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EXPLORATION LICENCE 15/73

HATFIELD

TASMANIA

REPORT ON EXPLORATION

DECEMBER 26, 1982 TO MAY 27, 1984

<u>Distribution</u>

Hawthorn (1/4)
Burnie (2/4)
AMH (3/4)
Department of Mines (4/4)

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Assistant Manager

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2. `Report on the UTEM Survey South of Mt Charter and Recommendations for Further Work´ by E. T. Eadie (Abridged)

3. `Results of the EM 37 survey at Zone E and Zone I_1, Hatfield Licence, Tamania´ by E. T. Eadie

4. Location of petrological samples in Appendices 5, 6, 7, 8.

5. Petrological Report CMS 84/1/6 on samples from the 4550N/4400E, 4500N/4400E, 4000N/4100E,3900N/4100E and 4400N/4200E costeans, by H. W. Fander

6. Petrological Rept CMS 84/3/3 on samples from the UTEM Zone E/7700N costean and Zone I_1/5700N and 5800N costeans, by H.W.Fander

7. Petrological Report CMS 84/3/32 on samples from the Zone E/7500N costean and the 5400N/3600E costean, by H.W.Fander

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SUMMARY

Work completed on the Hatfield Licence (EL 15/73) during the period December 26, 1982 to May 27, 1984 is summarised below in approximate chronological order : areas of activity are located and annotated on Plate HAT 45.

(i) From February to May, 1983 a UTEM survey covered part of the Hatfield Licence and the adjoining Mackintosh Licence. A survey in 1979 covered a block around Mt Charter.

(ii) A programme of costeaning and re-evaluation of the Mt Charter prospect was completed and 3 x 300m diamond drill holes proposed and approved.

(iii) Costeans were completed over major Pb/Zn soil anomalies at N.W. Mt Charter and S. W. Mt Charter. An exploration concept of hangingwall base metal expression of mineralization was proposed to explain these anomalies.

(iv) Follow-up of UTEM anomalies was begun. This involved detailing of anomalies E and I_1 with EM-37, costeaning of anomalies E and I_1, and a line of Max-Min EM over anomaly G_3.

(v) An area of prospective volcanics south of 4200N was covered by a UTEM survey in Feburary, 1984. The area was also soil sampled. Most of this area is on the Mackintosh Licence.

(vi) The J_1 - J_3 anomalies detected by the February, 1984 UTEM survey were detailed by a further survey in May 1984. 2 x 250 diamond drill holes were recommended to test the zone.

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INTRODUCTION

The Hatfield Exploration Licence 15/73 was pegged on May 5, 1973, by Cominco Exploration Pty.ltd. (Figure 1). The Exploration Licence was transferred from Cominco to Abminco N.L. on April 10, 1978; to Cleveland Tin Limited on March 28, 1979; and most recently to Aberfoyle Exploration Pty. Ltd. The Licence is partly over private land owned by Associated Forest Holdings Pty. Ltd., who have a timber concession covering the entire licence area.

Revised conditions governing exploration licences applied by the Department of Mines from July 1, 1982, now require that exploration be completed on the Hatfield Licence by June 25, 1988. However, since the current licence area is only 65 sq km, that is less than the maximum area permitted for a five year licence (125 sq km), then no reduction in area is required during this period.

The Hatfield Licence currently attracts an annual expenditure rate of $500 per square kilometre and an annual fee fixed at $25 per square kilometre.

This report describes exploration activity on the licence during the period December 26, 1982 to May 27, 1984.

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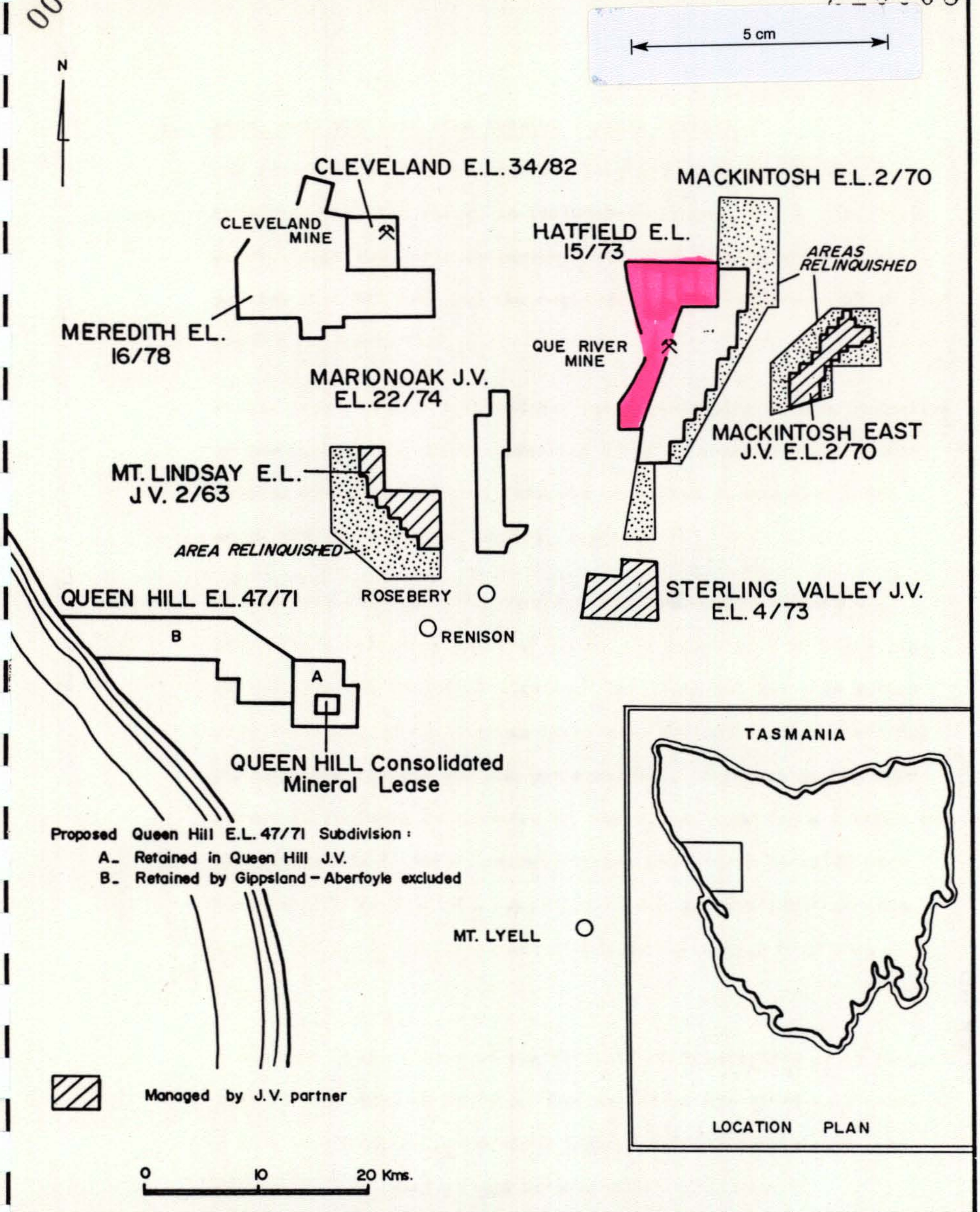

Aberfoyle Exploration Pty Ltd

Drawn: JRS	NORTH WEST TASMANIA	Location code:
Traced: RJE	EXPLORATION LICENCES	Date: OCT. 1984
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Revised by: Date:		Plate Nº FIG. 1

1. 1979, 1983 AND 1984 UTEM SURVEYS - AREAS COVERED

The area covered by these surveys is shown on Plate HAT 45. A report on the 1979 survey is included in (Young, 1979). Aberfoyle Geophysicist Tom Eadie re-assessed the 1979 results while interpreting the 1983 data and the combined results are presented in his report (Appendix 1).

In his report, Eadie selected and rated geophysically nine anomalies on the Hatfield Licence. Anomalies E and I_1 were recommended for further E.M. detailing and this was completed in December, 1983 using the EM-37 system (Report, Appendix 3).

In February 1984 the UTEM coverage was extended to a block of prospective volcanics south of 4200N, the major part of which lies on the adjacent Macintosh licence. The lines cut for this survey were soil sampled at 25 metre intervals, as indicated on Plate HAT 45. Complete results are not yet available. A report on the UTEM survey is included as Appendix 2. The survey detected a further two anomalies, the J_1 and J_3 anomaly trend, which were detailed with further UTEM in May 1984. A report is not yet available on this work. The J_1-J_3 anomalies are discussed in section 6 of this report.

A summary of the status of the Hatfield UTEM anomalies as of May 1984 is presented in Table 1. The anomalies are rated on a scale of 1 to 4 which takes into account geophysical and geochemical response, local geology and stratigraphic position.

Further UTEM coverage is recommended for the N.W. Mt Charter soil anomaly area (5400N/3600E) which has not yet been surveyed.

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TABLE 1: RATING OF UTEM ANOMALIES ON THE HATFIELD LICENCE

PROSPECT/ ANOMALY	GEOLOGY	GEOCHEMISTRY	GEOPHYSICS	WORK COMPLETED DURING TERM OF CURRENT WORK PROPOSAL	FURTHER WORK PLANNED	RATING AND COMMENTS
UTEM E	.No outcrop .HAI intersected quartz/ sericite/pyrite altered volcanic - drilled into IP target .Dacites and typical Que River mine footwall alteration exposed in recent costeans .Major pyritic fault at 7700N/4000E in costean	.Soil geochem not anomalous .Weak base metal anomalies in recent costeaning .No significant gold anomalies (7 rock chip samples)	.Weak EM response with possible north plunge .Large intense IP anomaly to east of EM trend between 7800N-8100N	Costeans 7500N,7700N 7900N EM-37 detailing of UTEM anomaly	.Detailed gradient array IP as an aid to mapping .Data compilation	1 .UTEM may be explained by 7700N fault zone .Zone thought to be a footwall alteration system - but facing, structure of area not known. Detailed mapping needed to define in which direction to look for massive Pb/Zn min
UTEM F	.Shale-volcanic contact. .Trenched and mapped in 1976 to show sed. and volcanic conformable. Trench did not cross UTEM axis	Not anomalous	.Weak shallow EM response. .Partial IP coverage suggests strong response	None	.Review in conjunction with trenching on Zone B. .Extend 1976 trench over UTEM axis	3 See Utem B
G1 Old Mill Site Geochem Trend	Predominantly green unaltered andesite with patches of GN/SPH/PY min. Pyritic dacite reported at 7200N/4300E (in trench) QE72, drilled for engineering purposes, not a true test of the zone-intersected unaltered andesite with GAL/SPH/QTZ aggregates	.Trend is strongly anomalous in Pb and Zn	.Single line weak EM response .Weak diffuse chargeability anomaly over G1 but zone is not fully covered by IP.	Brief field visit to G1 area - Sph and Galena min in unaltered andesite noted	.Completion of IP .Comparison with similar sources of Geochem anomalies around Mt Charter .More extensive trenching	2 Anomalous geochem can be explained by GN-SPH min in unaltered andesite. However, this may be a hangingwall expression of blind massive mineralisation (hypothesis for Mt Charter area). Pyrite in trench is encouraging. The powerline will be a hindrance to further geophysical work

PROSPECT/ ANOMALY	GEOLOGY	GEOCHEMISTRY	GEOPHYSICS	WORK COMPLETED DURING TERM OF CURRENT WORK PROPOSAL	FURTHER WORK PLANNED	RATING AND COMMENTS
UTEM G2	.UTEM axis crosses obliquely from shales into unalted andesite. .Trend of axis parallel to regional faulting. .Hole H1 passed through axis of UTEM anomaly on 6200N - at shallow depth	Not anomalous on UTEM trend, but scattered anomalies to south	.Weak, suspect EM anomalies. Trend is 750m long .IP on southern lines suggests shale	None	Keep under review	4 Suspect EM and lack of Geochem do not warrant ground work at this time. Maybe a composite anomaly including QRB shale contact and a NE striking fault
UTEM G3	Unknown-swamp	Not anomalous	.Good single line EM conductor, but could be noise .No IP coverage	Line of Max Min EM along QR Mine access road gave no response	None	4 No further interest-suspect UTEM anomaly was noise
UTEM I1	Unaltered andesites, trachytes	.Weakly anomalous Pb/Zn soil geochem .Confirmed by sampling of recent costean	.Complex zone of multiple conductors-best anomalies on 5600N and 5800N axis almost as conductve as Hellyer .Weak IP anomaly coincides	.Detailing of zone with EM-37, 100m line spacing .Costeans on 5800N and 5700N	Costean on 5600N Review results	1 Zone of interest because high condutivity indicated. Costeans inconclusive (UTEM axis in creek) and not ecouraging. EM interp. proposes shallow source (<25m) so costeaning should be effective.
UTEM I2	Costean (1977) on 5600N-wthd Mn stained clay after andesite. Carbonate veining with SPH/GN/PY mapped	.Soil geochem to 1450 ppm Pb .Confirmed by costean sampling	Weak EM response-difficult to interpret because of position with respect to loop	None	.Detail with EM .Review - see comments	2 Geochemical/geol similarities to Mt Charter and Old Mill site geochemical anomalies- review in conjunction with these

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PROSPECT/ ANOMALY	GEOLOGY	GEOCHEMISTRY	GEOPHYSICS	WORK COMPLETED DURING TERM OF CURRENT WORK PROPOSAL	FURTHER WORK PLANNED	RATING AND COMMENTS
UTEM I3, I4 MT CHARTER						1 Refer to reports on Mt Charter. Note that I3 and I4 are now correlated parallel to local strike
UTEM J1, J3 SW Mt Charter Soil Anomaly	Andesites, unaltered with aggregates of SPH and G/N associated with QTZ/Carb veining	Large intense Pb/Zn soil anomaly confirmed by costean sampling	.Definite but weak EM trends. Suggest west dip. Idea of two edges of flat lying conductor to be tested .IP anomaly at J1/4200N South plunge?	.Costean 3900N, 4000N .Auger cutting logs to refine position of SED/Volc contact .Mapping of new access road	.Further UTEM to detail zone .Compilation of data for drilling proposal	1 Concept - geochem is hangingwall expression of volcanugenic mineralisation system
J2	Well into black shales Trend exposed on Mt Charter access road-nothing but black shale	Not anomalous	.Strong EM anomaly complicated by proximity to loop .No IP coverage	Location in road exposure	Further UTEM to close off this zone to the south	4 Similar type to B, Cl, F - or may be, dolerite shale contact

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2. UTEM ANOMALY FOLLOW-UP PROGRAMME

2.i Introduction

Ground work was completed on anomalies E, I_1 and G_3 and results are discussed in section 2(ii).

The I_3 and I_4 anomalies are associated with Mt Charter prospect and are discussed in Section 3(ii) (c).

The axis of the J_2 anomaly is exposed on the Mt Charter access track at 4600N/3859E and in the 4800N/3800E costean. (Plate 21). At both locations underlying rocks are shale. Because the conductivity of the zone is much greater than that usually associated with anomalies in shale further work to close off the zone and define a drill target is warranted.

Work on the J_1-J_3 anomalies is reported in section 6, which includes a proposal to drill the J_3 anomaly.

No field work was completed on anomalies G_1, G_2 and I_2. The possible relation of anomalies G_1 andG_2 to mineralization is discussed in section 5.

Follow-up has involved the collation of existing exploration data, which is comprehensive for the Hatfield Licence, then selection of UTEM anomalies for trenching. Major mineral-isation at Que River, Hellyer and Mt Charter all have anomalous responses in EM, IP and Geochemistry as well as signs of alteration and mineralization and a combination of these is looked for when rating a UTEM response. However, it is realised that with the possibility of flat lying mineralization where a section through a volcanogenic system is not exposed, one or more of these responses may be weak or absent.

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2.ii Work Completed on Individual Anomalies

2.ii(a) Zone E

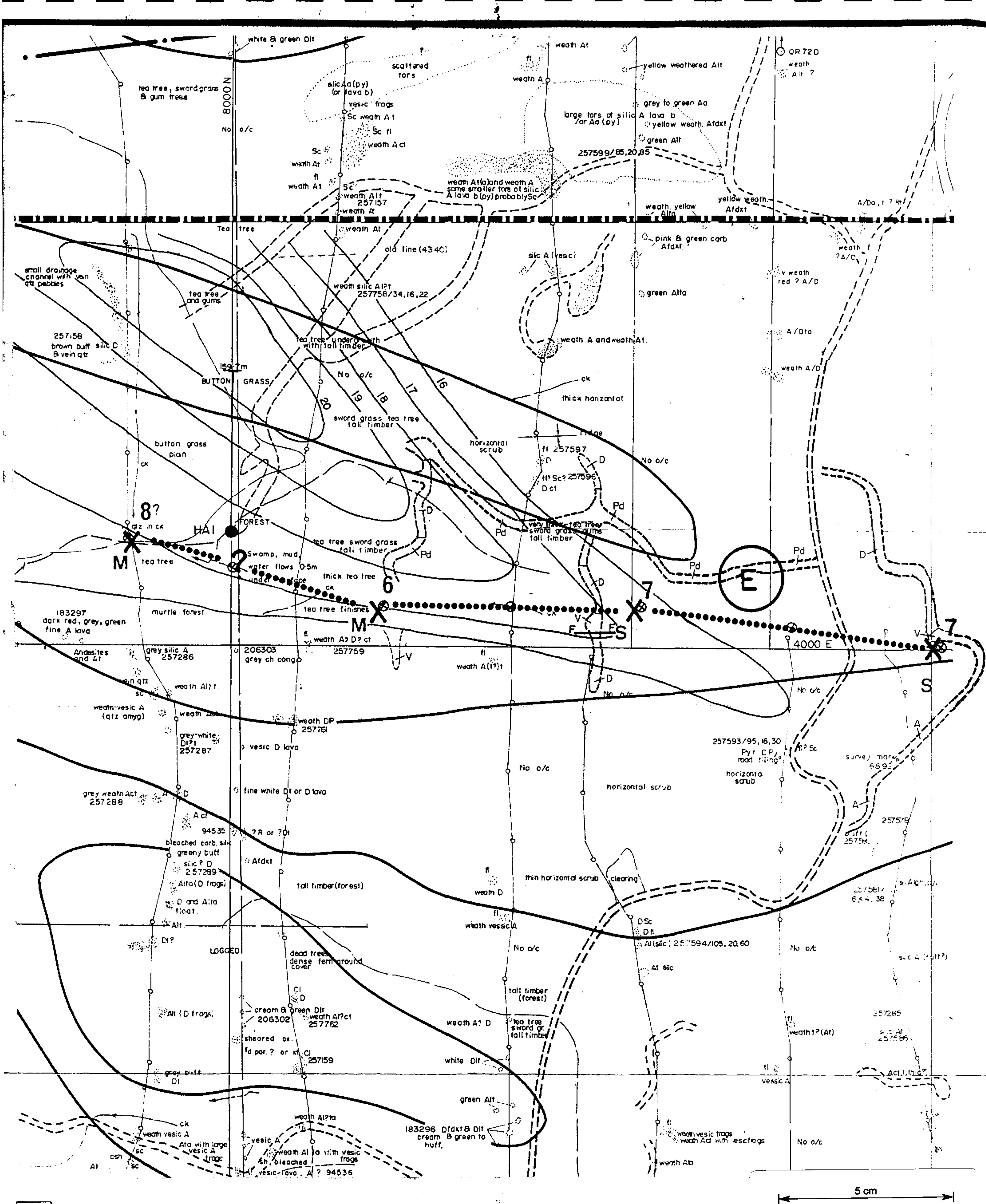
Previous Work

This zone includes what was previously known as the Amoeba I.P. anomaly. There is very little outcrop in the area and the thick humus and button grass prevent effective soil sampling. In March, 1982 drill hole HA-1 was completed on an I.P. target with limited anomalous deep auger soil geochemsitry about 150m west of the UTEM trend on 8000N. (Plate HT52). A 10m interval of intensely quartz sericite altered sheared lava breccia (intrusive breccia?) was intersected and accepted as the source of the I.P. anomaly. Core grind samples of the complete hole were low in Cu, Pb and Zn (<250 ppm).

Current Exploration

Geophysics : The 1983 UTEM survey detected a weak (low amplitude, channel 6 to 8) but well defined anomaly between 7500N amd 8100N plunging to the north. The anomaly trend is 50 to 75m west of and sub-parallel to the contoured I.P. trend. The zone was detailed with EM-37 in December, 1983. A report on this survey is included as Appendix 3. This survey confirmed the continuity of the zone. Both methods indicated that the anomalies on 7900N and 8000N had the greatest conductance and this area was recommended for testing.

Geology, Costeaning : The sub-parallel trends of the UTEM and I.P. anomalies were initially proposed to represent a



A	Weathered andesitic volcanics
Pd	Silicified pyritic dacites (Footwall Alteration Zone) or Porphyritic dacites.
V	Chloritized volcanics
D	Non-pyritic dacite lavas (& intrusives
⊗	UTEM anomaly, EM-37 anomaly
19	Contour of Averaged Chargeability

NB.. Base Plan is QR 81 b

Previous Geological Interpretation

0 — 100 METRES

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Drawn: AMH	NORTH WEST TASMANIA		Location code: K55/6/44
Traced: LML	HATFIELD EL 15/73	015	Date: May, 1984
Checked: AMH	UTEM ZONE E		Scale: 1:2500
Revised by: Date:	SUMMARY PLAN		Plate No HT- 52 B

response to a pyritic footwall alteration zone to the east and a massive pyrite/Pb/Zn zone to the west. To test this idea 3 costeans were dug from east to west to expose the sources of the I.P. and UTEM anomalies. (Plate HT52). The costeans were mapped at 1:250 scale (Plates HT47a, 47b, 47c). Petrological descriptions of costean samples are included in Appendices 5, 6 and 7. Rocks exposed in the costeans can be divided into :-

(i) Non-pyritic feldspar porphyritic dacite lavas (and intrusives?). A cream to pale yellow rock with sparse argillized feldspar phenocrysts in a fine grained gritty ground mass. In outcrop the rock may be blocky jointed, finely jointed or completely argillized. In thin section argillized feldspar phenocrysts, identified as original albite, are set in a weakly flow banded quartz sericite matrix. Lack of flow banding in these rocks around 7900N/4925E was taken as evidence of intrusive character by Fander.

(ii) Non-pyritic chloritized lavas and lava breccias. This distinctive rock has a marked fragmental texture in which angular green fragments are set in a green, pink or cream matrix. The breccia texture is interpreted to be the result of intense alteration which has affected most of the rock but left islands of the original rock composition in an altered matrix. In thin section, the composition of this rock is quartz/sericite/chlorite. In both thin section and hand specimen, chlorite crystals can be seen lining cavities and it has obviously been introduced and is not the result of alteration of ferro-magnesian minerals. This alteration type is always closely associated with the UTEM trend.

(iii) Weathered andesite lavas, only exposed in the western end of the 7500N costean, and easily mapped by a distinctive colour change to clayey yellow brown soil.

(iv) Pyrite/quartz/sericite altered dacites. These rocks are the textural equivalents of the Que River and Hellyer footwall `porphyritic dacites´ (so called). In hand specimen they are readily distinguished by their siliceous character and the occurrence of aggregates and veinlets of pyrite. Fuchsite is common.

In thin section, the rock appears to be a more strongly silicified and sericitised equivalent of the adjacent dacite porphyry lavas with the addition of pyrite. In the 7500N costean the fabric of the rock more closely resembles that of the adjacent chlorite altered lavas, and may not be correlatable with the `porphyritic dacite´ along the access track to the 7700N, 7900N costeans. No pyroclastic or epiclastic rocks were mapped in the costeans.

At about 4000E in the 7900N costean a fault with a strike of 025°mag and a steep dip to the east is exposed. The rock in this area is cavernous and composed of black pyritic quartz which permeates three metres into the joint planes of the adjacent dacites.

The only dip obtained in this system of costeans was 023°mag/90° in a banded lava breccia adjacent to this fault.

Generally flat dipping vuggy milky quartz veins are common in the pyritic dacite along the 7700N - 7900N access track and in the 7700N costean.

<u>Geochemistry</u> : All costeans were channel sampled at 5 or 10m intervals and samples were anlaysed for Cu, Pb, Zn, Ag, As, Ba. Results are plotted on the 1:250 costean plans (Plates HT47a, 47b, 47c). The analyses were uniformly low except for two areas.

Approaching the pyritic zone in the 7500N costean from the east, values for Ba, As and Ag increase from background of 800, <1, <1, ppm respectively, to 3340, 270, 5.5 ppm. The full extent of this zone could not be sampled as it was flooded soon after trenching. As and Ag are very sensitive indicators of hydrothermal alteration at Mt Charter and the D UTEM anomaly zone.

At Peg 9 in the 7700N costean, a 20cm wide chalcedonic limonitic gossan is strongly anomalous in Cu, Pb, Zn, Ag. As and Au but depleted in Ba. The gossan may be on a small shear.

Seven rock chip samples from rocks described as altered intrusive by Fander in the 7700N costean were sent for gold assay (fire assay/AAS finish). Results and locations are shown on Plate HT47b. The values are not considered anomalous.

Conclusions and Recommendations: Because the UTEM trend is along a creek, costeaning has not been entirely satisfactory in exposing an explanation for it. Within the limits of chaining accuracy for this area (±10m) the UTEM was shown to be associated with a zone of chlorite alteration in each costean, a zone of strong pyrite alteration in the 7500N costean, and a fault in the 7700N costean. The costeaning also exposed a large zone of pyritic dacitic rocks very similar to those in the altered footwall zone at Que River and Hellyer. Further exploration of Zone E should proceed on the assumption that it is such a footwall zone and be directed to determining the stratigraphic facing in the area. The one strucutral measurement available suggests a sub-vertical dip and a NNE strike. This would be supported by some evidence of continuity along strike, which could be obtained by 50m line spacing x 25m station spacing gradient array I.P. The I.P. contours on Plate HT52 were calculated from 100m dipole - dipole array I.P. which cannot resolve the several zones of pyritization exposed in the costeans. The resistivity component of the survey should also confirm the exact location of the UTEM anomaly in relation to pyritization and faulting not exposed at the time of the UTEM survey. Once the structure of the zone is defined, consideration should be given to testing the UTEM anomaly by drilling on 7900N from east to west, so as to allow correlation with surface geology in the costean.

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2.ii(b) ZONE I_1

Previous Work:

Previous work had not generated any exploration interest in this area. Scattered outcrops of andesitic and dacitic volcanics had been mapped, with some disseminated pyrite noted in the south of the zone (5300N - 5200N, 4200E-4300E). The I.P. is very weakly anomalous and according to contoured values it is the remnant of a ridge of high P.F.E. running grid north from an anomaly at 5200N/3900E. Weak Pb/Zn soil anomalies occur along the 4200N baseline between 5700N and 5800N. No alteration or mineralization has been mapped.

Current Exploration:

Geophysics: The 1979 UTEM survey outlined a complex zone of conductors (Plate HT52a). Anomalies at 5600N/4225E and 5800N/4175E were recommended for investigation because of their high conductivity (channel 5 UTEM response). In December 1983 the zone was detailed with the EM-37 system at 100m line spacing (Appendix 3). It confirmed the discontinuous character of the zone as no anomaly was detected on 5700N or on 5500N or 5400N. It also closed off the zone to the north of 5800N. The strong responses at 5800N/4175E and 5600N/4125E were repeated but the channel 5 UTEM response at 5600N/4225E was not. A possible explanation is that the `illumination´ of the conductor was adversely affected by the laying of the EM37 loop to the east - the UTEM loop was laid to the west.

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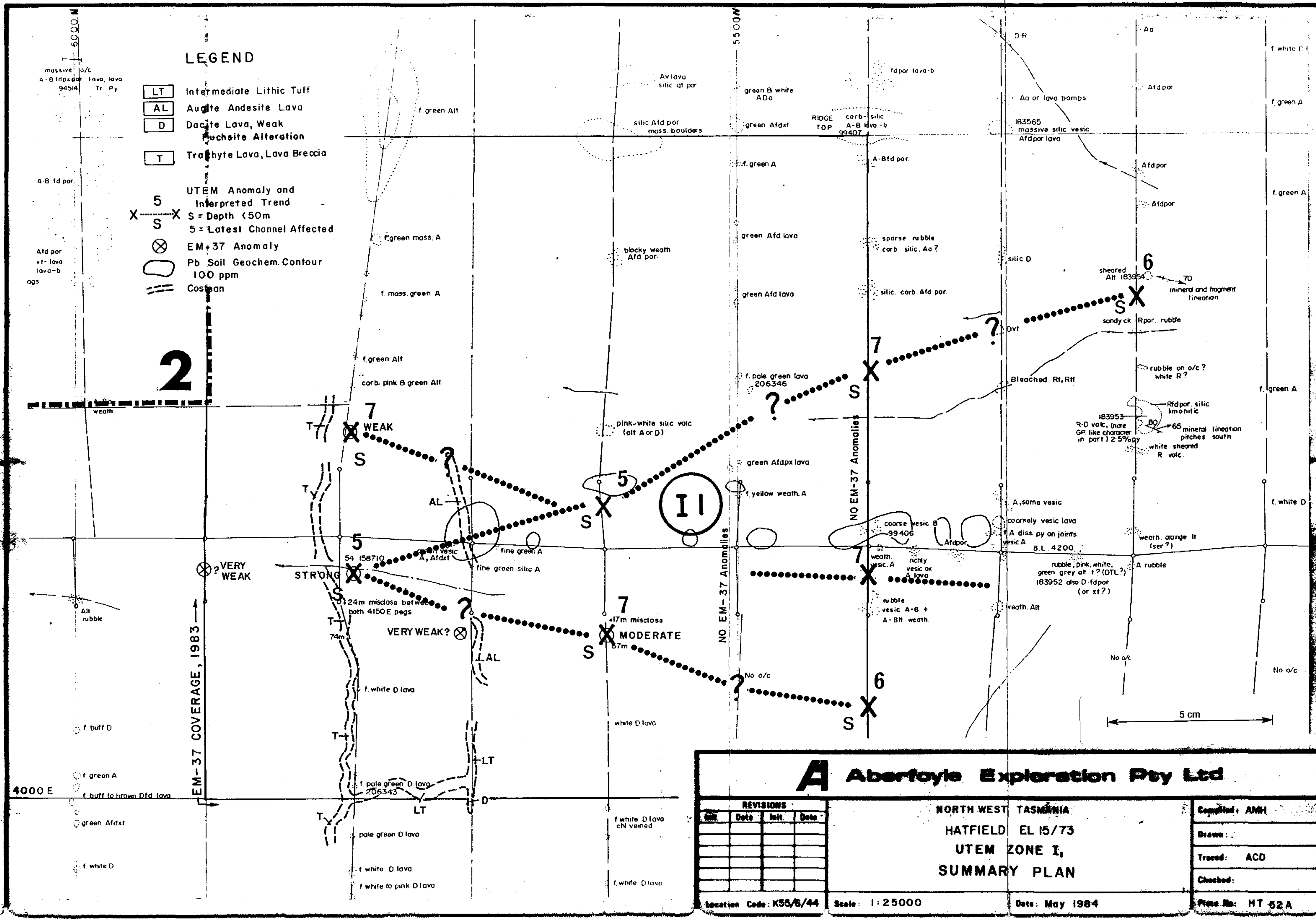

LEGEND
LT Intermediate Lithic Tuff
AL Augite Andesite Lava
D Dacite Lava, Weak Fuchsite Alteration
T Trachyte Lava, Lava Breccia
UTEM Anomaly and Interpreted Trend
S = Depth <50m
5 = Latest Channel Affected
EM-37 Anomaly
Pb Soil Geochem. Contour 100 ppm
Costean
6000 N
5500N
4000 E
B.L. 4200
2
I1
EM-37 COVERAGE, 1983
NO EM-37 Anomalies
NO EM-37 Anomalies
WEAK
STRONG
VERY WEAK
VERY WEAK?
MODERATE
24m misclose between both 4150E pegs
17m misclose
RIDGE TOP
5 cm
Aberfoyle Exploration Pty Ltd
REVISIONS
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NORTH WEST TASMANIA
HATFIELD EL 15/73
UTEM ZONE I1
SUMMARY PLAN
Compiled: AMH
Drawn:
Traced: ACD
Checked:
Location Code: K55/6/44
Scale: 1:25000
Date: May 1984
Plan No: HT 52 A

<u>Geology, Costeaning</u>: Costeans were dug on 5800N and 5700N to expose the UTEM anomalies and the source of the anomalous soil geochemistry at 5700N/4200E (Plate HT57a). The costeans were mapped at 1:250 scale (Plate HT47d, 47c).

The geology exposed in the costeans has the discontinuous character of the UTEM anomaly. Six petrological samples taken at regular intervals through the 5800N costean (Report, Appendix 5) are described as feldsparphyric trachytes, while three samples representing the 5700N costean west of 4100E are all andesites containing augite phenocrysts. The rocks are quite dissimilar in hand specimen. All are described as lavas. No pyroclastics were mapped except for two lithic tuff outcrops, which may be correlatable, at pegs 59 and 68. (Plate HT47d).

The major UTEM anomaly at 5800N/4175E coincides with a creek. No pyritization or silica/sericite alteration was mapped in trachyte lavas adjacent to the creek. Only weathered bedrock was exposed at the 5800N/4275E anomaly, but again there was no sign of alteration (e.g. iron or manganese staining, kaolinite, relect sericite flakes, pyrite).

The extrapolations of the UTEM trends cross the 5700N costean at 4150E, 4200E and 4260E. (Note that no anomalies were detected on 5700N by the EM-37 system). The 4150E and 4200E trends straddle a creek on either side of which unaltered andesite lavas or their yellow and red clay weathering products were exposed. Brick red clays in this area are manganese stained and are similar to occurrences at Hellyer and Mt Charter. There is not yet enough evidence to tell if this type of `alteration´ is diagnostic of ore mineralisation. The 4200E trend clips the eastern limit of the costean where yellow brown clays after andersite are exposed.

Geochemistry: Costeans were channel sampled at 5m intervals and samples analysed for Cu, Pb, Zn, Ag, As, Ba. Slightly anomalous Pb and Zn values were obtained from the 5700N costean between 4100E and 4230E. A weak zinc anomaly occurred between 4150E and4230E (staddling the UTEM conductor) in the 5800N costean.

Conclusions and Recommendations: Costeaning has not improved the exploration potential of this zone. However, it has not been entirely effective because of the coincidence of the 5800N/4175E UTEM anomaly with a creek. Since the UTEM anomalies are interpreted to have a shallow source a further attempt will be made to expose the cause by costeaning on 5600N from 4100E to 4250E. If the results are inconclusive, consideration will be given to testing the zone by drilling because of the high conductance indicated by the 5800N/4175E anomaly.

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2.ii(c) ZONE G_3

Previous Work:

The G_3 anomaly area (Plate HT48) has been covered with I.P., soil geochemistry and 1:2500 scale mapping. I.P. contours indicate a strong trend north east from G_3 to zone E. This is supported by the occurrence of pyritic dacites in exposures on the Que River Mine access road at 7250N/3700E. The immediate area of the G_3 anomaly is swampy, but further to the south west along the I.P. trend dacites and pyritic andesites are mapped between 6800N/3500E and 6400N/3200E. Soil geochemistry is not anomalous in the area of G_3, but swampy conditions may have made sampling ineffective.

Current Exploration

Geophysics : The UTEM anomaly is a single line feature indicating high conductivity but may be noise affected. An attempt was made to reproduce the anomaly by running the Max-Min E.M. system along the nearby acess road. Results are shown in Plate HT49 on the position of the traverse line in Plate HT48. There is no anomalous response.

Conclusions, Recommendations : The G_3 anomaly itself is downgraded because it could not be reproduced with the Max-Min system. Re-assessment of the I.P. data in the area has shown a connection with Zone E and further work will be directed towards proving this as a continuous zone of pyritic alteration.

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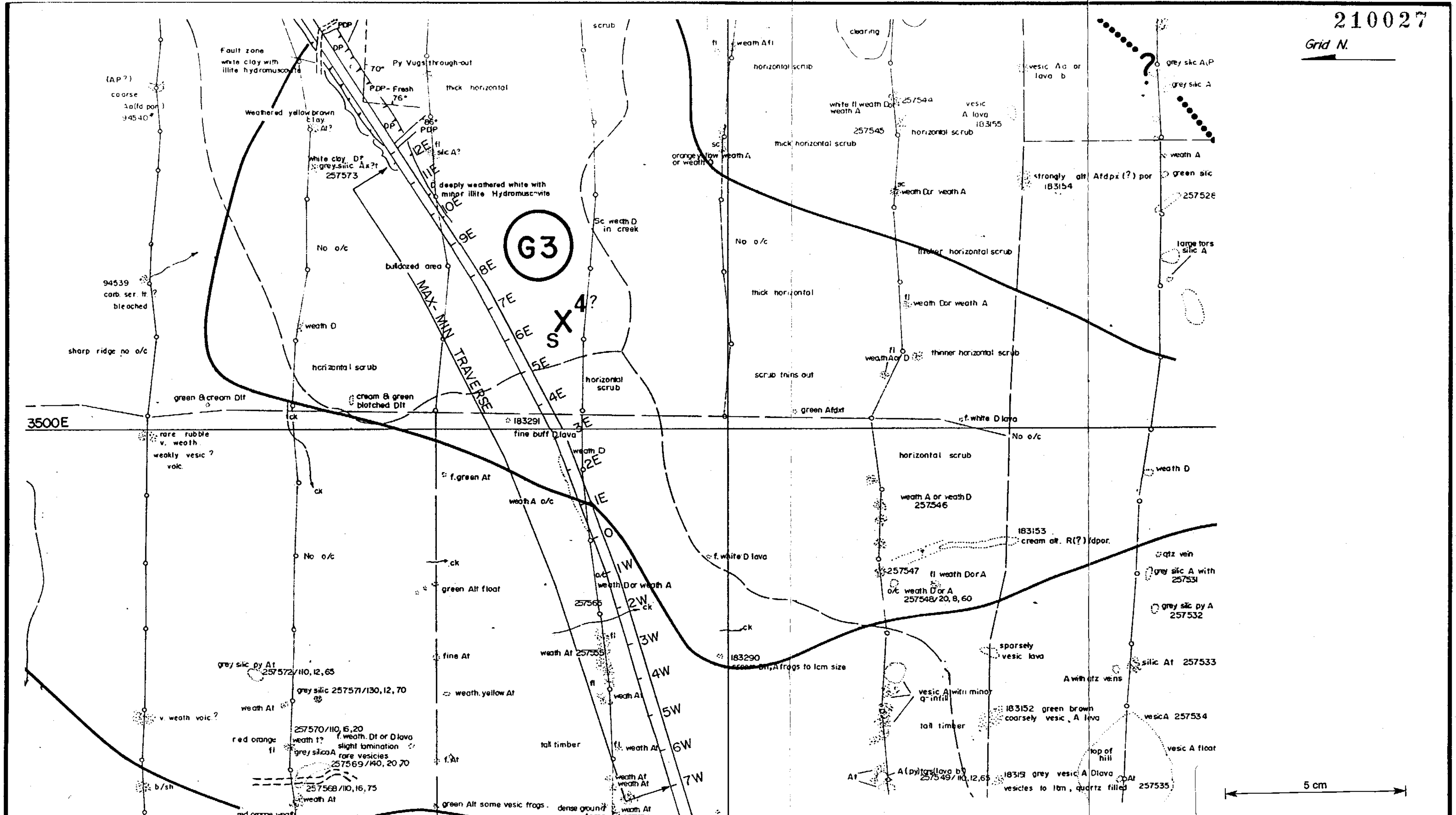

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NORTH WEST TASMANIA

HATFIELD E.L.15/73

UTEM ANOMALY - G3

LOCATION OF MAX-MIN E.M. TRAVERSE LINE

REVISIONS			
Init	Date	Init	Date

Location Code: K55/6/44 | Scale 1:2500 | Date: August, 1984 | Plate No: HT 48

Compiled: A.M.H.
Drawn: R.J.E.
Traced: R.J.E
Checked:

BMO 664

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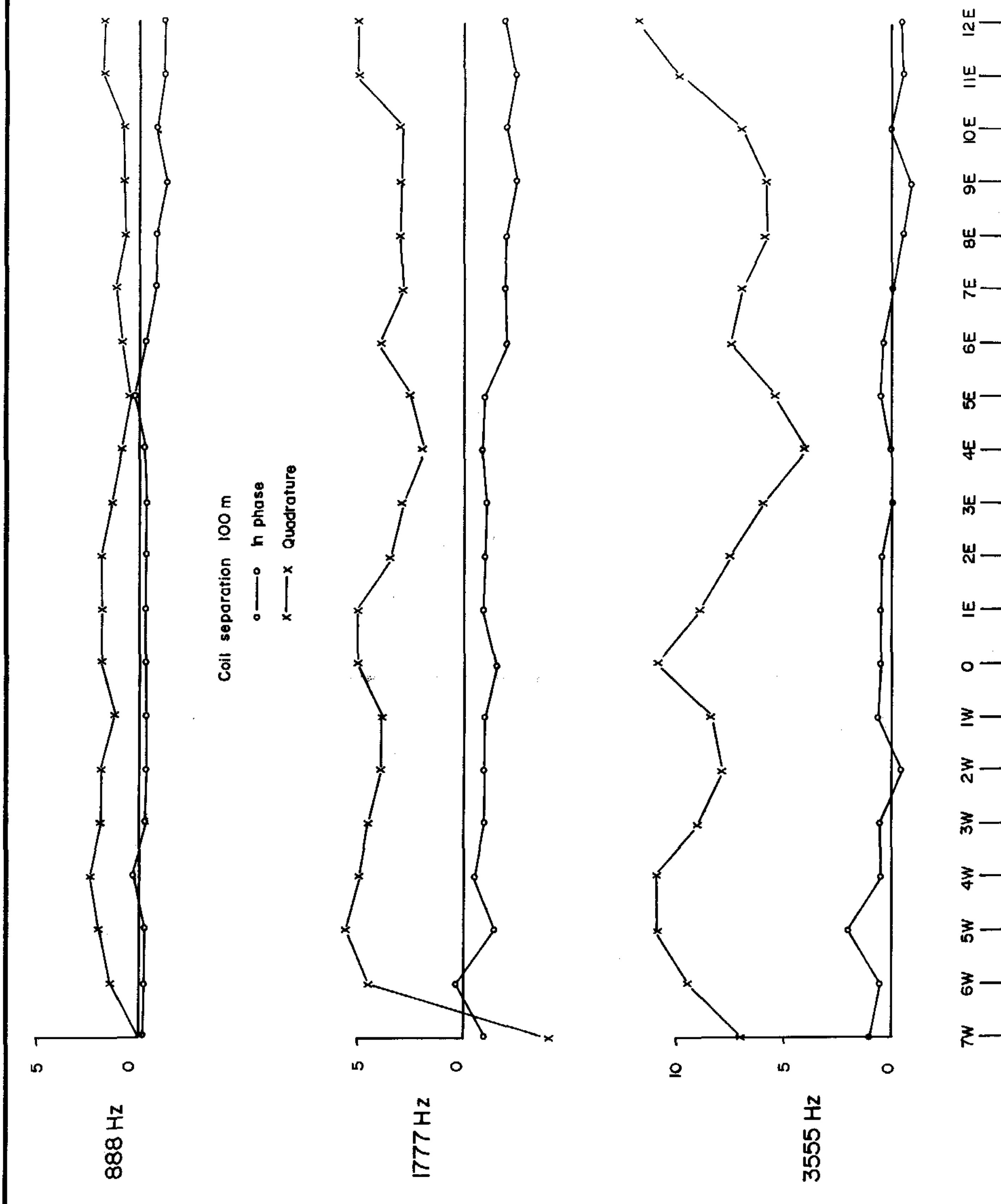

Aberfoyle Exploration Pty Ltd

Drawn: A.M.H.	NORTH WEST TASMANIA	Location code: K55/6/44
Traced: R.J.E.	HATFIELD E.L. 15/73	Date: Dec. 1983
Checked:	**UTEM ANOMALY G 3**	Scale: 1 : 2500
Revised by: Date:	Max-Min Traverse along Que R. mine access road	Plate Nº HT 49

3. RE-EVALUATION OF THE MT CHARTER PROSPECT AND DRILLING PROPOSAL

(i) Previous Exploration:

Up to 1976 the routine progress of exploration by Cominco had located the barite outcrops and workings on Mt Charter and outlined a strong Pb soil geochemical anomaly with a semi-coincident I.P. response (Plate HT48, 42). Strongly pyrite/quartz/sericite altered volcanics, similar to those hosting mineralization at Que River, were recognised. Two holes, MC-1 and MC-2, were drilled in February 1976 to test this area (Plate HT39). Because of the emphasis placed on I.P. as a direct indicator of massive sulphide mineralization, the holes were targeted principally on the I.P. anomaly. Both holes intersected silicified and sericitized volcanics which contained veinlets and disseminations of pyrite, galena, sphalerite and barite.

In preparation for further drilling, costeans were excavated in 1978 which for the first time indicated the extent of the barite horizon.

From the earliest mapping in the area, a south easterly offset in the andesite/dacite contact had been recognised (Plate HT45, Plate HT47c). Both faulting and folding were suggested as explanations (Skey and Webster June 1976). At the time of drilling of the third hole at Mt Charter (MC-3, June 1978), the fault explanation was favoured on the evidence that :-

(a) No barite rich rocks were known grid south of the MC-2 area (4600N).

(b) Some of the barite was of a massive crystalline form which suggested a fault association.

A stratigraphy with an overall grid SSE trend and a 55^{o} - 65^{o} westerly dip was assumed, offset by the proposed S.E. striking fault.

MC-3 was collared to test the prospect at depth below the levels reached in MC-1 and MC-2. The hole was collared in andesite and at 28.0m passed into altered lithologies similar to those in MC-1 and MC-2. Correlation of this contact with its surface exposure confirmed a 55^{o}-60^{o} westerly dip. No massive sulphides were intersected but the prospect was recognised as worthy of further deeper drilling (Young, 1979)

3.ii Current Exploration and Re-evaluation

The exploration potential of the Mt Charter prospect was re-assessed following a trenching programme in late 1983. The object of the programme was to determine the structure of the area for planning of further drilling. Costeans were dug on 4400N, 4500N and 4550N (Plate HT39). Other costeans on plate HT39 were excavated in 1978. The costeans were surveyed, mapped at 1:250 scale and sampled at 5 metre intervals (Plates HT37am HT37b, HT37c, HT37d). Petrological reports on samples from the costeans are included as Appendix 4.

3.ii(a) Geology of the Mt Charter Costeans and Re-interpretation of Mt Charter Geology

Footwall Alteration Zone :

The trench on 4500N exposed a contact at 4515E between unaltered to weakly altered andesitic volcanics and porphyritic dacite. The same contact is exposed in the 4550N costean at 4490E. The term `Dacite´ is retained although the rocks have been described by Fander as prophyritic trachytes (Appendix 6). These rocks are only weakly sericitised and silicified (feldspar are still visible in thin section) and contain no visible pyrite, base metal sulphides or barite. The same rocks are interpreted to have been intersected in MC-1, MC:2, Mc-3, but now strongly pyritized, silicified and sericitised and containing disseminated Pb/Zn sulphides and barite. The 4500N and 4550N costean exposures limit the strike extent of this type of alteration to the south-east. This is supported by the closure of the I.P. contours in this direction (Plate HT42). The I.P. contours also close in a north westerly direction, and this is interpreted to mark the limit of alteration there, where there is less geological information.

Because of the style and composition of the alteration, and its position adjacent to a barite horizon, it is now interpreted to be a zone of footwall alteration in a volcanogenic system, analogous to the keiko zone of the Kuroko Deposits. Although predominantly chalco-pyrite/pyrite rich, examples of galena/sphalerite/barite rich keiko zones are reported (e.g. Uwamuki No. 2 orebody, Kosaka Mine). From the author´s reading of previous exploration on the Mt Charter prospect, it seems as if this zone was the main target and was expected to grade laterally into massive Kuroko ore. The current interpretation is that it is a zone of alteration, foot-wall to possible kuroko ore.

Barite Horizon :

Costeaning in 1978 had exposed barite occurrences between MC-2 and MC-3. Around 4650N/4280E, the barite contains primary limonite banding after pyrite. From there towards MC-2 and east of MC-2 on 4600N it is massive and coarsely crystalline with patches of limonite. The 1983 4550E costean exposed more barite between 4335E and 4365E. Here there are occasional pods of barite but the predominant form is as barite porphyroblasts in a quartz sericite matrix. In the current geological interpretation these barite occurrences are correlated to form one stratigrahic unit, the `barite horizon´ (Plate HT39). No barite occurrences have been mapped outside the area shown on Plate HT39, which is also the strike extent of the I.P. anomaly.

The form of the barite horizon as exposed by costeaning suggests a folded unit plunging to grid SSW. This conforms with the regional dip of 60^{o} to the grid SW and with the plunge of possible minor folds in bedded barite at 4650N/4280E (Plate HT39). However, the main evidence for folding is the outcrop pattern exposed by trenching.

The facing in this area is interpreted to be to the SW giving the barite horizon a stratigraphic hangingwall position in relation to the alteration and mineralization in MC-1, 2, 3. Barite/Pb/Zn ore bodies are characteristic of the hangingwall position at Rosebery, Que River and Hellyer. In each of these deposits the barite ore bodies are within a few tens of metres stratigraphically above kuroko ore, although they are much less extensive laterally than the kuroko ore.

3.ii(b) Mt Charter Costeans, Geochemistry

All recent costeans as Mt Charter were channel sampled at 5m intervals and samples were analysed for Cu, Pb, Zn, Ag, As, Ba. Complete results are included on 1:250 costean plans. A summary of these and other geochemical results from Mt Charter is presented on Plate HT40.

A zone anomalous in all elements except copper was outlined between 4330E and 4460E in the 4550N costean. Peak values of 28.7% Ba, 4650 ppm As, 49 ppm Ag, and 2000 ppm Pb are extremely anomalous for rock chip samples on the Hatfield licence. A peak value of 250 ppm for Zn is only very weakly anomalous. The very high Ba values in this zone support the interpretation of a barite stratigraphic horizon continuing through this area. The anomalous geochemistry will be the target of proposed drill hole MC-p-2.

Costeans at 4500N/4100E and 4400N/4200E were dug to expose the source of Pb soil anomalies. They were found to be due to aggregates of galena and sphalerite associated with quartz carbonate veining. A full discussion of the interpretation of this type of mineralization is given in sections 4.

3.ii(c) Mt Charter Geophysics

The Mt Charter area was covered by dipole-dipole I.P. during the mid 1970's, and by UTEM in 1979.

As mentioned previously, the form of the I.P. contours is an important piece of evidence for the restriction of a zone of footwall style alteration to the immediate area of the barite horizon. The I.P. is responding mainly to pyritization, an essential part of this type of alteration. Geological mapping has also indicated the restricted extent of this zone of pyritization.

The 1979 UTEM survey located two anomalous trends, I_3 and I_4, in the Mt Charter area (Plate HT45). If the current strike direction around Mt Charter is accepted, then the interpretation of these anomalies becomes suspect as the traverse lines are oblique to strike. Plate HT42 is meant to shows that line to line correlation of the anomalies could be made parallel to strike, but because of the traverse line angle, detailed interpretation cannot be made.

3.iii Mt Charter Drilling Proposal

The re-assessment of the Mt Charter prospect has produced an interpretation which fits the geology to a model of the volcanogenic massive sulphide deposit type. Footwall and hangingwall stratigraphy have been identified, but the principal economic target, the massive Pb/Zn kuroko ore has not been encountered in drilling or trenching. The interpetation defines the stratigraphic position for this target to be at depth between the footwall alteration zone and the barite horizon. This position has been effectively tested to a depth of only 30m by MC-2 and MC-3. Three x 300m drill holes have been proposed and approved to test this zone at approximately 175m below surface (Plates HT39, HT41), assuming a 65 degree fold plunge and a general grid SE strike.

MC-P-1 will test beneath the thickest part of the barite horizon roughly in the centre of the system. MC-P-2 will test beneath the barite horizon further east where strongly anomalous Pb, Ag, As and Ba geochemistry was encountered in the costean on 4550N (Plate HT48). MC-P-3 will test the prospective stratigraphy along strike to the north-west below a Pb soil geochemistry anomaly but without barite. MC-P-3 will also pass through a zone of Pb soil geochemistry in unaltered andesites. The mineralization causing this anomaly may be a hangingwall base metal expression of the Mt Charter mineralizing system, and it is hoped that information from MC-P-3 will support this idea.

All holes will be logged with down hole EM. The drilling strategy is to test along strike at a constant RL by drilling, backed up by EM to test up and down dip and the strike intervals between holes.

* * * * *

4. COSTEANING OF Pb/Zn SOIL ANOMALIES IN THE MT CHARTER AREA

A zone of Pb/Zn soil geochemical anomalies occur in a belt from south-west to the north-west of Mt Charter (Plate HAT45). These anomalies were outlined by Cominco/Aberfoyle sampling in the mid-1970's. During the late 1983 to early 1984, costeans to investigate these anomalies were dug on 3900N centred on 4100E, 4000N/4100E, 4400N/4200E, 4500N/4100Em 4800N/3800E, 5400N/3600E (Plate HAT45). All costeans were surveyed, channel sampled and mapped at 1:250 scale (Plates HT 37a - HT 37d, HT37f,HT37g). Petrological descriptions of rocks from these costeans are included as part of Appendix 6.

All costeans are wholly in andesite lavas except for those on 4800N and 5400N which expose contacts with the shale of the Que River beds. The legend on Plate HT37a which applies to plates (HT37a-37g) is self explanatory. The main exposure within andesites is of yellow brown clays and brick red manganese stained clays containing green saprolitic remnants of andesite. This association and experience elsewhere on the liccence suggests that the clays are after andesite.

Pb/Zn soil geochemistry was confirmed by channel sampling in each costean. Note that in all costeans except the 4500N/4100E which contains some limonitic gossan, there are no anomalies in Ba and As. This contrasts with the high Ba and As values from strongly Qtz/Ser/Py altered rocks in the Mt Charter 4500N and 4550N costeans. There is no obvious relationship between clay type and geochemistry.

In Appendix 9 analyses for Pb, Zn, Ba and Ag from all of the 1983-1984 costeans are presented as frequency histograms.

The source of the anomalies in the 3900N/4100E and 4400N/4200E costean where fresh outcrops occur, was proven to be aggregates of galena and sphalerite in irregular patches and veinlets of quartz/carbonate in unaltered andesite. Occasionally pyrite and chalcopyrite occur in the same way. Float boulders indicate the same source for the 5200N and 4000N/4100E costeans, and it is also assumed for the 4800N/3800E costean, although mineralized float or outcrop was not found. Such mineralized float boulders were found at the 4500N/4100E costean, but the occurrence of Ba and As anomalies here indicate a second source of anomalous geochemistry. This area will be partly tested by MC-P-3 (see section 3(iii).

* * * * *

5. EXPLORATION COMPLETED AND DRILLING PROPOSAL FOR THE S.W. MT CHARTER UTEM/SOIL GEOCHEMICAL ANOMALY

The February, 1984 UTEM survey (Plate HAT45) detected a series of anomalies, J_1-J_3, straddling the SW Mt Charter Pb/Zn soil anomaly. A report on this survey is included as Appendix 2. Because of the encouraging coincidence of the geophysical and geochemical anomalies a decision was made to drill, and a further UTEM survey was completed in May 1984 to detail the anomaly. A full report on this survey has not yet been received, but according to Aberfoyle Geophysicist Tom Eadie the detailed survey does not substantially alter the interpretation.

Initially it was thought that the J_1 response was along the volcanic/shale contact but detailed mapping (not included in this report) showed this not to be the case, as it lies wholly within the volcanics. The J_1 trend is a weak response, and the main exploration interest is in the J_3 anomaly.

The J_3 anomaly is interpretated to be a weak conductor extending from 3600N to 4000N, dipping west at 40^o-50^o and thinning upwards from a point 75m vertically below surface (Plates HT 53, HT 54). The only surface dip measurement obtained was one of 75^oW obtained in the sediments on 4000N. No structural measurements are possible in the volcanics. If the J_3 anomaly is a response to a massive Pb/Zn zone, then it becomes difficult to fit its interpreted dip into the local structure, as there is no surface or I.P. indication of a pyritised footwall alteration zone within a reasonable distance to the east. However, for planning of drill holes the interpreted dip is accepted.

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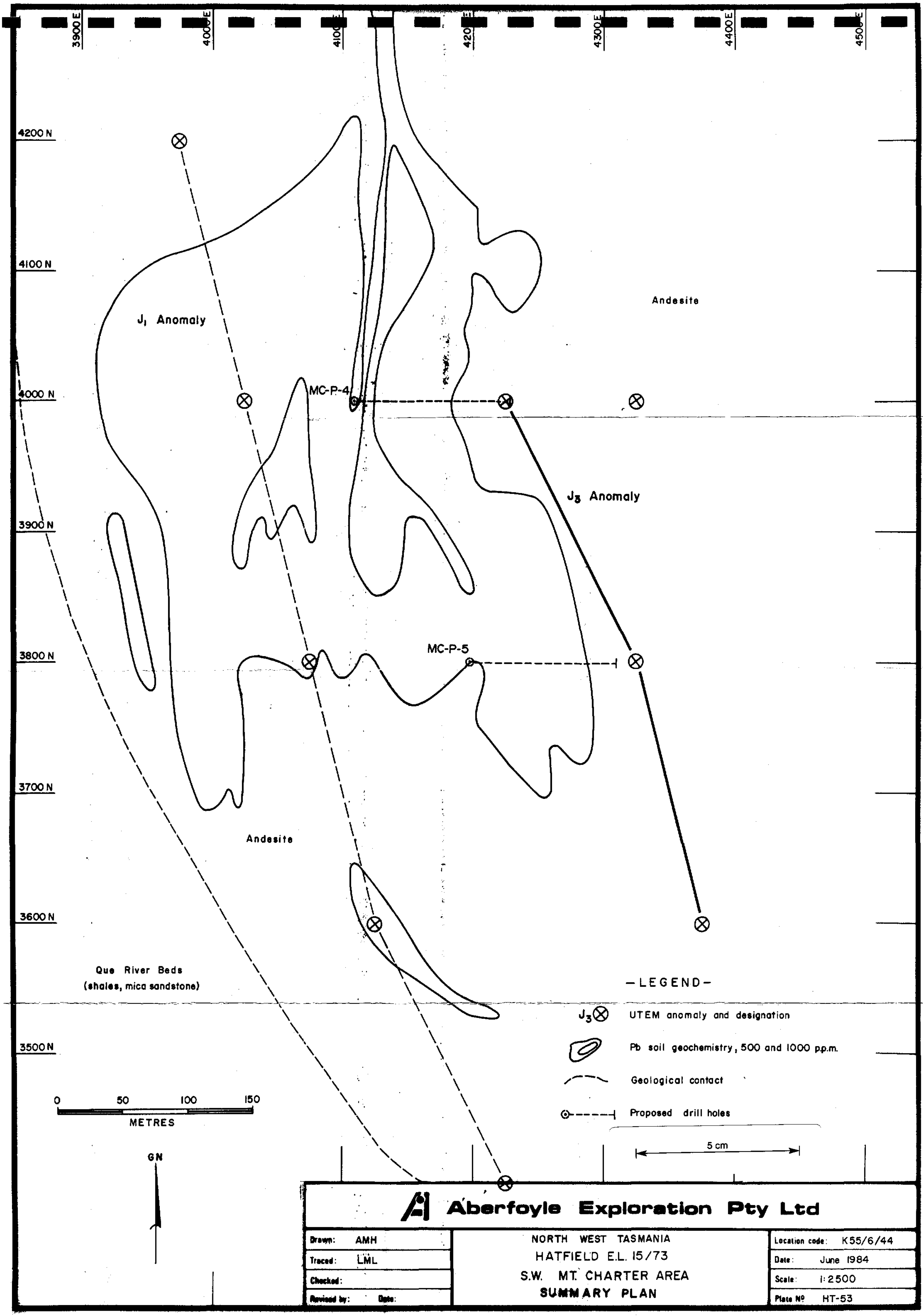

Aberfoyle Exploration Pty Ltd

Drawn: AMH	NORTH WEST TASMANIA	Location code: K55/6/44
Traced: LML	HATFIELD E.L. 15/73	Date: June 1984
Checked:	S.W. MT. CHARTER AREA	Scale: 1:2500
Revised by: Date:	**SUMMARY PLAN**	Plate Nº HT-53

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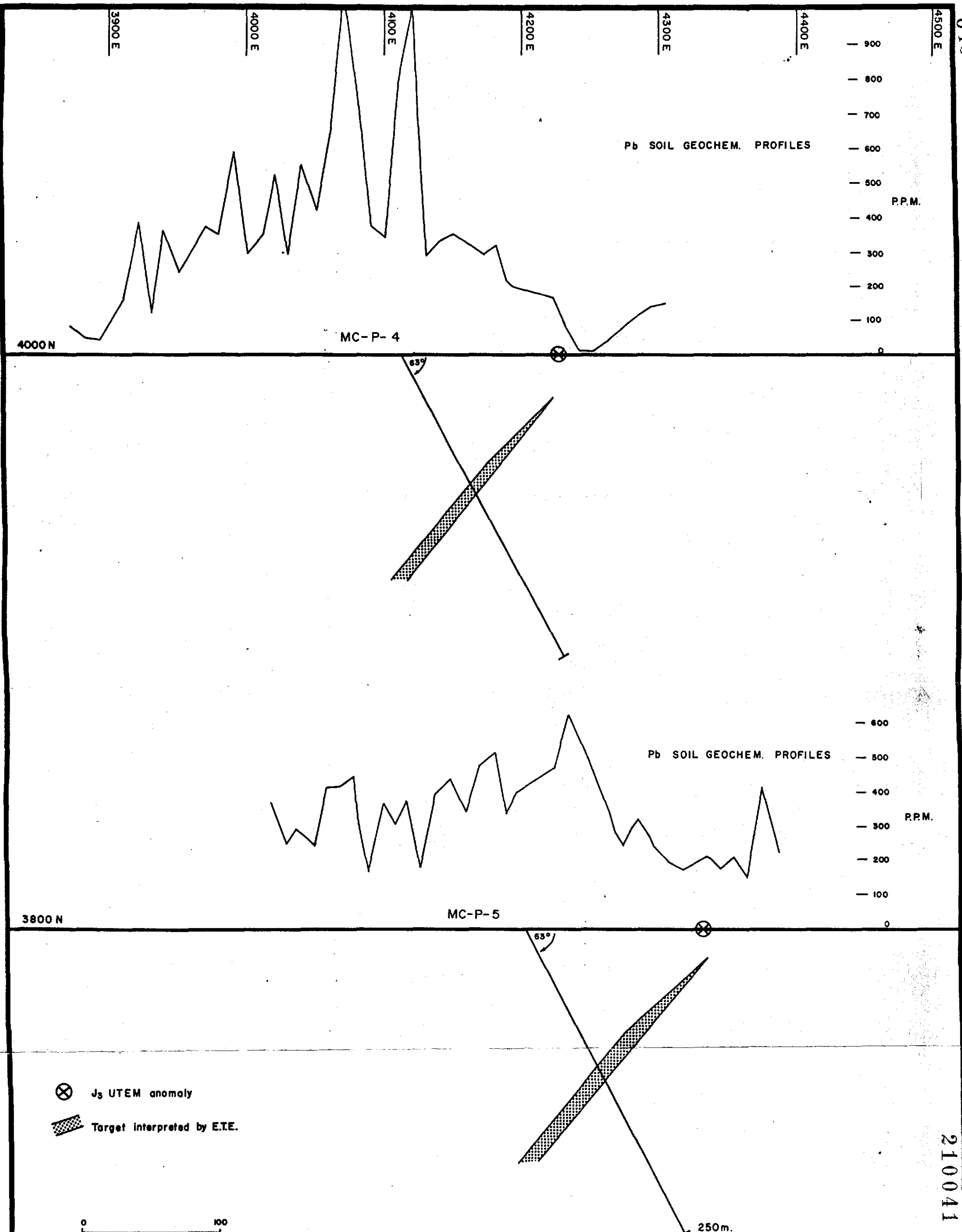

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Aberfoyle Exploration Pty Ltd

Drawn: AMH, ETE	NORTH WEST TASMANIA	Location code K55/6/44
Traced: LML	HATFIELD E.L. 15/73	Date June 1984
Checked:	S.W. MT. CHARTER GEOCHEM./UTEM ANOMALY	Scale 1:2500
Revised by: Date	PROPOSED DRILL HOLES	Plate No HT-54

To test the UTEM anomaly, 2 holes are planned on 4000N and 3800N to hit the target at 100m verticaly below surfce, and drilling from W to E. (Plate HT54) Both holes will be logged with down hole EM.

* * * * *

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Young, C.H. 1979 — Annual Report, Exploration licences 15/73 and 2/70, Hatfield and Mackintosh, Tasmania. For 12 months ending June 1, 1979. Unpublished report to Aberfoyle Exploration.

Skey, E.H. Webster, S.S. 1976 — Annual Progress Report Exploration Licence 15/73 Hatfield River, for 12 months ending June 25, 1976. Unpublished Report to Cominco Exploration Pty. Ltd.

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APPENDIX I

REPORT ON THE MACKINTOSH HATFIELD UTEM SURVEY AND A REVIEW OF THE IP

E T EADIE
(abridged)

REPORT ON THE MACKINTOSH HATFIELD UTEM SURVEY AND A REVIEW OF THE I.P.

INTRODUCTION

The 1983 and the 1979 UTEM data has now been interpreted and all of the conductors axes have been marked on the 1:10,000 map and the appropriate 1:2,500 maps. Along with the position of the axes, an estimation of the depth to the top of the body is included on the map, and the number of the latest channel affected by the conductor.

Each conductor has been labelled on the maps. The conductors are then discussed with reference to their EM and IP characteristics in Appendix I where the main interpretational details are given. A classification system based on the recommended method of follow up summarizes the Appendix.

Several of the zones require more discussion than was included in Appendix I. More detailed interpretation and recommendations for these zones follow below.

CLASSIFICATION I

Zone I3 Mt Charter

The best part of both the IP and the EM of this zone has been drilled and explained by earlier holes that encountered mostly pyrite with some low values of Zn and Pb. A deeper rich zone that is shielded from the EM by the shallow zone is a possibility. However there is no geophysical indication of this.

CLASSIFICATION III

Zone E "Amoeba" Anomaly

Closer spaced, better quality EM data is necessary on this anomaly before it can be interpreted properly. The follow up grid has already been cut in preparation for further work, probably with the EM 37 unit.

Zone G2

The major part of G2 apparently coincides with a known fault which could explain the anomaly. On close analysis of the geology of the southern, better part of the zone, it was obvious that this area corresponds with the shale contact. Therefore this zone should be re-classified as type IV. No further geophysics is necessary, but a complete understanding of the geology is required.

Zone G3

This zone is possibly quite highly conductive but the data can not be trusted because it is so noisy. A small three line grid at 100 metre spacing covered with horizontal loop EM (Max Min) will resolve this problem. This grid has already been cut in preparation for the work.

Zone I1

As with the other zones, closer spaced EM data is necessary on this complicated anomaly before it can be interpreted properly. The follow up grid has already been cut in preparation for a detailed EM 37 survey.

Zone J1

The 1979 UTEM loop was not in a very good position to get interpretable data from this zone. In spite of the fact that the anomaly is probably caused by shale, the complexity of the response suggests that it merits more definition at closer line spacing with either UTEM or the EM 37.

CLASSIFICATION IV

These zones have all been fairly well defined by the UTEM survey, and are mostly high amplitude, quickly decaying anomalies, this suggests large, shallow, poorly conductive bodies. However they are all suspected to be caused by the contact of shale with the volcanics except for D2. Some of them may warrant drilling after a close geological inspection is completed.

CLASSIFICATION V

The definition of the classification in Appendix I is an adequate explanation in all cases.

CONCLUSIONS

The UTEM response of the Que River ore deposit was sharper and stronger than anything seen during the 1983 survey. The Hellyer response was almost as strong as that at Que River but the greater depth to the Hellyer deposit and the greater interference from the surrounding rock units (shale and much pyrite) made it much more difficult to interpret. None of the other responses on the grid appear to be as strong as Que River or Hellyer, although in some cases (E, G3, H3, J2) it is difficult to say this with confidence because of the poor quality of the UTEM results.

Based on the characteristics of the UTEM data alone (strength and size of anomaly) the following priority list would be given to the zones:-

1) I1
2) E
3) J2 (shale)

After this come all of the other zones from Classifications III and IV.

The test work on Zones E and I1 that will be done in the near future with the EM 37 unit (another large loop time domain system, slightly different from UTEM) will show whether this unit is better, similar or worse than the UTEM system for this particular environment. It will definitely be more sensitive to poor conductors than UTEM, but it might then cause the same problem as IP in not being able to differentiate between barren pyrite and base metal sulphides.

Once the relative effectiveness of UTEM and EM 37 has been determined, the rest of the prospective area around Que River should be covered by the more appropriate system.

Another aspect of the follow up of all of the anomalies of interest that has not yet been mentioned is magnetics. In this environment, magnetics should be considered to be an integral part of a geological inspection of an area because of its usefulness as a mapping tool. Where possible, zones of interest should be covered with magnetics at a 100 metres (or 50 m) line spacing and a station interval of 10 metres. In time the whole of the Que River area should be covered with magnetics.

APPENDIX I

CLASSIFICATION OF THE VARIOUS ANOMALIES

There are 34 different anomalies described in the following pages. These can be divided into the five following groups.

I zones that have been drilled, are being drilled or already have drill hole locations planned for them - I3.

II zones that should be drilled straight off.

III zones that need more geophysics, a detailed geological inspection, a thorough examination of the soil geochemistry characteristics and drilling, if appropriate - E, G2, G3, I1 and J1.

IV zones that do not need any more geophysics, but that need a detailed geological inspection and a review of the soil geochemistry in the area; if necessary drilling should be considered if geological information can not be obtained in any other way - F and J2.

V zones of the lowest priority that should have a geological inspection and a review of the geochemistry in the area; a line of soil geochem over each zone should be considered if there is no old data - I2 and I4.

ZONE	LOOP	MAP (1:2500)	LOCATION	E.M. RESPONSE	I.P. ASSOCIATION	COMMENTS
E	11	B	7500N, 4000E to 7900N, 4025E	Weak, fairly well-defined response that appears to plunge to north; data is noisy because of nearby power line.	Very large I.P. anomaly expecially on lines 7800N, 7900N, 8000N, 8100N, (Line 7500N and 7700N not covered and L7400 & 7600N not impressive.)	E.M. conductor is consistently on the western edge of the I.P., this could by only apparent due to different grid or it could be that one edge of the sulphide zone is massive; in any case it is clear that HA1 did not hit the best part of the zone either along strike or section; follow up by closer spaced EM lines and drilling.
F	11	B	7500N, 3325E to 7900N, 3575E	Very sharp (shallow) weak response; near end of line so anomaly is not very well-defined.	Partial I.P. coverage on L7600N only; substantial anomaly suggested.	Open in both directions; very close to interpreted shale contact but amplitudes of both EM and I.P. response is less than those seen at other shale contacts (zones A6, B, C1) follow up by a detailed geological inspection (drilling is necessary) and a review of the geochem.
G1	2	B	6800N, 4075E	Single line very weak anomaly; its position near to the power line makes it suspicious.	Weak diffuse chargeability anomaly.	Could be a cultural feature; follow up by a geological inspection and a review of the geochem.
G2	2, 11	B, C	6200N, 3475E to 7100N, 3875E	Data in this area is very noisy because of the proximity to power lines; very long, weak questionable anomaly; there is only a hint of a conductor on each line.	Wide and good I.P. anomaly associated with conductor on southern lines; no correlation in central area; no I.P. coverage to north.	Zone is open to south and IP suggests that it continues; most of anomaly could be related to a mapped fault however southern end is very interesting and possibly quite complicated; the noisy data (because of power lines) and the wide line spacing (200m) make a proper interpretation impossible; possible a fault extension of zone E; more detailed EM data necessary on south end.

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ZONE	LOOP	MAP (1:2500)	LOCATION	E.M. RESPONSE	I.P. ASSOCIATION	COMMENTS
I1	1979 UTEM	C	5200N, 4375E to 5800N, ~4200E	Complicated zone of multiple conductors, which are moderately good at two locations, 5600N, 4225E and 5800N, 4175E; line to line correlation is impossible without closer spaced lines.	A weak I.P. anomaly coincides with the EM except that it seems to get weaker to the north instead of stronger as the EM indicate; the older IP data suggests that zone I1 is the western, most conductive edge of a broad IP zone.	Should be detailed with further EM work at 100 metre line spacing; since the anomaly is open to the north coverage should be extended in that direction.
I2	1979 UTEM 3	C, D	5400N, 4600E to 5800N, 4625E	Response hard to interpret because it is so far from the 1979 loop and too close to loop 3; it is clear that it is a weak response.	A resistivity low corresponds with the EM but little or no chargeability anomaly.	Probably represents a geological contact; follow up by a geological inspection and a review of the geochem.
I3	1979 UTEM	C	4400N, 4325E to 4800N, 4400E	Weak but well-defined response particularly on line 4400N.	Very good IP anomaly closely associated with EM.	Assuming that the geological dip is near vertical or to the west, and that the UTEM grid is properly tied in to the drill holes, then this anomaly has been drilled by Holes MC1 and MC2 and has been proven to be caused by pyrite - no further work is warranted unless it is still of great geological interest; if this is so, detailed EM should be carried out on 100 m line spacing.
I4	1979 UTEM	C	4600N, 4075E to 4800N, 4125E	Weak, questionable anomaly.	Coincident weak I.P. anomaly on line 4600N but not 4800N.	Follow up by a geological inspection and a review of the geochem.

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ZONE	LOOP	MAP (1:2500)	LOCATION	E.M. RESPONSE	I.P. ASSOCIATION	COMMENTS
J1	1979 UTEM	C	4200N, 3975E	Broad, moderately conductive zone that appears to be open to the south.	I.P. suggests that it simply marks the eastern edge of the shale package.	Open to south? Possibly another shale conductor? Follow up by more EM (Max Min?), geological inspection and a review of the geochem.
J2	1979 UTEM	C	4200N, 3775E to 4800N, 3775E	Moderate strength broad anomaly that is poorly defined because of its position close to, and beneath the loop.	No I.P. coverage.	Open to south; very similar to all of the other shale responses; follow up by a detailed geological inspection (drilling if necessary) and a review of the geochem.
G3	11	B	7100N, 3575E	A very good single line conductor if the very, very noisy data is to be trusted.	No I.P. coverage.	Follow up by more detailed EM (Max Min?), geological inspection and a review of geochem.

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APPENDIX II

REPORT ON THE UTEM SURVEY SOUTH OF MT. CHARTER AND RECOMMENDATIONS FOR FURTHER WORK

E T EADIE
(abridged)

REPORT ON THE UTEM SURVEY SOUTH OF MT. CHARTER AND RECOMMENDATIONS FOR FURTHER WORK

INTRODUCTION

During the first two weeks of February 1984, twenty kilometres of UTEM were collected to cover the prospective Mt. Reid Volcanics south of Mt. Charter. Three distinct but weakly conductive trends were located, two of which correlate very closely with the mapped shale volcanic contact. The third trend falls within the volcanics, in an area of anomalous base metal geochemistry.

In addition to these distinct trends, there is one area of slightly anomalous conductivity that can be traced down from the 1983 survey. There are also several isolated anomalies that are not clearly understood.

INTERPRETATION

The conductors have been divided into three separate zones, two of which continue down from the previous UTEM work (H and J).

The interpretation is summarized in Table 1. Zone J3 alone requires further discussion.

All UTEM anomalies from past and present surveys are shown on Plate MAC 77.

Anomaly eastings zone J1, J3

4000 N	4225E; 4325E
3800 N	4325E
3600 E	4375E

ZONE J3

A schematic representation of the interpretation is shown in Figure 1. The response must be described as weak because it dies off by Channel 7 (200 microseconds). This is very similar to the best part of the D1 anomaly which returned 10 - 15 metres of up to 50% pyrite in drilling. This amount of conductive sulphides should be expected in Zone J3.

The shape of the anomaly suggest a moderate dip to the west. The depth interpretation causes some ambiguity. Using the shape of the anomaly for the interpretation, a depth of 50 - 100 metres is indicated. However, an estimate based on the amplitude indicates a depth of less than 25 metres. One possible explanation is that the conductivity decreases towards the surface, either by a decrease in thickness or sulphide percentage.

This interpretation partially explains two other apparently surprising observations. The first is that there is no obvious source of the anomaly in the costeans. The second is that there is no P.F.E. anomaly in the IP data (frequency domain, 0.3 - 3 hz, 50 metres dipole, n = 1 to 4). These two observations lend support to the model that there is very little sulphide close to surface.

Because of interpretation of variation in the conductors thickness, two drill holes are proposed to test the target. The first is meant to intersect the body at a moderate depth to test the interpretation. If the results are at all positive, a second hole should be drilled to test the body at a greater depth.

There is one other point that must be mentioned with regard to Zone J3. There appears to be a very small, shallow, conductive body at approximately 4320E (±5m) on Line 4000N. This could be just noise or a cultural effect, but it also could be caused by a feature (pod of massive sulphides?) that could be of geological interest.

CONCLUSIONS and RECOMMENDATIONS

The UTEM survey has picked up several features that require geological and geochemical follow up. Of these, only Zone J3 can be considered a high priority target. Two drill hole locations have been recommended; the first at 4225E on Line 3800N and the second at 4125E on Line 3800N. Both should be drilled towards the east at about 45° (see Figure 1).

Several other zones within the volcanics have not yet been covered with UTEM. These are shown on Plate MAC 80. All of the volcanics should be covered with UTEM at the first opportunity.

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ZONE	LOOP	MAP (1:2500)	LOCATION	E.M. RESPONSE	I.P. ASSOCIATION	COMMENTS
J1 amended from last report	1979 UTEM, 14	M	3200N, 4425E to 4200N, 3975E	Questionable to reasonably strong (L4200N) conductor.	Good correlation especially to north.	Probably caused by shales. Geological inspection necessary.
J3	14	M	3600N, 4375E to 4000N, 4225E	Weak to well-defined conductor; more discussion in text.	Conductivity, but no chargeability anomaly on all lines.	Correlates well with a geochem anomaly and is right in an area of extreme geological interest. Drilling will be necessary.

210058

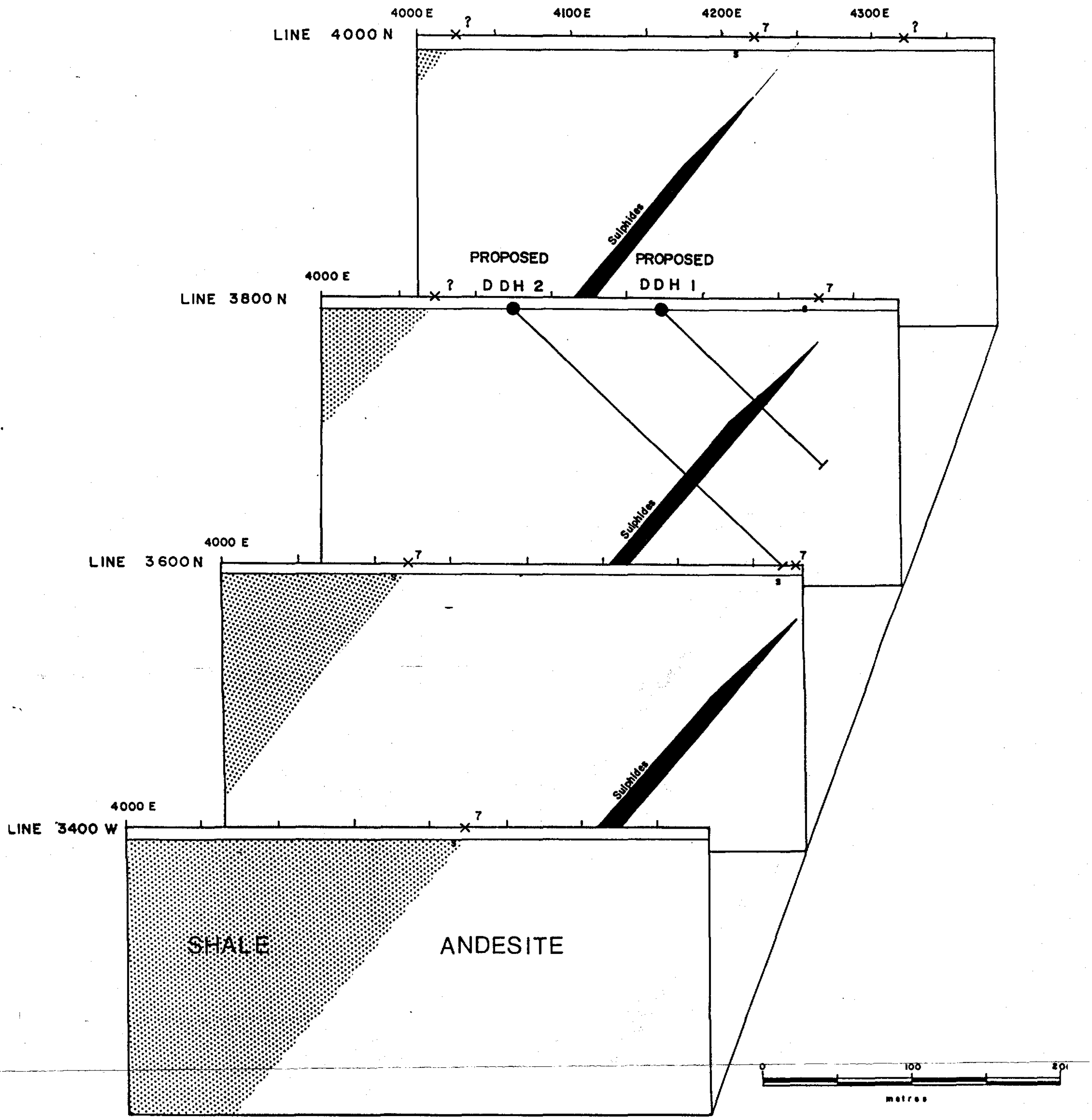

FIGURE 1 : INTERPRETATION OF ZONE J1 AND J3 WITH PROPOSED DRILL HOLES

210059

SCALE 1 : 2500

5 cm

Prepared by ETE
Drawn by sum
April '84

059

210060

APPENDIX III

RESULTS OF THE EM37 SURVEY AT ZONE E AND ZONE I1
HATFIELD LICENCE, TASMANIA

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RESULTS OF THE EM37 SURVEY AT ZONE E AND ZONE I1, HATFIELD LICENCE, TASMANIA

In December 1983, two separate EM37 surveys were performed on the Hatfield Licence.

The objectives of the surveys were as follows:

1) to detail poorly defined but interesting UTEM anomalies, Zones E and I1 (see Plate MAC77). Line spacing was reduced from 200 metres for the UTEM to 100 metres for the EM 37 and station spacing was reduced from 50 to 25 metres.
2) to test the effectiveness of the EM37 system relative to the UTEM system for recognising and outlining bodies that are only weakly (but anomalously) conductive.

The results confirm that Zone E is a long continuous conductor but showed Zone I1 to be a discontinuous and therefore less interesting feature.

Originally, it had been expected that EM37 would be more sensitive to weak conductors than UTEM. The comparison between the EM37 and the UTEM results showed clearly that EM37 has no more high frequency content than UTEM and is therefore no more suitable than UTEM exploring for very weak conductors (time constant of 100-200 microseconds). In fact, a close study of the host rock response indicates that UTEM has more high frequency content than the EM37. This is in spite of the fact that theoretically an impulse response system (EM37) should have more high frequency information than UTEM. The reason for this ambiguity has to do with the engineering problems of building a true impulse response system.

Coverage

Zone E		Zone I1	
7500N	3700E - 4300E	5400N	4000E - 4500E
76		55	
77		56	
78		57	
79		58	
80		59	
81			

ZONE E

Zone E is a pyrite rich body just over a kilometre west of the Que River Mine.

The UTEM data for Zone E (Lines 7500N - 7900N at 200 metre line spacing) are shown in Figures 1-3. The anomaly of interest is centred at about 4000E; the response is affected down to at least channel 7 (200 microseconds). The body becomes more conductive (to channel 6; 400 microseconds) and deeper to the north.

The EM37 data (Lines 7500N - 8100N at 100 metre line spacing) are shown in Figures 4 - 10. The same anomaly is seen on all lines that UTEM detected it. On most lines the anomaly appears to continue until channel 5 which is about 200 microseconds. This agrees very well with the UTEM. Both sets of data are affected detrimentally by a power line immediately to the east of the measured section.

The conclusion of this test is that both UTEM and EM37 can easily define weak conductors with a time constant of 100-200 microseconds, as long as care is taken with the EM37 to measure the earliest possible time (40 microseconds instead of the usual 80 microseconds). Because this conductance is significantly less than the known ore deposits in the vicinity (both Hellyer and Que River have a time constant of about 1000 microseconds), it is safe to say that both UTEM and EM37 are effective tools in searching for this type of mineralisation.

Logistical input must then be applied to decide which is more effective. In the difficult terrain in Northwest Tasmania, equipment portability is important. For the following reasons, I believe that UTEM is more suitable for work in the areas with poor access and bad weather, all other things being equal.

1) the UTEM transmitter gear can be backpacked and the EM37 can not.
2) UTEM transmitter loops are much easier to lay out because of the thinner wire
3) the UTEM receiver system weighs less than half as much as that for EM37 and,
4) the UTEM equipment is more waterproof.

Several other more subtle pieces of information can be obtained from this comparison of the two systems. It has been shown above that both systems have sufficient high frequency information to detect Zone E, a conductor with a time constant of about 100-200 microseconds. However, a study of the host rock response of the two systems indicates that UTEM actually has more high frequency content than EM37. This is shown by the fact that three of the UTEM channels cross over (channels 10, 9 and 8 - 25, 50 and 100 microseconds) and go negative due to host rock effects while none of the EM 37 channels cross over (compare Line 7900N). At first glance this is surprising since EM37 has several channels measuring as early as these times.

The problem is that with the EM37, because of engineering problems, the current in the loop does not turn off instantaneously. Instead there is a turn-off ramp which takes, in our case, about 300 microseconds. This necessary departure from a perfect impulse response system eliminates much of the very high frequency information because there are no measurements taken during the ramp time. UTEM's measuring times are from the instant of turn-off, thereby getting the maximum amount of high frequency information available to it.

Another detail of the comparison that is worth mentioning is the interpretability of the respective sets of data. I find it very simple, just by using the vertical component information to locate very accurately the axis of the response with the UTEM data. I can not do it so well with the EM37 vertical component data in spite of the fact that there is a closer station spacing. However, the Hx component of the EM37 delineates the axis very well (Figures 11-17). I believe that this is due to the fact that the EM37 Hz data is not normalized to the primary field at the station, thereby emphasizing anything close to the loop and subdueing information away from the loop and causing an unnecessary gradient across the line. This type of presentation can be useful for interpretation and is in fact used in UTEM interpretation for some cases (see Figure 18), but in general, the axis of the response appears to be more easily picked in data normalized to the primary field. Perhaps if this normalization was routinely performed on all EM37 data, the need for collecting Hx data on reconnaissance surveys would be eliminated.

The Hy data is worth a quick inspection in this case (figures 19-25). Line 7500N shows a reverse crossover as is expected at the extreme +Y (south) end of a conductor and Line 8000 N shows a normal crossover, representing the extreme -Y (north) end of a conductor. There is very little anomaly on line 7800N and 7900N, suggesting the conductor is continuous in this area. Faulting, or some other minor discontinuity is suggested by the crossover responses on Lines 7600 N and 7700 N.

BETWEEN 7600N AND 7700N?

ZONE I1

Zone I1 is an area of anomalous conductivity about 1 kilometre north of Mt. Charter. Several trenches over the zone of interest have not yet explained the source of the anomaly. This is surprising because the causative body is interpreted to be very shallow.

Interpretation of the original 1979 UTEM data suggests that there is a complex zone of multiple conductors from about 5200N to 5800N, with the best conductivities occurring on the northernmost two lines. The lines were 200 metres apart and went only to 5800N. The objective of the EM37 survey was to detail this complex conductive zone, and close it off to the north. The UTEM data is shown in Figures 26 to 28 and the Z component EM37 data in Figures 29 - 34.

The EM37 data confirms the fact that this is a very complex zone and shows that it is not continuous - there is no anomaly on Line 5700N. It also shows that the anomaly weakens to the north of Line 5800N, since the anomaly is barely detected on Line 5900N. The fact that the zone is discontinuous, plus the fact that it does not continue to the north, downgrade the zone. Another negative factor is that there is no PFE anomaly in the old IP data over the zone, although there is a zone of low restivity.

A trench over the best part of the anomaly on Line 5800N uncovered andesites for its whole length except at the exact location of the anomaly where bedrock was not exposed due to a creek. Undoubtable the conductive material is also a zone of structural weakness (fault?) and has become a creek channel. The only problem with the fault hypothesis is that none of the other faults on the property exhibit this degree of conductivity.

065

210066

CONCLUSIONS

1) Exploration Considerations

Zone E has been shown to be a weakly conductive but continuous body, except for some minor dislocations over a strike length of about 600 metres. Zone I1, although slightly more conductive, has been shown to be discontinuous over its strike length.

Both zones are for the most part very shallow and can be followed up quite effectively by the present programme of trenching, mapping and geochemistry. This may lead to drilling if there is any encouragement.

2) Experimental Considerations

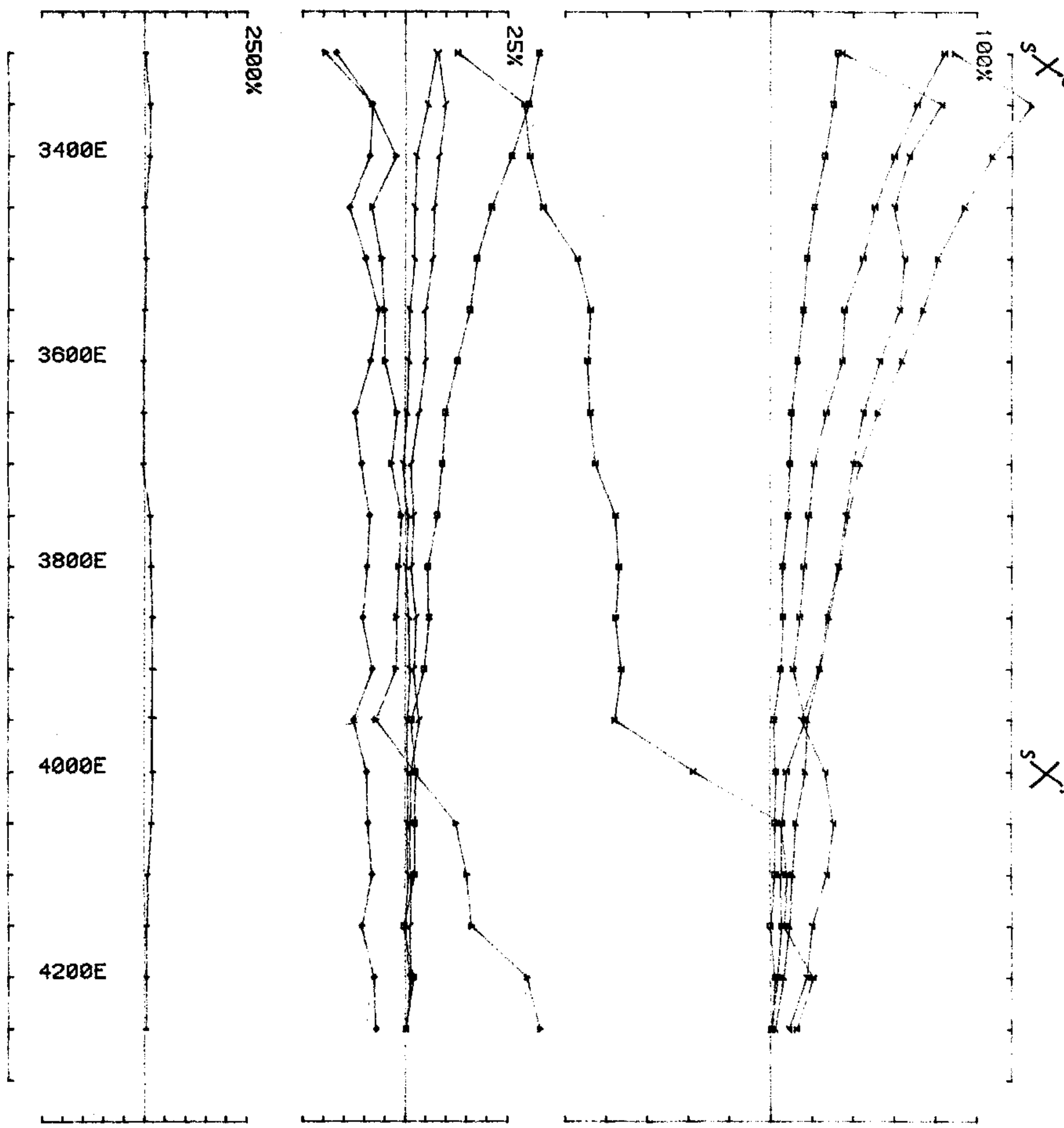
EM37 has shown itself to be approximately as effective as UTEM in detecting weak conductors (time constant of 100 - 200 microseconds) in the Que River environment, although logistically it is at a significant disadvantage to UTEM in areas of poor access and bad weather.

for [signature]

TOM EADIE
GEOPHYSICIST
ABERFOYLE EXPLORATION PTY LTD

066

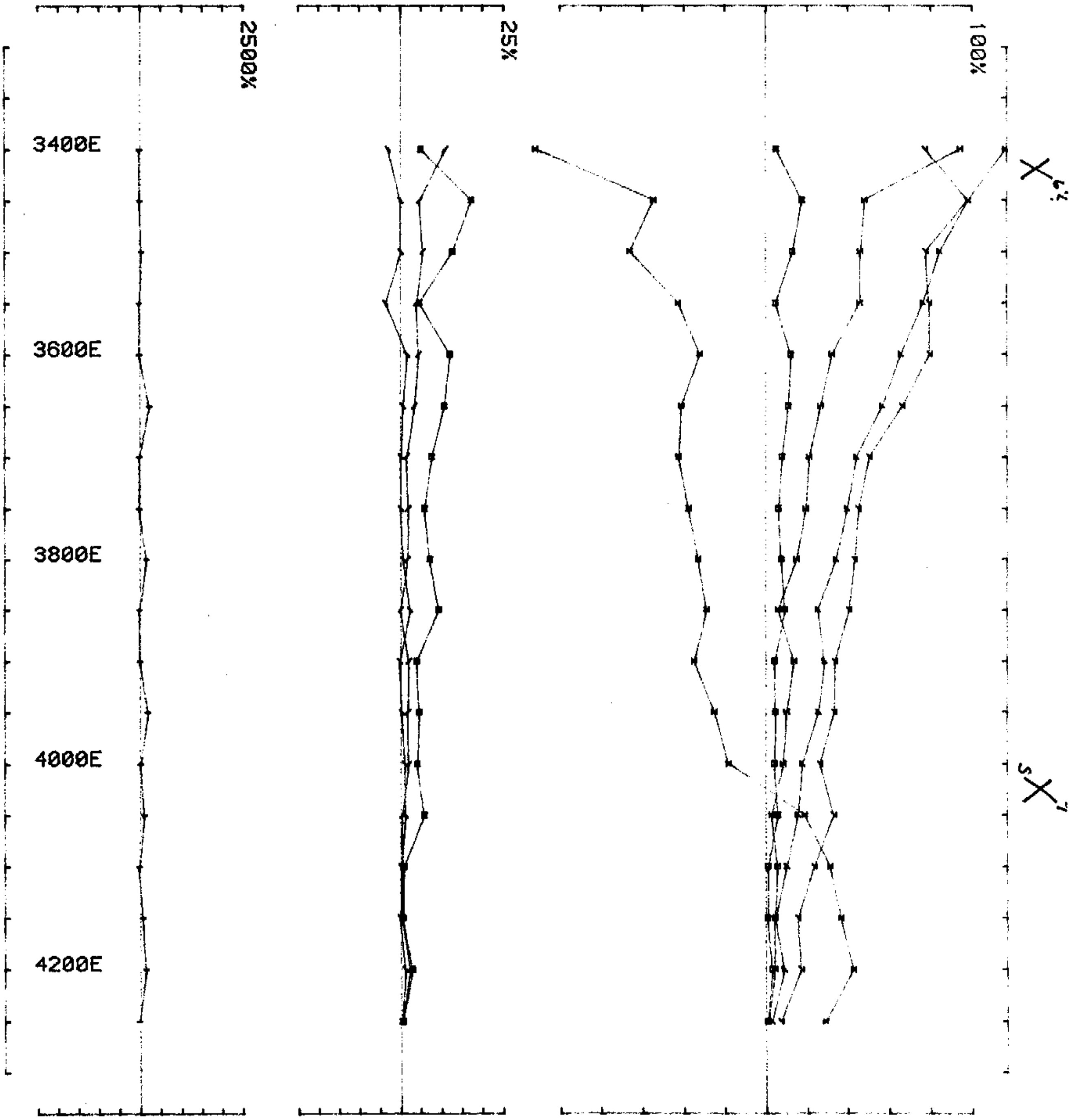
210067



Area QUE RIVER PROSPECT ABERFOYLE EXPLORATION PTY LTD Job 3001 freq(hz) 261
Loopno 0011 Line 7500N component Hz secondary Ch 1
FIGURE 1

067

210068



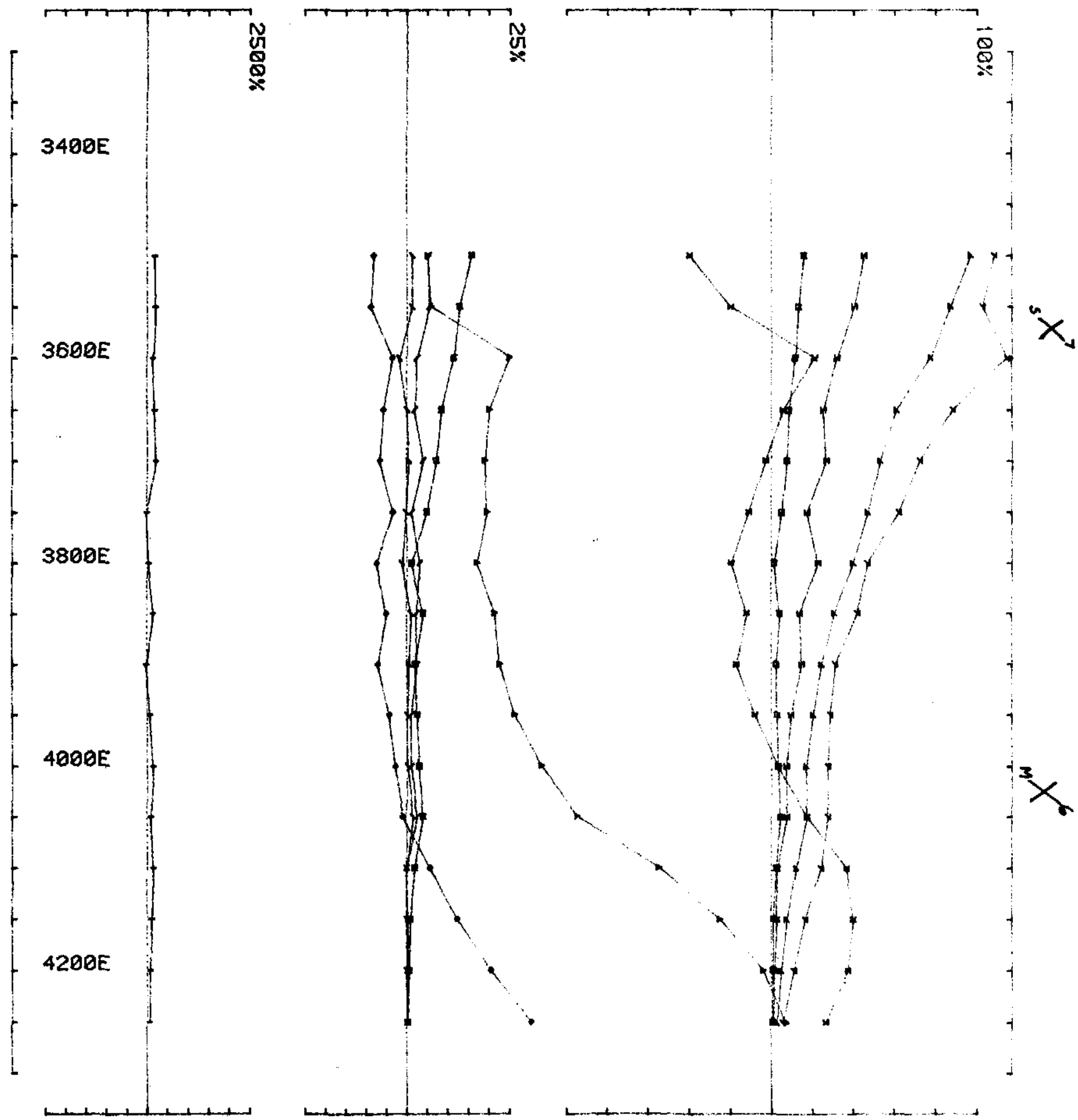
Area QUE RIVER PROSPECT ABERFOYLE EXPLORATION PTY LTD Job 3001 freq(hz) 261

Loopno 0011 Line 7700N component Hz secondary Ch 1

FIGURE 2

068

210069

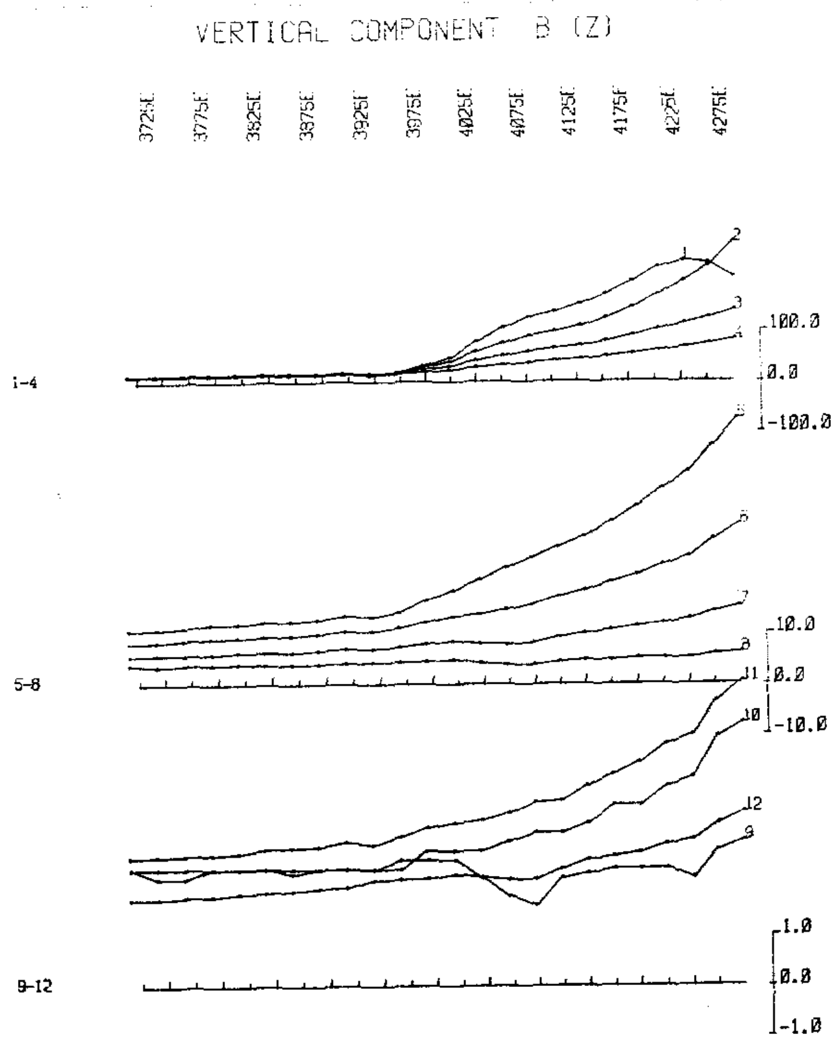


Area QUE RIVER PROSPECT   ABERFOYLE EXPLORATION PTY LTD   Job 3001   freq(hz) 26.1

Loopno 0011   Line 7900N component   Hz   secondary   Ch 1

FIGURE 3

2100070



5 cm

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES	: 7500N	4300E
	: 8100N	4500E
TX LOOP SIZE	: 200m X 600m	
TX TURN OFF TIME	: 300 microsecs	
CURRENT	: 14 amps	
FREQUENCY	: 25 Hz.	
INTEGRATION TIME	: 256 cycles	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: JP/RL	
DATE	: 16-DEC-1983	

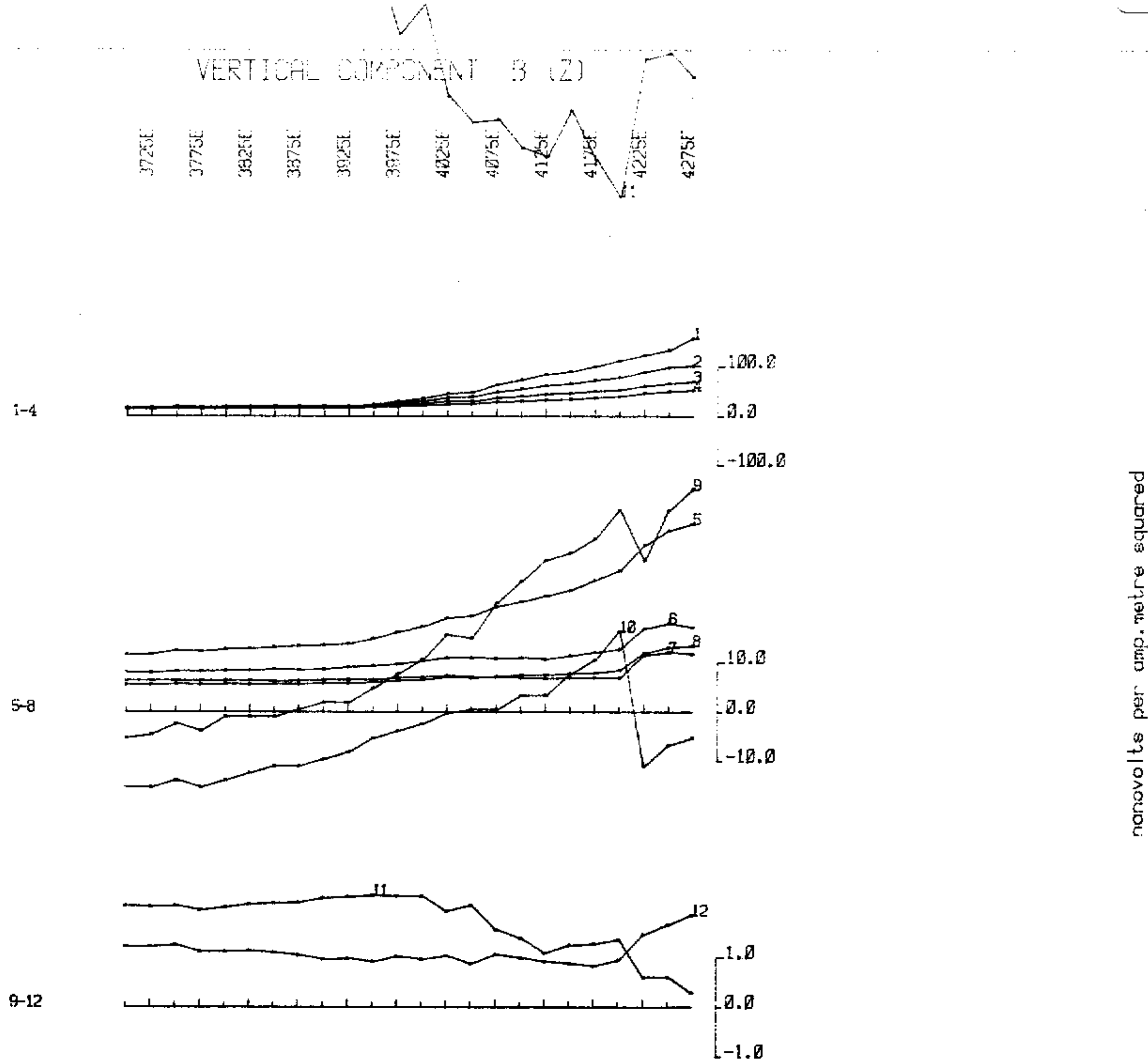
SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1800

CLIENT	: Aberfoyle Limited	
PROJECT	: Zone E	
AREA	: Que River	
LINE	: 7500N	Z
TX LOOP	: 3	

FIGURE 4

690

210071



5 cm

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES	: 7500N 4300E
	: 8100N 4600E
TX LOOP SIZE	: 300m X 600m
TX TURN OFF TIME	: 388 microsecs
CURRENT	: 17.5 amps
FREQUENCY	: 25 Hz
INTEGRATION TIME	: 256 cycles
SYNC MODE	: CRYSTAL
HORIZONTAL SCALE	: 1:5000
SURVEYED BY	: JP/RL
DATE	: 10-DEC,1983

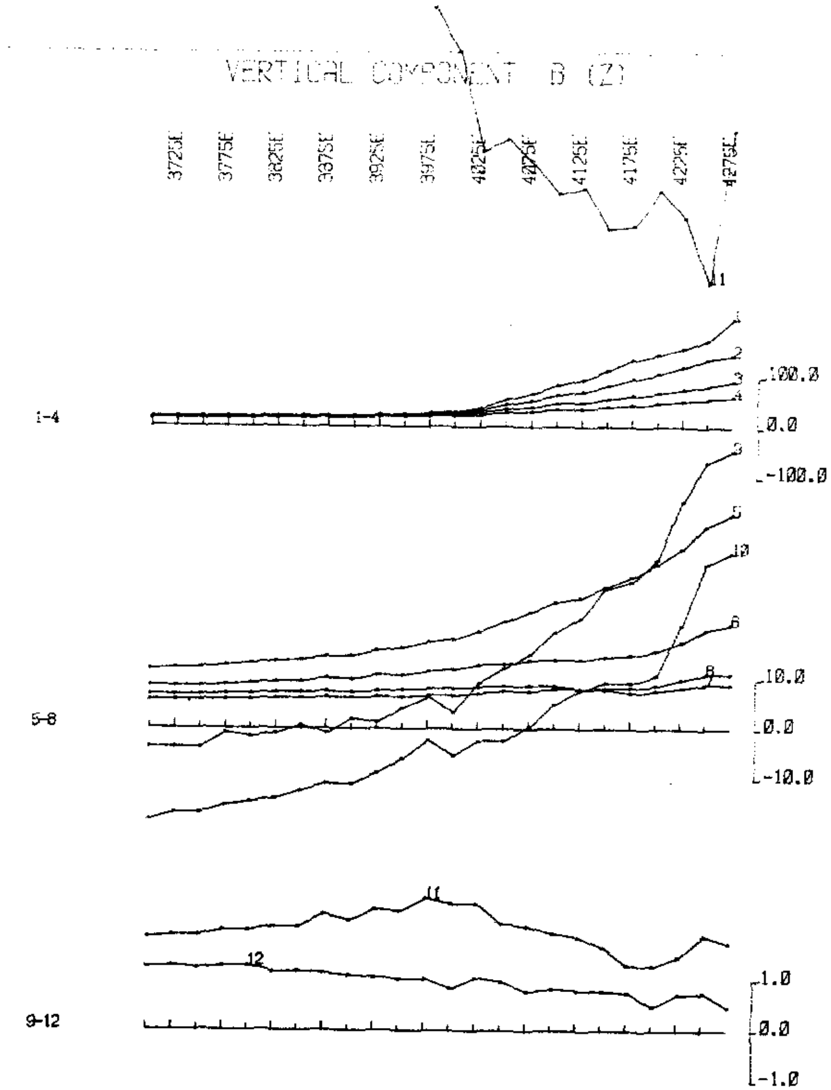
SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1809

CLIENT	: Aberfoyle Limited
PROJECT	: Zone E
AREA	: Que River, Tasmania
LINE	: 7600N Z
TX LOOP	: 1

FIGURE 5

070

210072



nanovolts per amp. metre squared

5 cm

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES	: 7500N 4300E
	: 8100N 4600E
TX LOOP SIZE	: 300m X 600m
TX TURN OFF TIME	: 388 microsecs
CURRENT	: 17.5 amps
FREQUENCY	: 25 Hz
INTEGRATION TIME	: 256 cycles
SYNC MODE	: CRYSTAL
HORIZONTAL SCALE	: 1:5000
SURVEYED BY	: JP/RL
DATE	: 11-DEC,1983

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1809

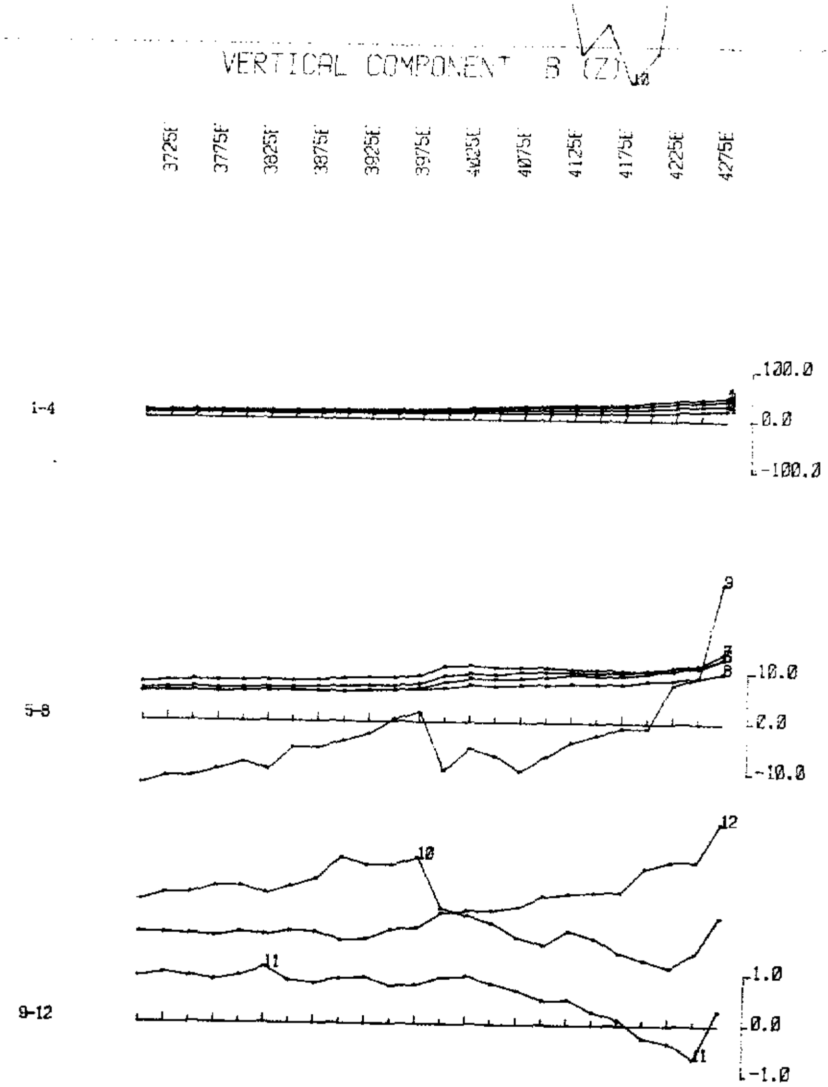
CLIENT	: Aberfoyle Limited
PROJECT	: Zone E
AREA	: Que River, Tasmania
LINE	: 7700N Z
TX LOOP	: 1

FIGURE 6

071

210073

5 cm



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES	:	7500N	4300E
	:	8100N	4600E
TX LOOP SIZE	: 300m X 600m		
TX TURN OFF TIME	: 388 microsecs		
CURRENT	: 17.5 amps		
FREQUENCY	: 25 Hz		
INTEGRATION TIME	: 256 cycles		
SYNC MODE	: CRYSTAL		
HORIZONTAL SCALE	: 1:5000		
SURVEYED BY	: JP/RL		
DATE	: 11-DEC,1983		

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD. | PROJECT NO. 85-1809

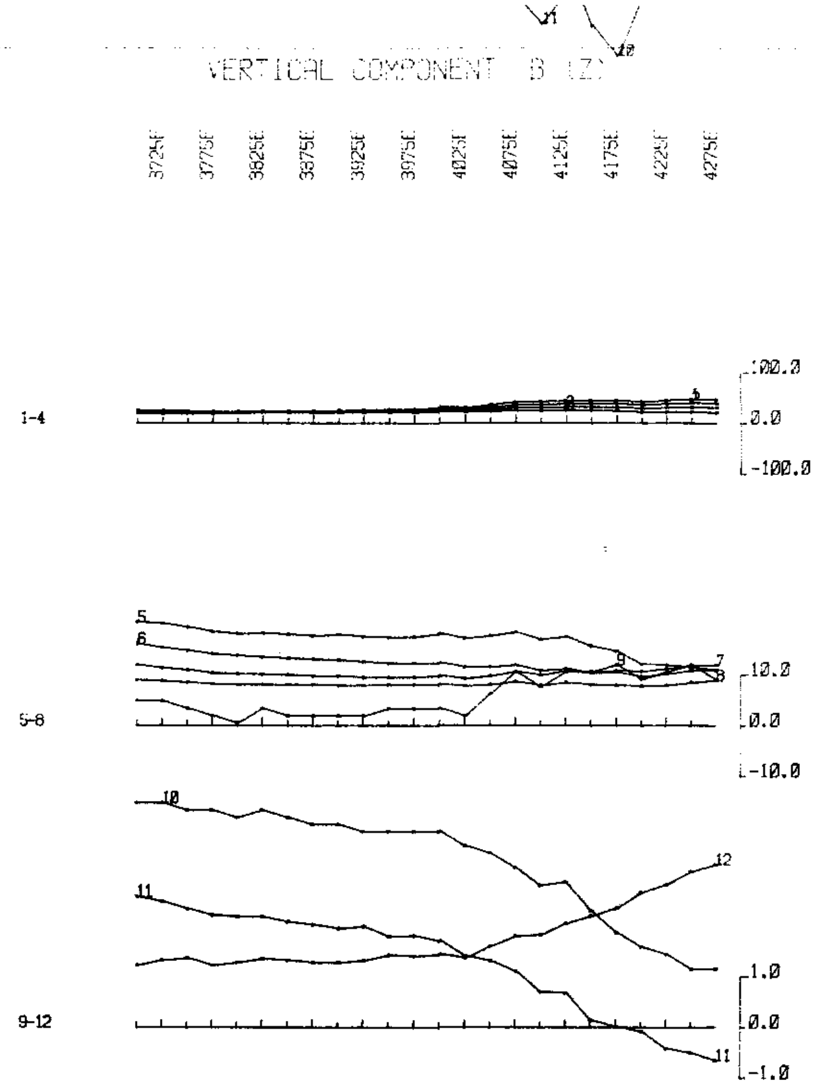
CLIENT	: Aberfoyle Limited
PROJECT	: Zone E
AREA	: Que River, Tasmania
LINE	: 7800N Z
TX LOOP	: 1

FIGURE 7

072

210074

5 cm



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES	: 7500N 4300E
	: 8100N 4600E
TX LOOP SIZE	: 300m X 600m
TX TURN OFF TIME	: 308 microsecs
CURRENT	: 17.5 amps
FREQUENCY	: 25 Hz
INTEGRATION TIME	: 256 cycles
SYNC MODE	: CRYSTAL
HORIZONTAL SCALE	: 1:5000
SURVEYED BY	: JP/RL
DATE	: 11-DEC,1989

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

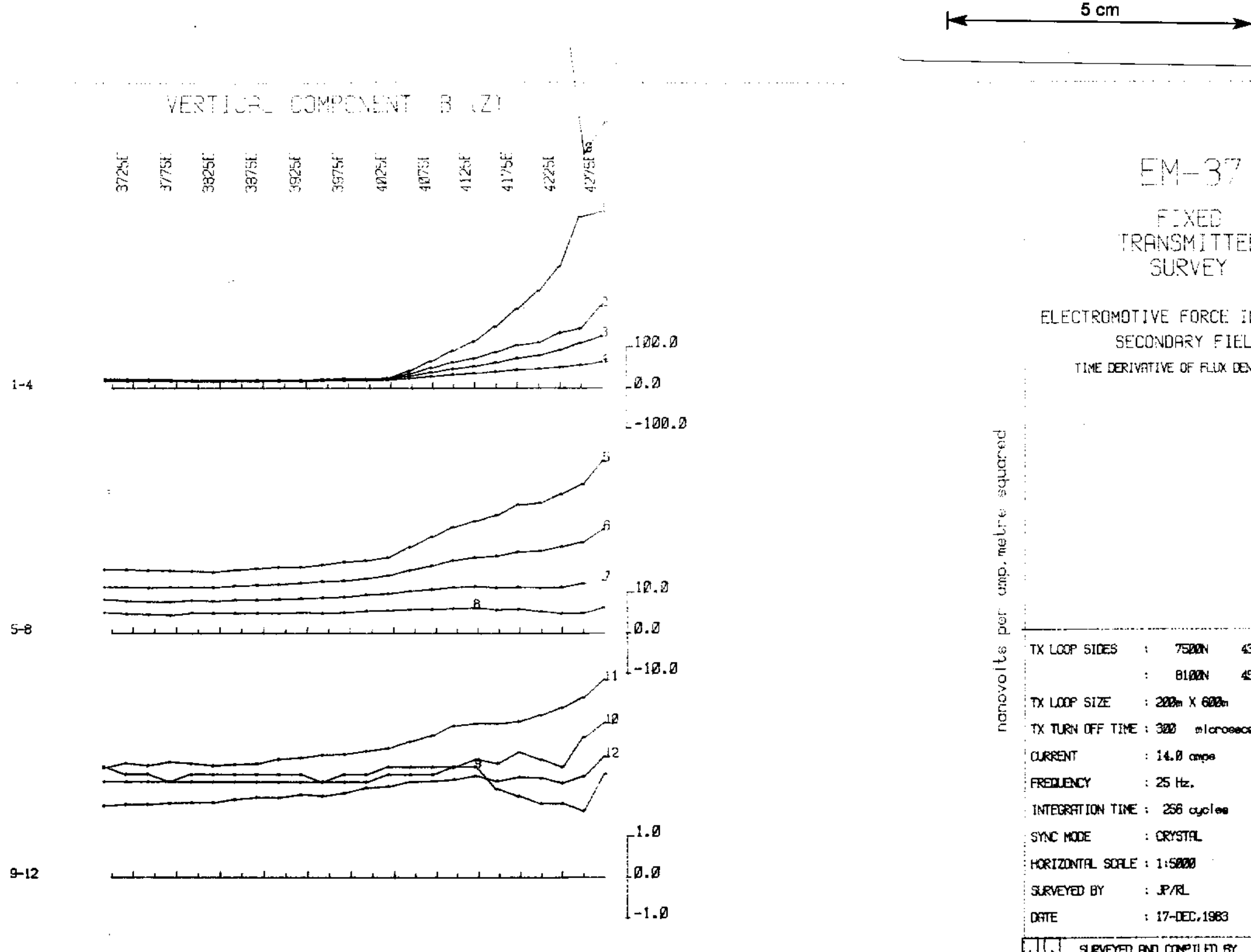
PROJECT NO. 85-1809

CLIENT	: Aberfoyle Limited
PROJECT	: Zone E
AREA	: Que River, Tasmania
LINE	: 7900N Z
TX LOOP	: 1

FIGURE 8

073

210075



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES	: 7500N	4300E
	: 8100N	4500E
TX LOOP SIZE	: 200m X 600m	
TX TURN OFF TIME	: 300 microsecs	
CURRENT	: 14.0 amps	
FREQUENCY	: 25 Hz.	
INTEGRATION TIME	: 256 cycles	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: JP/RL	
DATE	: 17-DEC,1983	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1809

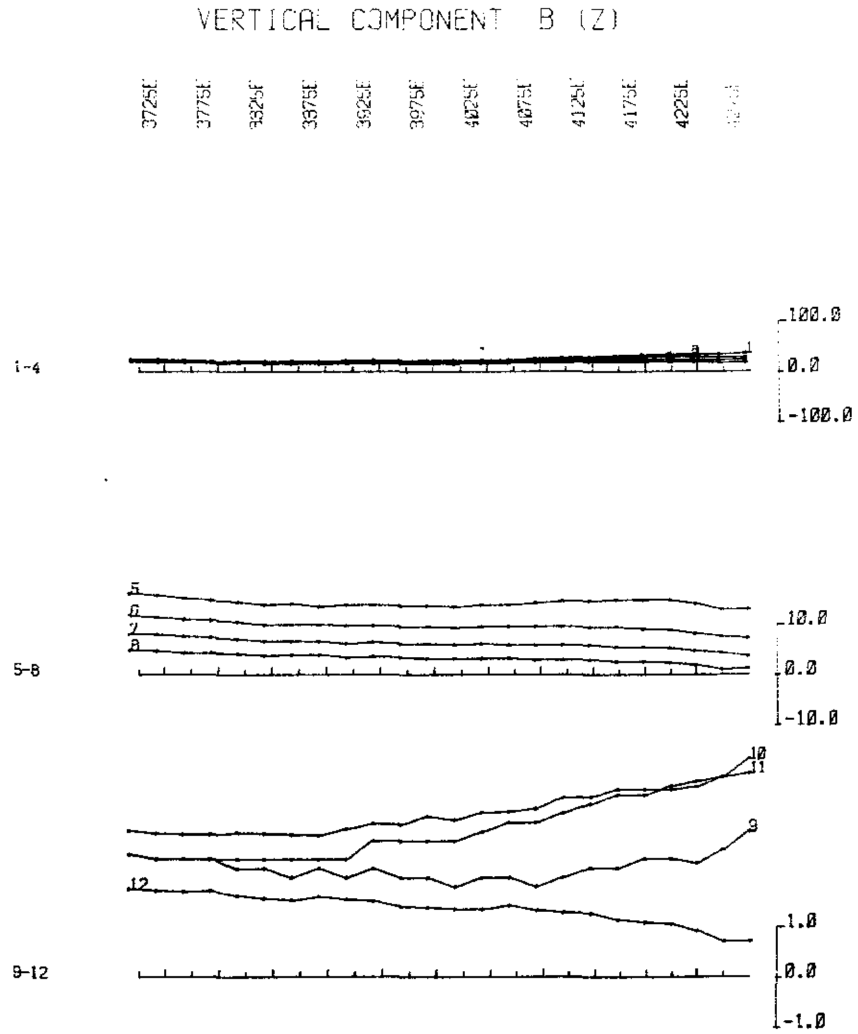
CLIENT	: Aberfoyle Limited
PROJECT	: Zone E
AREA	: Que River
LINE	: 8000N Z
TX LOOP	: 3

FIGURE 9

074

210076

5 cm



nanovolts per amp. metre squared

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES : 7500N 4300E

: 8100N 4500E

TX LOOP SIZE : 200m X 600m

TX TURN OFF TIME : 300 microsecs

CURRENT : 14.0 amps

FREQUENCY : 25 HZ

INTEGRATION TIME : 256 cycles

SYNC MODE : CRYSTAL

HORIZONTAL SCALE : 1:5000

SURVEYED BY : JP/RL

DATE : 17-DEC.,1983

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1809

CLIENT : Aberfoyle Limited

PROJECT : Zone E

AREA : Que River

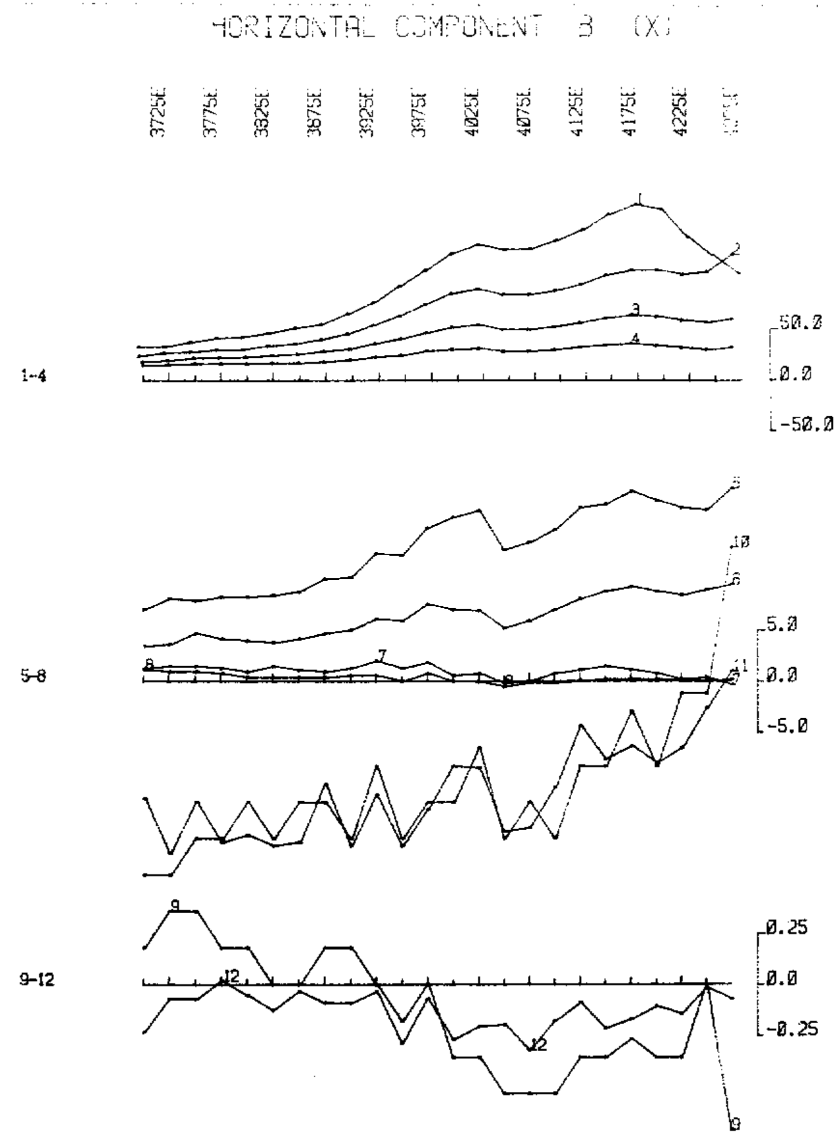
LINE : 8100N Z

TX LOOP : 3

FIGURE 10

210077

5 cm



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES	:	7500N	4300E
	:	8100N	4500E
TX LOOP SIZE	:	200m X 600m	
TX TURN OFF TIME	:	300 microsecs	
CURRENT	:	14 amps	
FREQUENCY	:	25 Hz.	
INTEGRATION TIME	:	256 cycles	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	JP/RL	
DATE	:	16-DEC,1983	

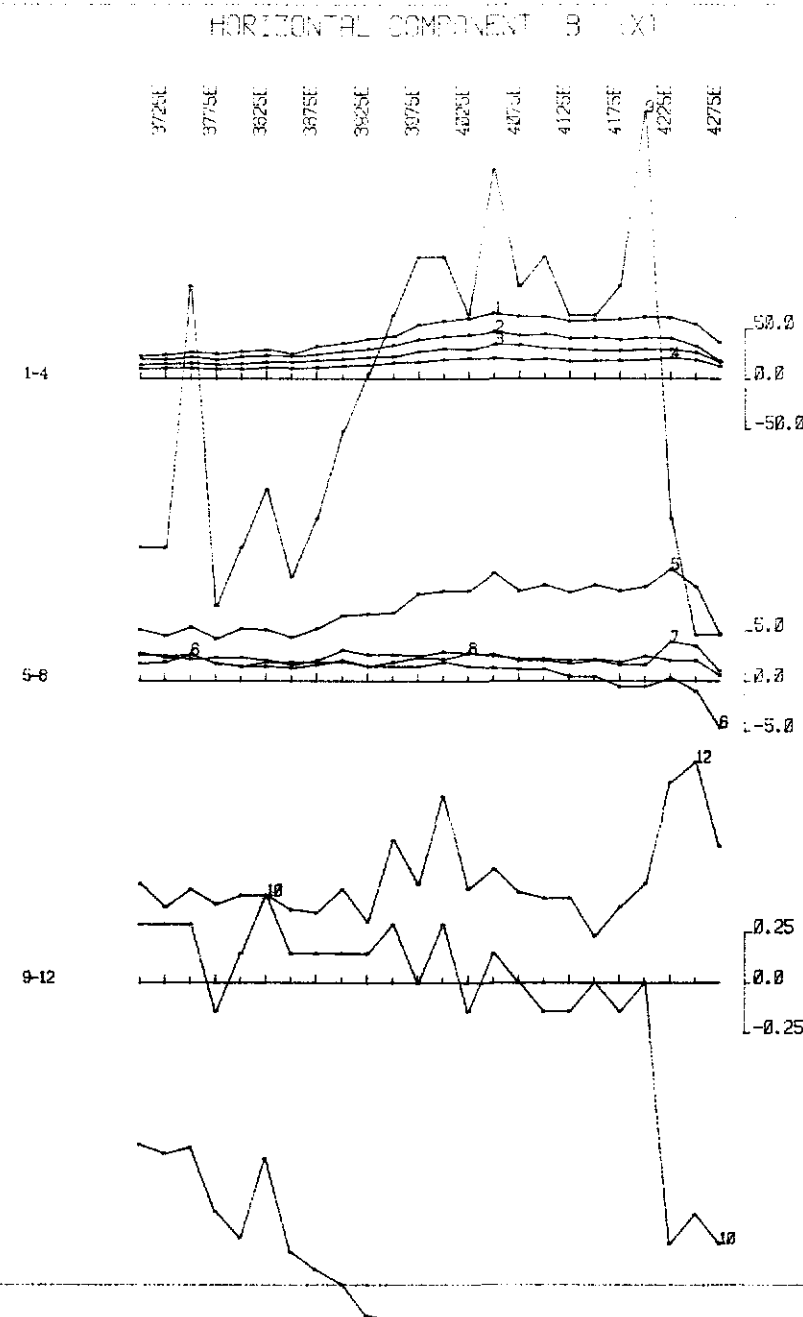
SURVEYED AND COMPILED BY GEOTERREX PTY. LTD. | PROJECT NO. 86-1809

CLIENT	:	Aberfoyle Limited
PROJECT	:	Zone E
AREA	:	Que River
LINE	:	7500N X
TX LOOP	:	3

FIGURE 11

076

210078



5 cm

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD
TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES	: 7500N 4300E
	: 8100N 4600E
TX LOOP SIZE	: 300m X 600m
TX TURN OFF TIME	: 388 microsecs
CURRENT	: 17.5 amps
FREQUENCY	: 25 Hz
INTEGRATION TIME	: 256 cycles
SYNC MODE	: CRYSTAL
HORIZONTAL SCALE	: 1:5000
SURVEYED BY	: JP/RL
DATE	: 10-DEC,1983

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1809

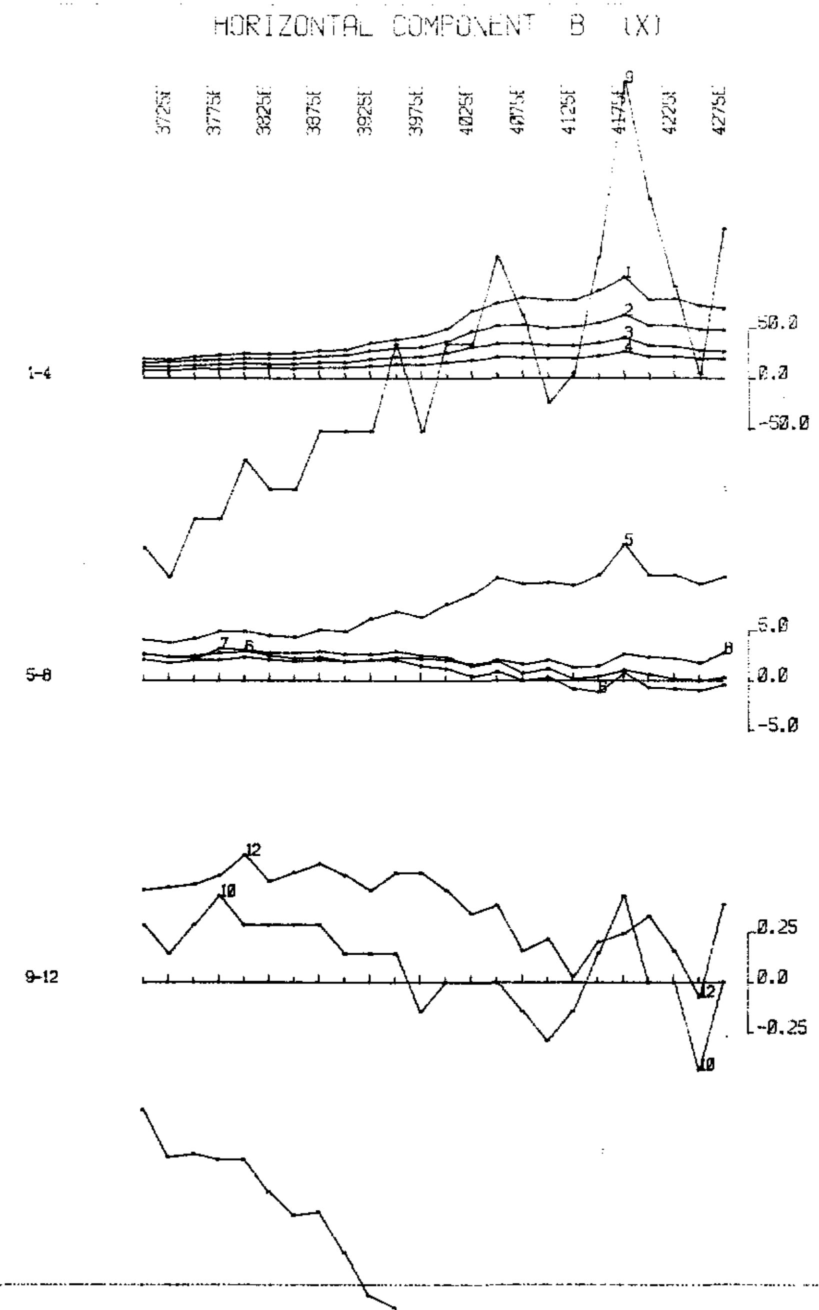
CLIENT	: Aberfoyle Limited
PROJECT	: Zone E
AREA	: Que River, Tasmania
LINE	: 7600N X
TX LOOP	: 1

FIGURE 12

077

210079

5 cm



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES	: 7500N 4300E
	: 8100N 4600E
TX LOOP SIZE	: 300m X 600m
TX TURN OFF TIME	: 388 microsecs
CURRENT	: 17.5 amps
FREQUENCY	: 25 Hz
INTEGRATION TIME	: 256 cycles
SYNC MODE	: CRYSTAL
HORIZONTAL SCALE	: 1:5000
SURVEYED BY	: JP/RL
DATE	: 11-DEC,1983

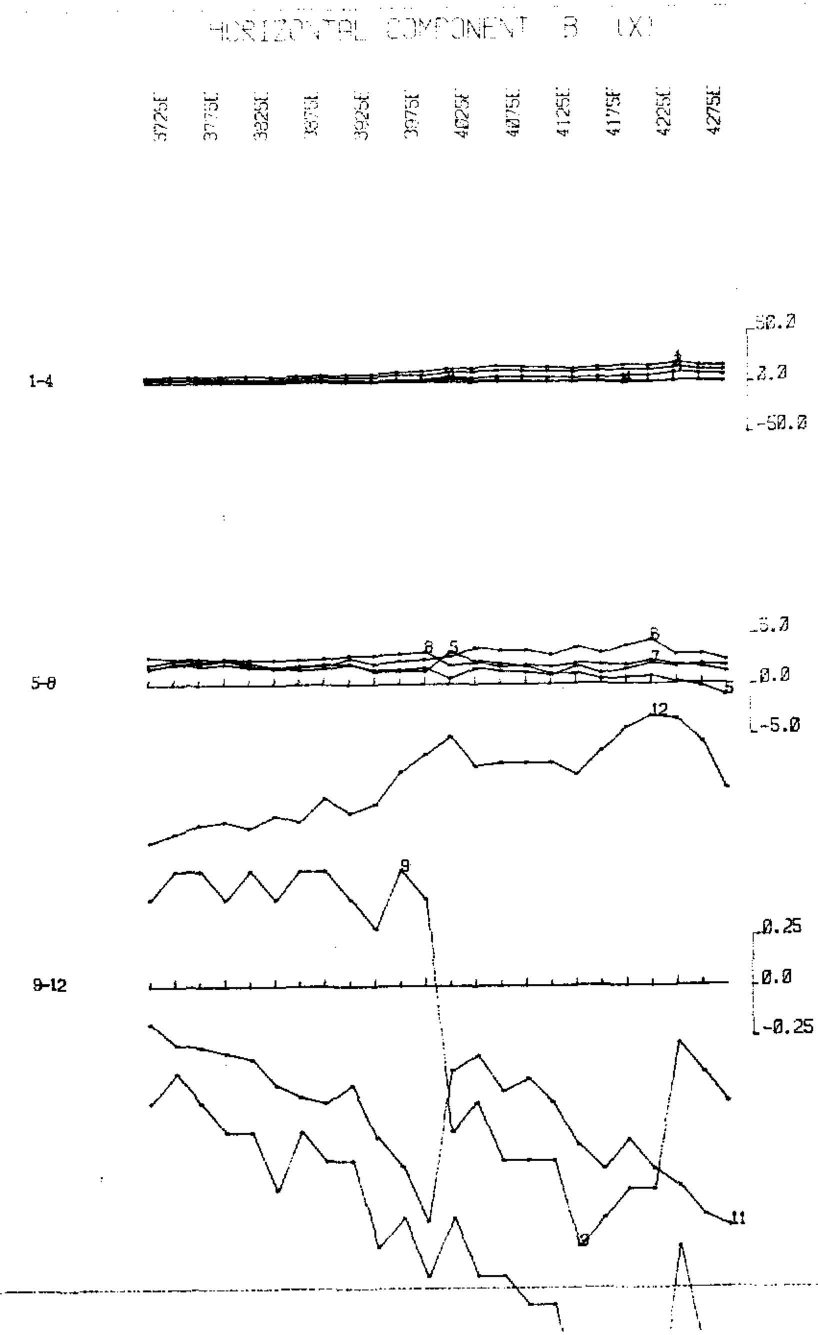
SURVEYED AND COMPILED BY GEOTERREX PTY. LTD. | PROJECT NO. 85-1809

CLIENT	: Aberfoyle Limited
PROJECT	: Zone E
AREA	: Que River, Tasmania
LINE	: 7700N X
TX LOOP	: 1

FIGURE 13

078

210080



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES	: 7500N 4300E
	: 8100N 4600E
TX LOOP SIZE	: 300m X 600m
TX TURN OFF TIME	: 388 microsecs
CURRENT	: 17.5 amps
FREQUENCY	: 25 Hz
INTEGRATION TIME	: 256 cycles
SYNC MODE	: CRYSTAL
HORIZONTAL SCALE	: 1:5000
SURVEYED BY	: JP/RL
DATE	: 11-DEC.1983

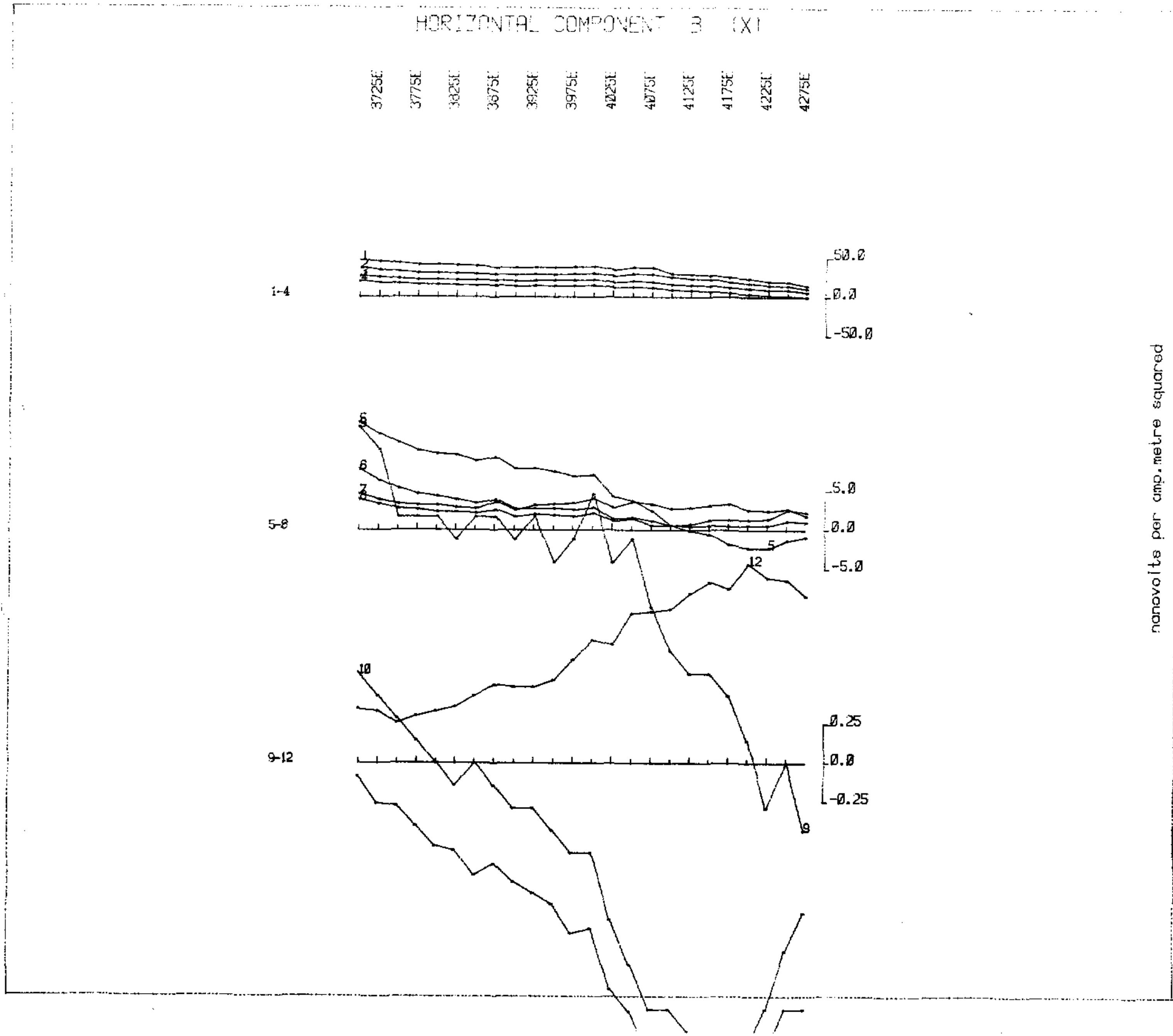
SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1809

CLIENT	: Aberfoyle Limited
PROJECT	: Zone E
AREA	: Que River, Tasmania
LINE	: 7800N X
TX LOOP	: 1

FIGURE 14

079

5 cm



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES	: 7500N 4300E
	: 8100N 4600E
TX LOOP SIZE	: 300m X 600m
TX TURN OFF TIME	: 388 microsecs
CURRENT	: 17.5 amps
FREQUENCY	: 25 Hz
INTEGRATION TIME	: 256 cycles
SYNC MODE	: CRYSTAL
HORIZONTAL SCALE	: 1:5000
SURVEYED BY	: JP/RL
DATE	: 11-DEC,1989

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

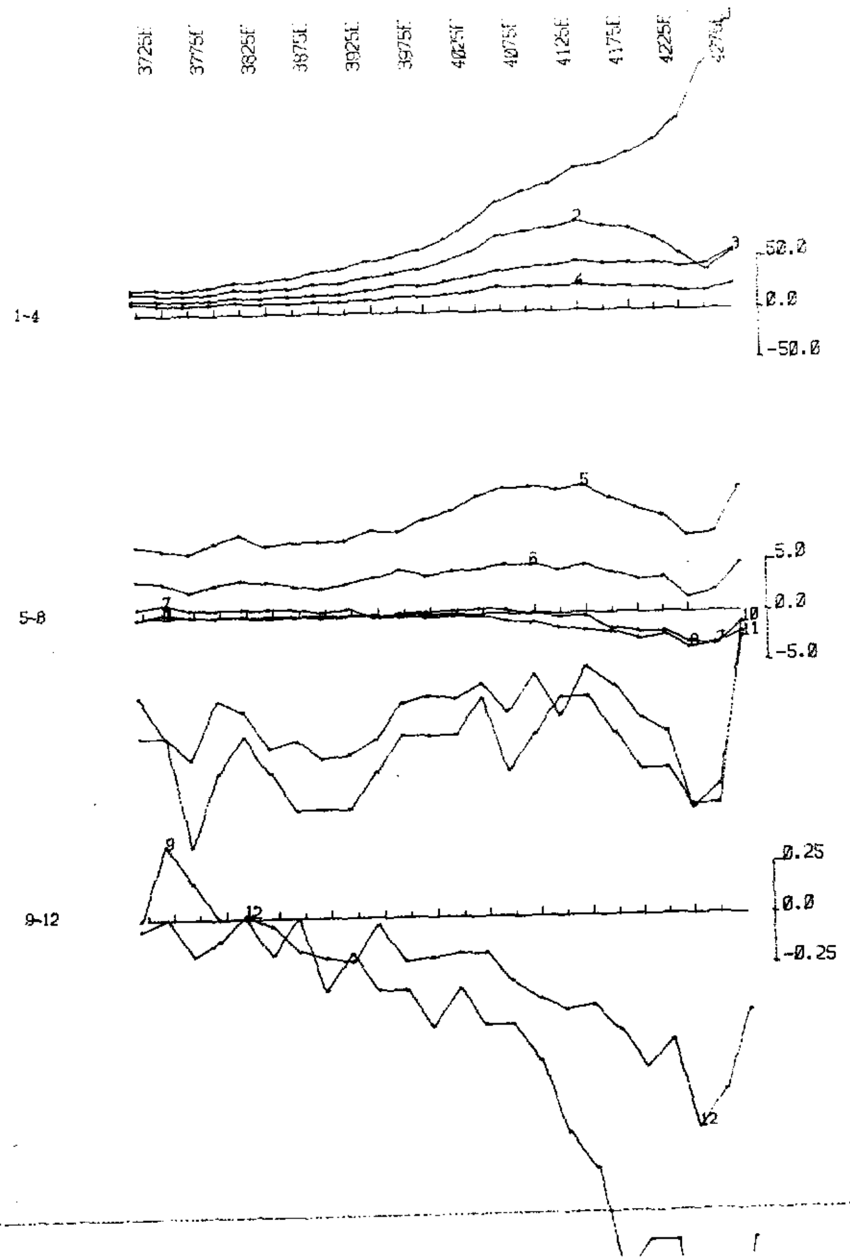
PROJECT NO. 89-1809

CLIENT	: Aberfoyle Limited
PROJECT	: Zone E
AREA	: Que River, Tasmania
LINE	: 7900N X
TX LOOP	: 1

FIGURE 15

210082

HORIZONTAL COMPONENT B (X)



5 cm

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

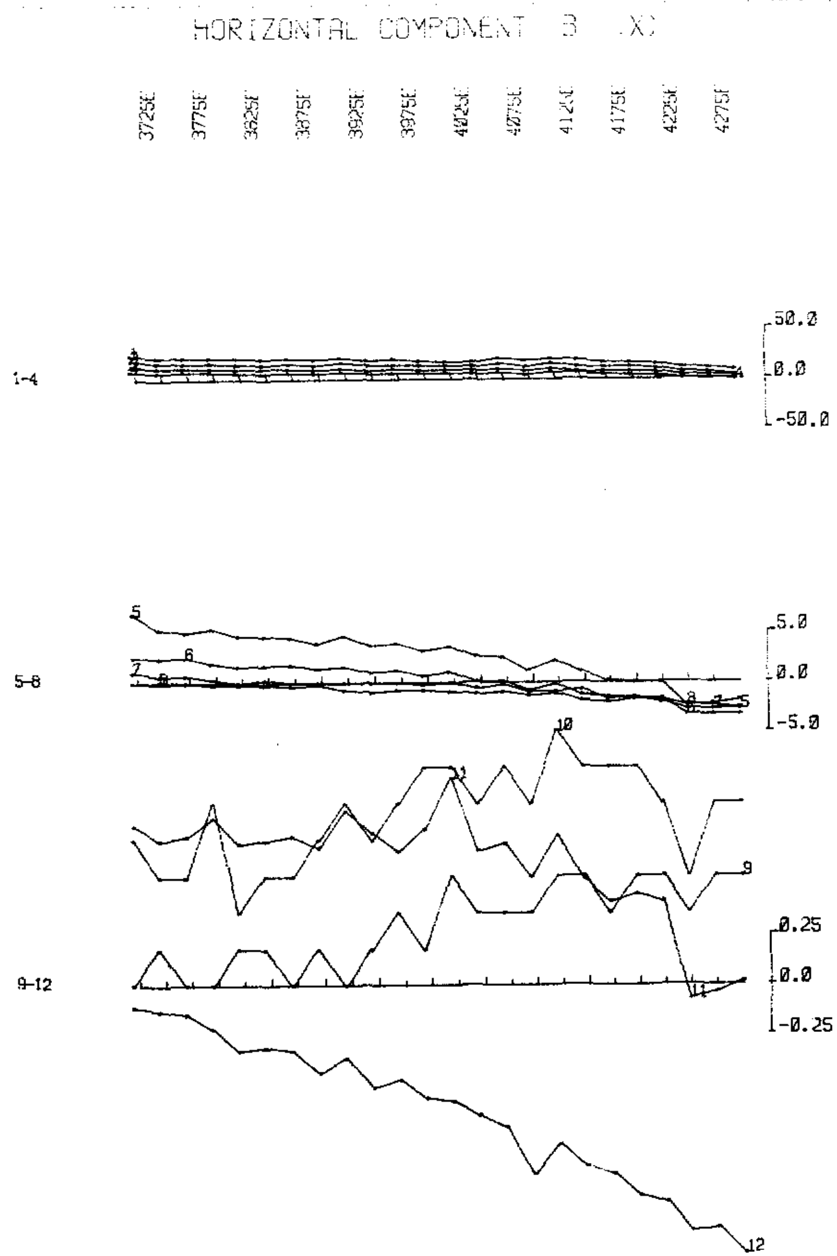
TX LOOP SIDES : 7500N 4300E
: 8100N 4500E
TX LOOP SIZE : 200m X 600m
TX TURN OFF TIME : 300 microsecs
CURRENT : 14.0 amps
FREQUENCY : 25 Hz.
INTEGRATION TIME : 256 cycles
SYNC MODE : CRYSTAL
HORIZONTAL SCALE : 1:5000
SURVEYED BY : JP/RL
DATE : 17-DEC.1983

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO 85-1809

CLIENT : Aberfoyle Limited
PROJECT : Zone E
AREA : Que River
LINE : 8000N X
TX LOOP : 3

180

210083



5 cm

nanovolts per amp.metre squared

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES	:	7500N 4300E
	:	8100N 4500E
TX LOOP SIZE	:	200m X 600m
TX TURN OFF TIME	:	300 microsecs
CURRENT	:	14.0 amps
FREQUENCY	:	25 HZ
INTEGRATION TIME	:	256 cycles
SYNC MODE	:	CRYSTAL
HORIZONTAL SCALE	:	1:5000
SURVEYED BY	:	JP/RL
DATE	:	17-DEC,1983

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1800

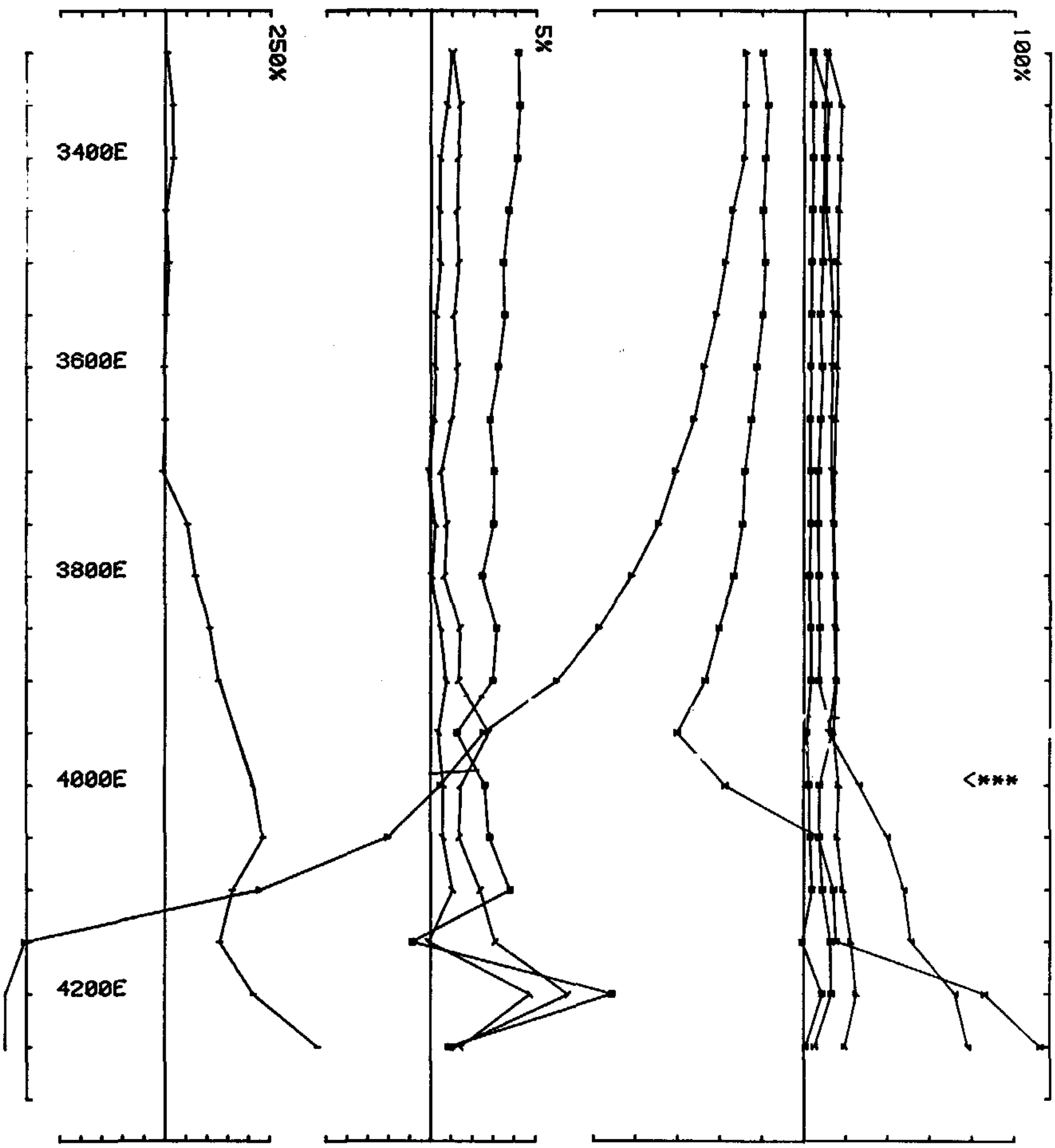
CLIENT	:	Aberfoyle Limited
PROJECT	:	Zone E
AREA	:	Que River
LINE	:	8100N X
TX LOOP	:	3

FIGURE 17

082

083

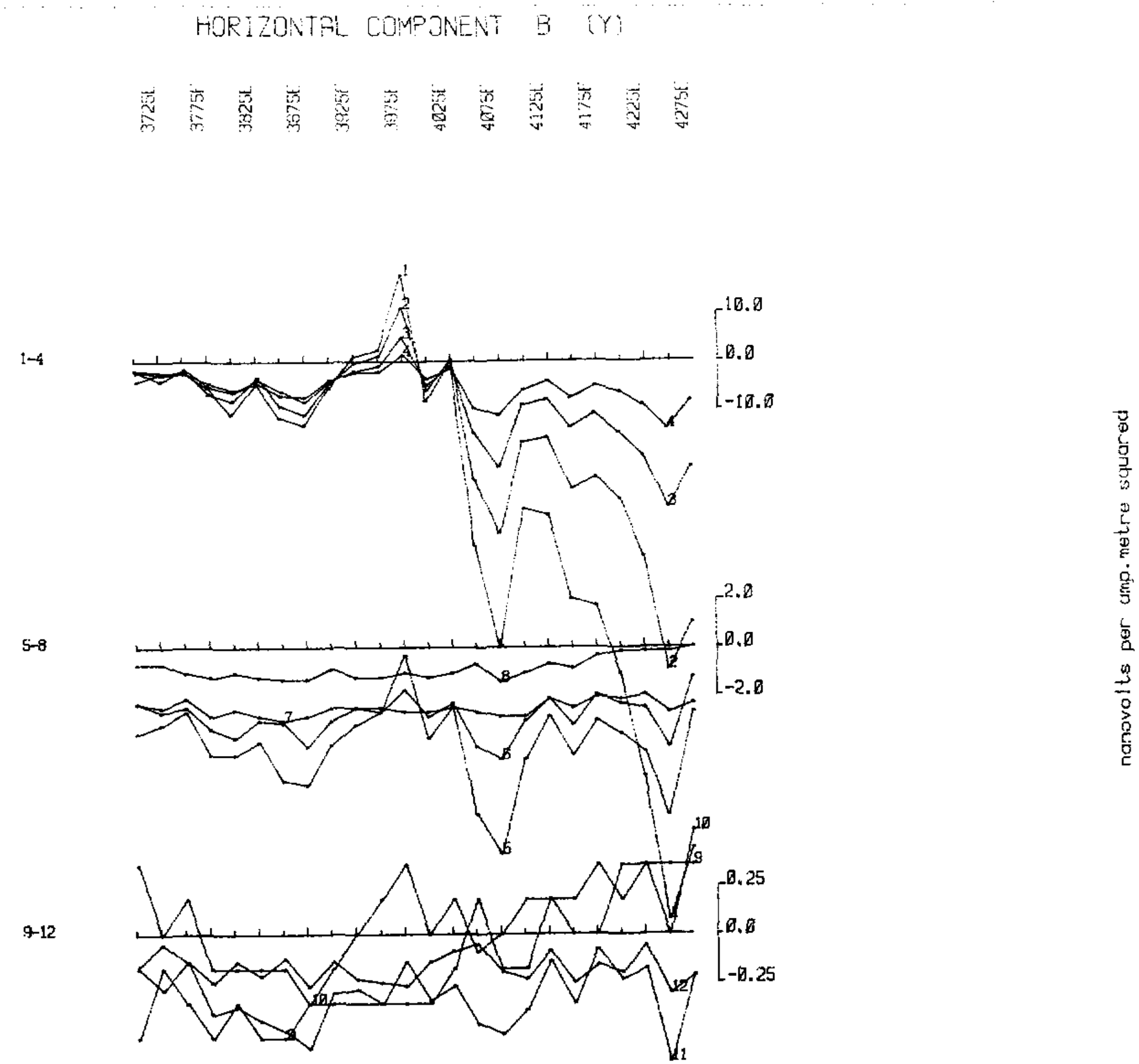
210084



Area QUE RIVER PROSPECT ABERFOYLE EXPLORATION PTY LTD Job 3001 freq(hz) 26J

Loopno 0011 Line 7500N component Hz secondary Ch 1

FIGURE 18



5 cm

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES	:	7500N	4300E
	:	8100N	4500E
TX LOOP SIZE	: 200m X 600m		
TX TURN OFF TIME	: 300 microsecs		
CURRENT	: 14 amps		
FREQUENCY	: 25 Hz.		
INTEGRATION TIME	: 256 cycles		
SYNC MODE	: CRYSTAL		
HORIZONTAL SCALE	: 1:5000		
SURVEYED BY	: JP/RL		
DATE	: 16-DEC,1983		

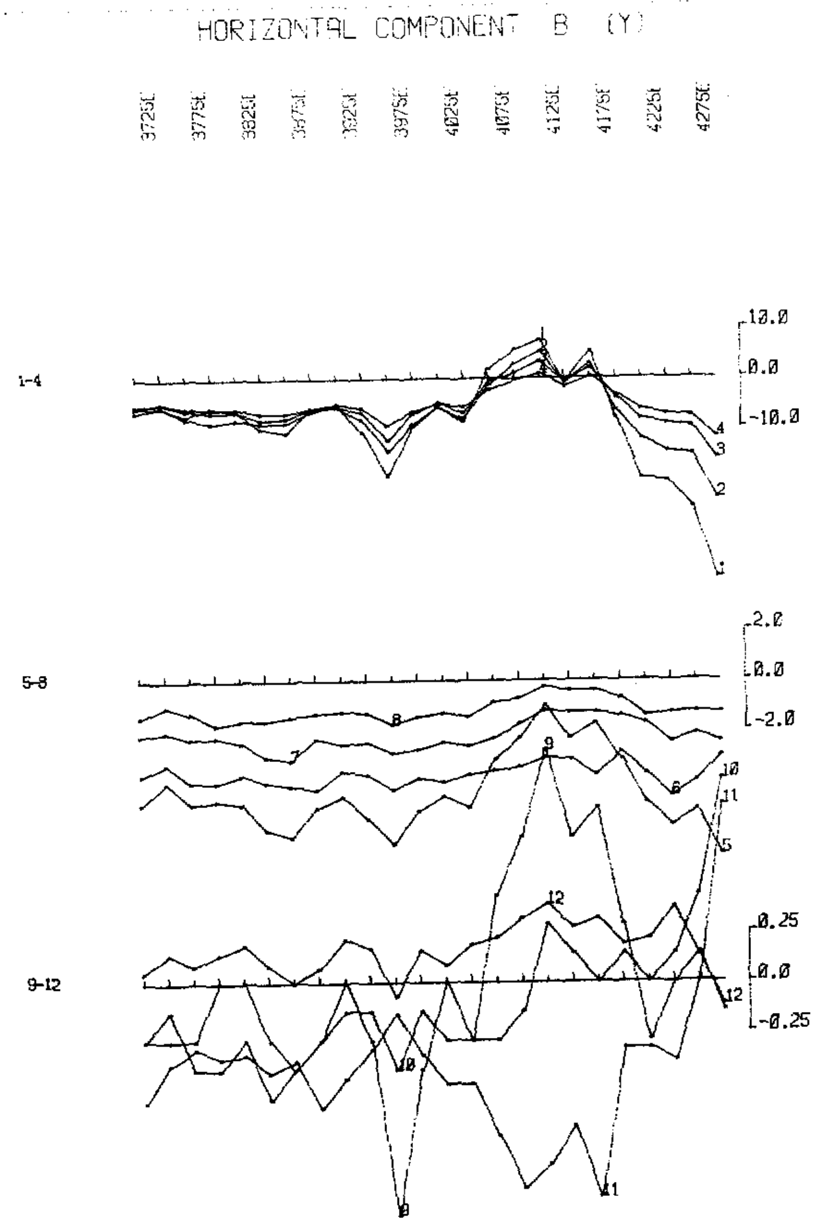
SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 85-1800

CLIENT	: Aberfoyle Limited
PROJECT	: Zone E
AREA	: Que River
LINE	: 7500N Y
TX LOOP	: 3

FIGURE 19

210086



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES : 7500N 4300E
: 8100N 4600E
TX LOOP SIZE : 300m X 600m
TX TURN OFF TIME : 388 microsecs
CURRENT : 17.5 amps
FREQUENCY : 25 Hz
INTEGRATION TIME : 256 cycles
SYNC MODE : CRYSTAL
HORIZONTAL SCALE : 1:5000
SURVEYED BY : JP/RL
DATE : 10-DEC,1988

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD. | PROJECT NO. 85-1809

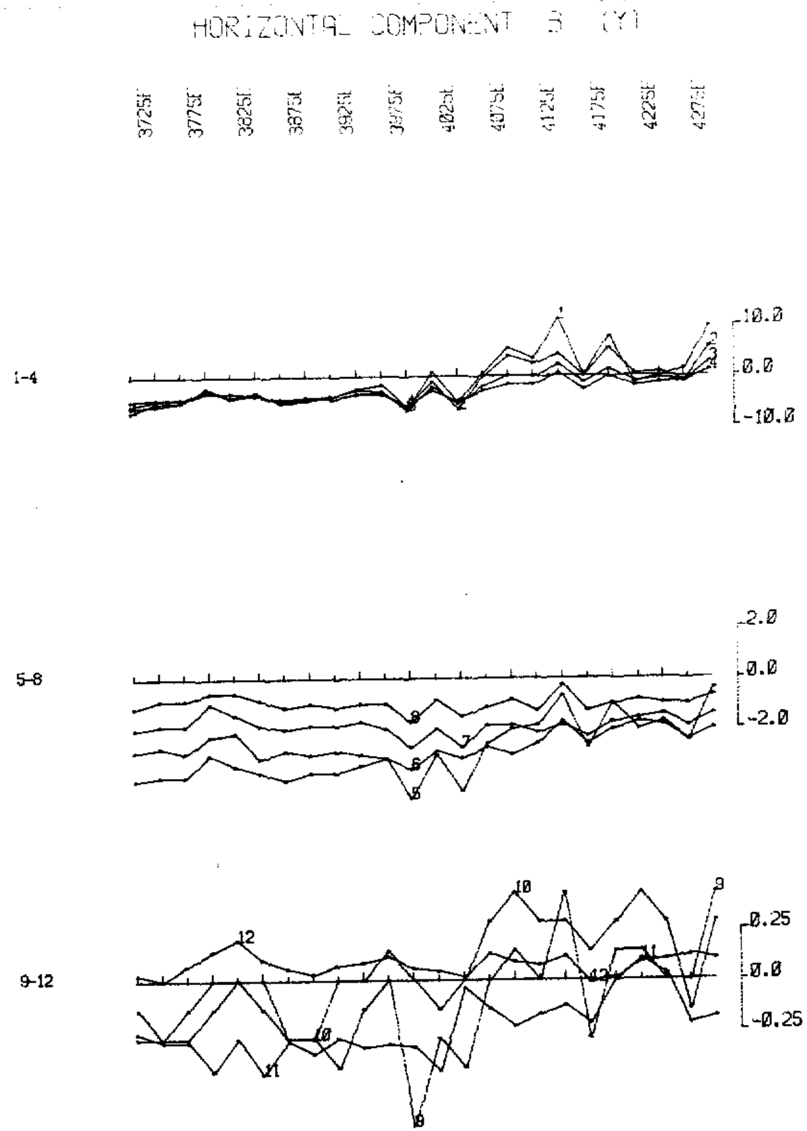
CLIENT : Aberfoyle Limited
PROJECT : Zone E
AREA : Que River, Tasmania
LINE : 7600N Y
TX LOOP : 1

FIGURE 20

5 cm

085

210087



5 cm

nanovolts per amp.metre squared

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES	: 7500N 4300E
	: 8100N 4600E
TX LOOP SIZE	: 300m X 600m
TX TURN OFF TIME	: 388 microsecs
CURRENT	: 17.5 amps
FREQUENCY	: 25 Hz
INTEGRATION TIME	: 256 cycles
SYNC MODE	: CRYSTAL
HORIZONTAL SCALE	: 1:5000
SURVEYED BY	: JP/RL
DATE	: 11-DEC,1983

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

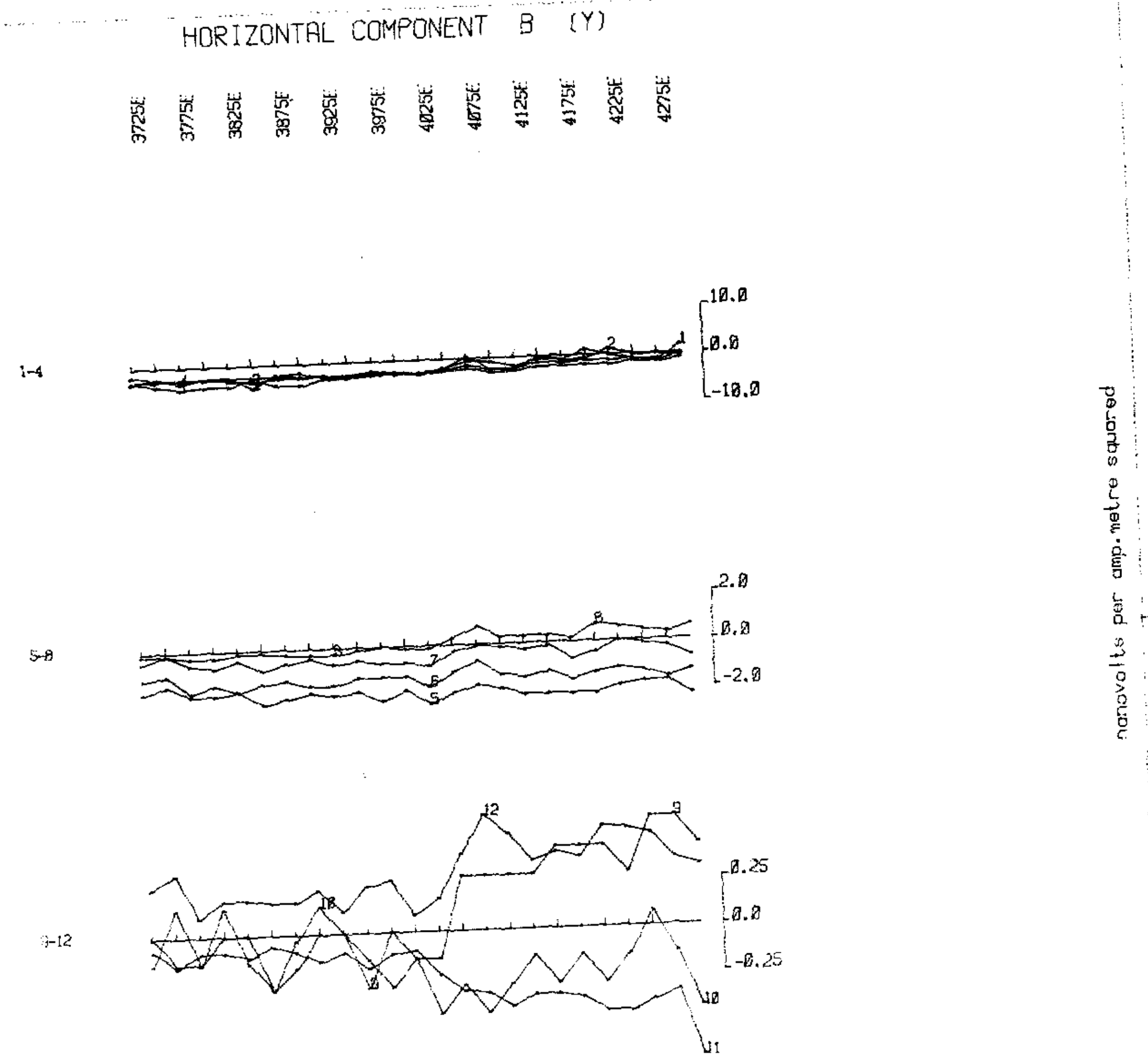
PROJECT NO. 85-1809

CLIENT	: Aberfoyle Limited
PROJECT	: Zone E
AREA	: Que River, Tasmania
LINE	: 7700N Y
TX LOOP	: 1

FIGURE 21

980

210088



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES	: 7500N 4300E
	: 8100N 4200E
TX LOOP SIZE	: 300m X 600m
TX TURN OFF TIME	: 388 microsecs
CURRENT	: 17.5 amps
FREQUENCY	: 25 Hz
INTEGRATION TIME	: 256 cycles
SYNC MODE	: CRYSTAL
HORIZONTAL SCALE	: 1:5000
SURVEYED BY	: JF/RL
DATE	: 11-DEC-1989

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD. — PROJECT NO. 85-1809

CLIENT	: Aberfoyle Limited
PROJECT	: Zone E
AREA	: Que River, Tasmania
LINE	: 7800N
TX LOOP	: 1

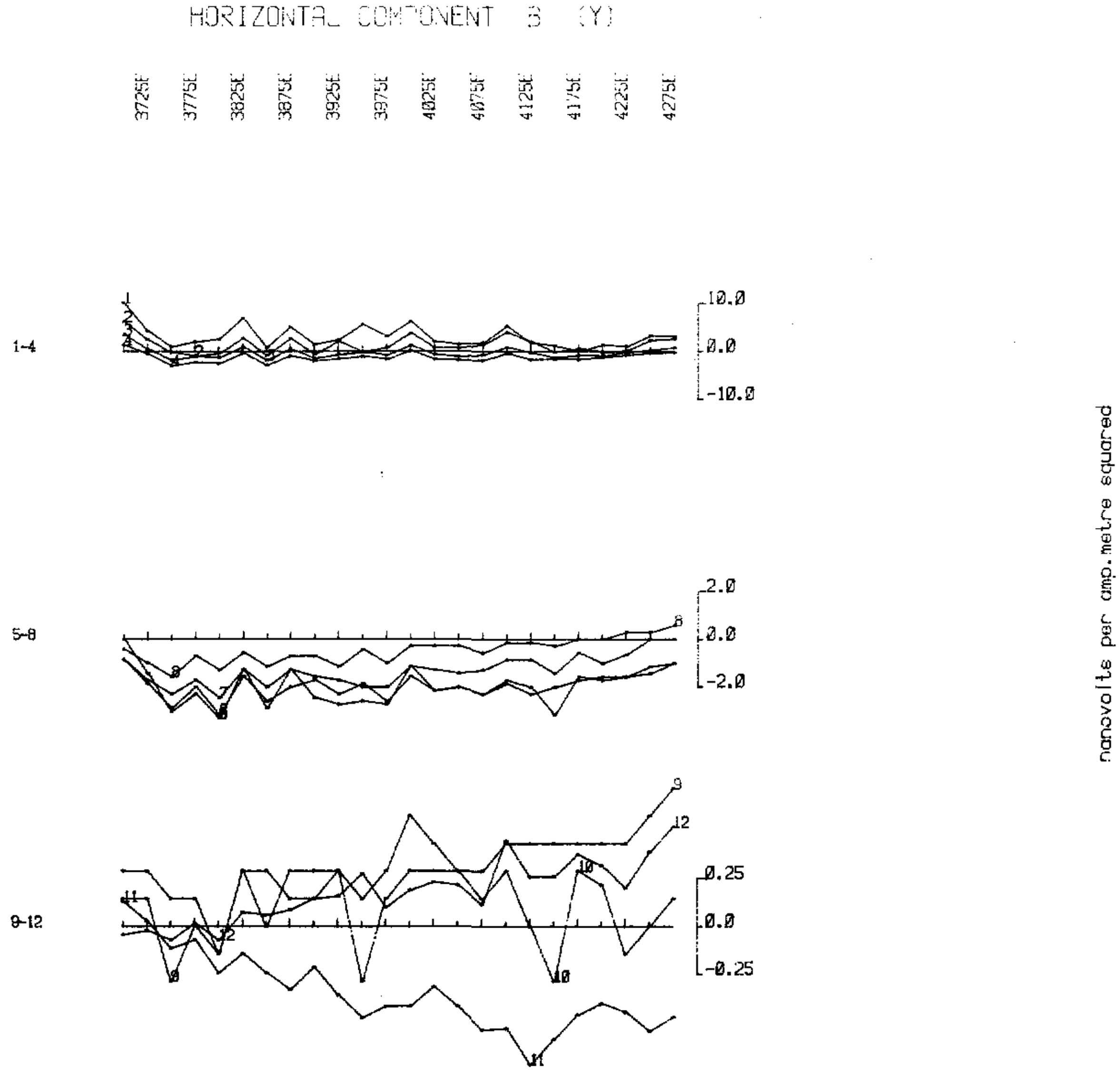
Y

FIGURE 22

5 cm

087

210089



5 cm

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES	: 7500N 4300E
	: 8100N 4600E
TX LOOP SIZE	: 300m X 600m
TX TURN OFF TIME	: 388 microsecs
CURRENT	: 17.5 amps
FREQUENCY	: 25 Hz
INTEGRATION TIME	: 256 cycles
SYNC MODE	: CRYSTAL
HORIZONTAL SCALE	: 1:5000
SURVEYED BY	: JP/RL
DATE	: 11-DEC,1983

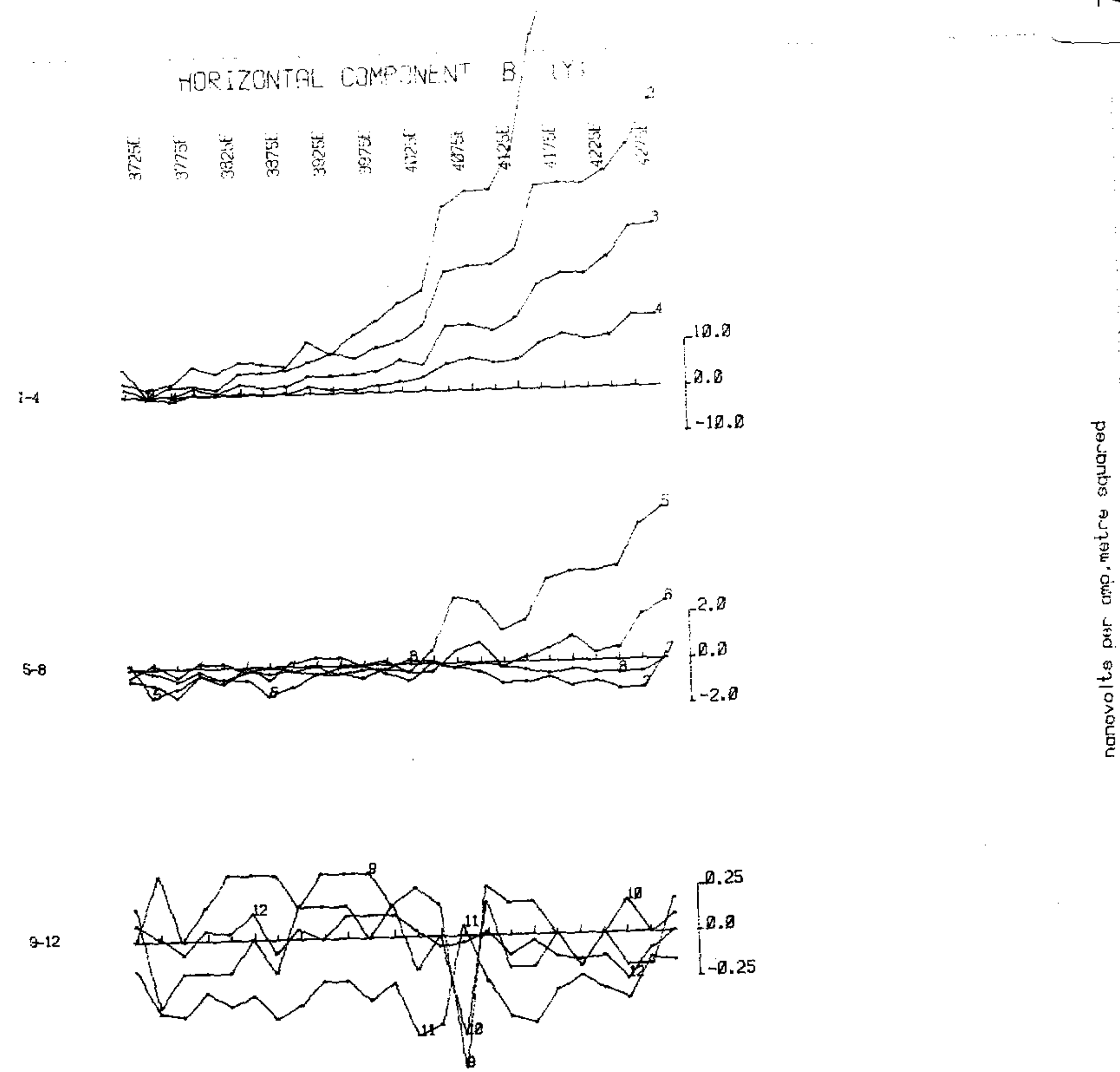
SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1809

CLIENT	: Aberfoyle Limited
PROJECT	: Zone E
AREA	: Que River, Tasmania
LINE	: 7900N Y
TX LOOP	: 1

FIGURE 23

880

210090



5 cm

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES	:	7500N 4300E
	:	8100N 4500E
TX LOOP SIZE	:	200m X 600m
TX TURN OFF TIME	:	300 microsecs
CURRENT	:	14.0 amps
FREQUENCY	:	25 Hz.
INTEGRATION TIME	:	256 cycles
SYNC MODE	:	CRYSTAL
HORIZONTAL SCALE	:	1:5000
SURVEYED BY	:	JP/RL
DATE	:	17-DEC,1989

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 95-1809

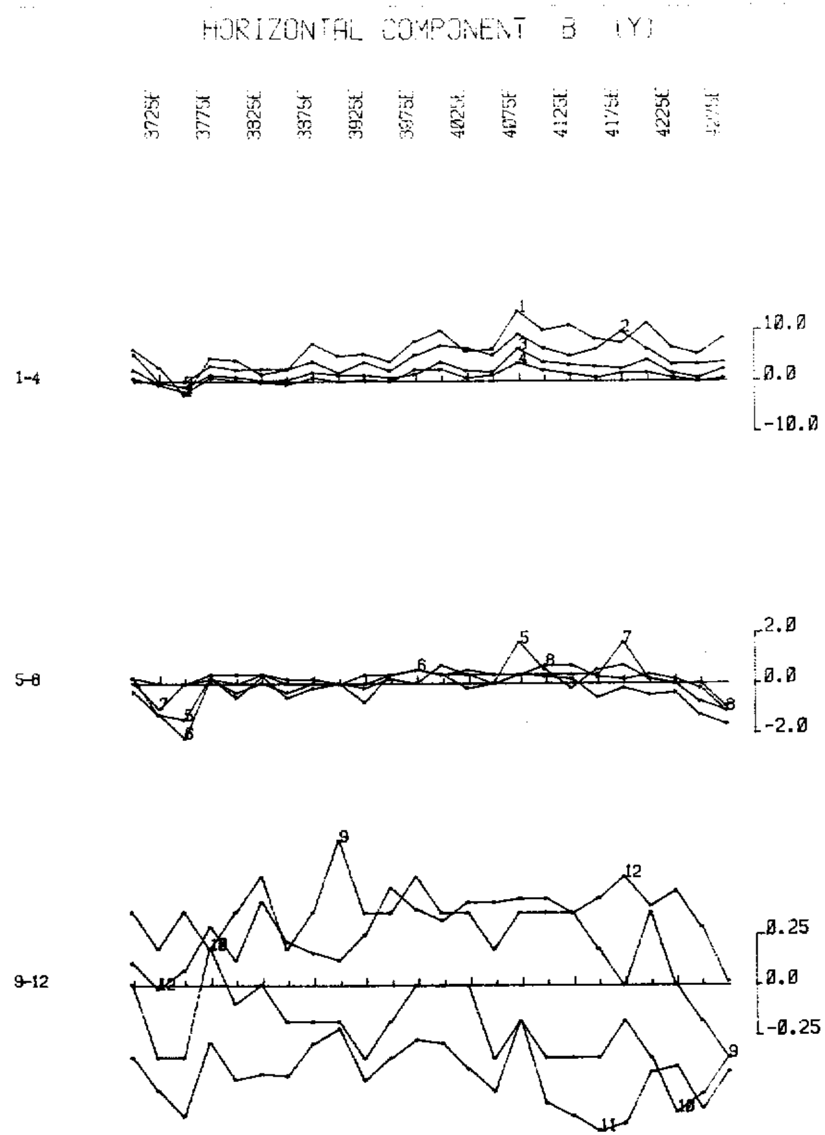
CLIENT	:	Aberfoyle Limited
PROJECT	:	Zone E
AREA	:	Que River
LINE	:	8000N
TX LOOP	:	3

Y

FIGURE 24

680

210091



5 cm

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES	:	7500N	4300E
	:	8100N	4500E
TX LOOP SIZE	:	200m X 600m	
TX TURN OFF TIME	:	300 microsecs	
CURRENT	:	14.0 amps	
FREQUENCY	:	25 HZ	
INTEGRATION TIME	:	256 cycles	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	JP/RL	
DATE	:	17-DEC,1983	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1809

CLIENT	:	Aberfoyle Limited	
PROJECT	:	Zone E	
AREA	:	Que River	
LINE	:	8100N	Y
TX LOOP	:	3	

FIGURE 25

060

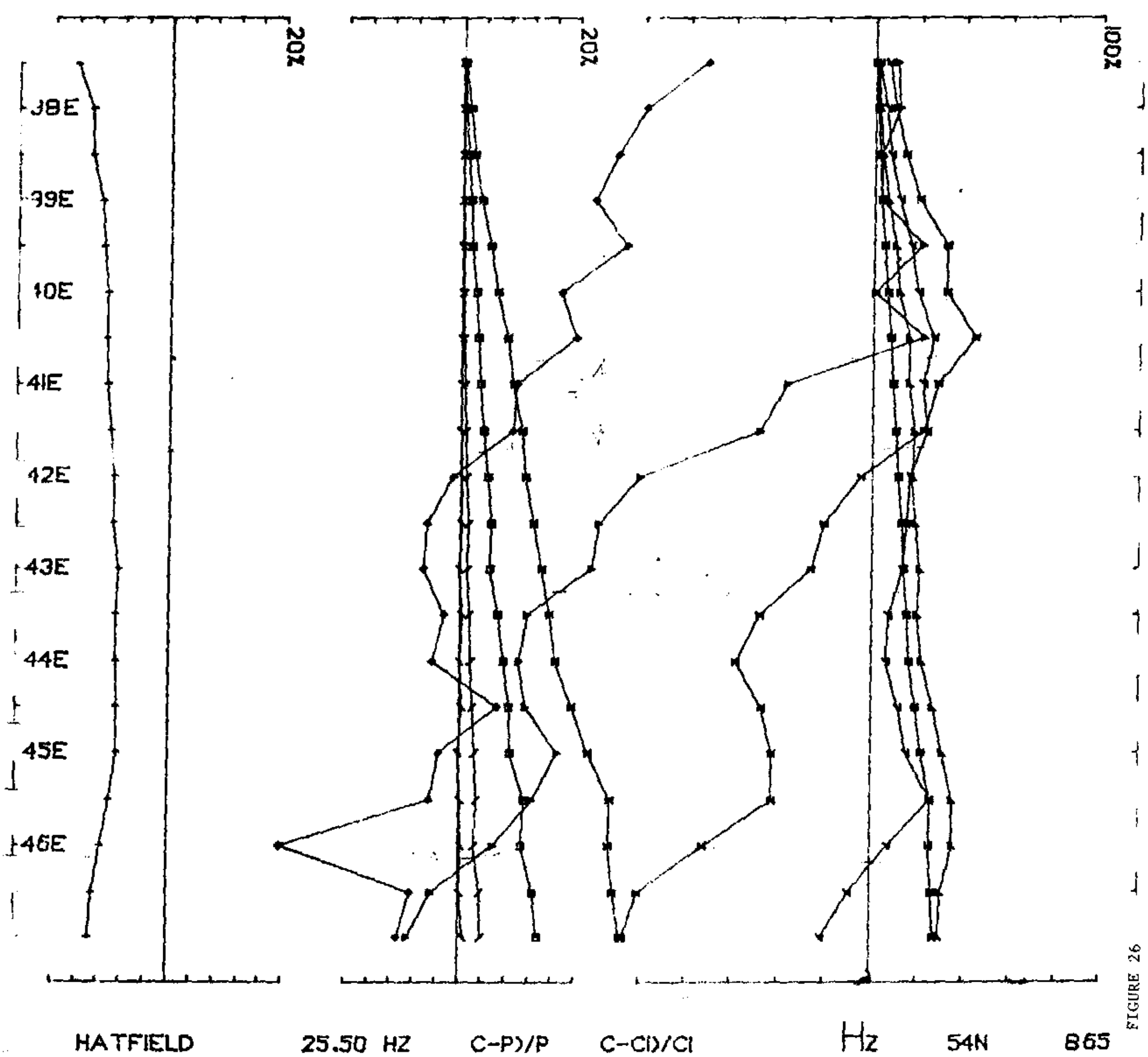

20%
20%
100%
38E
39E
40E
41E
42E
43E
44E
45E
46E
HATFIELD
25.50 HZ
C-P)/P
C-CI)/CI
Hz
54N
865

FIGURE 26

092

210093

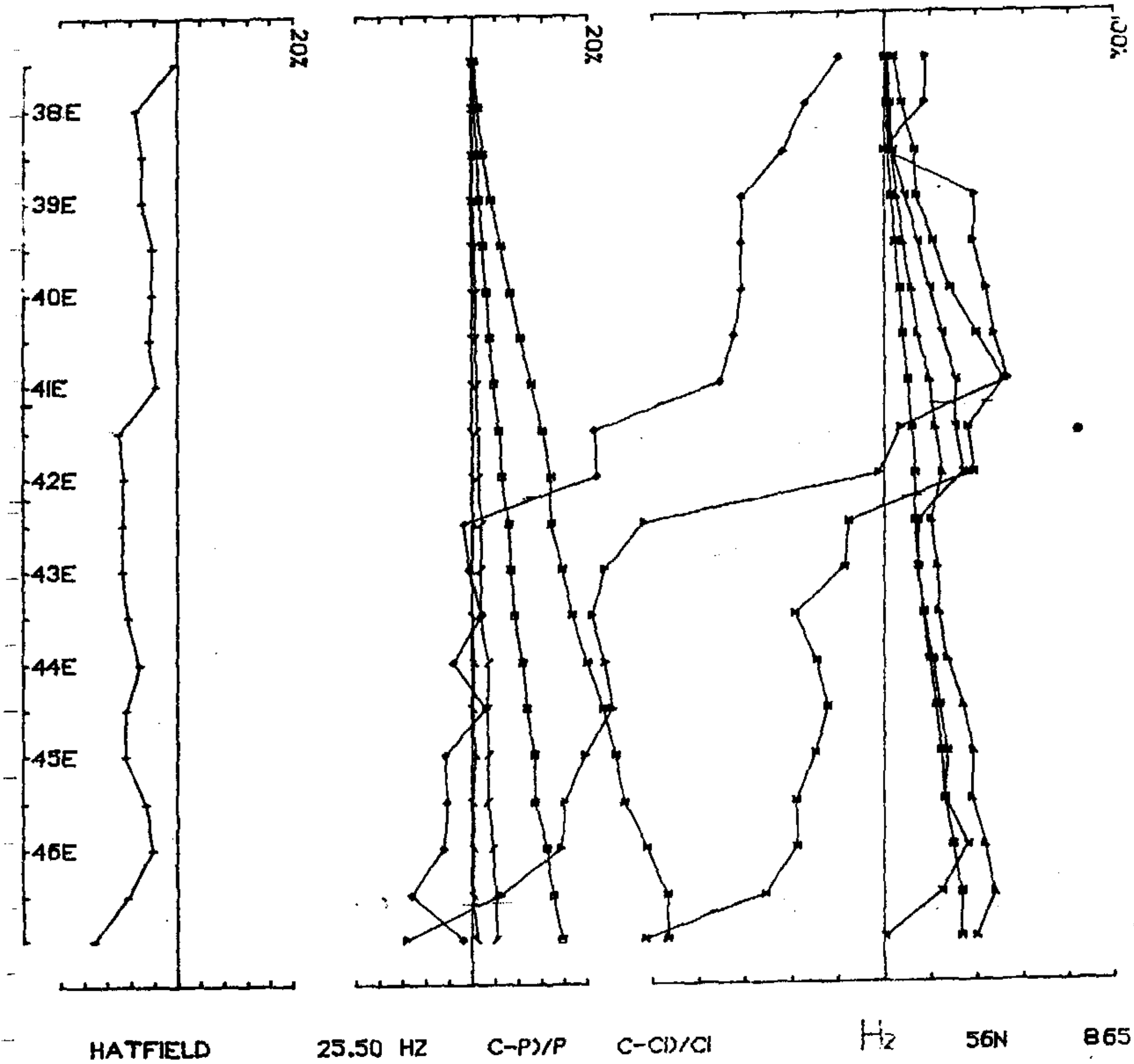


FIGURE 27

093

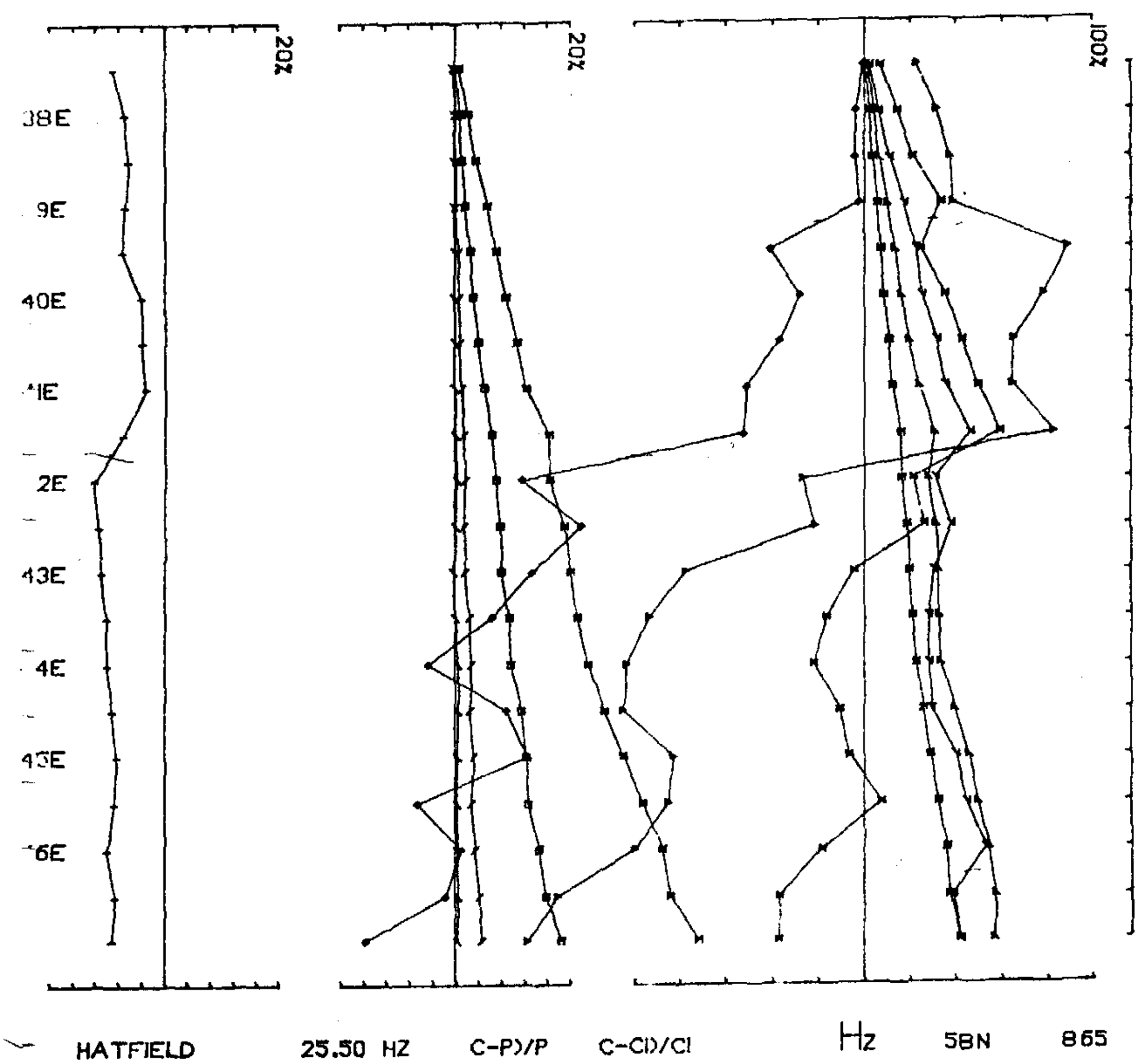
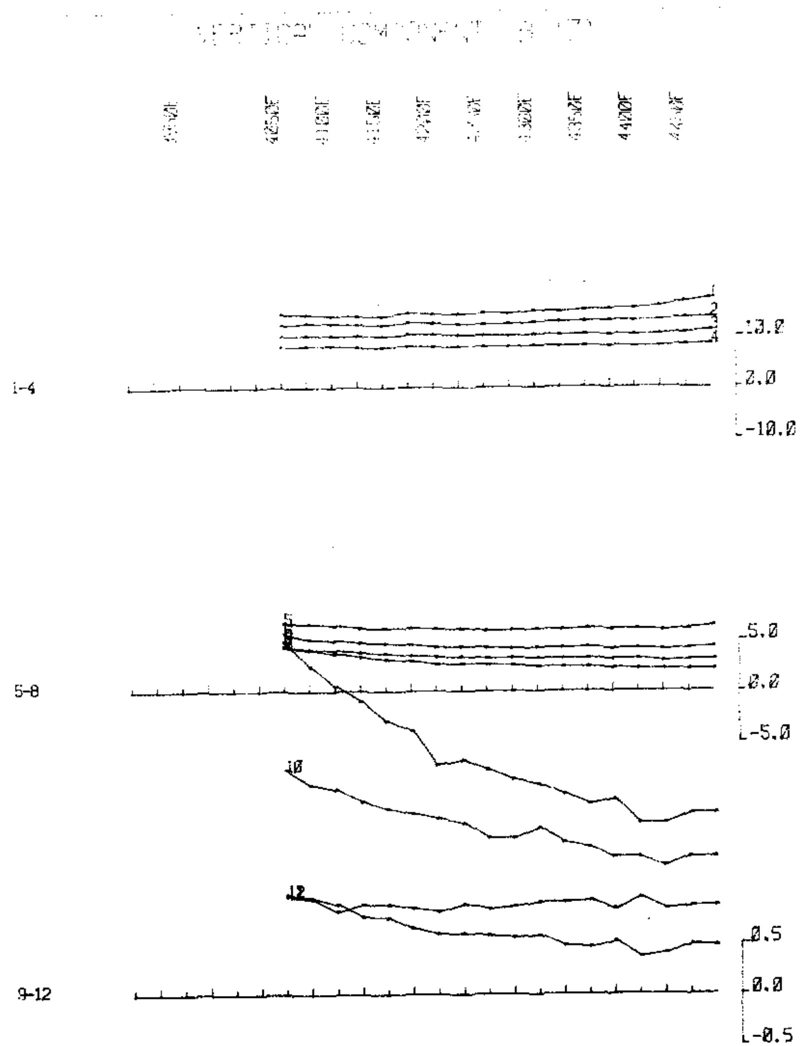


FIGURE 28

210095



5 cm

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

(TIME DERIVATIVE OF FLUX DENSITY (B))

nanovolts per amp.metre squared

TX LOOP SIDES	: 5400N 4500E
	: 6000N 4800E
TX LOOP SIZE	: 300m X 600m
TX TURN OFF TIME	: 360 microsecs
CURRENT	: 13.0 amps
FREQUENCY	: 25 Hz.
INTEGRATION TIME	: 256 cycles
SYNC MODE	: CRYSTAL
HORIZONTAL SCALE	: 1:5000
SURVEYED BY	: JP/RL
DATE	: 14-DEC,1983

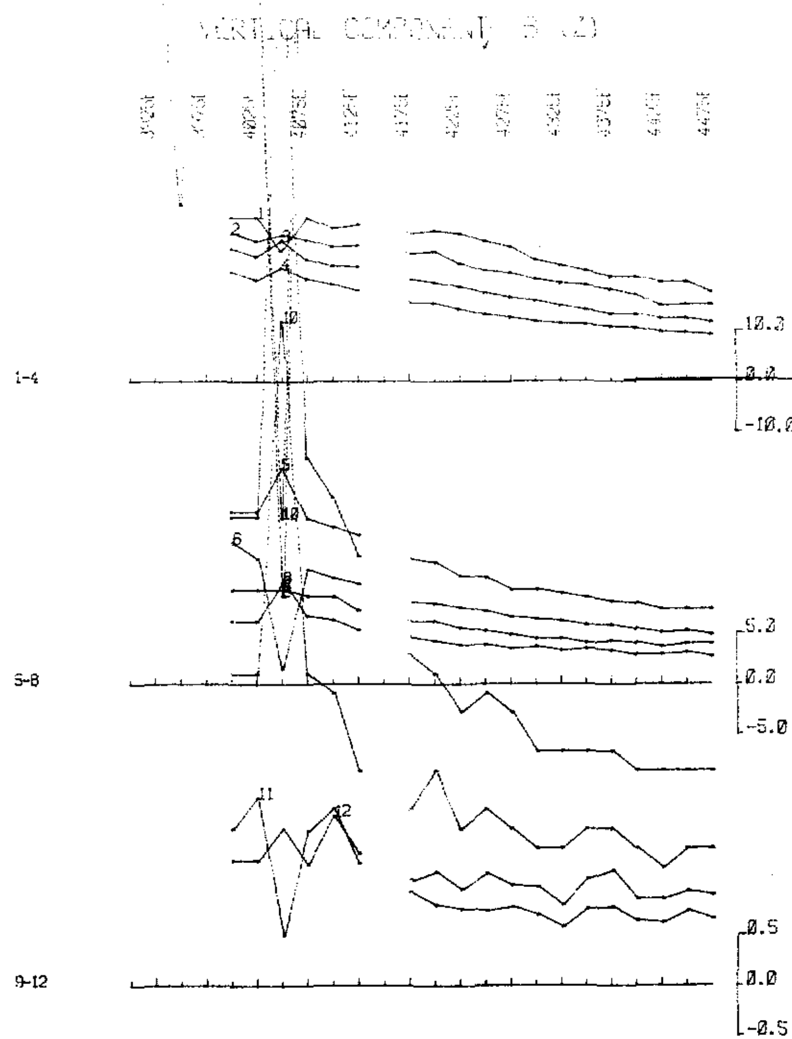
SURVEYED AND COMPILED BY GEOTERREX PTY. LTD. — PROJECT NO. 85-1809

CLIENT	: Aberfoyle Limited
PROJECT	: Zone I
AREA	: Que River, Tasmania
LINE	: 5400N Z
TX LOOP	: 2

FIGURE 29

094

210096



5 cm

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES	: 5400N	4500E
	: 6000N	4800E
TX LOOP SIZE	: 300m X 600m	
TX TURN OFF TIME	: 350 microsecs	
CURRENT	: 13.0 amps	
FREQUENCY	: 25 Hz.	
INTEGRATION TIME	: 256 cycles	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: JP/RL	
DATE	: 13-DEC,1983	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD. | PROJECT NO. 85-1809

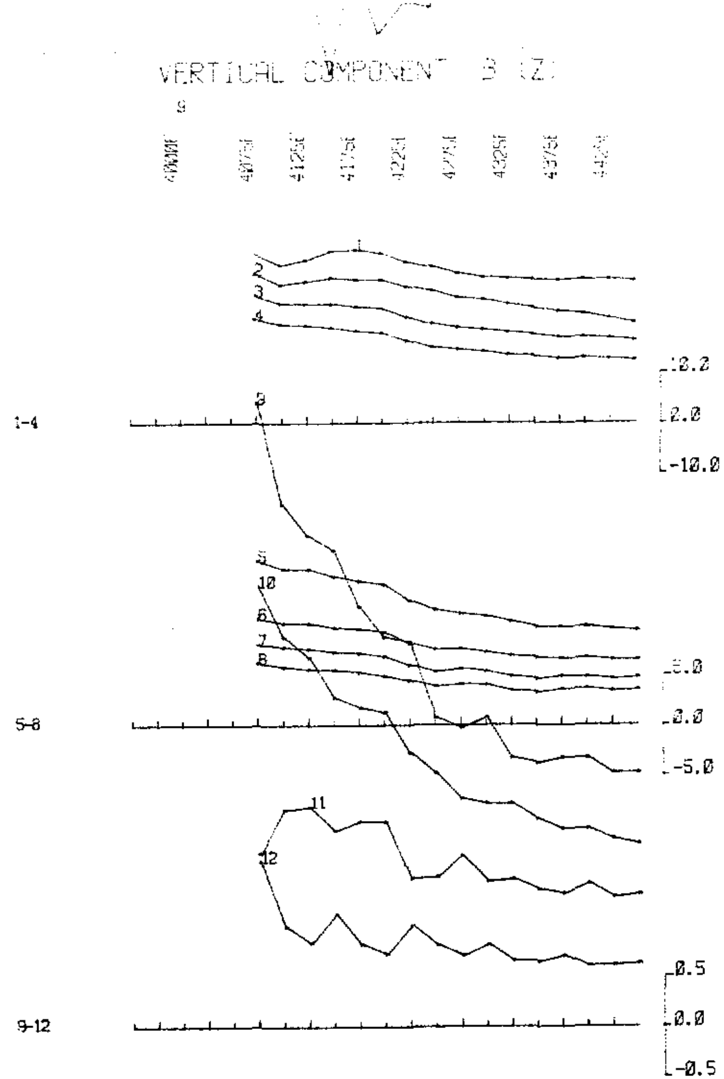
CLIENT	: Aberfoyle Limited
PROJECT	: Zone 1
AREA	: Que River, Tasmania
LINE	: 5500N Z
TX LOOP	: 2

FIGURE 30

095

210097

5 cm



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per amp. metre squared

TX LOOP SIDES	: 5400N 4500E
	: 6000N 4800E
TX LOOP SIZE	: 300m X 600m
TX TURN OFF TIME	: 344 microsecs
CURRENT	: 12.5 amps
FREQUENCY	: 25 Hz.
INTEGRATION TIME	: 256 cycles
SYNC MODE	: CRYSTAL
HORIZONTAL SCALE	: 1:5000
SURVEYED BY	: JP/RL
DATE	: 15-DEC,1983

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD. — PROJECT NO. 85-1809

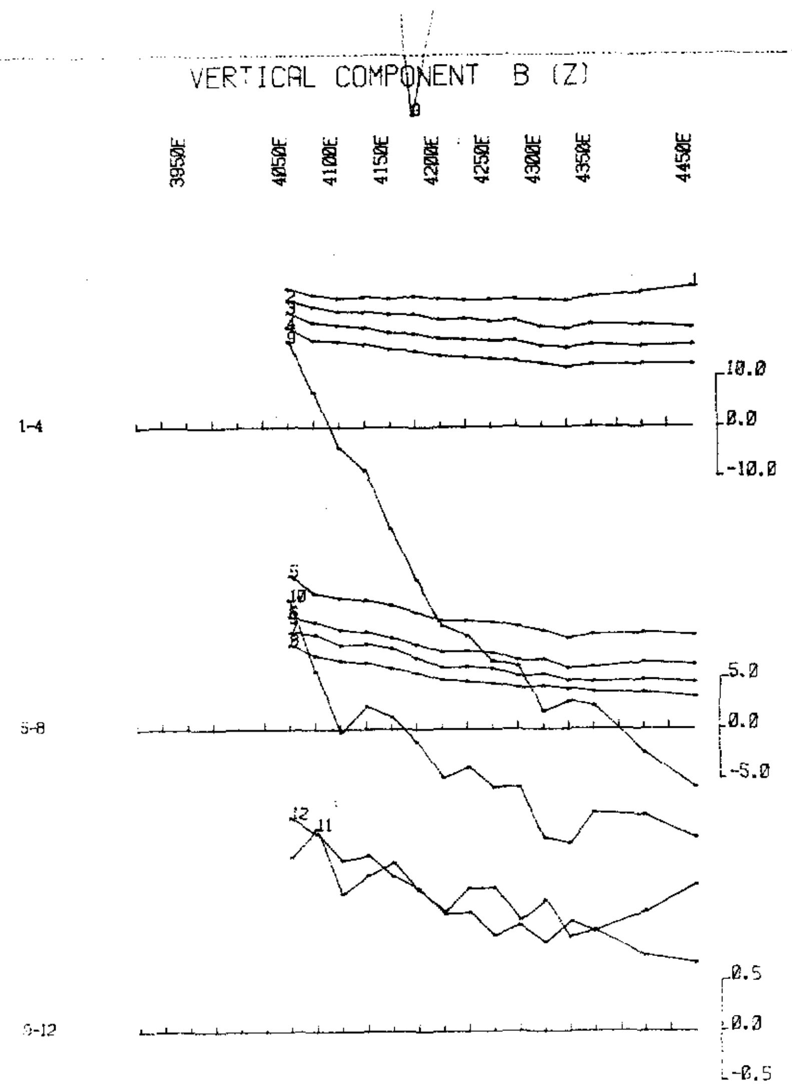
CLIENT	: Aberfoyle Limited
PROJECT	: Zone I
AREA	: Que River, Tasmania
LINE	: 5600N Z
TX LOOP	: 2

FIGURE 31

960

210098

5 cm



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES	: 5400N 4500E
	: 6000N 4800E
TX LOOP SIZE	: 300m X 600m
TX TURN OFF TIME	: 344 microsecs
CURRENT	: 12.5 amps
FREQUENCY	: 25 Hz.
INTEGRATION TIME	: 256 cycles
SYNC MODE	: CRYSTAL
HORIZONTAL SCALE	: 1:5000
SURVEYED BY	: JT/RL
DATE	: 15-DEC,1989

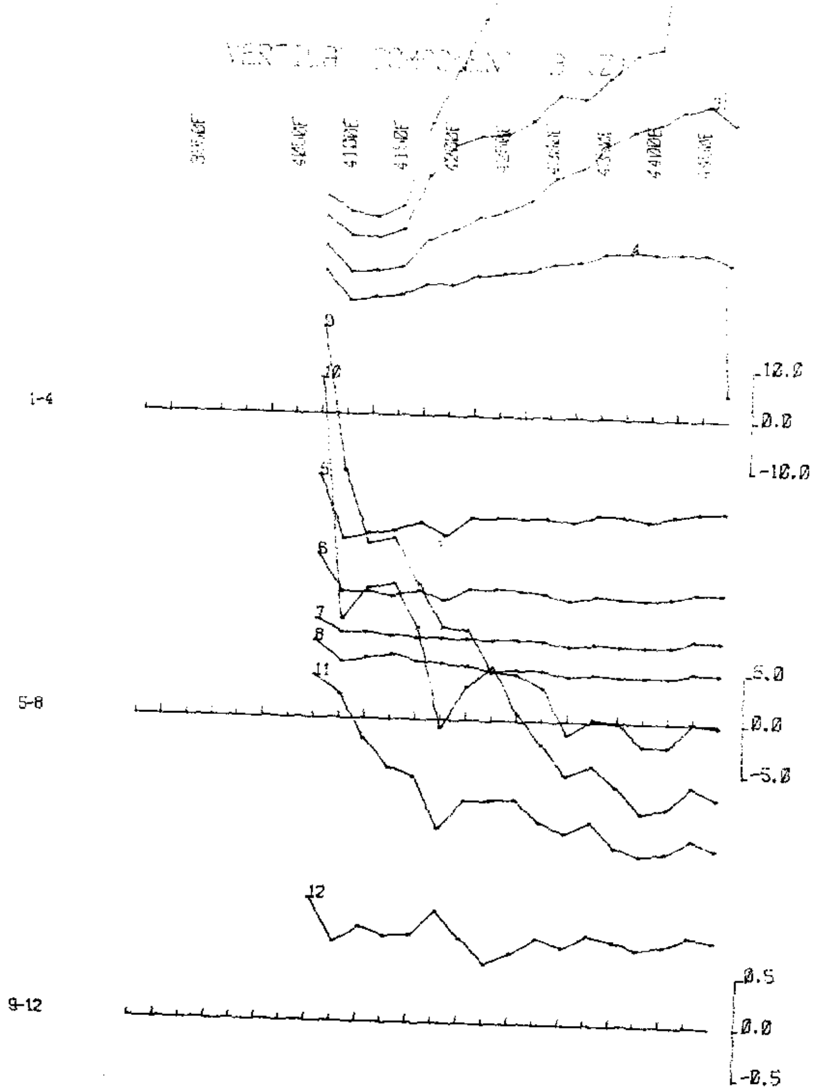
SURVEYED AND COMPILED BY GEOTERREX PTY. LTD. — PROJECT NO. 35-1809

CLIENT	Aberfoyle Limited
PROJECT	Zone 1
AREA	Que River, Tasmania
LINE	5700N Z
TX LOOP	2

FIGURE 32

097

5 cm



nanovolts per amp metre squared

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

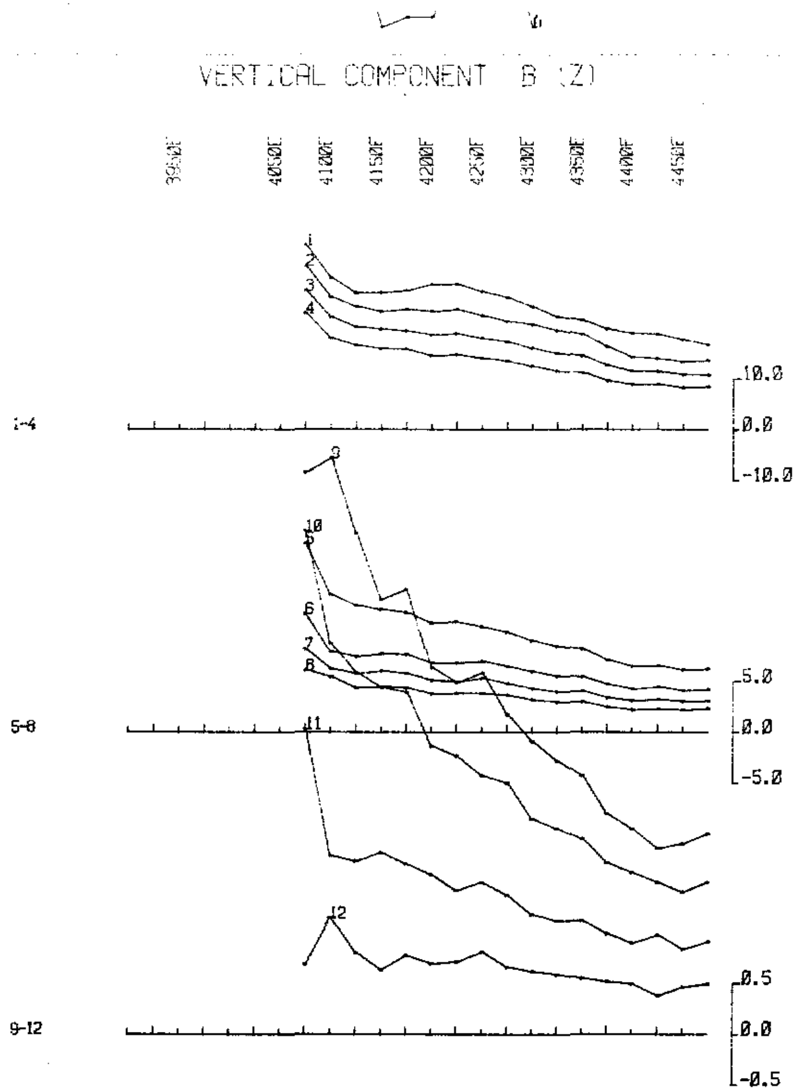
TX LOOP SIDES	:	5400N	4500E
	:	6000N	4800E
TX LOOP SIZE	:	300m X 600m	
TX TURN OFF TIME	:	344 microsecs	
CURRENT	:	12.5 amps	
FREQUENCY	:	25 Hz.	
INTEGRATION TIME	:	256 cycles	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:5000	
SURVEYED BY	:	JP/RL	
DATE	:	15-DEC,1989	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD. — PROJECT NO. 85-1809

CLIENT	:	Aberfoyle Limited
PROJECT	:	Zone I
AREA	:	Que River, Tasmania
LINE	:	5800N Z
TX LOOP	:	2

FIGURE 33

2101000



5 cm

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES	: 5400N	4500E
	: 6000N	4800E
TX LOOP SIZE	: 300m X 600m	
TX TURN OFF TIME	: 360 microsecs	
CURRENT	: 13.0 amps	
FREQUENCY	: 25 Hz.	
INTEGRATION TIME	: 256 cycles	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:5000	
SURVEYED BY	: JP/RL	
DATE	: 14-DEC-1983	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD. | PROJECT NO. 85-1809

CLIENT	: Aberfoyle Limited
PROJECT	: Zone I
AREA	: Que River, Tasmania
LINE	: 5900N Z
TX LOOP	: 2

FIGURE 34

660

APPENDIX IV

LOCATION OF PETROLOGICAL SAMPLES
IN APPENDICES 5, 6, 7, 8

LOCATION OF PETROLOGICAL SAMPLES

SAMPLE NO	PEG	COSTEAN	PLATE
270684	1	4550N/4400E	18
685	1	" "	
686	16	" "	
687	30	" "	
688	30	" "	
689	36	" "	
690	42	" "	
691	1	4500N/4400E	17
692	51	" "	
693	55	" "	
694	66-67	" "	
695	71-72	" "	
696	1	4500N/4100E	16
697	23	4000N/4100E	20
698	41-42	3900N/4100E	19
699	24-25	4400N/4200E	15
270885	5	Zone E/7700N	3
886	9	" "	
887	23-24	" "	
888	28	" "	
889	28-29	" "	
890	29	" "	
891	29-30	" "	
892	30	" "	
893	34	" "	
894	2	Zone L/5800N	7
895	10	" "	
896	28-29	" "	
897	33	" "	
898	45	" "	
899	54	" "	
900	60	Zone E/7700N	3
901	77	Zone L/5700N	6
902	78	" "	
903	93	" "	
904	3-4	5400N/3600E	22
905	14	" "	
906	34	" "	

270939	3-4	Zone E/7500N	2
941	17-18	" "	
942	19	" "	
943	21.8	" "	
944	24.5	" "	
945	24.5	" "	
946	27	" "	
947	24.3	" "	
948	31	" "	
949	32	" "	
950	32	" "	
951	46.5	" "	
963	74	Zone E/7900N	4
964	75	" "	
965	84	" "	

APPENDIX V

Petrological Report CMS 84/1/6 on samples from 4550N/4400E, 4500N/4400E, 4000N/4100E, 3900N/4100E and 4400N/4200E costeans

H W FANDER

Appendix V

Central Mineralogical Services

CMS

39 [illegible] Road
[illegible] SA 5067
Tel: [illegible] 42 5559

Mr. A.M. Hespe
Geologist
Aberfoyle Exploration Pty. Ltd.
P.O. Box 952
BURNIE / TAS. 7320

9th February, 1984

REPORT CMS 84/1/6

YOUR REFERENCE:	Letter dated 12.12.1983
DATE RECEIVED:	5th January, 1984
SAMPLE NOS.:	270684 - 270699
SUBMITTED BY:	A.M. Hespe
WORK REQUESTED:	Petrology

H.W. Fander, M. Sc.

Copy to:
The Chief Geologist
Aberfoyle Exploration Pty. Ltd.
144, Camberwell Road
HAWTHORN EAST / VIC. 3123

105

210106

REPORT CMS 84/1/6

Mt. Charter Samples, Nos. 270684 - 270699

Sixteen samples from the Mt. Charter area, near the Que River mine, were received for petrological study; thin-sections were prepared of all the rocks, and the offcuts were subjected to potash stain tests to aid identification of fine K-silicate phases for classification and interpretation purposes. The rocks are described in the accompanying table.

Summary

All the rocks are of igneous or inferred igneous origin, and include tuffs and other volcanics which are too severely altered for accurate classification.

The igneous rocks are all fine-grained, and range in composition from potash-rich trachytes (684, 685, 695), through trachyandesites, andesites to oligoclase-basalt (mugearite, 699); because of their fine grainsize and deuteric alteration, not all minerals are clearly recognisable, and a rock may be classified as a trachyte which may be more basic, i.e. andesitic. This is probably less important than the recognition that all these rocks are genetically related and form part of a series. Some are brecciated; this may be due to tectonism, but is believed to have been either flow-brecciation or due to extrusion.

Rocks such as 692, 693 (and possibly 690) have relict features thought to represent altered perlitic textures; they are most clearly displayed in 692 and suggest a glassy origin and broadly "acid" composition.

The pyroclastic rocks include a transitional type, sample 686, classified as a trachytic tuff-lava, and altered lithic tuff (694), and two schistose rocks (687, 688) which are believed to be sheared tuffs; one of these contains barite, and both are conspicuously pyritic.

Virtually all the alteration seen in these rocks is either deuteric or low-temperature hydrothermal, except for weathering and iron-staining as in 699 and others - the iron-staining seems to be derived from the oxidation of sulphides, pyrite in particular.

H.W. Fander, M. Sc.

..ple	..ock ., e omp :ior	abri	Mi -- Mir--ls	ommen..
I- I S. 33)	Porphyritic Trachyte. Scattered small sanidine phenocrysts, largely replaced by mosaic quartz, in a microcrystalline groundmass of K-feldspar with sericite veinlets, patches. 270-684 (T.S) 48633	Phenocrysts are crudely orientated, groundmass is faintly flow-banded. Fine-grained.	Quartz veins with oxidised sulphides. Younger goethite fracture-fillings. Leucoxenised primary opaques.	K-stain test strongly positive. Absence of primary quartz and strong potassic composition signify trachyt. Green colour = illite-sericite (hydrothermal).
)- ;	Porphyritic Trachyte. Feldspar phenocrysts pseudomorphed by quartz and Fe-stained, brown sericite, in a groundmass of K-feldspar, sericite, small chlorite pseudomorphs after ?amphibole. 270-685	Phenocrysts up to 2-3 mm. Groundmass uniform, with faint preferred orientation. Fine-grained.	Some unaltered phenocrystal feldspar (sanidine). Leucoxenised opaques. Quartz veinlets.	Correlatable with 684. Quartz-serici replacement of phenocrysts is hydrothermal. Quartz veinlets are younger, cutting altered phenocrysts
)-)	Trachytic Tuff-Lava. Small ovoid, elongate and irregular fragments of altered trachyte set in uniform fine mass of altered Hum Acr? trachyte or rhyolite with quartz, feldspar splinters. 270-686	Fragments have pronounced "trachytic" fabric. Matrix is faintly flow-banded also.	Chlorite pseudomorphs after ?hornblende in fragments. Leucoxene in matrix.	Fragments of one lava in a matrix of different composition. Fragments all of same origin, possibly still plastic when incorporated in lava matrix.
)- 7	Pyritic Sericite Schist. Dominantly fine schistose illite-sericite, with scattered pyrite crystals and skeletal leucoxene grains after oxide opaques. 270-687	Good, fine schistosity, with mass extinction of large sections of rock. Uniform, fine-grained.	A few quartz grains; isolated apatite crystals. Thin veinlets with traces of barite.	Mineral assemblage, especially the conspicuous leucoxene, strongly suggests igneous, volcanic origin, possibly trachytic/intermediate tuff
)- :	Baritic, Pyritic Sericite Schist. Small quartz-sericite lenses in fibrous sericite matrix, with scattered barite porphyroblasts and pyrite crystals with fibrous quartz fringes. 270-688	Fine schistose fabric and relict fragmental textures. Barite is post-schistosity.	Ultrafine leucoxene throughout. Possible traces of carbonaceous pigment.	Paler colour of some zones is due to bleaching of ?carbonaceous pigment by oxidation of pyrite (producing H_2SO_4). Probable sheared tuff.
)-) 1404?	Trachyte(?)-Breccia. Many small fragments of altered trachyte or trachyandesite, rimmed with chlorite and cemented by fine quartz; a few small plagioclase phenocrysts. 270-689	Brecciation appears to be governed by "crackle" or perlitic fabric. Trachytic texture.	Thin quartz-chlorite veinlets. Small shreds of Mn-epidote.	Believed to be trachyte or trachyandesite with well-developed perliti fabric, which provided access to pervasive quartz-chlorite penetration.
)-)	Sheared, Altered Volcanic. Scattered, sericitised feldspar crystals, in a fine, poorly-defined matrix of quartz, chlorite, sericite, cloudy epidote, fine fibrous plagioclase. 270-690	Semi-schistose fabric, may be partly due to flow. Possible fine vesicular textures.	Scattered fine pyrite crystals. Veinlets of fine ?prehnite. Apatite needles.	Exact nature and composition of original rock not known, because of extensive alteration; possibly a vesicular andesite.
:- I	Trachyandesite Breccia. Small and large angular fragments of rock composed of fine plagioclase laths, with scattered augite laths, interstitial K-feldspar; cemented by quartz. 270-691	Rock has typical felted trachytic fabric. A few microphenocrysts. Uniform, fine-grained.	Small pyrite crystals in quartz. Fine dendritic epidote, chlorite throughout.	K-staining is positive. Rock is relatively fresh, but very fine-grained, probably extrusive. Different from 690, no comparison possible.

	Rock Type Composition	Fabric	Minor Minerals	Comments
0-2 270 692	Argillised Perlitic Obsidian. A few sericitised feldspar phenocrysts in a groundmass of fine sericite and quartz with well-preserved fine perlitic and felsitic textures.	Uniform, fine-grained, with distinct preferred orientation. Phenocrysts are aligned.	Scattered oxidised pyrite crystals. A few leucoxenised oxide opaques.	Thoroughly altered. No quartz phenocrysts. Fresh rock possibly of dacitic composition, but could have been rhyolitic. Hydrothermally altered.
0-3 270 693	Altered Volcanic. Numerous small quartz spots (?altered spherulites), embedded in fine sericite and chlorite, with scattered argillised plagioclase phenocrysts.	Some preferred orientation, due to ?flow. Spotty textures may be perlitic.	Oxidised pyrite crystals. Leucoxenised oxide opaques. Light Fe-staining.	Severely altered, but is generally similar to 690, possibly related to 692 also. Chlorite is introduced, and rock was more "acid" than an andesite.
0-4 270 694	Argillised Lithic Tuff. Larger angular fragments of argillised volcanic rock, accentuated by limonite, in a matrix of smaller fragments; all composed of fine quartz and illite-sericite.	Fragmental nature of rock recognisable, but fragments themselves are featureless.	A few leucoxene grains. Goethite patches and veinlets.	Fragments could have been trachytic to andesitic, and were predominantly feldspathic. Low-grade pervasive hydrothermal alteration and weathering.
0-5 270 695	Porphyritic Trachyte. Small silicified and argillised feldspar phenocrysts, randomly scattered through fine-grained mass of K-feldspar with patches of introduced quartz.	Faint preferred orientation, devitrification textures, but fairly featureless, uniform.	Sericite shreds and films/networks. Leucoxenised opaques. Altered fine ?ferromagnesians.	Very similar to, and correlatable with, 685. K-stain test strongly positive. Two different species of feldspar phenocrysts originally present.
0-6 270 696	Argillised, Ferruginised Lava. Argillised, silicified feldspar phenocrysts in a fine argillic groundmass (altered feldspar and/or feldspathic glass), extensively limonite-impregnated.	Some shearing, brecciation, but essentially continuous fabric with flow-banding.	Leucoxenised opaques. Oxidised pyrite common in zones.	A kaolinised intermediate lava, probably trachytic. Relict perlitic textures in places. Clay mineral is kaolinite-illite.
0-7 270 697	Andesite. Small phenocrysts, singly and in clusters, of fresh augite, in a fine felted mass of plagioclase laths. Irregular small and large amygdales filled with quartz, prehnite.	Matted-parallel "trachytic" fabric. A few larger plagioclase phenocrysts.	Traces of epidote, carbonate, pyrite, mainly in amygdales. Minor interstitial K-feldspar.	Closely resembles 691, but with much less K-feldspar; hence, classificati as andesite rather than trachyandesite.
0-8 270 698	Andesite Breccia. Fragments of andesite, composed of many fresh augite microphenocrysts in felted fine plagioclase mass; many small amygdales. Cemented by quartz-albite-prehnite-clinozoisite.	Fragments are rounded, to splintery, fabrics similar, but with minor variations.	Small patches, veinlets of pale chlorite (penninite) - also in amygdales.	Compositionally very similar to 697. Brecciation was probably volcanic, but may have been tectonic fragments are related.
0-9 (T.S. 548)	Andesite. Scattered small plagioclase and augite phenocrysts, in a felted mass of fine oligoclase crystals and augite. A few irregular amygdales. Partly oxidised. 270-699 (T.S. 43648)	Matted-parallel "trachytic" fabric, but amygdales not flow-orientated or shaped.	Amygdales contain quartz, pumpellyite, prehnite, isolated dark sphalerite.	Composition possibly more basaltic than andesitic (i.e. oligoclase-basalt, "mugearite"). Clearly related to 697, 698. Sphalerite is deuteric. Brown zone is oxidised, weathered.

21010S

APRENDIX VI

Petrological Report CMS 84/3/3 on samples from the UTEM Zone E/7700N costean and Zone I1/5700N and 5800N costeans.

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16th March, 1984

REPORT CMS 84/3/3

YOUR REFERENCE:	Letter dated 28.2.1984
DATE RECEIVED:	2nd March, 1984
SAMPLE NOS.:	270885 - 270903
SUBMITTED BY:	A.M. Hespe
WORK REQUESTED:	Petrology

H.W. Fander, M. Sc.

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REPORT CMS 84/3/3

Samples 270885 - 270903

Nineteen rock samples, in two separate groups from the vicinity of the Que River mine, were received for petrological study; thin-sections were prepared, and offcuts were subjected to potash stain tests, invaluable in the examination and interpretation of fine-grained volcanics.

Summary

Group 1 (270885 - 270893)

This commences with a suite of five altered lavas of broadly similar composition, in the dacite to trachyte range, but with variable fabrics; the next three rocks are altered, argillised felsites which appear to be intrusive.

Colour variations in some of these rocks are due to subtle changes in the argillaceous minerals, and are more obvious in hand specimen, due to mass effects, than in thin-section; their significance is doubtful. In some cases, preferential alteration of some components in fragmental volcanics was responsible for patchy, uneven colour distribution.

The final member (270893) of the group is a dacitic ?tuff-lava and may be correlatable with 270889; possibly, therefore, the felsites were intruded into a sequence of lavas; alteration of the whole series was thus younger than the intrusives and was an epithermal event which also introduced the pyrite. It would not be surprising if low levels of Au were associated with these rocks.

Group 2 (270894 - 270903)

Many of these rocks are considerably fresher than those in Group 1. Most are trachytes ranging into rhyolites and include in- and extrusive types. The group includes a leucoandesite and related trachyandesite, and there may well be a gradational genetic relationship between these and the trachytes. The group also includes two lava breccias (i.e. of mixed pyroclastic/extrusive origin) and a tuff; thus, the majority of this group are volcanics rather than intrusives. There is a clear contrast between the two groups, though the intrusives in both may have had a common origin; this is speculative, because one suite of intrusives is altered (270890-1-2), the other is fresh (270895-7-8).

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mple .	Rock Type Composition	Fabric	Minor Minerals	Comments
0- 5 .S. 980)	Altered Volcanic. Now composed of microgranular quartz and streaks of illite-sericite; occasional larger, argillised feldspar crystals (?phenocrysts), iron-stained. 270-885 (T.S. 48980)	Fine-grained, with flow-banding and devitrification textures.	Leucox. .sed oxide opaques, Fe-staining in places.	Severe alteration precludes exact classification; possibly a dacitic lava or a pyroclastic rock (?welded or perhaps more trachytic.
0- 6 Dnc	Argillised Porphyritic ?Dacite. Scattered small argillised feldspar phenocrysts in a uniform mass of (?secondary) quartz and small illite-sericite aggregates. 270-886	Fine-grained, with relict felsitic textures, no flow-banding. Phenocrysts < 1 mm.	Leucoxenised opaques. Scattered pyrite, and jarosite pseudomorphs. Younger quartz veins.	Absence of quartz phenocrysts suggests dacitic or trachytic lava. Some groundmass quartz may be primary; originally ?glassy.
0- 7	Argillised Porphyritic Trachyte. Generally small phenocrysts of argillised feldspar common throughout a mass of felted small laths of altered feldspar and felsitic patches. 270-887	Excellent "trachytic" flow-fabric, with superimposed felsitic textures; aligned phenocrysts.	Conspicuous skeletal anatase or rutile after ?ilmenite. Altered cognate xenoliths.	Originally a strongly feldspathic rock, hence classified as a trachyt· but other interpretations are possible. Very probably extrusive.
0- 8 Dnc	Altered Volcanic. Argillised feldspar crystals (?xenocrysts) set in a fine mass of streaky sericite and microgranular quartz, with coarser, more quartzose lenses, sericitic streaks. 270-888	Pronounced relict flow-fabric; perlitic textures in places, and devitrification features.	Leucoxenised oxide opaques. Ultrafine pyrite, scattered larger crystals, accentuating flow.	Broadly similar to 270885 and 27088 probably a dacitic lava, possibly weakly sheared. Pyrite is associate with the alteration.
0- 9	Altered Lava Breccia. Bands, lenses and fragments of coarser sericite-quartz with argillised feldspar phenocrysts, with interbanded streaks of finer, more siliceous material. 270-889	Both phases are fine-grained, but with contrasting textures, compositions. Flow-banded.	Clusters and stringers of small pyrite crystals. Leucoxenised opaques.	May have been a mixture of two slightly different lava phases, extruded together. Main phase probably dacitic to trachytic.
0- 0	Altered Felsite. Very sparse argillised feldspar phenocrysts scattered through a mass of felsitic quartz patches with interstitial fine sericite; pyrite clusters. 270-890	Featureless, fairly uniform, with minor variations in felsite grainsize. No flow features.	Clusters and stringers of pyrite with rims of fibrous sericite.	Uniformity and lack of lava characteristics suggest a minor or shallow intrusive; probably of dacitic-trachytic composition.
0- 1	Altered Porphyritic Felsite. Random, argillised feldspar phenocrysts in a mass of typical felsitic material now composed of quartz dusted with ultrafine illite-sericite. 270891	Uniform fabric, no preferred orientation of phenocrysts or groundmass.	Leucoxenised oxide opaques. Small scattered pyrite clusters. Trace limonite.	Not particularly correlatable with 270885, 270887 or 270889, but quite similar to 270890. Could well be intrusive; no specific lava features.
0- 2	Altered Porphyritic Felsite. Leached and argillised feldspar phenocrysts in a fine-grained mass of poorly-defined quartz clouded with illite-sericite shreds. 270892	Felsitic textures; vaguely streaky, preferred fabric due to quartz-rich streaks.	Leucoxenised oxide opaques. Quartz-pyrite patches and distinct veins.	Resembles 270890 and 270891, though fabric is slightly different. Subtle colour variations probably due to slight changes in illite-sericite.

ample o.	Roc ype Co iti	Fab	or era	Com ts
70-93 270-893	Altered Dacitic ?Tuff-Lava. Composed o. quartz and illite-sericite; bands with fine fragmental textures and argillised feldspar crystals, and more siliceous streaks.	General fragmental fabric at different scales, with overall preferred orientation.	Scatt..ed leucoxenised oxide opaques - some microcrystalline anatase/rutile.	Severely altered, but appears to b. a mixed extrusive/pyroclastic, i.e lava with fragments. Similar to 270889, on a finer scale.
70-94 270-894	Porphyritic Trachyte. Small, subparallel fresh albite phenocrysts in a mass of felted albite laths and fine K-feldspar or devitrified K-silicate glass, with fine sericite.	Typical matted-parallel "trachytic" fabric. Phenocrysts mostly < 0.5 mm.	A few small chloritised ?amphibole crystals, with associated leucoxene.	Fresh rock, and thus able to be accurately classified; definitely a trachyte. K-stain test positive - could be useful for correlation in the field. Extrusive.
70-95 270-895	Porphyritic Sodic Trachyte. Small, fresh, well-formed albite phenocrysts scattered through microcrystalline groundmass of albite laths, minor quartz; all lightly iron-stained.	Uniform, except for irregular patches of finer rock-cognate xenoliths. No flow features.	Isolated quartz phenocrysts. Veinlets, patches of quartz-hydromuscovite. Oxidised pyrite.	Depending on primary quartz conten which is difficult to determine because of fine grainsize, rock ma be a sodic rhyolite (intrusive). Differs from 270894.
70-96 270-896	Trachytic Lava Flow Breccia. Rounded fragments of trachyte (albite microphenocrysts, K-feldspar groundmass) in a lava matrix of similar composition, but different fabric.	Fragments are 1-20 mm, smaller ones tend to be angular. Matrix is flow-banded.	Isolated chloritised amphibole crystals in fragments, matrix. Minor sericitisation.	Composition of fragments comparabl with 270894. Overall fabric indica extrusive rock, though fragments have intrusive fabric.
70-97 270-897	Argillised Porphyritic Trachyte. Scattered small argillised feldspar phenocrysts in a microcrystalline groundmass of quartz, sericite aggregates, altered felsitic patches.	Fine-grained, homogeneous, no flow features. Some felsitic textures in places.	Ultrafine leucoxene. Pervasive fine Fe-staining. Goethite veinlets.	Classified as a trachyte by analog with the other rocks, based on textures, alteration, but other interpretations possible.
70-98 270-898	Porphyritic Quartz-Trachyte. Small, extensively argillised plagioclase phenocrysts in a groundmass of K-feldspar or devitrified K-silicate glass, and fine quartz.	Uniform featureless fabric; fine felsitic textures. Random phenocrysts, mostly < 1 mm.	Fine leucoxene. Isolated small chlorite-leucoxene grains.	Depending on actual quartz content (i.e. primary quartz), rock may be rhyolite. Fabric suggests an intrusive. Correlatable with the other trachytes.
70-99 270-899	Porphyritic Trachyte. Small, well-formed oligoclase phenocrysts in a fine felted mass of K-feldspar, with fine zoisite-epidote and chlorite of deuteric origin; ?extrusive.	Excellent "trachytic" fabric, good flow-alignment of all components. Fine-grained.	Small quartz-chlorite filled ?vugs; also granular quartz (?primary). Rare chloritised hornblende.	Dark colour is misleading; rock is dominantly feldspathic. With increa in oligoclase, rock would be a fel spathic trachyandesite. Extrusive.
70-00 270-900	Altered Intermediate Lithic Tuff. Sand- to grit-sized fragments of trachyte, altered andesites with a variety of fabrics; interstitial chlorite, quartz, sericite, altered feldspar.	Fragmental, unsorted fabric, vaguely bedded; well-cemented, possibly welded.	Scattered deuteric epidote, chlorite patches.	Alteration has obscured relationshi between fragments, and rock may be a tuff-lava, i.e. pyroclastic fragments in a lava matrix.

ample o.	Roc ype Co iti	Fab	ior eral	Com ts
70- 01 270- 901	Quartz-Augite-Leucoandesite. Well-form. augite phenocrysts, smaller oligoclase crystals, irregular quartz bodies (?xenocrysts) in a matted oligoclase groundmass with fine epidote.	Good, fine flow-banding. Quartz apparently strongly resorbed, ?recrystallized.	A few .ornblende crystals. Replacive coarse epidote; minor interstitial K-feldspar.	Pale colour due to abundant feldsp and almost colourless augite. Quar believed to be xenocrystal, but ma be indigenous. Possible leached amygdales.
70- 02 270- 902	Augite-Trachyandesite. Clusters, individuals, of augite phenocrysts, smaller andesine crystals, in felted mass of fine plagioclase and K-feldspar. Irregular carbonate-filled amygdales.	Flow-banding and some flow-brecciation. Xenoliths with slightly coarser groundmass fabric.	Deuteric alteration minerals - chlorite, epidote, carbonate. Cognate xenoliths.	Similar to 270901, but without quartz; fresher, with elongate amygdales which may be represented by the cavities in 270901.
70- 03 T.S. 3998)	Lava Breccia. Small and large fragments of augite-andesite and augite-trachyandesite with variable deuteric alteration, in an augite-andesite matrix with amygdales. 270-903 (T.S. 48998)	Variable fabrics in different fragments. Crude flow-structure.	Some fragments preferentially altered, and are pale, semi-opaque. Some chloritised fragments.	Varying colours of fragments due t varying deuteric alterato rather than major differences in composition.

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APPENDIX VII

Petrological Report CMS 84/3/32 on samples from the Zone E/7500N costean and the 5400N/3600E costean

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Appendix VII

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12 APR 1984

Central Mineralogical Services

CMS

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9th April, 1984

REPORT CMS 84/3/32

YOUR REFERENCE:	Letter dated 16.3.1984
DATE RECEIVED:	20th March, 1984
SAMPLE NOS.:	15 Samples
SUBMITTED BY:	A.M. Hespe
WORK REQUESTED:	Petrology

Copy to:
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210117

REPORT CMS 84/3/32

Fifteen rock samples were received for petrographic study; thin-sections were prepared, and offcuts were subjected to routine K-stain tests. The rocks are described in the accompanying table.

Summary

All the rocks are volcanics, and all except 270904 are severely altered, so that classification is largely speculative and is based on somewhat tentative or extended interpretation of indifferently to poorly preserved textures and structures, and on extrapolation of alteration assemblages.

It is believed that all the rocks are lavas, ranging into lava breccias; no pyroclastic rocks were recognised, though of course some of the very coarse-grained members present sampling difficulties, where the size of the thin-section cannot be representative.

The only fresh rock is a porphyritic trachyte; the others are inferred with reasonable confidence, to have been in the dacite-trachyte range of compositions, perhaps extending to leuco-andesites and into rhyolites.

Silicification and argillic-sericitic alteration was a low-temperature hydrothermal event; in a few rocks, there is a superimposed, apparently younger deposition of chlorite. This mineral is unrelated to the composition of the original rock; its presence does not infer that these rocks were more basic. The only rock containing evidence of ferromagnesian minerals is 270905, which consists of fragments of two different rock types, one of which was andesitic.

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·ple .	Rock Type - Composition	Fabric	Minor Minerals	Comments
;- i .S. 289)	Porphyritic Trachyte. Small phenocrysts of fresh albite randomly scattered through a devitrified mass of K-silicate glass with minor secondary quartz.	Vaguely flow-banded, with some felted textures, but mostly microgranular.	Very small dendritic leucoxene patches. Quartz veinlets.	An unusually fresh rock considering its proneness to alteration. May be verging on rhyolite in composition, but whole-rock analysis needed.
)- 5	Lava Breccia. Mostly large irregular fragments of dacitic/leucoandesitic lavas with oligoclase phenocrysts in plagioclase groundmass, with or without altered ferromagnesians.	Fragments are flow-banded; mutual boundaries interlock - fragments were plastic.	A few corroded quartz phenocrysts. Deuteric epidote, chlorite patches and veinlets.	Composed of fragments of slightly different, but closely related lava: one may be the host, but this is difficult to ascertain because of scale.
,- ›	Perlitic Obsidian. Small albite phenocrysts in a mass of fine matted-parallel laths of altered feldspar; perlitic textures accentuated by development of chlorite.	Rock is disrupted, brecciated; this could be flow-brecciation of lava top.	Chalcedony patches, veins infilling spaces between fragments.	Rock is altered, but believed to be a trachyte, possibly related to 270904, but not particularly to 270905 as compositions differ significantly.
j- 9	Argillised Porphyritic Felsite. Scattered phenocrysts of completely sericitised feldspar set in a mass of interlocking fine quartz and small sericite shreds.	Phenocrysts are aligned; groundmass faintly flow-banded, with felsitic textures.	A few leucoxenised opaques. Weak, patchy Fe-staining.	No suggestion of pyrite. Fresh rock may have been dacite or trachyte; in any case, it was strongly feldspathic. Exact composition not known.
9- (	Altered Feldspar Porphyry. Scattered phenocrysts of sericitised, ferruginised ?plagioclase set in a mass of small sub-parallel argillised/ferruginised feldspar laths, and quartz.	Good flow-alignment of crystals. Pargings or joints more or less conformable with this fabric.	Very small leucoxenised opaques (?magnetite)* throughout.	Thorough alteration precludes exact classification, but rock coul[d] have ranged from dacite through trachyte to leucoandesite.
j- 2	Argillised Porphyritic Felsite. Dispersed phenocrysts of argillised ?plagioclase, in a mass of fine argillised feldspar laths and microgranular interstitial quartz.	Flow-alignment of phenocrysts and ground-mass, without pronounced flow-banding.	Relatively large grains of leucoxenised oxide opaques.	Rock resembles 270939 and also 2709[…] and all three could be minor varian[ts] of each other, in dacite-trachyte range; probably extrusive.
9- 3	Argillised, Chloritised Felsite. A few phenocrysts, argillised and subsequently chloritised, in a groundmass of fine sericite and interlocking quartz. Irregular chlorite aggregates.	Faint flow-alignment of all components. Felsitic textures preserved in quartz.	Leucoxenised opaque grains. Chlorite-hydromuscovite veins, patches.	Similar to the previous rocks, but with a younger phase of patchy chloritisation superimposed on already argillised rock.
9- 4	Altered Flow-Breccia. Streaks, lenses and stretched fragments of fine lava, now composed of sericite and quartz, sporadic chlorite; occasional silicified phenocrysts.	Typical flow-breccia fabric generated under conditions of viscous flow. Almost non-porphyritic.	Late-stage quartz infillings with hydromuscovite shreds. Leucoxene.	Composition was probably broadly similar to that of other rocks, but fabric is distinctive. Chlorite younger than sericite, but pre-dating quartz.

mple .	Rock Type - Composition	Fabric	Minor Minerals	Comments
0- 5	Altered Lava Breccia. Small and large, irregular, rounded and splintery fragments of matted sericite, microgranular quartz, and variable chlorite, both diffuse and compact.	A flow-breccia in which portions of lava were solidified, others still plastic. Felsitic.	Quartz infillings. Leucoxenised oxide opaques.	Some fragments are preferentially chloritised, possibly due to minor compositional variations. The rock is a felsitic (probably intermediat lava.
0- 6	Altered Lava Breccia. Irregular fragments of sericitised, chloritised lava with variable fabrics, but similar composition. Present minerals are sericite, chlorite, quartz.	Fragments show flow-banding, fine vesicularity; few phenocrysts. Felsitic textures.	Occasional, partly preserved plagioclase phenocrysts. Leucoxenised opaques.	Quite similar to 270944, 270945; some variation can be expected in such rocks. Chlorite has patchy distribution, lines cavities in places.
0- 7	Argillised Feldspar Porphyry. Completely argillised feldspar phenocrysts fairly conspicuous in a groundmass of fine clays (illite-sericite) and quartz.	Relict fine flow-banding in places, and flow-brecciation. Minor post-alteration shearing.	Cavities after ?pyrite. Leucoxenised oxide opaques. Patchy Fe-staining.	Evidently originally a predomina feldspathic lava; quartz is seconda Probably dacite-trachyte, and related to rocks such as 270943.
0- 8	Argillised Porphyritic ?Trachyte. Argillised small aligned feldspar phenocrysts in a well-preserved but argillised groundmass of fine feldspar laths.	Typical "trachytic" fabric recognisable. Flow-banded, extrusive rock.	A few small cherty quartz patches (pseudomorphs). Ultrafine leucoxene.	Possibly two types of feldspar phenocrysts originally present. Could be related to 270904 and 270906, though there are differences
0- [illegible]	Argillised Felsic Lava. Rather featureless mass of fine sericite and quartz, with small laths of silicified ?feldspar, occasional aggregates of fine sericite (greenish) after felspar.	Quartz tends to occur as thin subparallel streaks suggesting flow-fabric. Fine-grained, uniform.	Rare quartz-filled spherical amygdales. Leucoxenised oxide opaques.	Lack of distinctive features makes interpretation more difficult. Believed to be a lava, of trachytic or rhyolitic composition.
0- [illegible]	Argillised Felsic Lava. Dominantly fine illite-sericite and quartz, with scattered coarser, irregular quartz (?primary); scattered pyrite, and veins of fibrous sericite with pyrite.	Quartz patches may be recrystallized, inverted beta quartz. Fabric is felsitic or devitrified.	Fine leucoxenised oxide opaques. A few argillised feldspar phenocrysts.	Similar to 270949, perhaps more rhyolitic. Pyrite veins seem to postdate the argillic alteration, bu may be part of that phase.
1- 1 S. 904)	Quartz-Kaolinite Rock (?Lava Breccia). Composed entirely of small quartz patches and ultrafine kaolinite, variably distributed and almost featureless, with limonite staining.	HF etching of cut surface brings out structues suggesting a lava breccia.	Fine leucoxene-rutile, occasional coarser clusters, derived from oxide opaques.	Extreme alteration precludes more than broad interpretation as probabl felsic to intermediate lava.

APPENDIX VIII

Petrological Report CMS 84/3/41 on samples from the Zone E/7900N costean

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Appendix VIII

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16th April, 1984

REPORT CMS 84/3/41

YOUR REFERENCE:	Letter dated 27.3.1984
DATE RECEIVED:	28th March, 1984
SAMPLE NOS.:	270963 - 270965
SUBMITTED BY:	A.M.Hespe
WORK REQUESTED:	Petrology

Copy to:
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H.W. Fander, M. Sc.

REPORT CMS 84/3/41

Rock Samples 270963 - 270965

Three hand specimens were received for petrographic study; thin-sections were prepared and examined; K-stain tests were carried out, but gave negative results.

270 963 (T.S. 49366)
This is a completely argillised volcanic rock, and is believed to have been a glassy lava, possibly a pitchstone of broadly dacitic composition.

Very occasional random microphenocrysts of completely argillised feldspar are set in a fairly uniform fine-grained mass of quartz and kaolinite-illite, with scattered leucoxenised opaques and irregular patches of fine clay which may represent amygdales. Poorly defined felsitic textures and other devitrification features are recognisable.

Argillic alteration in this rock is thought to have been a low-temperature hydrothermal phenomenon.

270 964 (T.S. 49367)
This is an argillised, pyritised lava breccia or lapilli tuff; alteration has obliterated critical details. Fragmental fabric is well-preserved, but the nature of the matrix is uncertain; if it was a lava, then the rock is a lava breccia, but if it was pyroclastic, then the rock is a lapilli tuff.

The larger fragments tend to be angular, smaller ones are more rounded; sizes range from 0.1 mm to 10 mm. They now consist of fine quartz and kaolinite-illite with lava fabric and occasional argillised feldspar microphenocrysts. The matrix is featureless fine quartz and kaolinite-illite.

Fine pyrite occurs throughout, but is distinctly more abundant in the matrix; it was most probably introduced with the argillic alteration. The dark colour of the rock is due to very fine-grained pyrite which acts as a black pigment when the particles are less than about 5 μ in size.

Quartz veinlets cut the rock and contain traces of covellite.

270 965 (T.S. 49368)
This is an altered perlitic obsidian and is believed to have been of rhyolitic to trachytic composition.

Small phenocrysts of albite are scattered through the groundmass; they are microfractured and partly sericitised. The groundmass itself consists of small silicified spherulites and interstitial subparallel streaks of sericite; there are vaguely defined patches of brownish-green chlorite and aggregates of dark olive-green chlorite flakes in parts of the rock, but not throughout. It is thought that the chlorite was introduced at a late stage, after alteration, as is the case in previously described rocks. A few leucoxenised oxide opaques occur.

The fresh rock was a glassy lava, and the presence of albite crystals suggests a rhyolitic-trachytic composition rather than a dacitic one. The chlorite was apparently introduced and is not an alteration product of ferromagnesian minerals.

H.W. Fander, M. Sc.

APPENDIX IX

Frequency Histograms for Pb, Zn
Ba and As Analyses from the 1983-
84 Costeaning Program

APPENDIX 9: HISTOGRAMS OF COSTEAN GEOCHEMICAL SAMPLES

During the period of this report 406 weathered bedrock channel samples were collected from the following costean :-

UTEM Zone E	7500N Costean
UTEM Zone E	7700N Costean
UTEM Zone E	7900N Costean
UTEM Zone I_1	5700N Costean
UTEM Zone I_1	5800N Costean
	3900N/4100E Costean
	4000N/4100E Costean
	4400N/4200E Costean
	4500N/4100E Costean
	4500N/4400E Costean
	4550N/4400E Costean
	4800N/3800E Costean
	5400N/3600E Costean

Samples were predominantly over 5m intervals with about 5% over 10m intervals. Samples were prepared and analysed by Analabs for Cu, Pb, Zn, Ag, As and Ba. For Cu, Pb, Zn ad Ag a perchloric acid digestion was used followed by AAS analysis. Pressed poweder XRF was used for Ba, and basic hydride/AAS for As.

The results for Pb, Zn, As, and Ba are presented as histograms. Values from all rock types are included. Inspection suggests the following threshold values.

Pb 200 ppm

Zn 300 ppm

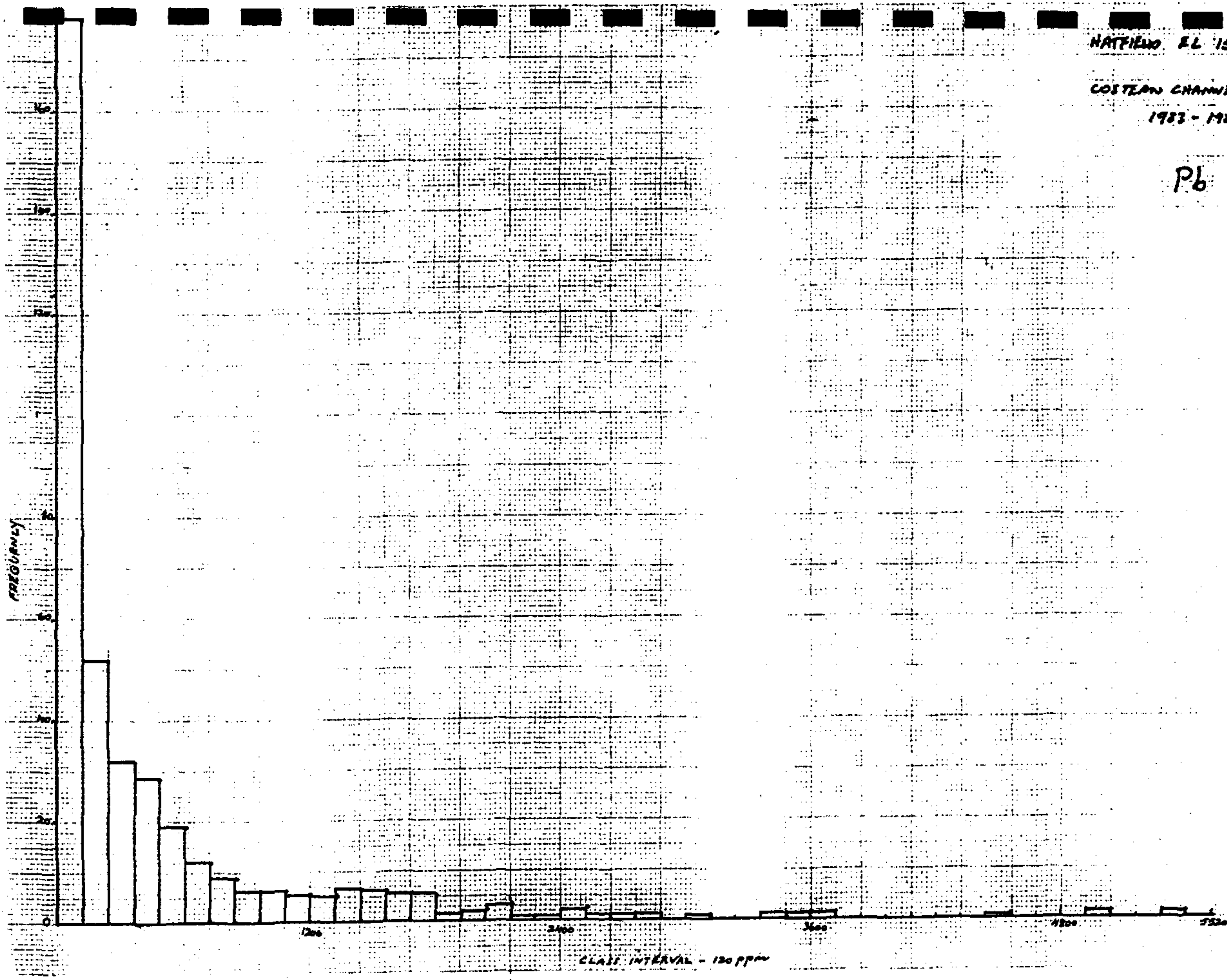
As 100 ppm

Ba 1500 ppm

HATFIELD EL 15/73

COSTEAN CHANNEL SAMPLES
1983 - 1984

Pb



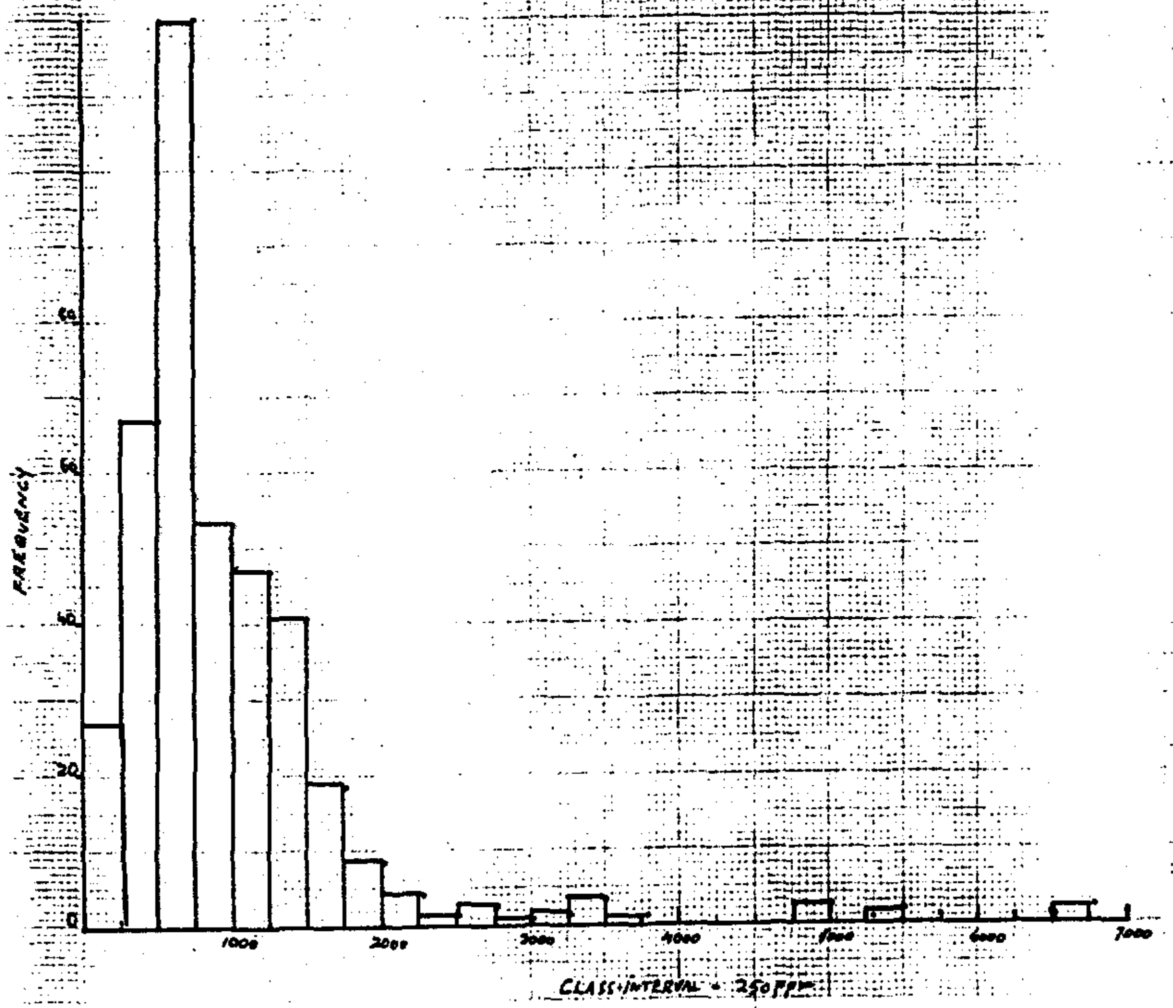
210127

HATFIELD EL 15/73

COSTEAN CHANNEL SAMPLES

1983 - 1984

Ba

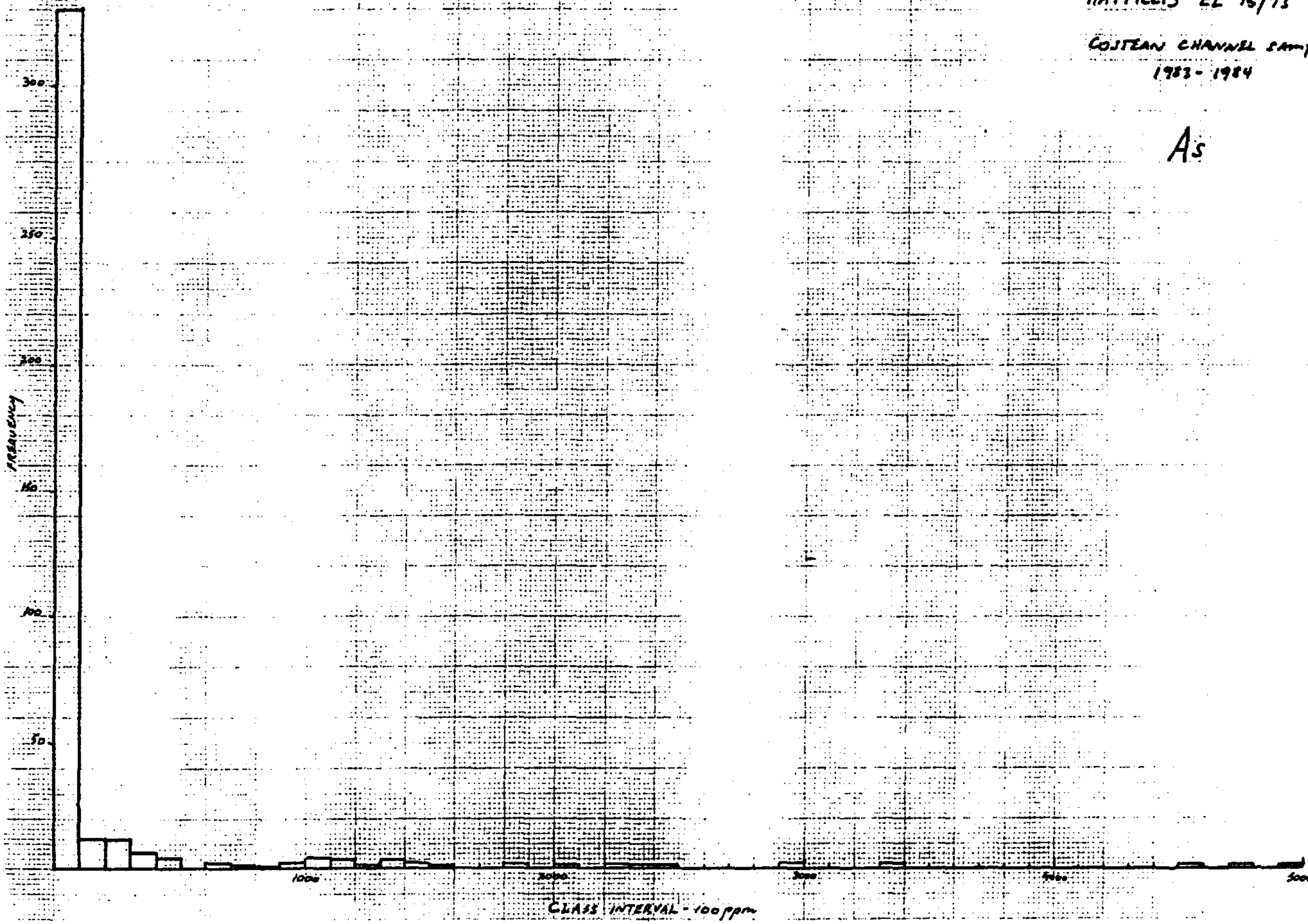


210128

HATFIELD EL 15/73

COSTEAN CHANNEL SAMPLES
1983 - 1984

As

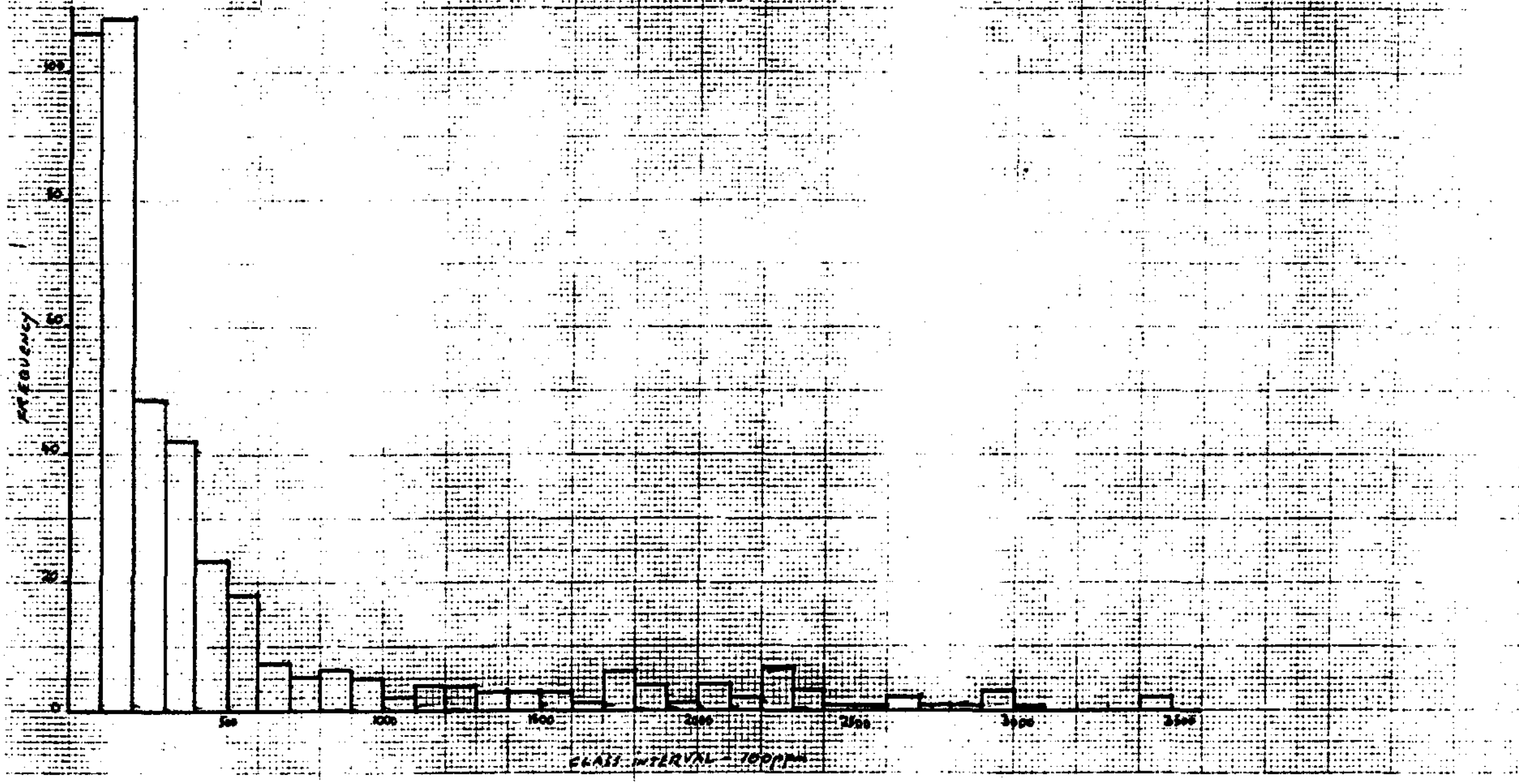


210129

HATFIELD EL 15/73 129

COSTEAN CHANNEL SAMPLES
1983 - 1984

Zn



210130

— LEGEND —

▲	Andesite – Basalt (lavas, lithic tuffs, agglomerates, lava breccia)
ADP	Andesitic Dacitic Pyroclastics
△	Cambrian – intermediate to acid (dacite – rhyolite) lavas and pyroclastics within andesite sequence
	Altered (sericite – carbonate – chlorite) and pyritic fragmentals and lavas
	1984 Soil sampling, analyses for Cu, Pb, Zn, As, Ba
	Area covered by 1984 UTEM Survey
	>250 ppm Pb Soil geochemistry
	Costean
(J3) X——X	Utem anomaly
(1976)	Diamond drill hole (with year drilled) MCP1,2,3 - Proposed diamond drill holes 1984 (Mt. Charter)
	Aberfoyle grid lines
1979	1979 Utem coverage
	1983 EM 37 coverage
	1984 Utem coverage
x—x—x	Power line
	E.L. Boundary
	Main road
	Track
	Creek

210131

Aberfoyle Exploration Pty Ltd 85-2355

REVISIONS			
Init.	Date	Init.	Date
AMH	30·7·84		

NORTH WEST TASMANIA 001

HATFIELD E.L.15/73

LOCATION OF EXPLORATION ACTIVITY

December 1982 – May 1984

Location Code: K55/6/44	Scale: 1:10,000	Date: July, 1984	Plate No: HAT. 45

Compiled: A.M.H.
Drawn: R.J.E.
Traced: R.J.E.
Checked: A.M.H.

RMO 557

LEGEND

— — — —	Limit of exposure in costean		Fault
- - - - - - - - -	Geological contact		Quartz vein
	" " Interpreted	⊗	Location of UTEM anomaly
	Survey peg with number		
	Strike/dip cleavage		
	Strike/dip - bedding		
	Strike/dip, jointing		
	Strike/dip, foliation		
ADL	Argillised dacitic(?) lava		
ATL	Andesitic tuff lava		
*BD	Similar to JD but fresher, less clay in matrix. Black silica/pyrite alteration along joint planes away from FZ		
BPSS	Baritic pyritic sericite schist		
BSH	Black shale, fresh except where indicated. Well bedded, well cleaved		
GC	Green, grey saprolitic andesite. Primary texture discernable, pink spots after feldspar phenocrysts common. Forms pods grading outwards to YBC or RCM		
HAA	Hyrothermally altered andesite		
*JD	Dacite - pale green white, blocky, strongly jointed, clayey matrix 2 - 3mm argillised feldspar phenocrysts. Non pyritic.		
KHBC	Khaki brown saprolitic andesite. Original feldspar porphyry texture retained		
PD	Porphyritic dacite (7700N & 7900N + veinlets & disseminations of pyrite in a brecciated matrix).		
QSR	Quartz sericite rock - strongly limonitic quartz sericite rock, limonitic gossan & white clay		
RCM	Brick red clay, stained with manganese, often associated with white waxy clay. Jointing & texture partially preserved. Possibly related to hydrothermal alteration		
WAL	Weathered andesitic lava		
CLB	Chlorite altered lava breccia and lava		
YBC	Yellow brown clay. Jointing, texture partially preserved		
*FD	Rock of same composition as JD but with strong, multiple cleavage		
FZ	Black silica - pyrite altered rock in a fault zone		
G	Chalcedonic limonitic gossan		

* Subdivision of these units is on macroscopic texture cf. " ADL"
These units differ from PD in being non pyritic.

210132

4090 E 4100 E 4110 E 4080 E

5 cm

Aberfoyle Exploration Pty Ltd

85-2355

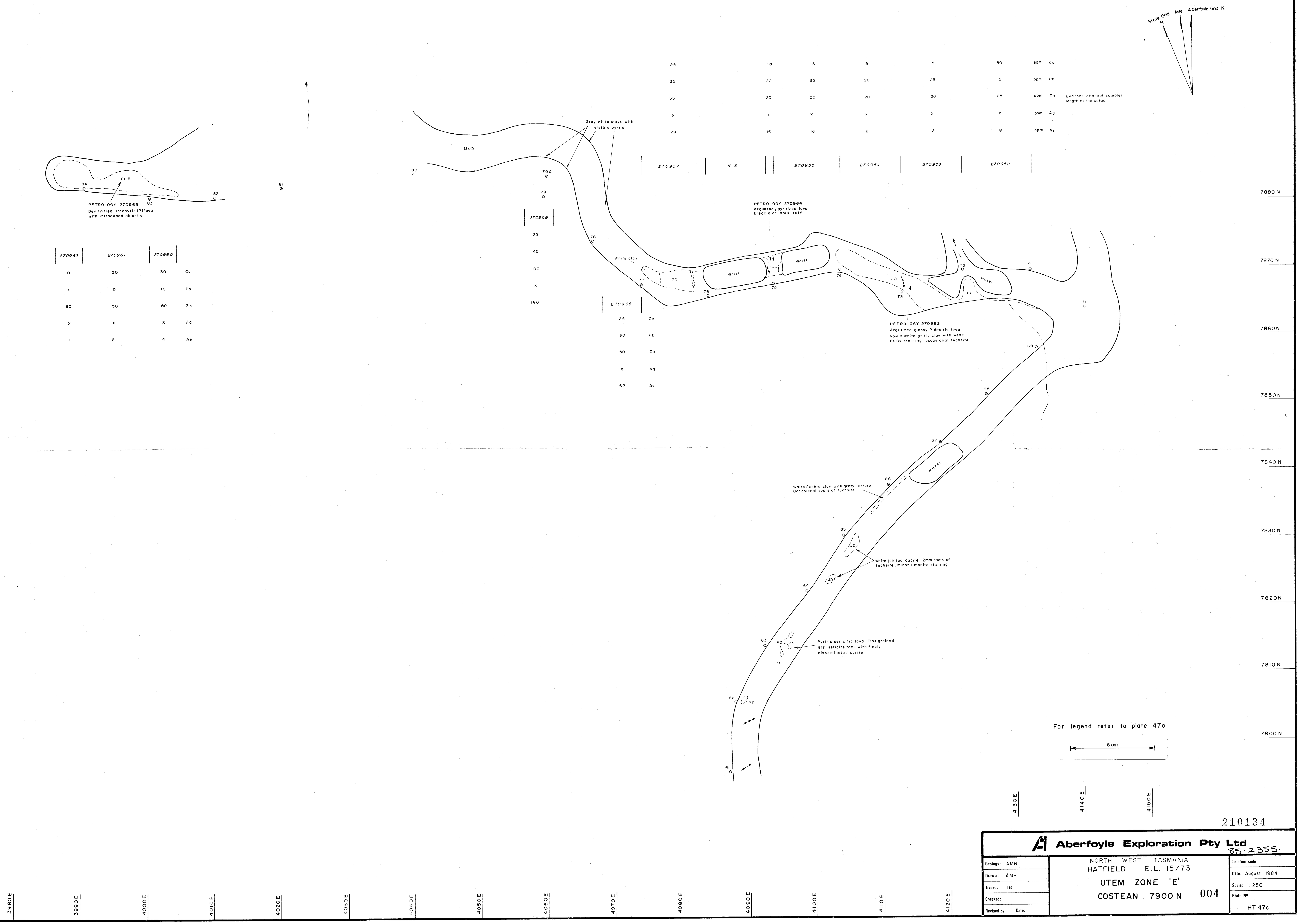
Geology: AMH	NORTH WEST TASMANIA	Location code:
Drawn: AMH	HATFIELD E.L. 15/73	Date: August 1984
Traced: JB	UTEM ZONE 'E'	Scale: 1: 250
Checked:	COSTEAN 7500 N	Plate Nº HT 47a
Revised by: Date:		

002

Sample	270855	270854	270853	270852	270851	270850
Cu ppm	20	20	20	25	20	30
Pb ppm	x	x	5	10	20	40
Zn ppm	15	10	15	20	20	45
Ag ppm	x	x	x	0·5	0·5	x
As ppm	15	13	14	41	100	660
Ba ppm	792	632	568	527	621	546

Sample	270849	270848	270847	270846	270845	270844	270843	270842	270841	270840	270839	270838
Cu ppm	15	15	15	15	10	10	15	15	20	35	30	30
Pb ppm	15	15	25	20	10	10	30	40	30	70	165	50
Zn ppm	15	40	20	20	20	15	15	20	15	15	20	15
Ag ppm	x	x	x	x	x	x	x	x	x	x	x	x
As ppm	4	6	6	6	11	4	5	6	12	26	37	59
Ba ppm	497	492	482	493	499	581	625	596	587	493	619	697

Sample	270837	270836	270835	270834	270833	270832	270831	270830	270829	270828	270827	270826
Cu ppm	25	20	65	40	25	55	40	20	40	30	20	15
Pb ppm	45	180	150	180	145	275	265	25	5	5	5	5
Zn ppm	15	15	40	40	30	25	35	20	15	10	10	15
Ag ppm	x	x	0·5	x	0·5	x	0·5	x	x	x	x	x
As ppm	82	49	230	73	63	220	150	48	40	28	6	6
Ba ppm	542	686	473	649	390	388	509	790	841	820	687	680

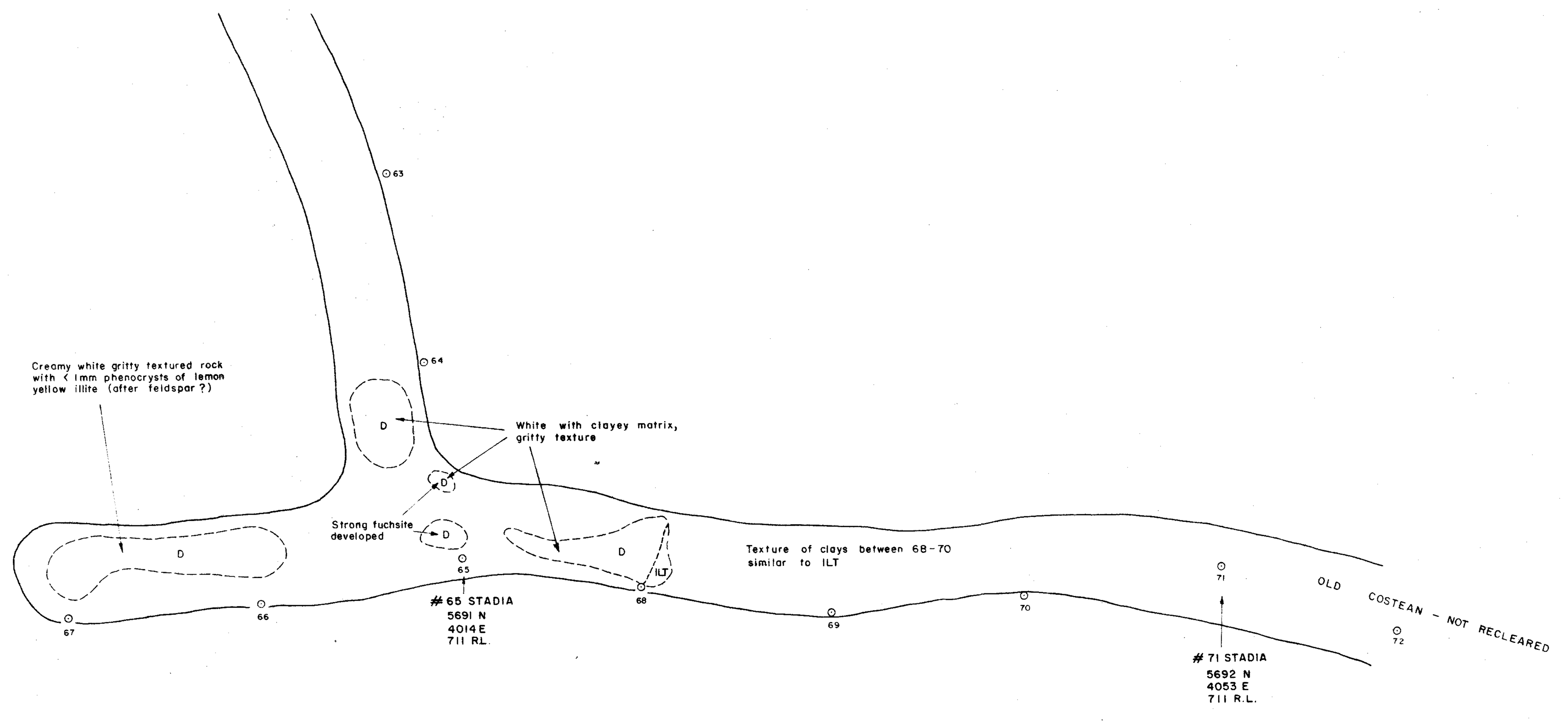


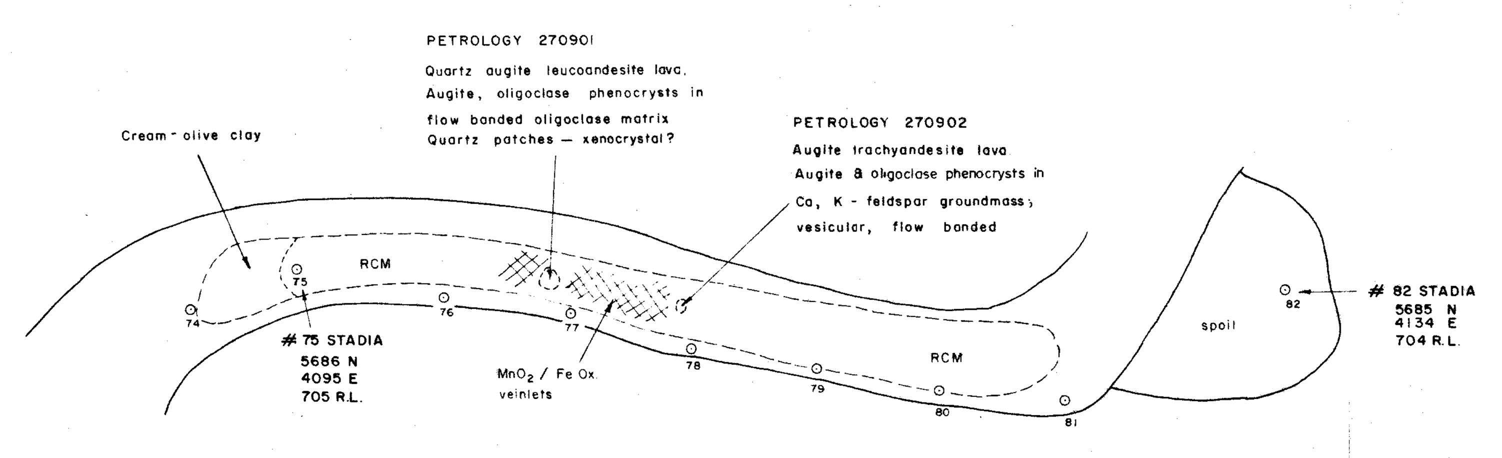
210134

Aberfoyle Exploration Pty Ltd 85-2355.

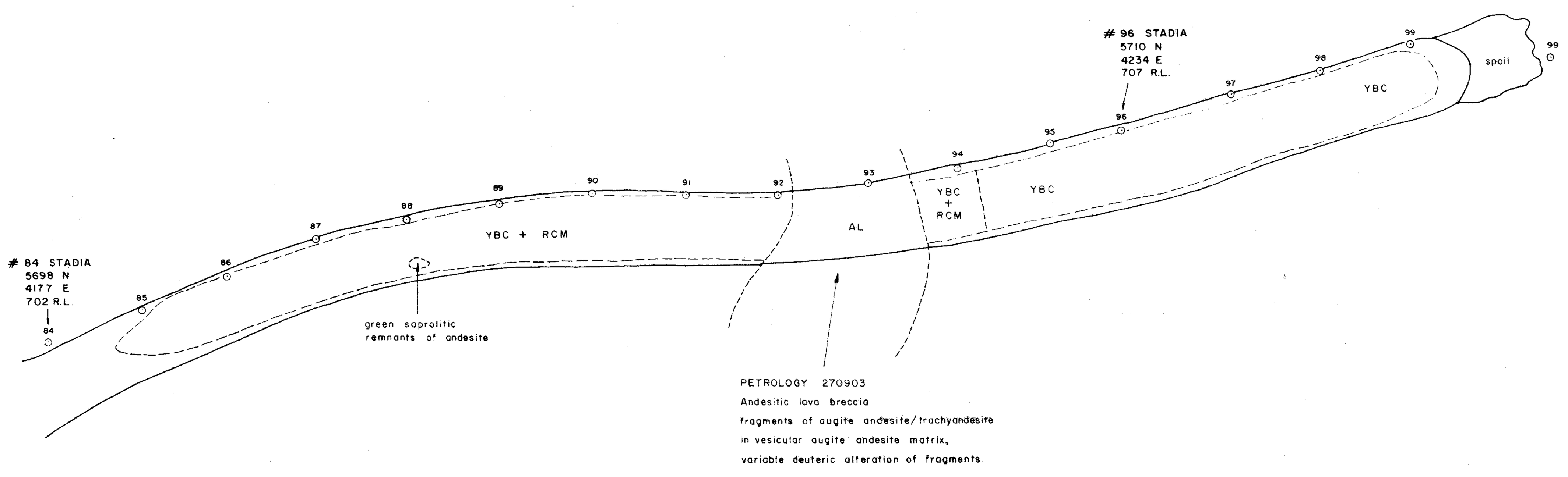
Geology: AMH	NORTH WEST TASMANIA	Location code:
Drawn: AMH	HATFIELD E.L. 15/73	Date: August 1984
Traced: IB	UTEM ZONE 'E'	Scale: 1:250
Checked:	COSTEAN 7900 N 004	Plate Nº HT 47c
Revised by: Date:		

		270805	270806	270807	270808	270809	270810	270811
ppm	Cu	30	50	115	125	145	95	125
ppm	Pb	20	50	55	45	415	455	325
ppm	Zn	205	385	555	490	720	895	390
5 metre channel samples ppm	Ag	1·5	1·5	2·0	2·0	2·0	1·0	1·0
ppm	As	24	87	29	24	28	75	16
ppm	Ba	942	553	357	253	703	206	462





		270812	270813	270814	270815	270816	270817	270818	270819	270820	270821	270822	270823	270824	270825
ppm	Cu	125	140	100	115	135	125	115	120	130	45	25	20	20	35
ppm	Pb	325	190	250	185	440	190	305	275	970	135	30	35	20	25
ppm	Zn	390	575	325	315	490	380	375	440	590	305	210	115	160	200
ppm	Ag	1·0	1·0	1·0	1·0	1·5	1·0	1·5	1·0	1·5	1·0	0·5	0·5	1·0	1·0
ppm	As	16	18	12	18	7	11	22	15	19	3	8	4	3	8
ppm	Ba	462	711	247	188	354	134	418	241	503	330	366	333	353	501



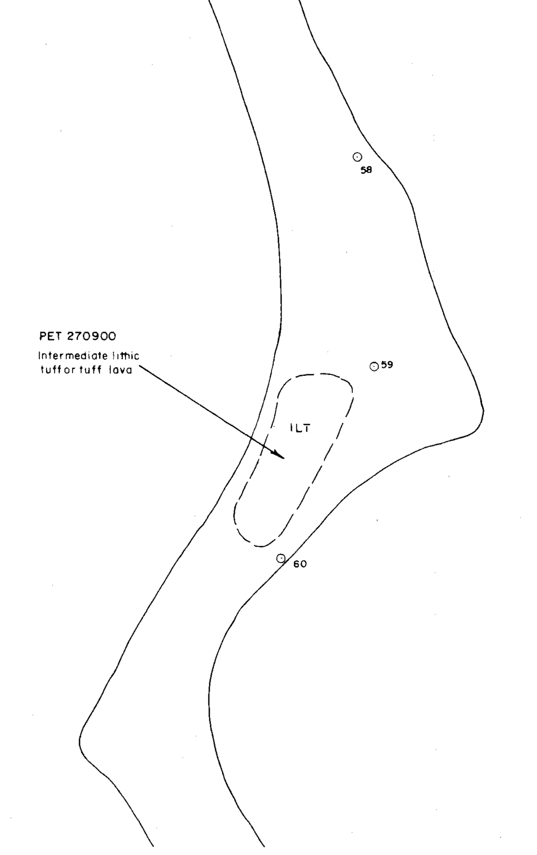
FOR LEGEND SEE PLATE NO. 47e

5 cm

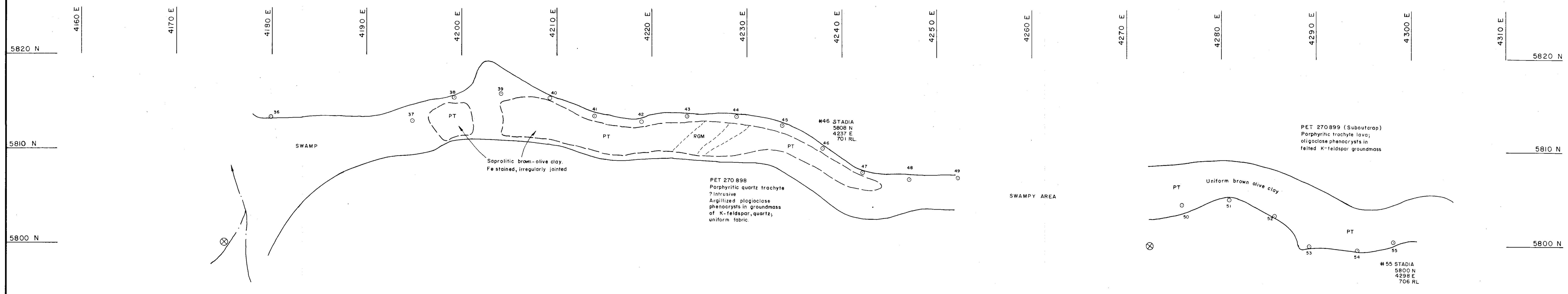
210135

Aberfoyle Exploration Pty Ltd 85-2355.

Geology: AMH	NORTH WEST TASMANIA	Location code:
Drawn: AMH	HATFIELD E.L. 15/73	Date: JULY 1984
Traced: JB	UTEM ZONE I₁ 005	Scale: 1:250
Checked:	COSTEAN 5700 N	Plate Nº HT 47 d.
Revised by: Date:		



		270769	270770	270771	270772	270773	270774	270775	270776	270777	270778	270779	270780	270781	270782	270783	270784	270785	270786	270787	270788	270789
5m Channel Samples	Cu ppm	20	20	15	20	30	20	135	110	60	45	30	65	115	30	30	45	40	40	65	35	60
	Pb ppm	80	130	10	10	40	15	20	45	10	105	10	15	25	10	15	20	20	15	50	25	15
	Zn ppm	195	285	115	80	115	85	60	175	195	310	135	105	165	115	120	135	255	625	620	205	190
	Ag ppm	1	1	1	1	1	0·5	1	1·5	1	1·5	1	1	1	0·5	1	0·5	1	1·5	1	1	1
	As ppm	5	7	–	9	7	3	21	34	3	4	7	15	14	11	9	48	17	7	299	45	37
	Ba ppm	1220	1410	1640	1450	1400	1360	1470	1040	792	1150	858	862	1380	1380	1490	1370	1460	725	851	513	490



		270790	270791	270792	270793	270794	270795	270796	270797	270798	270799
5m channel samples	Cu ppm	25	30	30	35	85	35	20	20	30	85
	Pb ppm	15	10	5	5	30	10	10	15	30	100
	Zn ppm	280	270	280	270	495	175	90	95	120	380
	Ag ppm	0·5	1	1	1	1·5	1	1	1·5	1	1·5
	As ppm	11	9	14	14	7	63	17	32	25	23
	Ba ppm	354	338	230	278	568	538	1170	785	652	384

270800	270801	270802	270803	270804
30	25	30	30	25
25	25	30	40	25
155	145	140	135	100
1·5	1	1·5	1	1·5
8	–	11	4	7
684	662	643	672	636

LEGEND

- – – – Limit of exposure in costean
- - - - - Geological Contact
- ○ Survey peg with number. Geochemical sampling is between survey pegs.
- ⊗ Location of UTEM anomaly or extrapolated UTEM axis

GEOLOGY

Pt	Porphyritic trachyte: homogenous fine grained felted dark green groundmass with bright pink patches. Lava, lava breccia, ? intrusive
RCM	Brick red MnO_2 stained clay after andesite
YBC	Yellow brown clay after andesite
ILT	Intermediate lithic tuff
D	Dacite

5 cm

210136

Aberfoyle Exploration Pty Ltd

85-2355

REVISIONS			
Init.	Date	Init.	Date

NORTH WEST TASMANIA

HATFIELD E.L. 15/73

UTEM ZONE I₁ 006

COSTEAN 5800 N

Compiled: AMH

Drawn: AMH

Traced: ACD

Checked:

Location Code:

Scale: 1:250

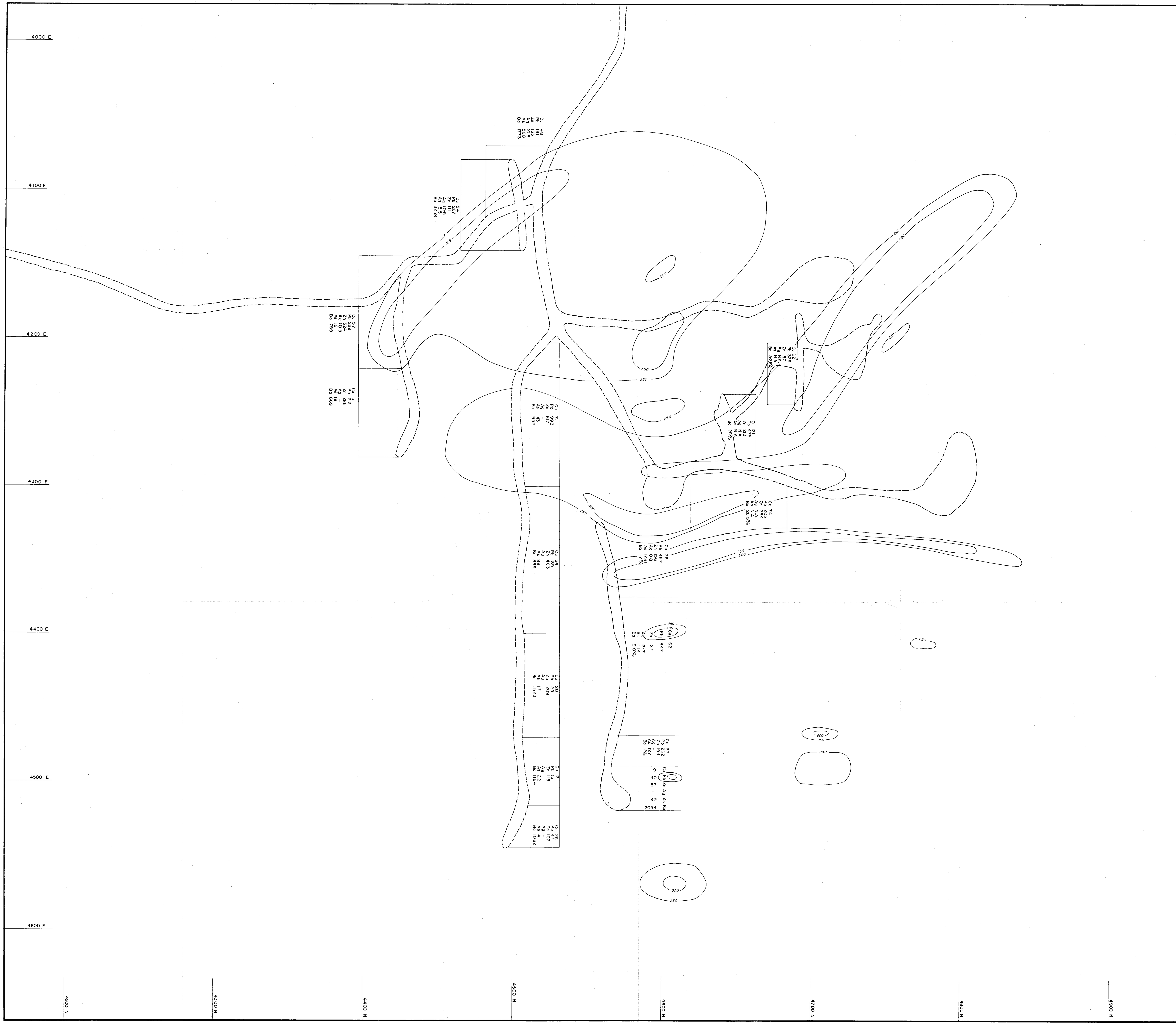
Date: July 1984

Plate No: HT 47 e

RMO 556


4200N
4300N
4400N
4500N
4600N
4700N
4800N
4900N
5000N
5100N
4000E
4100E
4200E
4300E
4400E
4500E
4600E
MC 8
MC 5
MC 6
MC 3
MC 1
MC 2
BSH
A
B
D
State Grid N
MN
Aberfoyle Grid N
840
830
820
810
800
790
780
770
760
750
740
730
— LEGEND —
MT CHARTER, FACT AND INTERPRETIVE GEOLOGY
BSH Que River Shale
A Andesite, undifferented. Not hydrothermally altered, except in 4500 N costean. Contains Pb/Zn mineralization in the form of galena and sphalerite associated with quartz/carbonate veining
B Massive coarsely crystalline barite, limonite banded barite and poddy and disseminated barite in hydrothermally altered volcanics.
D "Dacites" – Quartz/Sericite/Carbonate altered volcanics, containing patches and veinlets of pyrite galena, sphalerite and barite in the area footwall to the barite horizon.
Geological contact interpreted
Geological contact, probably gradational, inferred
Outcrop
Float
MC-I Drill Hole
MC-P-I Proposed drill hole
Anticlinal axis, showing plunge direction
Line of drill hole section
210137
5 cm
Aberfoyle Exploration Pty Ltd
85-2355
REVISIONS
Init. Date Init. Date
ACD 29/84
NORTH WEST TASMANIA
HATFIELD E.L. 15/73
MT. CHARTER AREA 007
SUMMARY MAP
Compiled: D.J.J.
Drawn: R.J.E.
Traced: R.J.E., A.C.D.
Checked:
Location Code: K55/6/44
Scale: 1:1000
Date: February, 1984
Plate No: H.T. 39

RMO 556



LEGEND

—250—	Pb SOIL GEOCHEMISTRY, 250 AND 500 ppm
Cu Pb Zn Ag As Ba	BULKED 5m CHANNEL SAMPLES FROM COSTEAN. SAMPLES BULKED ACCORDING TO INTERPRETED LITHOLOGIES AND ON 50m INTERVALS RESULTS IN PPM UNLESS OTHERWISE INDICATED.

210138

5000 N — 5 cm — 5100 N

Aberfoyle Exploration Pty Ltd 85-2355

NORTH WEST TASMANIA

HATFIELD E.L. 15/73 008

MT. CHARTER AREA

SUMMARY MAP - GEOCHEMISTRY

REVISIONS			
Init.	Date	Init.	Date

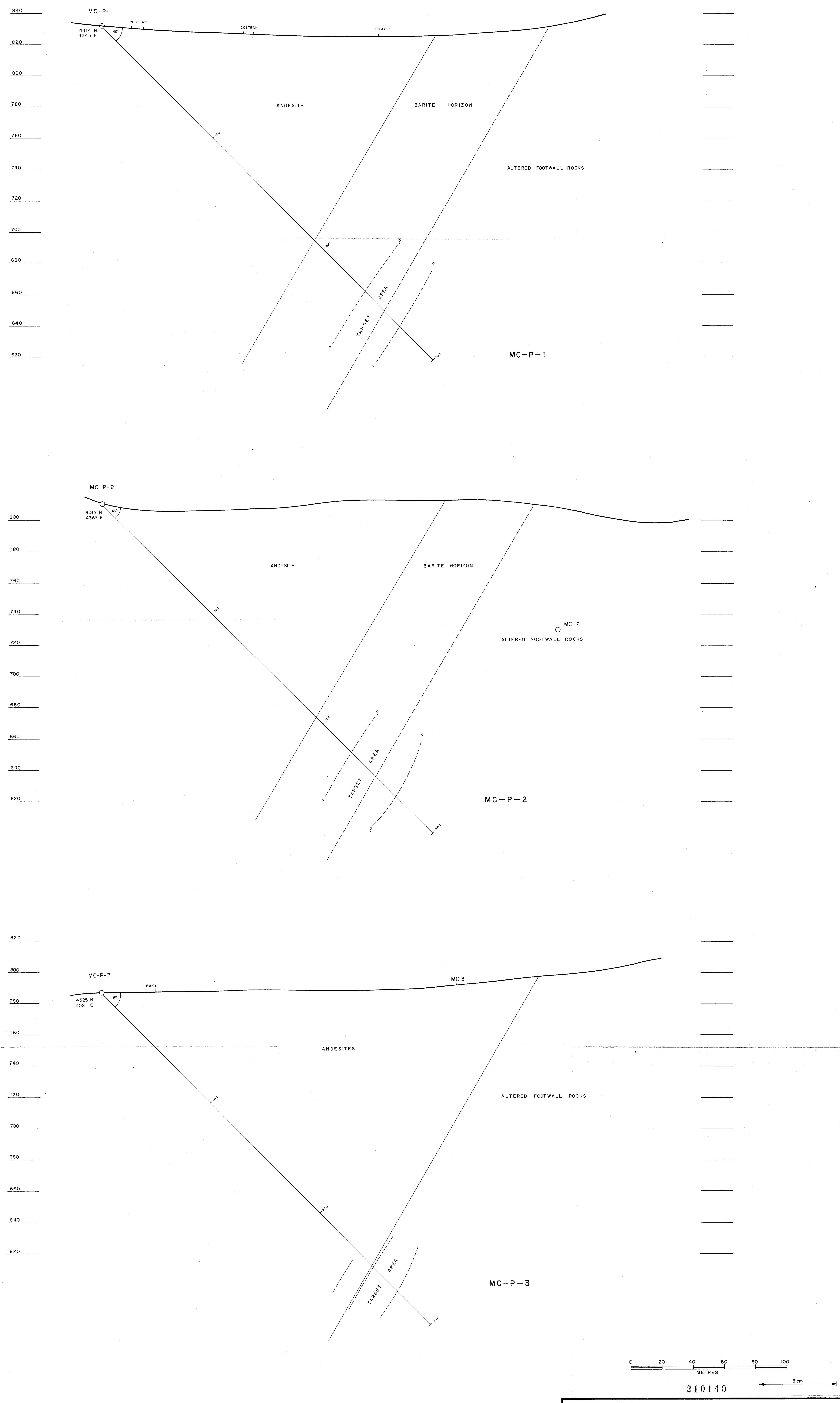
Location Code: K55/6/44 | Scale: 1:1,000 | Date: February 1984

Compiled: AMH
Drawn: AMH
Traced: ACD
Checked:
Plate No: HT 43

RMO 556


4000 E
4100 E
4200 E
4300 E
4400 E
4500 E
4600 E
4200 N
4300 N
4400 N
4500 N
4600 N
4700 N
4800 N
4900 N
5000 N
POSSIBLE CORRELATION OF UTEM ANOMALIES
LEGEND
AVERAGED I.P. PERCENT FREQUENCY EFFECT FOR a = 50m, n= 1 to 4
LOCATION OF UTEM ANOMALY WITH LOWEST CHANNEL NUMBER. FROM 1979 UTEM SURVEY.
210139
5 cm
Aberfoyle Exploration Pty Ltd
85-2355
REVISIONS
Init. Date Init. Date
NORTH WEST TASMANIA
009
HATFIELD E.L. 15/73
MT. CHARTER AREA
SUMMARY MAP - GEOPHYSICS
Compiled: AMH
Drawn: AMH
Traced: ACD
Checked:
Location Code: K55/6/44
Scale: 1:1000
Date: February 1984
Plate No: HT 42

RMO 556



210140

Aberfoyle Exploration Pty Ltd 85-2365

REVISIONS			
Init.	Date	Init.	Date

NORTH WEST TASMANIA

HATFIELD E.L. 15/73 010

MT. CHARTER AREA

SECTIONS OF PROPOSED DIAMOND DRILL HOLES

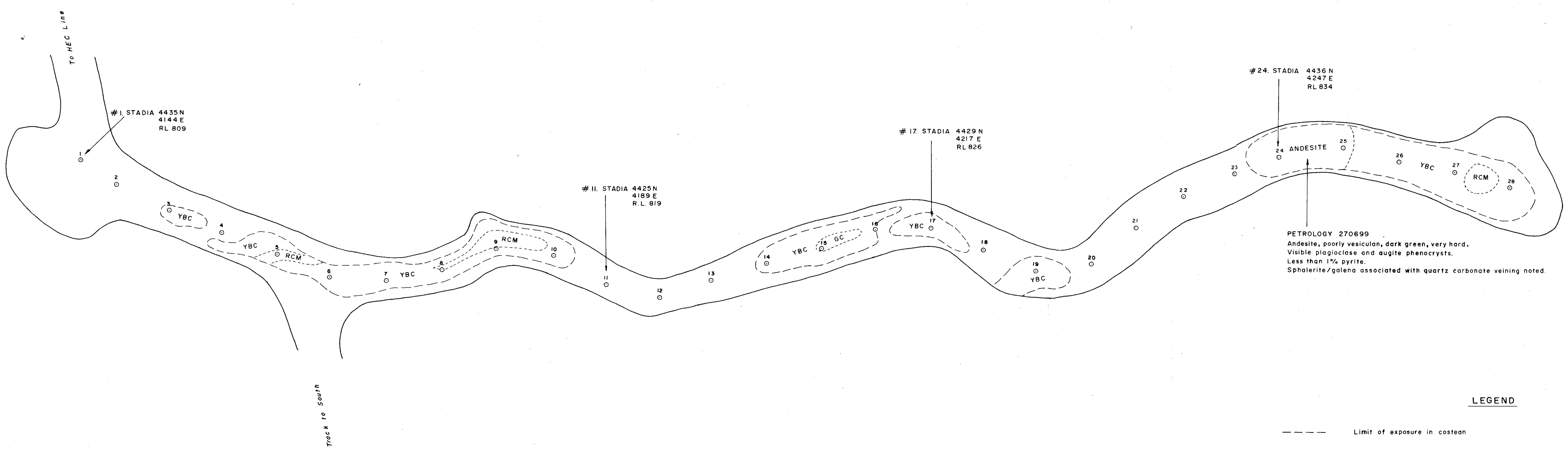
Compiled: AMH
Drawn:
Traced: ACD
Checked:

Location Code: K55/6/44 | Scale: 1:1000 | Date: February 1984 | Plate No: HT 41

RMO 557

5m weathered bedrock channel samples (ppm)

Sample	Ba	As	Ag	Zn	Pb	Cu
N.S.						
N.S.						
270581	517	24	0·5	170	55	70
270582	490	27	–	145	110	70
270583	723	17	–	145	235	70
270584	413	16	0·5	180	70	70
270585	386	14	0·5	205	75	50
270586	508	21	–	240	80	85
270587	740	16	0·5	235	265	80
270588	760	9	0·5	275	675	70
N.S.						
270589	1070	15	0·5	265	185	35
N.S.						
270590	1100	17	0·5	590	400	30
270591	877	8	0·5	680	800	20
270592	1520	12	0·5	765	515	30
N.S.						
270593	1030	11	0·5	415	650	45
270594	695	15	–	480	335	60
N.S.						
N.S.						
N.S.						
270595	1430	21	0·5	300	195	45
270596	1170	17	–	230	130	65
270597	721	20	–	205	80	45
270598	579	19	–	195	50	50
270599	460	32	–	175	50	50



4440 N
4430 N
4420 N
4410 N
4400 N

4140 E | 4150 E | 4160 E | 4170 E | 4180 E | 4190 E | 4200 E | 4210 E | 4220 E | 4230 E | 4240 E | 4250 E | 4260 E | 4270 E

LEGEND

— — — —	Limit of exposure in costean
- - - - - - - -	Geological contact
(wavy dashed line)	Geological contact interpreted
15 ⊙	Survey peg with number (Geochemical sampling is between pegs)
	Strike / dip of foliation, cleavage
	Strike / dip of bedding
	Strike / dip of jointing
PD	Porphyritic dacite
BPSS	Baritic pyritic sericite schist
QSR	Quartz sericite rock - strongly limonitic quartz sericite rock, limonitic gossan and white clay
HAA	Hydrothermally altered andesite
ATL	Andesitic tuff lava
• GC	Green, grey saprocitic andesite. Primary texture discernable, pink spots after feldspar phenocrysts common. Forms pods grading outwards to YBC or RCM
• KHBC	Khaki brown saprolitic andesite. Original feldspar porphyry texture retained
• RCM	Brick red clay, stained with manganese, often associated with white waxy clay. Jointing and texture partially preserved. Possibly related to hydrothermal alteration
• YBC	Yellow brown clay. Jointing, texture partially preserved
BSH	Black shale, fresh except where indicated. Well bedded, well cleaved

• denotes "interpreted to be weathering products of andesitic volcanics"

Bedrock channel samples prepared and analysed by Analab, Cooee, Tas.

ELEMENT	ANALAB CODE	METHOD
Cu, Pb, Zn, Ag	101	Perchloric acid digestion, A.A.S.
As	114	Perchloric acid digestion, vapour hydride generation, A.A.S.
Ba	401	Pressed powder X.R.F

5 cm

210141

Aberfoyle Exploration Pty Ltd 85-2355

NORTH WEST TASMANIA
HATFIELD E.L. 15/73 011
MT. CHARTER AREA
COSTEAN 4400N / 4200E

Location code:
Date: January, 1984
Scale: 1:250
Plate No. HT. 37a

Geology: A.M.H.
Drawn:
Traced: J.L.R. L.M.L.
Checked:
Revised by: A.M.H. Date: 7/8/84

weathered bedrock 5m channel samples (Pegs 6-12)

(ppm)	N.S.	270607	270606	270605	N.S.	270600	270601	270602	270603	270604	N.S.
Ba		988	1730	3370		4900	6730	5360	1540	1450	
As		290	490	1050		2300	4550	3000	240	200	
Ag		–	–	–		–	1·5	–	–	–	
Zn		150	100	85		105	130	110	120	130	
Pb		140	155	110		105	510	490	295	335	
Cu		55	45	50		45	95	60	45	40	

weathered bedrock 5m channel samples (Pegs 18 - 24)

Cu	Pb	Zn	Ag	As	Ba (ppm)	Sample
55	45	60	-	240	1490	270613
60	75	40	-	270	1570	270612
50	230	110	-	1000	1180	270611
55	130	145	-	370	657	270610
55	260	140	2·5	2450	3230	270609
40	150	115	-	410	1460	270608
40	55	80	-	16	3690	270614
35	60	125	-	1050	2060	270615
45	40	200	-	130	1710	270616
50	200	225	-	130	1400	270617
45	195	220	-	92	1060	270618
						N.S.

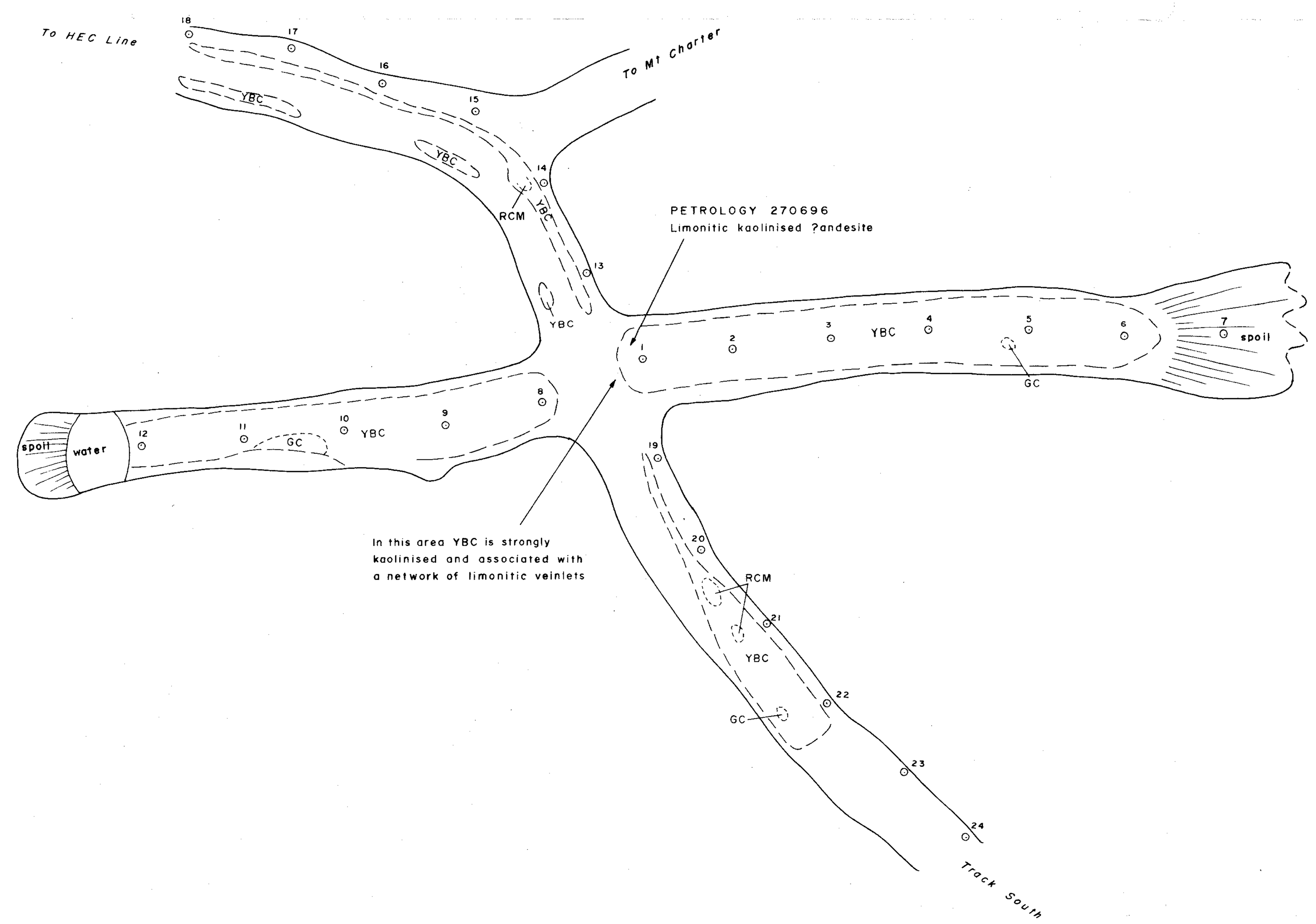
4520N

4510N

4500N

4490N

4480N



soil sample analysis on 4500N (nominal Eastings)

	4070E	4080E	4090E	4100E	4110E	4120E	4130E	4140E	4150E	4160E
Zn	130	68	57	58	67	69	75	135	135	140
Pb	210	195	105	600	1200	220	260	235	225	265
Cu	23	27	18	24	20	52	23	28	35	40

210142

SEE PLATE No. HT37a FOR LEGEND

5 cm

Aberfoyle Exploration Pty Ltd

85-2355

NORTH WEST TASMANIA

HATFIELD E.L. 15/73

012

MT. CHARTER AREA

COSTEAN 4500N/4100E

Geology: A.M.H.
Drawn:
Traced: J.L.R.
Checked:
Revised by: Date:

Location code:
Date: January, 1984
Scale: 1:250
Plate No HT 37b

Soil samples along 4500N (nominal Easting)

Zn	N.S.	86	210	220	285	325	260	350	1850	250	180	160	255	255	220	195	415	210	295
Pb	265	N.S	150	525	500	700	525	825	2000	270	190	110	240	175	150	180	60	35	50
Cu	40	25	23	55	50	46	57	36	31	55	40	28	60	74	57	49	52	40	50

5m weath. bedrock channel samples

	N.S	N.S	270534	270533	270532	270531	270530	270529	270528	270527	270526	270525	270524	270523	270522
Ba			1200	1060	1010	1040	1450	1030	1190	1860	1040	1060	612	474	632
As			24	31	56	100	38	66	52	60	32	21	48	51	65
Ag			-	-	-	-	-	-	-	-	-	-	-	-	-
Zn			140	110	125	220	285	595	395	555	460	590	405	420	495
Pb			75	65	490	250	435	810	570	1350	135	545	180	400	385
Cu			35	45	65	60	70	90	95	85	105	125	100	90	95

	270521	270520	270519	270518	270517	270516	270515	270514	270535	270536	270537	270538	270539	270540	270541	270542	270543	270544
Ba	505	568	836	526	767	1000	1180	1420	1138	1040	1080	383	528	692	692	649	556	614
As	30	32	14	17	20	36	63	1050	29	28	21	22	23	38	28	33	31	34
Ag	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zn	530	850	1450	1300	1400	950	1250	590	300	135	235	150	185	790	715	485	410	370
Pb	520	245	1030	875	1600	5400	4500	625	235	35	15	20	85	1250	215	145	230	195
Cu	70	20	40	30	55	70	70	55	40	30	70	95	95	120	95	95	100	95

	N.S	N.S	N.S	270545	270546	270547	270548
Ba				519	815	1490	1100
As				35	77	34	29
Ag				-	-	-	-
Zn				860	1200	355	285
Pb				75	85	45	85
Cu				55	50	35	35

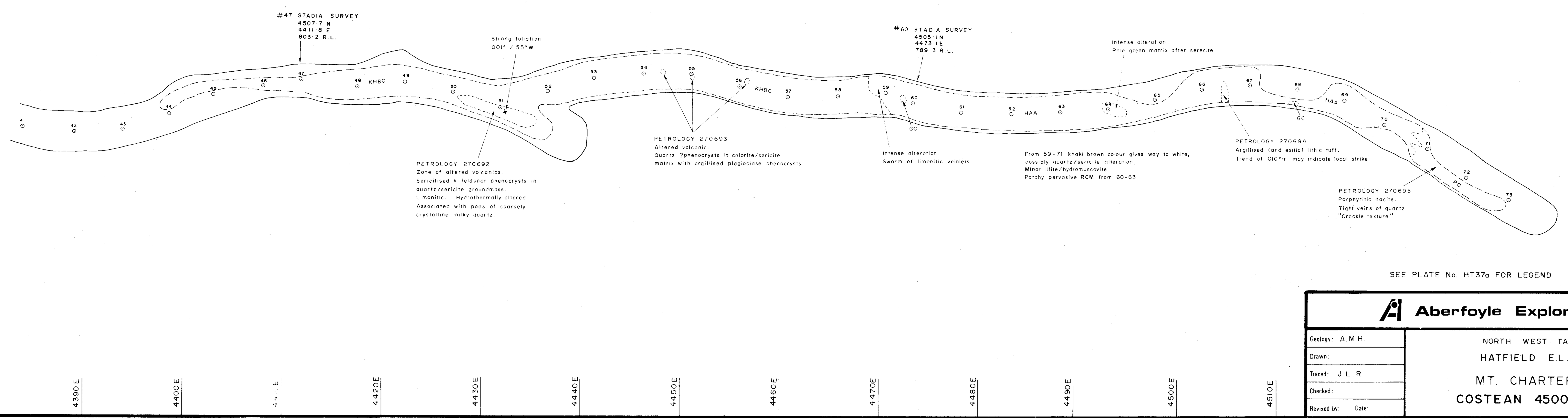
Soil samples along 4500N (nominal Easting)

Zn	310	240	285	89	200	140	94	84	89	41	28	29	37	95	91
Pb	50	125	115	70	70	20	20	30	40	<20	<20	<20	<20	25	50
Cu	23	34	43	47	18	28	14	11	13	15	7	5	6	5	14

5m weath. bedrock channel samples

	270549	270550	270551	270552	270553	270554	270555	270556	270557	270558	270559	270560	270561	270562	270563	270564
Ba	1010	996	1280	1150	1380	1160	1380	1540	1710	1640	1880	2090	1800	1730	1720	1450
As	37	23	22	22	22	28	10	2	9	18	18	6	26	22	13	7
Ag	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zn	565	320	385	250	205	125	185	235	225	160	185	180	285	220	185	200
Pb	70	105	70	55	65	35	60	10	15	15	20	10	30	30	20	20
Cu	35	30	30	25	35	20	30	10	10	10	10	15	25	10	30	10

	270565	270566	270567	270568	270569	270570	270571	270572	270573	270574	270575	270576	270577	270578	270579	270580
Ba	1610	598	1300	1430	1420	1570	1560	1610	1090	1170	796	610	660	751	1250	874
As	15	32	17	14	18	12	30	11	9	14	7	58	17	60	21	61
Ag	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zn	275	215	130	105	90	95	95	95	100	150	75	105	175	165	125	90
Pb	25	25	10	15	15	10	15	10	15	10	10	30	15	25	60	35
Cu	20	20	10	10	10	10	10	10	10	15	10	15	20	25	25	30



210143

SEE PLATE No. HT37a FOR LEGEND

5 cm

Aberfoyle Exploration Pty Ltd 85-2355

Geology: A.M.H.	NORTH WEST TASMANIA	Location code:
Drawn:	HATFIELD E.L. 15/73 013	Date: January, 1984
Traced: J.L.R.	MT. CHARTER AREA	Scale: 1:250
Checked:	COSTEAN 4500N/4400E	Plate Nº HT 37c
Revised by: Date:		

5m weath. bedrock channel sample or 5m rock chip sample

(ppm)

Ba	3·12%	8590	2·29%	9280	8000	4100		3·01%	2·47%	2·28%	1·12%	2·6%
As	4650	2050	1850	1200	1350	1150		1200	400	360	1050	1250
Ag	5	1	0·5	–	–	–		5	8	1	3·5	6
Zn	245	145	165	170	120	160		145	100	65	95	75
Pb	435	480	680	385	265	560		490	365	315	420	1045
Cu	140	80	60	55	50	75		100	50	30	60	40
Sample	265842	265841	265840	265839	265838	265837	265631	265630	265629	265628	265627	265626

Ba	9660	2·77%	7430	1·13%	4·38%	11·4%	24·2%	17·4%	28·7%	14·7%	13·8%	10·8%
As	1450	350	200	330	290	480	370	1850	1350	1300	2400	3350
Ag	1	1	–	5	8·5	10	15	21	22	43	49	25
Zn	80	100	70	80	110	125	125	115	125	165	245	250
Pb	470	185	285	375	380	430	925	1575	1325	2000	1525	1575
Cu	60	45	15	55	80	100	50	95	50	90	75	100
Sample	265625	265624	265623	265622	265621	265620	265619	265618	265617	265616	265615	265614

Ba	7·83%	1·58%	2·42%	8160	1950	3131	1·02%	6020	1520	1200	928	1010	1648
As	1450	260	61	290	48	39	67	46	36	24	86	34	24
Ag	8·5	–	–	–	–	–	–	–	–	–	–	–	–
Zn	210	230	240	185	150	170	190	155	55	40	30	35	30
Pb	730	475	80	645	110	120	140	80	40	20	35	35	30
Cu	55	40	35	45	15	20	65	15	10	5	10	10	5
Sample	265613	265612	265611	265610	265609	265608	265607	265606	265605	265604	265603	265602	265601

4330E 4340E 4350E 4360E 4370E 4380E 4390E 4400E 4410E 4420E 4430E 4440E 4450E 4460E 4470E 4480E 4490E 4500E 4510E

210144

SEE PLATE No. HT37a FOR LEGEND

5 cm

Aberfoyle Exploration Pty Ltd

85-2355

NORTH WEST TASMANIA
HATFIELD E.L. 15/73 014
MT. CHARTER AREA
COSTEAN 4550N/4400E

Location code:
Date: January, 1984
Scale: 1:250
Plate No: HT 37d

Geology: A.M.H.
Drawn:
Traced: J.L.R.
Checked:
Revised by: Date:

5m channel samples

Sample	270683	270682	270681	270680	270679	270678	270677	270676	270675	270674	270673	270672	270671	270670
Cr	568	691	626	672	847	767	683	478	625	625	512	520	490	535
Ba	183	169	236	246	436	919	275	309	253	507	1100	444	297	744
Bs	17	15	15	31	20	11	20	21	21	22	22	27	35	22
Ag	-	-	-	0·5	-	-	-	1·0	-	0·5	-	-	-	-
Zn	355	465	470	555	590	625	575	980	900	1050	840	990	1450	990
Pb	1700	1800	1750	2775	1000	845	1500	2650	1850	2450	975	1350	2050	1250
Cu	65	60	75	70	55	50	55	70	70	65	65	60	70	60

Sample	270669	270668	270667	270666	270665	270664	270663	270662	270661	270660	270659	270658	270657	270656
Cr	592	637	595	568	563	559	452	420	497	362	373	497	572	668
Ba	733	671	795	891	508	1480	512	497	701	687	429	661	1600	801
Bs	22	22	26	22	25	21	25	21	11	20	20	12	12	15
Ag	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zn	1800	1550	1900	2050	2300	2350	2250	1250	2050	1900	1750	2050	1600	2300
Pb	2450	1000	1800	1550	1650	1450	320	445	665	1550	320	210	265	490
Cu	115	85	60	65	115	80	120	125	50	75	70	30	30	40

Sample	270655	270654	270653	270652	270651	270650	270649	270648	270647	270646	270645	270644	270643	270642
Cr	517	565	527	561	475	484	935	501	520	931	650	955	669	1100
Ba	507	896	825	644	551	203	579	277	265	567	721	673	640	472
Bs	29	19	20	19	17	29	14	26	20	51	29	38	29	31
Ag	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zn	2250	2650	2950	2350	2250	1750	1800	1850	3000	3450	1800	2150	1400	2250
Pb	235	120	2050	1550	115	220	80	130	270	750	1250	1675	780	335
Cu	105	80	110	110	185	85	130	80	110	165	135	140	135	185

210145

SEE PLATE No. HT37a FOR LEGEND

5 cm

3990E 4000E 4010E 4020E 4030E 4040E 4050E 4060E 4070E 4080E 4090E 4100E 4110E 4120E 4130E 4140E 4150E 4160E 4170E 4180E 4190E 4200E

Aberfoyle Exploration Pty Ltd 85-2355

REVISIONS			
Init.	Date	Init.	Date
AMH ACD	6. 3. 85		

NORTH WEST TASMANIA 017.
HATFIELD E.L. 15/73
MT. CHARTER AREA
COSTEAN 3900N/4100E

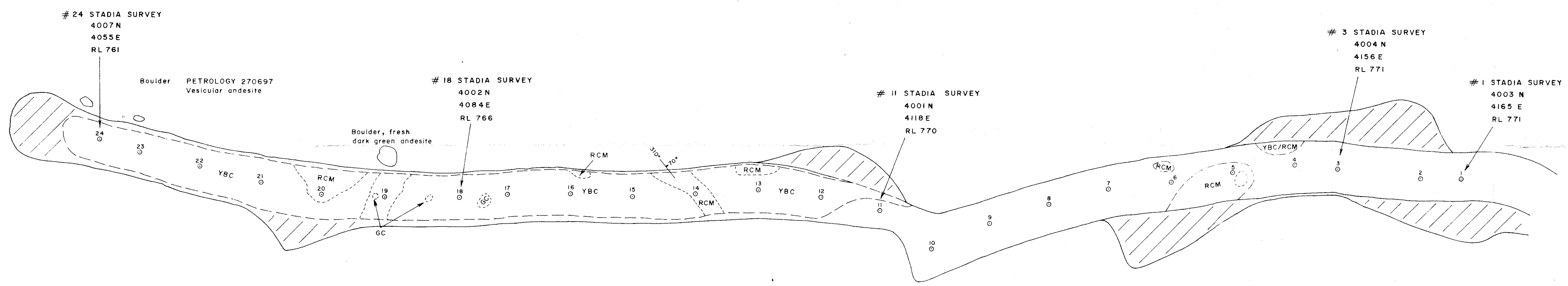
Compiled: A.M.H.
Drawn:
Traced: G.L.C.
Checked:

Location Code:
Scale: 1:250
Date: April, 1984
Plate No: HT37g

RMO 554

	270641	270640	270639	270638	270637	270636	270635	270634	270633	270632	270631	270630
Ba	445	223	172	259	279	379	441	249	397	341	315	242
As	50	200	100	43	36	63	35	53	37	37	32	32
Ag	-	-	-	-	-	-	-	-	-	-	-	-
Zn	395	360	365	330	305	320	325	380	300	340	310	345
Pb	295	2150	1750	3050	3550	935	500	3700	3450	5000	1950	315
Cu	115	95	60	65	70	55	55	70	55	70	50	40

	270629	270628	270627	270626	270625	270624	270623	270622	270621	270620	270619
Ba	493	402	180	852	1020	633	615	902	415	931	743
As	34	19	21	19	20	21	22	23	32	24	28
Ag	-	-	-	-	-	-	-	-	-	-	-
Zn	445	295	400	265	340	315	315	320	305	265	370
Pb	335	660	445	410	500	455	370	415	830	624	1125
Cu	45	35	40	45	35	45	75	80	80	50	65



4010N

4000N

3090N

4040E 4050E 4060E 4070E 4080E 4090E 4100E 4110E 4120E 4130E 4140E 4150E 4160E 4170E

210146

SEE PLATE No. HT37a FOR LEGEND

5 cm

Aberfoyle Exploration Pty Ltd

85-2355

REVISIONS			
Init.	Date	Init.	Date

NORTH WEST TASMANIA 016

HATFIELD E.L. 15/73

MT. CHARTER AREA

COSTEAN 4000N/4100E

Compiled: A.M.H.

Drawn:

Traced: G.L.C.

Checked:

Location Code:

Scale: 1:250

Date: April, 1984

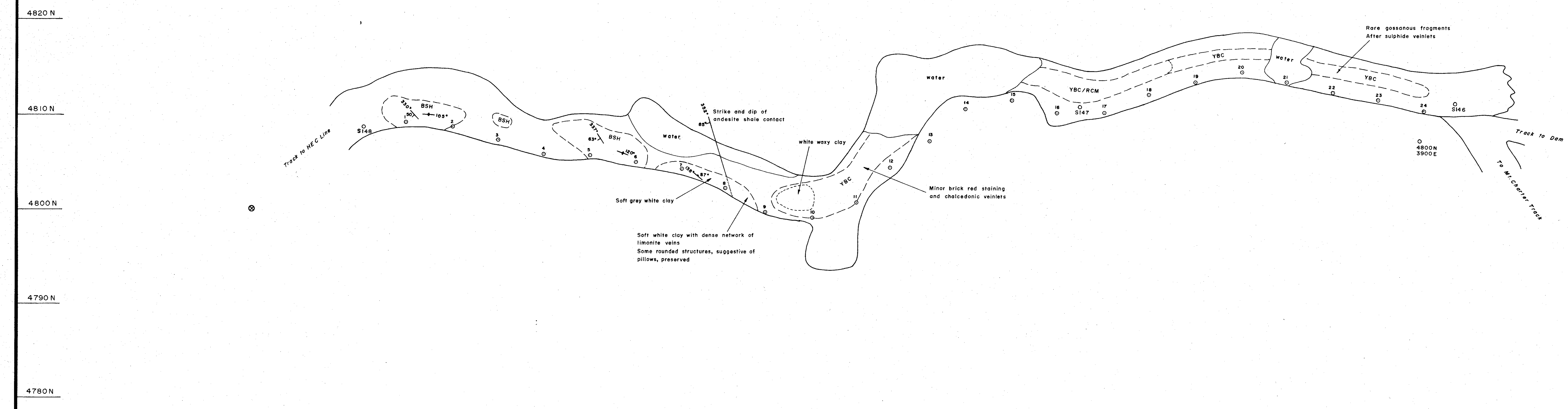
Plate No: HT 37f

RMO 554

(ppm)	270700	270701	N.S.	N.S.	270702	270703	270704	270705	270706	270707	270708	270709
Ba	747	662			980	832	1060	2230	1870	1500	1110	801
As	25	15			13	18	8	108	14	37	47	67
Ag	1·0	0·5			1·6	0·5	0·5	0·5	0·5	-	0·5	0·5
Zn	60	25			75	30	25	50	50	75	95	105
Pb	85	100			60	50	125	130	155	160	20	390
Cu	60	30			75	85	55	95	65	50	50	75

(ppm)	N.S.	N.S.	N.S.	270710	270711	270712	270713	270714	270715	270716	270717
Ba				974	779	928	1270	1330	1540	1980	1680
As				32	36	47	51	29	73	33	35
Ag				0·5	0·5	-	0·5	-	1·0	-	0·5
Zn				135	100	120	75	60	150	135	140
Pb				470	115	165	170	120	100	80	65
Cu				70	95	140	65	60	110	80	75

5m channel samples



210147

SEE PLATE No. HT37a FOR LEGEND

5 cm

Aberfoyle Exploration Pty Ltd

85-2355

Geology: A.M.H.
Drawn:
Traced: J.L.R.
Checked:
Revised by: Date:

NORTH WEST TASMANIA
HATFIELD E.L. 15/73
MT. CHARTER AREA
COSTEAN 4800N/3800E

015

Location code:
Date: January, 1984
Scale: 1:250
Plate No HT. 37a

5m CHANNEL SAMPLES

	270768	270767	N.S.	270766	270765	270764	270763	270762	270761	270760	270759
Cu ppm	40	30		40	45	55	95	80	95	70	55
Pb ppm	65	80		170	545	575	400	690	935	1325	1200
Zn ppm	50	55		140	380	250	500	610	595	540	495
Ag ppm	-	-		-	-	-	-	-	-	-	-
As ppm	6	9		19	11	18	16	14	24	8	2
Ba ppm	900	838		1330	1060	777	699	616	557	698	602

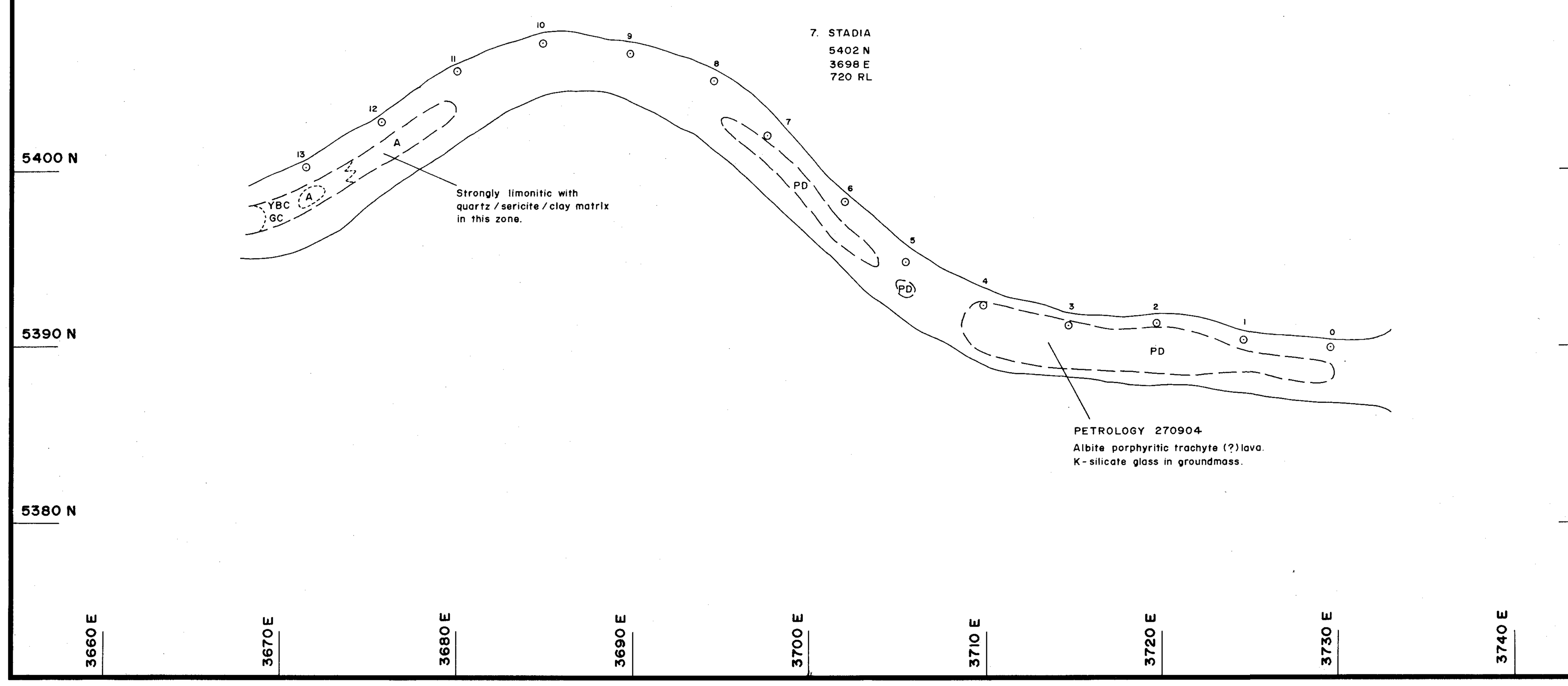
	270758	270757	270756	270755	270754	270753	270752	270751	270750	270749	270748
Cu ppm	55	45	55	50	50	50	50	55	50	50	50
Pb ppm	565	555	365	275	735	835	705	1175	665	520	1275
Zn ppm	445	520	630	445	460	520	425	380	400	355	320
Ag ppm	-	-	-	-	-	-	0·5	-	0·5	0·5	-
As ppm	4	18	11	7	-	-	-	9	7	15	9
Ba ppm	824	1180	855	519	716	569	683	591	526	549	800

	270747	270746	270745	270744	270743	270742	270741	270740
Cu ppm	45	50	50	65	40	40	35	40
Pb ppm	1250	1200	910	1200	1350	890	770	210
Zn ppm	285	360	420	190	115	145	125	120
Ag ppm	0·5	-	0·9	-	-	0·5	0·5	-
As ppm	4	2	17	4	10	15	26	32
Ba ppm	672	516	686	623	419	583	622	557

	270739	270738	270737	270736	270735	270734	270733	270732	270731
Cu ppm	55	60	95	70	70	65	50	55	60
Pb ppm	125	150	145	115	120	195	260	430	1350
Zn ppm	100	115	247	190	255	225	170	175	160
Ag ppm	0·5	1·0	0·5	1·0	-	0·5	0·5	1·0	1·0
As ppm	41	56	26	35	26	44	68	61	66
Ba ppm	478	548	452	627	632	984	676	1090	983

5m CHANNEL SAMPLES

	270730	270729	270728	270727	270726	270725	270724	270723	270722	270721	270720	270719	270718
Cu ppm	110	90	60	40	50	50	55	40	30	30	30	45	30
Pb ppm	2600	935	300	180	245	670	275	485	280	90	95	100	50
Zn ppm	160	145	105	80	100	140	120	85	60	65	65	70	30
Ag ppm	0·5	1·0	0·5	-	1·0	0·5	0·5	0·5	1·0	0·5	0·5	1·0	0·5
As ppm	178	172	110	76	69	77	43	51	26	44	40	64	27
Ba ppm	1200	1000	763	559	548	615	504	525	800	924	829	635	2530

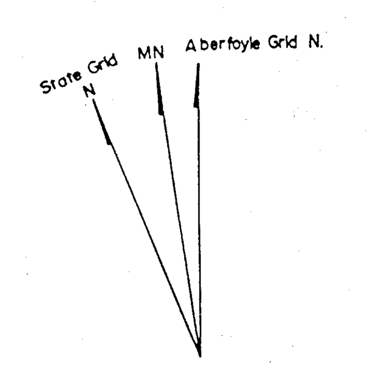


— — — —	Limit of exposure in costean
- - - - - -	Geological contact
(wavy dashed line)	Geological contact interpreted
10 ⊙	Survey peg with number (Geochemical sampling is between pegs)
(symbol)	Strike / dip of foliation, cleavage
(symbol)	Strike / dip of bedding
(symbol)	Strike / dip of jointing
PD	Porphyritic dacite
BPSS	Baritic pyritic sericite schist
QSR	Quartz sericite rock - strongly limonitic quartz sericite rock, limonitic gossan and white clay
HAA	Hydrothermally altered andesite
A	Dacite andesite lava breccia
ATL	Andesitic tuff lava
• GC	Green, grey saprocitic andesite. Primary texture discernable, pink spots after feldspar phenocrysts common Forms pads grading outwards to YBC or RCM
• KHBC	Khaki brown saprolitic andesite. Original feldspar porphyry texture retained
• RCM	Brick red clay, stained with manganese, often associated with white waxy clay. Jointing and texture partially preserved. Possibly related to hydrothermal alteration
• YBC	Yellow brown clay. Jointing, texture partially preserved
BSH	Black shale, fresh except where indicated. Well bedded, well cleaved

• denotes " interpreted to be weathering products of andesitic volcanics "

Bedrock channel samples prepared and analysed by Analab, Cooee, Tas.

ELEMENT	ANALAB CODE	METHOD
Cu,Pb,Zn,Ag	101	Perchloric acid digestion, A.A.S.
As	114	Perchloric acid digestion, vapour hydride generation, A.A.S
Ba	401	Pressed powder X.R.F.



210148

5 cm

Aberfoyle Exploration Pty Ltd 85-2355

NORTH WEST TASMANIA
HATFIELD E.L. 15/73 018
COSTEAN 5400N / 3600N

REVISIONS			
Init.	Date	Init.	Date

Location Code:

Scale: 1: 250 | Date: July 1984

Compiled: AMH
Drawn: AMH
Traced: GLC
Checked:
Plate No: HT 47 f

RMO 554