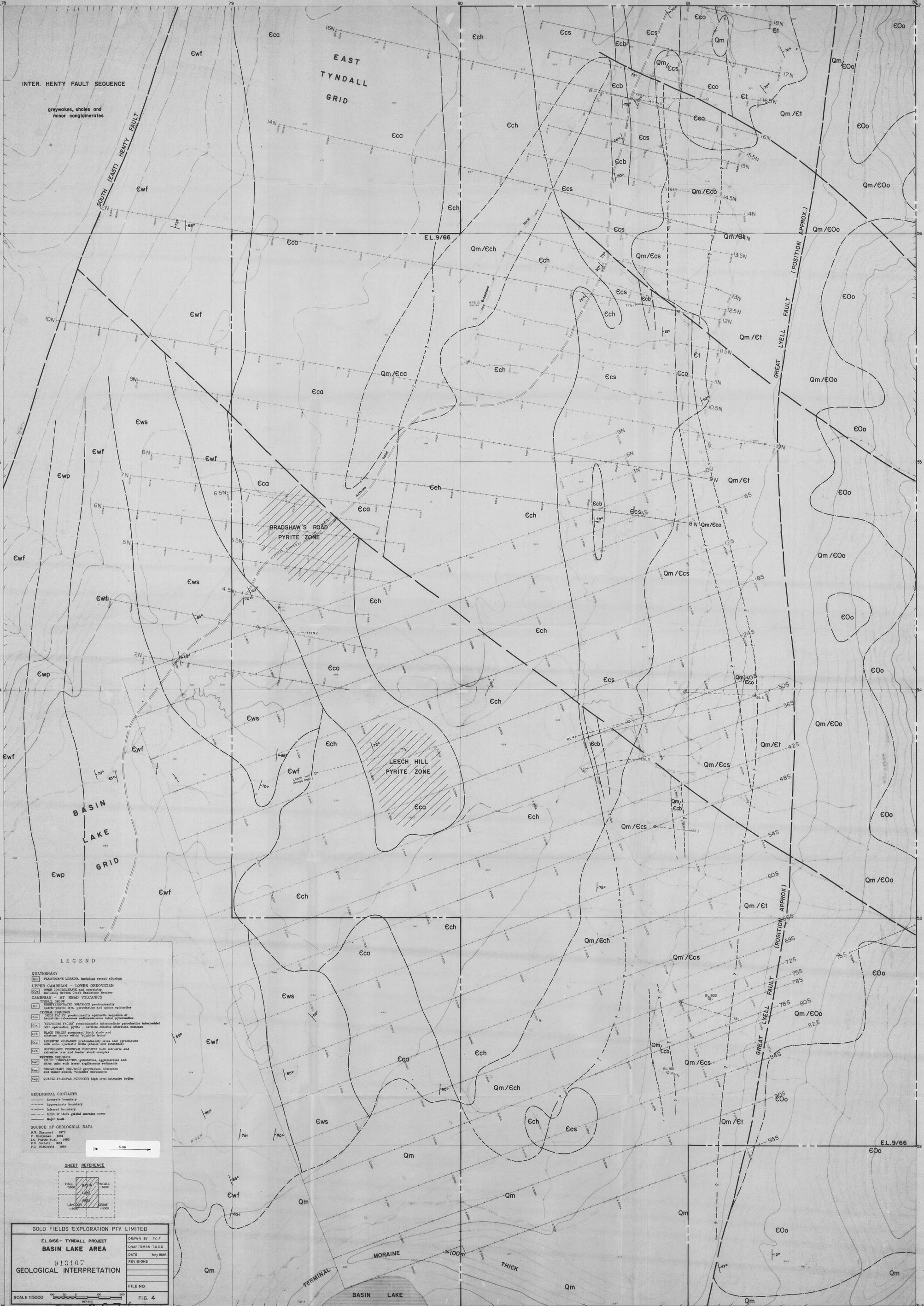
SCALE 1:5000

FIG. 8

DRILLING SECTION LINE BEARING 304° AMG



GOLDFIELDS EXPLORATION PTY. LIMITED	
E.L. 9/66	
JUKES PTY	
DRILL SECTION 304° AMG	
HOLES JP2 & JP4	
DRAWN BY : F.G.F.	REVISIONS :
DRAFTSMAN : G.M.B.	FILE NO.
DATE : May '87	FIG 9
SCALE 1:1000	



INTER. HENTY FAULT SEQUENCE

greywakes, shales and minor conglomerates

EAST TYNDALL GRID

BASIN LAKE GRID

BRADSHAW'S ROAD PYRITE ZONE

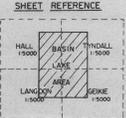
LEECH HILL PYRITE ZONE

LEGEND

- QUATERNARY
 - Qm PLEISTOCENE MORAINES, including recent alluvium
- UPPER CAMBRIAN - LOWER ORDOVICIAN
 - Eca OPEN CONGLOMERATE and correlated
 - Ecb including Devon Creek Sandstone Member
 - Ecs CAMBRIAN - MT READ VOLCANICS
- TUNDRA GROUP
 - Ech UNDIFFERENTIATED VOLCANICS predominantly quartz-pyrite lava, pyroclastics and minor epiclastics
- CENTRAL SEQUENCE
 - Ecs VOLCANIC FACIES predominantly epiclastic sequence of basaltic-andesite, andesite, rhyolite, and quartz-pyrite
 - Ecb "SUNDRINE FACIES" predominantly intermediate pyroclastics interbedded with epiclastics, pyrite - sericite chlorite alteration common
 - Eca SLICE SHALES prominent ideal shale and siltstone lenses within "siltstone facies"
- WESTERN SEQUENCE
 - Ews ANORTHIC VOLCANICS predominantly lava and pyroclastic with some epiclastic units (shales and siltstones)
 - Ewf BOWENLANDER FELDSPAR PORPHYRY both intrusive and extensive lava and feeder dyke complex
 - Ewp FELDSPAR PORPHYRY (epithermal, argillaceous and vitro tuffs with lesser argillaceous sediments)
 - Eca SEDIMENTARY SEQUENCES greywacke, siltstone and minor shales, volcanics unconformable
 - Eca QUARTZ FELDSPAR PORPHYRY high level intrusive bodies

- GEOLOGICAL CONTACTS
 - Accurate boundary
 - Approximate boundary
 - Internal boundary
 - Limit of thick glacial moraine cover
 - Major fault

SOURCE OF GEOLOGICAL DATA
 N.W. Sheppard 1975
 P. Komphang 1981
 J.C. Paine et al. 1983
 E.A. Coletti 1984
 F.C. Fitzgerald 1985



GOLD FIELDS EXPLORATION PTY. LIMITED

EL.9/66 - TYNDALL PROJECT

BASIN LAKE AREA

910107

GEOLOGICAL INTERPRETATION

SCALE 1:5000

FIG. 4

DRAWN BY	F.G.F.
DRAFTSMAN	T.G.D.S.
DATE	May 1986
REVISIONS	
FILE NO.	

SOUTH

NORTH

800mR.L.

800mR.L.

700mR.L.

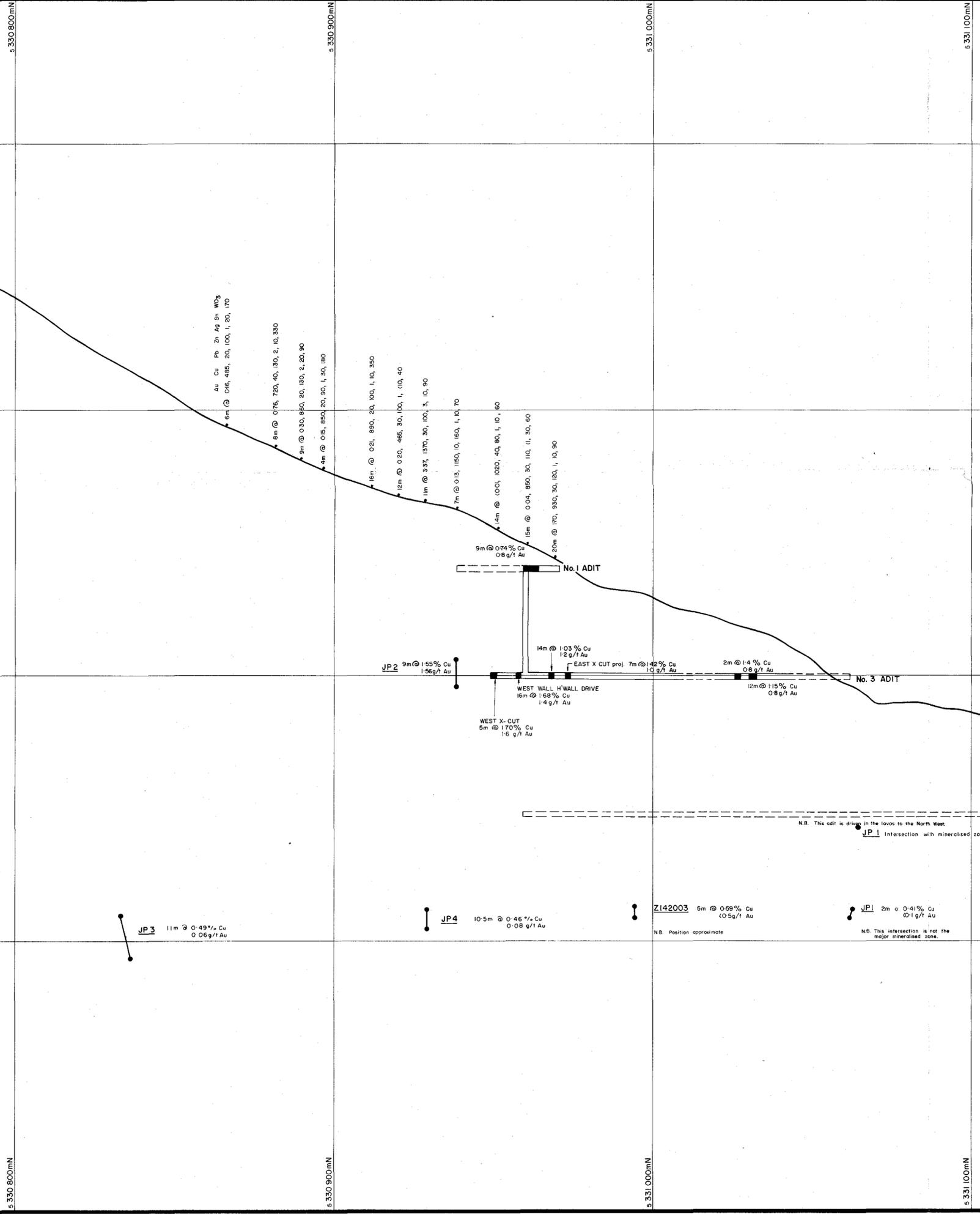
700mR.L.

600mR.L.

600mR.L.

500mR.L.

500mR.L.



913113

5 cm

NOTES

1. Position of projection reference line is shown on 1:5000 scale Huxley sheet geology plan.
2. Projection surface orientation is 034° AMG.
3. All thicknesses shown are horizontal.

6445

GOLD FIELDS EXPLORATION PTY. LIMITED	
JUKES PTY.	
LONGITUDINAL PROJECTION OF MINERALISATION IN CHLORITIC VOLCANICLASTICS	
DRAWN BY : A.J.C.	REVISIONS :
DRAFTSMAN: T.G.D.S.	DATE : MAY '83
FILE NO.	FIG. 10

SCALE 1:1000

87-2674

5 331 200mN

5 331 100mN

5 331 000mN

5 330 900mN

5 330 800mN

5 330 700mN

383 300mE

383 400mE

383 500mE

ADIT No. 2
548m R.L.

2m @ 2.40% Cu
1.7g/t Au
4m @ 0.75% Cu
2.3g/t Au
6m @ 0.58% Cu
1.3g/t Au

ADIT No. 3
600m R.L.

12m @ 1.15% Cu
0.8g/t Au
2m @ 1.4% Cu
0.8g/t Au

14m @ 1.03% Cu
1.2g/t Au
7m @ 1.42% Cu
1.0g/t Au
ADIT No. 1
639m R.L.
9m @ 0.74% Cu
0.8g/t Au
16m @ 1.68% Cu
1.4g/t Au
9m @ 1.27% Cu
0.9g/t Au

Z142003
(approx.)

JP2

JP4

JP3

Structure Contours
H.W. Mineralized Zone
(F.W. Jukes Pty Fault)

Longitudinal Projection Reference Line - Bearing 036° - AMG

700m
690m
680m
600m
550m
500m

5 cm

6446

GOLD FIELDS EXPLORATION PTY. LIMITED	
E.L. 9/66	DRAWN BY : F.G.F.
JUKES PTY	DRAFTSMAN : G.M.B.
DRILL HOLE LOCATION PLAN AND STRUCTURE CONTOURS	DATE : May '87
H.W. MINERALIZED ZONE	REVISIONS :
	FILE NO.
SCALE 1:1000	FIG. II

87-2674