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EXPLORATION LICENCE 5/63
COMSTAFF J.V., N.W. TASMANIA
FINAL REPORT, MAY 1989

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File Ref. EL 5/63	
- 2 JUN 1989	
Doc. Ref.	
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INTRODUCTION

This report describes the results of exploration in the period 30th June, 1988 to 31st May, 1989 carried out by BHP Minerals Ltd on behalf of the Comstaff Joint Venture in exploration licence 5/63 (fig. 1) relinquished on 30th June, 1989. The report also presents a brief summary of previous exploration and results.

Exploration Licence 5/63 was originally granted to Mt Costigan Mines Ltd in 1963 and transferred to Comstaff PL in 1964. A joint venture between Comstaff PL and Preussag Australia PL was formed in 1977. BHP Minerals Ltd formed into this joint venture in late 1985 and has carried out all exploration on the tenement since that time. The tenement initially covered 4947 km², but, as a result of successive compulsory relinquishments, the tenement covered only 32 km² at the beginning of this reporting period.

The exploration strategy adopted to search for Hellyer-type VMS deposits within this exploration licence emphasises the role of deep-sounding ground TEM methods, primarily the University of Toronto EM (UTEM) technique. As much of the area as is practicably possible has been covered by UTEM and any anomalies geologically mapped and detailed by additional EM, and in some instances with soil geochemistry. Any significant conductors have been drilled and logged using a downhole EM system such as SIROTEM or EM37.

2. SUMMARY OF EXPLORATION PRIOR TO JUNE 1988

Exploration of the current tenement area began in the early seventies with an airborne EM/magnetic (INPUT) and stream sediment survey. A stream sediment anomaly in Sock Creek (440 ppm Pb, 320 ppm Zn) lead to the

establishment of the Sock Creek (DAA) grid (fig. 2). B horizon soil samples were collected at 15 m intervals and analysed by AAS for Cu, Pb and Zn, delineating an anomalous zone trending NNE-SSW. Costeans through this zone revealed minor sphalerite and galena in slates. Chip samples from these costeans yielded a maximum of 2% Zn and 0.4% Pb. A second, metric, grid was then surveyed to position 14 diamond drillholes (fig. 2). Mineralization was found to be vein-controlled and discontinuous, although locally quite high in grade (SK2 4 m @ 8.7% Zn, 0.9% Pb, 0.3% Cu and 5 g/t Ag). The geology of the prospect has been exhaustively discussed elsewhere (Hopwood, 1977; Hall, 1979a and BHP 1987) and will not be repeated here. Apart from verification of Au assays and relogging of drillcore no additional work has been carried out on the prospect since 1979.

A single anomaly in the current EL area was identified during the Input survey, and a small grid (DAB grid, fig. 2) was cut over it. The grid was soil sampled and surveyed using Crone EM and ground magnetics. Three costeans, sub-parallel to the grid-lines were dug and rock-chip sampled for Cu, Pb and Zn. Although the exposed rocks (mainly slate) were weakly anomalous in base-metals (up to 220 ppm Pb, 150 ppm Zn and 80 ppm Cu) no additional work was carried out.

The DAC grid (fig. 2) was evidently established to cover prospective stratigraphy without encouragement from drainage geochemistry or airborne EM. Both A and C horizon soil samples were collected, the latter using an auger (Hall, 1979b). Samples were dried and sieved to -80 mesh, prior to AAS analysis for Cu, Pb, Zn, Ag, Mn, Fe and Ba. Three lines were surveyed using ground magnetics. No significant geochemical anomalism was identified and mapping suggested the absence of a major hydrothermal alteration system (Hall, 1979b). Accordingly no further work was carried out.

During early 1986, BHP conducted a regional cyanide gold drainage survey, incorporating the current tenement area, with negative results. Additional stream sediment samples were collected along Thunderbox Creek, the site of a 1982 Pb and Ba anomaly in -80 mesh (but not -20 and +80) fractions of stream sediment. This anomaly could not be reproduced (BHP, 1987).

Most of the EL was surveyed using UTEM in 1987 (fig. 2; BHP, 1988). Six anomalies were detected, although one was the result of powerlines and two (anomalies D & E) were interpreted as being due to a fault and a lithological contact, warranting no further work.

UTEM anomaly H (High Point prospect) was confirmed by follow-up UTEM and after geological mapping and rock chip sampling, two inclined diamond drillholes were sunk, in order to test the most conductive of several individual anomalies within anomaly H. Drillhole HPI (table 1) intersected volcanic rocks correlative of the Hellyer-Que River sequence and which assayed at 250 m at >0.2% Zn. Both holes were logged using SIROTEM which obtained responses interpreted to be due to a flat-lying sheet of conductive Que River Shale, north of the drill collars.

UTEM anomaly G (Sock Creek South) was confirmed by SIROTEM. An IP survey over the anomaly obtained a response interpreted to be due to an outcropping zone of moderate chargeability, namely a weathered basalt below a thin glacial cover. SCS1-3 tested the EM anomaly (table 1) and SCS2 and 3 were logged using SIROTEM, the results of which are reported below.

UTEM anomaly J (Tullabardine Gorge) was confirmed by SIROTEM and weathered bedrock sampled using a power auger. An anomalous zone, containing up to 1250 ppm Pb was later found to be due to laboratory (Analabs) contamination. Apart from this spurious anomaly there was no surface geochemical indication of mineralization.

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Nevertheless nine shallow drillholes were completed, using a helicopter portable rig supplied by contractor N. Poltock, for a total of 220 m. No significant mineralization was detected.

3. EXPLORATION DURING JUNE 1988 TO MAY 1989

3.1 Summary

Activity of the current reporting period consisted of additional EM surveys and diamond drilling at the three prospects identified as a result of the 1987 UTEM survey. At the High Point prospect a program of TEM soundings was undertaken in the area north of drillholes HP1 and 2, and a further two diamond drillholes (HP3 & 4) were completed. HP3 was downhole logged using the EM37 system. At the Sock Creek South prospect an additional UTEM survey was carried out along strike of the known conductor and a single diamond drillhole (SCS4) completed and downhole logged using EM37. At the Tullabardine Gorge prospect further UTEM surveying was carried out in an attempt to resolve some of the ambiguities of the previous surveys. A planned drillhole was not carried out.

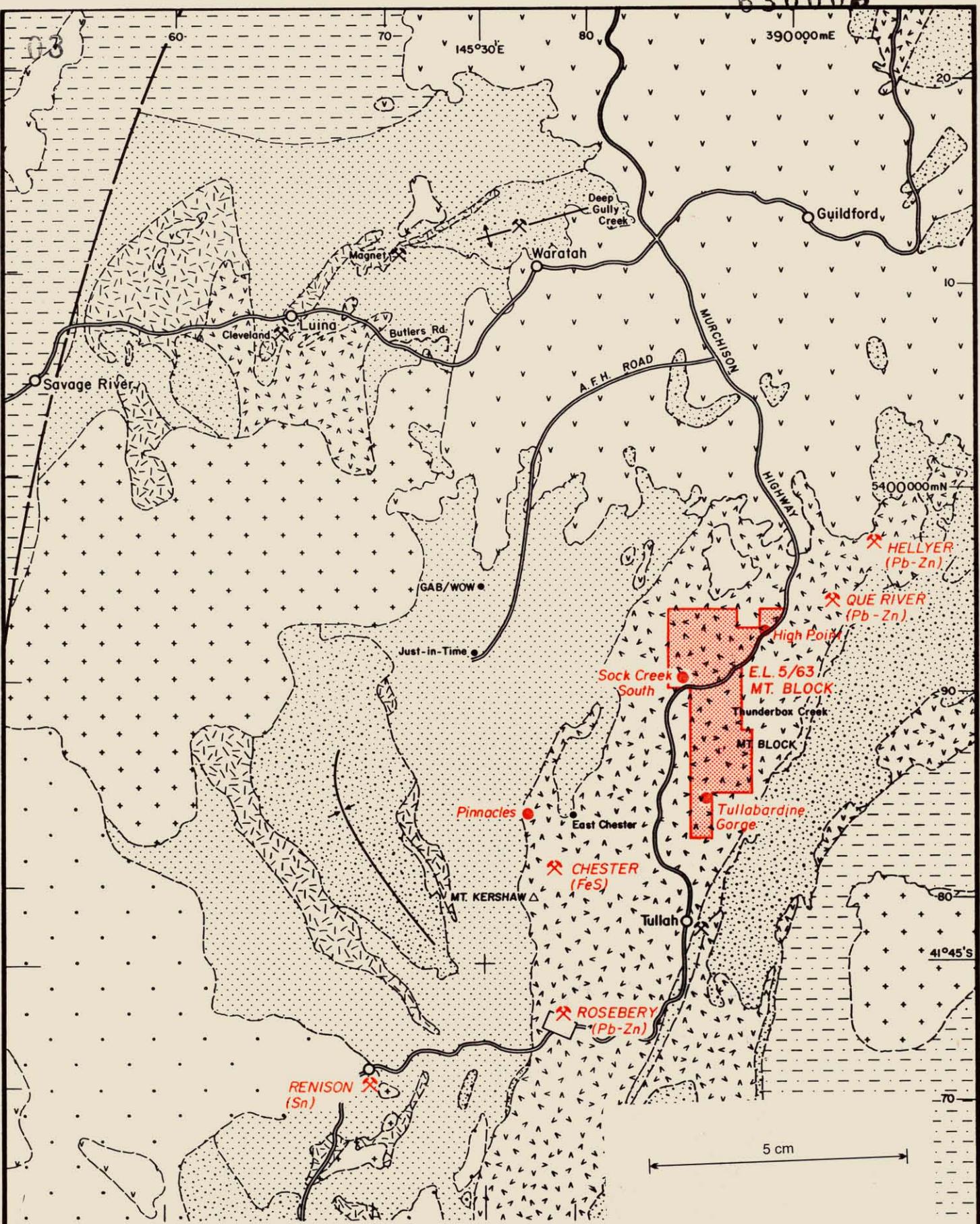
3.2 High Point Prospect

3.2.1 TEM Soundings

A transient electromagnetic sounding survey, using EM37 equipment, was conducted over the High Point prospect in February 1989. The survey was intended to provide information regarding depth and thickness of the Que River Shale and Que-Hellyer Volcanics in the vicinity of the High Point prospect. A total of ten 200 x 200m loops and three 400m x 400m loops were surveyed using the in-loop/out-of-loop technique (fig. 3).

The 200m x 200m loops were preferred as the best compromise between depth penetration and resolution of individual layers. In regions where it was believed that the 200m x 200m loops would not provide sufficient

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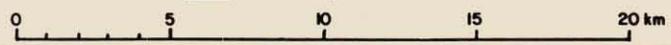


- TERTIARY
 - Basalt
- DEVONIAN
 - Granite, porphyry
- ORDOVICIAN-SILURIAN
 - Conglomerate, limestone
- CAMBRIAN ?
 - Ultramafite

- CAMBRIAN
 - Sediments with minor volcanics
 - Volcanics and intrusives
- PRECAMBRIAN
 - Unmetamorphosed sediments
 - Metamorphosed sediments

FIG. 1

- Mine
- Prospect



Centre
MELBOURNE

Date
1 - 6 - 88

THE BROKEN HILL PROPRIETARY CO. LTD.

EL 5/63 - MT. BLOCK, COMSTAFF JOINT VENTURE, TAS.

REGIONAL GEOLOGY AND PROJECT LOCATION

Fig.1 Project No
B56

Drawing No
A4-2763

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penetration to resolve the base of the Que River Shale, 400m x 400m loops were surveyed in conjunction with the 200m x 200m loops. This also enabled a comparison of inversion models from the small and large loops. Twenty channels of Z component data were collected at each measurement station. The raw data are presented as Kaufman apparent resistivity curves in Appendix 4.

Initial inspection of the raw data plots reveals one obvious feature - in almost all cases the tails of the resistivity curves rise more steeply than the theoretical maximum of 45°. It is not unusual to see this effect with in-loop readings due to the "loop effect" (Asten & Price, 1985), but corrections using out-of-loop readings can usually rectify this problem. In this case the feature was present in both in-loop and out-of-loop data. The possibility that the unusually steep late time resistivity curve was due to instrumental effects was ruled out when a repeat sounding some weeks later (using Sirotem equipment) produced the same effect.

Interpretation of the data involved inversion of the loop-corrected data using CSIRO's GRENDL software. The data points lying in the theoretically impossible section of the curve were weighted to zero before the inversion took place. Experiments involving weighting varying proportions of the curve to zero revealed that the depth to the top of the shale, and the conductivity contrast between the shale and overlying lithologies were consistently resolved regardless of the late-time steep tail. However no reliable information could be obtained with regard to the depth to the base of the Que River Shale. Inversion model results are presented in the form of Kaufman apparent resistivity plots and pseudo sections in Appendix 4. A summary of the inversion results is presented in figure 4.

Data from loops over HP1 and HP2 highlighted the change in electrical behaviour between these drill-holes previously identified by surface and downhole EM. Correspondence between the modelled electrical layers and

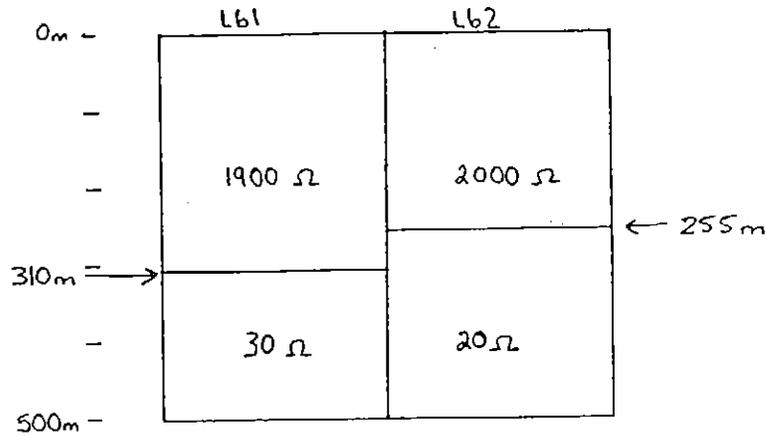
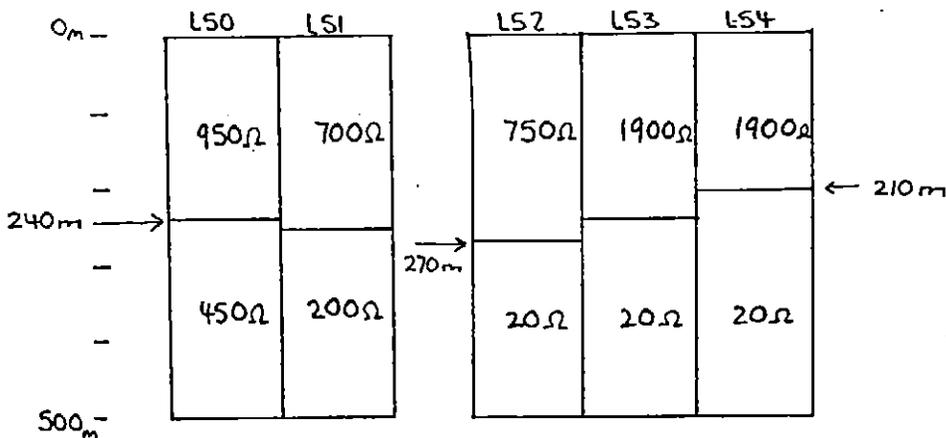
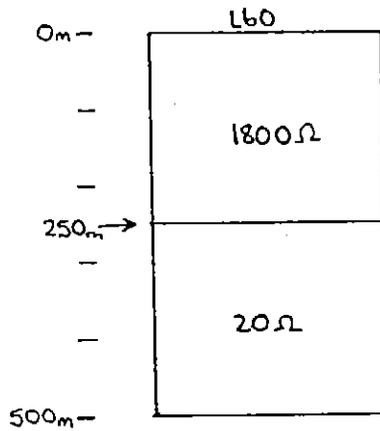
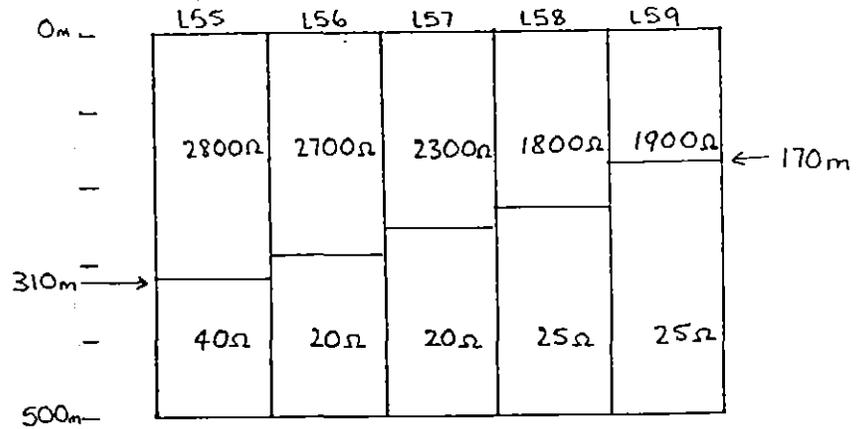


FIGURE 4

TEM SOUNDING

HIGH POINT, TAS

INVERSION MODEL
DEPTH SECTIONS



lithological units in these holes was poorer because the assumption of horizontal continuity used in the inversion process is not valid (next section). The horizontal continuity assumption is valid for the vicinity of HP3 and correspondence between models for loops over HP3 and geological data was excellent.

The major conclusion to be drawn from the data is that the Que River Shale is shallowing toward the north-east corner of the High Point prospect (fig. 4). It is also clear that the theory of TEM sounding inversion requires further development to account for the extremely steep late time increase in the Kaufman apparent resistivities.

3.2.2 Diamond Drilling

Details of HP3 and 4 are given in table 1. HP3 was drilled to test the depth below surface to the prospective volcanic rocks encountered in HP1 and 2. It also served to calibrate the TEM sounding data. HP4 was drilled along the same section as HP1 and was aimed at testing prospective stratigraphy beneath HP1 using DHEM (next section). HP3 was completed in four weeks and reached a total depth of 577 m. HP4 encountered very difficult drilling conditions in penetrating the Mt Charter fault system and took considerably more time than anticipated (12 weeks). The PVC piping became stuck at 350 m and lack of time precluded drilling it out. This, together with the presence of over 170 m of HQ drillpipe and casing meant that the hole was not logged with EM.

3.2.3 Downhole EM

Three downhole transient electromagnetic survey programs have been conducted within the High Point prospect. These surveys were designed to locate off-hole conductors which could be massive developments of base metal mineralisation intersected in HP1 and HP2. The first program consisted of surveying HP1 from loops HP14, HP15 and HP16 (fig. 5). This survey was reported in the 1987/1988 annual report and will be reviewed only

briefly. The downhole data from this survey indicated the presence of a large off-hole conductor at a depth of 300 m, with a conductivity \times thickness of 15 Siemens. This preliminary survey constrained the conductor to lie NE or SW of HP1.

The second program involved surveying HP1 from loops HP17 and HP18. HP2 was surveyed from loops HP14 to 18 inclusive. The program was conducted using Sirotem II equipment and readings were taken every 10 metres down the holes. Sixteen channels of early time and standard time data were recorded at each measuring point. The data is presented in the form of bi-log plots in Appendix 5. Channel specifications are presented in table 2. Analysis of this data from HP1 set suggested that an off-hole conductor lay to the NE of HP1. Inspection of the data from HP2 suggested that HP2 had intersected the margin of this conductor. HP2 data from loops 14 and 18 suggested that the drillhole was within the conductor. The sign change evident in data from loops 15, 16 and 17 indicated that at early time the drillhole was inside the current filament flowing within the conductor. As time increased the currents migrated into the centre of the conductor, past the drillhole. Hence while the drillhole was within the conductor, it was close to the margin. The interval within the drillhole interpreted to lie within the conductor, corresponded to a massive graphitic black shale interval. Conductivity measurements on core indicated that the shale was sufficiently conductive to account for the 15 Siemens conductivity thickness previously modelled.

The third program was designed to survey HP3 and HP4 from loops HP14 to 18 inclusive. It was recognised that data in the top 100 m of HP3 would be affected by proximity to the loop edge but it was felt that it was most valuable to have all holes logged from the same loops to allow direct comparison of results from different drillholes. Unfortunately it was not possible to log HP4. HP3 was logged using the EM37 system and readings were taken every 10 m. Twenty channels were recorded at each

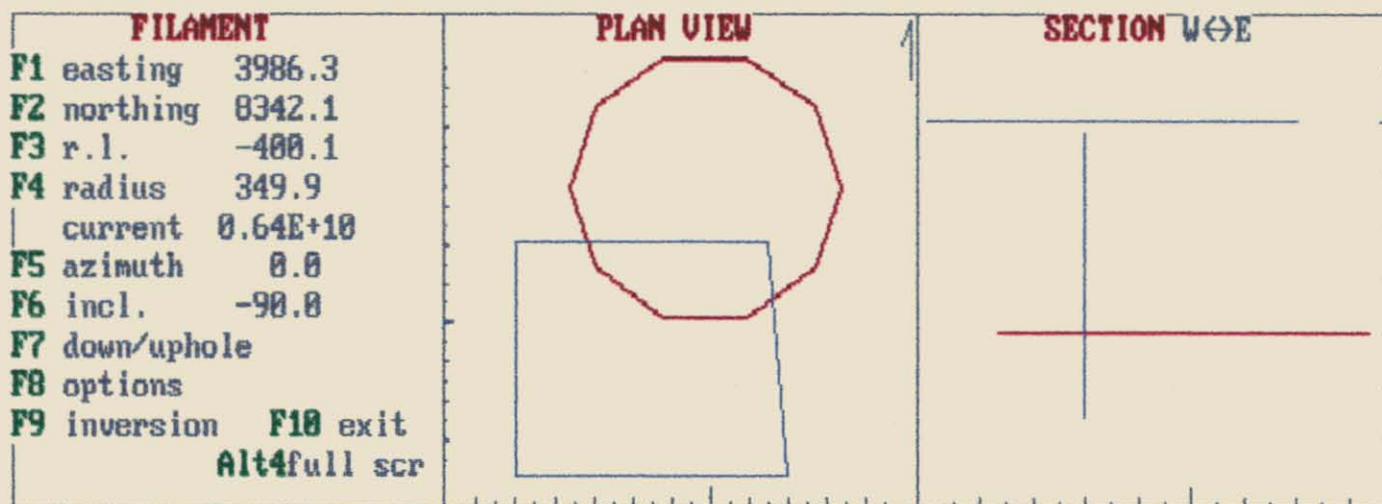
measuring point using the High Frequency mode. The data are presented in the form of bi-log plots in Appendix 5. Channel specifications are presented in Table 3.

Initial inspection of the profiles reveals a great difference between early time and late time responses. At late time, data from loops 15 to 18 indicated that HP3 was indeed within the large conductor interpreted previously using data from HP1 and HP2. The late time anomaly seen from loops 15 to 18 was modelled using filament inversion software. The resulting model (Fig. 6) indicated a large sub horizontal filament with a diameter of the order of 700 m, at a depth of 400 m would provide a close fit to Channel 16 field data. This agreed well with the models derived from DHEM data for HP1 and HP2. The modelled filament corresponded once again to the thick, graphitic, black shale intersected in HP2 and HP3.

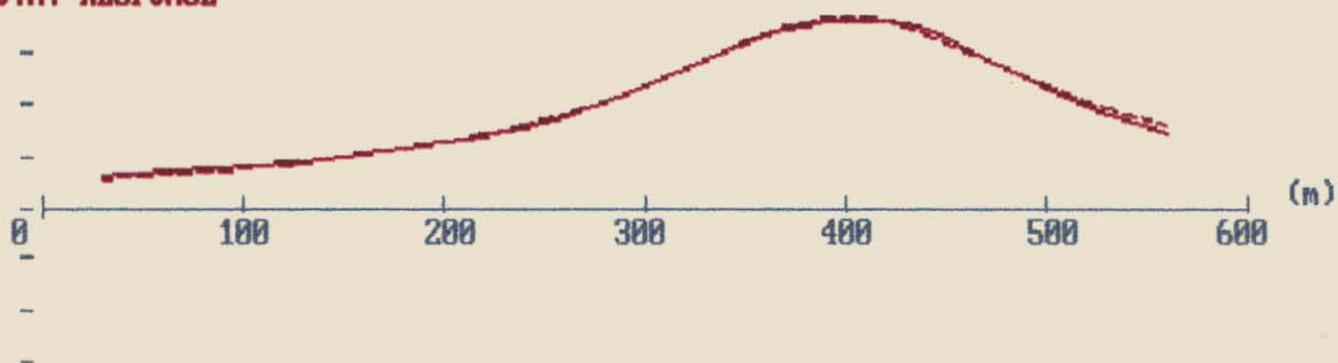
A comprehensive interpretation of data from loop 14 and early time data from loops 15 to 18 was unable to be completed in time for this report. Preliminary interpretation suggested that the anomaly from loop 14 may be due to a current filament in a vertical plane flowing on the western margin of the shale "block", possibly within the Mt Charter fault or a splay fault. Data from loops 15 to 17 suggested that at early time the induced currents were flowing on the top of the shale block, and were slow to penetrate into the conductive shale mass. Early time data from loop 18 are more complex but were interpreted once again to be a function of currents flowing on faces of the shale mass.

In summary, a preliminary interpretation of data from HP3 and a more comprehensive interpretation of data from HP1 and HP2 attributed all downhole anomalies to the massive occurrence of Que River shale intersected by HP2 and HP3. Early time anomalies identified in HP3 data were tentatively attributed to the shale.

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D.H. RESPONSE

tic:5x10¹⁰ model ----- data ———

h3115_16.dat

FIGURE 6

DHEM FILAMENT MODEL
 DDH HP3, LOOP 15, CHANNEL 16

8205-08

3.2.4 Geology & Mineralization

Figure 7 shows the mapped geology in the vicinity of the High Point prospect. The area is bisected by the NNW-SSE trending Mt Charter fault which separates rocks of the Animal Creek Greywacke to the south-west from rocks of the Southwell Sub-Group to the north-east (BHP, 1988).

HP3 (fig. 9) was collared approximately 200 m NW of HP2 (fig. 8) and was designed to establish the depth to the prospective Que-Hellyer Volcanics, which HP2 indicated could be present at a depth of ca. 450 m. The hole penetrated 268 m of interlayered breccia, slate and sandstone correlated with the Southwell Sub-Group (Appendix 2). The remaining 309 m comprised monotonous Que River Shale. This thickness of shale is somewhat greater than elsewhere in the region, and partly explains the anomalous conductivity of this unit in the High Point area. This data, together with the TEM soundings, suggests that the prospective Que-Hellyer Volcanics are at a depth in excess of 600 m over much of the EL north of the collar of HP3, substantially reducing the prospectivity of this area, although there is evidence of a shallowing to the north (Section 3.2.1).

HP4 intersected 118 m of interlayered breccia, sandstone and slate identical to that seen in HP2 and HP3, (fig. 9) which suggests stratigraphic continuity between the upper sections of these holes, although the data does not preclude a fault of minor displacement (<100 m). A major fault zone terminates this sequence at 118 m and is defined by intense veining, brecciation and lost core. This structure is evidently part of the Mt Charter system and cuts off the Que-Hellyer sequence to the north of the drill-collar. Beneath the fault is the mineralized Que-Hellyer volcanic sequence which is an alternating sequence of basalt lava, epiclastic and hyaloclastic breccia with minor siltstone and sandstone (Fig. 10).

As in HP1, the Que-Hellyer sequence in HP4 is mineralized, and sphalerite is visible in the drillcore over an interval of 125 m. Mineralization is largely of vein-style, occurring with varying proportions of calcite and quartz in sub-vertical veinlets. The sequence is strongly carbonated although textures are clearly preserved. Over 50 m of intense fuchsite/calcite alteration was observed in the upper parts of the sequence. Mineralization in HP3 is restricted to a small, possibly stratabound body within the uppermost breccia unit, correlated to a similar interval in HP2. Much of the sphalerite in these rocks is again vein-related, and alteration is very weak. The possibility of significant VMS mineralization south of the mapped Mt Charter fault (fig. 7) is precluded by the fact that the prospective sequence has been eroded away. It is noted, however, that greywackes and slates of the Animal Creek Greywacke intersected in HP1 do contain weak mineralization.

In summary, a wedge of mineralized mafic volcanics correlated with the Que-Hellyer volcanics has been upthrown along the complex Mt Charter fault system (fig. 10). There is evidence of substantial hydrothermal activity in this wedge manifested as fuchsite carbonate alteration and low grade Zn mineralization. The geometric constraints imposed by the Mt Charter fault and the licence boundary mean that the volume of the prospective sequence at depths of less than 600 m is small, and this volume is considered to have been adequately tested by HP1 and HP4, and to a lesser extent by HP2. DHEM surveys have yielded responses appropriate to the large thickness of Que River Shale to the north of the prospect area and do not suggest the presence of a massive sulphide body.

3.3 Sock Creek South Prospect

3.3.1 UTEM Survey

A UTEM III fixed loop TEM survey was conducted over the westward extension of EL 5/63 in the vicinity of Sock Creek, a region not covered by the 1987 survey (fig. 11). This reconnaissance survey was conducted by Lamontagne Geophysics on BHP's behalf. A total of 6.8 line kilometres was surveyed from one 1400 m x 1000 m loop (Fig 11). Readings were taken at 50 m intervals along lines 200 m apart. At each station the vertical component was read using a transmitting frequency of 33.409Hz to read 10 channels of data. The channel specifications for this frequency are presented in Table 4. All data collected was out-of-loop data. Data is presented in Appendix 6 in the form of continuously normalised and point normalised profiles, with channels 5-10 on the top axis, channels 2-5 on the centre axis and channel 1 on the lower axis. An explanation of the plotting symbols used is presented in Table 4.

The 1989 survey extended anomaly G south to line 3600N and beyond. A plan view of the anomaly is presented in Figure 11. The interpreted depth to the top of the conductor decreases to 30 m on 4600N before steadily increasing again to 110 m on 3800N. The most notable feature however is the increase in amplitude from 4400N south to 3600N despite the fact that the depth to the conductor is apparently increasing. The amplitude of the anomaly at 3800N is more than 1.5 times the amplitude of the anomaly at line 4400 even though the conductor is interpreted to be 3 times deeper. The amplitude of the anomaly at 3800 is more than twice the amplitude of the anomaly at 5000N which was tested by SCS3. The anomaly amplitude increases further on line 3600N, as does the depth of the conductor, but because the anomaly has not been fully delineated on this line very little quantitative interpretation can be performed.

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3.3.2 Diamond Drilling

Drillhole (SCS4) (Table 1) was not positioned as originally planned on line 3800N, but at 3837N to avoid boggy button grass flats. As the hole was collared in thick glacial sediments a casing advancer was used for the first 88 m of the hole, and this had little difficulty in penetrating the poorly consolidated sediments.

The marked increase in the amplitude of the anomaly towards the EL boundary, together with the interpreted depth of the conductor (clearly not a superficial effect) prompted the drilling of SCS4. The preferred location for this drillhole was on line 3800, because on this line the anomaly had the greatest amplitude whilst still being completely defined - allowing location and depth estimations. On all lines the symmetric nature of the anomaly suggested a steep to vertical dip.

3.3.3 Downhole EM

A down-hole transient electromagnetic survey was conducted within DDH SCS4 using EM37 equipment. This survey consisted of surveying SCS4 from loops AC1 and AC2 (fig. 11). Readings were taken every 5 m, with 20 channels being recorded using the High Frequency mode. Data are presented in the form of profiles in Appendix 5. It should be noted that due to an equipment problem a D.C. offset is present in the profiles. Channel specifications are presented in Table 3.

Inspection of the downhole profiles reveals that both data sets show a broad negative anomaly, which becomes positive near the surface. No plausible situation has been found which would give rise to both loops giving negative downhole anomalies. Thus it is assumed that the polarity used when measuring from one of the loops was incorrect. Inspection of geological data reveals that

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the drillhole intersected a fault zone which coincided with the TEM target interpreted from surface data. Initial attempts to explain the DHEM anomaly revolved around assuming the polarity of loop AC1 was reversed and that the anomaly was due to current channelling within the fault zone above the drillhole, near the palaeosurface beneath the glacials. Whilst this could offer an explanation for the sign of the anomaly it could not account for the dramatic difference in amplitude of the responses from loops AC1 and AC2. Nor could it account for the late time positive anomaly near the surface. Thus while the surface anomaly was almost certainly due to current channelling within the fault zone; the downhole data seemed to infer a second conductor. Further modelling suggested that, if one assumes the polarity of loop AC2 to be reversed, a horizontal plate-like conductor lying below the eastern side of loop AC1 could adequately explain the differences in amplitude between the two data sets and permit a positive response at late times near the surface. The modelled plate had a strike length of 300 m, a width of 150 m and occurred at a depth of approximately 100 m, with its eastern margin lying below the eastern edge of loop AC1. The plate was assumed to have a conductivity - thickness of 2.5S. This poorly conducting plate was interpreted to represent current flowing within the base of a thicker patch of glacials.

Hence the surface anomaly appears due to the intersected fault zone, while the downhole data seems to reflect thickening glacial sediments.

3.3.4 Geology and Mineralization

Figure 12 shows section 5000N which had not been completed prior to the submission of the previous annual report. A strip log of drillhole SCS4 is presented as figure 13.

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The sequence encountered in SCS4 is very similar to that seen in SCS3, although the former did not intersect the rhyolitic Sock Creek Porphyry. SCS4 was collared in glacial sediments and penetrated a true thickness of 74 m of poorly consolidated red to orange clays, locally with weakly cemented silty and sandy layers. The uppermost Cambrian unit is a weakly altered (carbonated) pillowed basalt lava with a fault at its base. The fault separates basalt from a sedimentary sequence of variable grain size ranging from graphitic mudstones to breccias containing abundant dacitic lithic fragments. This sequence contains calcite-sphalerite-quartz veinlets over a vertical range of 72 m, but sphalerite rarely exceeds 1% by volume of the rock. Higher Zn grades tend to be associated with fine-grained (argillaceous) lithologies but this is not always the case. At the base of the hole is a dacitic unit comprising alternating hyaloclastic breccia lava, pumiceous breccia and epiclastic breccia. It appears that the most likely explanation of the UTEM anomaly is the fault in the basalt, (which probably correlates to a fault in a similar position in SCS3), particularly where this fault subcrops beneath glacial sediments.

Petrographic examination of mineralised samples from SCS3 (Appendix 1) reveals that sphalerite is largely restricted to veinlets and selvages even on a thin-section scale, although some replaces feldspar phenocrysts in lava fragments and feldspathic silty to sandy layers. Minor K-feldspar and/or mica replacement of plagioclase is seen, but chlorite is rare and overall alteration intensity is low.

3.4 Tullabardine Gorge Prospect

3.4.1 UTEM Survey

Several Sirotem electrical surveys over the Tullabardine Gorge prospect were conducted to follow up a UTEM anomaly initially identified from loop PM01 (fig. 14). These surveys were reported in the 1987/1988 report and thus

will be briefly be reviewed here. The follow up surveys resolved four conductors, A to D (fig. 14), with A corresponding to the original UTEM anomaly. No response was obtained from any of the conductors which was comparable in amplitude to the UTEM conductor. Most of the Sirotem conductors were associated with geological contacts and faults. No encouraging geochemistry was obtained from the extensive sampling conducted over this prospect. Hence the original UTEM feature remained unexplained. Thus it was decided to position UTEM loops to the west of the anomalies in an attempt to reconcile UTEM, Sirotem and geological data. This survey was conducted in March 1989. A total of 3.55 km were surveyed from loops centre and east (fig. 14). Data are presented in the form of continuously normalised and point normalised profiles in Appendix 7. Channel specifications and plotting symbols are presented in Table 4. While the initial anomaly can be identified it is a small amplitude, short wavelength feature, lending strength to the idea that the initial anomaly was due to surficial current channelling within a poorly conducting feature such as a trough of glacials or a fault. The larger amplitude of the anomaly when read from loop PM01 is attributed to the fact that the larger loop would generate a larger current channelling system. Also the further one gets from the loop edge the greater current channelling effects dominate, lending support to a larger anomaly amplitude from PM01. Thus no further work is recommended on this prospect.

3.4.2 Geology and Mineralization

Drillholes TG6-9 (Table 1) were logged after completion of the annual report for 1988 and accordingly logs are included in Appendix 2 of this report. Sections displaying the results of the drilling are presented as figures 15 and 16. Bedrock, below a thin (up to 8 m) cover of poorly consolidated overburden (possibly of glacial origin) is dominated by a porphyritic rhyodacitic lava unit. Interbedded with this rock in TG7 is approximately 12 m of pyritic tuff.

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The rhyodacite lava unit is typically pale green and hard with phenocrysts of embayed quartz to 4 mm, green feldspar laths (altered to chlorite and white-mica) and minor chloritized hornblende. Pervasive silicification and albitization is apparent throughout, and there is rare disseminated hematite and pyrite. Phyllosilicate alteration appears to be mainly restricted to pseudomorphing of phenocryst phases. The tuffaceous unit observed in TG7 contains anomalous Zn (maximum 390 ppm) although pyrite was the only sulphide observed.

4. REHABILITATION WORK

Several new tracks and drillpads were bulldozed in order to provide access to the drillsites at High Point and Sock Creek South. In addition a track off the main Sock Creek access track was opened up to establish a water supply for the drilling of HP1 and HP2. An old logging track was opened up to allow access to the drillsite of SCS4. All these will be restored as closely as possible to their original condition prior to the end of July. It is proposed to use a tracked excavator to re-position top-soil previously stockpiled at the side of the access tracks. Original drainages will be restored as closely as possible to their pristine condition. It is not planned to seed the restored tracks as experience has shown that the soil already contains enough seed material to allow substantial revegetation within a few years.

5. CONCLUSIONS

Exploration within what was formerly part 3 of EL 5/63 has identified four Pb-Zn prospects at Sock Creek, Sock Creek South, Tullabardine Gorge and High Point.

The Sock Creek prospect was discovered in 1975 as the result of followup of stream sediment anomaly. Despite some moderately high-grade intersections (for example 4 m at 9% combined Zn and Pb) the mineralization is not of the target-type, massive Hellyer-style VMS. Rather, mineralization is structurally controlled in a breccia

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zone at the junction of rhyolite porphyry (Sock Creek porphyry) and slate. Irrespective of its ultimate origin, the Sock Creek Mineralization is unlikely to achieve either the required tonnages or grades, and gold grades are far too low to consider this as a gold prospect.

BHP's exploration strategy has identified three prospects, of which the most significant is the High Point prospect. Mineralization at High Point is hosted by rocks correlative of the prospective Que-Hellyer Volcanics and which exhibit extensive fuchsite-carbonate alteration. Although it was a UTEM anomaly that focussed attention onto this area initially, subsequent work suggested that the anomaly was due to the presence of unusually conductive and flat-lying Que-River Shale in addition to the graphitic Mt Charter fault system. Nonetheless, all of the four drillholes into this prospect have intersected low-grade Zn mineralization, with the most extensive and relatively high grade within the Que-Hellyer sequence (HP1 - 250 m @ >0.2% Zn; HP4 - 21 m @ >0.2% Zn).

Mineralization consists predominantly of veinlets of quartz, calcite and sphalerite with minor pyrite, chalcopyrite and galena, within all four units present (Animal Creek Greywacke, Que-Hellyer Volcanics, Que River Shale, Southwell Subgroup). Geometry is poorly defined, although there appears to be stratabound sphalerite in breccias of the Southwell Subgroup in HP3 and HP2. In general, veins lack distinct alteration selvages and alteration intensity in the sedimentary units is low. The Que-Hellyer sequence is pervasively chloritized and carbonated, and locally intensely altered to a fuchsite-calcite assemblage.

The possibility of major VMS-style mineralization within 600 m of the surface in much of the High Point area appears to have been ruled out by a combination of EM soundings, drilling and downhole EM.

Four diamond drillholes at the Sock Creek South prospect were aimed at testing high amplitude regions within a linear UTEM anomaly with upwards of 1 km strike length. Little was known of the geology prior to drilling. A dacitic sequence outcrops to the south, possibly an equivalent of the Que-Hellyer sequence (Corbett et al., 1988). Drilling has revealed four main units: intrusive porphyritic rhyolite (Sock Creek Porphyry), pillow basalt lava, base-metal enriched sedimentary sequence with breccias of dacitic lava fragments and a dacitic unit ranging from lava to epiclastic breccia (which outcrops). The sedimentary unit contains sphalerite-quartz-calcite veinlets similar to those seen at High Point, and 23 m of $>.01\%$ Zn (1 m at 1.02% Zn) was intersected in SCS3. In SCS4 mineralization is visible over 72 m. Remarkable similarity in the rock sequences between SCS3 and SCS4, collared approximately 1.2 km apart, suggests the possibility of a very large, albeit low grade, zinc deposit. It is considered unlikely however that there is a massive sulphide body in this area, and the UTEM anomaly is interpreted as due to a fault (seen in SCS3 and SCS4) consistent with its persistence and linear nature. Lack of a VMS-style body is supported by the absence of extensive hydrothermal alteration, and negative DHEM results. Responses in the DHEM data for SCS2 and 3, while superficially indicative of a downhole conductor are in fact attributable to probe self-response, accentuated by the highly resistive nature of the local rocks.

No significant mineralization has been located at the Tullabardine Gorge prospect, the site of a conductive shallow-depth UTEM anomaly. Nine drillholes found silicified and albitized rhyodacite lava with minor hematite and sparse pyrite, but no elevated base metal values. A tuff horizon within the lava is weakly anomalous in zinc (300 ppm). The anomaly is attributed to current channelling at the base of conductive glacial overburden.

Despite several substantial intersections of low grade zinc mineralization within EL 5/63, it is considered that exploration carried out by BHP Minerals has effectively tested virtually the whole licence area to a depth of 200 m and locally 600 m for massive sulphide mineralization of Hellyer type with negative results. Accordingly the licence is to be relinquished in its entirety.

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TABLE 1: Details of diamond drillholes drilled
during 1988-1989

HOLE NAME	DEPTH	E	N	RL	DIP	AZIMUTH	RIG TYPE	COMMENTS
HP1	666.6 m	387879	5392492	655.8 m	51°	121°	Longyear 38	
HP2	593.6 m	388074	5392594	695.16 m	50°	120°	Longyear 38	
HP3	577.2 m	388225	5392750	ND	90°	-	Longyear 44	
HP4	600.0 m	388010	5392360	ND	90°	-	Longyear 44	Redrilled as HP4A
SCS1	25.0 m	2270*	5200*	ND	48°	120°	Longyear 38	Redrilled as SCS2
SCS2	148.5 m	2282*	5200*	ND	58°	120°	Longyear 38	
SCS3	178.5 m	2247*	5000*	ND	48°	120°	Longyear 38	
SCS4	201.4 m	2295*	3837*	ND	60°	120°	Longyear 44	
TG1	39.7 m	385837	5384817	587.8 m	90°	-	Modified Winkie	
TG2	5.2 m	385821	5384892	560.4 m	90°	-	" "	
TG3	32.5 m	385853	5384815	587.3 m	90°	-	" "	
TG4	34.4 m	385828	5384818	587.5 m	90°	-	" "	
TG5	12.2 m	385347	5384798	504.3 m	90°	-	" "	
TG6	12.8 m	385356	5384792	506.9 m	90°	-	" "	
TG7	33.65 m	385323	5384799	497.8 m	90°	-	" "	
TG8	15.6 m	385269	5385005	439.9 m	90°	-	" "	
TG9	35.0 m	385258	5385003	438.1 m	90°	-	" "	

* Local Grid
ND Not Determined

TABLE 2
SIROTEM MK II
NOMINAL DATA WINDOWS

CHANNEL	EARLY TIME			CHANNEL	STANDARD TIME		
	START (MS)	MIDDLE (MS)	END (MS)		START (MS)	MIDDLE (MS)	END (MS)
1	0.025	0.049	0.074	1	0.315	0.487	0.659
2	0.074	0.098	0.123	2	0.707	0.879	1.051
3	0.123	0.147	0.172	3	1.099	1.271	1.443
4	0.172	0.196	0.221	4	1.491	1.663	1.835
5	0.221	0.245	0.270	5	1.883	2.055	2.227
6	0.270	0.319	0.368	6	2.275	2.643	3.011
7	0.368	0.417	0.466	7	3.059	3.427	3.795
8	0.466	0.515	0.564	8	3.843	4.211	4.579
9	0.564	0.613	0.662	9	4.627	4.995	5.363
10	0.662	0.711	0.760	10	5.411	5.779	6.147
11	0.760	0.858	0.956	11	6.195	6.955	7.715
12	0.956	1.054	1.152	12	7.763	8.523	9.283
13	1.152	1.250	1.348	13	9.331	10.091	10.851
14	1.348	1.446	1.544	14	10.899	11.659	12.419
15	1.544	1.642	1.740	15	12.467	13.227	13.987
16	1.740	1.936	2.132	16	14.035	15.579	17.123
17	2.132	2.328	2.524	17	17.171	18.715	20.259
18	2.524	2.720	2.916	18	20.307	21.851	23.395
19	2.916	3.112	3.308	19	23.443	24.987	26.531
20	3.308	3.504	3.700	20	26.579	28.123	29.667
21	3.700	4.092	4.484	21	29.715	32.827	35.939
22	4.484	4.876	5.268	22	35.987	39.099	42.211
23	5.268	5.660	6.052	23	42.259	45.371	48.483
24	6.052	6.444	6.836	24	48.531	51.643	54.755
25	6.836	7.228	7.620	25	54.803	57.915	61.027
26	7.620	8.404	9.188	26	61.075	67.323	73.571
27	9.188	9.972	10.756	27	73.619	79.867	86.115
28	10.756	11.540	12.324	28	86.163	92.411	98.659
29	12.324	13.108	13.892	29	98.707	104.955	111.203
30	13.892	14.676	15.460	30	111.251	117.499	123.747
31	15.460	17.028	18.596	31	123.795	136.315	148.835
32	18.596	20.164	21.732	32	148.883	161.403	173.923

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630029

TABLE 3: Channel Specifications, EM-37 SystemBANDWIDTH OF EM-37 SYSTEM

25Hz Repetition Rate

<u>CHANNEL</u>	<u>BEGINNING</u>	<u>END</u>	<u>GATE WIDTH</u>	<u>MID-GATE</u>
1	.080	.097	.017	.0885
2	.097	.121	.024	.109
3	.121	.158	.037	.140
4	.158	.195	.037	.177
5	.195	.244	.049	.220
6	.244	.316	.072	.280
7	.316	.393	.077	.355
8	.393	.492	.099	.443
9	.492	.634	.142	.563
10	.634	.790	.156	.712
11	.790	.962	.172	.876
12	.962	1.212	.250	1.087
13	1.212	1.587	.378	1.400
14	1.587	1.957	.367	1.772
15	1.957	2.457	.400	2.21
16	2.457	3.177	.720	2.82
17	3.177	3.957	.780	3.57
18	3.957	4.957	1.000	4.46
19	4.957	6.377	1.420	5.667
20	6.377	7.937	1.560	7.16

ALL TIMES ARE IN MILLISECONDS FROM END OF RAMP

TABLE 4
UTEM DATA PLOTTING SPECIFICATIONS

Nominal Time Windows (for a base frequency of 33.5Hz)

SYMBOL	CHANNEL NO.	START (MS)	CENTRE (MS)	END (MS)
◇	10	0.014	0.020	0.027
△	9	0.027	0.04	0.054
⊗	8	0.054	0.082	0.109
7	7	0.109	0.163	0.218
△	6	0.218	0.326	0.435
Σ	5	0.435	0.653	0.870
□	4	0.870	1.306	.741
\	3	1.741	2.611	3.482
/	2	3.482	5.222	6.963
	1	6.963	10.445	13.93

All channels are plotted as:

$$\frac{\text{Channel} - \text{reference}}{\text{base}} \times 100\%$$

For continuously normalised plots:

reference = primary (for channel 1)
= channel 1 (for all other channels)

base = primary field (total) at reading station

For point normalised plots:

reference = primary (for channel 1)
= channel 1 (for all other channels)

base = primary field (total) at reference station
marked with symbol ***>

380000 m E

390000 m E

630032

31

DAA & SOCK CREEK
METRIC GRIDS

1975 COMSTAFF INPUT
ANOMALY

DAB GRID

X HIGH POINT

X SOCK CREEK
SOUTH

5390000 m N

O THUNDERBOX CREEK

UTEM
ANOMALIES E & D

DAC GRID

EL 5/63

TULLABARDINE GORGE X

MURCHISON
HIGHWAY
BASE LINE



5 cm

FIG. 2

0 1 2 3 4 km



BHP 200m
Mount Block Grid (1987)

Centre
Melbourne

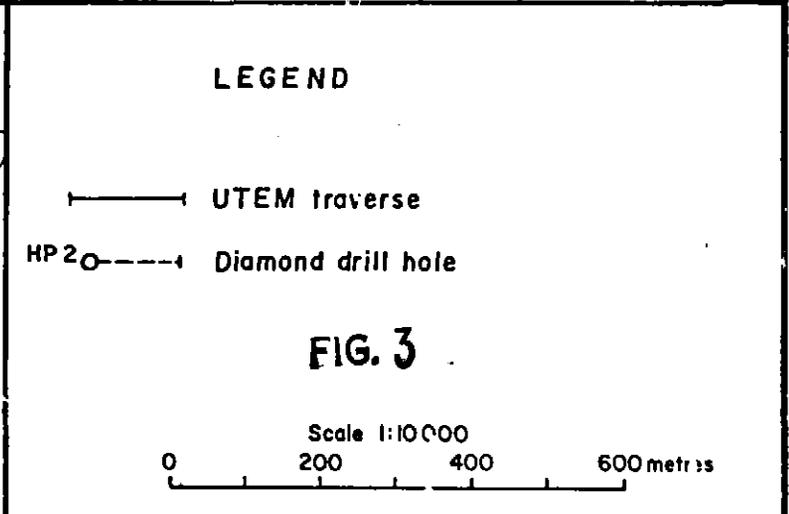
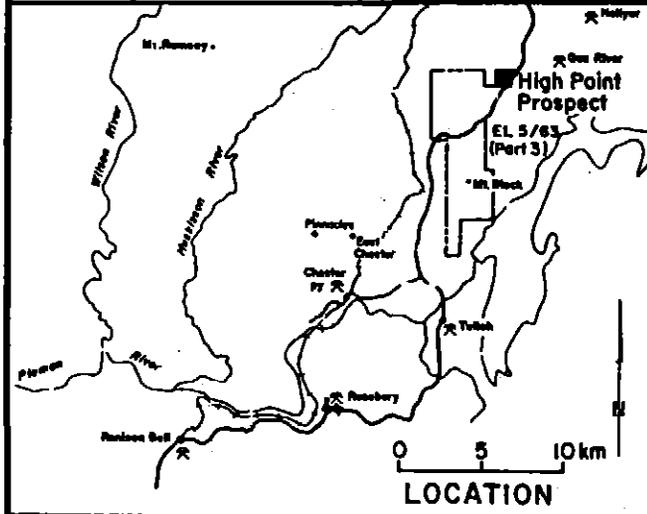
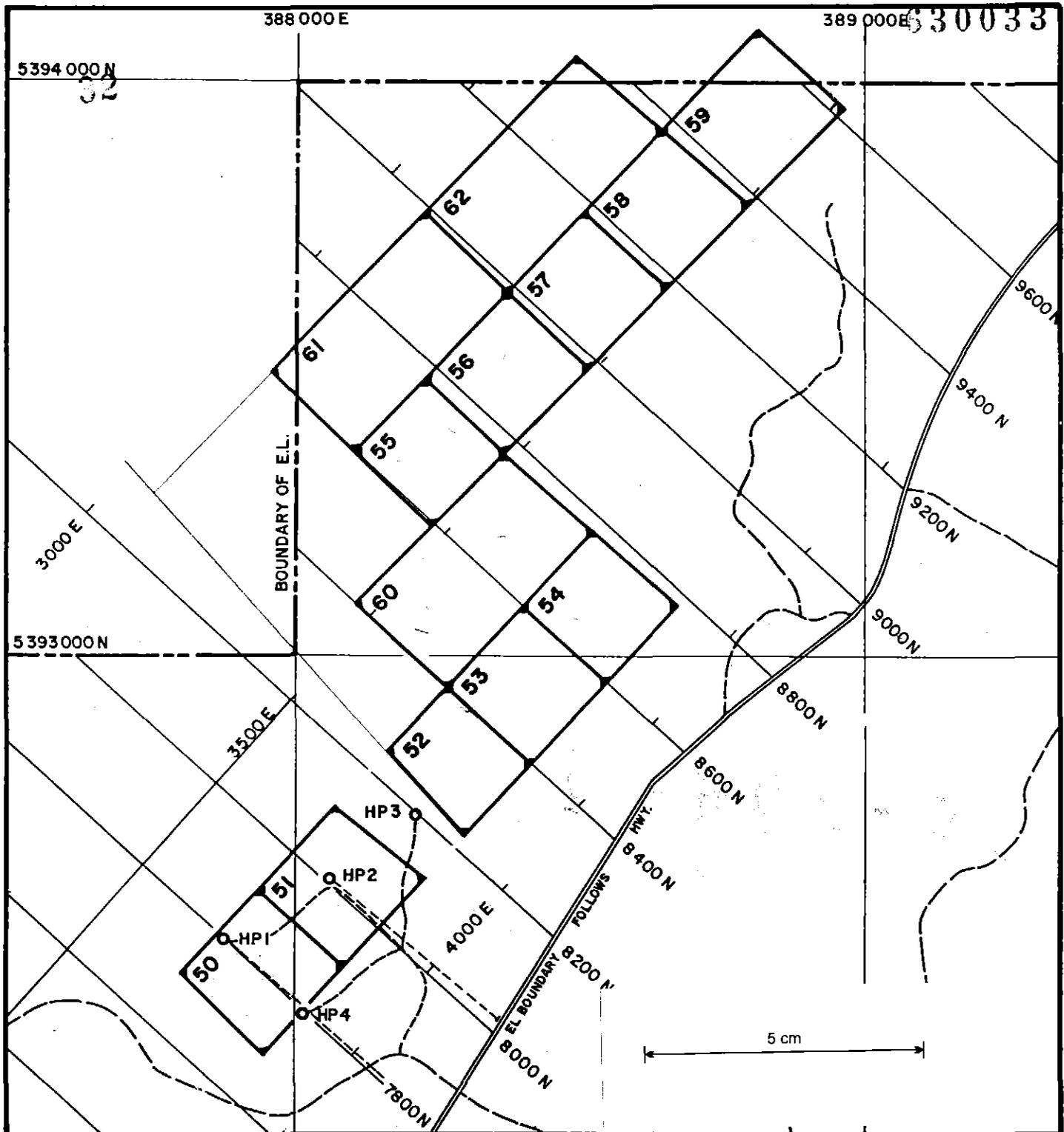
Date
4.5.89

THE BROKEN HILL PROPRIETARY CO. LTD.

EL 5/63 - MT. BLOCK, COMSTAFF JOINT VENTURE, TAS.
LOCATION OF GRIDS, ANOMALIES & PROSPECTS

Project N^o
B56

Drawing N^o
A4-2934



Centre
Melbourne

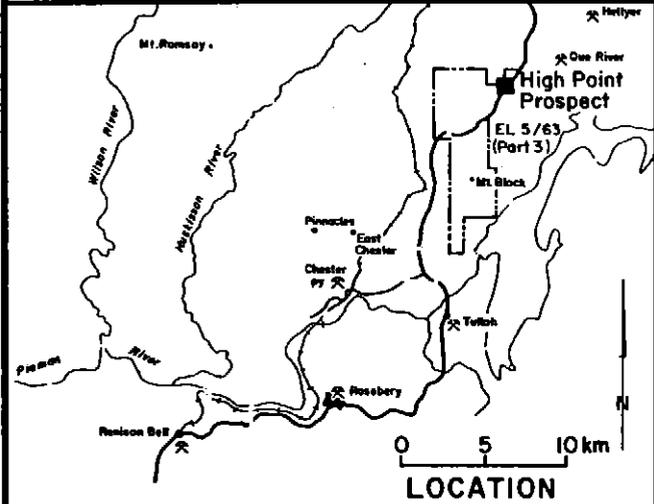
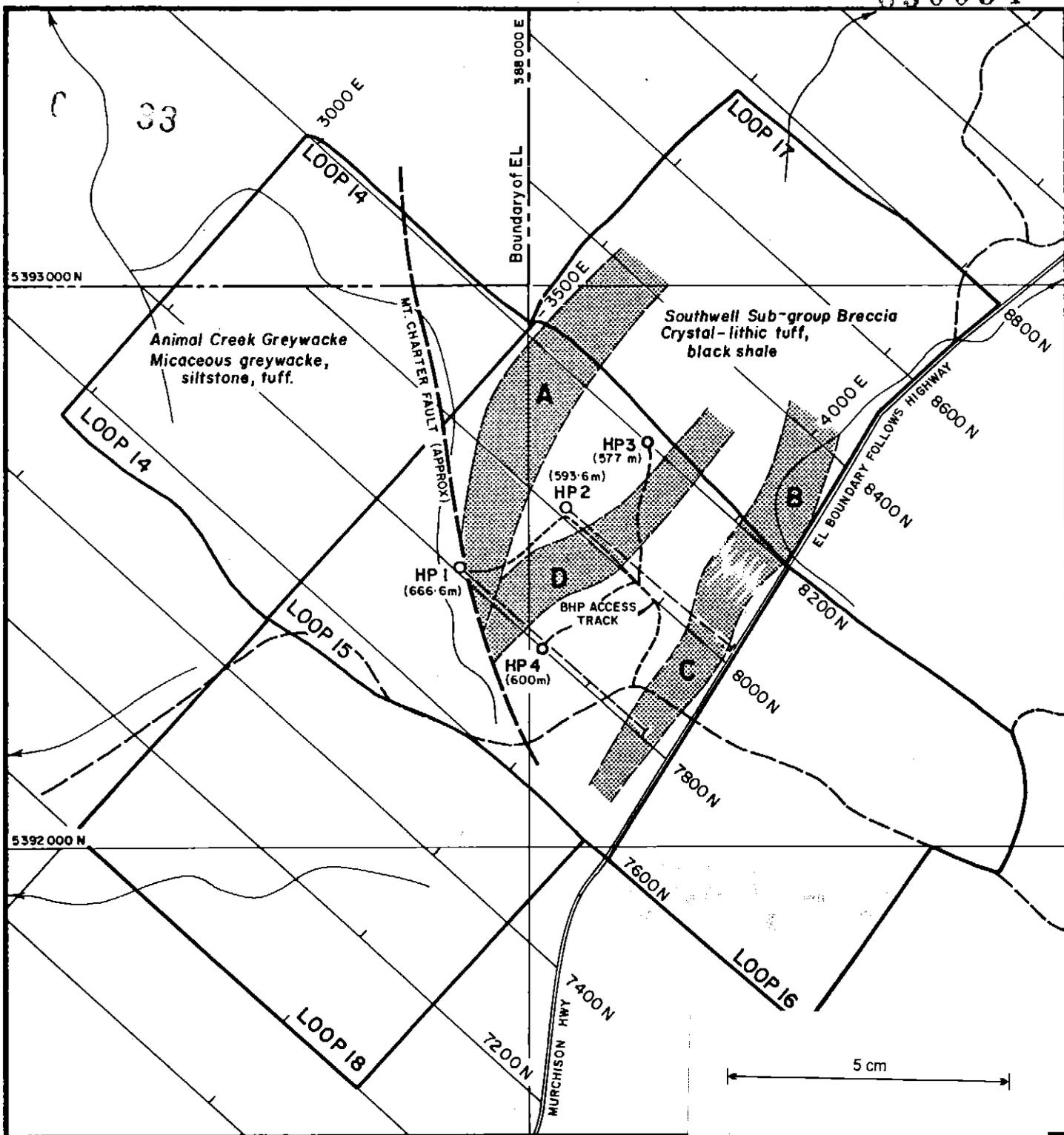
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May 89

THE BROKEN HILL PROPRIETARY CO. LTD.
EL 5/63, (Part 3), COMSTAFF JV, TASMANIA

HIGH POINT PROSPECT, TEM SOUNDING PROGRAM

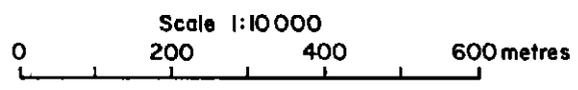
Project No
B56

Drawing No
A4-2764



- LEGEND**
-  UTEM anomaly
 -  UTEM traverse
 -  Diamond drill hole

FIG. 5



Centre
Melbourne

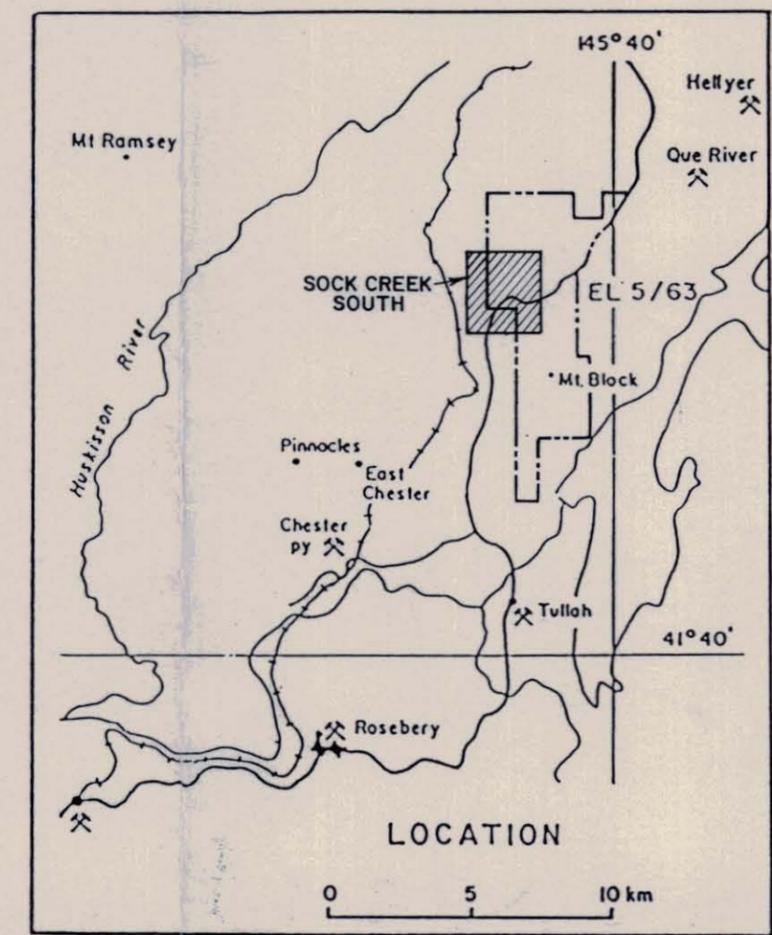
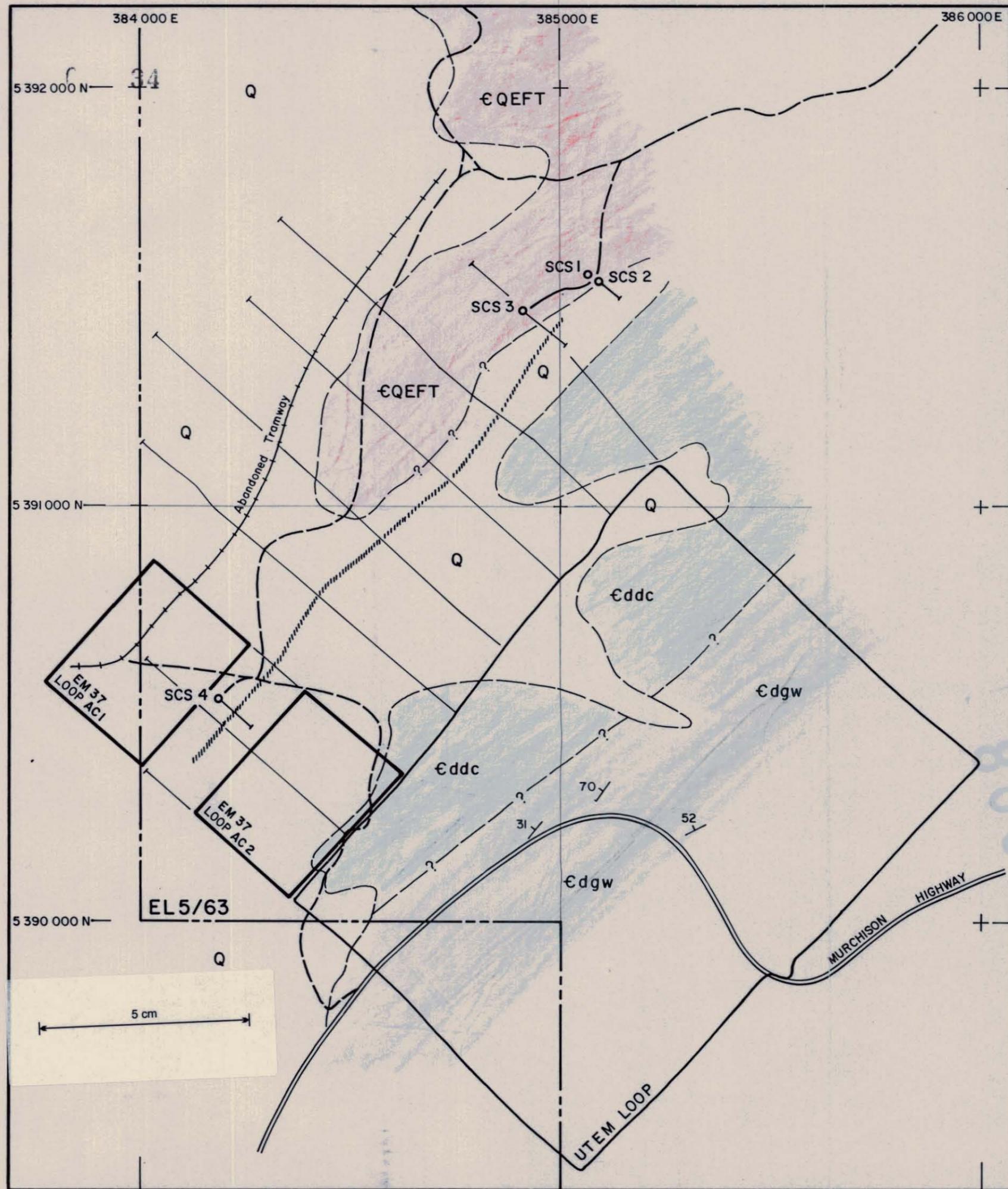
Date
May '88

THE BROKEN HILL PROPRIETARY CO. LTD.
EL 5/63, (Part 3), COMSTAFF JV, TASMANIA

UTEM FOLLOW-UP & DRILLING AT HIGH POINT PROSPECT

Project No
B56

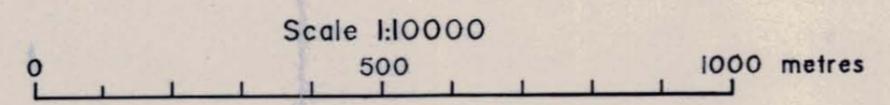
Drawing No
A4-2764



LEGEND

- Q Glacial sediments
- εQEFT Sock Creek Porphyry
- εddc Sock Creek Lava Sequence
- εdgc Animal Creek Greywacke
- Geological boundary
- Diamond drill hole
- ▨ UTEM conductor
- Vehicular track (FWD)

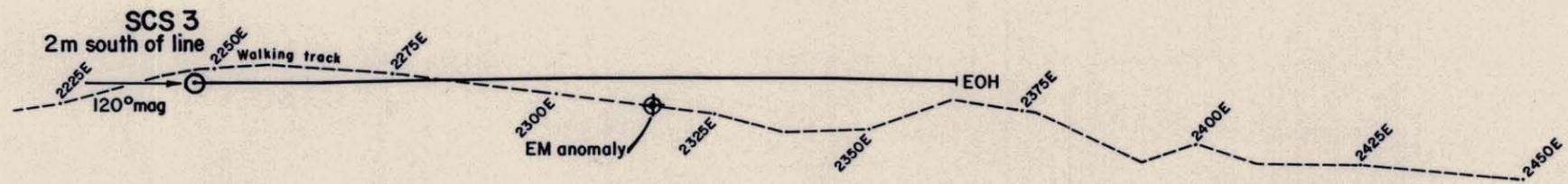
FIG. 11



BHP-Utah Minerals International Asia Pacific Division - Exploration Department		
EL 5/63, COMSTAFF JV, TASMANIA SOCK CREEK SOUTH		
LOCATION OF 1989 EM SURVEYS		
Prepared:	A. Wilde	Date: May 89
Drawn:	M. Rosker	Centre: Melbourne
Checked:	B 56	Project N ^o :
		Drawing N ^o :
		A3- 1850

LINE 5000N

PLAN



SECTION

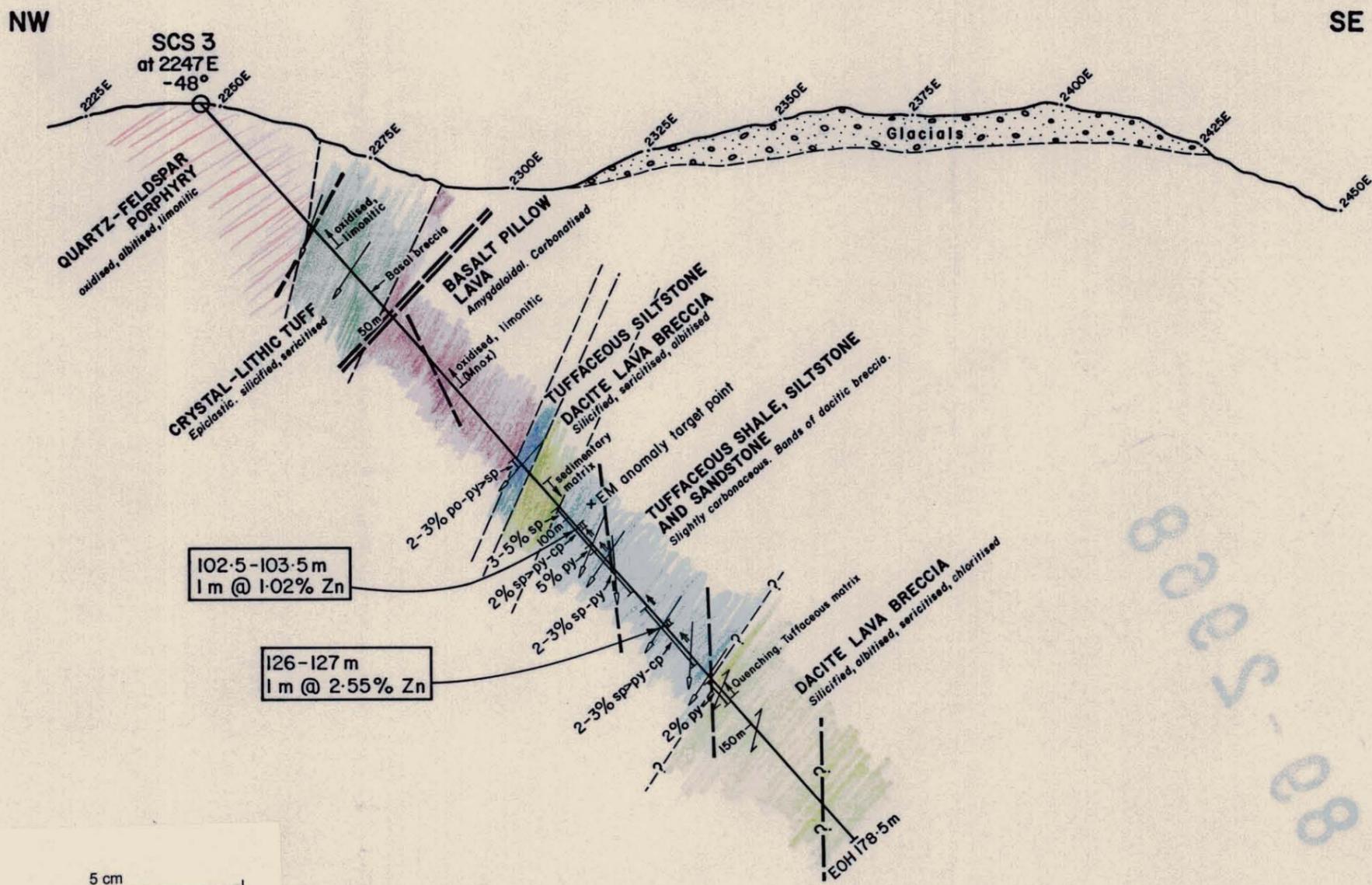


Fig. 12

LEGEND

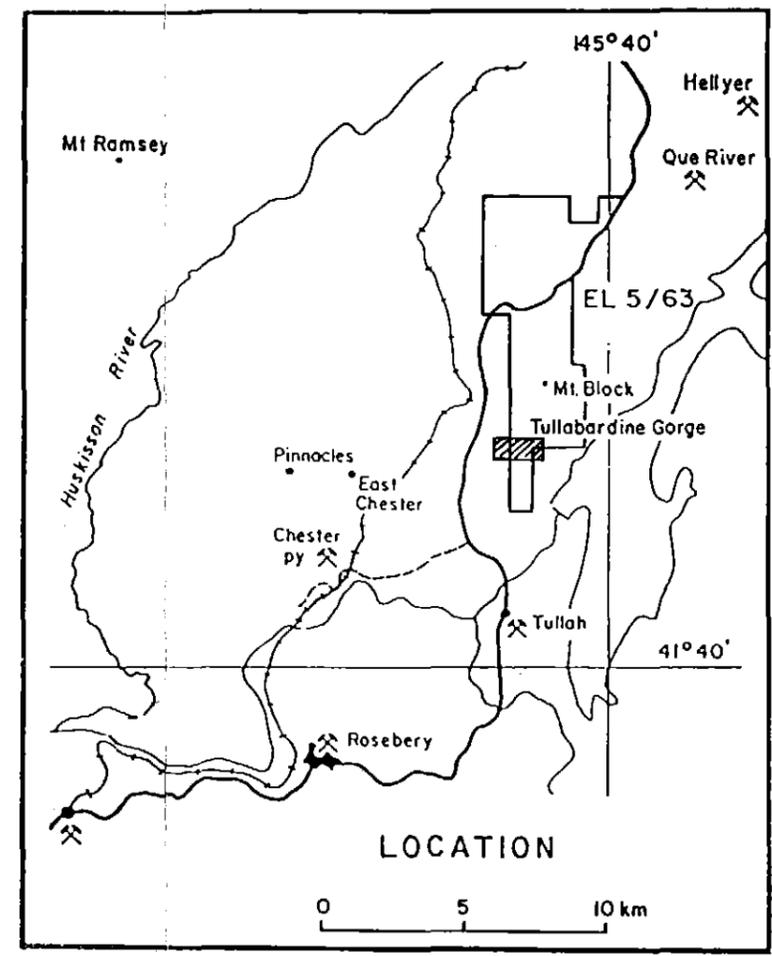
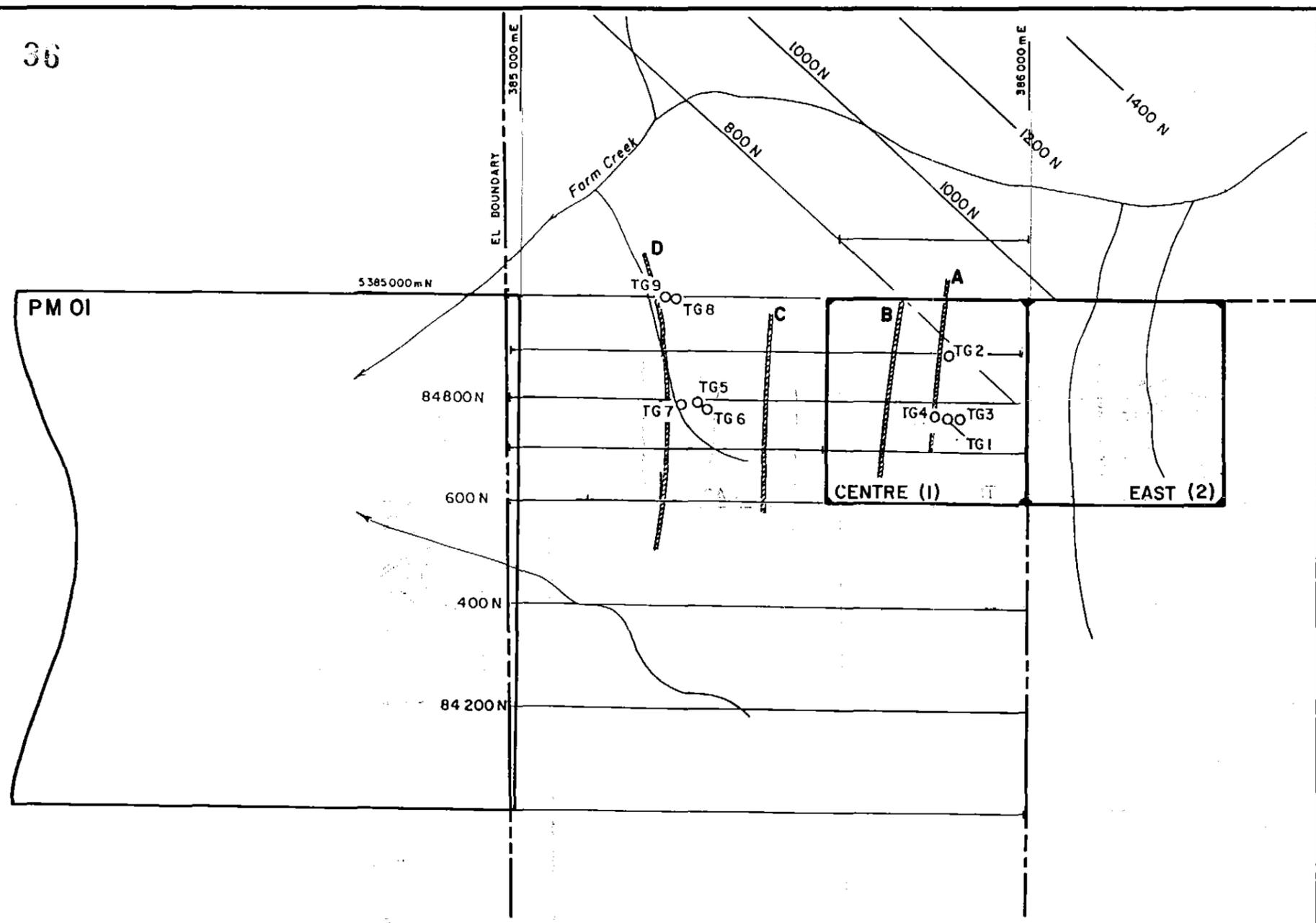
- Fault
- - - Geological contact
- ↔ Bedding
- ↔ Schistosity
- ↑ Bedding facing
- ▬ Significant mineralisation
- ▬ Significant sulphides (totalling over 2%)

FIG. 12

Scale 1:1,000
0 50 metres

5 cm

Revisions: 19 - 8 - 88	BHP-Utah Minerals International Asia Pacific Division - Exploration Department		
	E.L. 5/63 (PART 3) COMSTAFF J.V., TAS. SOCK CREEK SOUTH PROSPECT LINE 5000N-DRILLHOLE SCS 3		
	Prepared: G. Purvis	Date: 23-5-88	Centre: MELBOURNE
	Drawn: A.R. Veale	Project No: B56	Drawing No: A3-1793
	Checked: J.G. Purvis		



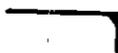
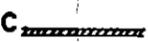
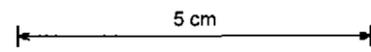
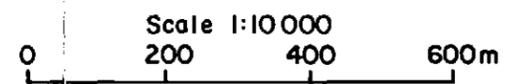
-  EM Loop location
-  SIROTEM anomaly
-  Diamond drill hole

FIG. 14



 BHP-Utah Minerals International Asia Pacific Division - Exploration Department		
EL 5/63, COMSTAFF JV, TASMANIA TULLABARDINE GORGE LOCATION OF 1989 EM SURVEY		
Prepared:	T. Kerr	Date: May 89
Drawn:	M. Rosker	Project N ^o : B 56
Checked:		Drawing N ^o : A3 - 1849

WEST

630038 EAST

mASL
510

TG6
Projected 7m S

TG5

B5350 E

Overburden

Ox

LL

Ox

Ox

LL

Ox

EOH 12.2m

EOH 12.8m

Rhyodacite lava
Silif, alb

Survey point 3-116
(AMG. 5384798 mN
385325 mE)

TG7

Overburden

-490 LL Oxidised rhyodacite lava
Broken

Lim Strong fault parallel
to drill hole

Lim Tuff
Ox, broken

1-2% py
3-5% py

1-2% py

-480 Minor py

LL Tuff intercalation

Rhyodacite Lava
Silif, ser

Broken

Tuff intercalation

-470 Strong fault parallel
to drill hole

Broken

Alb

Flaw banding

EOH 33.65m

5 cm

LEGEND

- Geological contact
- ← Bedding or primary layering
- F — Fault or shear

Abbreviations

- Ox oxidised
- Ser sericitised
- Chlor chlorite, chloritised
- Silif silicified
- Alb albitised
- Lim limonite, limonitic

Scale 1:200
0 2 4 6 8 10 m

Note: Map based on profile surveyed by P.Cameron, BHP
See A31814 for location

Centre
Melbourne

Date
6.9.88

THE BROKEN HILL PROPRIETARY CO. LTD.
EL 5/63 (PART 3) COMSTAFF J.V., T.A.S.
TULLABARDINE GORGE PROSPECT

SECTION THROUGH DDHs TG5-7 (LINE 84800 N)

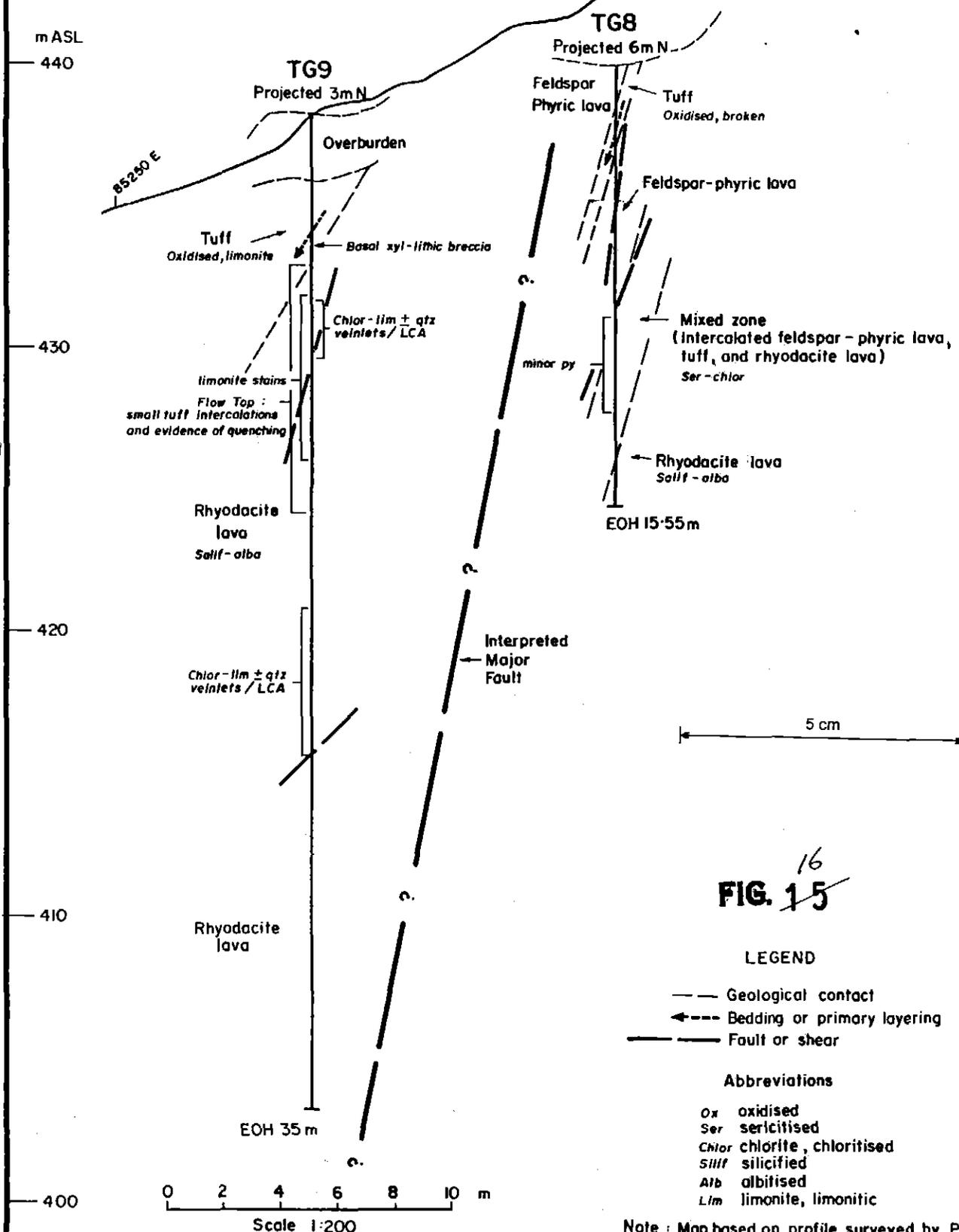
Figure 15

Project N^o
B56

Drawing N^o
A4-

0 37

630039



16
FIG. 15

LEGEND

- Geological contact
- ← Bedding or primary layering
- Fault or shear

Abbreviations

- Ox oxidised
- Ser sericitised
- Chlor chlorite, chloritised
- Sillf silicified
- Alb albitised
- Lim limonite, limonitic

Note: Map based on profile surveyed by P. Cameron, BHP
See A3-1814 for location

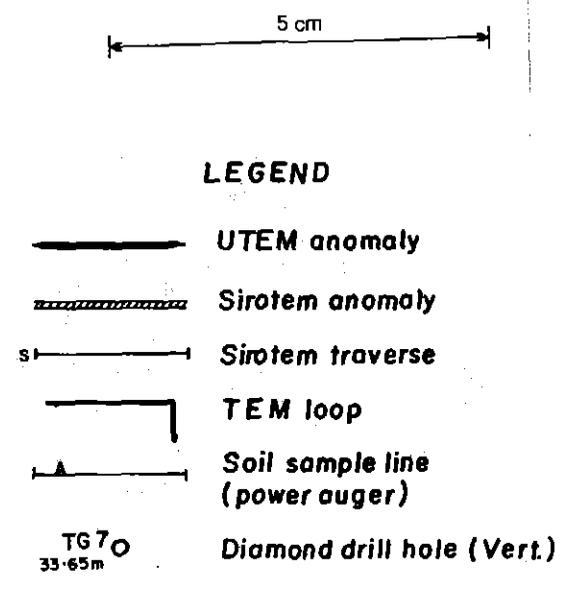
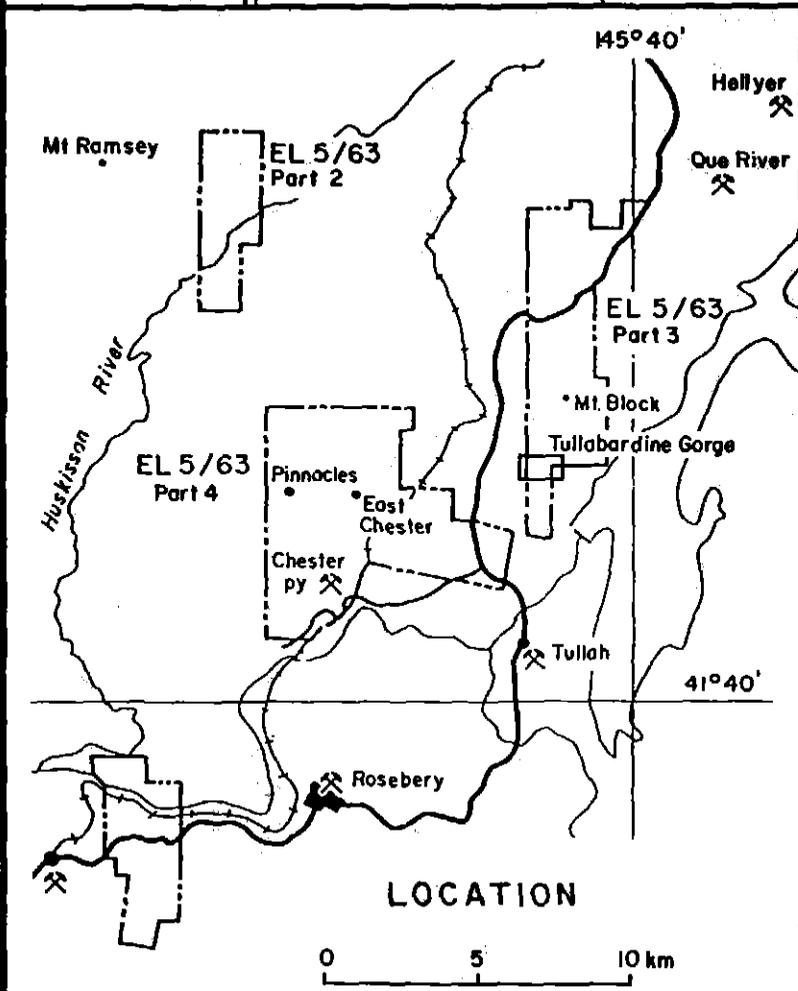
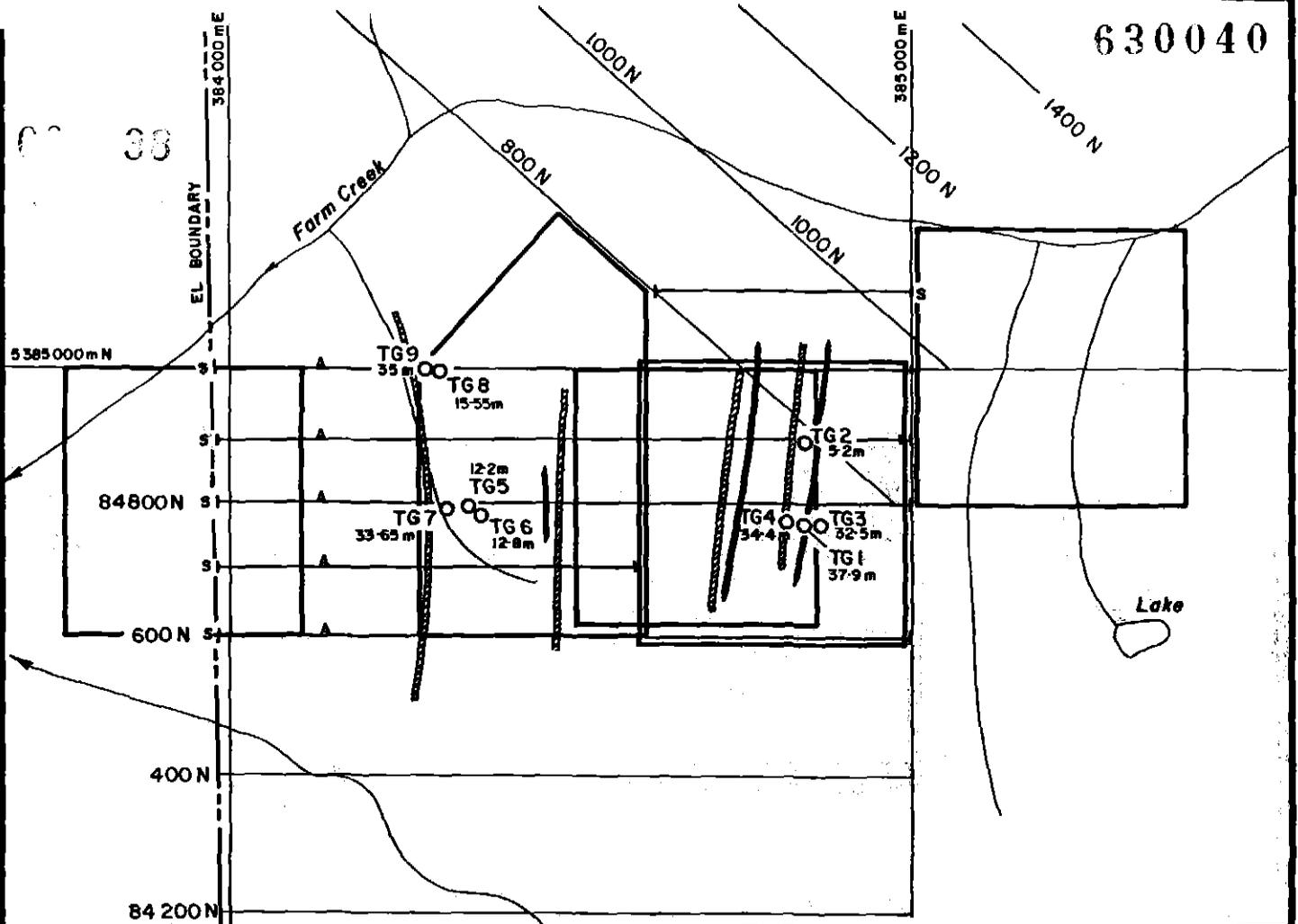
Centre
Melbourne

Date
6.9.88

THE BROKEN HILL PROPRIETARY CO. LTD.
EL 5/63 (PART 3) COMSTAFF J.V., TAS.
TULLABARDINE GORGE PROSPECT
SECTION THROUGH DDHs TG8 & 9 (LINE 85000 N)

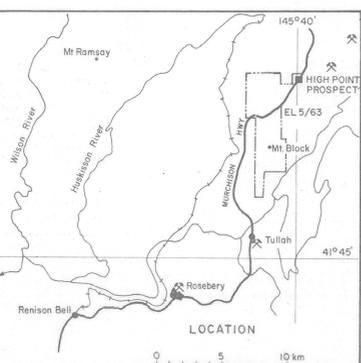
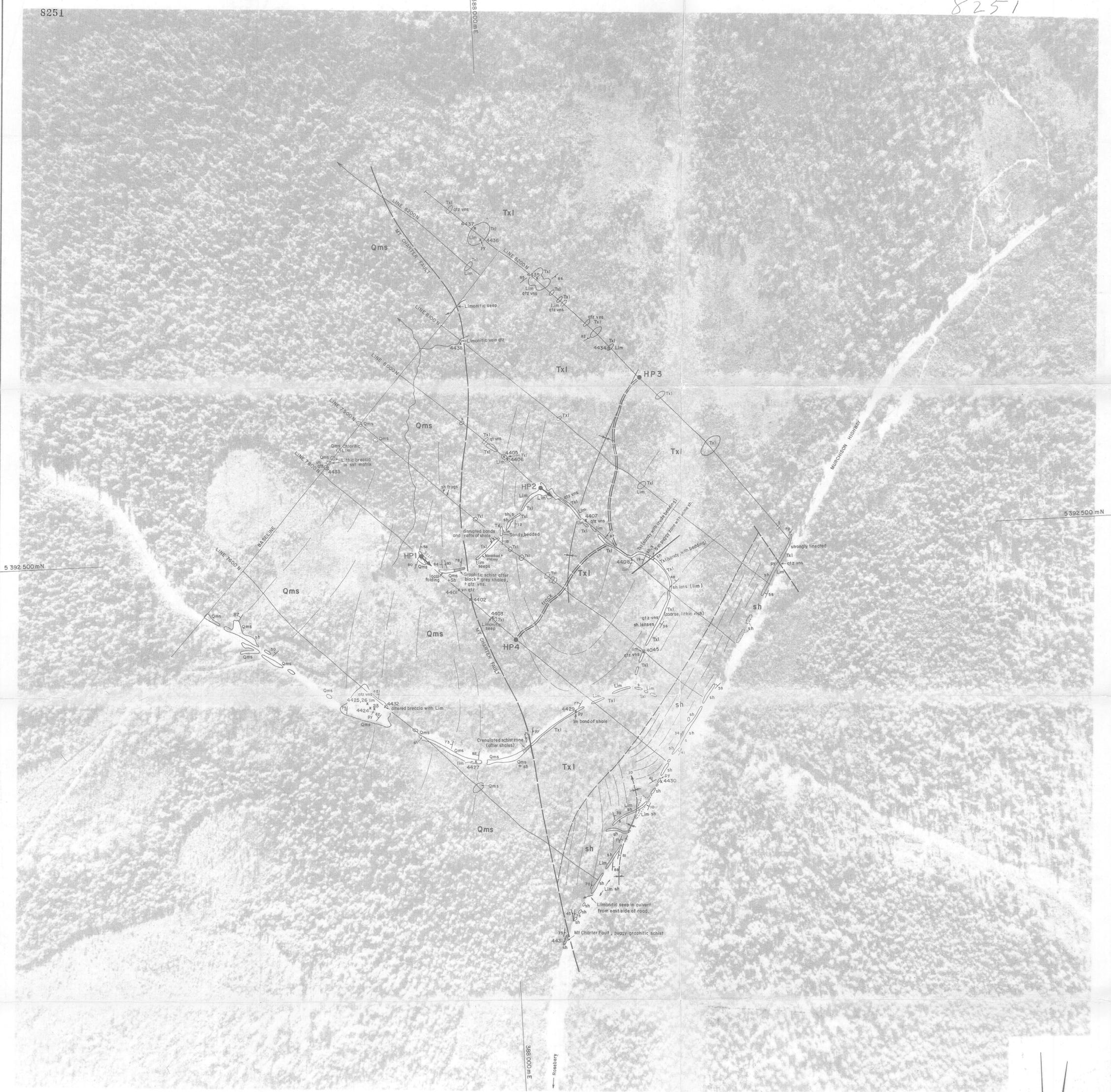
Project No
B56

Drawing No
A4 2843



17
FIG. 16

Fig.8



LEGEND

<p>WEST OF MT. CHARTER FAULT ZONE</p> <p>Qms QUARTZ-MICA-LITHIC SANDSTONE Often feldspathic. Intercalations of shale and siltstone. Unaltered. Occasionally weakly pyritic. Occasional qtz ± chlor veins.</p> <p>sh QUE RIVER SHALE Finely bedded black and grey shale. Partly carbonaceous. Lesser siltstone and sandstone. Locally strongly pyritic.</p>	<p>EAST OF MT. CHARTER FAULT ZONE</p> <p>Tx1 CRYSTAL-LITHIC TUFF Epiclastic unit of rhyolitic and dacitic provenance. Varies from coarse lithic-rich breccias to sandy quartz-feldspar crystal rich sections, latter sometimes displaying bedding. Occas. lenses of dk grey siltic shale and slts. Weakly altered (sericitisation-bleaching-chloritisation-silicification) Weakly pyritic in places.</p>
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

MT CHARTER FAULT ZONE
Puggy, grey and black, partly graphitic SCHIST after black carbonaceous SHALES. Minor sandstone/siltstone intercalations.

HP 3

BHP diamond drill hole

30

Bedding; Schistosity

Outcrop; Suboutcrop

Interpreted geological contact

Trend lines; Fault

Synclinal axis with plunge

x 4430

Grab rock sample (outcrop or float)

4431

Chip sample.

SCALE 1:2500 (Approx)

0

100

200

300 m

5 cm

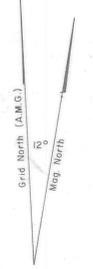
8251

630041 - FIG. 7

BHP-Utah Minerals International
Asia Pacific Division - Exploration Department

EL 5/63 (Part 3), COMSTAFF JV, TAS.
HIGH POINT PROSPECT
GEOLOGY

Prepared: G. Purvis	Date: Aug 88	Centre: Melbourne
Drawn: M. Rosker	Project No: B 56	Drawing No: A 0 - 150
Checked:		



PROJECT EL 5/63

HOLE SUMMARY

DRILLING INFORMATION

PROJECT CONSTAFF JV
 WELL NUMBER B56
 230,000 SHEET
 WELL NAME BURNIE
 DATED BY RWD/W/LGK
 DATE LOGGED JAN-FEB '89
 PREVIOUSLY LOGGED REFERENCE
 LOG REFERENCE SHEET NAME
 LOG REFERENCE SHEET DATE

TOTAL DEPTH 571.2m
 DEPTH TO WATER NOT RECORDED
 DEPTH TO BASE OF TOTAL CIRCULATION (CLAY ZONE) NOT RECORDED
 DEPTH TO BASE OF PARTIAL CIRCULATION (WEATHERED BEDROCK) 35.1m

DRILLING CONTRACTOR DIAMOND DRILLING TECHNOLOGY
 RIG TYPE LONGYEAR 411
 DATE COMMENCED 8.1.89
 DATE COMPLETED 20.2.89
 MATERIAL LEFT IN HOLE 57m OF 40mm DIAMETER PVC PIPING

HOLE INFORMATION

COLLAR COORDINATES
 EASTING 3797 (LOCAL)
 NORTHING 8200 (LOCAL)
 REDUCED LEVEL
 BEDRIELAWEDGE HOLE No.

	TYPE	FROM	TO	METHOD/SIZE	FROM	TO	COMMENTS
GEOLOGICAL LOG				TRICONE	0	21m	NO CORE
ENGINEERING LOG	/			HQ(WL)	21m	149.6m	
PHOTOGRAPHIC LOG	/			NQ(WL)	149.6m	577.2m	

SUMMARY LOG

ANALYSES

SURVEY DATA

DEPTH	AZIMUTH	DIP
COLLAR	-	90°
30m	177°M	87°
50m	181°M	87.75°
90m	191°M	88
120m	194.5°M	87.5
150m	195°M	87.5
180m	187°M	87.5
210m	184°M	87.0
240m	189°M	87.0
280m	193°M	87.25°
300m	176°M	87.0
330m	170°M	87.0°
360m	* 142° (1°)	87.0°
390m	167°M	88.0
420m	172°M	87.0
450m	174°M	87.5
480m	174°M	87.5
510m	174°M	87.5
540m	175°M	87.5
570m	177°M	87.5

FROM	TO	LITHOLOGY ETC.	SAMPLE NUMBERS FROM TO	LABORATORY	DATE DESPATCHED	ELEMENTS	REMARKS
0	21m	NO CORE					
21	35.1m	VOLCANIC CLASTIC BRECCIA OF ANDESITE WITH FINE GRAIN LACERATED QUARTZ DEBRIS WITH OOL. LITHOLOGY (NOTE) A FINE VOLCANIC LACERATED MUD TO BENTONITE SLATE. LIGHT LACER. DUE TO CONCRETE, SILEX & PEG. TUFFACEOUS BENTONITE					
35.1m	38.4m						
38.4m	97.5m	VOLCANIC CLASTIC BRECCIA AS ABOVE WITH 2m THICK SLATE LACER. VOLCANIC GRANITE TURBULENT BUT DOES NOT EXCEED 2% OF ROCK MASS SANDSTONE					
97.5	106.0	SLATE WITH OOL. YLS OF FELD. & DTZ "FLOATING" IN ARGILLACEOUS MATRIX					
		Pyritic					
106.0	135.8	VOLCANIC CLASTIC BRECCIA					
135.8	183.9	MUDSTONE TO SANDSTONE SLATE (PYRITIC)					
183.9	201.0	PINK TO GREEN QUARTZITIC SANDSTONE WITH ABT. LOWS. FELDSPHR. ALL.					
201.0	268.3	COARSE VOLCANIC CLASTIC BRECCIA, NEARLY FELDSPHR. CLASTIC MUDSTONE WITH CONSPICUOUS CONCRETE OR LOWS. ABT 20m WITH ABUNDANT LITHIC CLASTS.					
268.3	571.2	MASSIVE, WEATHERED, FOLDED AND (NOTE) MUDSTONE FOLDED VOLCANIC CLASTIC DEBRIS IN LACER. 100m. TRACES OF DRYING PYR. GRANULITE STRATITES (NOTE) CONCRETE. PYRITIC NODULES IN LACER. PORT					

* QUESTIONABLE READING, DISCARD.

16-OCT-1990 11:17 BHP MINERALS EXPLORATION 61 3 8107722 P.02

630043

PROJECT

EL5/63

HOLE SUMMARY

DRILLING INFORMATION

PROJECT JOB NUMBER 1 250,000 SHEET GRID NAME LOGGED BY DATE LOGGED PREVIOUSLY LOGGED REFERENCE CODE REFERENCE SHEET NAME CODE REFERENCE SHEET DATE

CONSTAFF 3V 856 BURNIE A WILDL E68-APRIL 89 NA

TOTAL DEPTH DEPTH TO WATER DEPTH TO BASE OF TOTAL OXIDATION (CLAY ZONE) DEPTH TO BASE OF PARTIAL OXIDATION (WEATHERED BEDROCK)

NR NR 112m

DRILLING CONTRACTOR DIAMOND DRILLING TASMANIA RIG TYPE LONGYEAR 6L DATE COMMENCED 20/2/89 DATE COMPLETED MATERIAL LEFT IN HOLE 70m HQ RODS & BIT - CORE BARREL

HOLE INFORMATION

COLLAR COORDINATES (LOCAL) EASTING NORTHING REDUCED LEVEL

5900 7700 NR

REDRILL WEDGE HOLE No. HP4A

SUMMARY LOG

ANALYSES

SURVEY DATA

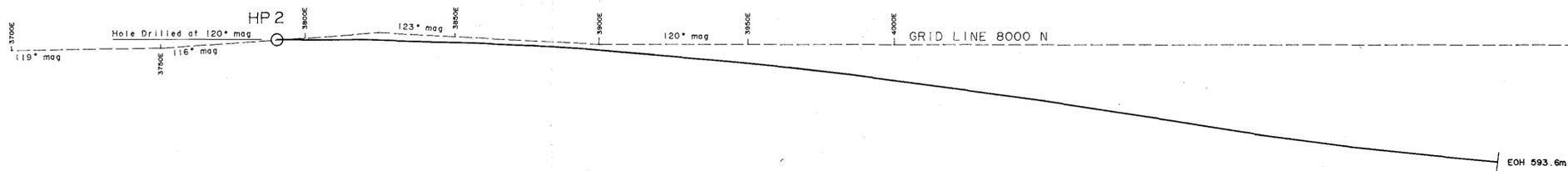
Table with columns: DEPTH, AZIMUTH, DIP. Rows include HP4, COLLAR, 30, 63, 91.5, 121.5, 156, 184, REDRILL (STARTING AT 110), 175, 205.5, 235, 265, 297, 332, 362, 392, 422, 452, 482.

Table with columns: FROM, TO, LITHOLOGY etc. Rows include 0-3 (NO CORE), 3-41.5 (VOLCANICLASTIC BRECCIA...), 41.5-63.0, 63.0-88.9, 88.9-102.2, 102.2-116.6, 116.6-164.8, 164.8-167.0, 167.0-173.3, 173.3-187.0, 187.0-187.4, 187.4-198.7, EOH @ 198.7 - NO CORE RECOVERED 198.7-20m, HP4A: 196.5-248.1, 248.2.

Table with columns: SAMPLE NUMBERS FROM TO, LABORATORY, DATE DESPATCHED, ELEMENTS, METHOD. Includes a large text block for COMMENTS: HOLE ORIGINALLY DRILLED HQ TO 56.6m STRUCK BAD GROUND AT 116m & REAMED OUT NQ WITH HQ & DRILLED WITH MUD TO 201m DRILL STRING SHEARED AT 140m & WAS NOT POSSIBLE TO RECOVER IT. NQ HOLE DRILLED PAST ORIGINAL HOLE STARTING AT APPROXIMATELY 140m. PIPE STUCK AT 350m N 498 UP ~ 320.

16-OCT-1990 11:18 BHP MINERALS EXPLORATION 61 3 8107722 P.03 TOTAL P.03

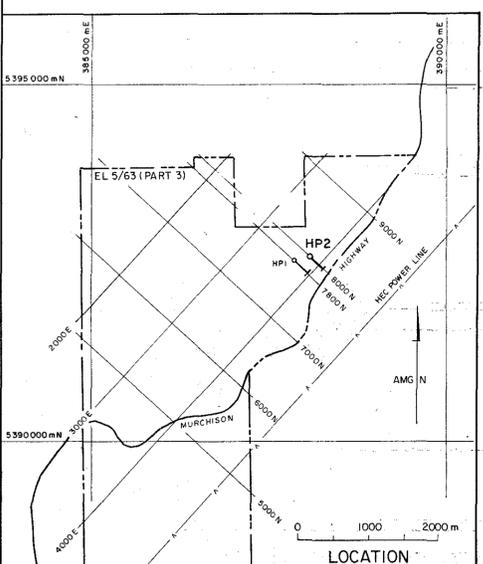
PLAN



SECTION ALONG LINE 8000 N
LOOKING N.E.
(Line bears 132° AMG)

NORTH WEST

SOUTH EAST



LEGEND

- Fault
- Geological contact
- Bedding
- Schistosity
- Bedding facing

5 cm

FIG. 8 8252

SCALE 1:1,000

0 50 100 metres

ABBREVIATIONS

Alb	Albitisation
Ble	Bleached
Carb	Carbonisation
Chlor	Chloritisation
Ser	Sericitisation
Silf	Silicification
Ox	Oxidised

630044

BHP Minerals Exploration

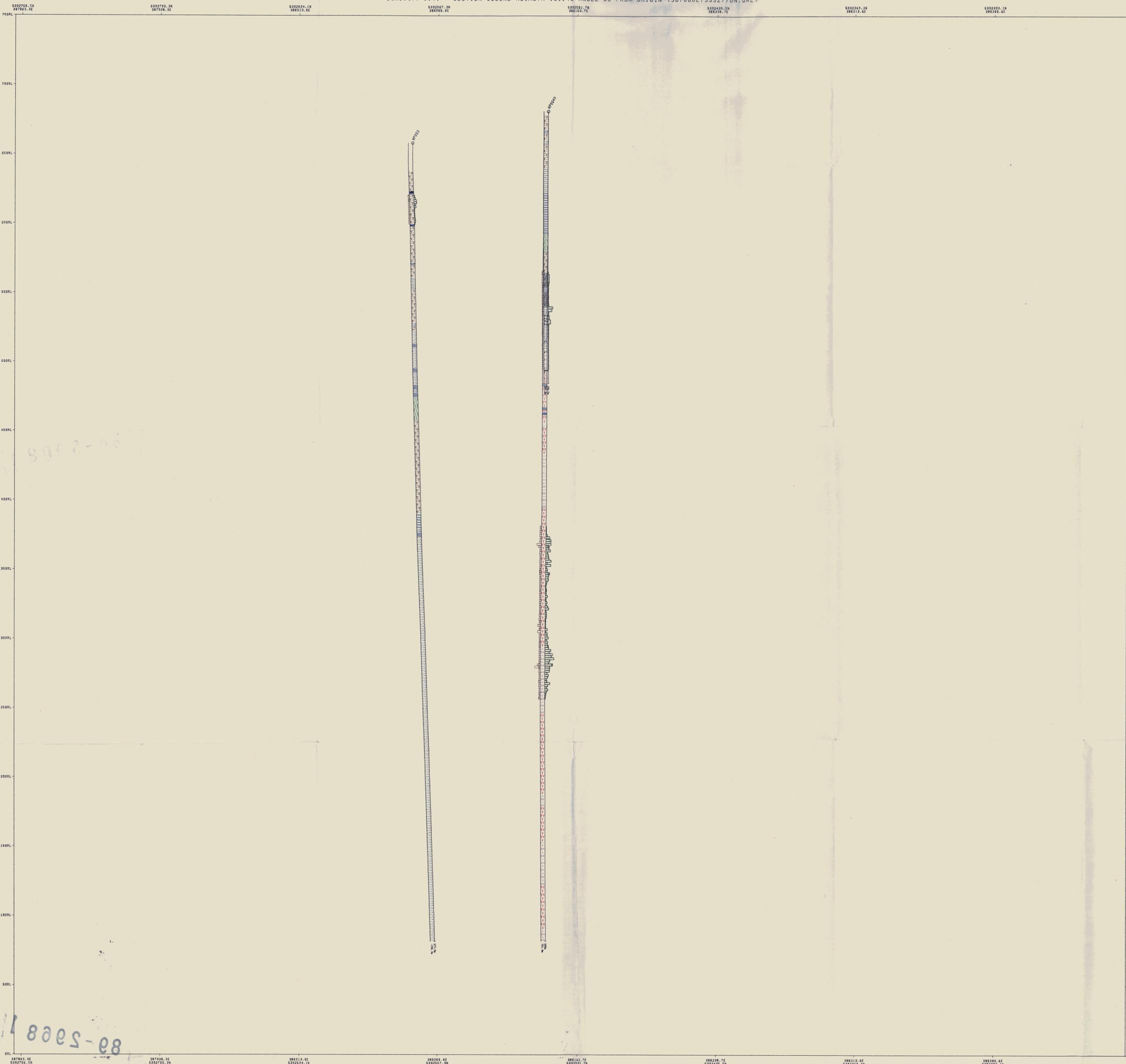
EL 5/63 (PART), COMSTAFF J.V., TAS.
HIGH POINT PROSPECT
SECTION THROUGH DDH HP2 (8000 N)

Prepared: G. Purvis	Date: Sept. 12 88	Drawing No.
Drawn: C. Osborne	Project No.: B56	AI-2281
Centre:	Drawing No.:	

DGN. FILE: HP2CMS.F

8253

Comstaff J.V. - SECTION 8000NL AZIMUTH 131.46 ANGLE 90 FROM ORIGIN (387860E,5392770N,ORL)



SAMPLE BASED RESULTS:

0	10000+	0	10000+	0	0.1+	0	0.1+
PPM	PPM	Zn	PPM	Pb	PPM	Pb	PPM
0	0.1+	0	0.1+				
PPM	PPM	PPM	PPM				

ROCK:

- Felsic volc. breccia
- Laminated slate
- Slate
- Mesozoic silt
- Volcaniclastic sandstone
- Tectonic breccia
- Fault gouge
- Dolomite
- Siliceous
- Mafic volc. breccia
- Basalt
- Mafic volc. breccia

DRILLHOLE SYMBOLS:

- Drillhole collar

88-5002-08

88-5005-08

5 cm

630045 FIG. 9 1

BHP-UTAH Minerals International
Comstaff J.V.

HIGH POINT
HOLES HP3 HP4 and HP4R
Projected
onto
section
8000NL
local

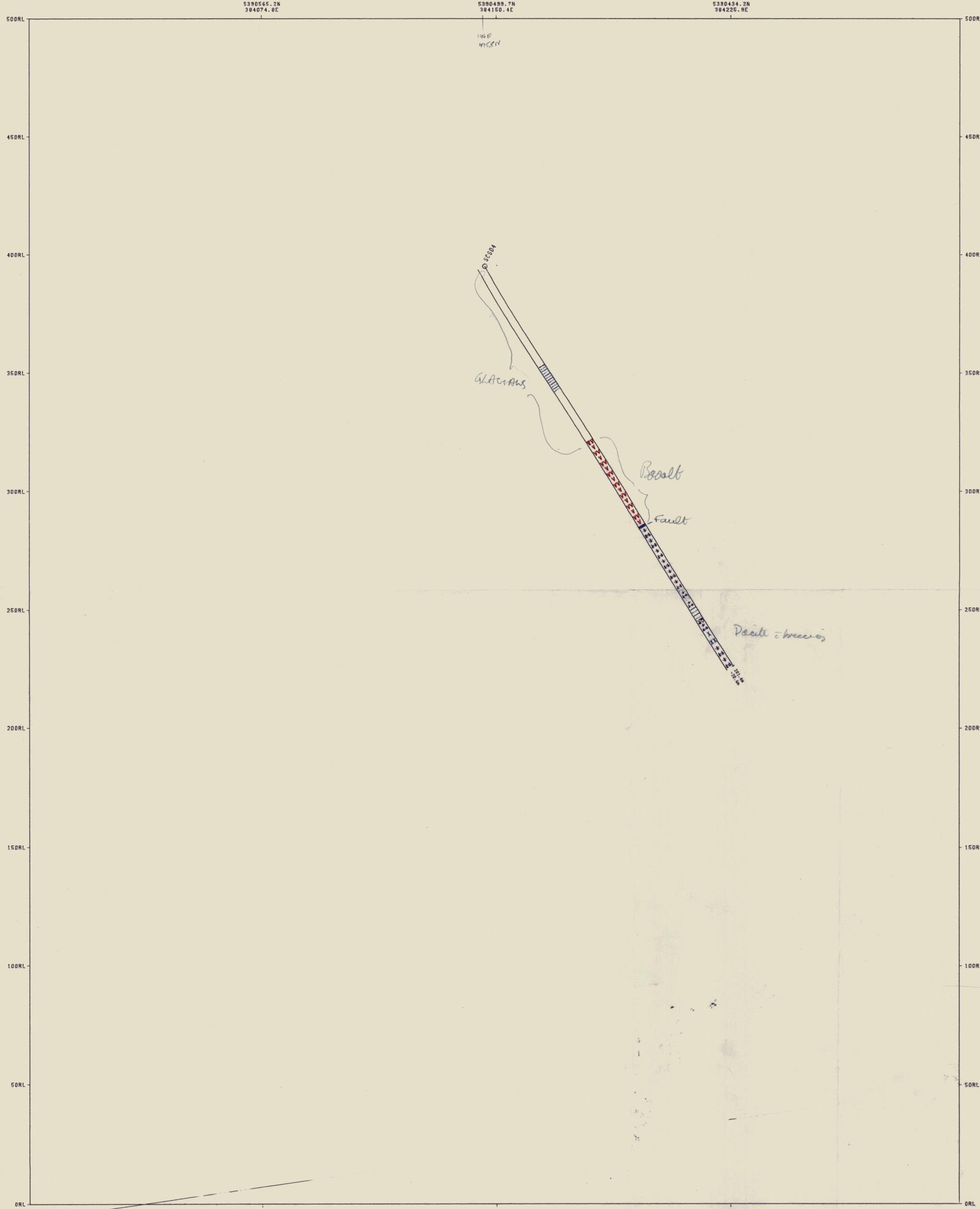
Rocktype patterns with
Zn Pb+Zn and Au histograms

DATE: 30-MAY-89
SCALE: 1:1000

Compiled by
CTF

BHP-UTAH MINERALS INTERNATIONAL
ASIA PACIFIC DIVISION
EXPLORATION DEPARTMENT

Comstaff J.V. - SECTION 3800NL AZIMUTH 130.91 ANGLE 90 FROM ORIGIN (384000E,5390630N,ORL)



SAMPLE BASED RESULTS:

0	13000+	0	13000+	0	0.1+	0	0.1+
PBZN	ARS	ZN	ARS	AU	FR1	AU	FR1
PPM		PPM		PPM		PPM	
0	0.1+	0	0.1+				
AU_R1	FR1	AU_PREF	FR1				
PPM		PPM					

- ROCK:
- Siltstone
 - Basalt
 - Slate
 - Mafic volc. breccias
 - Sandstone
 - Pumice
 - Dacite
- DRILLHOLE SYMBOLS:
- Drillhole collar

82-5008

5 cm

630046 8255

FIG. 13

BHP-UTAH Minerals International
Comstaff J.V.

SOCK CREEK SOUTH
HOLE SCS04

Rocktype patterns with
Zn Pb+Zn and Au histograms

DATE: 30-MAY-89	Compiled by CTF	BHP-UTAH MINERALS INTERNATIONAL ASIA PACIFIC DIVISION EXPLORATION DEPARTMENT
SCALE: 1:1000		

APPENDIX 1

PETROGRAPHIC REPORTS

GENERAL COMMENTS

1. These samples represent a suite of mafic lavas (fragmental or brecciated in some cases) which seem to be of pyroxene andesitic rather than basaltic composition. Some of them have or had a primary mafic index in excess of 35 and could be classified as calc-alkali basalt, but their plagioclase is not particularly calcic (although possibly modified) and more importantly they commonly carry a few quartz phenocrysts as well as phenocrysts of plagioclase and clinopyroxene (or its alteration products).

The specimens typically carry amygdales containing quartz with or without calcite, chlorite and sulphides. Late veins of quartz-calcite-sulphide are common.

2. The samples 7570, 7578 and 7579 are the most intensely hydrothermally altered rocks. They are sericitized, carbonated and sulphide impregnated; two are also silicified and two are chloritic. Sample 7570 is regarded as a turbidite breccia, 7578 was sandy and pebbly but better sorted, and 7579 was lava.

Sample 7578 is also a heavily altered rock (carbonated and chloritized) : it has variolitic textures comparable to those commonly encountered in the crusts of mafic pillow lavas.

3. The three samples 7581, 7614 and 7758 represent veined and amygdaloidal porphyritic mafic andesite lava. They are porphyritic in plagioclase in all cases, supplemented by clinopyroxene and quartz in 7758. Two are chloritic and one is lightly sericitic. Sulphides occur in amygdales and veins.

The texturally similar lava 7900 is mildly pyritized, moderately carbonated, amygdaloidal and heavily veined, porphyritic trachyandesite.

4. Four specimens display breccia textures of tensional or expansive style, with the clasts cemented by hydrothermal minerals. The rocks may have been generated by tensional (normal) faulting followed by passive introduction of hydrothermal minerals, or they may have been generated by hydrothermal fracturing and subsequent healing by hydrothermal minerals. I am inclined towards the faulting hypothesis because the fractured rocks are not severely altered : indeed, pyroxene (a generally reactive mineral) survives unchanged in the breccias 7678 and 9891.

In samples 7608 and 7627 clasts of chloritized, amygdaloidal, porphyritic, mafic andesite are cemented by calcite, quartz, sulphides and other minerals and veined by later calcite and other minerals.

In samples 7678 and 9891 the brecciated amygdaloidal, porphyritic pyroxene andesite is virtually unaltered and the hydrothermal cement involves prehnite with sulphides, quartz and calcite.

Sample Number : 7568 HPI 254.9m

Identification : Heavily carbonated and chloritized, variolitic mafic andesite with sparse phenocrysts of quartz

Description :

The sample is a specimen of drill core, displaying dark greenish grey volcanic rock with very sparse small phenocrysts of quartz and cut by several irregular light grey veins carrying carbonate and traces of pyrite and sphalerite.

A staining test revealed no K-feldspar.

In thin section the sample is seen to be heavily carbonated and chloritized but its primary textures are distinctly variolitic and sparsely porphyritic. Phenocrysts are 0.5 to 2mm in size and the variolitic groundmass involves sheafs and radial sprays of acicular plagioclase about 0.1 to 0.5mm long.

The most obvious phenocrysts are smoothly corroded and deeply embayed grains of quartz. Smaller, less abundant and less obvious phenocrysts are calcite and calcite-chlorite pseudomorphs of equant prismatic pyroxene and/or plagioclase. The variolites consist of acicular plagioclase with interstitial chlorite and specks of leucoxene with heavy patchy overprinting by calcite. Chlorite also forms irregular groundmass blebs. There are a very few disseminated cubes of fine pyrite (less than 0.05mm) and rare groundmass grains of quartz.

Several thin fissure veins (0.2mm in the section, but thicker elsewhere) carry calcite and a very few grains of pyrite and sphalerite.

An approximate mode is :

0.5-0.8%	quartz phenocrysts
0.2-0.3%	calcite-chlorite pseudomorphs of other phenocrysts
30-35%	groundmass plagioclase
30-35%	groundmass chlorite
1-2%	groundmass leucoxene
tr	groundmass quartz
30-35%	calcite overprinting the groundmass
tr	disseminated pyrite
0.5-0.8%	veins of calcite with traces of pyrite and sphalerite

Comments and Interpretations :

This rock originated as a sparsely porphyritic, variolitic lava. Variolitic texture is encountered in basaltic and related rocks and is equivalent to the spherulitic texture encountered in some rhyolites. Variolitic texture is especially characteristic of the crusts of pillow lava.

This rock seems to have had a rather mafic composition, but it carries distinct phenocrysts of quartz and a trace of groundmass quartz. Thus, it seems to be mafic andesite rather than basalt.

The rock is heavily carbonated and chloritized. There are traces of disseminated pyrite and traces of pyrite and sphalerite within calcite fissure veins.

Sample Number : 7570 HPI 270.85m
Identification : Carbonated, sericitized, pyritized and chloritized turbidite breccia of amygdaloidal andesite and quartzofeldspathic, sandy mud

Description :

The sample is a specimen of drill core, displaying angular and subrounded clasts (0.5 to 30mm) of greenish grey, altered and pyritic volcanic rock dispersed through a dark grey, fine-grained matrix. The clasts range in size from a fraction of a millimetre to at least 40mm.

A staining test revealed no K-feldspar.

In thin section the lithic clasts are seen to be heavily sericitized and carbonated, abundantly amygdaloidal, porphyritic intermediate volcanic rock; there are minor textural differences from one clast to another. The largest amygdales are ovoid, up to 1.5mm and contain sericite or calcite, albite and a core of quartz and rarely pyrite. More numerous, smaller amygdales (commonly 0.2mm) are filled variously with sericite or calcite and in some cases chlorite. Small phenocrysts (less than 0.5mm) comprise plagioclase, quartz, carbonated grains and rarely chloritized grains. The groundmass involves plagioclase laths, variously 0.05 to 0.3mm long, along with variable sericite, calcite, sphene, chlorite and a few pyrite grains.

There is one sand-sized clast of sericitized, acid volcanoclastic siltstone.

The matrix between the clasts involves angular sand and silt-sized clasts of quartz, variously sericitized, carbonated and chloritized mineral clasts, a few muscovite flakes, unevenly disseminated pyrite several microns to 0.1mm, stylolitic wisps of carbonaceous matter and an indeterminate finely silty or argillic component. There are textural indications that the matrix was laminated into mud and sandy mud, but the layers have been disturbed.

Crenulated fissure veins, disrupted by carbonaceous stylolites are 0.03 to 0.5mm wide and contain toothy quartz and calcite.

An approximate mode is :

40-50%	carbonated, sericitized, chloritized and pyritized clasts of amygdaloidal andesite
rare	sericitized clasts of acid volcanoclastic siltstone
5-7%	sericitized and carbonated mineral clasts
4-6%	quartz clasts
0.5-1%	chloritized mineral clasts
rare	muscovite clasts
35-45%	muddy matrix
1-2%	disseminated pyrite
1-2%	carbonaceous matter
0.4-0.6%	veins of quartz-calcite

Comments and Interpretations :

This rock is interpreted to have originated as a turbidite breccia, involving coarse clasts of abundantly amygdaloidal andesite dispersed through a carbonaceous muddy matrix with disturbed and disrupted crude laminations involving silt and sand-sized, angular clasts of quartz and other minerals.

It seems quite possible that the turbidite was generated in response to subaqueous eruption of andesite : coarse clasts of vesicular andesite mixed with mud and quartzofeldspathic sand.

The turbidite has been pervasively heavily carbonated and sericitized, and mildly pyritized and chloritized after deposition, then fissure-veined by additional quartz and calcite.

Sample Number : 7578 HPI 318.3m

Identification : Intensely sericitized, carbonated and silicified volcaniclastic rock

Description :

The sample is a specimen of drill core, displaying densely packed, poorly sorted clasts of pebble and coarse sand size with heavy alteration to a greenish yellow sericitic mineral and very light grey carbonate. There are also irregular, fine veins of a moderate green mineral.

A staining test revealed no K-feldspar.

In thin section the sample is seen to be intensely sericitized and remnant textures are less obvious than in the hand specimen. About all that can be discerned with any confidence about the primary rock is that it was composed of densely packed clasts of sand and pebble size. Within a few clasts there are vague suggestions of formerly porphyritic volcanic textures with sparse coarsely quartzose amygdales.

The rock now consists mainly of abundant sericite, quartz (about 0.02 to 0.2mm), patchy coarser calcite (0.1 to 1mm) and disseminated finely granular rutile (less than 0.03mm). Some of the sericite (moderate green in hand specimen) forms transgressive veins of replacement style.

Fine pyrite (less than 0.1mm) occurs mainly as aggregates (up to 1mm) associated with the coarsest quartz.

An approximate mode is :

40-50%	sericite (possibly fuchsitic)
30-35%	calcite
20-25%	quartz
0.5-1%	rutile
0.2-0.3%	pyrite

Comments and Interpretations :

This rock originated as a coarsely sandy to finely pebbly rock and its clasts may have been mafic volcanic and comparable to subsequently described andesites.

The rock has experienced intense, pervasive alteration of hydrothermal style to sericite-calcite-quartz-rutile and pyrite. Some sericite also formed replacement style veins. The sericite has a green colour in hand specimen, but is colourless in thin section. It may be fuchsitic, but the optical properties are not definitive.

Sample Number : 7579 HPI 336-5m
Identification : Intensely sericitized, carbonated, chloritized and silicified, porphyritic, amygdaloidal mafic andesite

Description :

The sample is a specimen of drill core, displaying dark greenish grey volcanic rock and some light grey amygdales and fine veins.

A staining test revealed no K-feldspar.

In thin section the sample is seen to be intensely altered, but remnant primary textures are of porphyritic, amygdaloidal, hypidiomorphic, finely crystalline volcanic style. Numerous phenocrysts are about 0.3 to 2mm, amygdales are about 0.5 to 5mm, and primary groundmass grains are about 0.05 to 0.2mm.

The most common phenocrysts were prismatic plagioclase, now heavily to completely altered to calcite and sericite. Some other smoothly corroded and deeply embayed phenocrysts are quartz. Some mafic or other phenocrysts have been pseudomorphed by fine quartz and chlorite. The groundmass retains some plagioclase, but has been intensely altered to calcite, sericite, chlorite, specks of leucoxene and a few patches of fine silicification. There are rare specks of sphalerite and pyrite.

The amygdales have small ovoid to larger, irregular cusped shapes. They are filled with quartz, chlorite and traces of calcite. Thin straight fissure veins carry sericite, quartz and calcite (in that paragenetic sequence).

An approximate mode is :

5-10%	intensely carbonated and sericitized plagioclase phenocrysts
4-6%	chloritized and silicified phenocrysts
0.3-0.5%	quartz phenocrysts
5-10%	remnant groundmass plagioclase
20-25%	groundmass sericite
20-25%	groundmass calcite
20-25%	groundmass chlorite
3-4%	groundmass secondary silica
0.2-0.3%	groundmass leucoxene
rare	disseminated sphalerite and pyrite
3-4%	amygdales of quartz-chlorite-calcite
0.4-0.6%	veins of sericite-quartz-calcite

Comments and Interpretations :

This rock is intensely altered to a sericite-calcite-chlorite-quartz assemblage, but remnant textures and minerals plainly indicate that it was an abundantly porphyritic, amygdaloidal volcanic rock with phenocrysts of plagioclase, quartz and probably pyroxene. Its primary composition was probably mafic andesite.

Amygdales are filled with quartz, chlorite and traces of calcite. Early thin fissure veins featured sericite with minor quartz and calcite and later veins carried mainly quartz and calcite.

47

Sample Number : 7581 HPI 380-4m

Identification : Veined and amygdaloidal, lightly chloritized, porphyritic mafic andesite

Description :

The sample is a specimen of drill core, displaying dark greenish grey volcanic rock with evenly disseminated, small light grey specks and several larger amygdales (2 to 8mm) containing light brown sphalerite and other minerals.

A staining test revealed no K-feldspar.

In thin section the sample displays amygdaloidal, abundantly porphyritic, moderately flow-aligned, finely crystalline volcanic textures. Phenocrysts are about 0.5 to 1mm, amygdales are about 0.3 to 8mm, and the groundmass is dominated by feldspar laths about 0.1 to 0.5mm long.

The phenocrysts are all smoothly corroded, lightly clouded plagioclase with traces of sericite and calcite. The groundmass consists of similarly clouded plagioclase, interstitial chlorite and specks of secondary sphene and traces of calcite and sericite.

Numerous small angular amygdales carry only chlorite. Other larger, ovoid and vermiform amygdales have very thin linings of chlorite, incomplete zones of albite and an acicular epidote group mineral and a core of quartz and in some cases calcite. Translucent yellowish brown sphalerite (with opaque seriate inclusions of probable chalcopryrite) and traces of galena occur with the quartz and albite in several large amygdales. Several thin fissure veins (less than 0.5mm) carry calcite and minor quartz with sphalerite. Traces of fine sphalerite occur also as disseminations in host rock.

An approximate mode, based on a brief count of 100 widely spaced points, is :

8%	plagioclase phenocrysts
47%	groundmass plagioclase
34%	groundmass chlorite
4%	groundmass sphene
6%	amygdales containing chlorite, albite, epidote, quartz, calcite, sphalerite, chalcopryrite and galena
1%	veins of calcite and minor quartz and sphalerite

Comments and Interpretations :

This rock is interpreted to be amygdaloidal, porphyritic, mafic andesite lava. Its mafic index exceeds that which can be used to distinguish basalt from andesite, but it is porphyritic only in plagioclase and the plagioclase is less calcic than An₅₀, so andesite seems a more reasonable identification.

The rock shows only light alteration, involving chlorite after mafic silicates and sphene after primary oxides; feldspar is essentially unaltered. Amygdales are filled with chlorite, albite, epidote, quartz, calcite and sulphides and fissure veins carry calcite and minor quartz and sphalerite.

00 48

Sample Number : 7608 HPI 419.75m

Identification : Breccia involving clasts of chloritized, amygdaloidal, porphyritic mafic andesite dispersed through a calcite-quartz-pyrite cement and cut by veins of quartz-calcite-sphalerite-galena

Description :

The sample is a specimen of drill core, displaying angular clasts of dark greenish grey volcanic rock dispersed abundantly through a medium light grey matrix. The specimen is cut by straight fissure veins, about 0.5 to 8mm thick, carrying mainly very light grey carbonate and quartz, but with brown sphalerite in some places.

A staining test revealed no K-feldspar.

In thin section the clasts display amygdaloidal, porphyritic, finely crystalline volcanic textures. Phenocrysts are about 0.4 to 1.5mm, amygdales are about 0.4 to 4mm, and the groundmass features moderately flow-aligned feldspar laths about 0.05 to 0.3mm long.

The phenocrysts are lightly clouded plagioclase and completely chloritized inferred pyroxene. The groundmass has fresh laths of plagioclase, interstitial chlorite, specks of secondary sphene, disseminated grains of quartz and a few specks of calcite. Amygdales are subspherical where small and lenticular to vermiform where larger : they carry toothy but generally anhedral quartz and a core of calcite.

The angular network between the clasts is filled by a mosaic of calcite (commonly 0.1mm but up to 0.5mm locally) with variable minor quartz and with disseminated very fine pyrite (less than 0.03mm). Subsequent straight fissure veins carry coarser calcite and toothy quartz (0.2 to several millimetres) and sparse, translucent yellowish brown sphalerite and subordinate galena.

An approximate mode of the volcanic clasts is :

4-6%	phenocrysts of plagioclase
0.5-1%	chloritized phenocrysts of inferred pyroxene
45-50%	groundmass plagioclase
30-35%	groundmass chlorite
3-4%	groundmass sphene
3-4%	groundmass calcite
3-4%	groundmass quartz
3-4%	amygdales of quartz and calcite

An approximate mode of the whole rock is :

45-50%	clasts of chloritized mafic andesite
40-45%	breccia cement of calcite, minor quartz and trace pyrite
10-12%	veins of quartz, calcite and traces of sphalerite and galena.

Comments and Interpretations :

This rock originated as vesicular, porphyritic, mafic andesite. Its inferred pyroxene has all been chloritized and its oxides altered to sphene; its vesicles filled with quartz and calcite. Severe tensional or expansive brecciation occurred and the dispersed clasts were cemented by fine calcite with variable fine quartz and disseminated very fine pyrite. Later straight fissure veins filled with coarser quartz and calcite and sparse sphalerite and galena.

Sample Number : 7614 HPI 426.05m
Identification : Veined and amygdaloidal, lightly sericitized
 and chloritized, finely porphyritic andesite

Description :

The sample is a specimen of drill core, displaying dark greenish grey, fine-grained rock with small ovoid very light grey amygdales and a thin very light grey fissure vein.

A staining test revealed no K-feldspar.

In thin section the sample displays amygdaloidal, finely porphyritic, hypidiomorphic, flow-aligned, finely crystalline volcanic textures. Phenocrysts are about 0.3 to 0.5mm, amygdales are about 0.3 to 3mm, and aligned groundmass laths of feldspar are about 0.1 to 0.5mm long.

The phenocrysts are blocky prisms of moderately sericitized plagioclase. The groundmass has lightly sericitized plagioclase, leucoxene specks after primary oxides, interstitial chlorite and sparse grains of quartz.

The amygdales are mainly simple ovoid structures. Many are filled with anhedral but toothy grains of quartz growing radially inwards. Some carry outer zones of chlorite, then sericite, then quartz with pyrite and sphalerite, then calcite. Several thin crenulated fissure veins carry chlorite, quartz and calcite.

An approximate mode, based on a brief count of 100 widely spaced points, is :

3%	plagioclase phenocrysts, lightly sericitized
58%	groundmass plagioclase, lightly sericitized
30%	groundmass chlorite
2%	groundmass leucoxene
<1%	groundmass quartz
6%	amygdales of quartz and minor chlorite, sericite, pyrite, sphalerite and calcite
1%	fissure veins of chlorite, quartz and calcite

Comments and Interpretations :

This rock is interpreted to be amygdaloidal, finely porphyritic andesite lava. Its mafic index is high, but does not conflict with identification as andesite.

The rock shows light alteration to a sericite-chlorite-leucoxene assemblage. Amygdales have filled with quartz and minor chlorite, sericite, pyrite, sphalerite and calcite. Fissure veins carry chlorite, quartz and calcite.

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Sample Number : 7627 HPI 443-25m

Identification : Breccia of chloritized, amygdaloidal, porphyritic mafic andesite finely cemented by quartz-feldspar-calcite-chlorite-sulphides and veined by mainly calcite

Description :

The sample is a specimen of drill core displaying dark greenish grey volcanic rock brecciated into clasts about 1 to 30mm in size and healed by light grey minerals. Some light brown sphalerite is visible.

A cobaltinitrite staining test revealed some K-feldspar in the breccia network.

In thin section the clasts display amygdaloidal, finely porphyritic volcanic textures. Phenocrysts are about 0.3 to 1mm in size, amygdales are 1 to several millimetres and the groundmass is dominated by mildly flow-aligned plagioclase laths about 0.1 to 0.4mm long.

The phenocrysts are lightly sericitized plagioclase and completely chloritized inferred pyroxene. The groundmass involves laths of plagioclase (slightly sericitic), interstitial chlorite and specks of secondary sphene. Amygdales are ovoid to vermiform: the smallest carry chlorite, but larger ones carry relatively coarse quartz and minor calcite and translucent brown sphalerite.

A network of angular interstices between lithic clasts is occupied by a microcrystalline (0.02mm grainsize) assemblage of quartz, untwinned feldspar, calcite, chlorite and traces of sphalerite and pyrite. Subsequent irregular fractures (up to 0.5mm wide) are dominated by relatively coarse calcite, but with traces of quartz, sphalerite and pyrite.

An approximate mode is :

5-7%	phenocrysts of lightly sericitized plagioclase
2-3%	chlorite pseudomorphs of pyroxene phenocrysts
35-45%	groundmass plagioclase
30-35%	groundmass chlorite
3-4%	groundmass sphene
3-4%	amygdales of relatively coarse quartz and minor chlorite, calcite and sphalerite
8-10%	breccia cement of fine quartz, feldspar, calcite, chlorite and traces of sulphide
2-3%	late veins of calcite with traces of quartz and sulphides

Comments and Interpretations :

This rock originated as vesicular, porphyritic, mafic pyroxene andesite lava. It was pervasively chloritized and its vesicles filled with quartz and minor chlorite, calcite and sphalerite. The rock was then tensionally or expansively brecciated by faulting or hydrothermal action, and then cemented by fine quartz, feldspar (apparently potassic), calcite, chlorite and traces of sulphide. A second set of fractures was healed by coarser calcite with traces of quartz and feldspar.

Sample Number : 7678

HPI 534m

Identification : Prehnite-cemented breccia of only slightly altered porphyritic, mafic pyroxene andesite

Description :

The sample is a drill core specimen, displaying breccia textures involving angular clasts a fraction of a millimetre to about 50mm in size, composed of medium dark grey volcanic rock, and a cement of a light grey, hard mineral accompanied by a few specks of bronze, magnetic pyrrhotite.

A cobaltinitrite staining test indicated a potassic selvedge up to several millimetres thick adjacent to part of the cement.

In thin section the clasts are seen to be only slightly altered volcanic rock, displaying phenocrysts about 0.4 to 1.5mm in size, set in a moderately flow-aligned groundmass with plagioclase laths about 0.1 to 0.3mm long. The most common phenocrysts are fresh plagioclase and fresh clinopyroxene, but there are also a few phenocrysts of quartz, embayed by corrosion and with thin mafic coronas of pyroxene. The groundmass consists of plagioclase laths, fresh prisms of clinopyroxene, many specks of secondary sphene, disseminated fine pyrite and a few patches of chlorite which resemble small amygdales.

The angular interstices between the angular breccia clasts are densely cemented by an anhedral mosaic of a mineral which is thought to be prehnite (high relief, biaxial positive, upper first order interference colours, hard, colourless to neutral). Much of it is about 0.5mm in grain size, but in places it grades to finer sizes (about 0.05mm). There are disseminated specks of very fine opaque sulphide and translucent sphalerite, several patches (0.5 to 3mm) of coarser pyrrhotite, and a single grain of brown tourmaline. In general there is no alteration selvedge in adjacent rock, but in several cases there is a local selvedge of fine potassic feldspathization of wall rock andesite. Several late, irregular veins carry quartz-albite-prehnite-calcite-sphalerite and later, thinner, straight veins carry calcite and chlorite.

An approximate mode is :

3-5%	phenocrysts of plagioclase
2-3%	phenocrysts of clinopyroxene
0.2-0.3%	phenocrysts of quartz
35-45%	groundmass plagioclase
25-30%	groundmass clinopyroxene
1-2%	groundmass secondary sphene
0.2-0.3%	chlorite
0.2-0.3%	disseminated pyrite
20-30%	cavity fillings of prehnite with traces of pyrrhotite, sphalerite and possibly pyrite
2-3%	fissure veins of quartz-albite-prehnite-calcite-sphalerite
0.1-0.2%	fissure veins of calcite and chlorite

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Sample Number : 7758 HPI 643-75m
Identification : Chloritic, porphyritic, finely amygdaloidal
 mafic pyroxene andesite

Description :

The sample is a specimen of drill core, displaying very light grey phenocrysts and inconspicuous amygdales in a dark greenish grey volcanic host. Several amygdales carry pyrrhotite.

A staining test revealed local potassium feldspathization as light grey jackets around amygdales.

In thin section the sample displays sparsely amygdaloidal, abundantly porphyritic, hypidiomorphic, volcanic textures. The phenocrysts are about 0.3 to 3mm, amygdales are about 0.2 to 2mm, and the groundmass shows mild flow-alignment of plagioclase laths about 0.05 to 0.2mm long.

The main phenocrysts are twinned, mildly zoned, smoothly corroded prisms of plagioclase; a few are clumped. Clinopyroxene forms a few small prismatic phenocrysts and quartz occurs very sparsely as corroded and embayed phenocrysts. The quartz phenocrysts have subtle mafic coronas of fine pyroxene. The groundmass consists of fresh plagioclase laths and pyroxene prisms and interstitial chlorite; there are no opaque oxides.

The amygdales have small ovoid to larger, elongate, cusped shapes and contain mainly sheafs of an acicular epidote group mineral. An outer lining of chlorite and a core of quartz and pyrrhotite occurs in some cases. The potassium feldspathized jackets around amygdales are not obvious in the thin section. Inconspicuous thin fracture veins (less than 0.1mm) carry quartz, minor epidote and traces of pyrrhotite.

An approximate mode, based on a brief count of 100 widely spaced points, is :

6%	plagioclase phenocrysts
2%	clinopyroxene phenocrysts
<1%	quartz phenocrysts
43%	groundmass plagioclase
24%	groundmass clinopyroxene
22%	groundmass chlorite
3%	amygdales of an epidote group mineral and subordinate quartz, chlorite and pyrrhotite
<1%	veins of quartz-epidote-pyrrhotite

Comments and Interpretations :

This rock has porphyritic, finely amygdaloidal, finely crystalline textures consistent with lava. Using the mafic index (about 48) as a criterion the rock would qualify for identification as calc-alkali basalt. However, the plagioclase phenocrysts and groundmass grains seem to be less calcic than An_{50} and this criterion takes precedence in classifying the rock as andesite. The absence of opaque oxides and presence of sparse phenocrysts of quartz also favour identification as andesite.

The rock is quite chloritic, but its plagioclase and clinopyroxene are unaltered. Amygdales and fissure veinlets carry an epidote group mineral, quartz, and pyrrhotite; some amygdales are also lined by chlorite.

Sample Number : 7900

HP2 558.75m

Identification : Mildly pyritized, moderately carbonated, amygdaloidal and heavily veined, finely porphyritic trachyandesite

Description :

The sample is a specimen of drill core, displaying numerous light grey fissure veins (ranging up to about 4mm thick) cutting a medium dark grey volcanic host with disseminated very light grey specks.

A cobaltinitrite staining test revealed that the rock is rich in fine K-feldspar and that some small feldspar phenocrysts have rims of K-feldspar.

In thin section the sample displays finely porphyritic and amygdaloidal, hypidiomorphic, mildly flow-aligned volcanic textures. Phenocrysts are about 0.4 to 1mm, amygdales are 0.2 to 4mm, and the groundmass is characterised by plagioclase laths about 0.05 to 0.3mm long.

The phenocrysts are mainly clouded, smoothly corroded plagioclase, some with a thin overgrowth rim of more clouded orthoclase. There are sparse examples of deeply corroded quartz phenocrysts. The groundmass involves laths of plagioclase, calcite pseudomorphs of clinopyroxene (remnants of which are preserved in part of the section), sphene after oxides, and interstitial fine K-feldspar and chlorite. There are also disseminated cubes (0.02 to 0.2mm) and clusters of pyrite.

The smallest amygdales contain chlorite. The largest amygdales contain quartz, chlorite, pyrite, sphalerite and calcite. Numerous fracture veins, 0.2 to several millimetres thick, contain mainly calcite, but with minor quartz and a few grains of pyrite.

An approximate mode is :

2-3%	plagioclase phenocrysts
0.1-0.2%	quartz phenocrysts
30-35%	groundmass plagioclase
30-35%	groundmass K-feldspar
10-15%	calcite after groundmass pyroxene
2-3%	groundmass secondary sphene
2-3%	groundmass chlorite
0.2-0.3%	disseminated pyrite
3-5%	amygdales containing quartz, chlorite, pyrite, sphalerite and calcite
10-12%	veins carrying calcite, minor quartz and trace pyrite

Comments and Interpretations :

This rock is considered to be finely porphyritic and amygdaloidal trachyandesite (or latite). Its phenocrysts are mainly plagioclase, but there are a few quartz phenocrysts.

The rock shows moderate alteration (mainly involving conversion of pyroxene to calcite and oxides to sphene) and mild impregnation with disseminated pyrite. Amygdales are filled with varying amounts of quartz, chlorite, pyrite, sphalerite and calcite, and numerous thick fissure veins carry mainly calcite, but with minor quartz and traces of pyrite.

Sample Number : 9891

HP 2 583.4m

Identification : Breccia of amygdaloidal, porphyritic pyroxene andesite cemented by quartz, prehnite and minor calcite, pyrite and sphalerite

Description :

The sample is a specimen of drill core, displaying densely packed angular clasts of greenish grey, altered volcanic rock cemented by a hard white mineral and very light grey quartz.

A staining test revealed no K-feldspar.

In thin section the clasts display porphyritic, amygdaloidal, finely crystalline volcanic textures. Phenocrysts are about 0.5 to 1.5mm in size, amygdales are 1 to 2mm in size, and groundmass grains are about 0.05 to 0.3mm.

The phenocrysts are prehnite pseudomorphs of plagioclase, fresh clinopyroxene and deeply embayed phenocrysts of quartz. The amygdales are ovoid to vermiform and mainly contain quartz, but with pyrite, prehnite and traces of calcite in places. The groundmass consists of fresh unzoned and partly recrystallized plagioclase laths, fresh clinopyroxene and aggregates of secondary sphene after opaques.

The cement between the clasts consists of relatively coarse (0.1 to 2mm) mainly anhedral but toothy quartz and a central filling of prehnite of similar grainsize and sheaf-like textures. A few grains of pyrite (0.02 to 0.5mm), translucent reddish brown sphalerite and calcite occur mainly in the quartzose, outer zones of the cavity fillings. Several late, straight veins (less than 0.3mm wide) carry albite and calcite.

An approximate mode is :

2-3%	prehnite pseudomorphs of plagioclase phenocrysts
1-2%	clinopyroxene phenocrysts
0.1-0.2%	quartz phenocrysts
35-45%	groundmass plagioclase
18-22%	groundmass clinopyroxene
2-3%	groundmass secondary sphene
1-2%	amygdales of quartz and traces of prehnite, calcite and pyrite
30-35%	fracture fillings of quartz-prehnite-pyrite-calcite-sphalerite
0.3-0.4%	late veins of albite-calcite

Comments and Interpretations :

This rock originated as vesicular mafic pyroxene andesite lava with phenocrysts of plagioclase, clinopyroxene and quartz. It has been tensionally or expansively brecciated by faulting or hydrothermal processes and the resultant fractures, along with the vesicles have been filled with quartz, prehnite and minor calcite, pyrite and sphalerite. Plagioclase phenocrysts were replaced by prehnite, but pyroxene remained quite fresh. Primary opaque oxides have changed to aggregates of fine sphene.

Sample Number : 7239

Identification : Carbonated and chloritic, volcanoclastic pebbly and sandy mudstone (turbidite) with disseminated patches of sphalerite and pyrrhotite

Description :

The sample is a drill core specimen of hard, dark greenish grey rock with laminations and finely fragmental textures of volcanoclastic style. There are fine specks of sulphides.

A cobaltinitrite staining test performed on the off-cut from one of the coarsest fragmental layers revealed abundant fine K-feldspar especially within amygdaloidal lithic clasts up to 5mm in size.

The thin section displays two segments of sandy textured rock separated by a 7mm thick zone of laminated mudstone.

The sandy segments display many unsorted or very poorly sorted angular to subrounded lithic clasts (ranging up to at least 5mm) and angular mineral clasts scattered through a muddy matrix of silty feldspars, minor quartz, sericite and chlorite. The lithic clasts comprise densely amygdaloidal, altered volcanic rock (plagioclase phenocrysts and chloritic amygdaloids in a densely carbonated host), mudstone, greywacke (plagioclase and quartz sand grains in a matrix of chloritic mudstone) and heavily chloritized, lightly carbonated porphyritic intermediate lava (?trachyandesite).

Disseminated through the rock, and located especially within carbonated phenocrysts and mineral grains there are small patches (up to 0.5mm) of anhedral reddish brown sphalerite and bronze, magnetic pyrrhotite.

A crude mode of the sandy segments is :

40-50%	pebbles and sand-sized clasts of chloritized, carbonated, generally amygdaloidal (?trachyandesite)
20-30%	pebbles and sand-sized clasts of mudstone and greywacke
3-4%	sand grains of feldspar and quartz
20-30%	muddy matrix of feldspathic silt, chlorite and sericite
3-4%	disseminated aggregates of sphalerite and pyrrhotite

The intervening segment of laminated mudstone is chloritic, mildly carbonated and comparable in composition to the muddy matrix of the adjacent sandy regimes. It carries disseminated patches of pyrrhotite and is disrupted by a microfault.

Comments and Interpretations :

This sample is considered to display volcanoclastic sediment of turbidite style, comprising layers of unsorted or poorly sorted pebbly and sandy mudstone (loosely greywacke) and some laminated mudstone.

The volcanic component is quite amygdaloidal and heavily altered. Its composition is quite potassic, but apparently intermediate (probably trachyandesite). Intraformational clasts of greywacke and mudstone are also incorporated.

The alteration assemblage involves much chlorite, prominent calcite, minor sericite, fine sphene and disseminated, replacement-style aggregates of sphalerite and pyrrhotite.

Sample Number : 7240

Identification : Unwelded trachyandesitic pumice vitric
crystal tuff with moderate chloritization
and sericitization

Description :

The sample is a drill core specimen of hard, light olive grey and greenish grey rock with indistinct fragmental textures involving clasts ranging in size from less than 1mm to at least 30mm.

A staining test revealed moderately abundant K-feldspar as fine groundmass grains within lithic clasts and as veinlets in plagioclase phenocrysts.

In thin section the sample displays unsorted, distinctly fragmental textures of apparently tuffaceous style. There are many lithic clasts of irregular to ragged shape (about 0.5 to 20mm in size) and many smaller, angular mineral clasts (0.1 to 1mm) scattered through a finely crystalline matrix (0.01 to 0.02mm grainsize).

The lithic clasts display many phenocrysts of plagioclase (0.5 to 2mm) and leucoxene pseudomorphs of smaller oxide phenocrysts set in a moderately sericitic, and chloritic groundmass with cellular patterns suggestive of former pumiceous textures. Orthoclase and minor quartz is present in the groundmass and some orthoclase has formed replacement patches and cleavage-controlled veins within phenocrysts. A few lenticular amygdales carry untwinned and poorly twinned, toothy albite.

The mineral clasts are lightly sericitized plagioclase and leucoxenized oxide, comparable to the phenocrysts in the lithic clasts, but smaller and broken.

The finely crystalline matrix consists of untwinned feldspars, chlorite and minor quartz. Distribution patterns of chlorite hint at the former existence of unwelded vitric shards.

An approximate mode is :

60-70%	chloritized and sericitized clasts of probable trachyandesitic pumice
3-4%	mineral clasts of plagioclase and minor leucoxenized oxide
20-30%	matrix feldspars and minor quartz
4-6%	matrix chlorite

Comments and Interpretations :

This rock is thought to have originated as a coarsely and abundantly pumiceous, unwelded tuff of probably trachyandesitic (= latite) composition.

Moderate sericitic and chloritic alteration has affected the groundmass of the pumiceous clasts. Plagioclase phenocrysts survived, but with some replacement by mobilized K-feldspar. The apparently vitroclastic matrix of the tuff was finely devitrified and chloritized. All oxide phenocrysts and clasts were leucoxenized.

There are no sulphides.

Sample Number : 7241

Identification : Black shale and sericitized pebbly mudstone (turbidite) with sulphidic quartz veins and heavily mineralized clasts.

Description :

The sample is a drill core specimen which displays a disturbed contact between dark grey pelite and a pebbly volcanolithic rock type. The pebbles range up to 20mm in size and retain some feldspar phenocrysts but contain so much fine sphalerite that they are light brown in colour.

A staining test revealed some fine K-feldspar in a mineralized lithic clast and in its silty host.

In polished thin section the dark grey pelite is seen to be carbonaceous shale. Silt and sand-sized clasts (about 0.03 to 1mm in size) of quartz, plagioclase and sphalerite-impregnated, altered volcanic rock are scattered through a foliated matrix of sericite, very fine carbonaceous matter or graphite and fine specks of pyrite.

The rest of the section involves variously altered and mineralized subrounded lithic pebbles and variously altered sand-sized mineral clasts scattered through a silty and sericitic matrix with traces of carbonaceous matter or graphite and a few specks of pyrite.

One of the largest pebbles (about 20mm) has obvious dacitic or rhyodacitic parentage, but has been moderately sericitized and heavily replaced by fine, anhedral sphalerite (reddish brown colour and grainsizes around 0.03 to 0.1mm) and very subordinate, similarly fine pyrite; there are remnant phenocrysts of quartz, lightly to moderately sericitized plagioclase and chloritized biotite set in a groundmass of remnant feldspar and quartz, a moderate amount of sericite and abundant sphalerite. Another clast of similar size shows similar porphyritic volcanic textures but with only light alteration to sericite and calcite and with fine sphalerite developed only as sparse patches and as 0.5 to 1mm replacement selvages adjacent to thin fissure veins (0.05 to 0.3mm wide) of quartz, sphalerite and minor pyrite which pass through the clast and continue into the adjacent muddy matrix. Other clasts show characteristics transitional between these extremes.

The quartz-sulphide veins develop narrower, less intense selvages of sphalerite where they are hosted by the muddy matrix. There are two later fissure veins (0.2 to 0.5mm) of calcite and sericite.

An approximate mode of the pebbly sectioned regime is :

30-35%	pebbles of dacite or rhyodacite with variable light to heavy replacement by sphalerite and minor pyrite
2-3%	sand-sized clasts of plagioclase, lightly altered and in some cases sulphidic

0.5-1%	sand-sized clasts of quartz
30-35%	silty feldspars and quartz
30-35%	matrix sericite
0.2-0.3%	matrix carbonaceous matter or graphite
0.1%	matrix pyrite
2-3%	fissure veins of quartz-sphalerite-pyrite
0.5-1%	fissure veins of calcite

Comments and Interpretations :

This specimen is considered to display some sandy carbonaceous mudstone and poorly sorted pebbly and sandy, sericitized mudstone (loosely greywacke). Deposition by turbidite style processes is implied.

The rock is cut by thin fissure veins carrying quartz, sphalerite and minor pyrite. Minor replacement selvages of sphalerite and pyrite are developed where the veins traverse the muddy matrix, but their passage through pebbles of dacite or rhyodacite has resulted in variously light to heavy selective replacement.

Several late fissure veins consist of calcite and sericite.

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SCS3 126.4m

Sample Number : 7242

Identification : Finely pyritic and carbonaceous, laminated mudstone with sphalerite mineralization in silty/sandy layers and fractures

Description :

The sample is a drill core specimen of dark grey, carbonaceous pelite with fine laminations or bands of pale reddish brown sphalerite and with a 2mm wide discordant fissure vein of similar sphalerite.

A staining test revealed no K-feldspar.

In polished thin section the sample displays laminations of sedimentary style about 0.1 to 3mm thick. The thickest are mudstone, composed of sericite, fine silt grains of quartz and feldspar wisps of carbonaceous matter or graphite (not satisfactorily identifiable in reflected light) and evenly disseminated tiny grains (cubes and multifaceted forms) of pyrite, about 0.005 to 0.02mm in size.

The thinner, coarser-grained layers carry coarse silt and fine sand grains (about 0.03 to 0.4mm) of quartz and feldspar, along with reddish brown sphalerite and minor pyrite of similar grainsize. Some sulphide is seen to partly replace feldspar grains.

Concordant with, but overprinting sedimentary laminations there is a 10mm x 2mm lenticular nodule of pyrite enveloped by fibrous, strained quartz. Cutting the laminations at a high angle there are subparallel carbonaceous fractures and a related 2mm wide fissure vein containing reddish brown sphalerite, minor strained quartz and a few grains of pyrite.

An approximate mode is :

60-70%	fine silt and sericite
15-20%	coarser silt and sand
3-4%	carbonaceous matter or graphite
5-6%	disseminated very fine pyrite
5-6%	sphalerite with silty/sandy layers
1-2%	carbonaceous matter in parallel fractures
3-4%	sphalerite with minor quartz and trace pyrite in a fracture vein
1-2%	nodule of pyrite and quartz

Comments and Interpretations :

This sample is regarded as finely carbonaceous and pyritic, laminated mudstone with sphalerite-mineralized silty/sandy laminations and fracture veins.

The very fine pyrite is thought to be a syngenetic/diagenetic component; some of it has accreted into a nodule by diagenetic processes. The sphalerite which is concentrated within the thinner laminations of coarser-grained silty/sandy material is thought to have been introduced; greater permeability of the coarser material probably explains the distribution. Additional similar sphalerite has formed a major vein filling within a carbonaceous fracture which belongs to a probably regional tectonic set.

Sample Number : 7243

Identification : Pebbly and sandy carbonaceous mudstone (turbidite) with quartz-calcite-sphalerite-pyrite veins and some heavily mineralized volcanic clasts

Description :

The sample is a drill core specimen displaying many unsorted, angular, light grey lithic and mineral clasts set in a dark grey pelitic host. There are veinlets and patches of pale reddish brown sphalerite.

A staining test revealed that the lithic clasts contain abundant groundmass K-feldspar and that additional fine K-feldspar occurs as cleavage-controlled veinlets in plagioclase phenocrysts and clasts.

In polished thin section the sample displays textures of turbidite style. One end of the section displays carbonaceous mudstone with fine silty and sandy laminations, but the bulk of the section displays unsorted angular rock and mineral clasts of sand and pebble size (ranging up to 20mm) scattered abundantly through a muddy matrix containing very fine carbonaceous matter or graphite (too fine for adequate identification in polished section), silty feldspars and quartz, sericite and disseminated subhedral to euhedral grains of pyrite (several microns to about 0.01mm).

The lithic clasts are mainly of rhyodacitic style, involving phenocrysts of plagioclase and less commonly quartz set in a finely quartzofeldspathic groundmass; all are lightly sericitized and carbonated. Some are quite free of sulphides, but others show variable amounts of replacement sphalerite (reddish brown and commonly 0.03 to 0.3mm in grain size); there are a few grains and aggregates of pyrite. The most mineralized rhyodacitic clast carries about 50% sphalerite. One large ragged clast which may have been glassy now displays phenocrysts of lightly altered plagioclase and finer quartz set in a groundmass of chlorite which has been semi-massively replaced by pyrite (0.03 to 0.3mm) in several large patches.

Mineral clasts are quartz and lightly altered plagioclase comparable to the phenocrysts in the lithic clasts.

Many thin fissure veins (0.02 to 0.2mm) cut the rock: they carry quartz, calcite, reddish brown sphalerite and a few pyrite grains. Where the veins traverse the muddy matrix there are generally no alteration selvages, but where they cut feldspar clasts or lithic clasts there are some very clear examples of sulphidic replacement selvages (sphalerite and some pyrite) spreading into the host for distances greater than the width of the vein (e.g. 0.5mm from a 0.2mm vein).

An approximate mode is :

30-40%	pebbles and sand-sized clasts of lightly altered rhyodacite with light to heavy replacement by sphalerite and pyrite
2-3%	sand-sized clasts of plagioclase lightly altered and in some cases sulphidic

1-2%	sand-sized clasts of quartz
15-20%	silty feldspars and quartz
35-40%	matrix sericite
2-3%	matrix carbonaceous matter or graphite
0.2-0.3%	matrix pyrite
3-4%	fissure veins of quartz-calcite-sphalerite-pyrite

Comments and Interpretations :

This sample is considered to display sedimentary material of turbidite style. It involves rhyodacitic rock fragments and related phenoclasts scattered through a carbonaceous muddy matrix. It could be loosely described as greywacke, but volcanolithic, pebbly and sandy mudstone is more descriptive.

The rock is cut by thin fissure veins carrying quartz, calcite, sphalerite and minor pyrite. There are obvious replacement selvages of sulphide developed where the veins cut feldspar or rock fragments. More massive mineralization of some rhyodacitic clasts is probably an extension of similar replacement processes.

Sample Number : 7244

Identification : Finely pyritic and carbonaceous black shale with fracture veins of quartz-calcite-sphalerite-pyrite-chalcopyrite

Description :

The sample is a specimen of drill core displaying dark grey pelite with a few pyritic nodules and some fissure veins carrying light grey quartz and carbonate along with reddish brown sphalerite and brassy pyrite.

A staining test revealed moderately abundant silty grains of K-feldspar.

In polished thin section the host rock displays quartz and feldspar clasts of coarse silt to fine sand size (about 0.05 to 0.2mm) scattered through a matrix of finer silt grains, sericite and tiny specks and wisps of carbonaceous matter or graphite (not adequately identifiable in reflected light). Tiny subhedral to euhedral grains of pyrite (up to 0.01mm grainsize) are evenly distributed and there are less abundant, unevenly distributed grains of anhedral, coarser, brown sphalerite (0.03 to 0.05mm), commonly most conspicuous in patches or crude lenses of the coarsest silty material.

There is a 10mm x 4mm lenticular nodule involving a core of pyrite and a jacket of fibrous, strained quartz. There are also carbonaceous fractures of varied orientation and related fracture veins (0.05 to 2mm wide), commonly lined with mildly strained, toothy quartz then filled with more abundant calcite and a substantial core of anhedral, reddish brown sphalerite (grainsizes ranging up to 0.5mm) accompanied by chalcopyrite and subhedral pyrite. Some such veins are obviously deformed and disrupted by shearing.

An approximate mode is :

50-60%	sericite
25-35%	silt and fine sand grains of quartz and feldspar
3-4%	carbonaceous matter or graphite
2-3%	disseminated fine pyrite
0.1-0.2%	unevenly disseminated sphalerite
3-5%	veins of quartz-calcite-sphalerite-pyrite-chalcopyrite
2-3%	nodule of pyrite and quartz

Comments and Interpretations :

This sample is regarded as carbonaceous mudstone, similar to Sample 7242, but lacking distinct laminations.

Disseminated very fine pyrite is thought to be a syngenetic/diagenetic component; some of it was mobilized diagenetically to form a nodule. The origin of the unevenly distributed, coarser less abundant sphalerite is less certain, but it may well be an introduced component: the association with coarser silty patches is suggestive of such an origin. Much more sphalerite, accompanied by some chalcopyrite and pyrite, occurs as coarser grains in the cores of fracture veins which are also lined with quartz and partly filled with calcite.

Sample Number : 7245

Identification : Pyritic, intensely sericitized breccia of former pumice and felsic glass

Description :

The sample is a specimen of drill core displaying angular clasts of light olive grey to orange pink, fine-grained rock, a fraction of a millimetre to 30mm in size, fairly densely packed in a fragmented, stringy pumiceous matrix. There are several pyritic clasts and several dark, partly chloritic veins.

Cobaltinitrite stain reacted with pumiceous clasts, ut did not reveal any definite K-feldspar.

In thin section the large clasts display cellular patterns suggestive of perlitic cracking. Fine leucoxene outlines fracture cells about 0.2 to 1.5mm in size within which there are smaller crude spheroids of untwinned, anhedral, reddish pigmented albite and clear quartz enclsoed by networks of fine sericite and subtle chlorite. There are also several phenocrysts of completely sericitized plagioclase (1 to 2mm) and several lenticular quartzose amygdales (0.5mm).

The pumiceous clasts have ragged shapes and filamentous vesicular styles; they are more densely sericitized but carry fine leucoxene/rutile and minor fine feldspar.

Semi-massive subhedral to euhedral pyrite (0.02 to 0.1mm grainsize) has selectively replaced several pumiceous clasts (up to 5mm) and several sericitized phenocrysts within the perlitic clasts.

A crenulated fissure vein about 0.5mm wide carries chlorite, mildly strained quartz and fine rutile.

An approximate mineralogical mode is :

40-50%	sericite
40-50%	albite
5-10%	quartz
2-3%	leucoxene and rutile
2-3%	pyrite
1-2%	chlorite
0.4-0.6%	veins of chlorite-quartz-rutile

Comments and Interpretations :

This sample is considered to be an intensely altered breccia developed from originally massive glassy felsic rock and pumiceous rock of comparable composition. It seems quite likely that the rock is a flow breccia which mixed massive glass with a pumiceous froth, but other interpretations are possible (e.g. talus breccia developed from frothy, glassy lava).

The rock has devitrified and altered mainly to sericite and albite. Leucoxene/fine rutile has especially delineated a perlitic cracking pattern. Quartz is not very abundant, but it is not possible to judge how much metasomatism was involved in the devitrification and alteration : certainly there are no quartz phenocrysts. Chlorite is present but inconspicuous in the body of the rock; it is more obvious in late veins with quartz and rutile. Pyrite has replaced a few clasts and phenocrysts but is absent from the probably later chloritic veins

Sample Number : 7246

Identification : Pyritic, amygdaloidal, formerly glassy felsic lava, now cut by many fissure veins

Description :

The sample consists of orange pink, fine-grained rock cut by many fracture veins with light grey quartz, whitish carbonate and reddish sphalerite.

Cobaltinitrite stain gave a diffuse reaction but revealed no definite K-feldspar.

In thin section the bulk of the host rock displays ghosted perlitic textures (fracture cell sizes 0.2 to 0.5mm) many small, interconnected quartz amygdales (individually 0.2 to 0.5mm) and rare small phenocrysts of plagioclase (0.5mm) set in a felted groundmass of poorly twinned albite (less than 0.1mm grainsize). Very fine granules of rutile delineate the perlitic cracking pattern and many amygdales. Towards one end of the section there is a rapid gradation into heavily sericitized rock with filamentous textures of pumiceous style. There are several patches of semi-massive fine pyrite within the sericitic regime and smaller patches and disseminated grains of pyrite (up to 0.05mm) elsewhere within the quartzose amygdales.

The many fracture veins are 0.02 to 5mm wide and cut one another as well as the host rock. The paragenetic sequence revealed by zoning within veins and by successive veining is sericite-chlorite-albite-rutile-quartz-calcite-sphalerite. Quartz and calcite are much more abundant than the other minerals.

An approximate mode is :

50-60%	host rock albite
10-15%	amygdaloidal quartz
0.4-0.6%	fine rutile
10-15%	host rock sericite (confined to the pumiceous portion)
0.4-0.6%	disseminated grains and aggregates of pyrite
rare	phenocrysts of plagioclase
20-25%	veins dominated by quartz and calcite, but with minor albite, chlorite and sphalerite and traces of sericite and rutile

Comments and Interpretations :

This rock is interpreted to have been finely vesicular, glassy, felsic lava with a rapid gradation into pumice. The less vesicular regime developed a finely cellular pattern of perlitic cracks and devitrified to mainly albite and very fine rutile. Quartz accompanied by minor pyrite filled the vesicles. The more vesicular and filamentous pumiceous regime was intensely sericitized and patchily pyritized.

Many subsequent fractures filled with veins carrying mainly quartz and calcite, but with a paragenetic sequence of minerals involving early sericite, more abundant chlorite and some albite and rutile, then a major quantity of quartz and finally calcite and minor reddish brown sphalerite.

There are general similarities between this sample and the more brecciated, more pumiceous, less veined Sample 7245.

07 67

APPENDIX 2

DIAMOND DRILLHOLE LOGS HP3, HP4, SCS4, TG6, 7, 8, 9

HP3 SUMMARY LOG

0-21 m NO CORE

21-135.8 VOLCANICLASTIC BRECCIA WITH MUDDY INTERBEDS

This unit is composed of coarse volcaniclastic debris, chiefly crystals of feldspar and lesser quartz with minor lithic fragments (lithic fragments are more abundant towards the base) in a matrix which varies from fine sand to silt sized crystal material to dark grey mudstone. Lithic fragments are mudstone similar to the matrix material and (predominantly) felsic volcanic fragments with euhedral feldspar phenocrysts, occasionally vesicular. Bedding is not apparent in the breccia but there are several distinct mudstone units ranging in apparent thickness from 1 to 8 m. Contacts between these argillaceous sediments and the mudstone indicate rapid deposition of crystal fragments into a water-saturated sediment (slumped bedding, sedimentary dykes). The unit is weakly altered and disseminated and vein sphalerite occur in a distinctive sandstone unit at 38.4-42.0 m. The mudstone is commonly pyritic, although pyrite rarely exceeds 1% volume of the rock. Graphite is also common, occurring on fracture surfaces where it is accompanied by films or fine (<1mm) cubes of pyrite.

135.8-183.9 m MUDSTONE (SLATE)

This unit contains numerous thin layers of fine feldspar and quartz crystals and occasional nodules or clasts of pyrite up to 13 mm long. Layers and thin veinlets of pyrite are common, but rarely exceed 1% of the rock. This unit has a sharp and apparently horizontal contact with the rock below.

183.9-201.0 m ALTERED COARSE VOLCANICLASTIC SANDSTONE

The bulk of this rock is a silicified minor albitized quartzose sandstone with occasional black crystals (1% or less), possibly amphibole. Alteration is intense, and manifested as pervasive silicification and to a much lesser extent albitization. Olive green talc (?) or white-mica/chlorite replaces clastic feldspars. Chlorite veins and veinlets are quite common, often with the irregular serrated form of stylolites. Fine (<1 mm) grains of pyrite are disseminated throughout.

HP3 Summary Log (Cont.)

201.0-268.3 m VOLCANICLASTIC BRECCIA

This unit is very similar to the breccia encountered previously. Weak, pervasive alteration occurs throughout and involves silicification and the presence of an olive-green mineral, possibly talc or a mixture of chlorite and white mica. Disseminated and vein pyrite is rare, and one example of a sphalerite-galena vein was noted.

268.3-577.2 m DARK GREY WEAKLY FOLIATED MUDSTONE (SLATE)

Volcaniclastic debris is present in the upper 100 m of this unit, as light-grey silt to fine sand-sized layers. Fine stratiform pyrite occurs throughout this interval, often occurring as layers several millimeters in thickness which define bedding. From 481 m coarse pyrite nodules with a thin quartz rim are characteristic. Graphite is ubiquitous, coating planar fractures, usually with films or cubes of pyrite. Graphite also occurs in stylolitic sutures which cut and offset carbonate veins. Layering (where visible) is generally shallow dipping ($<10^\circ$) but there are areas where bedding is irregular, suggesting slump folding.

HP4 SUMMARY LOG

0-3 m NO CORE

3.0-41.5 m VOLCANICLASTIC BRECCIA

Breccia of quartz and feldspar crystals with lesser clasts of mudstone and pink felsic volcanic (? glassy rhyolite) in a dark to light grey argillaceous matrix. The colour of the matrix probably reflects varying degrees of silicification. The breccia is typically matrix-supported, but there are rare layers consisting almost entirely of coarse crystal and fine lithic fragments which show evidence of slumping into the muddy matrix. Quartz crystals are usually sub-rounded, while the feldspars are usually quite angular, as are the lithic fragments. Hydrothermal alteration is weak and confined to silicification of the matrix, albitization of feldspars and minor pervasive olive-green chlorite/white mica. Possibly diagenetic pyrite clasts or nodules are common.

41.5-63.1 m INTERLAYERED MUDSTONE AND VOLCANICLASTIC BRECCIA

Similar to, and gradational with, the previous unit. There is a higher volume of discrete mudstone layers, and the crystal debris forms discrete layers up to 1 m in thickness. There are locally mudstone clasts in a mudstone matrix and clasts of re-sedimented breccia. As in the previous interval there is evidence for slumping and a sedimentary dyke was observed.

63.1-88.9 m WEAKLY FOLIATED MUDSTONE (SLATE)

This rock contains minor (5 vol %) crystal debris in its upper parts, but is predominantly dark grey (probably carbonaceous) and occasionally bedded. Bedding is defined by light grey silty horizons, which are typically inclined at 80-85° to the core axis. The core is often broken due to the proximity of a major fault zone (below).

88.9-102.2 m VOLCANICLASTIC SANDSTONE

This interval consists of a coarse-grained, light olive-green silicified sandstone composed of quartz feldspar and flecks of black mineral, possibly chlorite after hornblende.

HP4 Summary Log (Cont.)

102.2-116.6 m VOLCANICLASTIC BRECCIA

Similar to the first breccia.

116.6-154.5 m BRECCIATED & SILICIFIED SLATE (MT CHARTER FAULT?)

This interval consists of broken fragments of tectonically brecciated and quartz-cemented slate, and dark-grey to black puggy clay (after slate). Core recovery was very poor through this zone. Graphite is ubiquitous and pyrite cubes are common but usually less than 1 mm and constitute less than 1% of the rock. 141-142 m is a sulphide rich zone with ca. 30% pyrite and chalcopyrite.

154.5-164.8 m SLATE (QUE RIVER SHALE EQUIVALENT?)

A massive, dark grey to black graphitic rock, which splits into splintery fragments, as the foliation is near parallel to the core axis (and locally is sub-parallel to it). Pyrite is ubiquitous but not abundant.

164.8-167.0 m DACITIC? LAVA

Feldspar-porphyrific rock of possible dacitic composition. It is not known whether this is a lava or shallow intrusive.

167.0-173.3 m LAMINATED SILTSTONE

The laminated siltstone is a medium grey, locally argillaceous rock with minor layers of breccia containing quartzite (or vein quartz) fragments. The core is typically broken and often friable.

173.3-198.7 m (E.O.H.) MAFIC VOLCANIC BRECCIA

This unit consists of pumiceous fragments in its upper part, grading to green/grey ?meta-basaltic fragments, up to 520 cm. The matrix is dark to medium grey mudstone. The fragments are highly altered, and sheared locally. Fuchsite is a conspicuous phase at the bottom of this interval. There is a fault at 187.0-187.4 m.

HP4A SUMMARY LOG

196.5-225.9 m INTERLAYERED BASALT & SLATE

Basalt is highly altered locally (219.5-225.9) and textures are unrecognisable. Pervasive, khaki, calcite-fuchsite alteration is extensive, and the rock contains traces of pyrite and pyrrhotite. Shearing has resulted in the development of a schistose fabric in some sections of core, notably at beginning of interval. There are three distinct layers of slate up to 2 m thick, which contain minor volumes of cryptocrystalline silica rock ("chert") possibly of exhalative origin.

225.9-228.8 m BRECCIA (EPICLASTIC?)

Breccia consisting of quartzitic fragments and khaki-coloured fuchsitic altered basalt in a prominent matrix of dark grey argillaceous material. Clasts are angular and range up to 340 mm, comprising 40% of the rock.

228.8-248.1 m BASALTIC FLOW

Khaki-coloured basalt of possible flow origin, with localised incipient (?hyaloclastic) brecciation. Alteration intensity is variable, some sections are dark green indicating a chlorite-calcite assemblage. Rock is locally amygdaloidal, and contains sparse patches of pyrite which reach 5 cm.

248.1-287.0 m BRECCIA (EPICLASTIC?)

Fragments of khaki fuchsitic basalt in an argillaceous matrix. Fragments reach 450 mm and comprise between 30 and 85% of the rock. The matrix is typically medium to dark grey in colour, and sometimes black.

287.0-387.3 m BASALTIC FLOW

Similar to previous basaltic flow, but khaki calcite fuchsite alteration only persists to 302 m. Below this the rock is dark green and chloritic. Pervasive calcite microveining occurs throughout. Rock is highly amygdaloidal at its upper contact, but sparsely so in its core. Sphalerite is visible in veinlets from 305 m onwards. Calcite quartz and rarely pyrite are constituents of those veinlets. Towards the base the basalt contains either xenoliths, discrete layers or intra-pillow medium grey micritic limestone.

HP4A Summary Log (Cont.)

387.3-435.5 m BRECCIA (HYALOCLASTIC?)

Fragments are coarser than in the previous breccia reaching 750 mm, and also are more abundant, constituting 75-90% of the rock. Dacitic fragments occur in the upper part but basaltic fragments dominate overall. Cement is typically "cherty". Sphalerite-quartz-calcite veins occur throughout. Disseminated pyrite is ubiquitous but reaches only 2% by volume of the rock.

435.5-494.0 m BASALTIC FLOW

As above, except fuchsite to 479 m. Locally hyaloclastic brecciation. Traces of pyrite only. Sphalerite in veinlets 456-461 m, and chalcopyrite in veinlets 467-473 m.

494.0-502.8 m BRECCIA

As above.

502.8-528.5 m BASALTIC FLOW

Massive to amygdaloidal, dark green (chloritic) basalt, with no significant Zn mineralization.

528.5-529.3 m SANDSTONE

Distinctive grey, quartzitic sandstone, with a well-developed irregular (lobate) contact with overlying basalt inclined at 40° to the core axis.

529.3-559.7 m BRECCIA

As above, with minor fault 552-553.6 m. Minor disseminated pyrite (<1%) and a few specks of chalcopyrite in veinlets. This breccia contains a high volume of basaltic clasts (80-85%) and may be of hyaloclastic origin.

559.7-591.8 m BASALTIC FLOW

Highly amygdaloidal chloritic basalt, with strong pervasive carbonation. Fuchsite observed 573.4-586.9 m.

591.7-600.0 m (E.O.H.) BRECCIA

As above.

0-86.2 m GLACIAL SEDIMENTS

No core from 0-48 m and 61.3-86.2 m. 48-61.3 m interlayered red-orange clays and buff, friable silt and sandstone, with manganese oxide coatings on joints.

86.2-129.1 m PILLOWED BASALT

Medium green, amygdaloidal basalt, pervasively carbonated. Frequent angular intra-pillow(?) light-grey, cherty sediments (often calcitic). Amygdales are infilled with white calcite and, in rare cases, sphalerite. The base is defined by a thin clay zone with a marked increase in open fractures, probably a fault.

129.1-176.5 m SEDIMENTARY (EPICLASTIC) UNIT

129.1-130.3 m SLATE

Graphitic with silt laminae

130.3-161.4 m BRECCIA

Consists of angular fragments of sub-rounded grey, porphyritic dacitic lava and rare mudstone. The matrix varies from dark grey and argillaceous to light grey and siliceous. The breccia is matrix supported, and clasts rarely exceed 100 mm, although a large clast (or dyke?) of basalt occurs at 146.2-147.4 m. The core is fragmented from 148-155 m, possibly a minor fault. Minor quartz calcite sphalerite veinlets.

161.4-176.5 m INTERLAYERED BRECCIA, SANDSTONE & SILTSTONE

Sandstone is strongly pyritised, containing 3-5% fine pyrite cubes. Breccias as above. Minor quartz-calcite-sphalerite veinlets.

176.5-201.4 m (E.O.H.) DACITIC UNIT

176.5-178.8 m PUMICEOUS BRECCIA

Distinctive, yellow green tubular pumice breccia, with sparse siliceous fragments of dacitic lava (?) to 30 cm.

SCS4 Summary Log (Cont.)

178.8-182.4 m ?HYALOCLASTITE BRECCIA

Fragments of angular dacite up to 40 mm, which appear to fit together quite well, in fine-grained grey matrix.

Gradational contact with:

182.4-189.7 m MASSIVE DACITIC LAVA (PERLITIC)

Massive pink-grey rock, similar to fragments in overlying breccias. Contains ca. 15% feldspar phenocrysts to 2 mm. Spheroidal (perlitic) cracking visible, particularly adjacent to overlying hyaloclastite breccia.

189.7-201.4 m (E.O.H.) POLYMICT BRECCIA

Polymict breccia with abundant angular chloritic fragments to 20 mm (possibly shards) and red-pink massive lava fragments.

HOLE NO: **76 6**
 STATE: **TASMANIA**

DRILL CORE RECORD

PROJECT	TULLABARDINE GORGE	PURPOSE
DESIGNED BY	J.G. PURVIS	TO TEST SOIL LEAD 'ANOMALY' CENTERED AT 84800N/85375E. THIS 'ANOMALY' LATER FOUND TO BE SPURIOUS.
LOGGED BY	J.G. PURVIS	
COMMENCED	18-3-88	
COMPLETED	29-3-88	

LOG SUMMARY	0-4m: OVERBURDEN
GENERAL COMMENTS	4-12.8m: MASSIVE RHYODACITE LAVA. Rare pyrite

ASSAY SUMMARY

INTERVAL		From	To	Distance	D. Sin. Dip	R.L.	D. Cos. Dip	Prog Total	Depth	Bearing	Dip	From	To	Distance	D. Sin. Dip	R.L.	D. Cos. Dip	Prog Total	Comments
From	To																		
																			NOT SAMPLED.

LOCATION

NORTHING	538472
EASTING	385356
R.L.	506.9m
GRID	AMG
LENGTH	12.8m

HOLE CONDITION

SIZE	
Hole Size	Depth
BQ	12.8m

SIGNIFICANT CORE LOSS INTERVALS

From	To	% Lost

POOR GROUND CONDITION ZONES

From	To	Condition

HOLE CONDITIONS AFTER COMPLETION
1.5m 55mm ID PLASTIC STEM PIPE WITH CAP, LEFT IN TOP OF HOLE.

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

SURVEY			INTERVAL			VERTICAL		HORIZONTAL		SURVEY			INTERVAL			VERTICAL		HORIZONTAL	
Depth	Bearing	Dip	From	To	Distance	D. Sin. Dip	R.L.	D. Cos. Dip	Prog Total	Depth	Bearing	Dip	From	To	Distance	D. Sin. Dip	R.L.	D. Cos. Dip	Prog Total
Collar		-90°																	

5380085

EL 5/63

PROJECT: TULLABARDINE GORGE DRILL CORE LOG AND ASSAY DATA

HOLE NUMBER: TG 6

Page: 2

INTERVAL (m)		RECOVERY		DESCRIPTION	ASSAY DATA													
From	To	m	%		Sample No	From	To	Rec %										
0	2	NIL		TRICONED - NO CORE.														
2	4	0.3	15	OVERBURDEN. Partly weathered rhyodacite lava blocks and weathered yellow clayey f. or top blocks, in a loosely-cemented matrix of rock frags in yellow clay. v. minor limonite staining.														
4	12.8	7.65	87	MASSIVE RHYODACITE LAVA. Pale red, uniform. Extremely hard. Unbroken. Unveined. Weath. pale cream + clayey, to 5m. Minor weath to 8.25m. Evenly-distrib. of phenocr. as 3-4mm, gen euhedral, some sl corroded. Also, green (ser+chlor) feld laths, sl corroded, as 1-2mm. Lesser dark green chloritised hornblende 1mm. All in v. f. or highly silic + albitic, weakly sericitised groundmass. Overall, rock v strongly silic, alb, sl hematized & alk ser + chlor. Rare dissol. py.														
				END OF HOLE.														

0
77

030086

EL 5/63.

PROJECT: TULLABARDINE GORGE. DRILL CORE LOG AND ASSAY DATA

HOLE NUMBER: TG7

Page: 2

INTERNAL (m)		RECOVERY		DESCRIPTION	DESPATCH %N: 11186				ASSAY DATA (COMLABS. Au BY FIRE ASSAY)						
From	To	m	%		Sample No	From	To	Rec. %	Cu	Pb	Zn	Ag	Au	As	Ba
0	2	NIL		TRICONED, NO CORE.											
2	7	1.5	30	<p>OVERBURDEN</p> <p>Rhyodacite lava and glacial rubble.</p> <p>Mostly hard rhyodacite lava boulders (qtz + feld - pluriic ± small green hornblendes). Gen pink to silf. alb. Some boulders weathered.</p> <p>Glacial clasts incl quartz and Owen Conglomerate ± some glacial sand 5.5-6.0m. Other boulders incl a strongly lineated dacitic volc - poss an ignimbrite; and oxidised bi qz dacitic tuff.</p>	7847	2	9.5	36	7	28	62	0.4	0.01	10	780
7	9.5	1.2	48	<p>OXIDISED RHYODACITE LAVA.</p> <p>Strongly weak + clayey, sl leached + bleached. Creamy-fayed to 8.5m, thereafter orange-brown + limonite-stained. Badly broken, ± clay zones.</p> <p>Qtz phenos to 4mm, av 2mm, some sl corroded.</p> <p>Felds av 1-2mm.</p> <p>Basal contact a clayey shear almost // LCA.</p>											
9.5	17.25	4.35	56	<p>TUFF.</p> <p>Brown + cream in upper part, becoming pale green below 15.3m.</p> <p>Highly ox, leached, bleached, clayey and broken. Ox dec ± depth and ground conditions improve slightly, esp below 15.3m.</p> <p>Ft qz sericitic tuff (originally vitric), ± abundant tiny felds av < 1mm and charact rounded white or green 'spots', av < 1mm, prob after glass. Occ leached and bleached rhyodacite lava clasts to 100mm below 12.8m, and rare lithic frags av 1mm.</p> <p>Rock appears to be 1° pyroclastic rather than epiclastic (?).</p> <p>Essent' melt: v weak chlor + ser esp assoc ± sulphides.</p> <p>Shear // LCA 9.5-11.5m; Prob fault to 12-12.75m + 15.3m - both zones very sheared and clayey.</p> <p>9.5-12m: highly limonite-stained ± abund lim frags + minor biot.</p> <p>12-12.8m: 1-2% py; 12.8-13.2m: 3-5% py in loose bands and patches of dissem grains 30% LCA; 13.2-15.3m: 1-2% py.</p> <p>Below 15.3m rare dissem py.</p>	7848	9.5	12.75		22	130	195	0.9	0.01	74	210
					7849	12.75	15.30		10	44	300	0.1	< 0.01	52	390
					7850	15.30	17.30		7	16	390	0.2	< 0.01	22	700

B30088

EL 5/63.

PROJECT: TULLABARDINE GORGE. DRILL CORE LOG AND ASSAY DATA

HOLE NUMBER: TG 7 Page: 3

INTERVAL (m)		RECOVERY		DESCRIPTION	ASSAY DATA (DESPATCH %: 11186. COMLABS. FIREA)											
From	To	m	%		Sample No	From	To	Rec. %	Cu	Pb	Zn	Ag	Au	As	Ba	
				Basal contact irreg - // LCA (deposition on irreg lava surface)												
17.25	33.65	15.55	95	RHYODACITE LAVA. Pale gray-green, becoming pinkish below 30.5m. Massive, uniform, hard. Evenly-distrib'd qtz phenos, gen euhedral, often fractured & c sl corrosion to 5mm, an 3mm. Green sericitised felds av 1-2mm, small green chloritised hornblende laths to 2mm max. All in v.f. qtz, pale creamy-green or pink, highly silic, mod sericitic and albital groundmass. Some regular flow banding below 31.5m 45°/LCA. 24.25-24.4m: irreg top intercalation = lithified top frags + lava frags in tuffaceous matrix, c 1° layering 60°/LCA. Another top intercalation (broken up) @ 26.1-26.2m; + 26.35m. Lke patchy ox to 23.7m, c leaching and lim stains along fract. Strongly silic, mod ser. Strong alb-hem alt below 30.5m. Badly broken in places, esp: 23.75-26.75m + 28.1-30.5m due to fault // LCA seen @ 23.75-24.8m, 28.1-28.9m, 29.5-30.5m. Minor qtz and/or chlor veins // LCA assoc c marginal of this fault. Minor dissem py throughout.	7851	17.3	19.3		3	8	48	0.3	<.01	11	680	ES
					7852	19.3	21.3		4	4	54	0.1	<.01	8	700	
					7853	21.3	23.3		4	<4	66	0.1	0.01	9	540	
					7854	23.3	25.3		6	20	210	<0.1	<.01	5	550	
					7855	25.3	27.3		10	6	150	0.1	<.01	10	620	
					7856	27.3	29.3		7	14	155	0.2	<.01	11	490	
					7857	29.3	31.3		6	12	125	<0.1	<.01	4	620	
				END OF HOLE												

630089

EL 5/63.

PROJECT: TULLABARDINE GORGE. DRILL CORE LOG AND ASSAY DATA

HOLE NUMBER: TG 8

Page: 2

INTERVAL (m)		RECOVERY		DESCRIPTION	DESPATCH #N: 11186				ASSAY DATA (COMLABS. Au BY FIRE ASSAY)						
From	To	m	%		Sample No	From	To	Rec %	Cu	Pb	Zn	Ag	Au	As	Ba
0	0.8	NIL		TRICONED - NO CORE.											
0.8	1.5	0.55	79	FELDSPAR-PHYRIC LAVA. Max-mafic than dacite but not a true andesite. Green & white flecks. White feld laths to 4mm in green finely felsic matrix. Lk ser alt. Minor ox. Basal contact irreg. // LCA.	7833	0.8	3.0		100	12	125	0.1	0.02	10	690
1.5	3.0	1.35	90	TUFF. Pale grey-green + brown. Fg. Partially ox. A poorly sediment? Almost no reworking. Essent unalt. Abund fine felsic and vitric tuffaceous material & occ lithic frags and occ feld laths to 2mm. Clearly derived from adjacent vlfcs. Indistinct 1° layering 15°/LCA. Badly broken, soft + clayey. Minor limonite stains. Basal contact irreg.											
3.0	8.9	5.35	91	FELDSPAR-PHYRIC LAVA. As @ 0.8-1.5m. Green & white flecks. Med gr. White feld laths to 6mm, av 2-3mm, in groundmass of abund similar felds < 0.5mm (some green + sericitic), & some ferromags to 1mm. Groundmass text borders on sub-ophitic. Rock v. widely sericitized. Partially ox. Soft + clayey. Numerous clayey broken zones esp above 6.3m + below 7.5m due to shears // LCA above 6.3m + shear 20°/LCA 8.5-8.7m. Some qtz-chlor veins assoc & shears // LCA. Minor limonite stains to 4.5m. Dissem py @ 6.5m, elsewhere none.	7834	3.0	4.85		66	8	250	0.3	0.01	7	780
					7835	4.85	6.95		110	8	170	<0.1	<0.01	10	610
					7836	6.95	8.9		88	10	195	0.1	<0.01	10	520
8.9	13.9	4.85	97	MIXED ZONE. Green. Sl ox along fracts. Unbroken. Complex intermixing (gen along angles around 15°/LCA), of above lava, minor tuffaceous intercalations of sim composition to lava, and light red-brown silt + alb rhyodacite lava (between 11.4 + 12.2m). Latter poss isolated blocks to 400mm.	7837	8.9	10.8		220	<4	60	0.1	0.01	7	155
					7838	10.8	12.8		88	4	64	<0.1	<0.01	8	400
					7839	12.8	14.3		84	4	56	0.4	<0.01	11	430

630091

EL 5/63.

PROJECT: TULLABARDINE GORGE

DRILL CORE LOG AND ASSAY DATA

HOLE NUMBER: TG 8

Page: 3

INTERVAL (m)		RECOVERY		DESCRIPTION	ASSAY DATA														
From	To	m	%		Sample No	From	To	Fac. %											
				<p>Tuff appears to be pyroclastic rather than epiclastic. Tuff brecciated in places. Contains some 2-3mm feld phenos. Rocks are wk-red chloritised and sericitised. Minor dissem py to 12.2m. Basal contact irreg, S^o/LCA. Evidence of cherting in both feldspar-phyric lava and underlying rhyodacite lava, & some alignment of feld phenos // contact in upper lava.</p>															
13.9	15.55			<p>RHYODACITE LAVA Dark brownish-red. V hard. Sl broken + shattered. Qtz phenos (gen euhedral, av 2mm, to 5mm); Feld phenos (gen pink + albitised, to 2mm); and hornblendes av 1-2mm (chloritised). All in v fine silic + sericitic groundmass. Rock intensely silic, heml + albitised. Sl ser + chlor. Minor Fe oxides on fracs. No sulfides.</p>															
				<p>END OF HOLE.</p>															

88

630092

HOLE NO: TG 9
STATE: TASMANIA

DRILL CORE RECORD

M.V. 1988

PROJECT	TULLABARDINE GORGE, EL 5/63.	PURPOSE
DESIGNED BY	J.G. PURVIS	TO TEST WEAK SIROTEM RESPONSE CENTERED BETWEEN 8525DE AND 8527SE ON LINE 8500DN.
LOGGED BY	J.G. PURVIS	
COMMENCED	8.A.88	
COMPLETED	14.A.88	

LOG SUMMARY	0-2.3m: OVERBURDEN. 2.3-5.05m: TUFFACEOUS SEDIMENTS. 5.05-35m: RHYODACITE LAVA.
GENERAL COMMENTS	NO MINERALISATION.

ASSAY SUMMARY

INTERVAL		From	To	Distance	D. Sin. Dip	R.L.	D. Cos. Dip	Prog Total	Depth	Bearing	Dip	From	To	Distance	D. Sin. Dip	R.L.	D. Cos. Dip	Prog Total	Comments
From	To																		
NO SIGNIFICANT ASSAY RESULTS.																			

LOCATION

NORTHING	5385003
EASTING	385258
R.L.	438.07m
GRID	AMG
LENGTH	35.0m

HOLE CONDITION

SIZE	
Hole Size	Depth
80	35m

SIGNIFICANT CORE LOSS INTERVALS		
From	To	% Lost

POOR GROUND CONDITION ZONES		
From	To	Condition
2	4m	Broken and clayey.
8.25	9m	Sheared and badly broken.

HOLE CONDITIONS AFTER COMPLETION
1.5m OF 55mm ID PLASTIC
STEM PIPE WITH CAP, LEFT IN
TOP OF HOLE.

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

SURVEY			INTERVAL			VERTICAL			HORIZONTAL			SURVEY			INTERVAL			VERTICAL			HORIZONTAL									
Depth	Bearing	Dip	From	To	Distance	D. Sin. Dip	R.L.	D. Cos. Dip	Prog Total	Depth	Bearing	Dip	From	To	Distance	D. Sin. Dip	R.L.	D. Cos. Dip	Prog Total	Depth	Bearing	Dip	From	To	Distance	D. Sin. Dip	R.L.	D. Cos. Dip	Prog Total	
Collar		-90°																												
NOT SURVEYED																														

8500DN

EL 5/63.

PROJECT: TULLABARDINE GORGE

DRILL CORE LOG AND ASSAY DATA

HOLE NUMBER: TG 9 Page: 2

INTERVAL		RECOVERY		DESCRIPTION	(DESPATCH #N: 11186)				ASSAY DATA (COMLABS. AU BY FIRE ASSAY)							
From	To	m	%		Sample No	From	To	Rec %	Cu	Pb	Zn	Ag	Au	As	Ba	
0	2	NIL		TRICONED - NO CORE.												
2	2.3	0.2	67	OVERBURDEN. Highly oxidised rhyodacite lava.												
2.3	5.05	2.7	98	TOFFACEOUS SEDIMENTS. Creamy-white and brown. Highly ox. soft. Broken to 4m. V. fi gr toffaceous + felsic siltstone/mudstone with grain size coarsening \bar{c} depth to zones of feld-grt xyl \pm lithic tuff below 4m and sandy lithic breccia at base of interval. Clear sorting and grain size variations but bedding gen irreg or absent (bedding: 30°/LCA @ 4.2m). At 3.5m 150mm block of rhyodacite. Basal xyl-lithic breccia comprises subangular to subrounded clasts to 20mm (some sl stretched and unlit when recover in breccia) \bar{c} : tuff-silt/shale, rhyodacite lava and tuff. In sandy feld-grt xyl-lithic matrix. Some thin grt-chlor or grt-limonite veinlets 20°/LCA, 3.7m to base. Limonite staining throughout. Irreg basal contact.	7840	2	4		13	64	135	0.1	<.01	12	175	
5.05	35.0	29.75	99	RHYODACITE LAVA. Pale brown to 12m, gray-green + pink to 30m then brown-red. Massive, uniform. Grt phenos (gen euhedral + fractured) av 3mm. Feld phenos av 1-2mm; green chloritized hornblende av 1-2mm. All in v. fi gr silic + sericitic groundmass - originally felsic + glassy. Rock mod silif - also ser + chlor, \bar{c} silif + alb + horn etc to intense below 30m. Irreg lineations + 'blotchy' text, \bar{c} rare small intercalations of xyl-toffaceous material, indicates flow top in zone to 4m. Over this interval matrix has spongy text in places, forming a 'matrix' to patches of lava or rhyolite to such patches - this text indicative of quenching, indicating lava extruded sub-aqueously. Mod ox \bar{c} pervasive lime staining, to 12.2m. The latter ox patchy to 30m, esp in zone of chlor-lime \pm grt veinlets to 4m, // LCA 17.3 - 22.5m. Ditto 6.5 - 8.5m to 15m. Badly broken 8.25 - 8.6m + 9m - shears at low \bar{c} to LCA. Shear 45°/LCA @ 22.5m. Rare dissem py 27-30m, otherwise none.	7841	4	6		5	22	160	<.01	<.01	9	690	
					7842	6	8		5	50	100	0.1	<.01	8	1020	
					7843	8	10		8	40	125	0.2	<.01	9	930	
					7844	10	12		5	8	115	0.2	<.01	8	1040	
					7845	17.5	19		4	16	195	0.2	<.01	9	1040	
					7846	19	21		5	18	180	0.4	0.02	6	300	

630094

APPENDIX 3

ASSAY DATA HP2, HP3, HP4

COMSTAFF J. V.
ASSAY RESULTS FOR HP-2

Hole Name	Sample Number	Sample From	Sample To	Copper AAS1	Lead AAS1	Zinc AAS1	Silver AAS2	Barium XRF1	Arsenic XRF1	Gold FA1	Gold Repeat	Gold Preferred
HP002	BX 4415	28.5	30.0	8	44	220	<1	1020	7	<.01		<.01
HP002	BX 4416	30.0	31.5	22	210	1600	1	770	16	<.01		<.01
HP002	BX 4417	36.0	37.5	26	74	440	1	1180	18	<.01		<.01
HP002	BX 4418	37.5	39.0	11	38	270	<1	360	9	<.01		<.01
HP002	BX 4419	39.0	40.5	13	38	135	1	440	18	<.01		<.01
HP002	BX 4420	68.0	69.5	26	370	1520	1	1740	24	<.01		<.01
HP002	BX 4421	69.5	71.0	9	210	240	<1	970	<2	<.01	<.01	<.01
HP002	BX 4422	95.0	96.5	13	52	220	<1	1300	5	<.01		<.01
HP002	BX 4423	96.5	98.0	10	60	630	<1	930	<2	<.01		<.01
HP002	BX 4424	98.0	99.5	13	48	500	<1	1440	10	<.01		<.01
HP002	BX 4425	99.5	101.0	11	52	460	<1	1460	9	<.01		<.01
HP002	BX 4426	101.0	102.5	14	98	620	1	850	<2	<.01		<.01
HP002	BX 4427	102.5	104.0	17	115	790	1	890	9	<.01		<.01
HP002	BX 4428	104.0	105.5	26	150	1020	1	1180	15	.01		.01
HP002	BX 4429	105.5	107.0	46	94	1980	1	700	17	<.01		<.01
HP002	BX 4430	107.0	108.5	44	94	1440	1	1280	20	<.01		<.01
HP002	HP 7858	465.0	466.0	76	620	3850	<1	320	4	.02		.02
HP002	HP 7859	466.0	467.0	34	62	280	<1	10	12	.03		.03
HP002	HP 7860	467.0	468.0	26	330	1380	<1	40	36	.05		.05
HP002	HP 7861	468.0	469.2	13	98	810	<1	390	40	.02		.02
HP002	HP 7862	489.5	491.0	52	40	2350	<1	650	34	<.01		<.01
HP002	HP 7863	491.0	492.5	82	155	4200	<1	860	26	.01		.01
HP002	HP 7864	492.5	494.0	14	30	470	<1	670	22	.03		.03
HP002	HP 7865	494.0	495.5	42	120	800	<1	210	50	.05		.05
HP002	HP 7866	495.5	497.0	1660	82	970	<1	240	40	<.01		<.01
HP002	HP 7867	497.0	498.5	8	8	88	<1	980	24	.02		.02
HP002	HP 7868	546.0	547.7	12	4	17	<1	300	8	.02		.02
HP002	HP 7869	547.7	548.7	42	40	82	<1	650	40	.04		.04
HP002	HP 7870	548.7	550.5	36	105	290	<1	800	32	.03		.03
HP002	HP 7871	550.5	552.0	32	10	40	<1	1520	19	.02		.02
HP002	HP 7872	552.0	553.5	24	8	28	<1	1320	18	<.01		<.01
HP002	HP 7873	553.5	555.0	40	8	36	<1	600	30	.03		.03
HP002	HP 7874	555.0	556.5	38	14	30	<1	560	26	.04		.04
HP002	HP 7875	556.5	558.0	60	14	32	<1	1240	18	<.01		<.01
HP002	HP 7876	558.0	559.5	46	44	56	<1	1320	17	.04		.04
HP002	HP 7877	559.5	561.0	40	28	105	<1	1460	20	.02		.02
HP002	HP 7878	561.0	562.5	32	24	62	<1	1280	20	.01		.01
HP002	HP 7879	562.5	564.0	13	18	60	<1	185	18	.02		.02
HP002	HP 7880	564.0	565.5	30	30	98	<1	670	22	.05		.05
HP002	HP 7881	565.5	567.0	46	140	260	<1	890	24	.03		.03
HP002	HP 7882	567.0	568.5	28	92	230	<1	1300	20	<.01		<.01
HP002	HP 7883	568.5	570.0	48	320	470	<1	520	19	.04		.04
HP002	HP 7884	570.0	571.5	40	400	590	<1	2100	10	.03		.03
HP002	HP 7885	571.5	573.0	24	220	330	<1	1700	18	.02		.02
HP002	HP 7886	573.0	574.5	40	850	660	<1	1800	8	.03		.03
HP002	HP 7887	574.5	576.0	52	380	510	<1	1140	13	.04		.04
HP002	HP 7888	576.0	577.5	62	240	370	<1	2600	11	.05		.05
HP002	HP 7889	577.5	579.0	44	165	280	<1	2100	18	<.01		<.01
HP002	HP 7890	579.0	580.5	54	200	500	<1	790	12	.04		.04
HP002	HP 7891	580.5	582.0	54	910	590	<1	700	5	.01		.01
HP002	---	---	---	---	---	---	<1	1840	19	.04		.04

0
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630096

COMSTAFF J. V.
 ASSAY RESULTS FOR HP-2

PAGE : 2
 DATE : 22-MAY-89

Hole Name	Sample Number	Sample From	Sample To	Copper AAS1	Lead AAS1	Zinc AAS1	Silver AAS2	Barium XRF1	Arsenic XRF1	Gold FA1	Gold Repeat	Gold Preferred
HP002	HP 7893	583.5	585.0	54	360	570	<1	1600	9	<.01		<.01
HP002	HP 7894	585.0	586.5	58	165	160	<1	1960	15	.03		.03
HP002	HP 7895	586.5	588.0	56	145	220	<1	3800	18	<.01		<.01
HP002	HP 7896	588.0	589.5	50	78	150	<1	1440	16	.03		.03
HP002	HP 7897	589.5	591.0	52	62	175	<1	1520	15	<.01		<.01
HP002	HP 7898	591.0	592.5	56	140	310	<1	2350	14	<.01		<.01
HP002	HP 7899	592.5	593.6	46	300	480	<1	1780	10	.01		.01

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630097

COMSTAFF J. V.
ASSAY RESULTS FOR HP-3

PAGE : 1
DATE : 22-MAY-89

Hole Name	Sample Number	Sample From	Sample To	Copper AAS1	Lead AAS1	Zinc AAS1	Silver AAS2	Barium XRF1	Arsenic XRF1	Gold FA1	Gold Repeat	Gold Preferred
HP003	BX 4401	38.0	39.5	28	78	370	<1	1020	7	<.01	.01	.01
HP003	BX 4402	39.5	41.0	22	80	850	<1	970	15	<.01		<.01
HP003	BX 4403	41.0	42.5	28	58	1520	1	1140	17	<.01		<.01
HP003	BX 4404	42.5	44.0	34	92	1680	1	1280	28	<.01		<.01
HP003	BX 4405	44.0	45.5	11	380	540	1	570	5	<.01		<.01
HP003	BX 4406	45.5	47.0	9	850	440	2	620	5	<.01		<.01
HP003	BX 4407	47.0	48.5	6	28	250	<1	710	7	<.01		<.01
HP003	BX 4408	48.5	50.0	8	18	130	<1	800	6	<.01		<.01
HP003	BX 4409	50.0	51.5	8	10	140	<1	840	2	<.01		<.01
HP003	BX 4410	51.5	53.0	9	12	270	<1	720	8	<.01		<.01
HP003	BX 4411	53.0	54.5	12	20	360	<1	850	10	<.01		<.01
HP003	BX 4412	54.5	56.0	16	22	560	<1	1120	9	<.01		<.01
HP003	BX 4413	56.0	57.5	12	22	700	<1	900	8	<.01		<.01
HP003	BX 4414	57.5	59.0	7	14	330	<1	1180	7	<.01		<.01

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630098

COMSTAFF J. V.
ASSAY RESULTS FOR HP-4

Hole Name	Sample Number	Sample From	Sample To	Copper AAS1	Lead AAS1	Zinc AAS1	Silver AAS2	Barium XRF1	Arsenic XRF1	Gold FA1	Gold Repeat	Gold Preferred
HP004	BX 4431	116.0	118.0	120	16	36	<1	190	18	<.01	.01	.01
HP004	BX 4432	118.0	124.0	20	160	650	<1	180	74	.01		.01
HP004	BX 4433	124.0	125.5	28	150	280	<1	370	88	<.01		<.01
HP004	BX 4434	125.5	127.0	42	86	72	<1	400	88	<.01		<.01
HP004	BX 4435	127.0	128.5	36	120	84	<1	380	62	<.01		<.01
HP004	BX 4436	128.5	130.0	32	46	90	<1	380	56	<.01		<.01
HP004	BX 4437	130.0	133.0	30	42	58	<1	360	54	<.01		<.01
HP004	BX 4438	133.0	135.0	26	52	115	<1	300	60	<.01		<.01
HP004	BX 4439	135.0	137.0	105	36	32	<1	360	80	<.01		<.01
HP004	BX 4440	137.0	139.0	60	44	58	<1	350	68	<.01		<.01
HP004	BX 4441	139.0	141.0	96	120	200	<1	320	70	<.01		<.01
HP004	BX 4442	141.0	142.5	5000	660	2600	3	290	80	<.01		<.01
HP004	BX 4443	142.5	144.5	100	630	1920	1	280	66	<.01		<.01
HP004	BX 4444	144.5	146.0	180	62	135	<1	280	62	<.01		<.01
HP004	BX 4445	146.0	147.5	18	56	100	<1	230	54	<.01		<.01
HP004	BX 4446	147.5	150.5	17	220	450	<1	180	78	<.01		<.01
HP004	BX 4447	150.5	153.5	16	155	1400	<1	55	58	<.01		<.01
HP004	BX 4448	153.5	155.5	15	50	130	<1	185	44	<.01		<.01
HP004	BX 4449	155.5	157.0	9	36	52	<1	540	36	<.01		<.01
HP004	BX 4450	157.0	158.5	20	46	100	<1	520	46	<.01		<.01
HP004	BX 4451	158.5	160.0	26	54	78	<1	540	56	<.01	<.01	<.01
HP004	BX 4452	160.0	161.5	36	46	28	<1	540	72	.01		.01
HP004	BX 4453	161.5	163.0	22	50	26	<1	540	140	<.01		<.01
HP004	BX 4454	163.0	165.0	32	38	28	<1	480	115	<.01		<.01
HP004	BX 4455	165.0	166.5	10	6	22	<1	420	30	<.01		<.01
HP004	BX 4456	166.5	168.0	125	20	12	<1	620	24	<.01		<.01
HP004	BX 4457	168.0	169.5	48	16	14	<1	300	22	.01		.01
HP004	BX 4458	169.5	171.5	11	16	15	<1	570	36	<.01		<.01
HP004	BX 4459	171.5	175.5	10	10	20	<1	430	28	<.01		<.01
HP004	BX 4460	175.5	177.0	11	18	34	<1	510	28	<.01		<.01
HP004	BX 4461	177.0	178.5	32	18	38	<1	660	34	<.01		<.01
HP004	BX 4462	178.5	180.0	46	16	44	<1	470	26	<.01		<.01
HP004	BX 4463	180.0	181.5	19	20	58	<1	430	30	<.01		<.01
HP004	BX 4464	181.5	183.0	34	14	50	<1	460	15	<.01		<.01
HP004	BX 4465	183.0	184.5	18	12	54	<1	460	14	<.01		<.01
HP004	BX 4466	184.5	186.5	11	10	50	<1	470	17	<.01		<.01

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630099

COMSTAFF J. V.
ASSAY RESULTS FOR HP-4A

Hole Name	Sample Number	Sample From	Sample To	Copper AAS1	Lead AAS1	Zinc AAS1	Silver AAS2	Barium XRF1	Arsenic XRF1	Gold FA1	Gold Repeat	Gold Preferred
HP004A BX 4468	300.0	301.5	14	40	96	<1	210	48	<.01	<.01		
HP004A BX 4469	301.5	303.0	24	28	120	<1	165	22	<.01	<.01		
HP004A BX 4470	303.0	304.5	26	28	110	<1	220	10	<.01	.01		
HP004A BX 4471	304.5	306.0	24	16	70	<1	230	3	<.01	<.01		
HP004A BX 4472	306.0	307.5	38	290	530	<1	45	3	.01	.01		
HP004A BX 4473	307.5	309.0	36	930	1640	<1	70	12	<.01	<.01		
HP004A BX 4474	309.5	311.0	82	610	2850	1	30	2	.01	.01		
HP004A BX 4475	311.0	312.5	72	820	2700	<1	55	20	.01	.01		
HP004A BX 4476	312.5	314.0	64	1640	1960	1	75	22	.03	.03		
HP004A BX 4477	314.0	315.5	46	500	1240	1	35	2	<.01	<.01		
HP004A BX 4551	314.0	315.5	44	660	1640	<1	35	4	.02	.02		
HP004A BX 4478	315.5	317.0	50	135	1940	<1	40	10	<.01	<.01		
HP004A BX 4479	317.0	318.5	60	830	2400	1	50	3	<.01	<.01		
HP004A BX 4480	318.5	320.0	84	140	930	<1	60	9	.01	.01		
HP004A BX 4481	320.0	321.5	76	110	1520	<1	50	11	<.01	<.01		
HP004A BX 4482	321.5	323.0	80	270	1700	<1	65	7	<.01	<.01		
HP004A BX 4483	323.0	324.5	280	130	2150	<1	60	9	<.01	<.01		
HP004A BX 4484	324.5	326.0	130	84	3700	<1	25	12	.01	.01		
HP004A BX 4485	326.0	327.5	38	50	940	<1	100	13	<.01	<.01		
HP004A BX 4486	327.5	329.0	78	130	3400	<1	460	13	<.01	<.01		
HP004A BX 4487	329.0	330.5	52	48	500	1	120	4	<.01	<.01		
HP004A BX 4488	330.5	332.0	58	84	980	<1	175	4	<.01	<.01		
HP004A BX 4489	332.0	333.5	48	145	980	<1	300	10	.01	.01		
HP004A BX 4490	333.5	335.0	52	175	2550	<1	390	9	<.01	<.01		
HP004A BX 4552	333.5	335.0	54	135	1640	<1	300	10	<.01	<.01		
HP004A BX 4491	335.0	336.5	70	74	2050	<1	1020	9	<.01	<.01		
HP004A BX 4492	336.5	338.0	38	52	1680	<1	240	7	<.01	<.01		
HP004A BX 4493	338.0	339.5	56	44	1860	<1	200	10	<.01	<.01		
HP004A BX 4494	339.5	341.0	220	20	870	<1	240	9	<.01	<.01		
HP004A BX 4495	341.0	342.5	110	16	600	<1	220	8	<.01	<.01		
HP004A BX 4496	342.5	344.0	36	16	200	<1	20	7	<.01	<.01		
HP004A BX 4497	344.0	345.5	20	10	260	<1	30	9	<.01	<.01		
HP004A BX 4498	345.5	347.0	60	18	620	<1	45	12	<.01	<.01		
HP004A BX 4553	345.5	347.0	52	26	420	<1	40	9	<.01	<.01		
HP004A BX 4499	347.0	348.5	28	20	380	<1	25	5	<.01	<.01		
HP004A BX 4500	348.5	350.0	15	8	400	<1	25	8	<.01	<.01		
HP004A BX 4501	350.0	351.5	50	10	1320	<1	55	9	<.01	<.01		
HP004A BX 4502	351.5	353.0	11	6	330	<1	30	5	<.01	<.01		
HP004A BX 4503	353.0	354.5	22	8	330	<1	30	8	<.01	<.01		
HP004A BX 4504	354.5	356.0	24	12	1020	<1	110	10	<.01	<.01		
HP004A BX 4505	356.0	357.5	24	<4	830	<1	165	6	<.01	<.01		
HP004A BX 4506	357.5	359.0	24	8	1620	<1	360	3	<.01	<.01		
HP004A BX 4507	359.0	360.5	76	22	2200	<1	930	8	<.01	<.01		
HP004A BX 4508	360.5	362.0	100	12	340	<1	50	4	<.01	<.01		
HP004A BX 4509	362.0	363.5	56	18	670	<1	340	3	<.01	<.01		
HP004A BX 4510	363.5	365.0	62	22	690	<1	600	9	.01	.01		
HP004A BX 4511	365.0	366.5	34	46	650	<1	740	9	<.01	<.01		
HP004A BX 4512	366.5	368.0	88	10	135	<1	50	8	.01	.01		
HP004A BX 4513	368.0	369.5	80	14	145	<1	120	6	<.01	<.01		
HP004A BX 4554	368.0	369.5	130	18	200	<1	145	5	<.01	<.01		

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630100

COMSTAFF J. V.
ASSAY RESULTS FOR HP-4A

PAGE : 2
DATE : 25-MAY-89

Hole Name	Sample Number	Sample From	Sample To	Copper AAS1	Lead AAS1	Zinc AAS1	Silver AAS2	Barium XRF1	Arsenic XRF1	Gold FA1	Gold Repeat	Gold Preferred
HP004A BX	4515	371.0	372.5	70	12	190	<1	55	15	.02		.02
HP004A BX	4516	372.5	374.0	48	10	175	<1	40	7	<.01		<.01
HP004A BX	4517	374.0	375.5	13	18	1460	<1	120	10	.01	<.01	.01
HP004A BX	4518	375.5	377.0	11	14	380	<1	260	9	.02		.02
HP004A BX	4519	377.0	378.5	22	14	1480	<1	800	6	<.01		<.01
HP004A BX	4520	378.5	380.0	24	12	1320	<1	460	6	<.01		<.01
HP004A BX	4521	380.0	381.5	8	26	2100	<1	740	11	<.01		<.01
HP004A BX	4522	381.5	383.0	32	10	770	<1	50	4	<.01		<.01
HP004A BX	4523	383.0	384.5	24	48	1660	<1	70	7	<.01	<.01	<.01
HP004A BX	4524	384.5	386.0	28	26	1520	<1	300	5	<.01		<.01
HP004A BX	4525	386.0	387.5	68	28	1900	<1	130	7	<.01		<.01
HP004A BX	4555	386.0	387.5	68	32	2150	<1	190	8	<.01		<.01
HP004A BX	4526	387.5	389.0	44	40	2500	<1	970	20	<.01		<.01
HP004A BX	4527	389.0	390.5	92	340	3750	<1	2200	22	<.01		<.01
HP004A BX	4528	390.5	392.0	72	370	2700	<1	960	22	<.01		<.01
HP004A BX	4529	392.0	393.5	125	1060	4350	<1	2050	24	<.01		<.01
HP004A BX	4530	393.5	395.0	32	170	4350	<1	1780	28	<.01		<.01
HP004A BX	4531	395.0	396.5	32	72	6300	<1	1160	60	<.01		<.01
HP004A BX	4532	396.5	398.0	16	50	3300	<1	380	28	<.01		<.01
HP004A BX	4533	398.0	399.5	20	22	2500	<1	180	20	<.01	<.01	<.01
HP004A BX	4534	399.5	401.0	22	22	5400	<1	770	18	.01		.01
HP004A BX	4557	399.5	401.0	15	22	4850	<1	830	11	.01	.02	.02
HP004A BX	4535	401.0	402.5	11	22	3350	<1	840	22	<.01	.04	.02
HP004A BX	4536	402.5	404.0	5	30	3250	<1	700	9	<.01		<.01
HP004A BX	4537	404.0	405.5	8	28	3150	<1	970	14	.01		.01
HP004A BX	4538	405.5	407.0	6	28	1360	<1	700	12	<.01		<.01
HP004A BX	4539	407.0	408.5	7	82	2300	<1	1060	12	<.01		<.01
HP004A BX	4540	408.5	410.0	7	66	1780	<1	1000	5	<.01		<.01
HP004A BX	4541	410.0	411.5	6	36	900	<1	1500	4	<.01		<.01
HP004A BX	4542	411.5	413.0	10	28	1400	<1	1080	3	.01		.01
HP004A BX	4556	411.5	413.0	12	22	1340	<1	1180	5	.01		.01
HP004A BX	4543	413.0	414.5	7	22	3450	<1	1200	4	<.01		<.01
HP004A BX	4544	414.5	416.0	11	20	1960	<1	1160	3	.01		.01
HP004A BX	4545	416.0	417.5	8	76	940	<1	840	3	<.01		<.01
HP004A BX	4546	417.5	419.0	6	170	1820	<1	1180	4	<.01		<.01
HP004A BX	4547	419.0	420.5	8	240	880	<1	1160	2	<.01		<.01
HP004A BX	4548	420.5	422.0	12	86	560	<1	1080	6	<.01	<.01	<.01
HP004A BX	4549	422.0	423.5	8	16	390	<1	730	6	<.01		<.01
HP004A BX	4550	423.5	425.0	5	6	140	<1	85	4	<.01		<.01
HP004A BX	4558	423.5	425.0	5	6	175	<1	100	6	.01		.01

01
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630101

APPENDIX 4

HIGH POINT TEM SOUNDING DATA

CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 0380

CURRENT 24 amp. T/O 217 usec.

Tx FREQ 25 Hz.

LOOP CENTRE: 07600N 03800E

Rx LOCATION:

SURVEYED BY: TEM

A= 200 B= 200

OFFSET FOR OUT-LOOP RDGS : 0

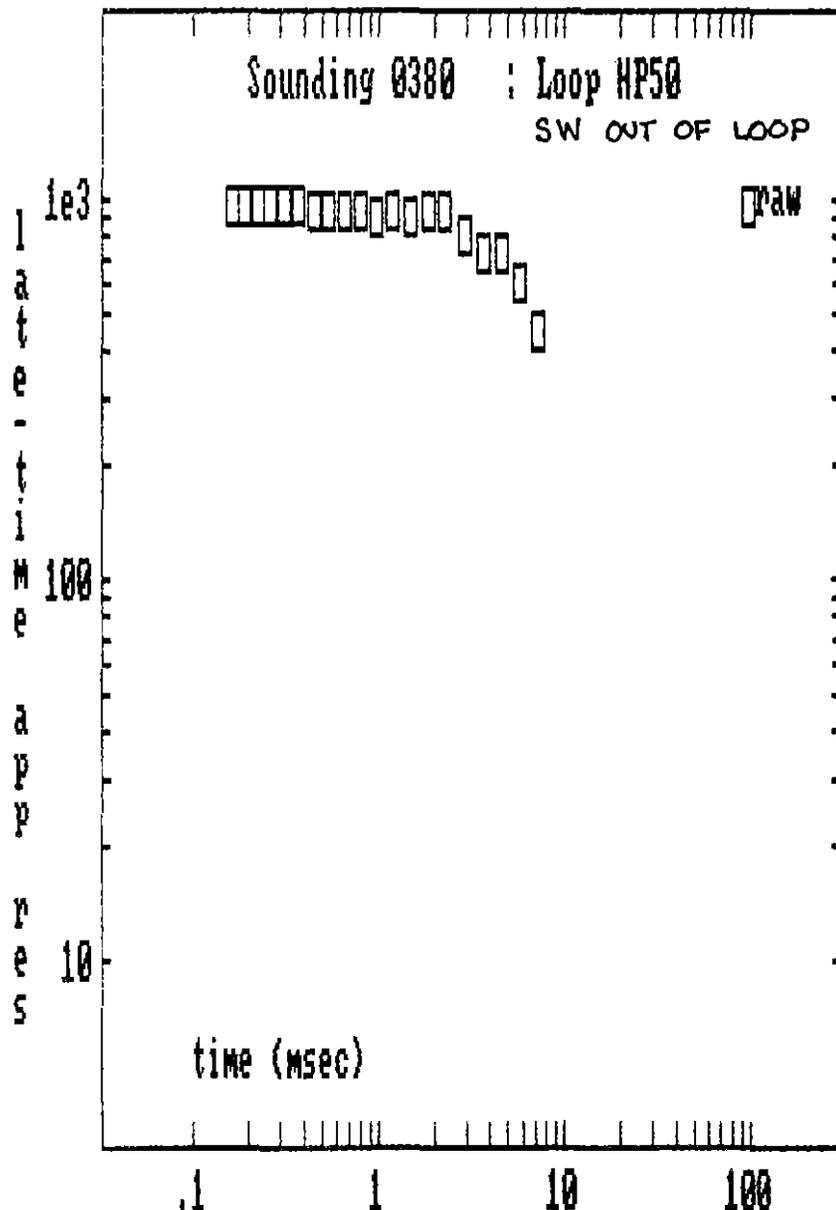
DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

Q values for ch. 1-40 are:



CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 0400

CURRENT 24

amp. T/O 217

usec.

Tx FREQ 25

Hz.

LOOP CENTRE: 07800N

04000E

Rx LOCATION:

SURVEYED BY: TEM

A= 200

B= 200

OFFSET FOR OUT-LOOP RDGS : 0

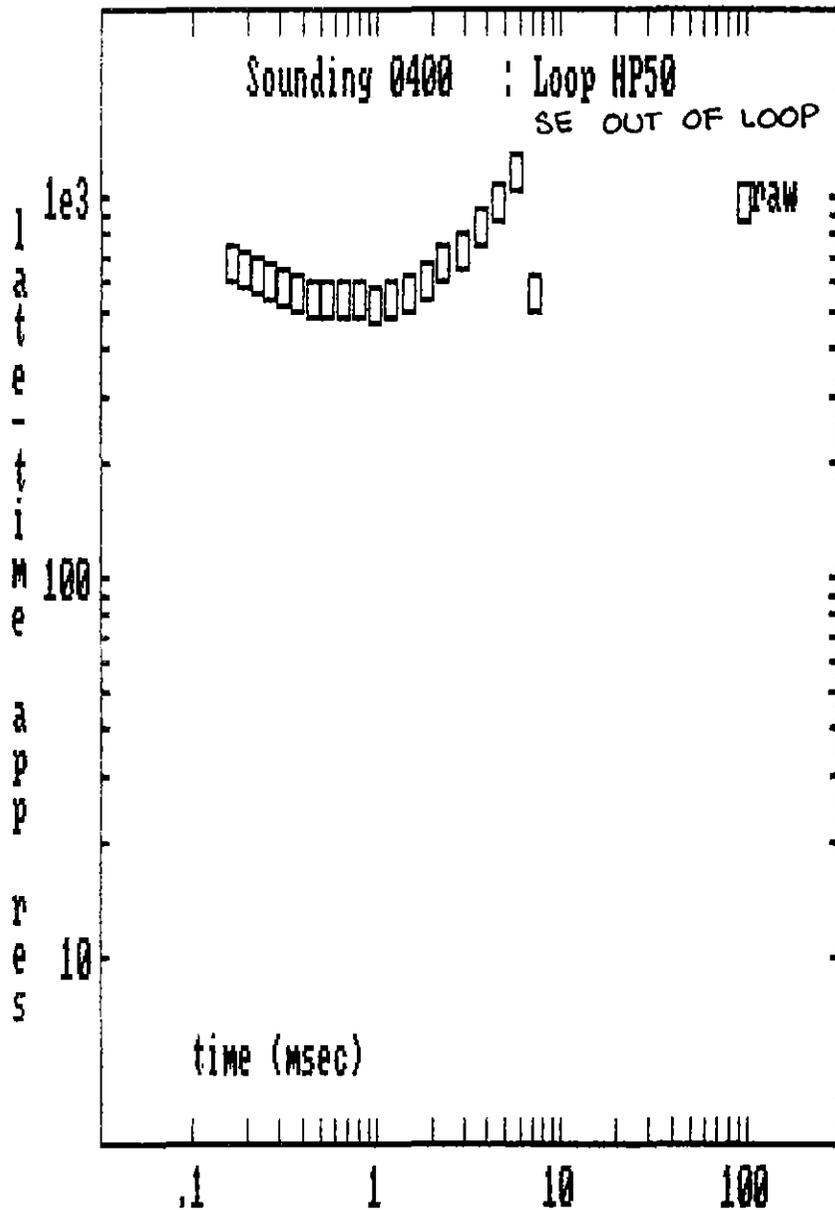
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LOCATION:

APP. RES. FORMULA IS KAUFMAN

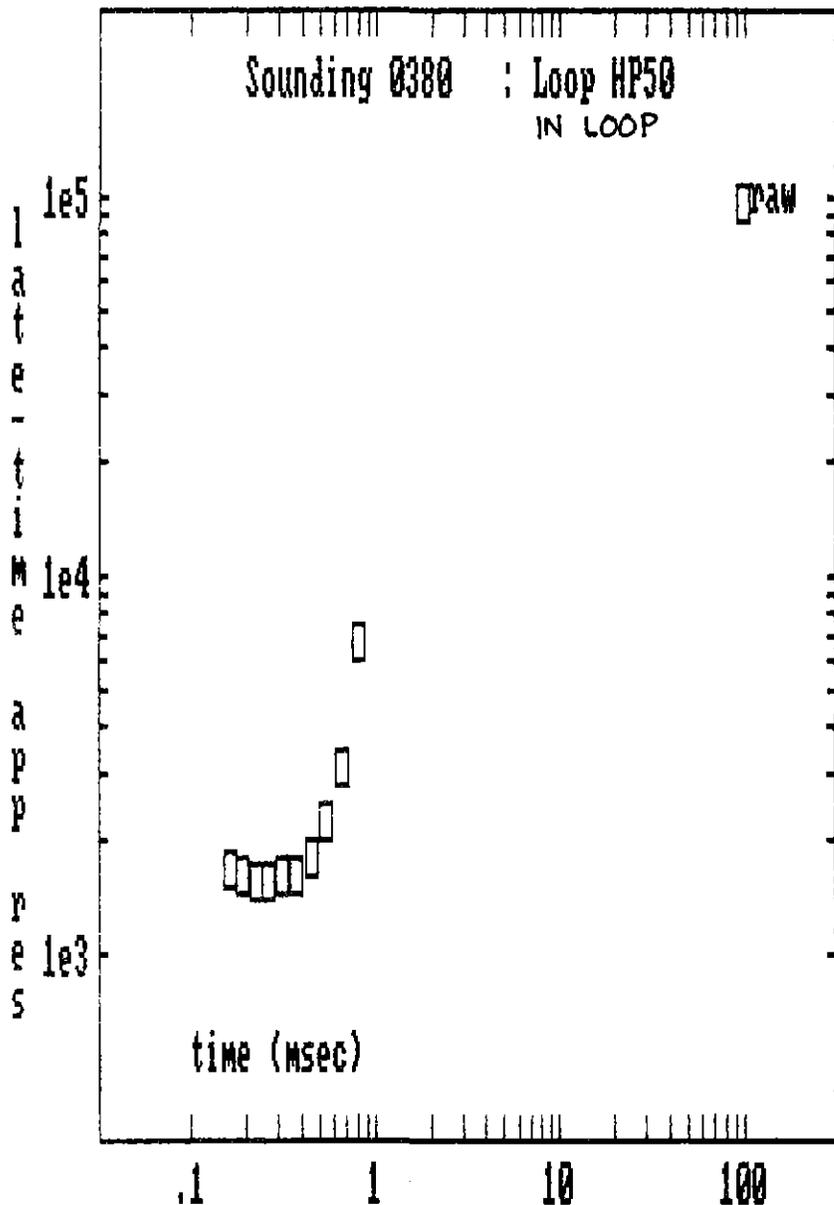
LATE-TIME FORMULA.

Q values for ch. 1-40 are:



CODE & CLIENT:
 AREA:
 PROJECT & I.D.:
 SOUNDING: 0380
 CURRENT 24 amp. T/O 217 usec.
 Tx FREQ 25 Hz.
 LOOP CENTRE: 07800N 03800E
 Rx LOCATION: 07800N 03800E
 SURVEYED BY: TEM
 A= 200 B= 200
 OFFSET FOR OUT-LOOP RDGS : 0
 DATE: DATE
 LOCATION:

APP. RES. FORMULA IS KAUFMAN LATE-TIME FORMULA.
 Q values for ch. 1-40 are:



CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 0360

CURRENT 24

amp. T/O 217

usec.

Tx FREQ 25

Hz.

LOOP CENTRE: 07800N

03600E

Rx LOCATION:

SURVEYED BY: TEM

A= 200

B=

200

OFFSET FOR OUT-LOOP RDGS : 0

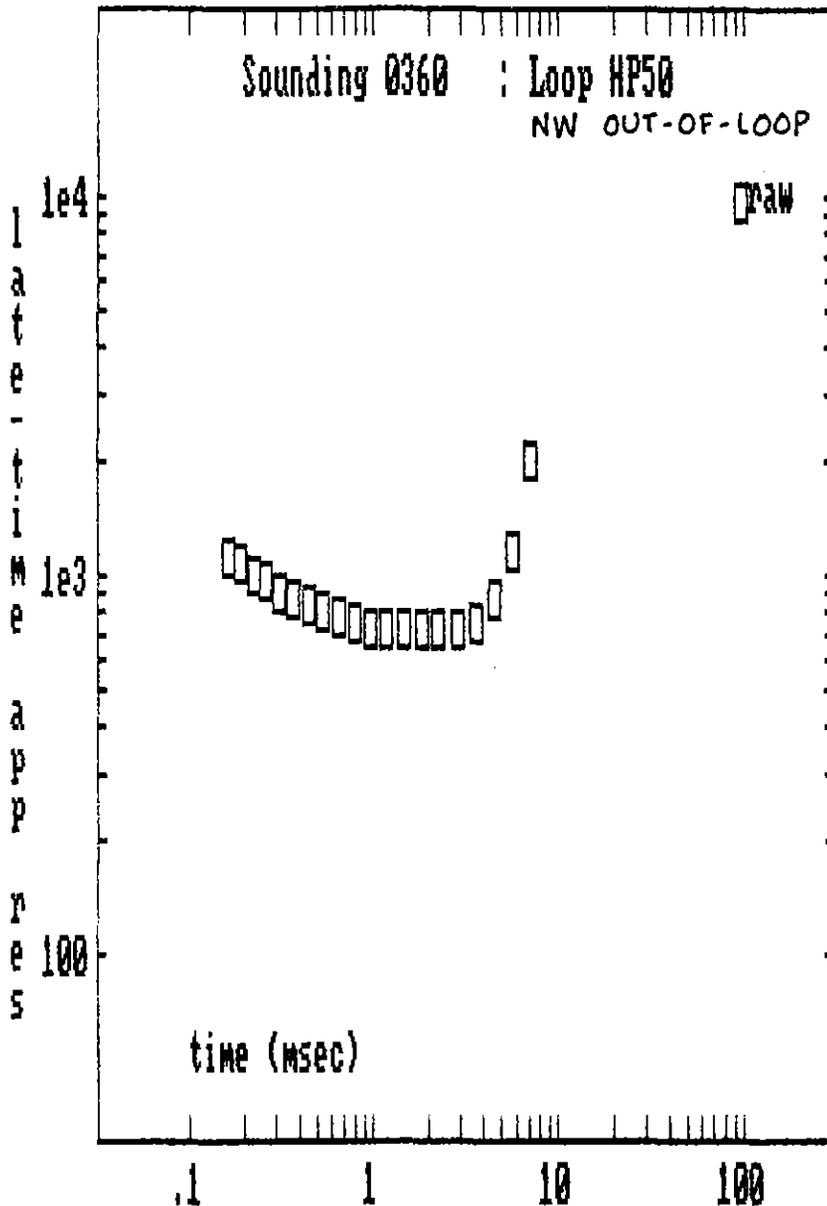
DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

Q values for ch. 1-40 are:



CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 0380

CURRENT 24

amp. T/O 217

usec.

Tx FREQ 25

Hz.

LOOP CENTRE: 08000N

03800E

Rx LOCATION:

SURVEYED BY: TEM

A= 200

B= 200

OFFSET FOR OUT-LOOP RDGS :

0

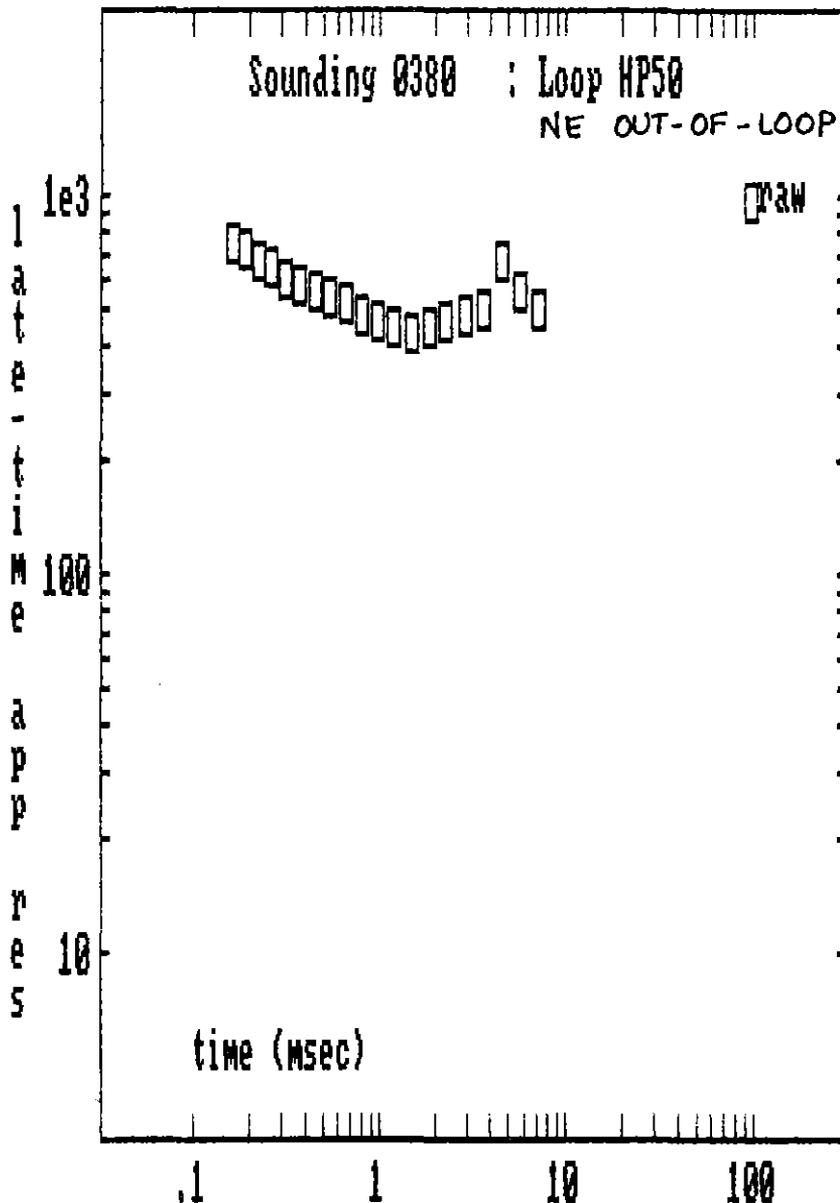
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LOCATION:

APP. RES. FORMULA IS KAUFMAN

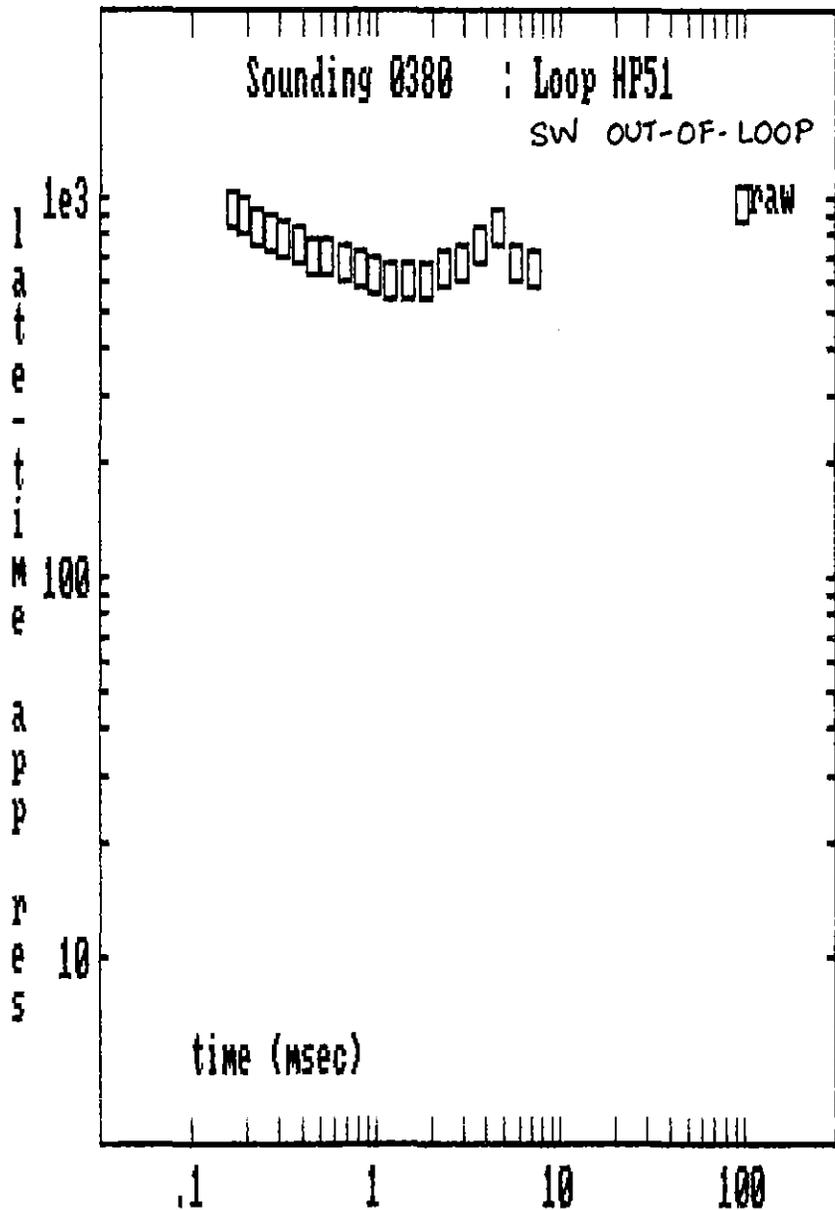
LATE-TIME FORMULA.

Q values for ch. 1-40 are:



CODE & CLIENT: ...
 AREA:
 PROJECT & I.D.:
 SOUNDING: 0380
 CURRENT: 27 amp. T/O 228 usec.
 Tx FREQ: 25 Hz.
 LOOP CENTRE: 07800N 03800E
 Rx LOCATION:
 SURVEYED BY: TEM
 A= 200 B= 200
 OFFSET FOR OUT-LOOP RDGS : 0
 DATE: DATE
 LOCATION:

APP. RES. FORMULA IS KAUFMAN LATE-TIME FORMULA.
 Q values for ch. 1-40 are:



CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 0400

CURRENT 27

amp. T/O 228

usec.

Tx FREQ 25

Hz.

LOOP CENTRE: 08000N

04000E

Rx LOCATION:

SURVEYED BY: TEM

A= 200

B= 200

OFFSET FOR OUT-LOOP RDGS : 0

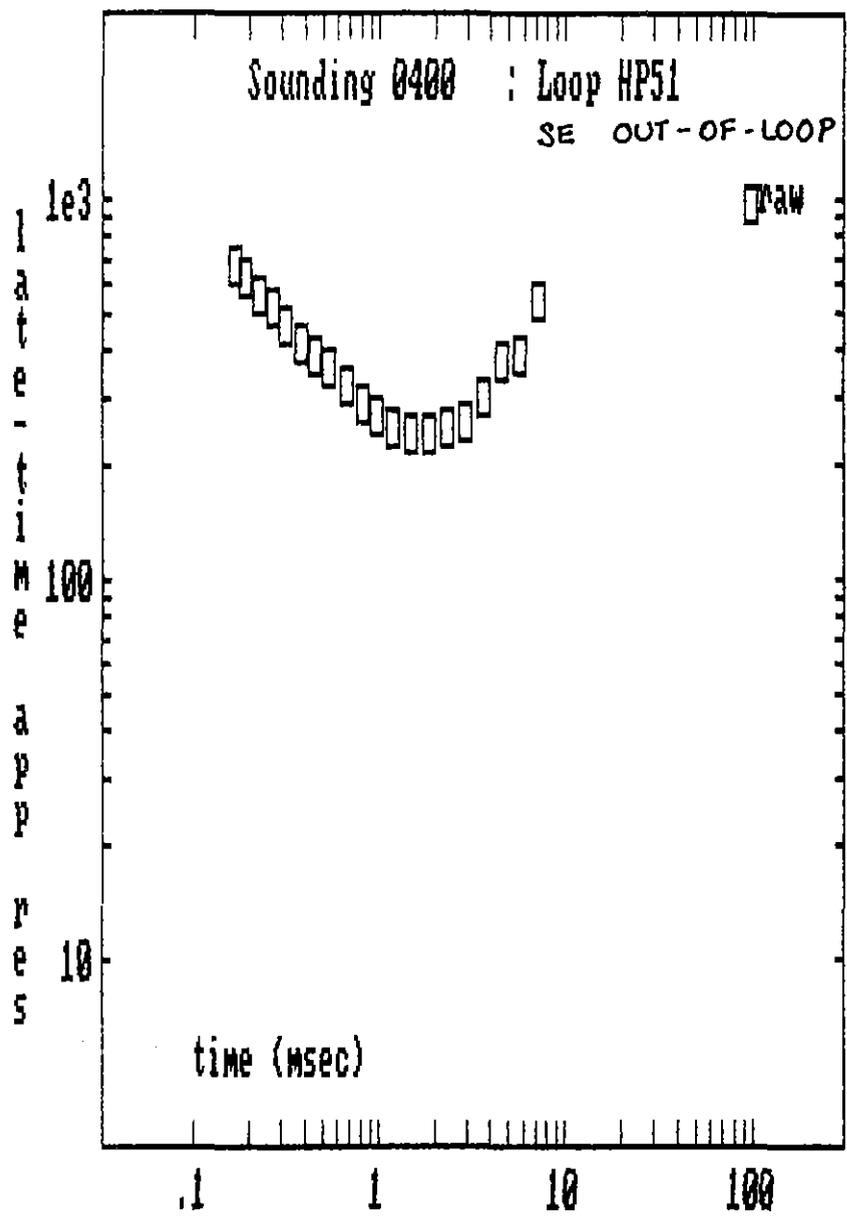
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LOCATION:

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

Q values for ch. 1-40 are:



CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 0380

CURRENT 27 amp. T/O 228 usec.

Tx FREQ 25 Hz.

LOOP CENTRE: 08000N 03800E

Rx LOCATION: 08000N 03800E

SURVEYED BY: TEM

A= 200 . B= 200

OFFSET FOR OUT-LOOP RDGS : 0

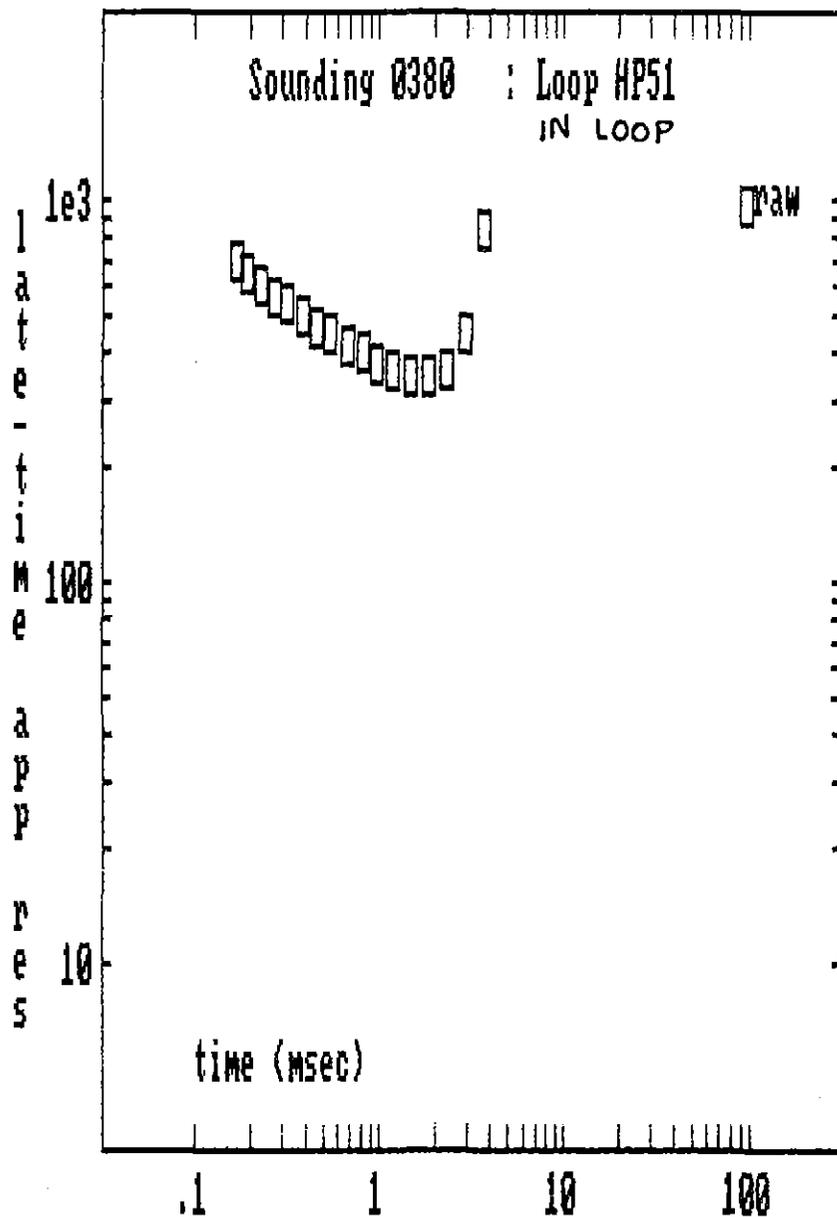
DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

Q values for ch. 1-40 are:

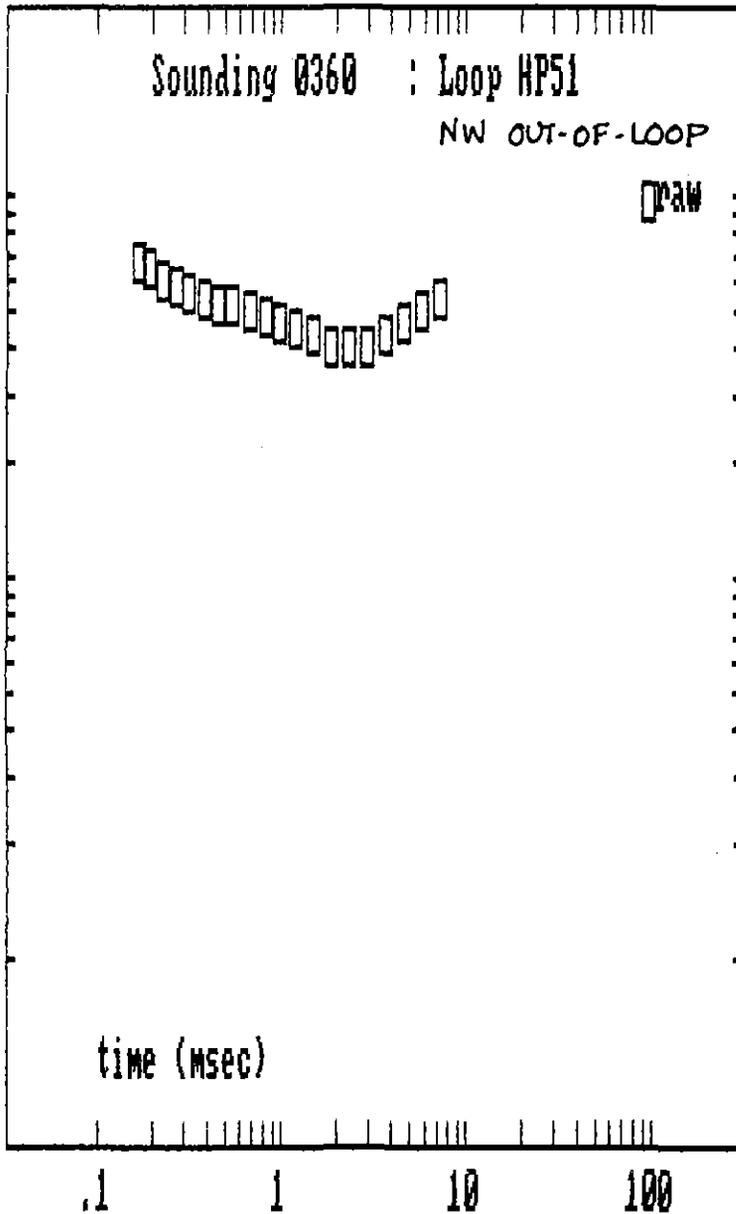


1.2
 CODE & CLIENT:
 AREA:
 PROJECT & I.D.:
 SOUNDING: 0360
 CURRENT 27
 Tx FREQ 25
 LOOP CENTRE: 08000N
 Rx LOCATION:
 SURVEYED BY: TEM
 A= 200
 OFFSET FOR OUT-LOOP RDGS : 0
 DATE: DATE
 LOCATION:

amp. T/O 228 usec.
 Hz.
 03600E

B= 200

APP. RES. FORMULA IS KAUFMAN LATE-TIME FORMULA.
 Q values for ch. 1-40 are:



CODE & CLIENT:

AREA:
PROJECT & I.D.:

SOUNDING: 0380

CURRENT 27 amp. T/O 228 usec.

Tx FREQ 25 Hz.

LOOP CENTRE: 08200N 03800E

Rx LOCATION:

SURVEYED BY: TEM

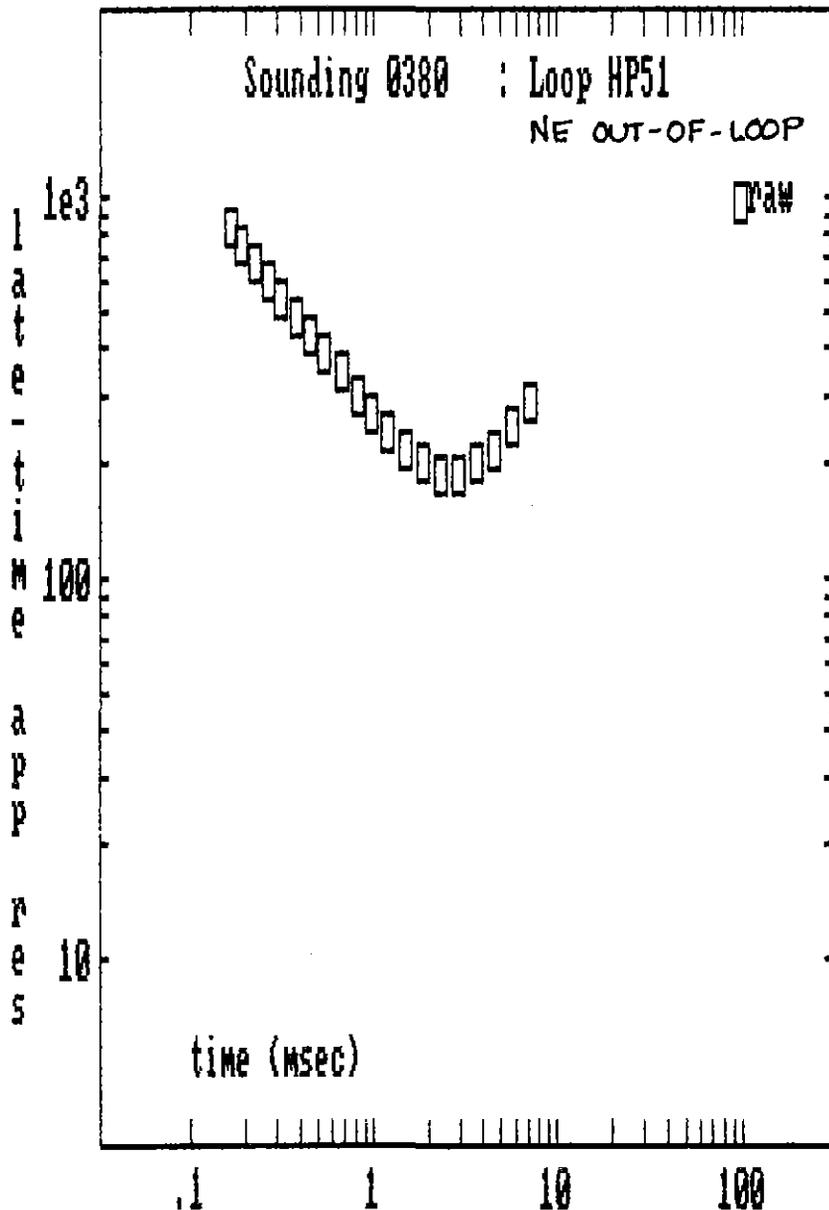
A= 200 B= 200

OFFSET FOR OUT-LOOP RDGS : 0

DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN LATE-TIME FORMULA.
Q values for ch. 1-40 are:



CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 0380

CURRENT 21 amp. T/O 192 usec.

Tx FREQ 25 Hz.

LOOP CENTRE: 08300N 03800E

Rx LOCATION:

SURVEYED BY: TEM

A= 200 B= 200

OFFSET FOR OUT-LOOP RDGS : 0

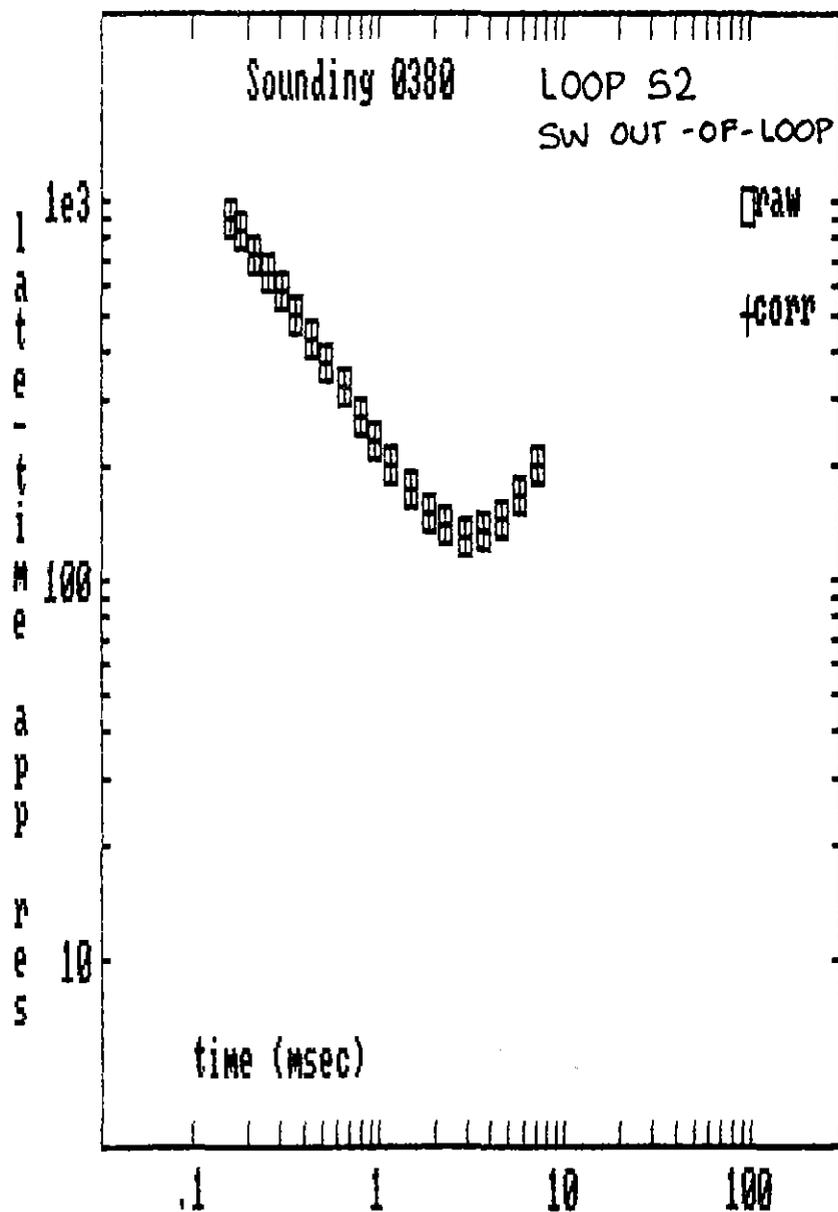
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LOCATION:

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

Q values for ch. 1-40 are:



00 105

CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 0380

CURRENT 21

amp. T/O 192

usec.

Tx FREQ 25

Hz.

LOOP CENTRE: 08300N

03800E

Rx LOCATION: 08300N

03800E

SURVEYED BY: TEM

A= 200

B= 200

OFFSET FOR OUT-LOOP RDGS : 0

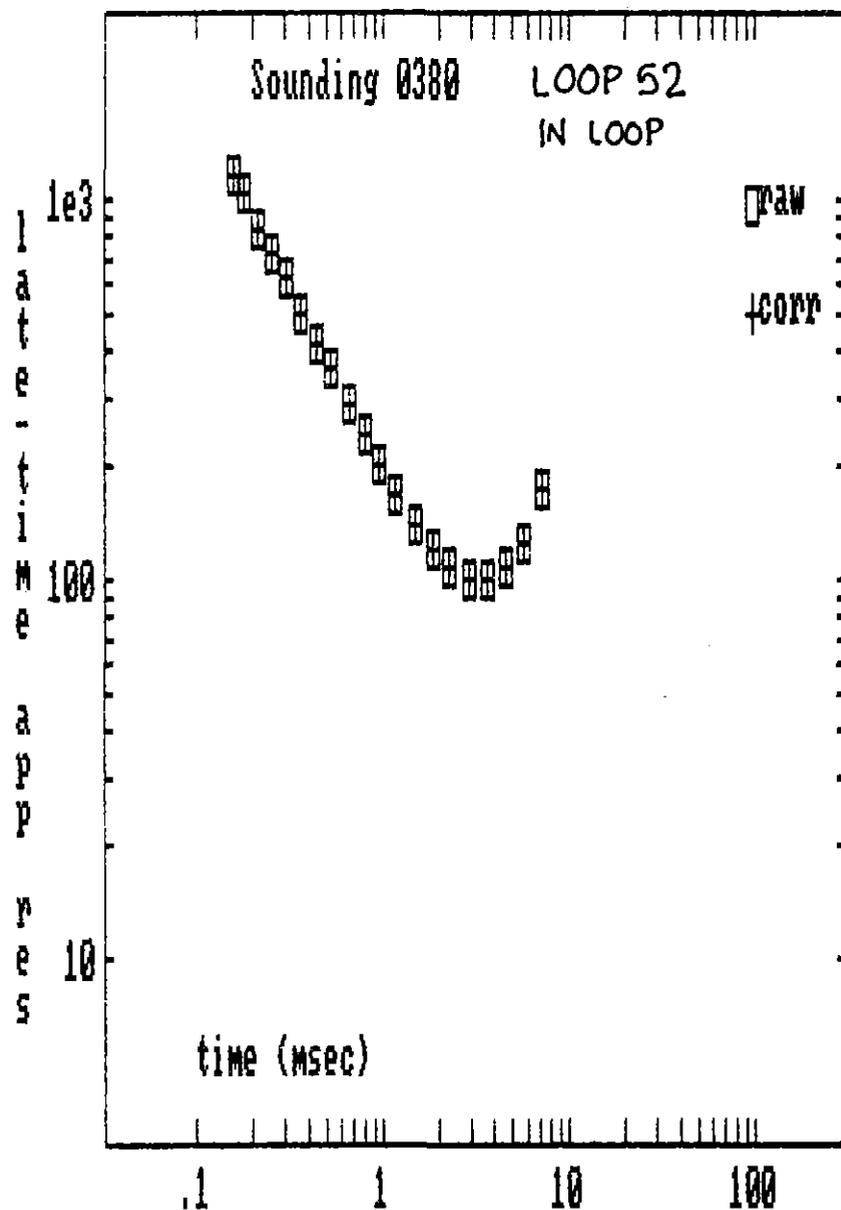
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LOCATION:

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

Q values for ch. 1-40 are:



CODE & CLIENT:

CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 0380

CURRENT 21 amp. T/O 192 usec.

Tx FREQ 25 Hz.

LOOP CENTRE: 08300N 03800E

Rx LOCATION:

SURVEYED BY: TEM

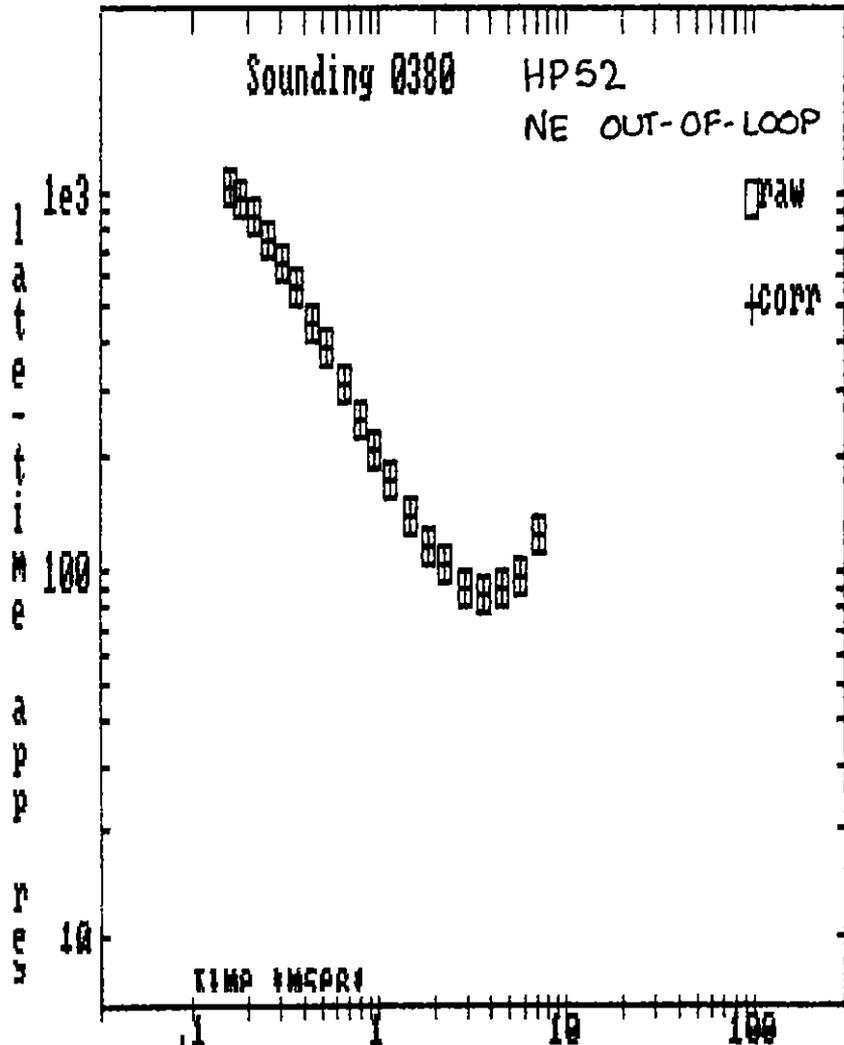
A= 200 . B= 200

OFFSET FOR OUT-LOOP RDGS : 0

DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN LATE-TIME FORMULA.
Q values for ch. 1-40 are:

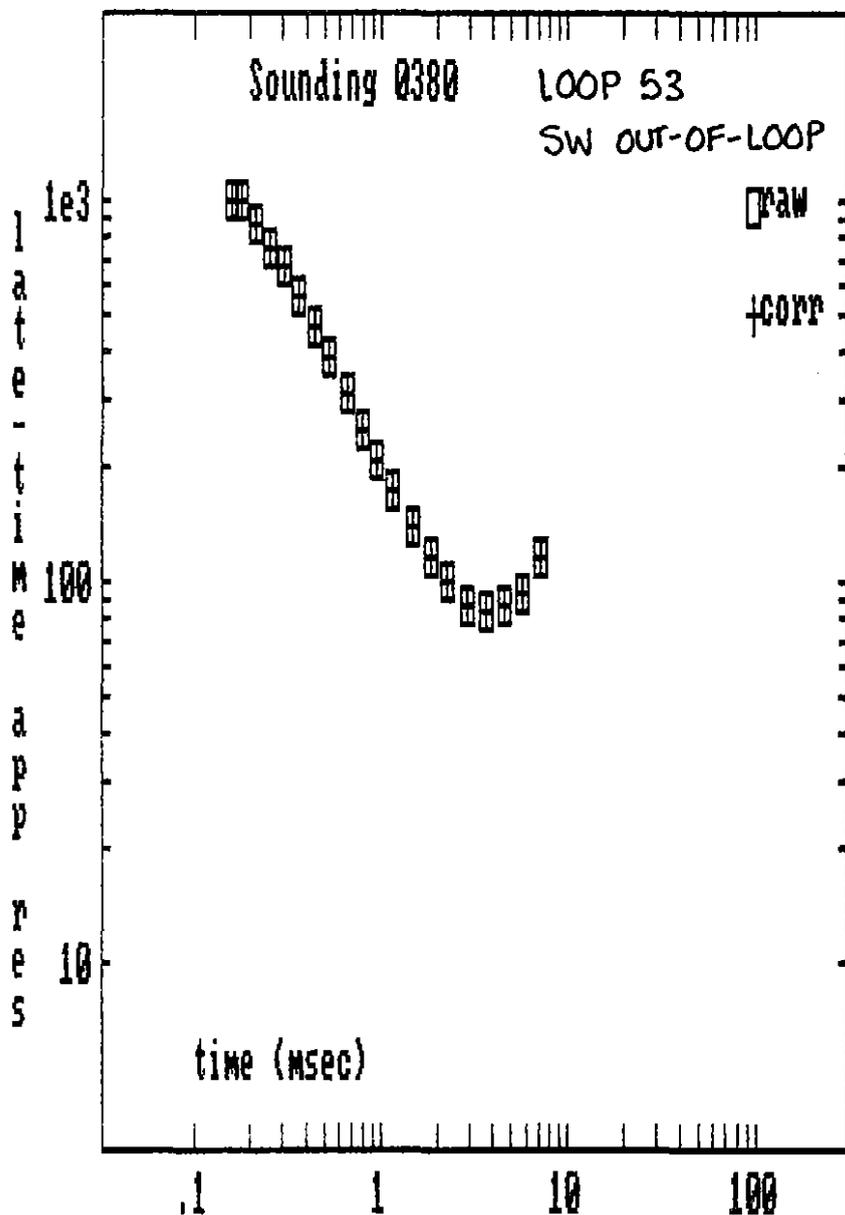


CODE & CLIENT: 03800N 03800E T/O 192 usec.
PROJECT & I.D.: 03800N 03800E
SOUNDING: 0380
CURRENT: 21
Tx FREQ: 25
LOOP CENTRE: 08300N 03800E
Rx LOCATION:
SURVEYED BY: TEM
A= 200 . B= 200
OFFSET FOR OUT-LOOP RDGS : 0
DATE: DATE
LOCATION:

APP. RES. FORMULA IS KAUFMAN LATE-TIME FORMULA.
Q values for ch. 1-40 are:

CODE & CLIENT:
 AREA:
 PROJECT & I.D.:
 SOUNDING: 0380
 CURRENT 17 amp. T/O 193 usec.
 Tx FREQ 25 Hz.
 LOOP CENTRE: 08500N 03800E
 Rx LOCATION:
 SURVEYED BY: TEM
 A= 200 B= 200
 OFFSET FOR OUT-LOOP RDGS : 0
 DATE: DATE
 LOCATION:

APP. RES. FORMULA IS KAUFMAN LATE-TIME FORMULA.
 Q values for ch. 1-40 are:



CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 0380

CURRENT 17

amp. T/O 193

usec.

Tx FREQ 25

Hz.

LOOP CENTRE: 08500N

03800E

Rx LOCATION:

SURVEYED BY: TEM

A= 200

B= 200

OFFSET FOR OUT-LOOP RDGS : 0

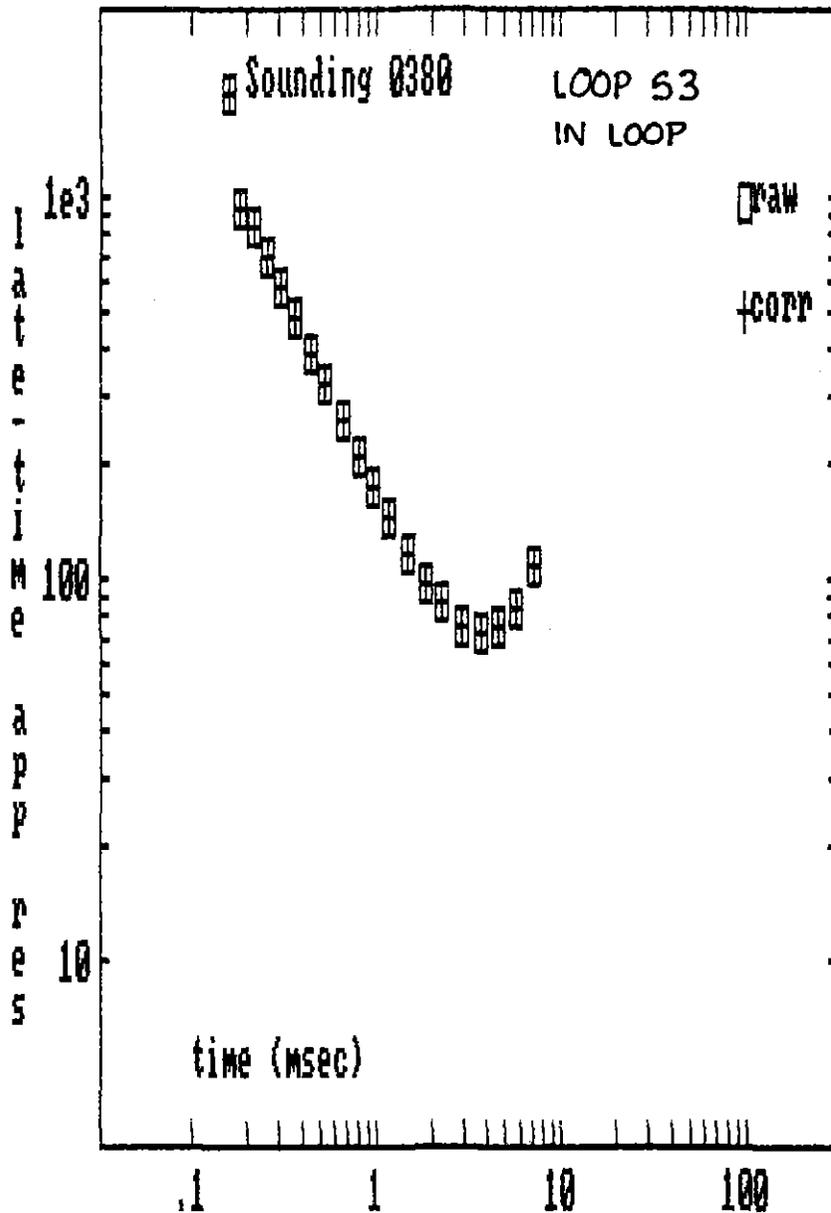
DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

Q values for ch. 1-40 are:



CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 0380

CURRENT 17

amp. T/O 193

usec.

Tx FREQ 25

Hz.

LOOP CENTRE: 08500N

03800E

Rx LOCATION:

SURVEYED BY: TEM

A= 200

B= 200

OFFSET FOR OUT-LOOP RDGS : 0

0

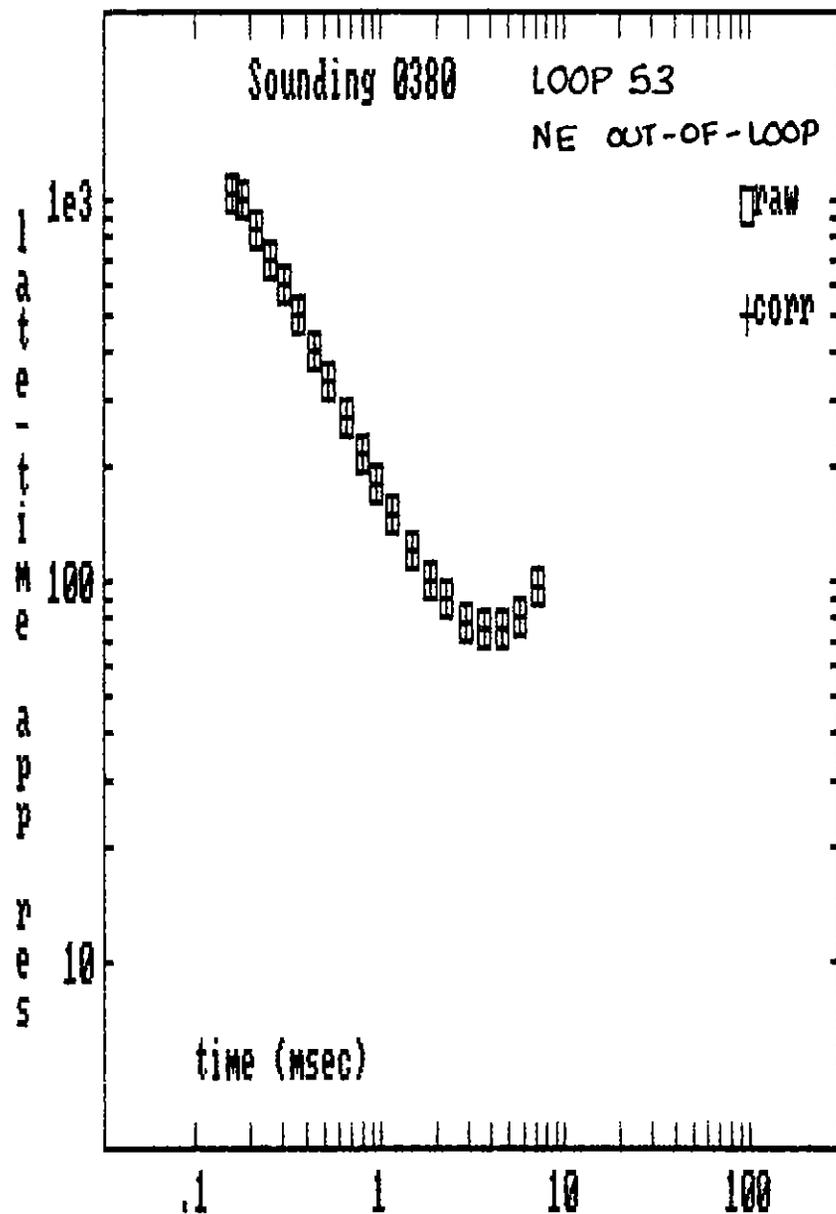
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LOCATION:

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

Q values for ch. 1-40 are:



CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 0380

CURRENT 22 amp. T/O 211 usec.

Tx FREQ 25 Hz.

LOOP CENTRE: 08700N 03800E

Rx LOCATION:

SURVEYED BY: TEM

A= 200 . B= 200

OFFSET FOR OUT-LOOP RDGS : 0

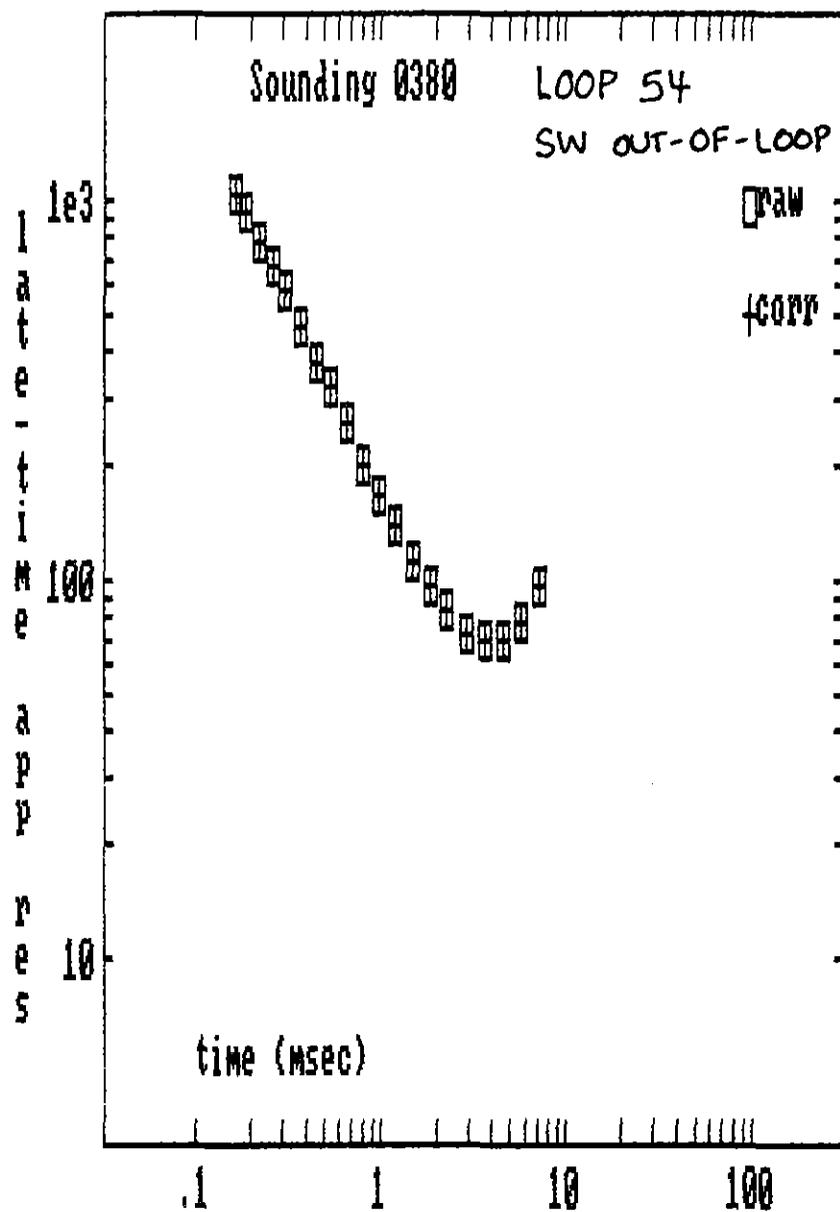
DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

Q values for ch. 1-40 are:



111

CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 0380

CURRENT 22

amp. T/O 211

usec.

Tx FREQ 25

Hz.

LOOP CENTRE: 08700N

03800E

Rx LOCATION:

SURVEYED BY: TEM

A= 200

B= 200

OFFSET FOR OUT-LOOP RDGS : 0

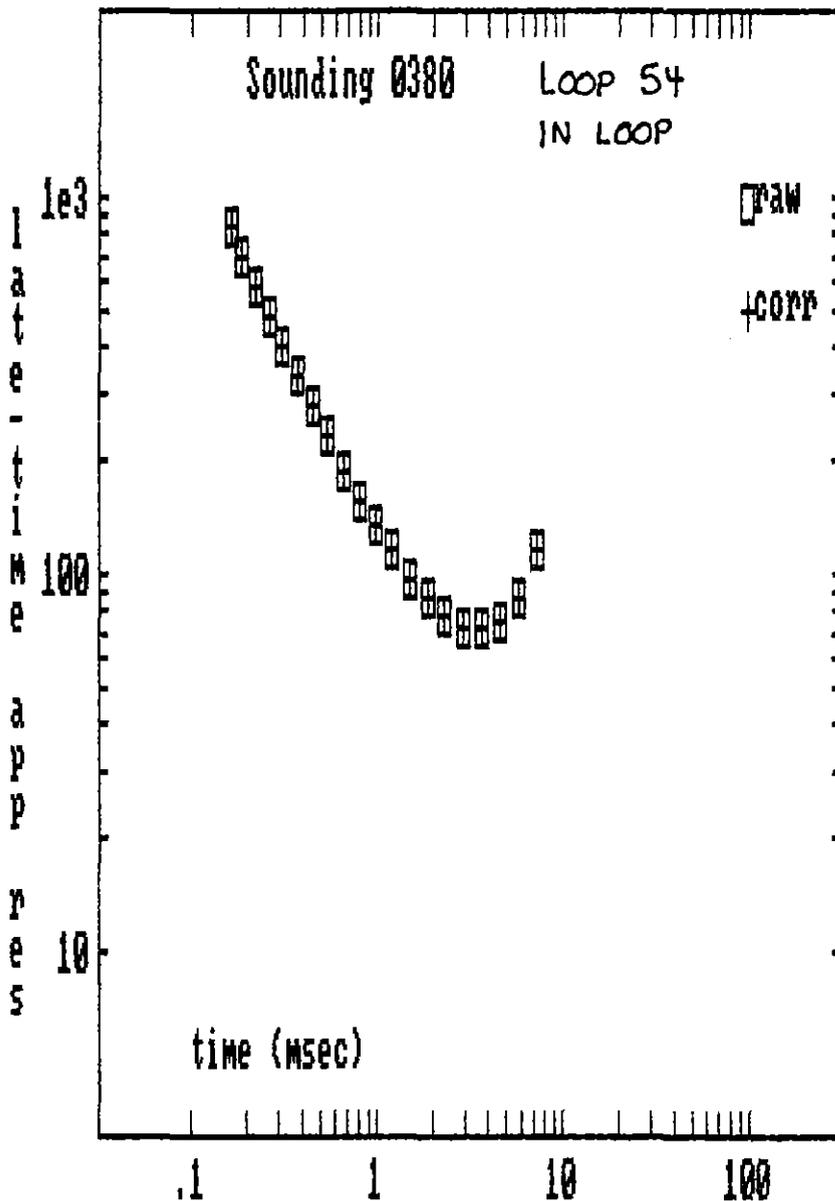
DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

Q values for ch. 1-40 are:



CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 0380

CURRENT 22 amp. T/O 211 usec.

Tx FREQ 25 Hz.

LOOP CENTRE: 08700N 03800E

Rx LOCATION:

SURVEYED BY: TEM

A= 200 B= 200

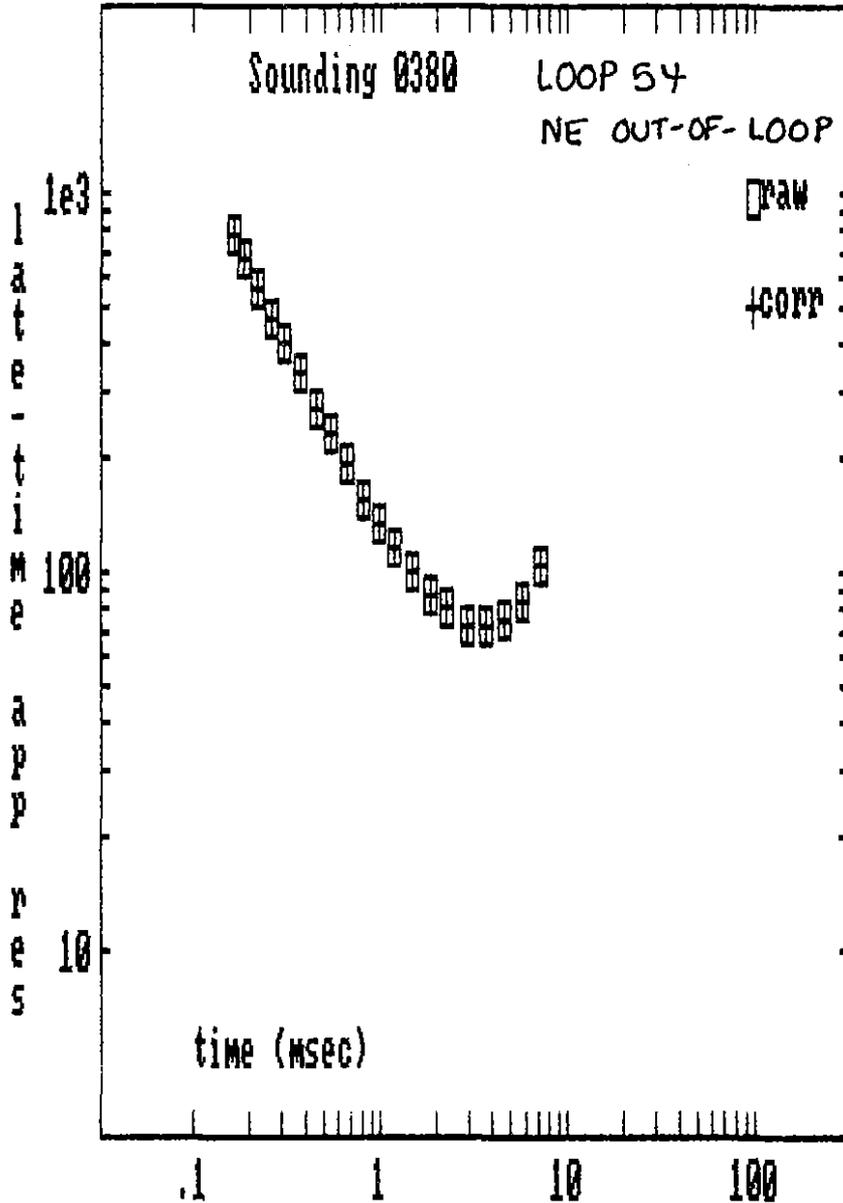
OFFSET FOR OUT-LOOP RDGS : 0

DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN
Q values for ch. 1-40 are:

LATE-TIME FORMULA.



CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 8500

CURRENT 20

amp. T/O 204

usec.

Tx FREQ 25

Hz.

LOOP CENTRE: 03400E

8500N

Rx LOCATION:

SURVEYED BY: TEM

A= 200

B= 200

OFFSET FOR OUT-LOOP RDGS : 0

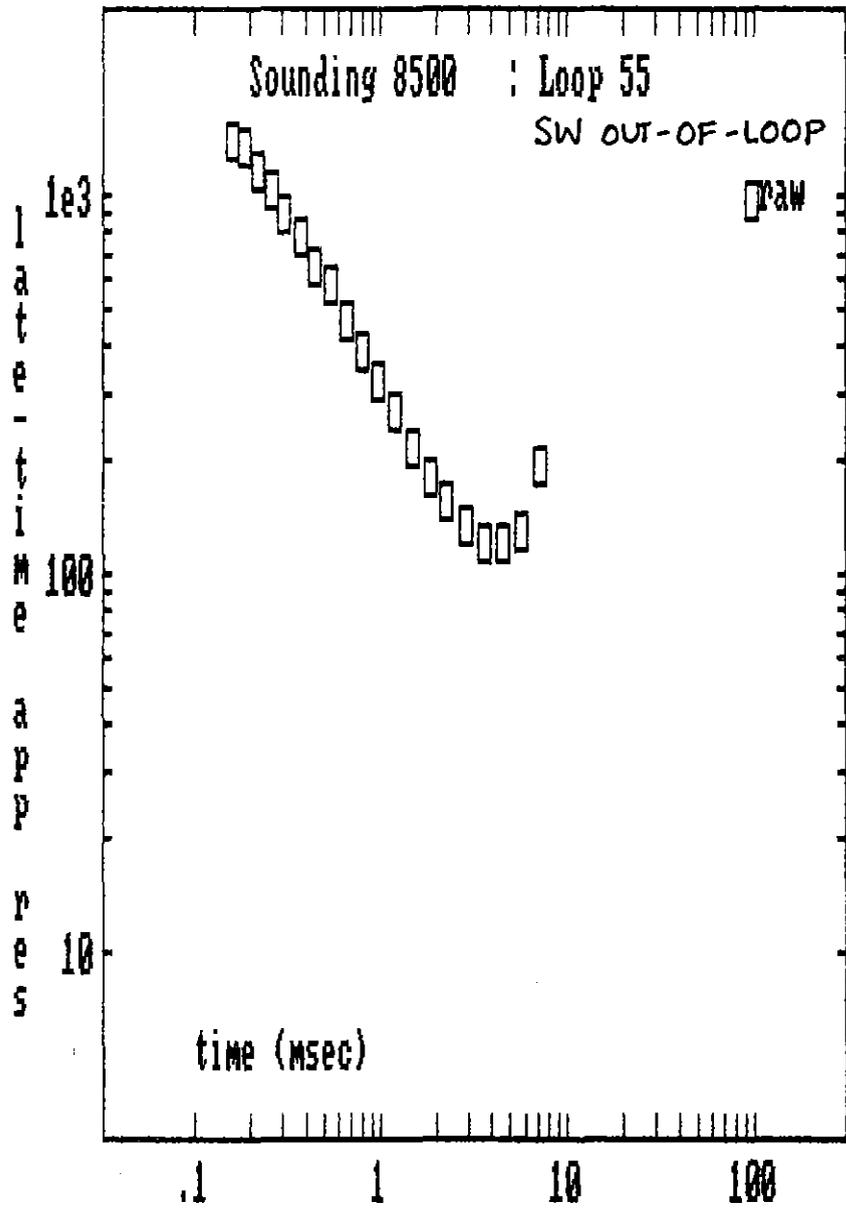
DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

Q values for ch. 1-40 are:



CODE & CLIENT: **114**

AREA:

PROJECT & I.D.:

SOUNDING: 8700

CURRENT 20

amp. T/O 204

usec.

Tx FREQ 25

Hz.

LOOP CENTRE: 03400E

8700N

Rx LOCATION: 03400E

8700N

SURVEYED BY: TEM

A= 200

B= 200

OFFSET FOR OUT-LOOP RDGS : 0

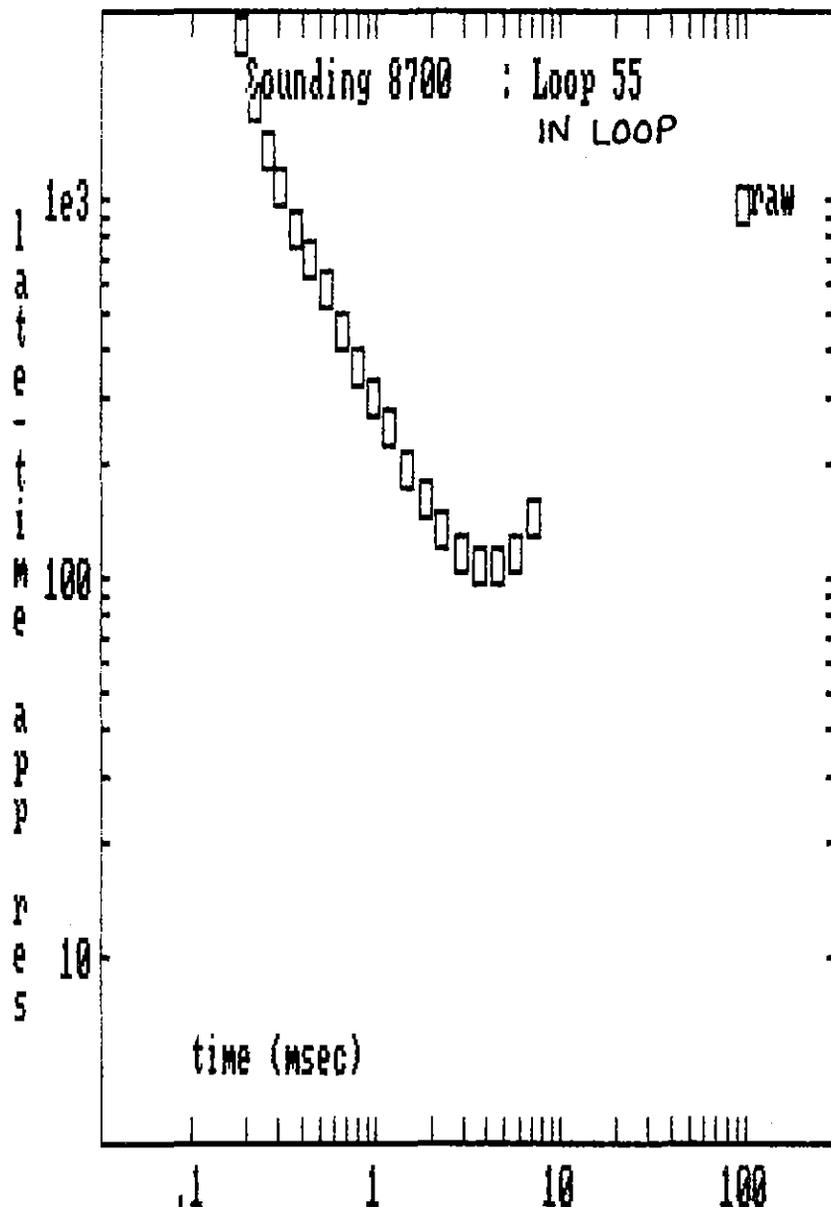
DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

Q values for ch. 1-40 are:



CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 8900

CURRENT 20 amp. T/O 204 usec.

Tx FREQ 25 Hz.

LOOP CENTRE: 03400E 8900N

Rx LOCATION:

SURVEYED BY: TEM

A= 200 . B= 200

OFFSET FOR OUT-LOOP RDGS : 0

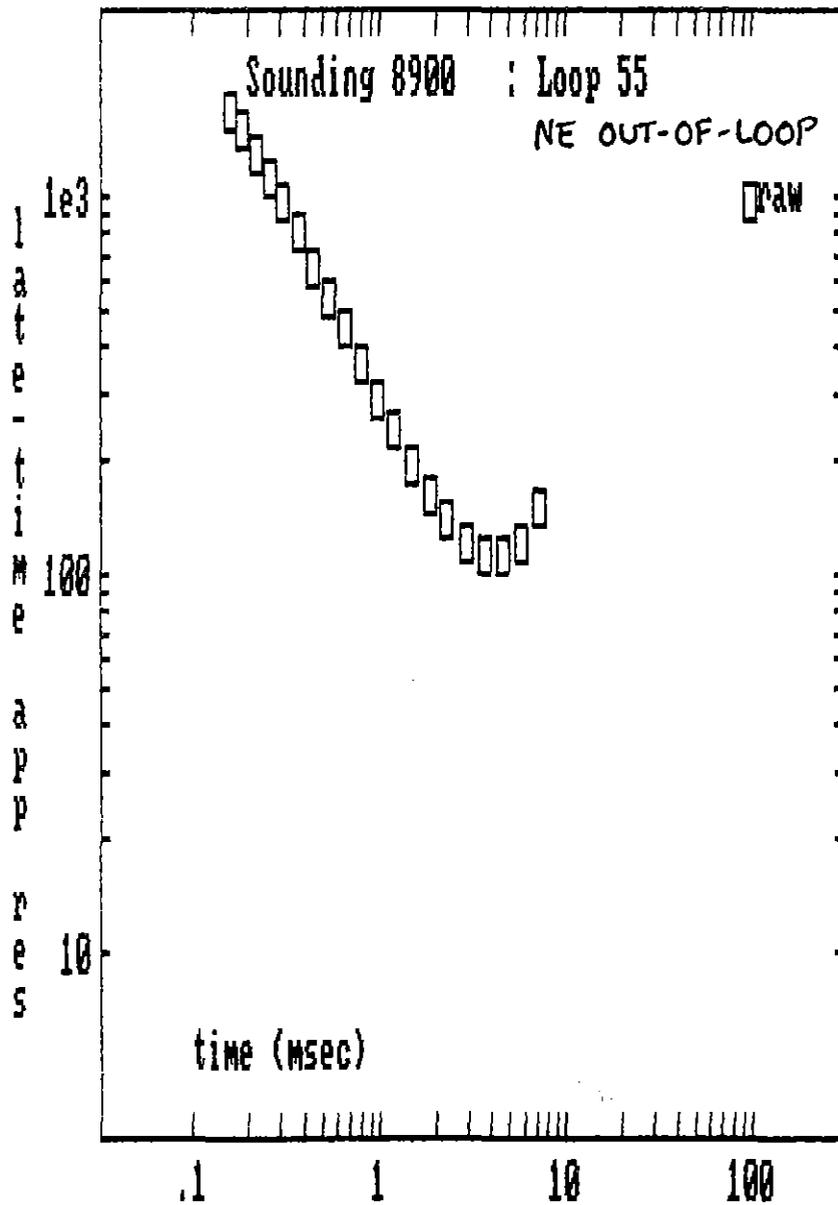
DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

Q values for ch. 1-40 are:



CODE & CLIENT: 116

630125

AREA:

PROJECT & I.D.:

SOUNDING: 8700

CURRENT 25

amp. T/O

264

usec.

Tx FREQ 25

Hz.

LOOP CENTRE: 03400E

8700N

Rx LOCATION:

SURVEYED BY: TEM

A= 200

B=

200

OFFSET FOR OUT-LOOP RDGS : 0

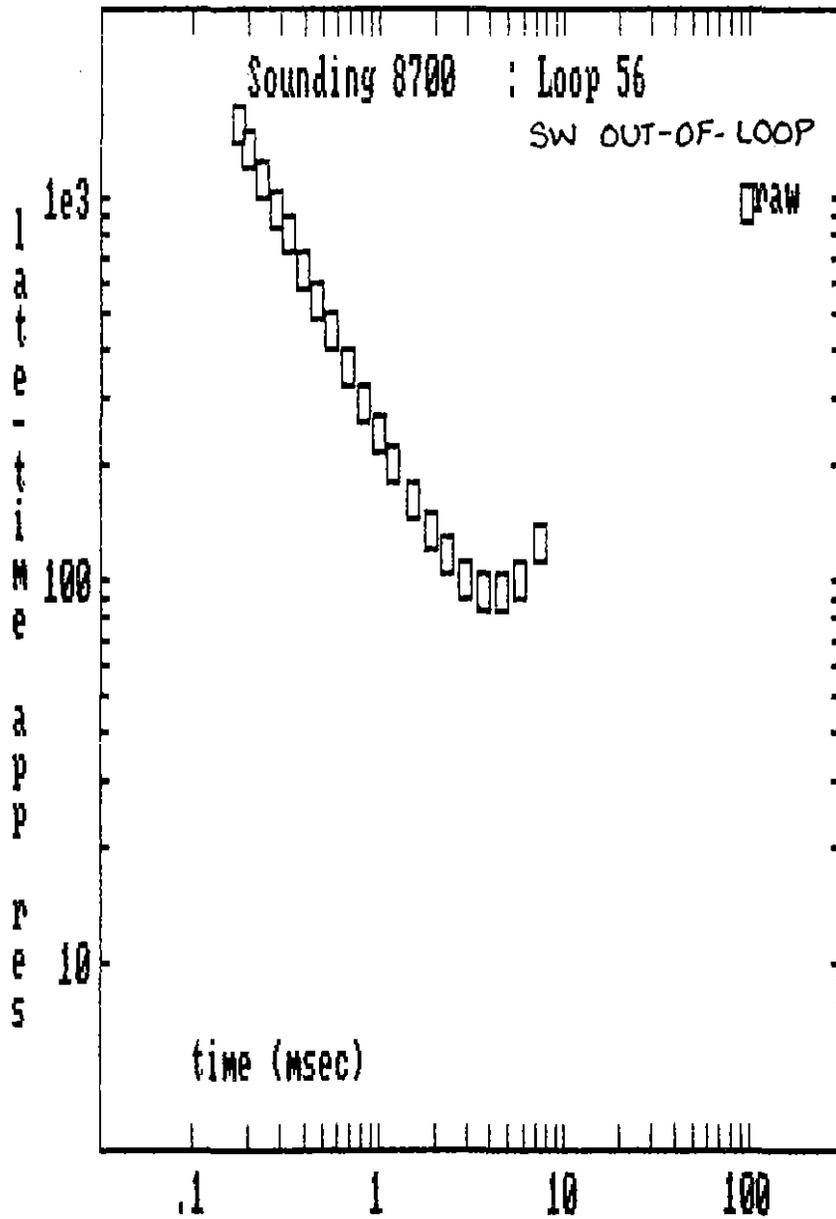
DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

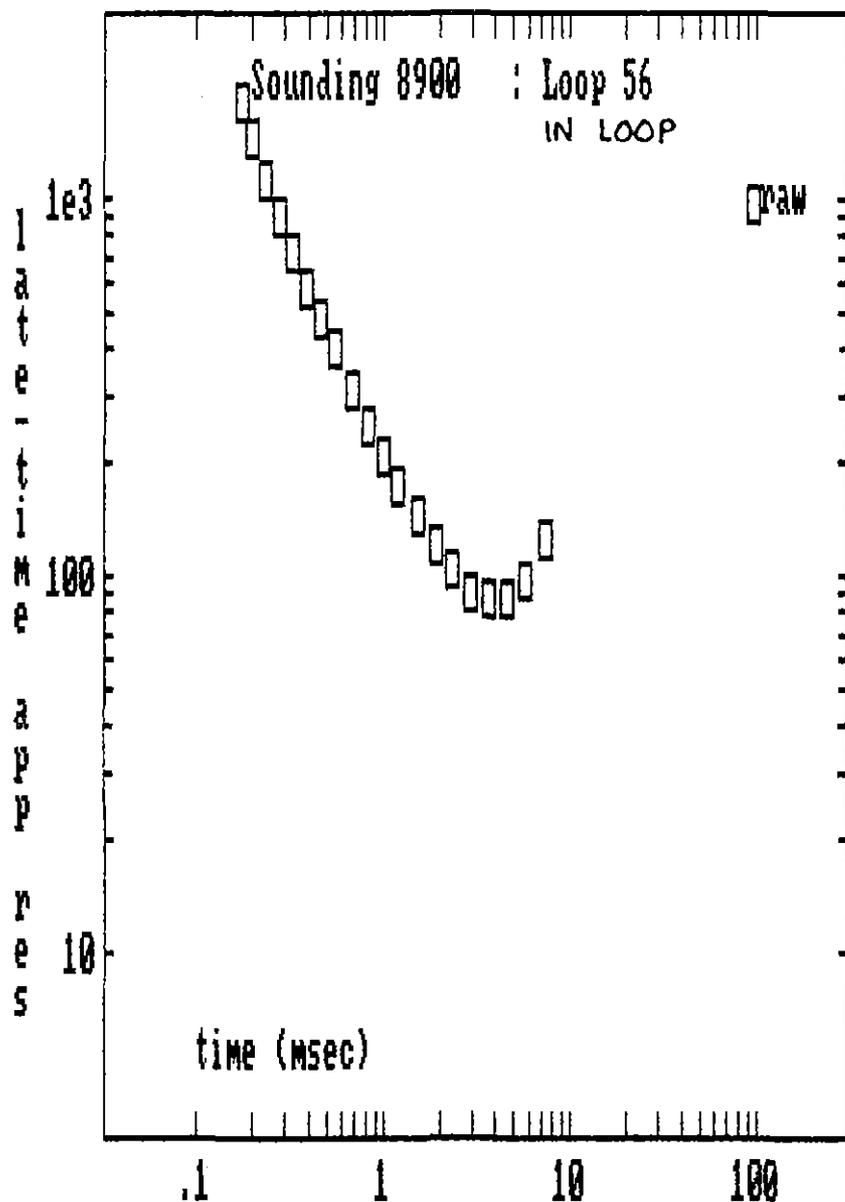
Q values for ch. 1-40 are:



CODE & CLIENT:
 AREA: 117
 PROJECT & I.D.:
 SOUNDING: 8900
 CURRENT 26
 Tx FREQ 25
 LOOP CENTRE: 03400E
 Rx LOCATION: 03400E
 SURVEYED BY: TEM
 A= 200
 OFFSET FOR OUT-LOOP RDGS : 0
 DATE: DATE
 LOCATION:

amp. T/O 264 usec.
 Hz.
 8900N
 8900N
 B= 200

APP. RES. FORMULA IS KAUFMAN LATE-TIME FORMULA.
 Q values for ch. 1-40 are:



CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 9100

CURRENT 26

Tx FREQ 25

LOOP CENTRE: 03400E

Rx LOCATION:

SURVEYED BY: TEM

A= 200

OFFSET FOR OUT-LOOP RDGS :

DATE: DATE

LOCATION:

amp. T/O 264

Hz. 9100N

usec.

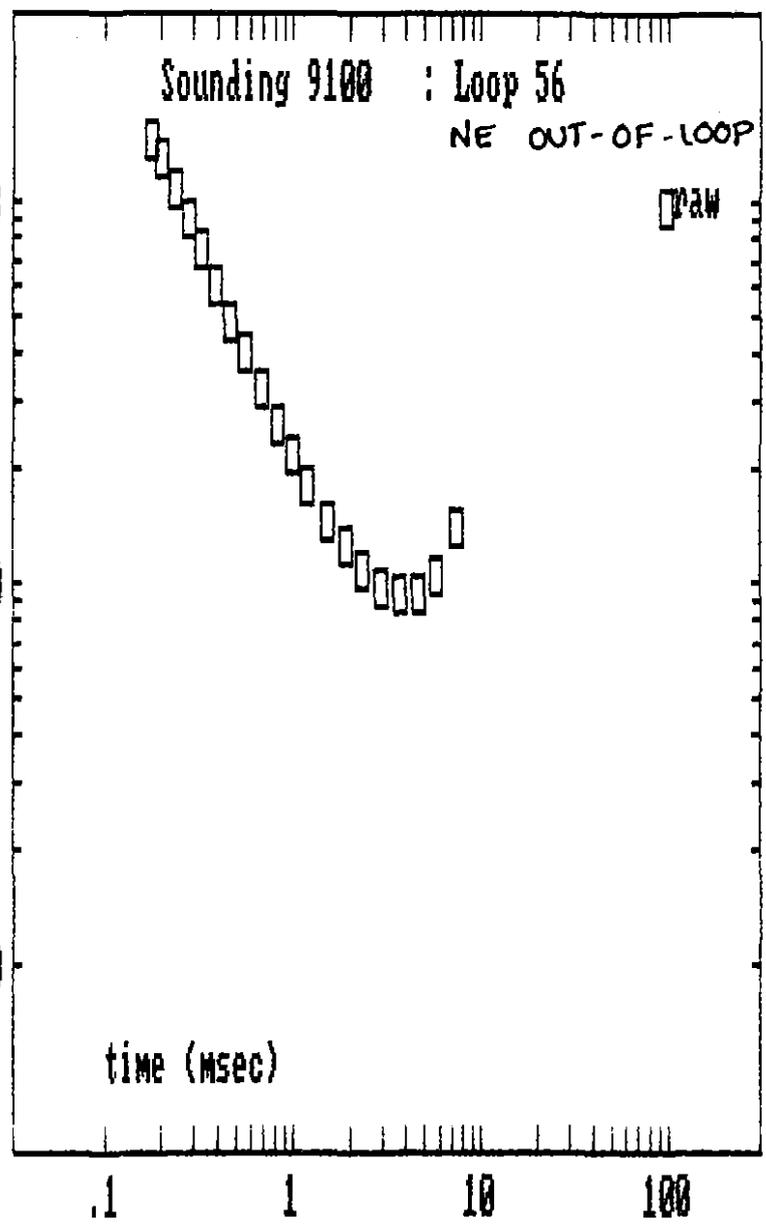
B= 200

0

APP. RES. FORMULA IS KAUFMAN

Q values for ch. 1-40 are:

LATE-TIME FORMULA.



CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 8900

CURRENT 25 amp. T/O 228 usec.

Tx FREQ 25 Hz.

LOOP CENTRE: 03400E 8900N

Rx LOCATION:

SURVEYED BY: TEM

A= 200 . B= 200

OFFSET FOR OUT-LOOP RDGS : 0

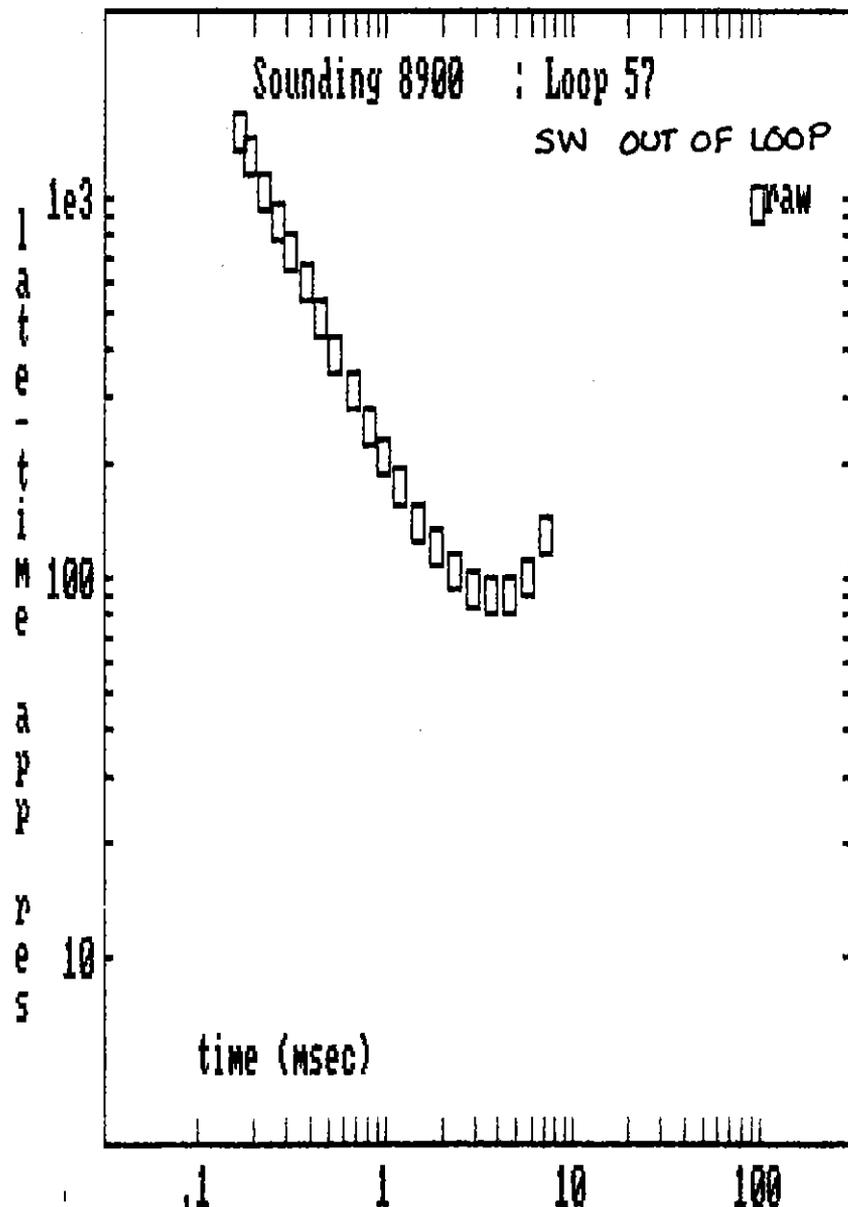
DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

Q values for ch. 1-40 are:



00 120

630129

CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 9100

CURRENT 25 amp. T/O 228 usec.

Tx FREQ 25 Hz.

LOOP CENTRE: 03400E 9100N

Rx LOCATION: 03400E 9100N

SURVEYED BY: TEM

A= 200 . B= 200

OFFSET FOR OUT-LOOP RDGS : 0

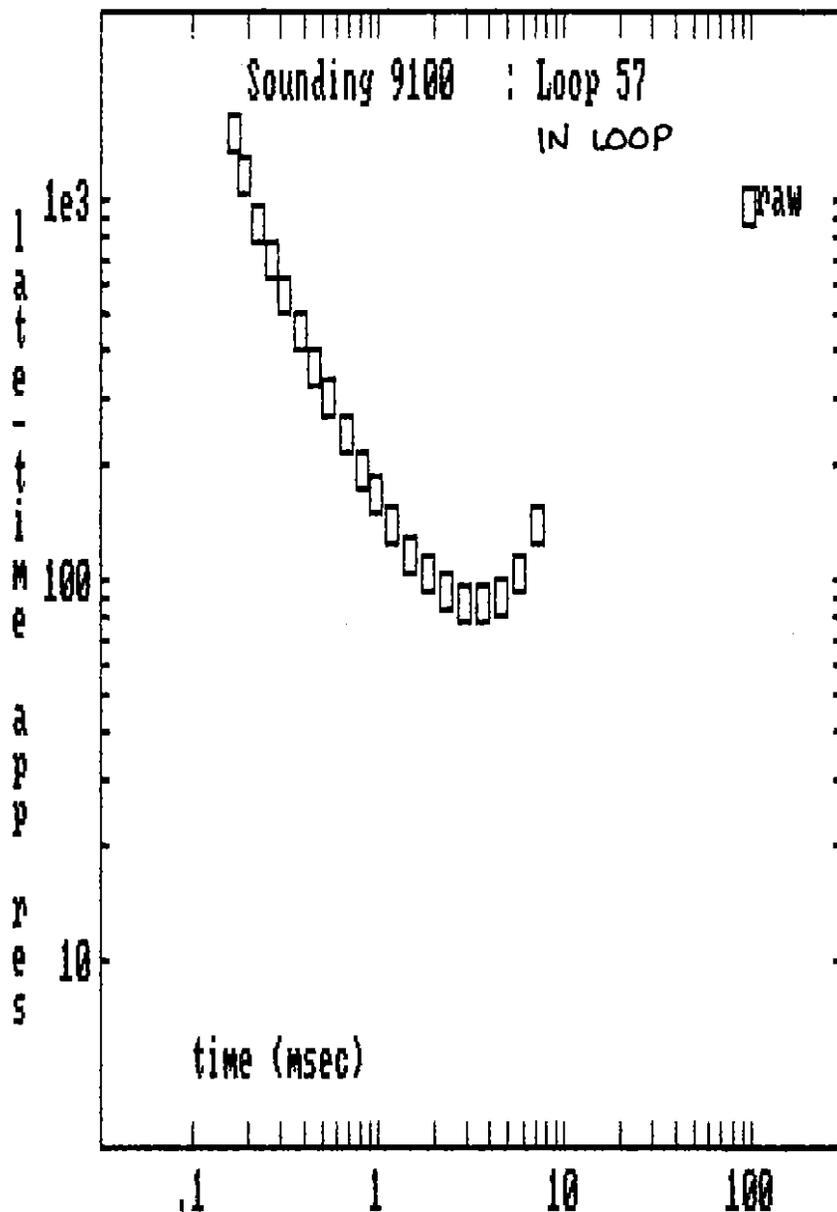
DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

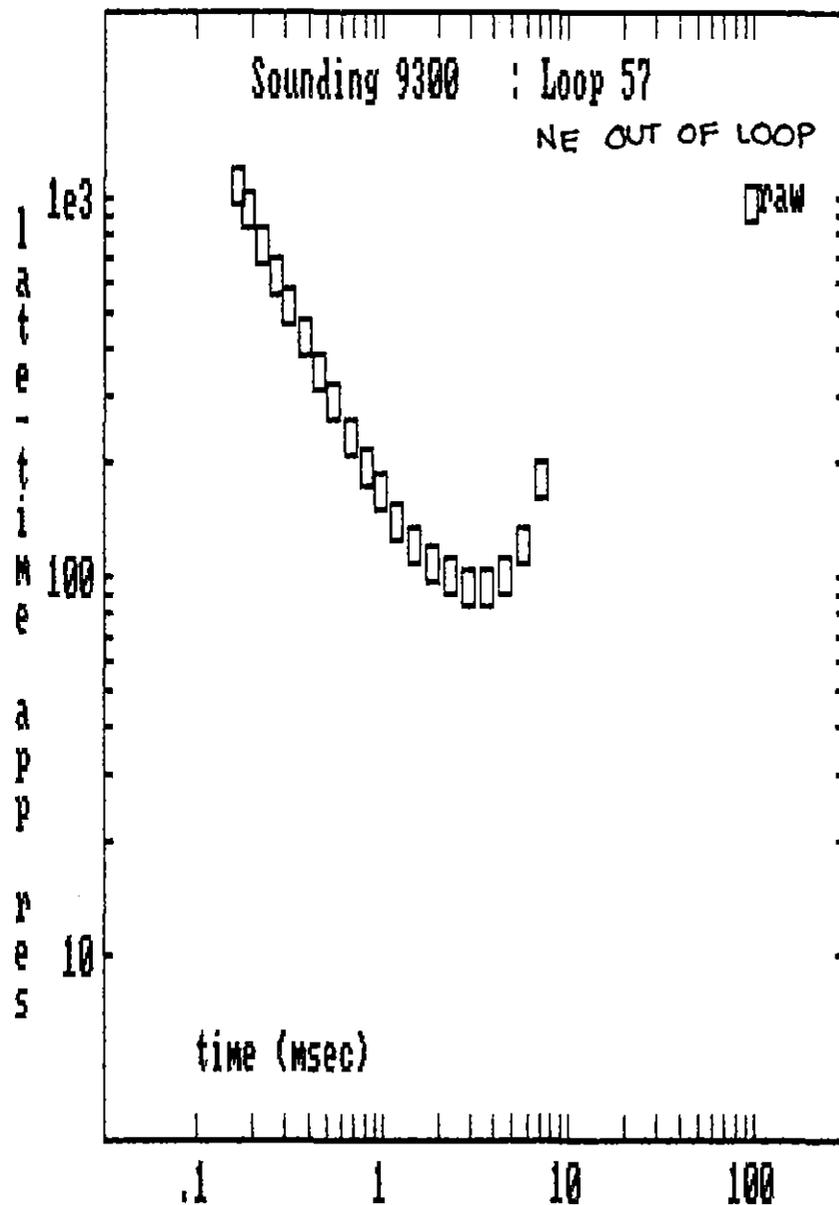
Q values for ch. 1-40 are:



121

CODE & CLIENT:
 AREA:
 PROJECT & I.D.:
 SOUNDING: 9300
 CURRENT 25 amp. T/O 228 usec.
 Tx FREQ 25 Hz.
 LOOP CENTRE: 03400E 9300N
 Rx LOCATION:
 SURVEYED BY: TEM
 A= 200 . B= 200
 OFFSET FOR OUT-LOOP RDGS : 0
 DATE: DATE
 LOCATION:

APP. RES. FORMULA IS KAUFMAN LATE-TIME FORMULA.
 Q values for ch. 1-40 are:



CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 9100

CURRENT 28 amp. T/O 216 usec.

Tx FREQ 25 Hz.

LOOP CENTRE: 03400E 9100N

Rx LOCATION:

SURVEYED BY: TEM

A= 200 . B= 200

OFFSET FOR OUT-LOOP RDGS : 0

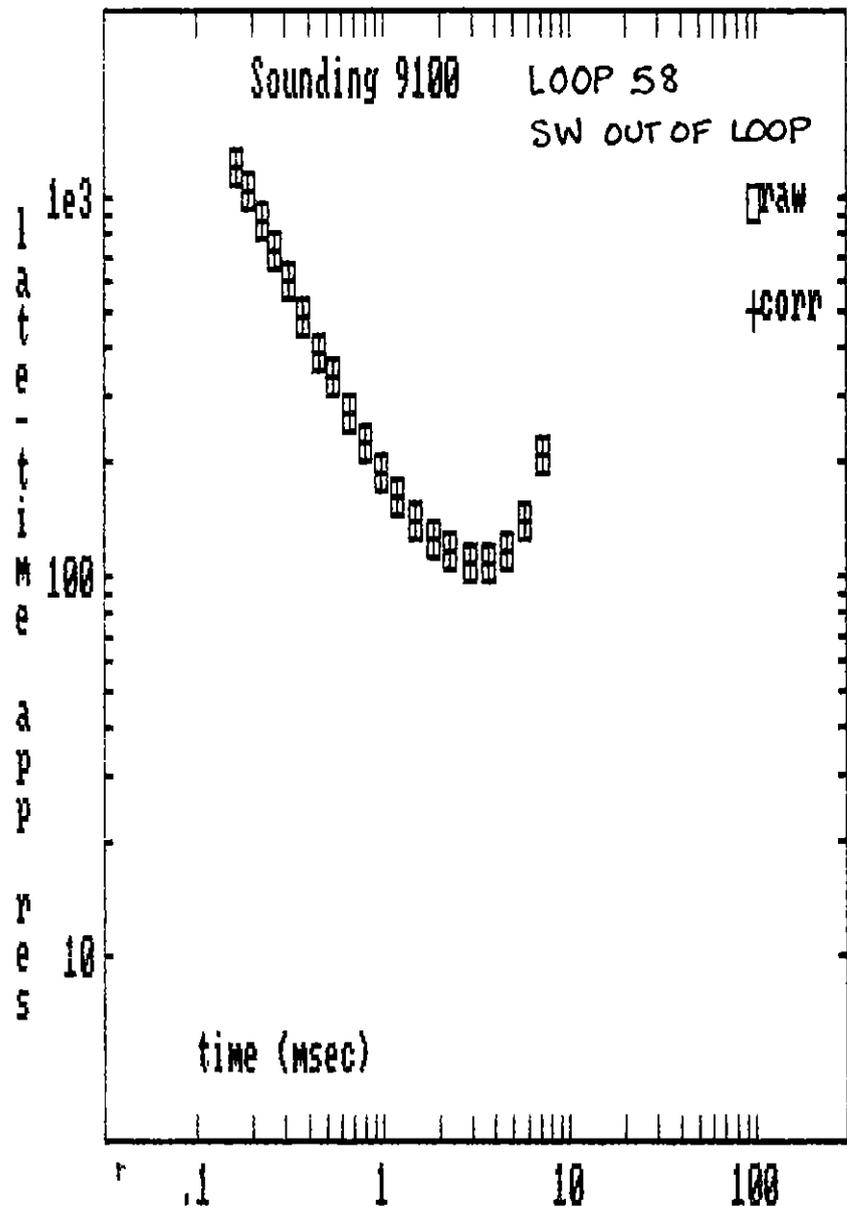
DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

Q values for ch. 1-40 are:



CODE & CLIENT: 123

AREA:

PROJECT & I.D.:

SOUNDING: 9100

CURRENT 28

Tx FREQ 25

LOOP CENTRE: 03400E

Rx LOCATION: 03400E

SURVEYED BY: TEM

A= 200

OFFSET FOR OUT-LOOP RDGS :

DATE: DATE

LOCATION:

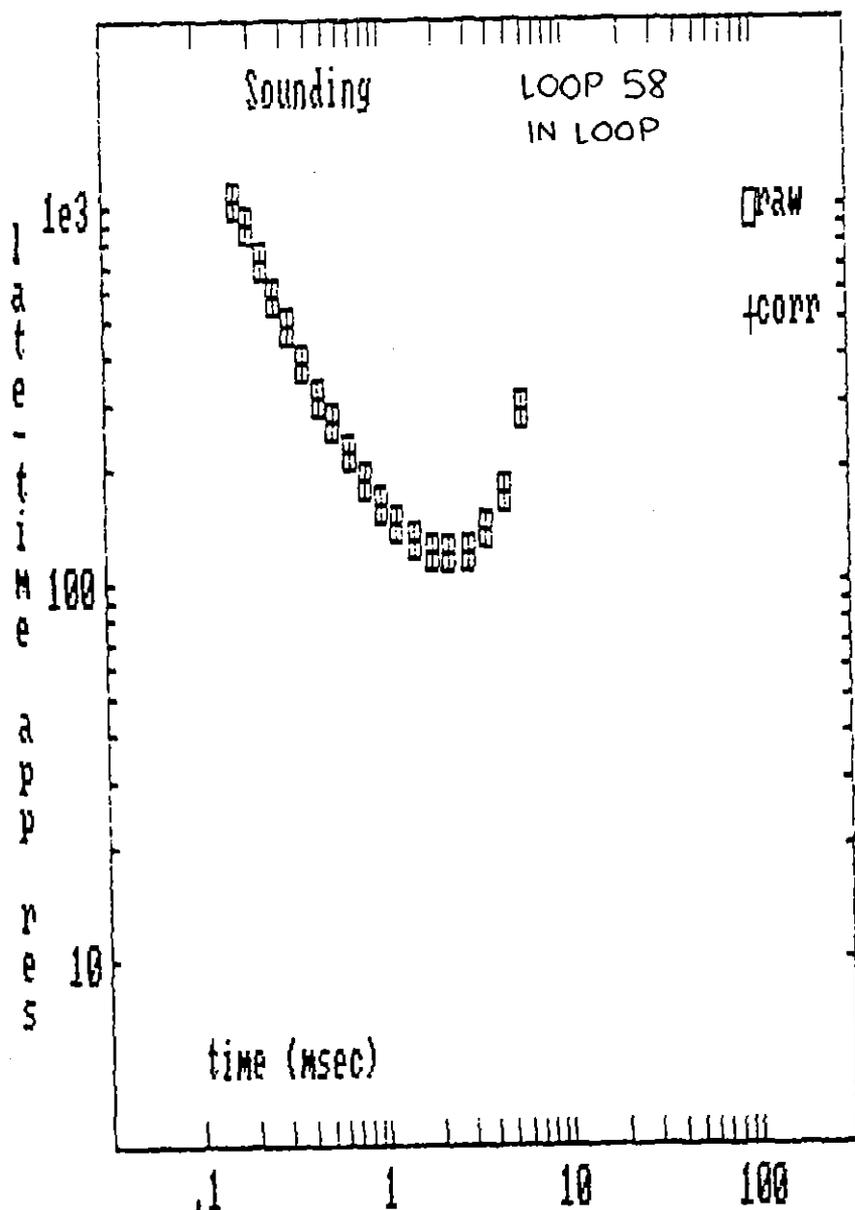
amp. T/O 216
 Hz.
 9100N
 9100N

usec.

B= 200
 0

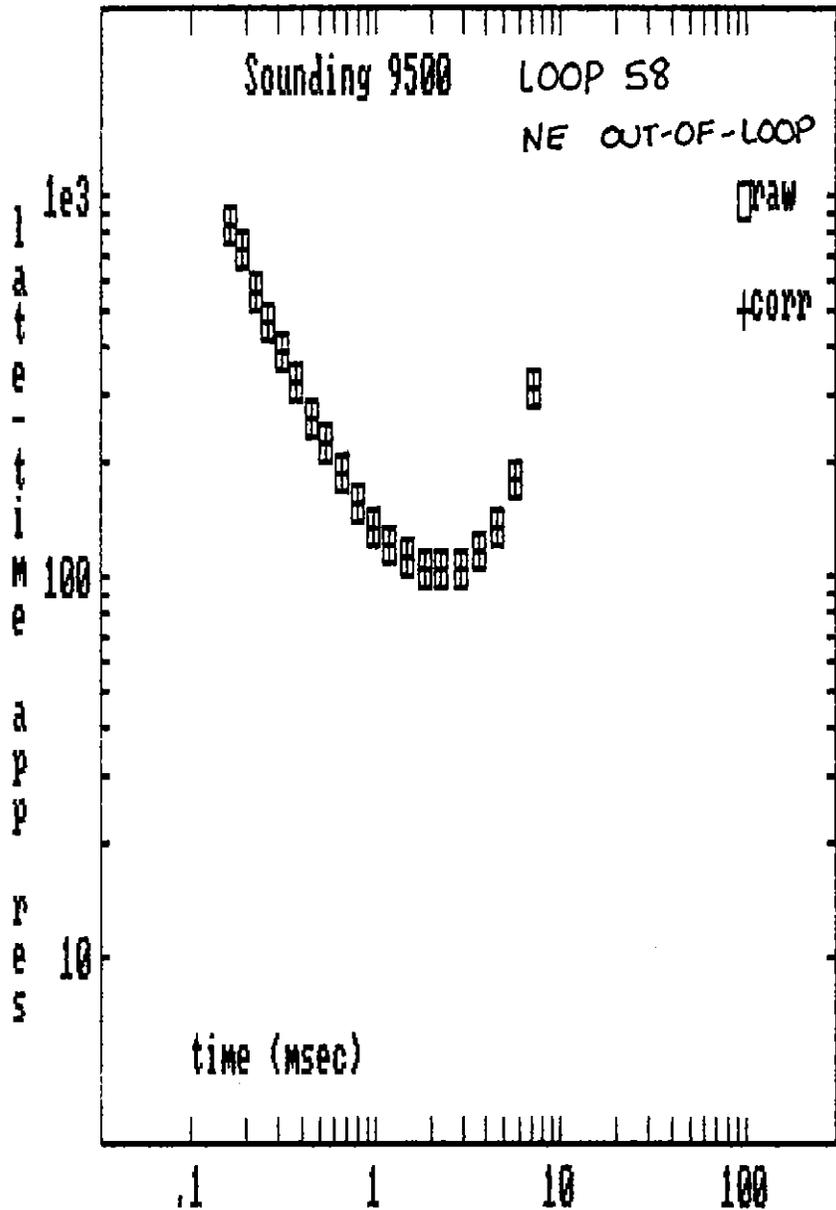
APP. RES. FORMULA IS KAUFMAN
 Q values for ch. 1-40 are:

LATE-TIME FORMULA.



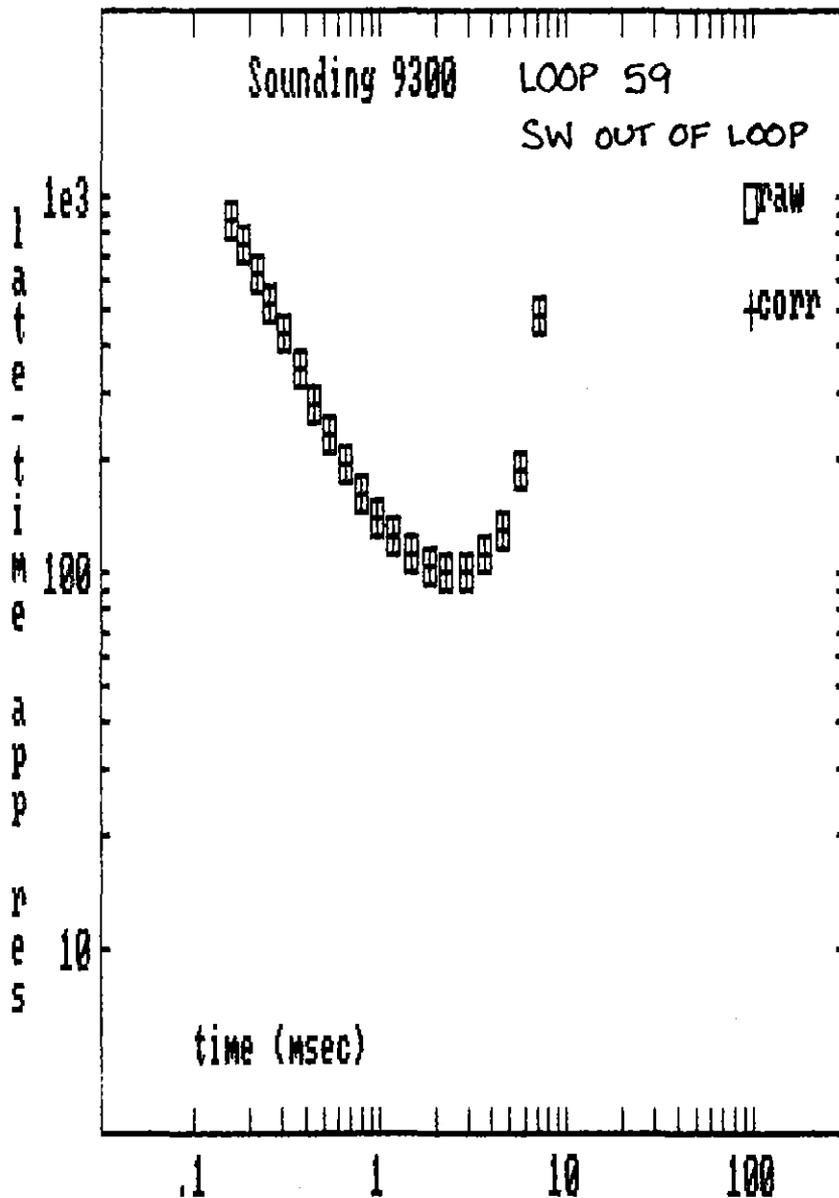
CODE & CLIENT:
 AREA:
 PROJECT & I.D.:
 SOUNDING: 9500
 CURRENT 28 amp. T/O 216 usec.
 Tx FREQ 25 Hz.
 LOOP CENTRE: 03400E 9500N
 Rx LOCATION:
 SURVEYED BY: TEM
 A= 200 . B= 200
 OFFSET FOR OUT-LOOP RDGS : 0
 DATE: DATE
 LOCATION:

APP. RES. FORMULA IS KAUFMAN LATE-TIME FORMULA.
 Q values for ch. 1-40 are:



CODE & CLIENT:
 AREA:
 PROJECT & I.D.:
 SOUNDING: 9300
 CURRENT 19 amp. T/O 202 usec.
 Tx FREQ 25 Hz.
 LOOP CENTRE: 03400E 9300N
 Rx LOCATION:
 SURVEYED BY: TEM
 A= 200 B= 200
 OFFSET FOR OUT-LOOP RDGS : 0
 DATE: DATE
 LOCATION:

APP. RES. FORMULA IS KAUFMAN LATE-TIME FORMULA.
 Q values for ch. 1-40 are:



CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 9500

CURRENT 19 amp. T/O 202 usec.

Tx FREQ 25 Hz.

LOOP CENTRE: 03400E 9500N

Rx LOCATION: 03400E 9500N

SURVEYED BY: TEM

A= 200 . B= 200

OFFSET FOR OUT-LOOP RDGS : 0

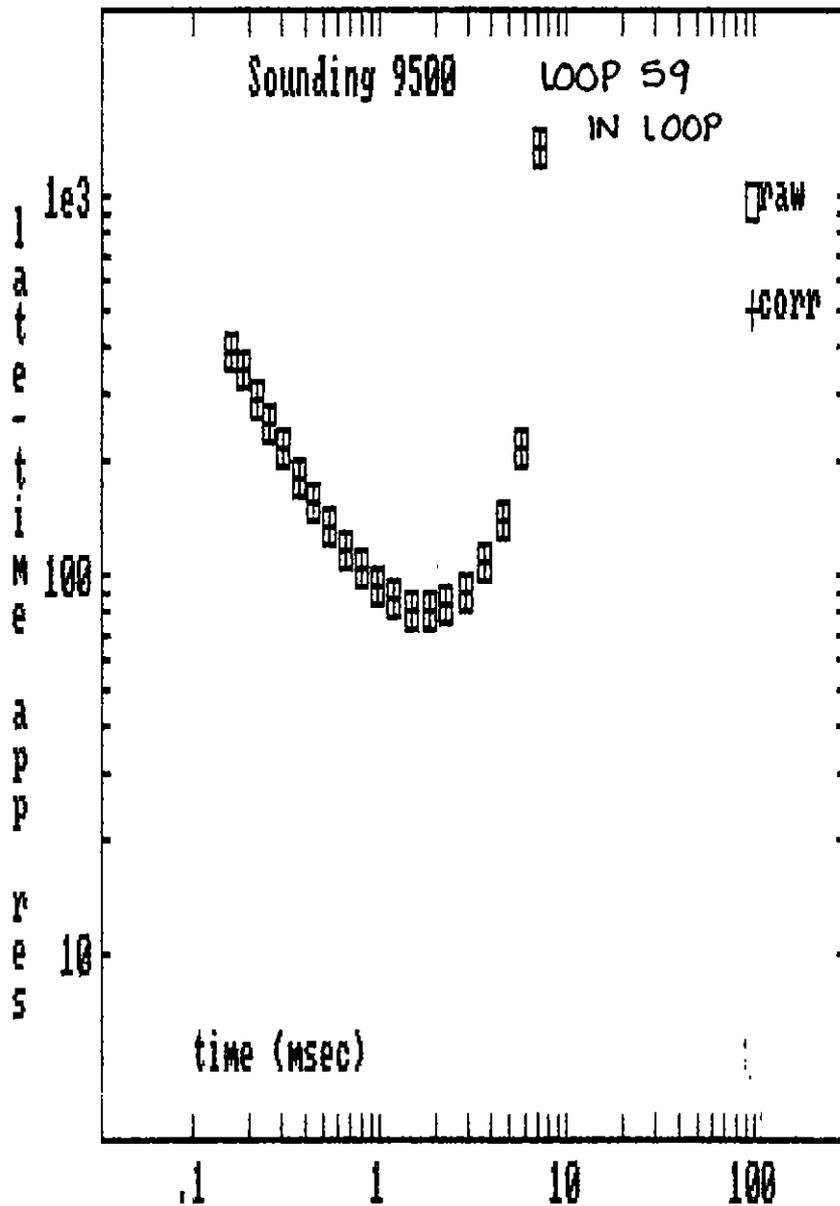
DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

Q values for ch. 1-40 are:



CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 9700

CURRENT 19 amp. T/O 202 usec.

Tx FREQ 25 Hz.

LOOP CENTRE: 03400E 9700N

Rx LOCATION:

SURVEYED BY: TEM

A= 200 B= 200

OFFSET FOR OUT-LOOP RDGS : 0

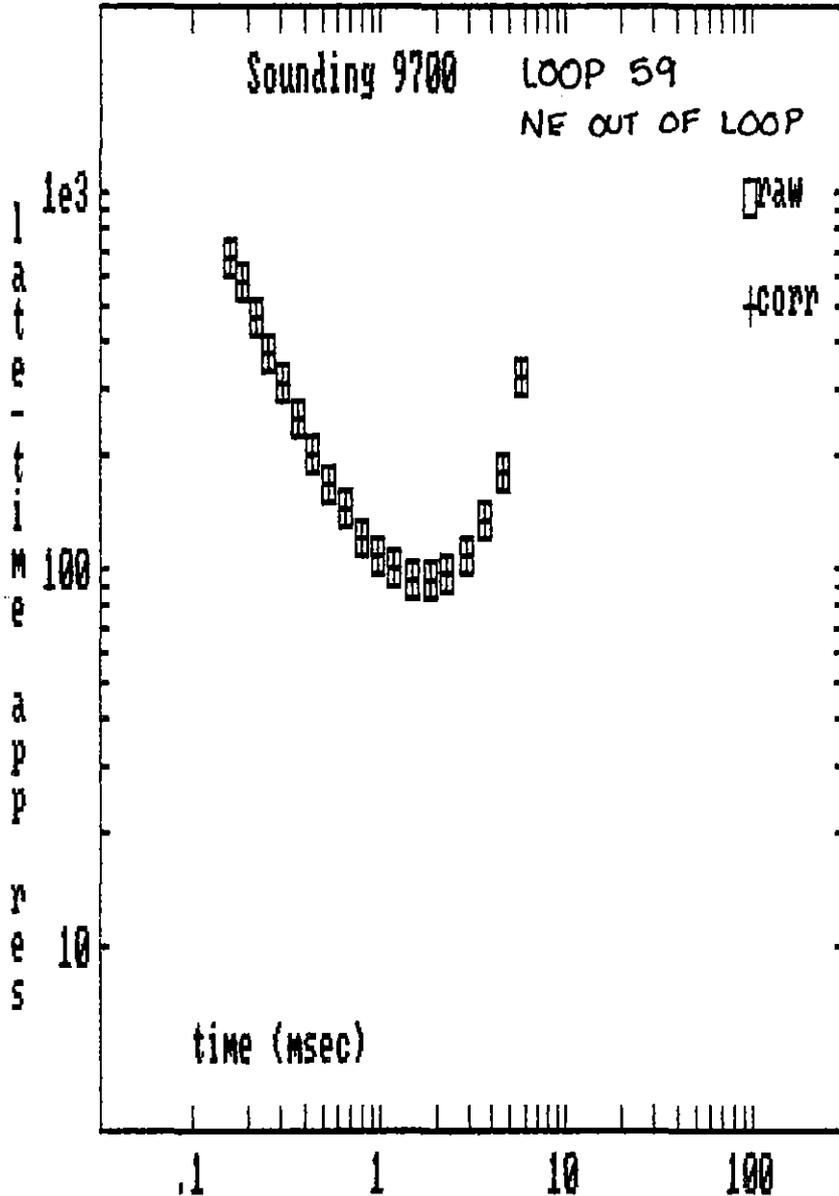
DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN

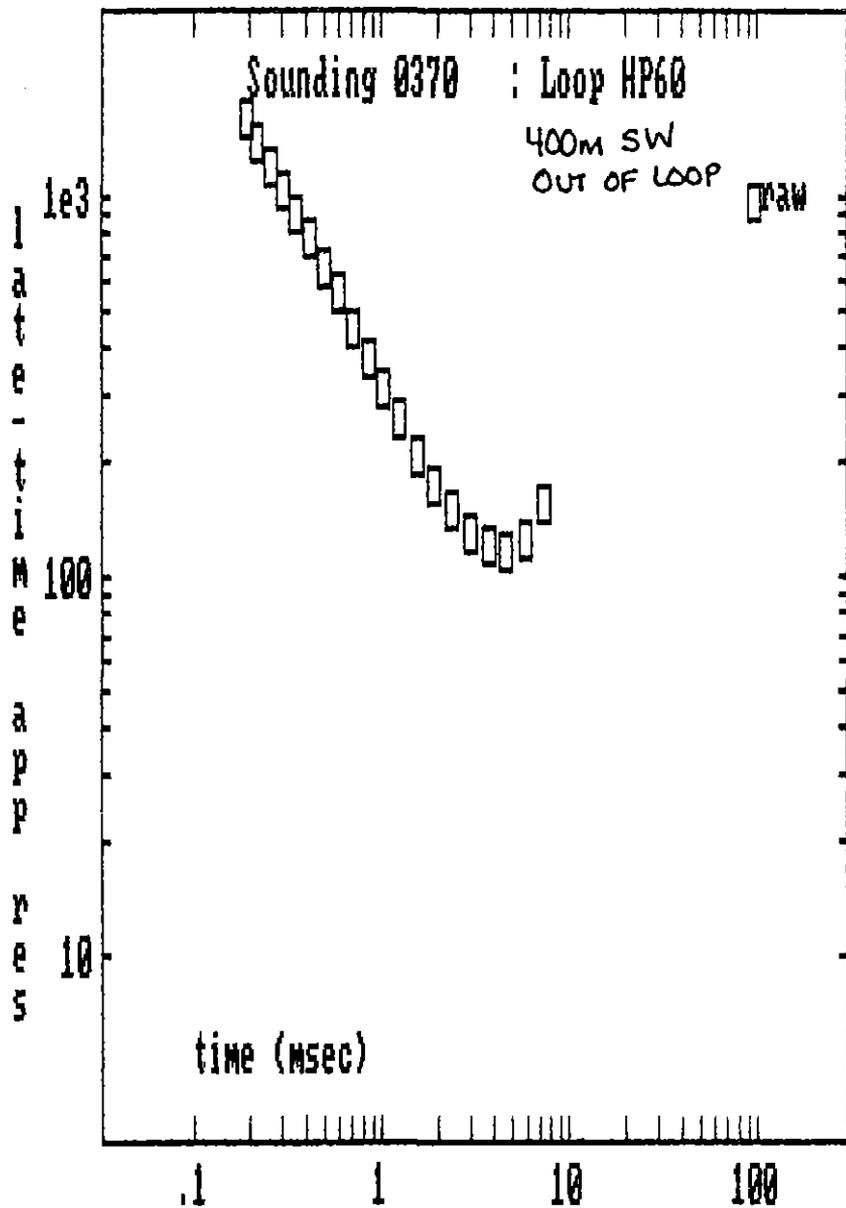
LATE-TIME FORMULA.

Q values for ch. 1-40 are:



CODE & CLIENT:
 AREA:
 PROJECT & I.D.:
 SOUNDING: 0370
 CURRENT 19 amp. T/O 348 usec.
 Tx FREQ 25 Hz.
 LOOP CENTRE: 08200N 03700E
 Rx LOCATION:
 SURVEYED BY: TEM
 A= 400 B= 400
 OFFSET FOR OUT-LOOP RDGS : 0
 DATE: DATE
 LOCATION:

APP. RES. FORMULA IS KAUFMAN LATE-TIME FORMULA.
 Q values for ch. 1-40 are:



CODE & CLIENT: 129

AREA:

PROJECT & I.D.:

SOUNDING: 0370

CURRENT 19

Tx FREQ 25

LOOP CENTRE: 08300N

Rx LOCATION:

SURVEYED BY: TEM

A= 400

OFFSET FOR OUT-LOOP RDGS :

DATE: DATE

LOCATION:

amp. T/O 346

Hz.

03700E

usec.

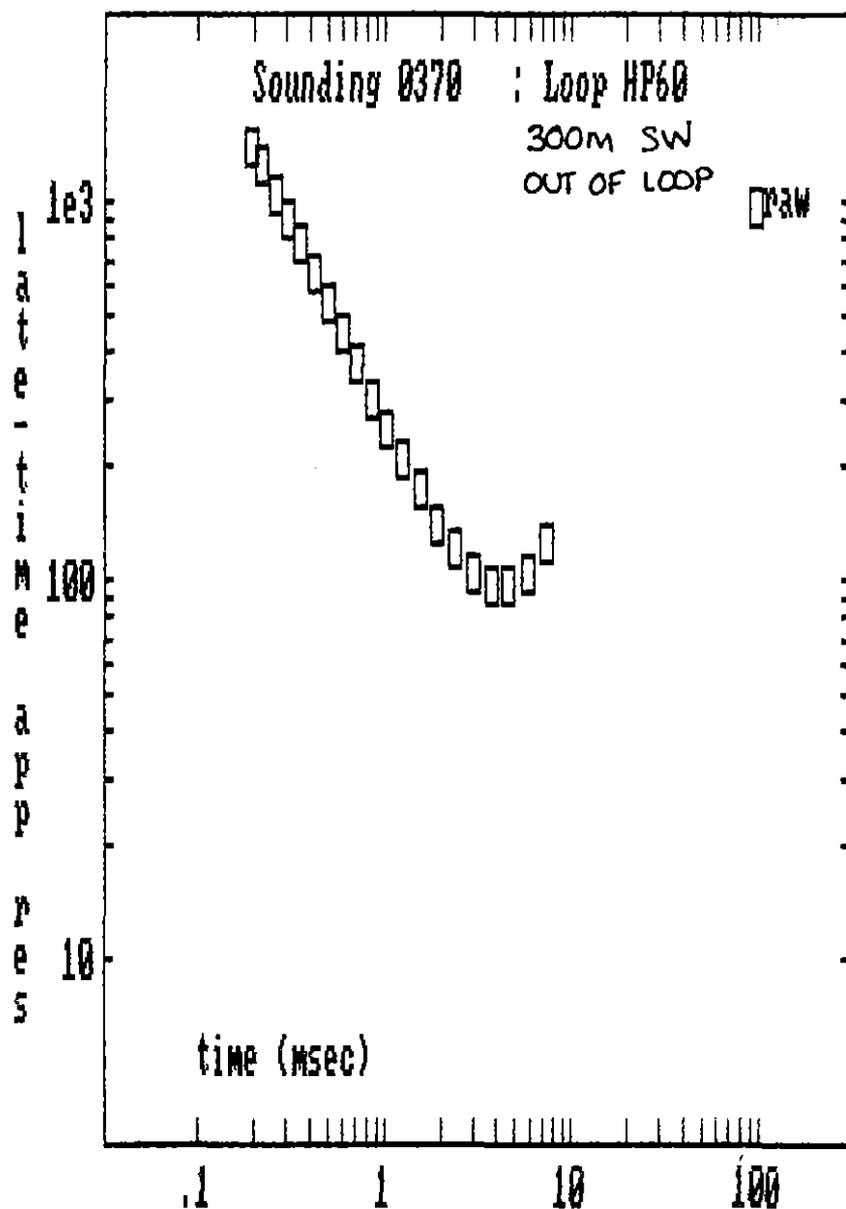
B= 400

0

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

Q values for ch. 1-40 are:



130

CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 0370

CURRENT 19

amp. T/O 346

usec.

Tx FREQ 25

Hz.

LOOP CENTRE: 08600N

03700E

Rx LOCATION:

SURVEYED BY: TEM

A= 400

B=

400

OFFSET FOR OUT-LOOP RDGS : 0

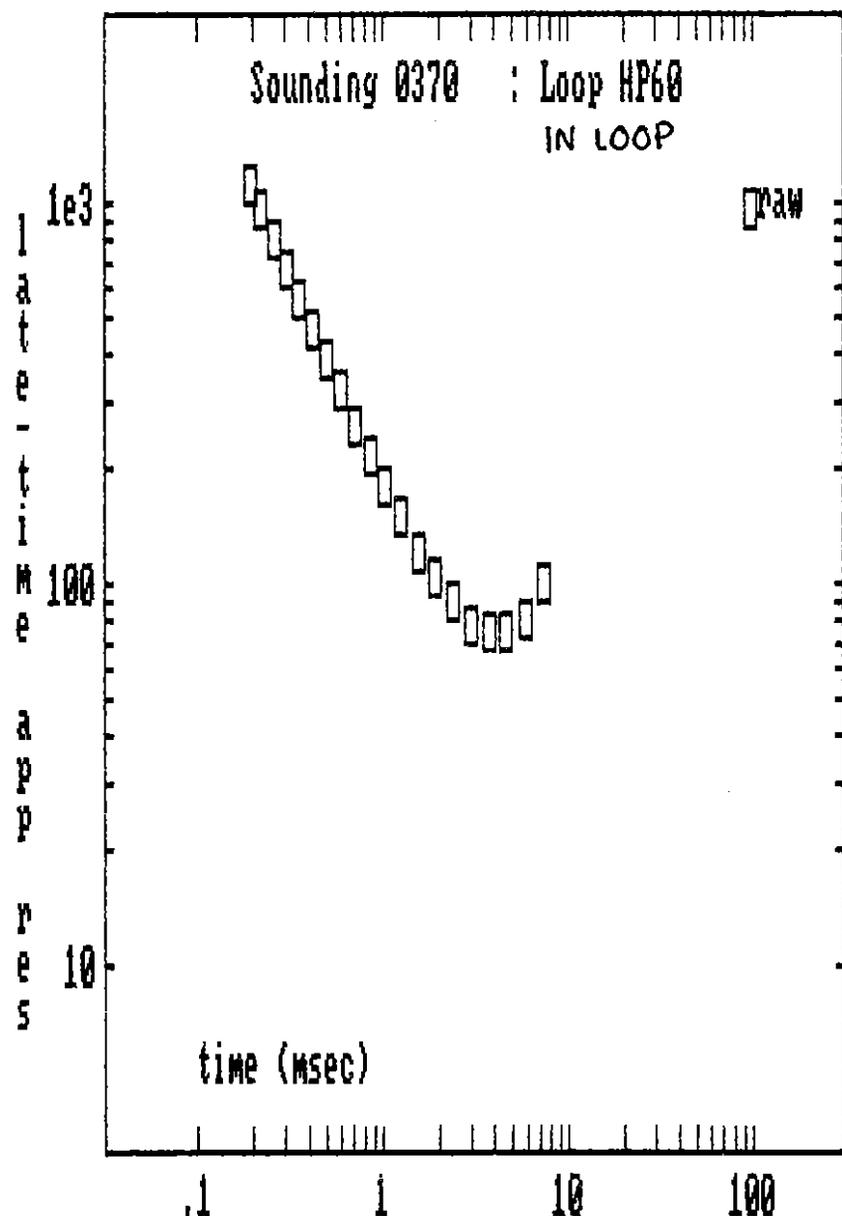
DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

Q values for ch. 1-40 are:



CODE & CLIENT: 131

AREA:

PROJECT & I.D.:

SOUNDING: 0370

CURRENT 19 amp. T/O 346 usec.

Tx FREQ 25 Hz.

LOOP CENTRE: 08900N 03700E

Rx LOCATION:

SURVEYED BY: TEM

A= 400 . B= 400

OFFSET FOR OUT-LOOP RDGS : 0

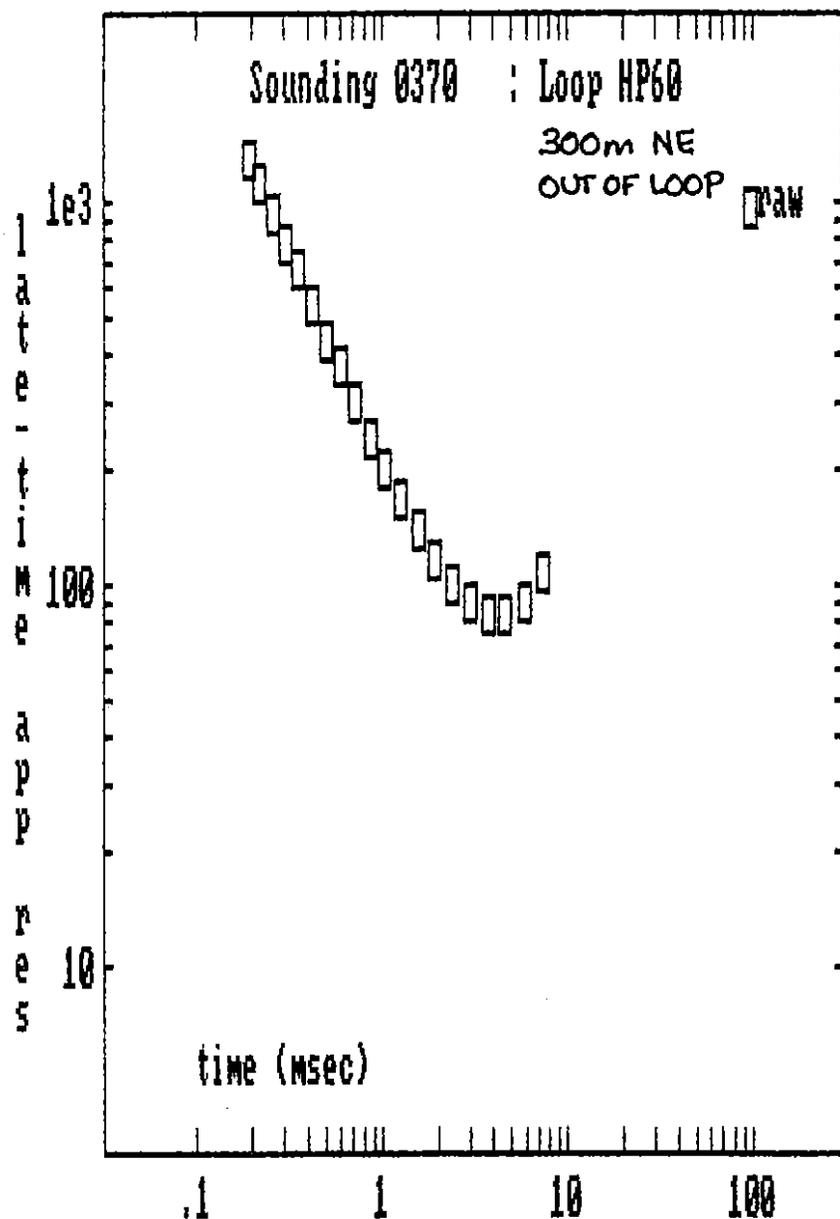
DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN

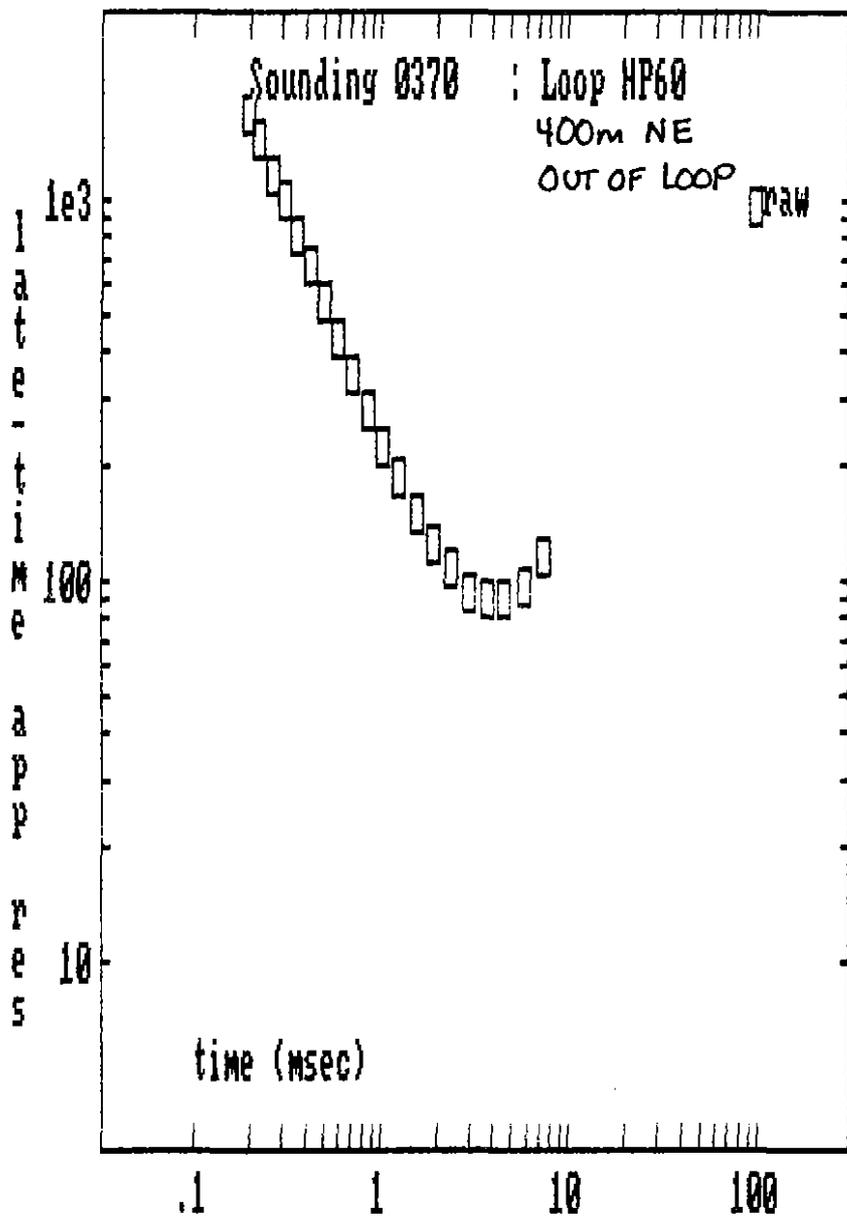
LATE-TIME FORMULA.

Q values for ch. 1-40 are:



CODE & CLIENT:
 AREA:
 PROJECT & I.D.:
 SOUNDING: 0370
 CURRENT 19 amp. T/O 346 usec.
 Tx FREQ 25 Hz.
 LOOP CENTRE: 09000N 03700E
 Rx LOCATION:
 SURVEYED BY: TEM
 A= 400 B= 400
 OFFSET FOR OUT-LOOP RDGS : 0
 DATE: DATE
 LOCATION:

APP. RES. FORMULA IS KAUFMAN LATE-TIME FORMULA.
 Q values for ch. 1-40 are:



C 133

CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 8700

CURRENT 20

amp. T/O 346

usec.

Tx FREQ 6.25

Hz.

LOOP CENTRE: 03300E

8700N

Rx LOCATION:

SURVEYED BY: TEM

A= 400

B= 400

OFFSET FOR OUT-LOOP RDGS :

0

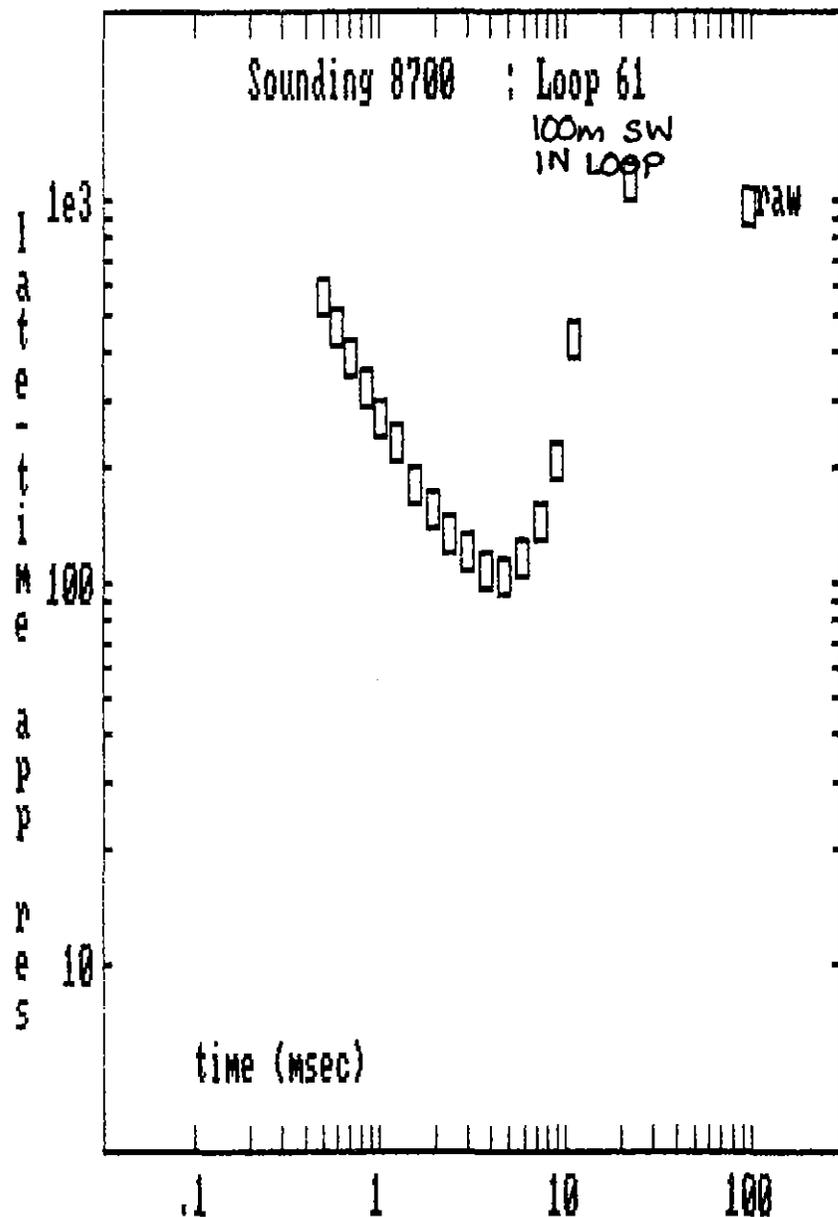
DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

Q values for ch. 1-40 are:



CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 8800

CURRENT 20 amp. T/O 346 usec.

Tx FREQ 6.25 Hz.

LOOP CENTRE: 03300E 8800N

Rx LOCATION: 03300E 8800N

SURVEYED BY: TEM

A= 400 B= 400

OFFSET FOR OUT-LOOP RDGS : 0

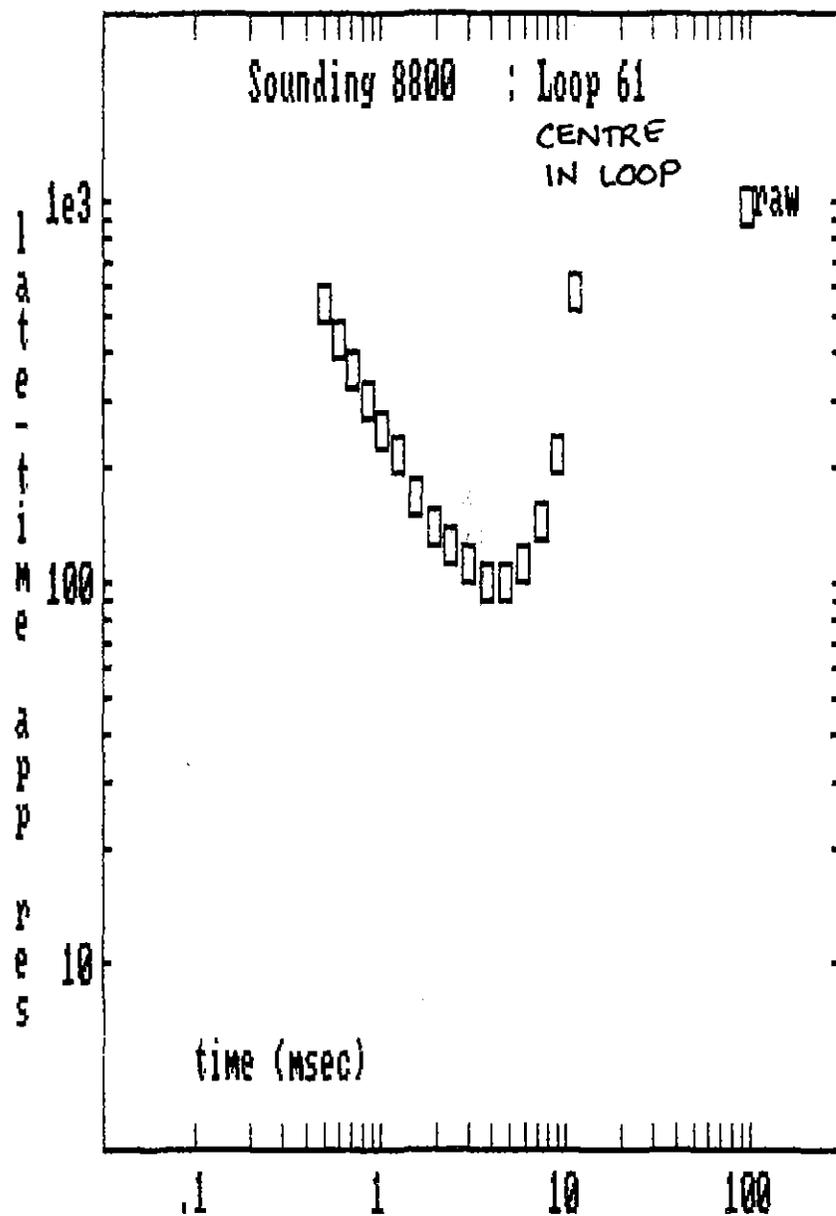
DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN

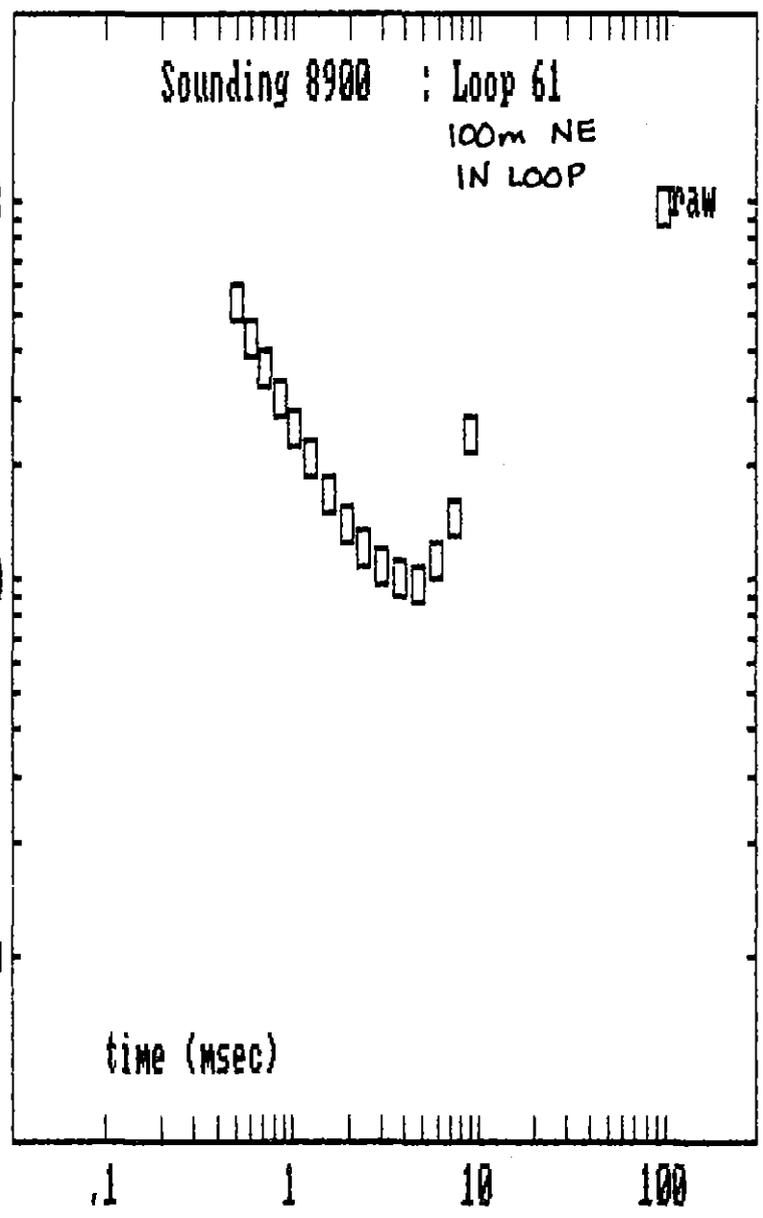
LATE-TIME FORMULA.

Q values for ch. 1-40 are:



CODE & CLIENT:
 AREA:
 PROJECT & I.D.:
 SOUNDING: 8900
 CURRENT 20 amp. T/O 346 usec.
 Tx FREQ 6.25 Hz.
 LOOP CENTRE: 03300E 8900N
 Rx LOCATION:
 SURVEYED BY: TEM
 A= 400 B= 400
 OFFSET FOR OUT-LOOP RDGS : 0
 DATE: DATE
 LOCATION:

APP. RES. FORMULA IS KAUFMAN LATE-TIME FORMULA.
 Q values for ch. 1-40 are:



136

CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 9100

CURRENT 20 amp. T/O 346 usec.

Tx FREQ 6.25 Hz.

LOOP CENTRE: 03300E 9100N

Rx LOCATION:

SURVEYED BY: TEM

A= 400 B= 400

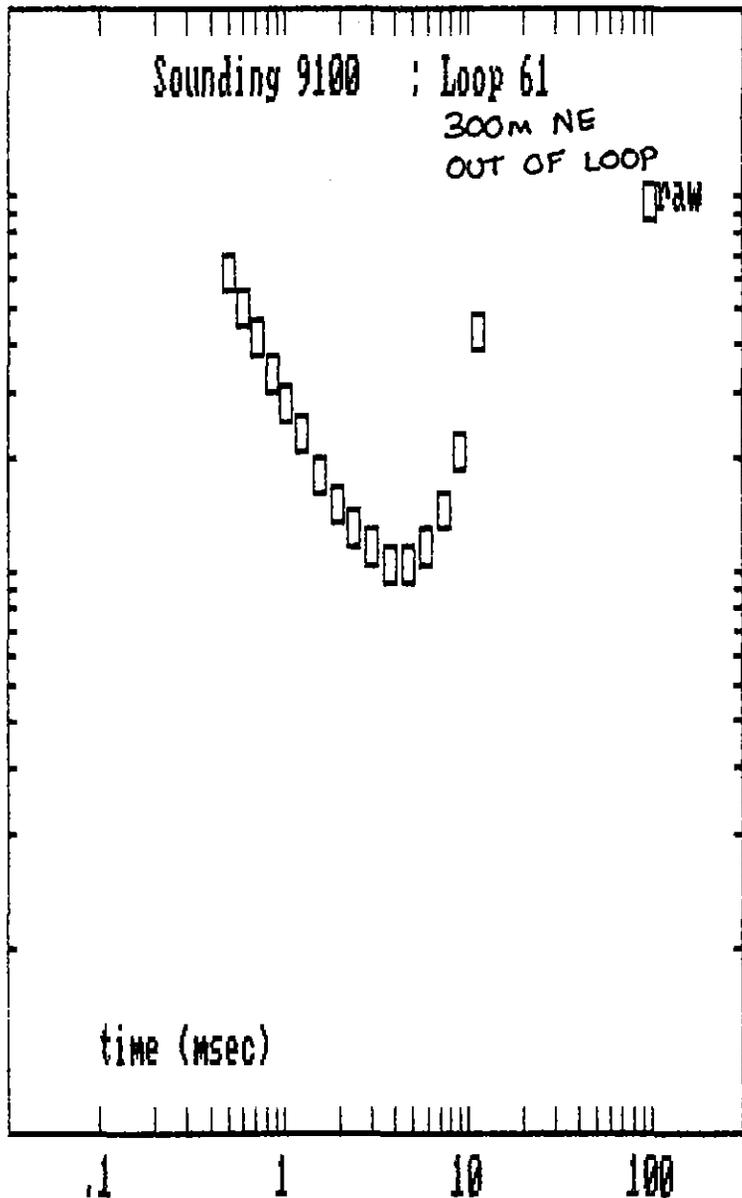
OFFSET FOR OUT-LOOP RDGS : 0

DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN LATE-TIME FORMULA.

Q values for ch. 1-40 are:

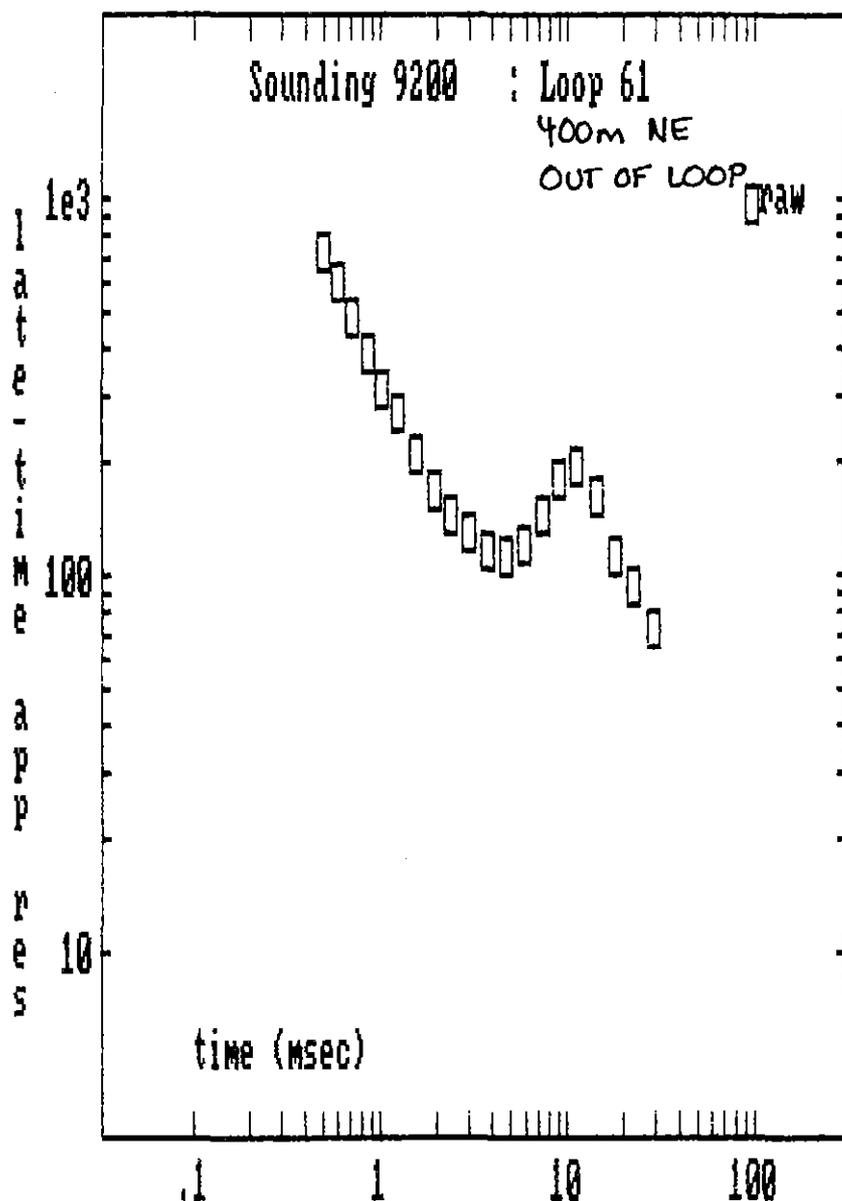


late-time app res

time (msec)

CODE & CLIENT: 137
 AREA:
 PROJECT & I.D.:
 SOUNDING: 9200
 CURRENT 20 amp. T/O 346 usec.
 Tx FREQ 6.25 Hz.
 LOOP CENTRE: 03300E 9200N
 Rx LOCATION:
 SURVEYED BY: TEM
 A= 400 B= 400
 OFFSET FOR OUT-LOOP RDGS : 0
 DATE: OATE
 LOCATION:

APP. RES. FORMULA IS KAUFMAN LATE-TIME FORMULA.
 Q values for ch. 1-40 are:



CODE & CLIENT: 138

AREA:

PROJECT & I.D.:

SOUNDING: 8800

CURRENT 20 amp. T/O 336 usec.

Tx FREQ 6.25 Hz.

LOOP CENTRE: 03300E 8800N

Rx LOCATION:

SURVEYED BY: TEM

A= 400 . B= 400

OFFSET FOR OUT-LOOP RDGS : 0

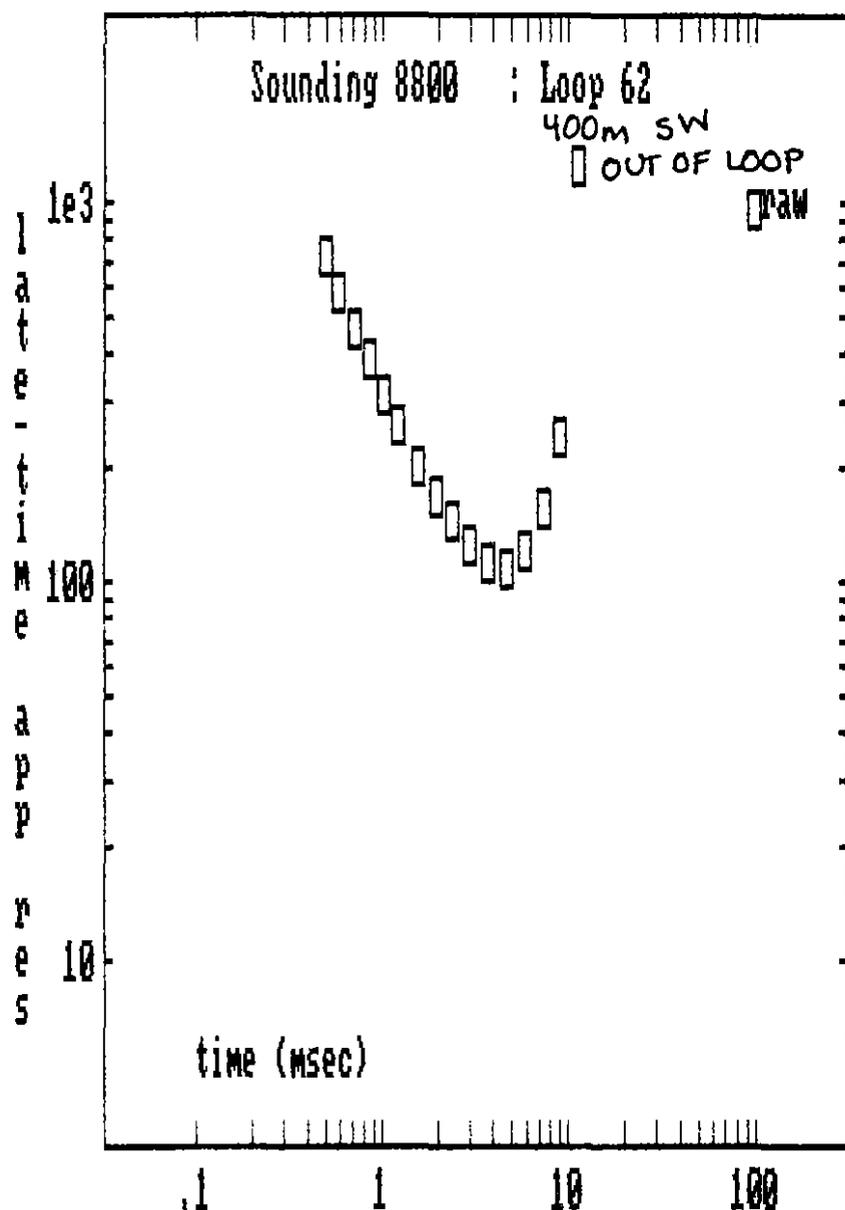
DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

Q values for ch. 1-40 are:



CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 8900

CURRENT 20 amp. T/O 336 usec.

Tx FREQ 6.25 Hz.

LOOP CENTRE: 03300E 8900N

Rx LOCATION:

SURVEYED BY: TEM

A= 400 . B= 400

OFFSET FOR OUT-LOOP RDGS : 0

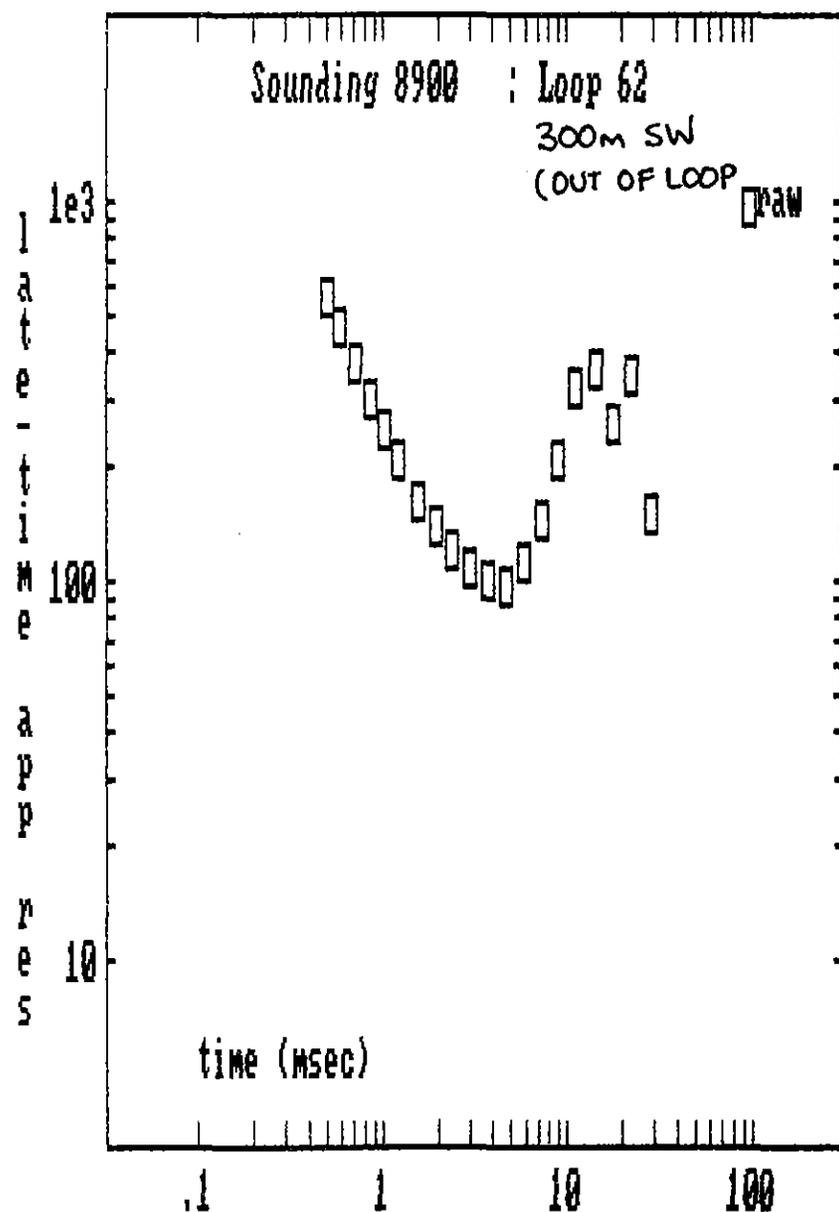
DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN

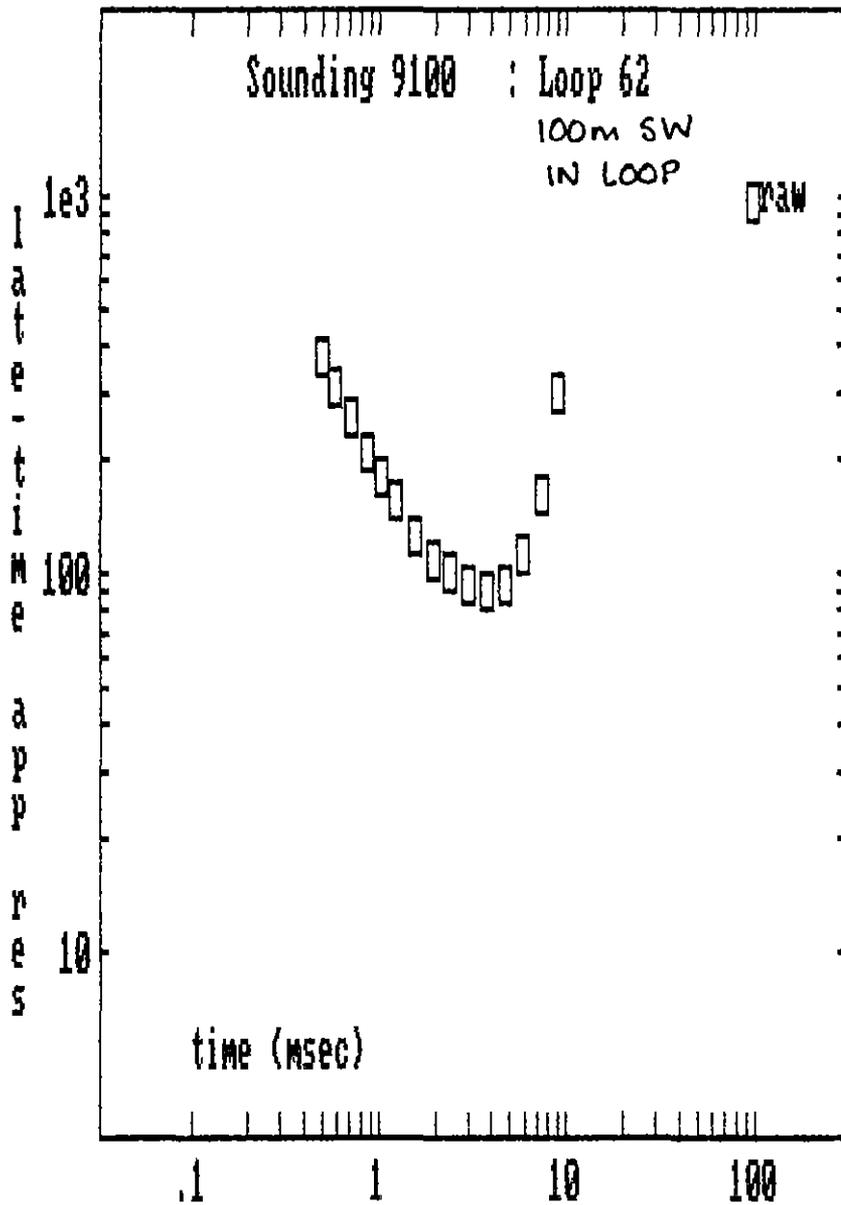
LATE-TIME FORMULA.

Q values for ch. 1-40 are:



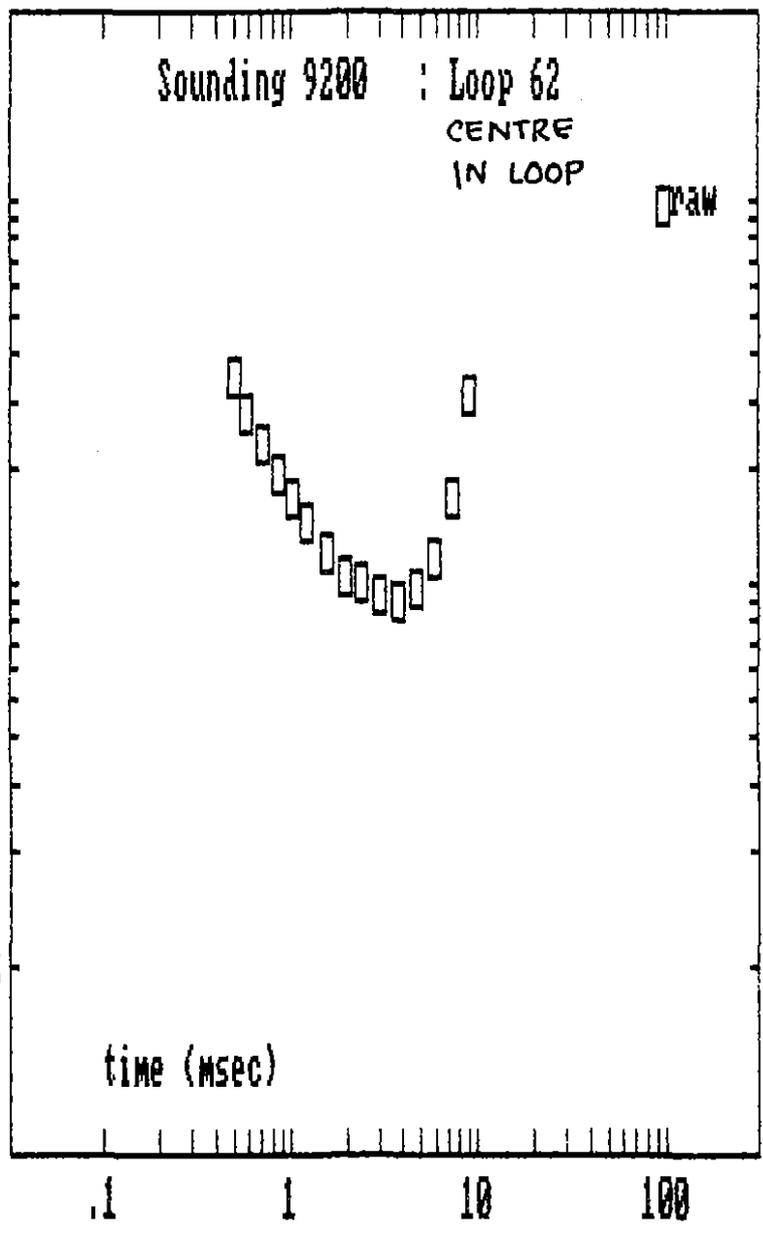
CODE & CLIENT: 01 140
 AREA:
 PROJECT & I.D.:
 SOUNDING: 9100
 CURRENT 20 amp. T/O 336 usec.
 Tx FREQ 6.25 Hz.
 LOOP CENTRE: 03300E 9100N
 Rx LOCATION:
 SURVEYED BY: TEM
 A= 400 . B= 400
 OFFSET FOR OUT-LOOP RDGS : 0
 DATE: DATE
 LOCATION:

APP. RES. FORMULA IS KAUFMAN LATE-TIME FORMULA.
 Q values for ch. 1-40 are:



CODE & CLIENT: 141
 AREA:
 PROJECT & I.D.:
 SOUNDING: 9200
 CURRENT 20 amp. T/O 336 usec.
 Tx FREQ 6.25 Hz.
 LOOP CENTRE: 03300E 9200N
 Rx LOCATION: 03300E 9200N
 SURVEYED BY: TEM
 A= 400 B= 400
 OFFSET FOR OUT-LOOP RDGS : 0
 DATE: DATE
 LOCATION:

APP. RES. FORMULA IS KAUFMAN LATE-TIME FORMULA.
 Q values for ch. 1-40 are:



CODE & CLIENT:

AREA:

PROJECT & I.D.:

SOUNDING: 9300

CURRENT 20 amp. T/O 336 usec.

Tx FREQ 6.25 Hz.

LOOP CENTRE: 03300E 9300N

Rx LOCATION:

SURVEYED BY: TEM

A= 400 B= 400

OFFSET FOR OUT-LOOP RDGS : 0

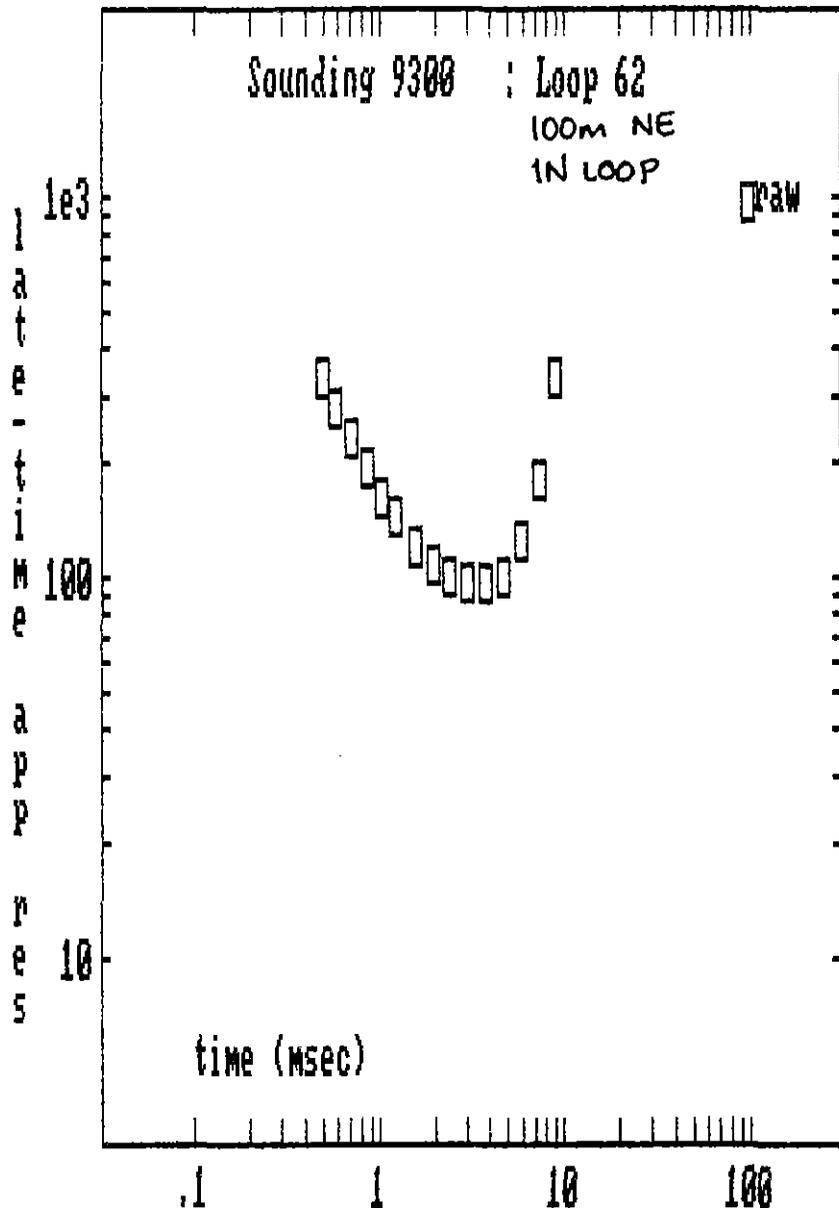
DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

Q values for ch. 1-40 are:



CODE & CLIENT:

AREA:

PROJECT & I.D.: 143

SOUNDING: 9500

CURRENT 20 amp. T/O 336 usec.

Tx FREQ 6.25 Hz.

LOOP CENTRE: 03300E 9500N

Rx LOCATION:

SURVEYED BY: TEM

A= 400 B= 400

OFFSET FOR OUT-LOOP RDGS : 0

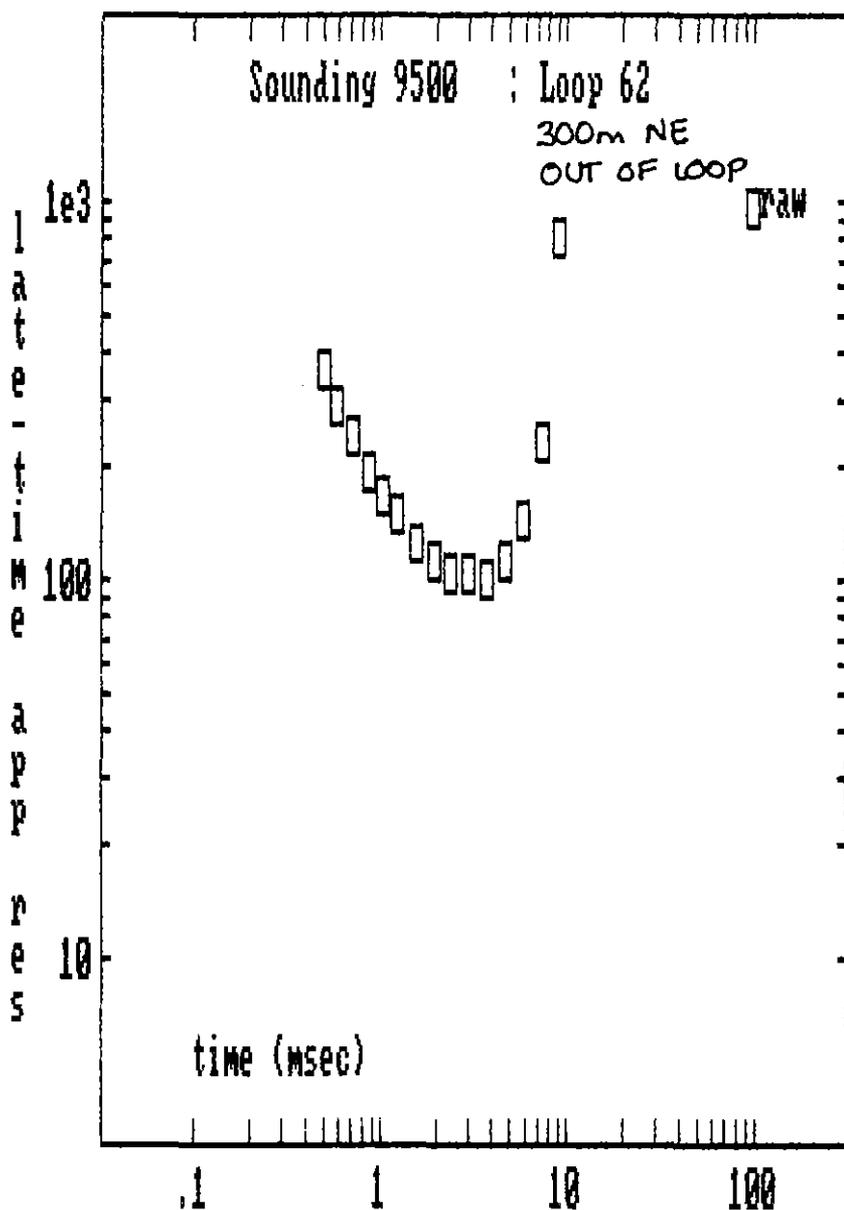
DATE: DATE

LOCATION:

APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

Q values for ch. 1-40 are:



CODE & CLIENT: (144

AREA:

PROJECT & I.D.:

SOUNDING: 9600

CURRENT 20

amp. T/O 336

usec.

Tx FREQ 6.25

Hz.

LOOP CENTRE: 03300E

9600N

Rx LOCATION:

SURVEYED BY: TEM

A= 400

B= 400

OFFSET FOR OUT-LOOP RDGS :

0

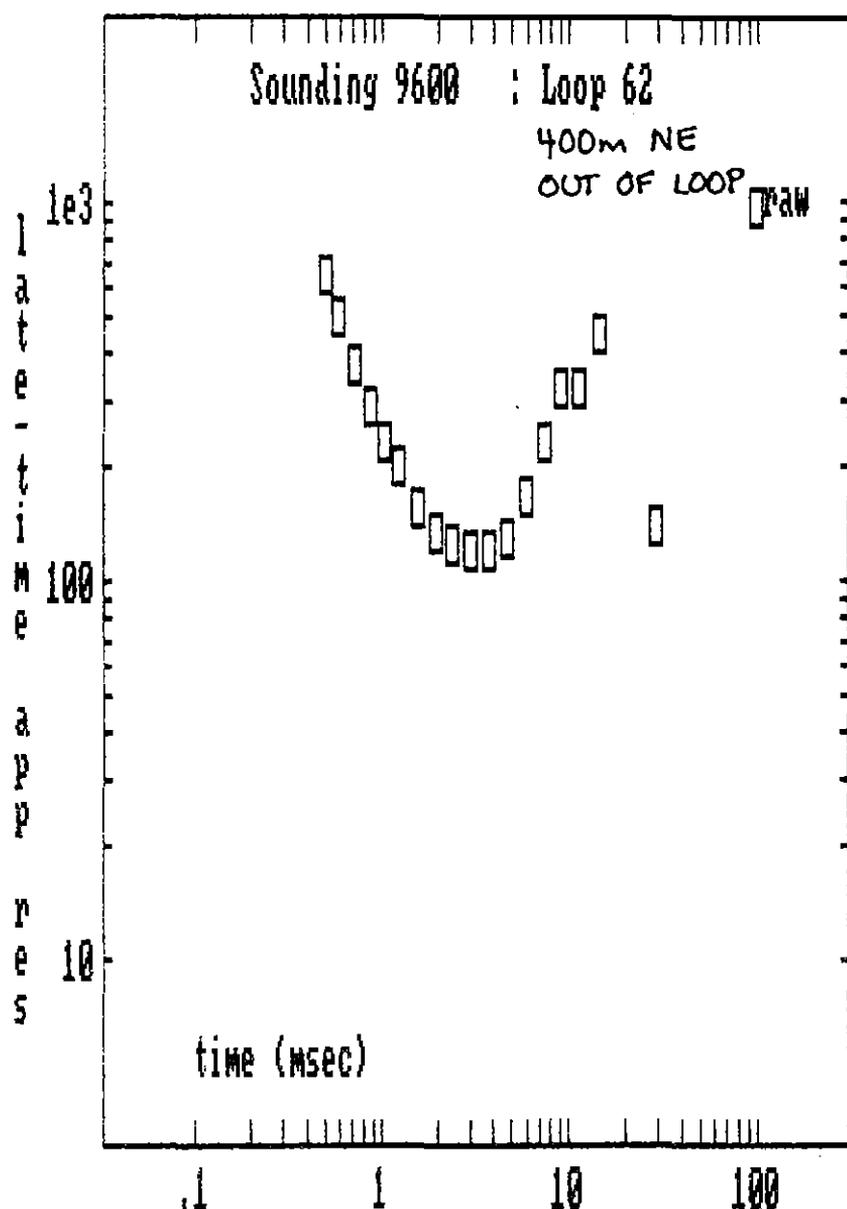
DATE: DATE

LOCATION:

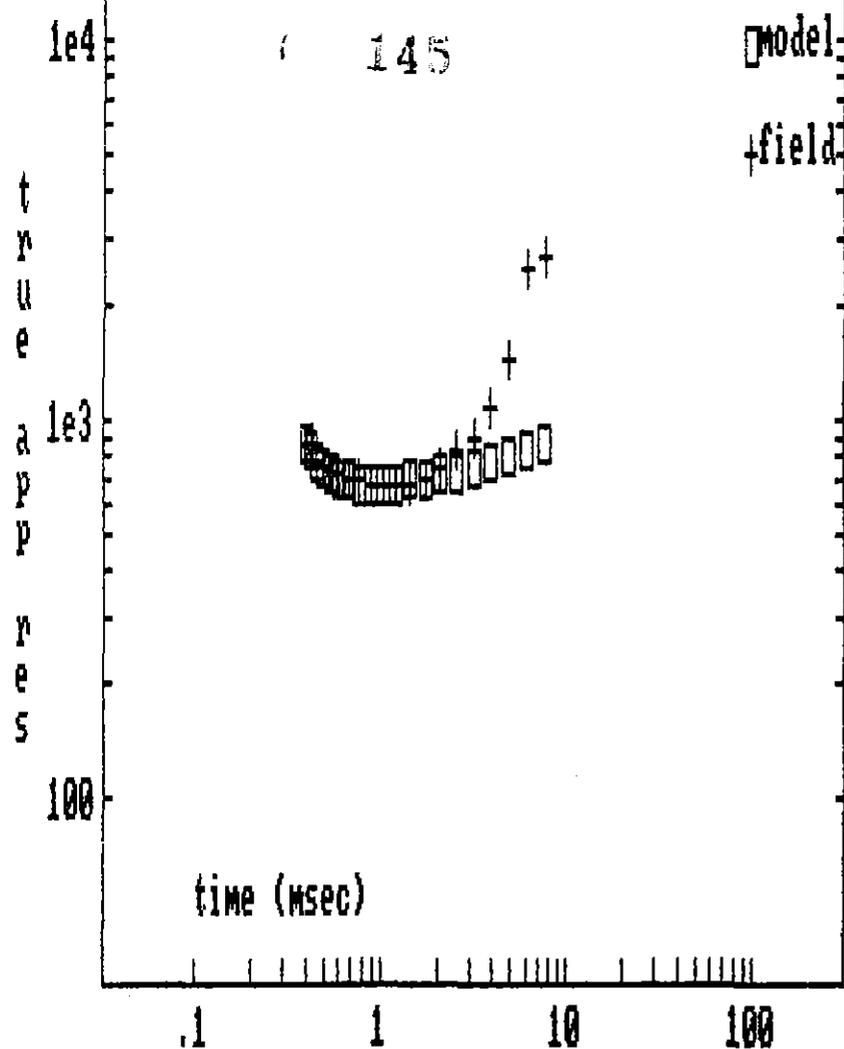
APP. RES. FORMULA IS KAUFMAN

LATE-TIME FORMULA.

Q values for ch. 1-40 are:



Sounding 0050 : Ver F6 : Vers. F6



SOUNDING: 0050 : Vers F6
 0050 : , 07800N, 03800E.
 LOOP CORR A5/A8 ELEC MODEL E/W 3LYR 13PTS

0050AF

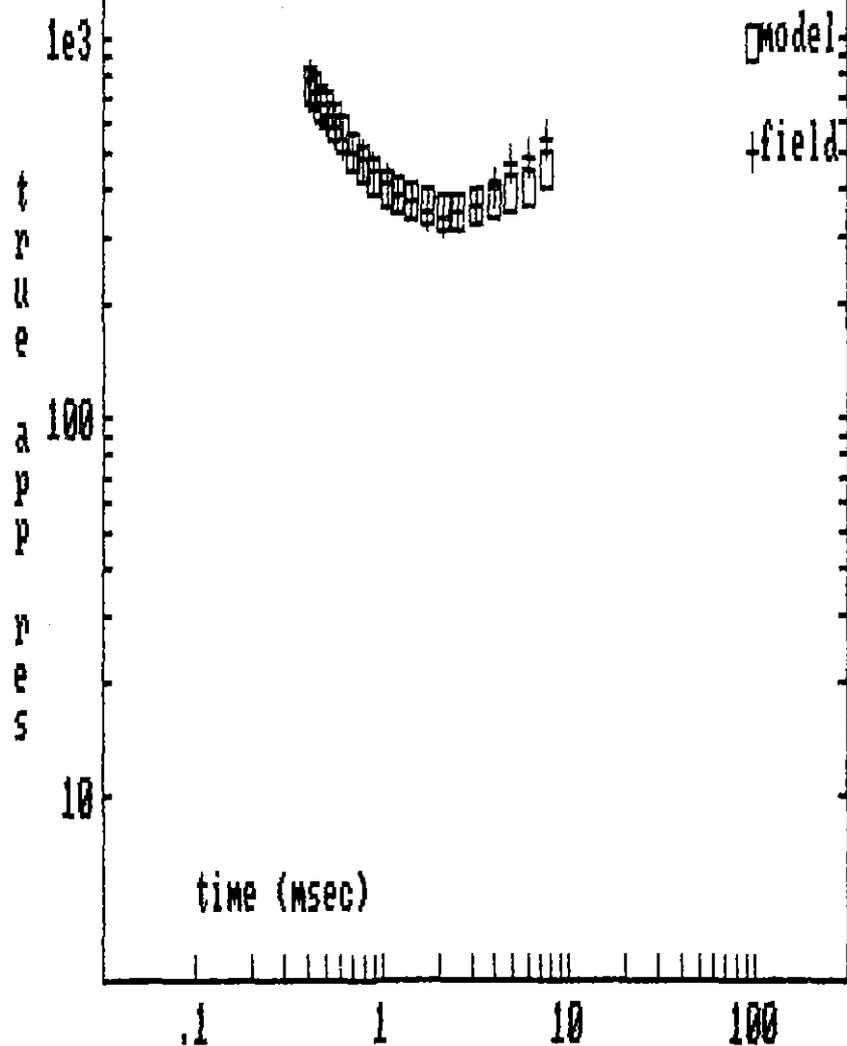
* 948 ohm.m	* 241 m.	* 946
----- 241 m.		
* 455 ohm.m	255 m.	* 455
----- * 496 m.		
* 976 ohm.m		* 976

STD ERR= 1.3% : S= 1 S

E- 1%
 S- 15

146

Sounding 0051 : Ver E2 : Vers. E2



SOUNDING: 0051 : Vers E2
 0051 : , 08000N, 03800E.
 LOOP CORR AS ELEC MODEL N/S 3LYR 14 PTS

0051AE

* 771 ohm.m * 280 m.

* 771

-----* 280 m.

* 205 ohm.m * 381 m.

* 205

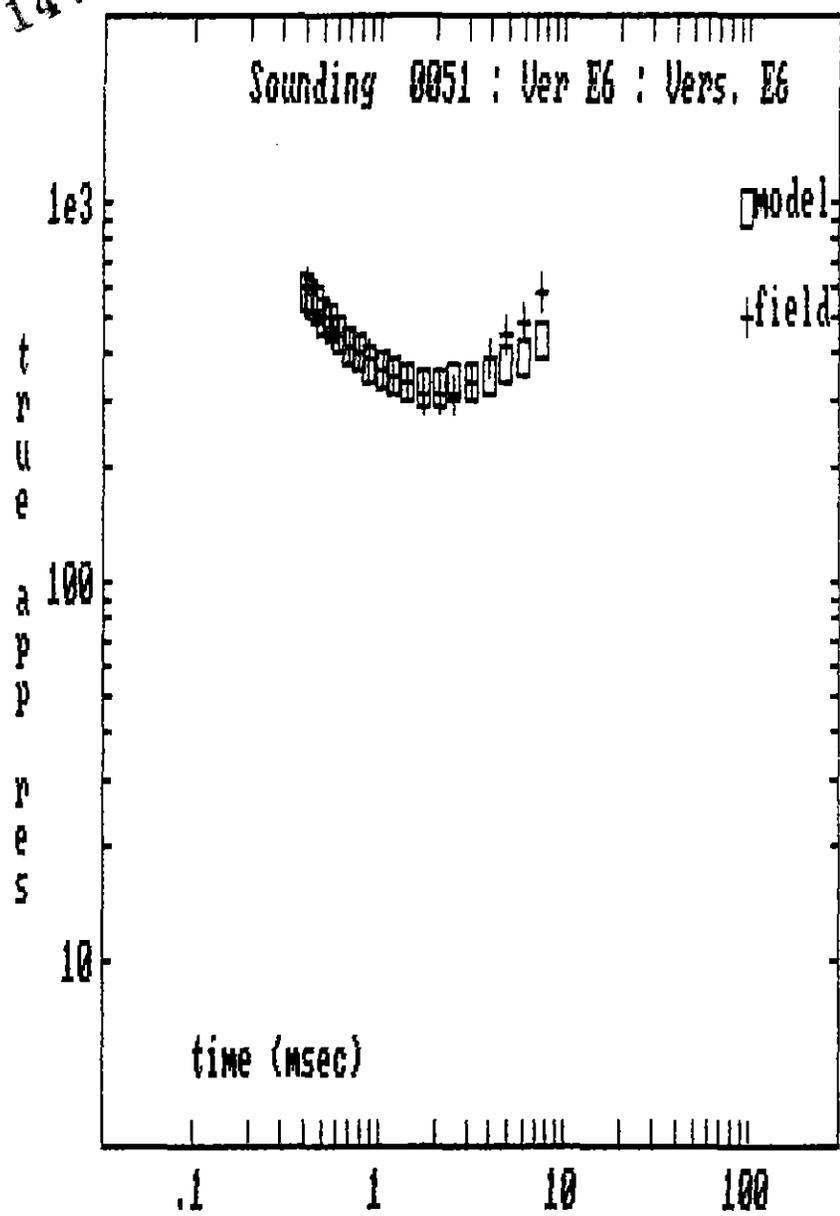
-----* 661 m.

(988 ohm.m)

E= 3%

~~988~~

STD ERR= 3.4% : 9- 2 S



SOUNDING: 0051 : Vers E6
 0051 : , 0800N, 03800E.
 LOOP CORR A3 ELEC MODEL E/W 3LYR 13 PTS

0051AE

* 624 ohm.m * 232 m.

* 624

* 232 m.

* 217 ohm.m * 398 m.

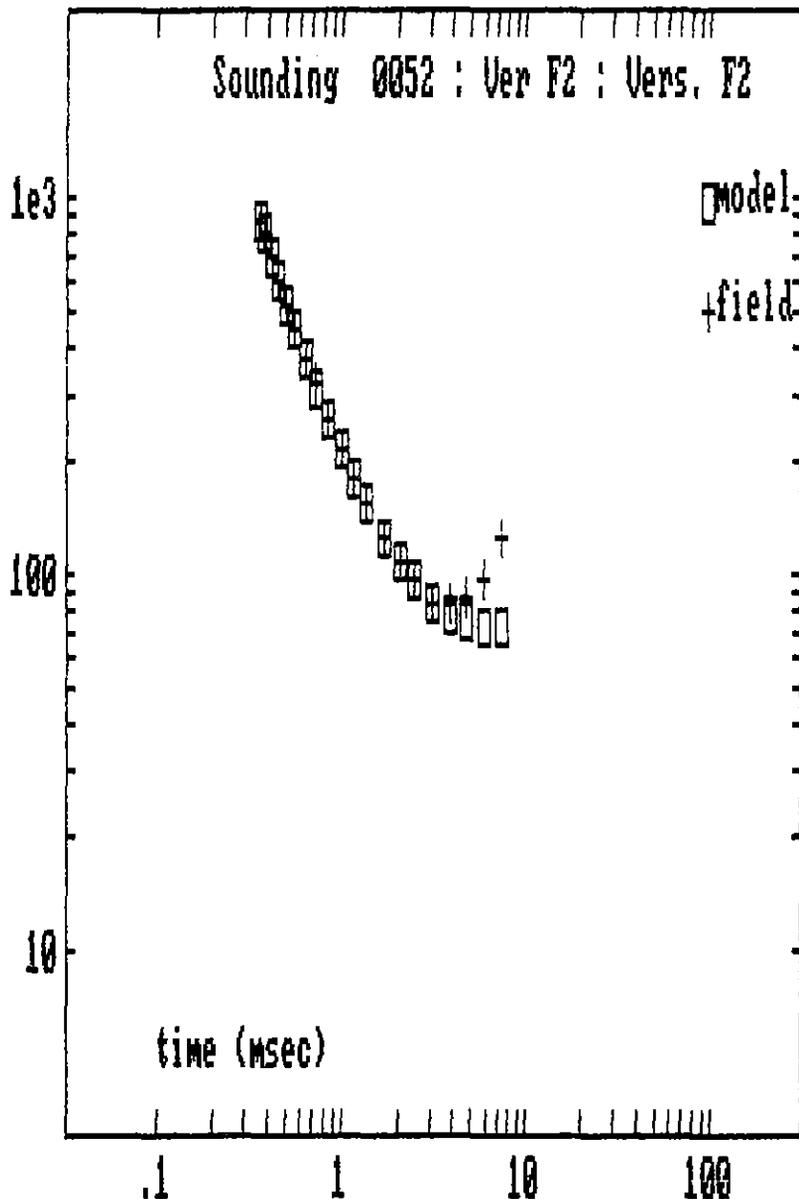
* 217

* 830 m.

(919 ohm.m)

9%
8-819
ES

STD ERR- 2.7% : 9- 2 3



SOUNDING: 0052 : Vers F2
 0052 : , 03800E, 08300N.
 LOOP CORR E1 MODEL 3LYR 14PTS

0052AF

* 748 ohm.m * 272 m.

* 743

* 272 m.

* 21.8 ohm.m * 198 m.

* 21.5

* 468 m.

(497 ohm.m)

(4071

STD ERR- 1.8% : S- 9 3

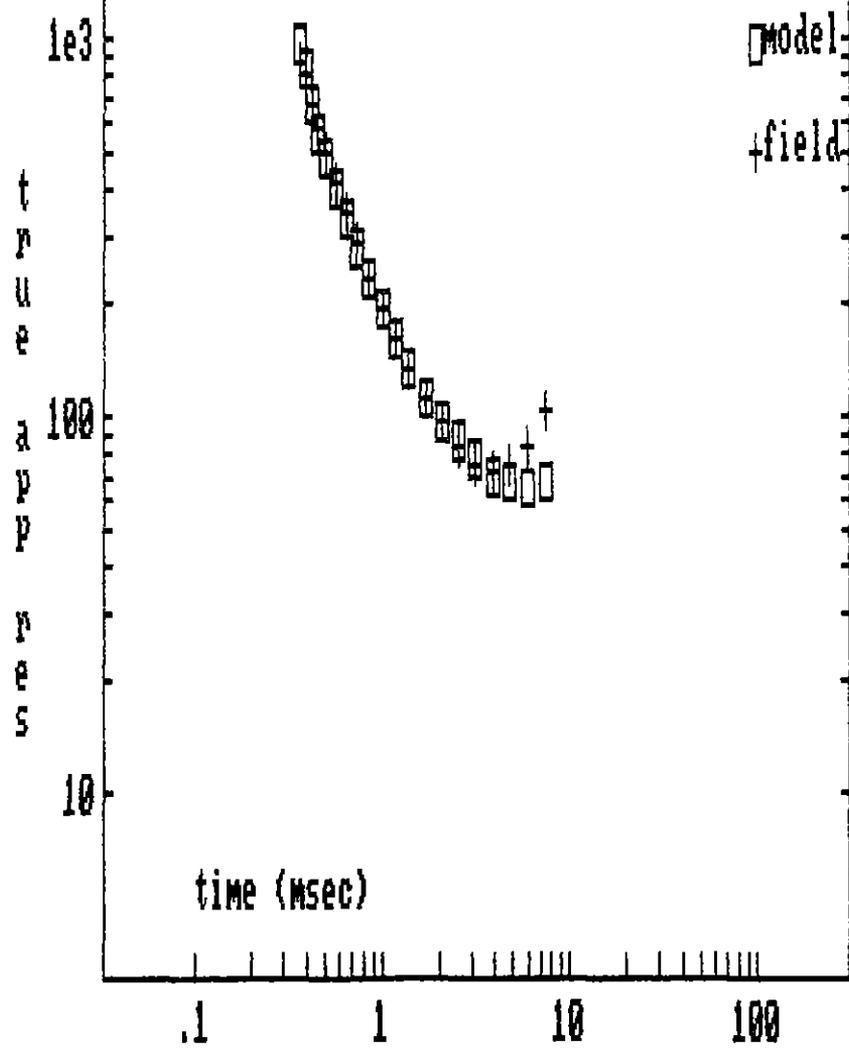
E- 2%

S- 95

149

Sounding 0053 : Ver F2 : Vers. F2

630158



SOUNDING: 0053 : Vers F2
 0053 : , 03800E, 08500N.
 LOOP CORR A2 ELEC MODEL 3LYR 15PTS

0053AF

(1882 ohm.m) * 244 m.

(1882)

* 244 m.

* 21.3 ohm.m * 206 m.

* 21.3

* 450 m.

(494 ohm.m)

(494)

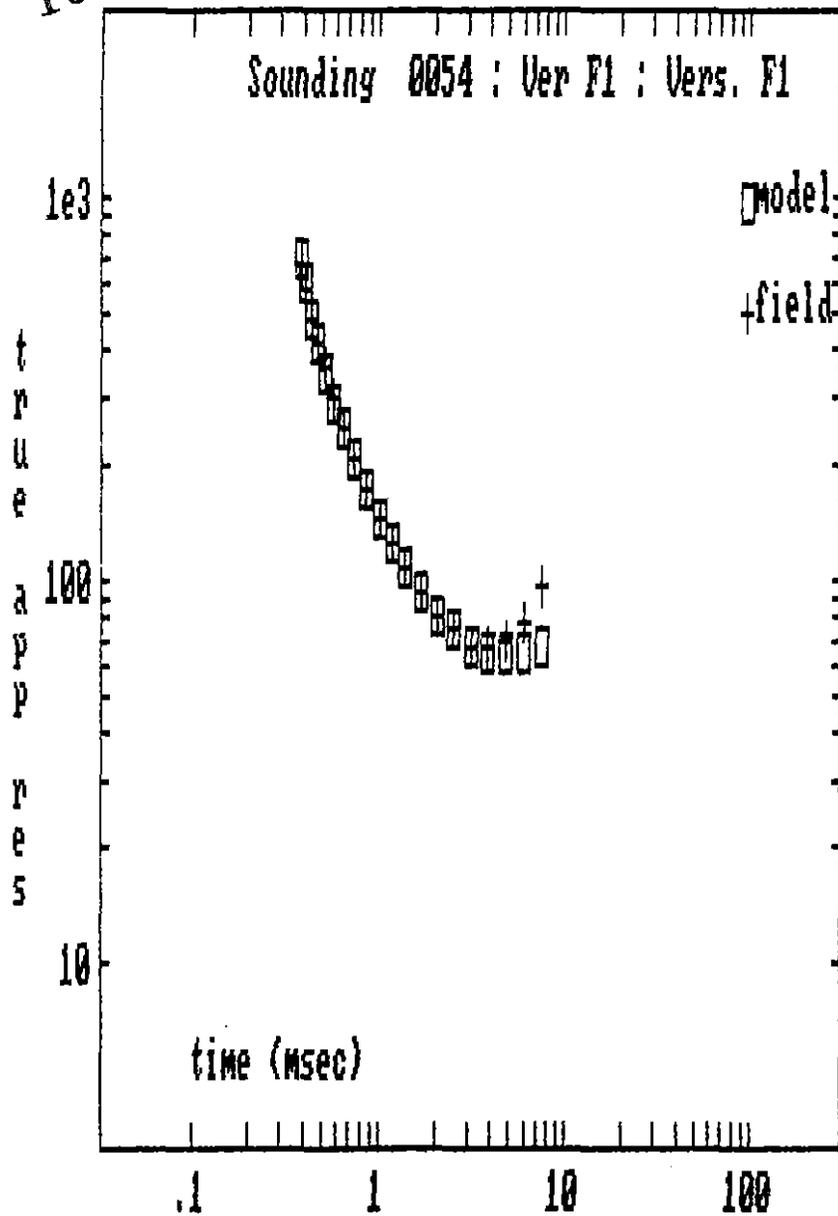
STD ERR= 5.9% : S= 10 S

E- 6%

S- 10S

150

Sounding 0054 : Ver F1 : Vers. F1



SOUNDING: 0054 : Vers F1
 0054 : , 03800E, 08700N.
 LOOP CORR A3 ELEC MODEL 3LYR 18PTS

0054AF

1938 ohm.m * 207 m.

1938

* 207 m.

* 22.0 ohm.m * 188 m.

* 22.0

* 395 m.

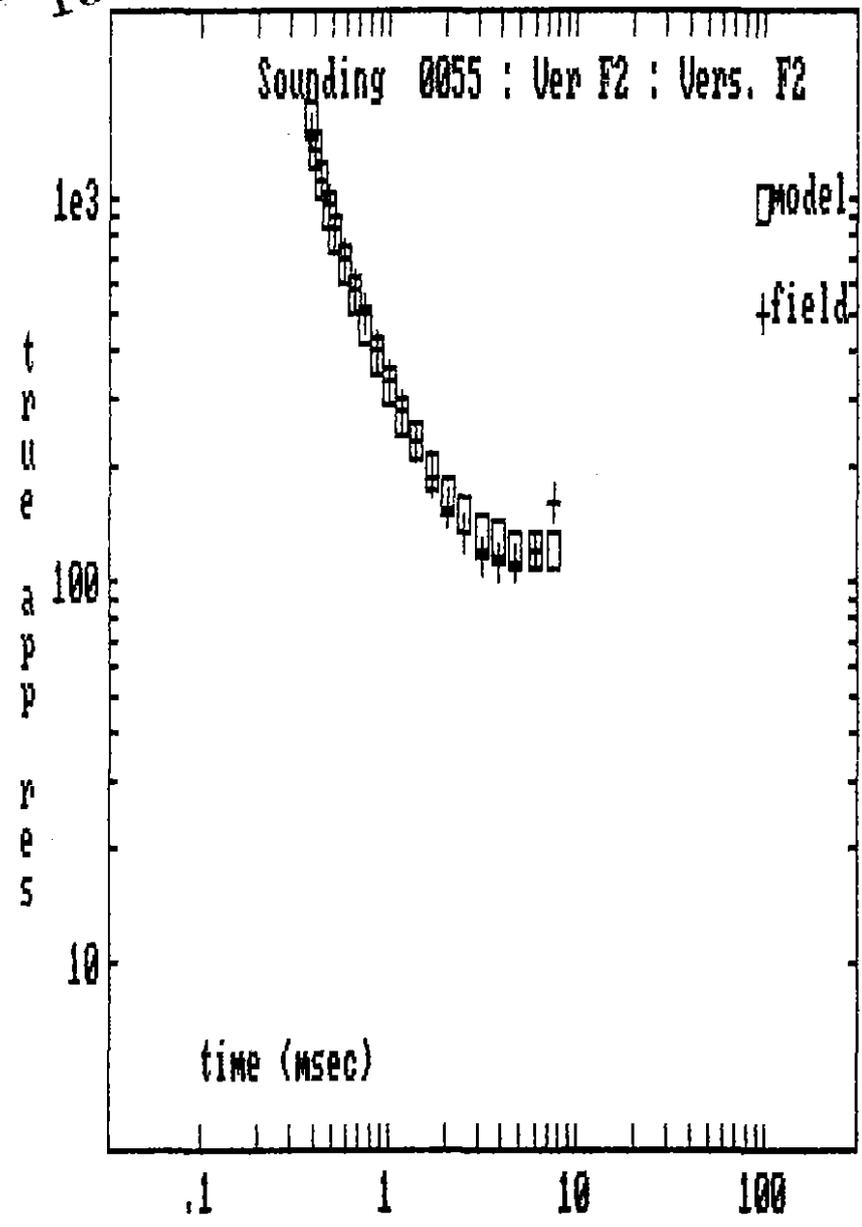
(495 ohm.m)

(495)

STD ERR= 1.6% : S= 9 S

E= 2%

S= 9S



SOUNDING: 0055 : Vers F2
 0055 : , 03400E, 8700N
 LOOP CORR A3 ELEC MODEL 3LYR 15PTS

0055AF

(2804 ohm.m) * 321 m.

(2804)

-----* 321 m.

* 37.5 ohm.m * 237 m.

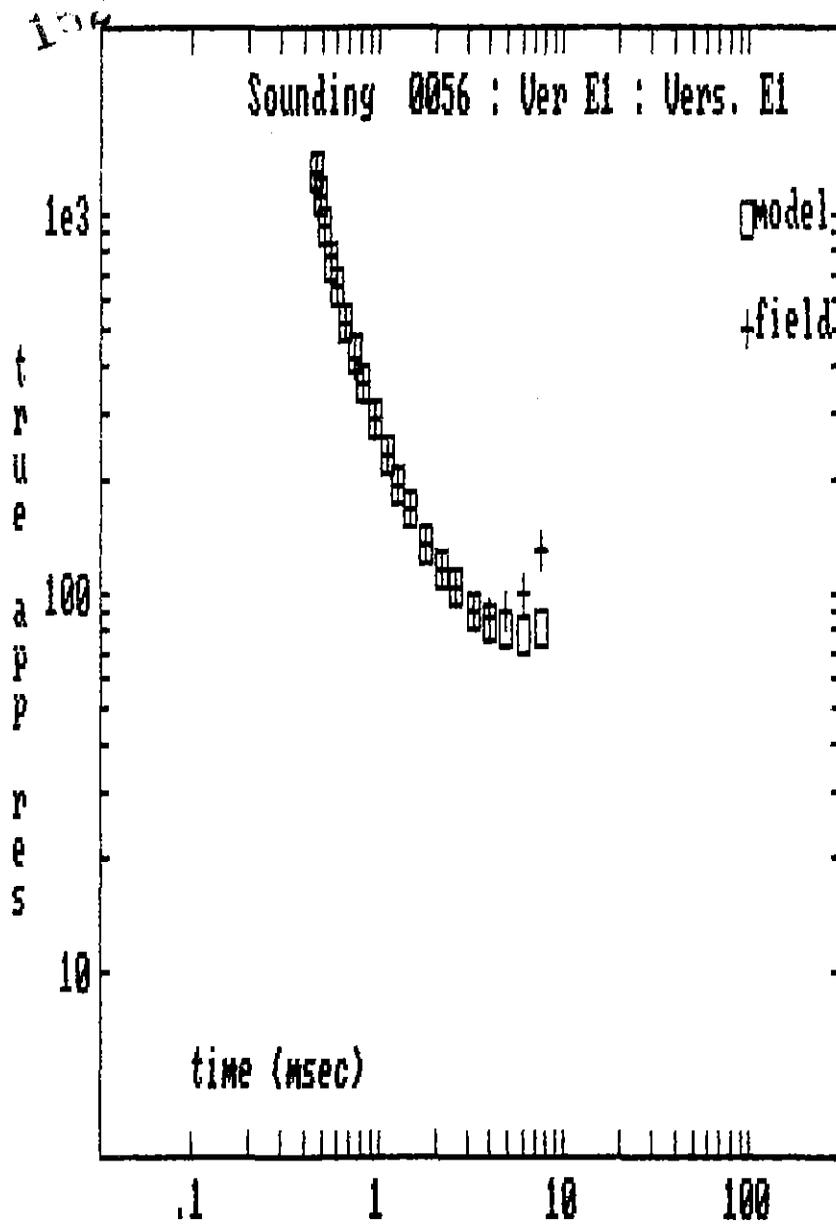
* 37.5

-----* 557 m.

330 ohm.m

E- 330
 S- 7%
 8S

STD ERR- 7.1% : S- 0 8



SOUNDING: 0056 : Vers E1
 0056 : 03400E, 8700N
 LOOP CORR A4 ELEC MODEL 3LYR 18PTS

0056AE

(2892 ohm.m) * 290 m.

(2892)

* 19.5 ohm.m * 165 m.

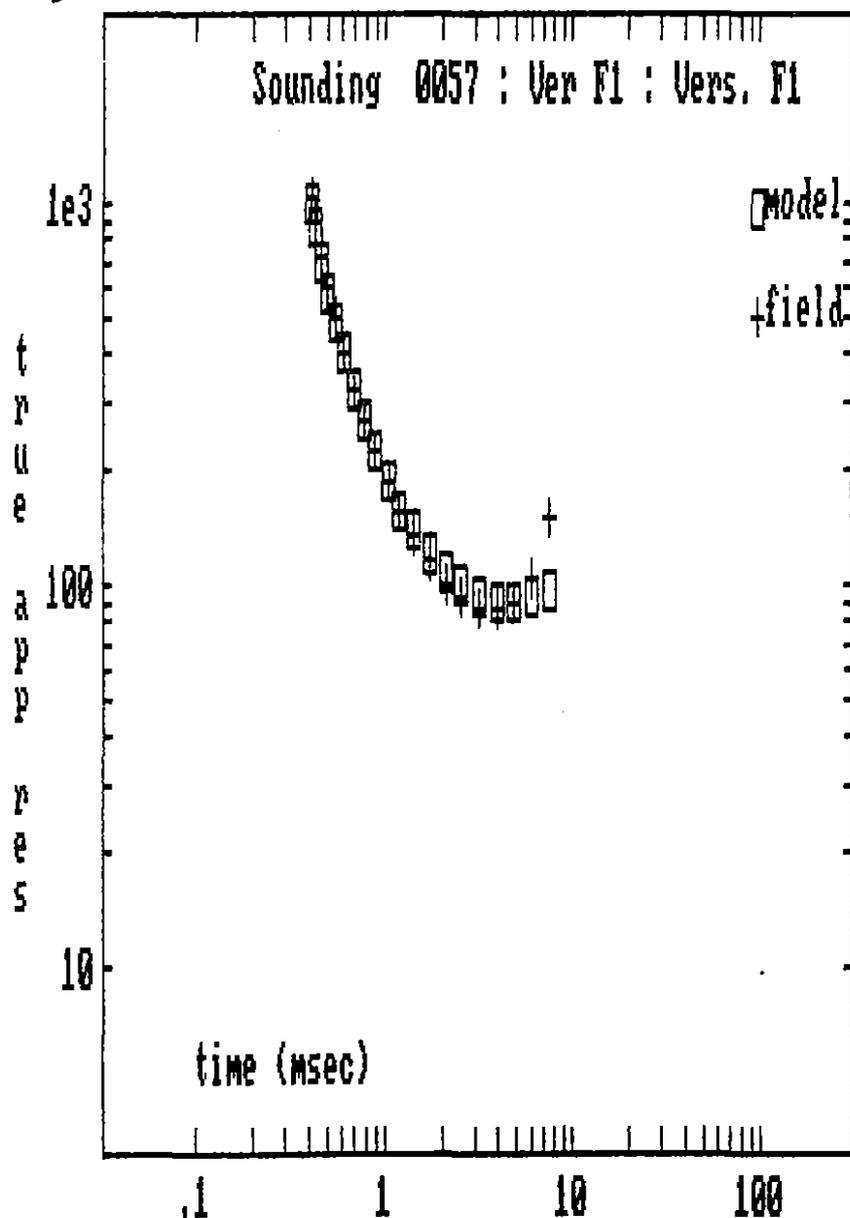
* 19.5

(477 ohm.m)

(477)

STD ERR= 1.1% : S= 9 S

E= 1%
S= 9S



SOUNDING: 0057 : Vers F1
 0057 : , 03400E, 9100N
 LOOP CORR A3 ELEC MODEL 3LYR 10PTS

0057AF

(2282 ohm.m) * 255 m.

(2282)

* 21.9 ohm.m * 130 m.

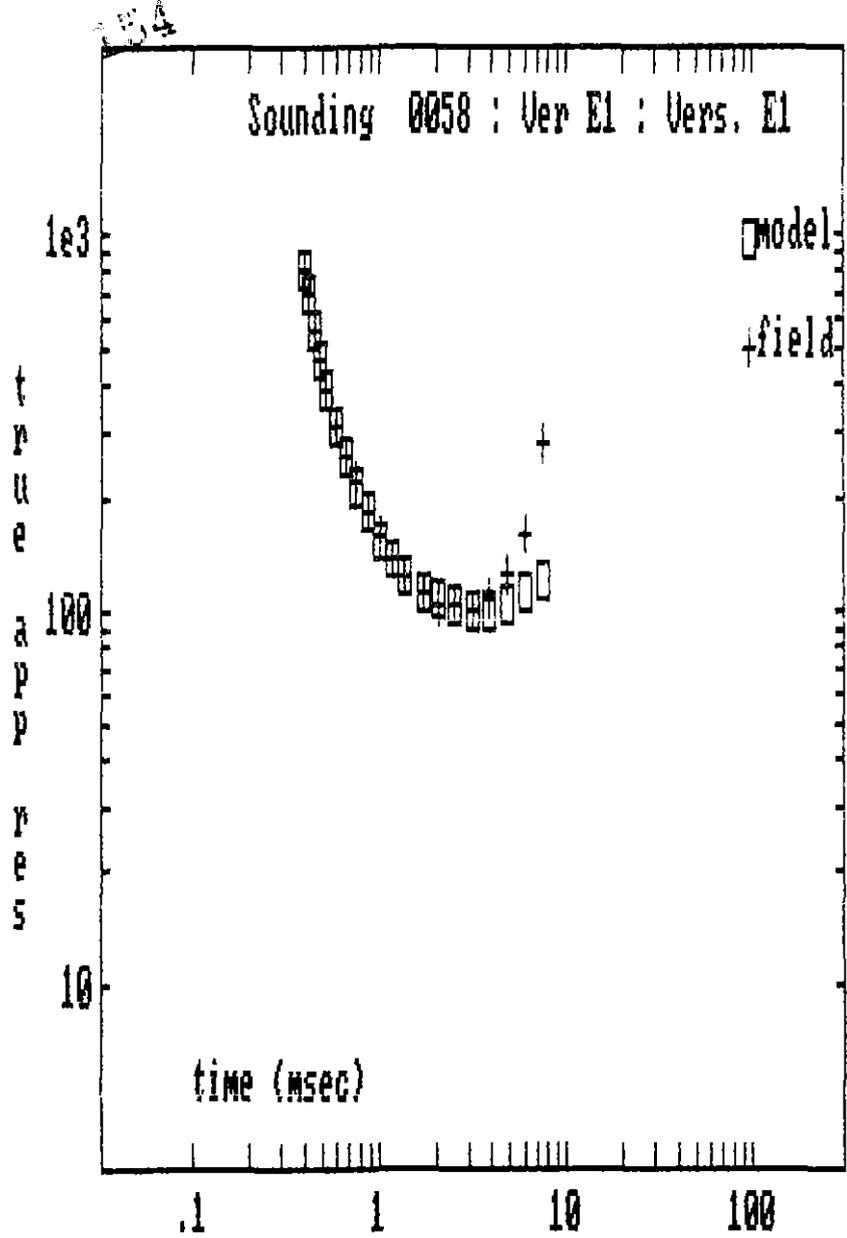
* 21.9

* 371 ohm.m * 385 m.

* 371

STD ERR= 5.8% : S= 6 S

E= 6%
 S= 6S



SOUNDING: 0058 : Vers E1
 0058 : 03400E, 9300N
 LOOP CORR A3 ELEC MODEL 3 LYR 16PTS

0058AE

(1839 ohm.m) * 229 m.

(1839)

* 29.7 ohm.m * 109 m.

* 29.7

* 464 ohm.m * 338 m.

* 464

STD ERR- 1.2% : S- 5 S

E- 1%
 S- 5S

155

Sounding 0059 : Ver F4 : Vers. F4

1e3

□ model

+ field

100

10

time (msec)

.1 1 10 100

SOUNDING: 0059 : Vers F4
 0059 : , 03400E, 9500N
 LOOP CORR SMALL LOOP A3 MODEL 13PTS

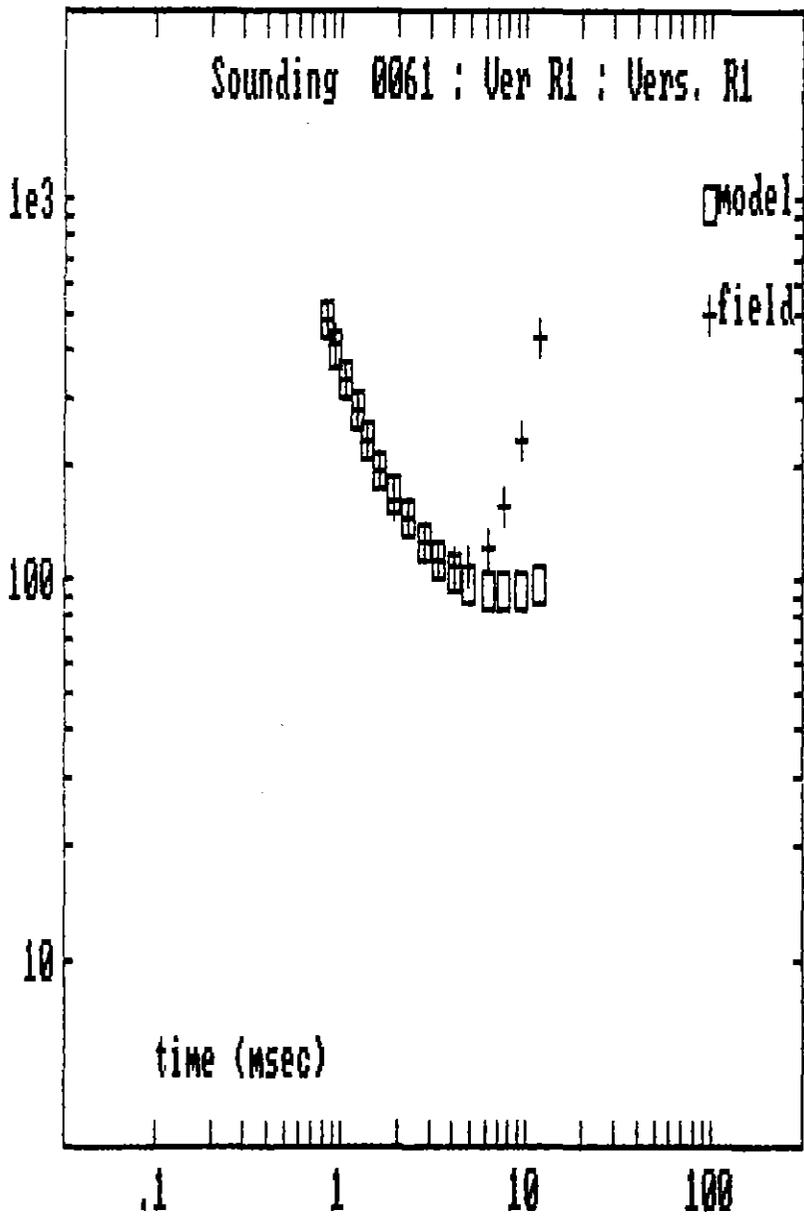
0059AF

1004 ohm.m * 172 m.
 * 26.0 ohm.m * 122 m.
 505 ohm.m

1004
 * 26.0
 505

STD ERR= .9% : S= 5 S

E- 1%
 S- 5S



SOUNDING: 0061 : Vers R1
 0061 : , 03300E, B800N
 F2

0061AR

* 1848 ohm.m * 308 m.

* 1848

* 308 m.

* 30.0 ohm.m * 225 m.

* 30.0

* 533 m.

481 ohm.m

481

E= 1%

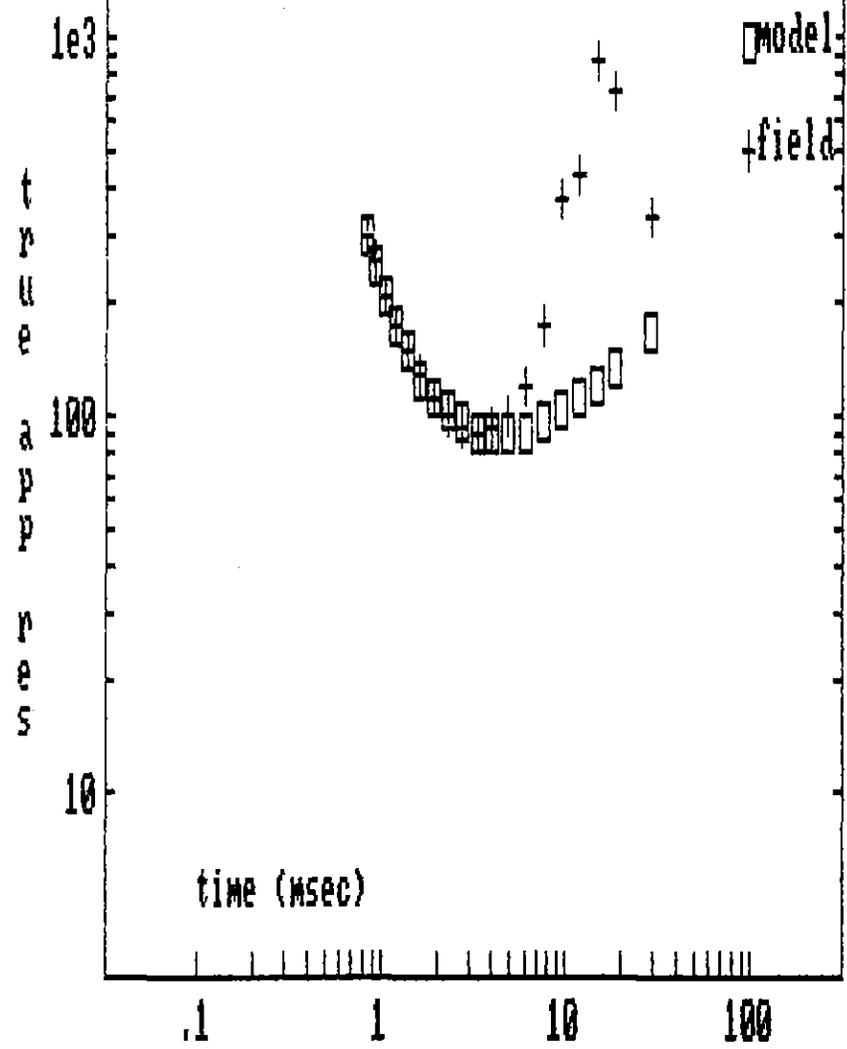
S= B S

STD ERR= .8% : S= B S

157

Sounding 0062 : Ver F1 : Vers. F1

630166



SOUNDING: 0062 : Vers F1
 0062 : 03300E, 9200N
 LOOP CORR A2 ELEC MODEL 3LYR 11PTS

0062AF

(1999 ohm.m) * 256 m.

(1999)

_____ * 352 m.
 17.4 ohm.m 96.8 m.

17.4

(531 ohm.m)

(531)

STD ERR= 2.1% : S= 6 S

E= 2%
S= 6S

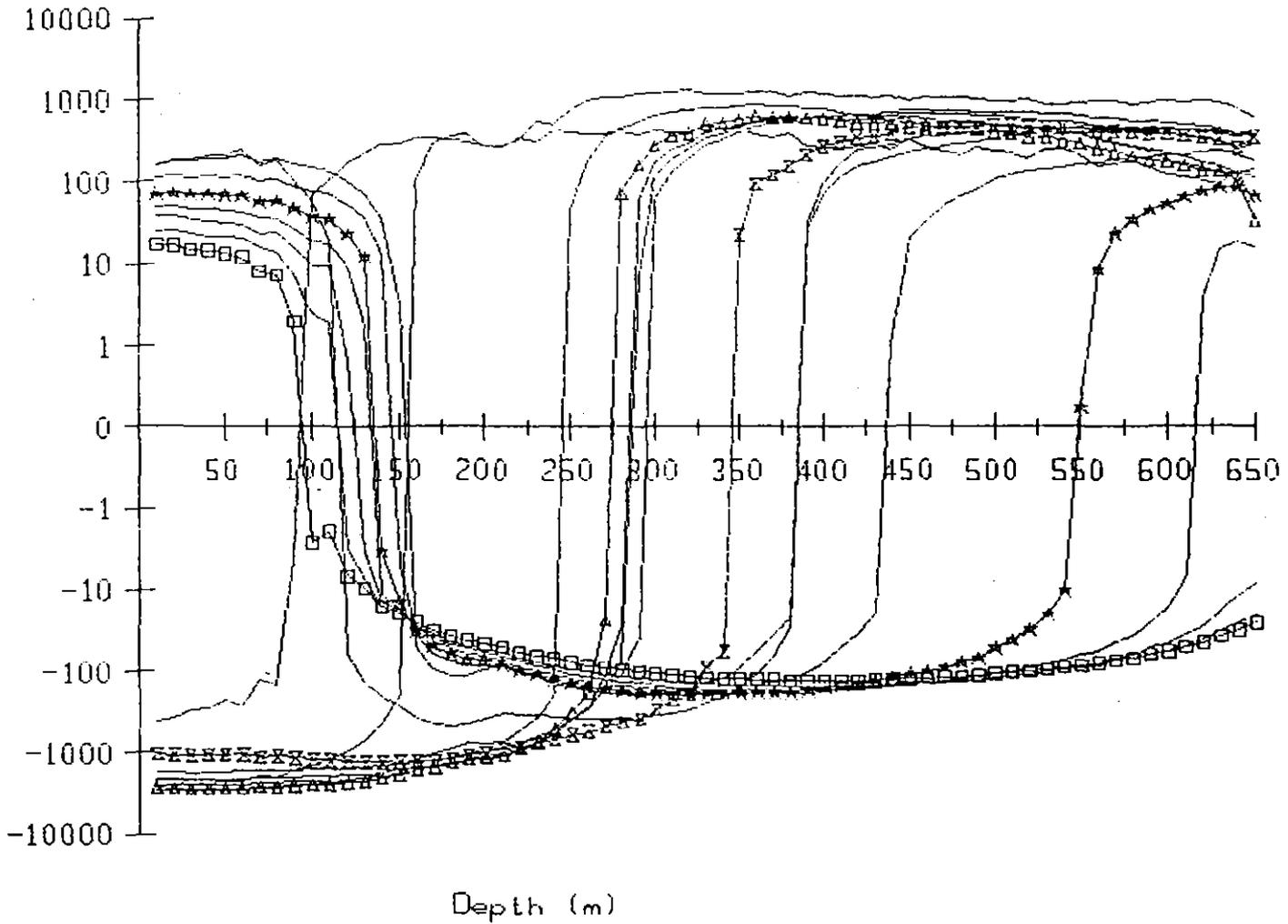
APPENDIX 5

DHEM DATA
HIGH POINT AND SOCK CK SOUTH PROSPECTS

DOWNHOLE SIROTEM SURVEY

PROSPECT: High Point
DRILLHOLE: DDH HP1
LOOP: 17

EARLY TIME
CHANNELS 1-16



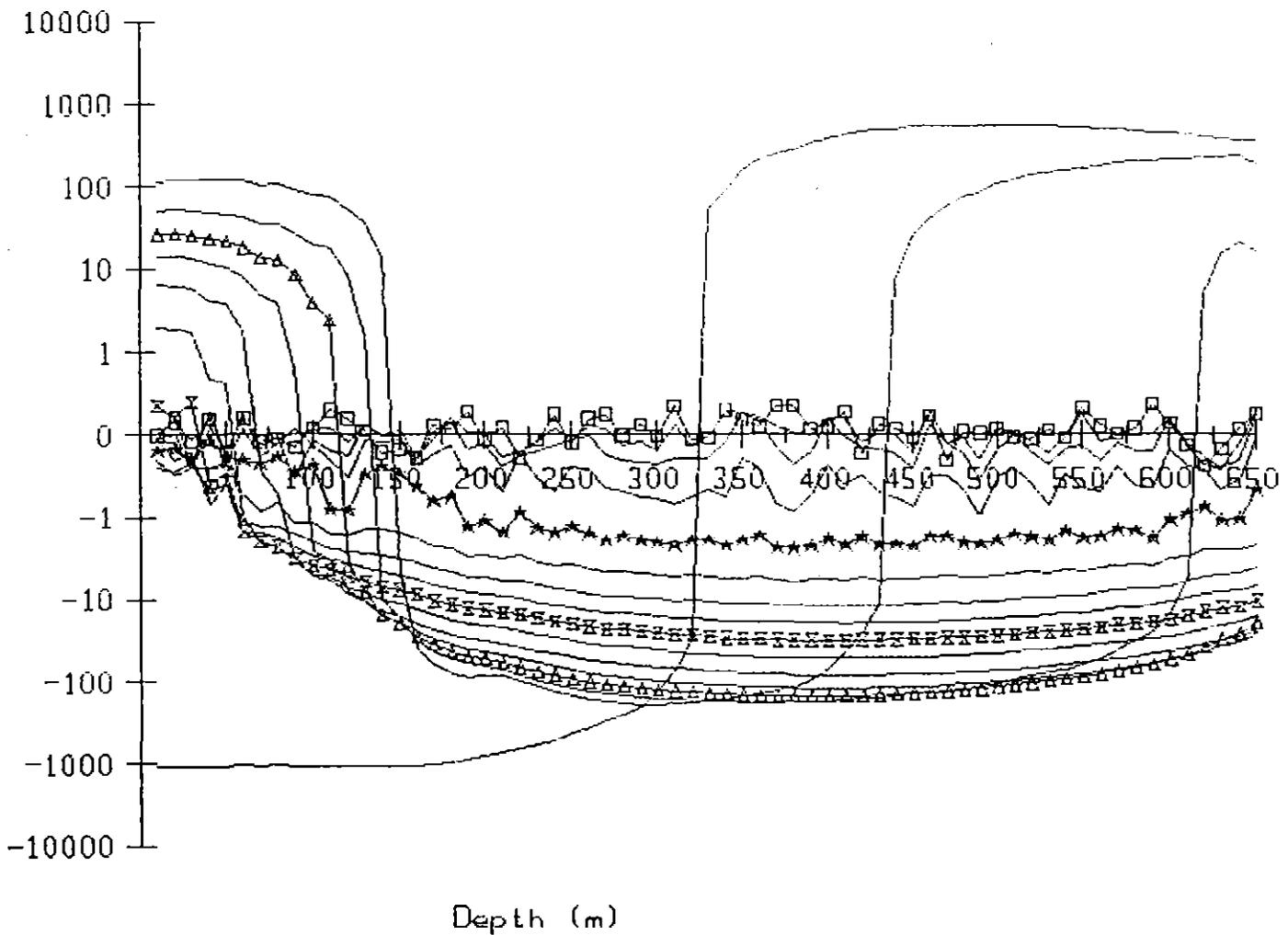
PLOTTING SYMBOLS

- △ Channel 4
- ⊗ Channel 8
- ☆ Channel 12
- Channel 16

DOWNHOLE SIROTEM SURVEY

PROSPECT: High Point
 DRILLHOLE: DDH HP1
 LOOP: 17

STANDARD TIME
 CHANNELS 1-16



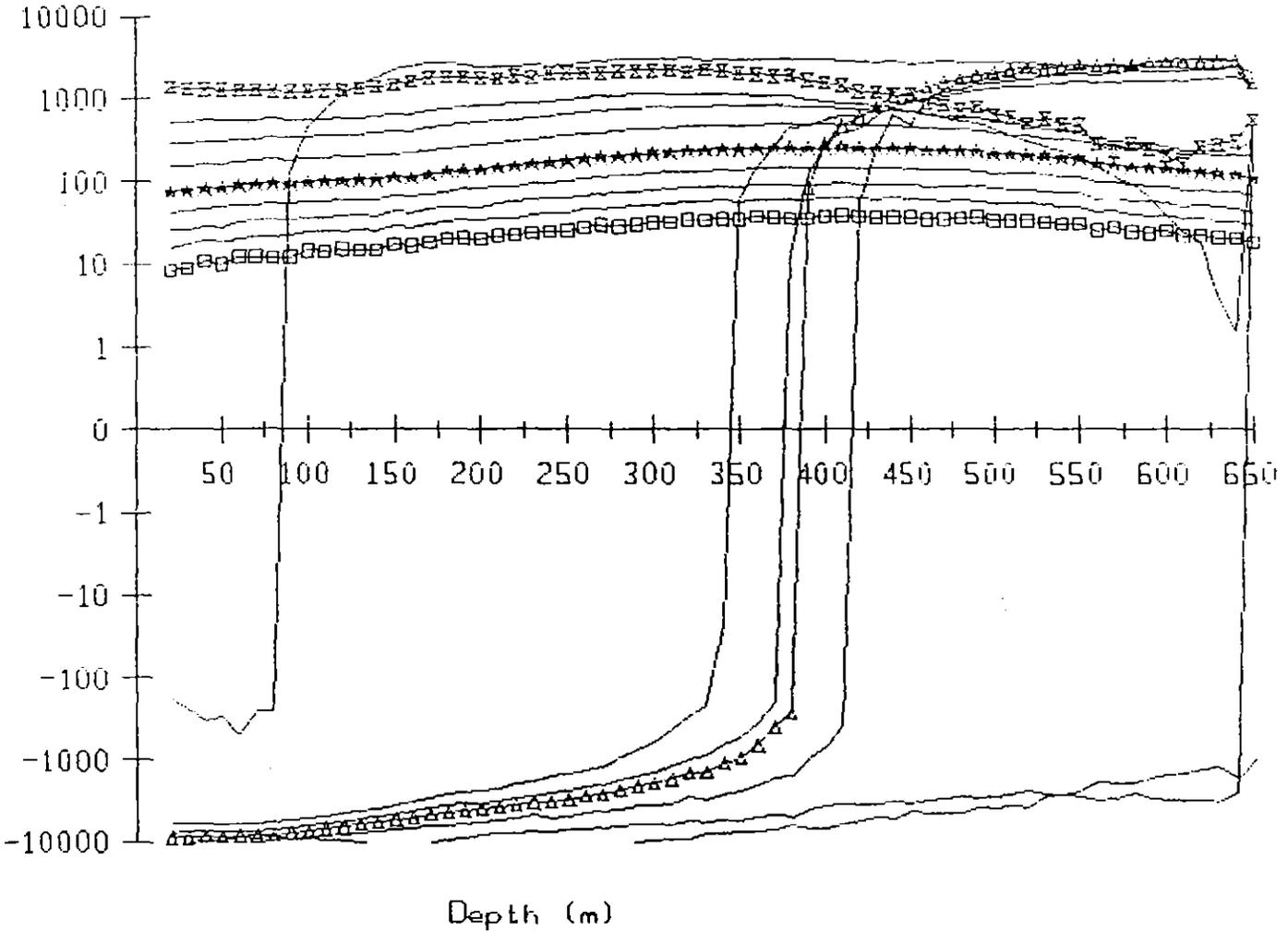
PLOTING SYMBOLS

- △ Channel 4
- ⊗ Channel 8
- ☆ Channel 12
- Channel 16

DOWNHOLE SIROTEM SURVEY

PROSPECT: High Point
DRILLHOLE: DDH HP1
LOOP: 18

EARLY TIME
CHANNELS 1-16



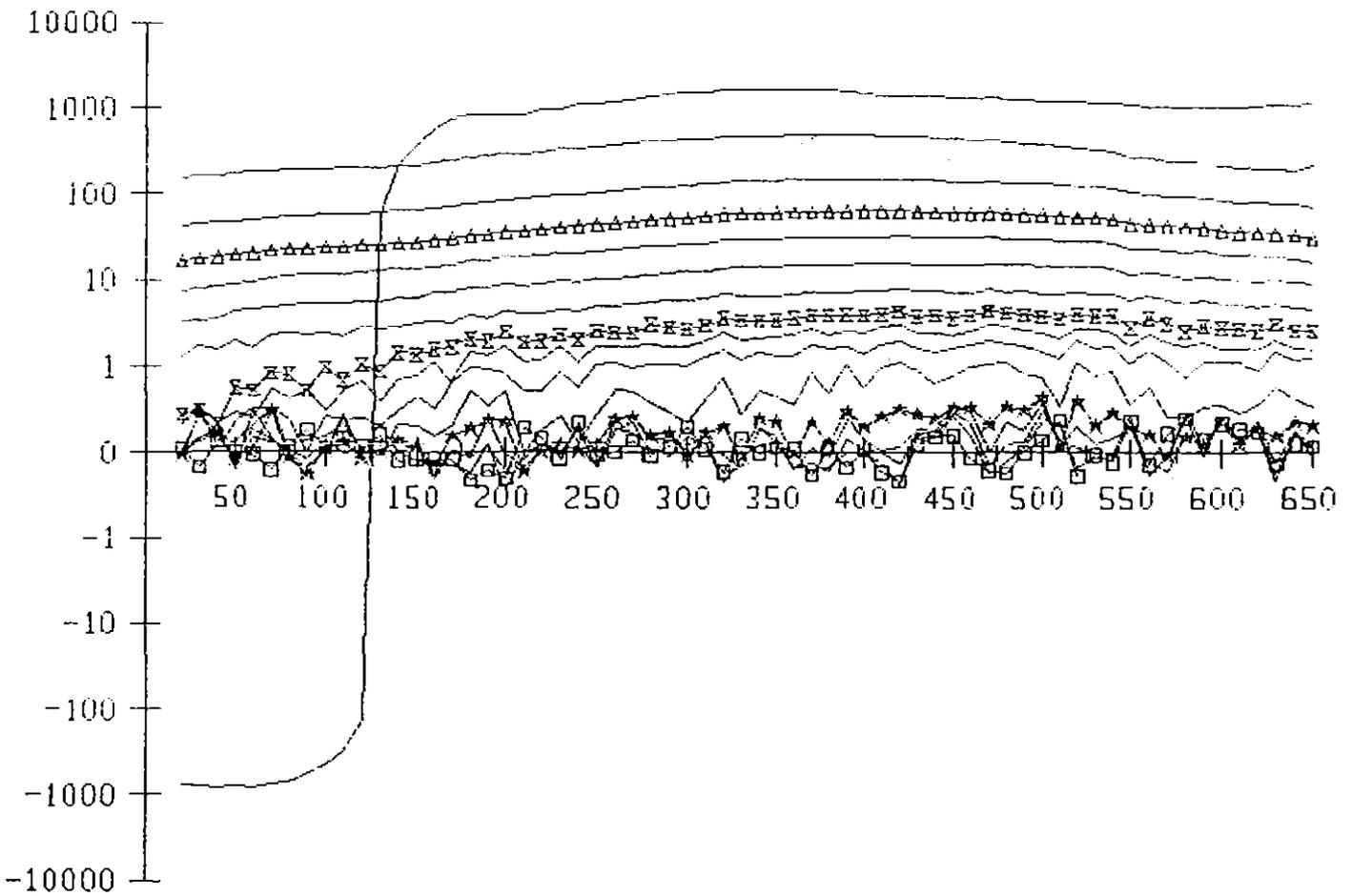
PLOTTING SYMBOLS

- △ Channel 4
- ⊗ Channel 8
- ☆ Channel 12
- Channel 16

DOWNHOLE SIROTEM SURVEY

PROSPECT: High Point
 DRILLHOLE: DDH HP1
 LOOP: 18

STANDARD TIME
 CHANNELS 1-16



Depth (m)

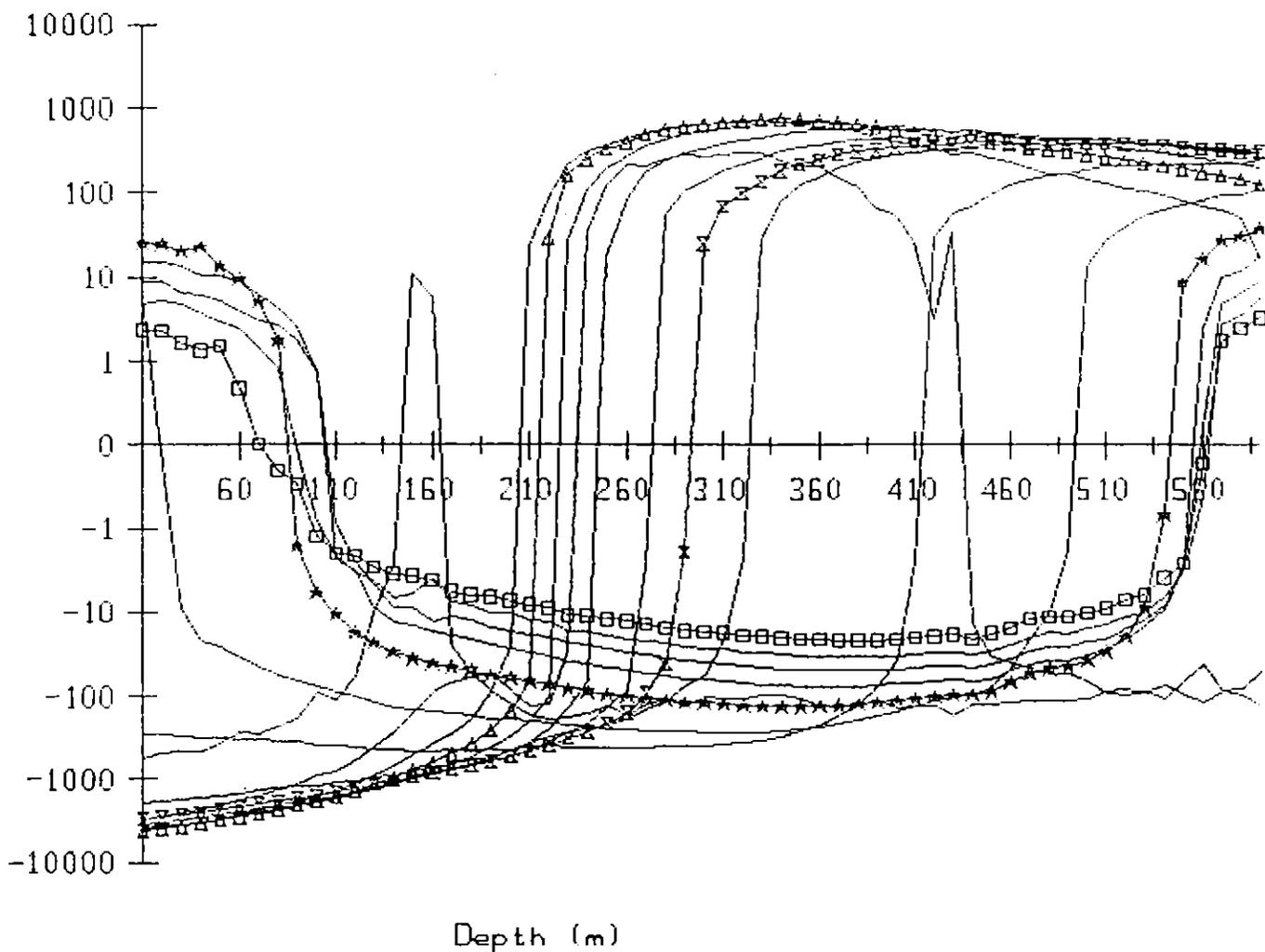
PLOTTING SYMBOLS

- △ Channel 4
- ⊗ Channel 8
- ☆ Channel 12
- Channel 16

DOWNHOLE SIROTEM SURVEY

PROSPECT: High Point
DRILLHOLE: DDH HP2
LOOP: 14

EARLY TIME
CHANNELS 1-16



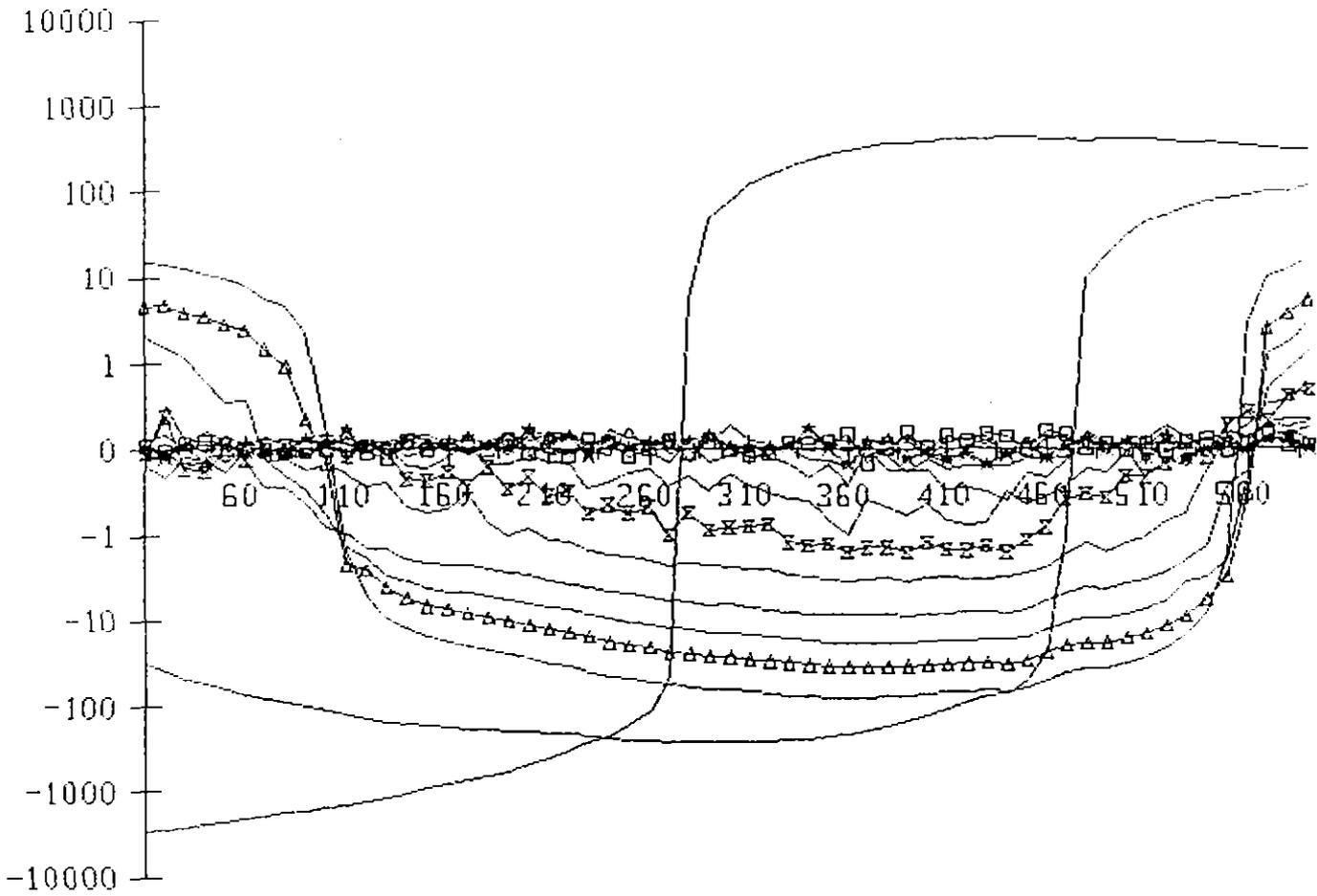
PLOTTING SYMBOLS

- △ Channel 4
- ⊗ Channel 8
- ☆ Channel 12
- Channel 16

DOWNHOLE SIROTEM SURVEY

PROSPECT: High Point
DRILLHOLE: DDH HP2
LOOP: 14

STANDARD TIME
CHANNELS 1-16



Depth (m)

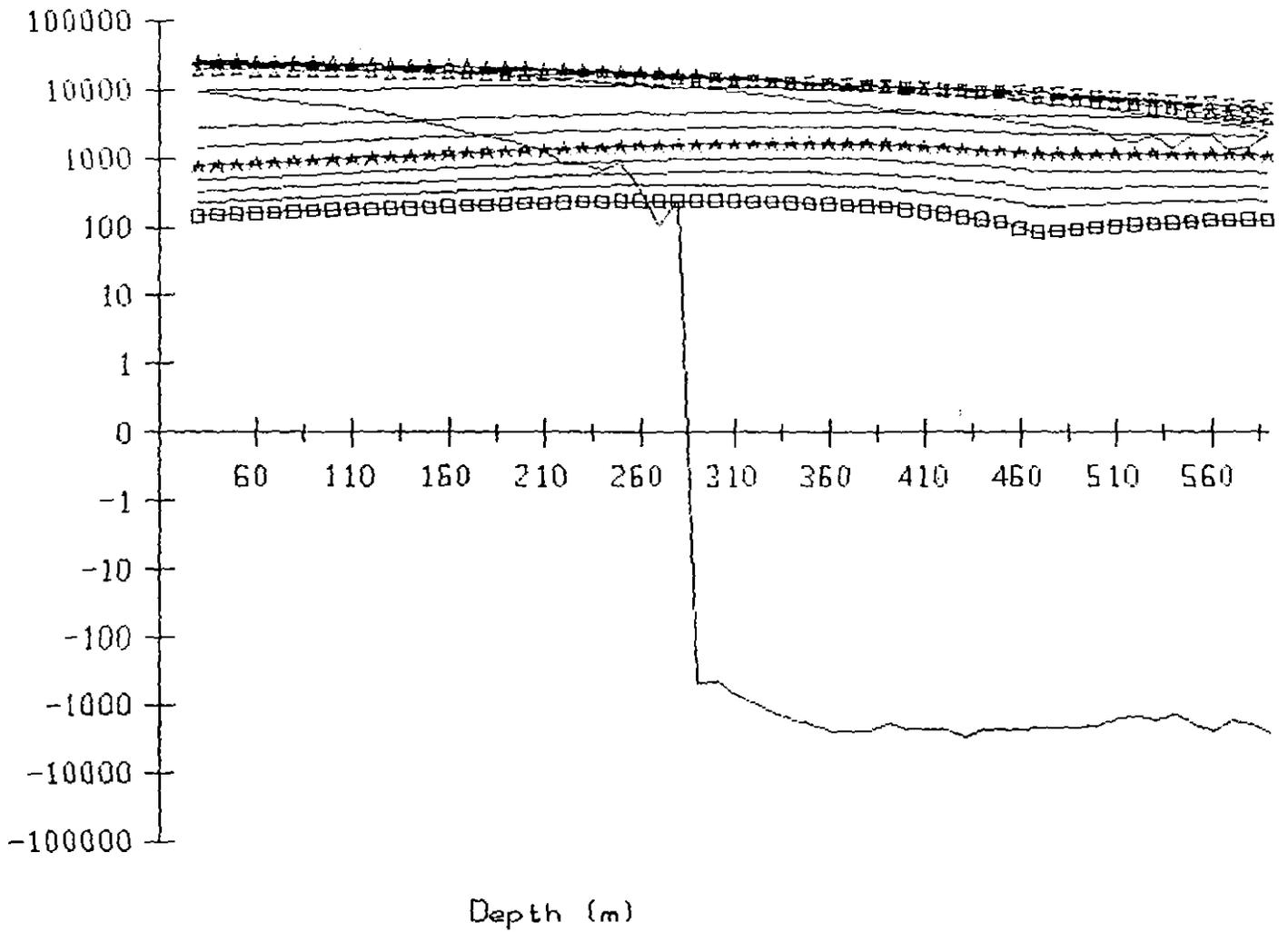
PLOTTING SYMBOLS

- △ Channel 4
- × Channel 8
- ☆ Channel 12
- Channel 16

DOWNHOLE SIROTEM SURVEY

PROSPECT: High Point
 DRILLHOLE: DDH HP2
 LOOP: 15

EARLY TIME
 CHANNELS 1-16



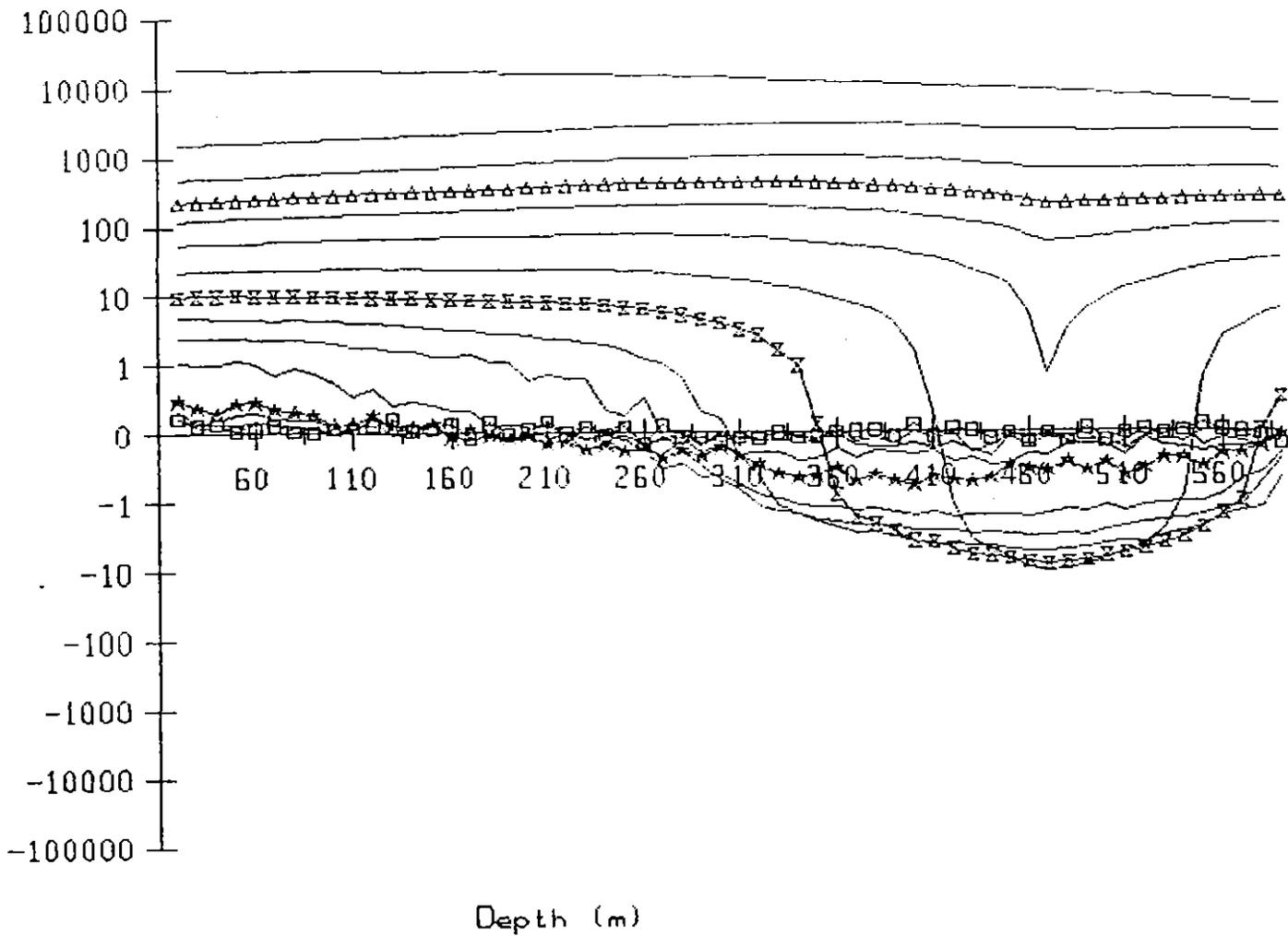
PLOTTING SYMBOLS

- △ Channel 4
- ⊗ Channel 8
- ☆ Channel 12
- Channel 16

DOWNHOLE SIROTEM SURVEY

PROSPECT: High Point
 DRILLHOLE: DDH HP2
 LOOP: 15

STANDARD TIME
 CHANNELS 1-16



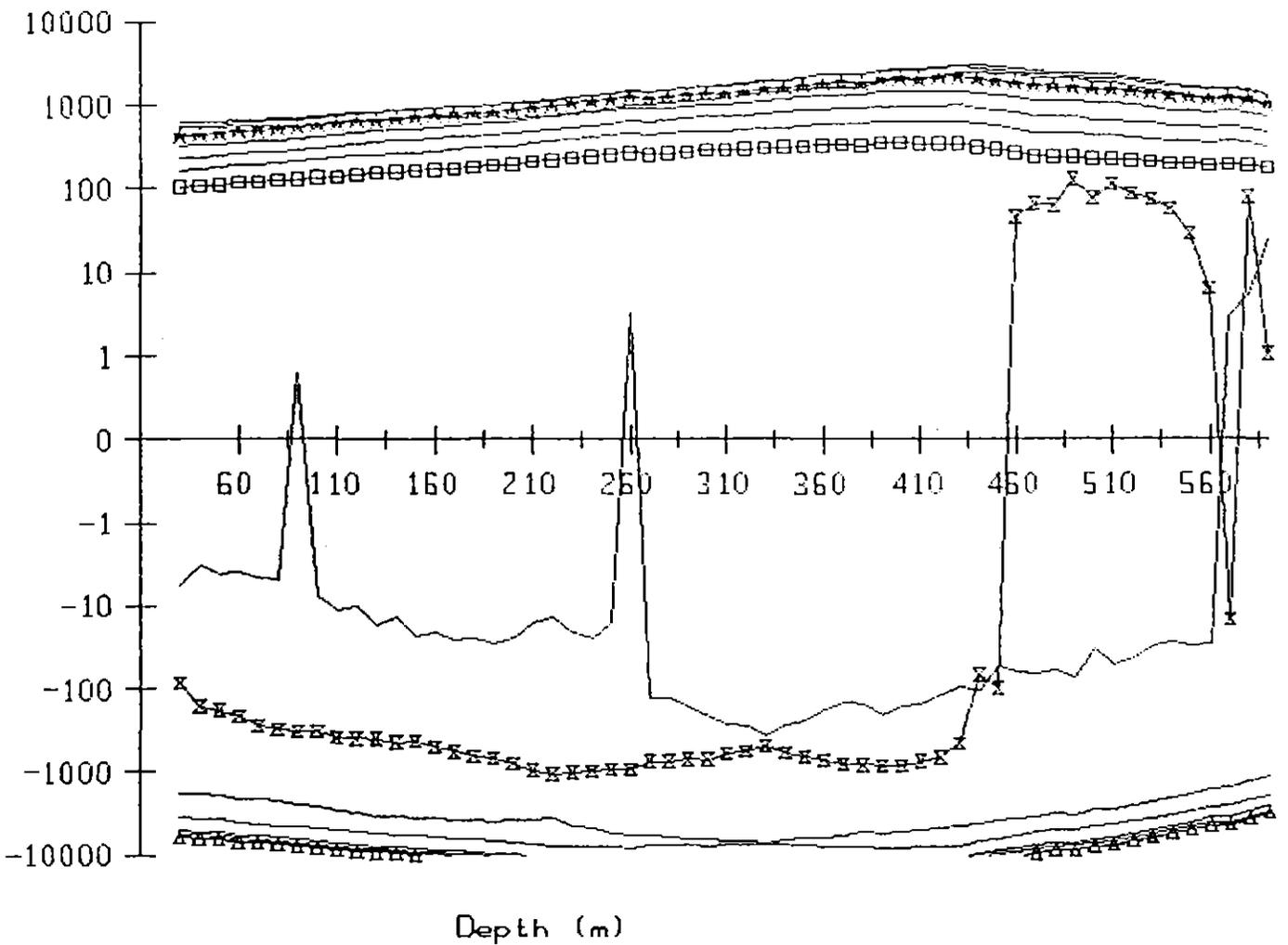
PLOTTING SYMBOLS

- △ Channel 4
- ⊗ Channel 8
- ☆ Channel 12
- Channel 16

DOWNHOLE SIROTEM SURVEY

PROSPECT: High Point
DRILLHOLE: DDH HP2
LOOP: 16

EARLY TIME
CHANNELS 1-16



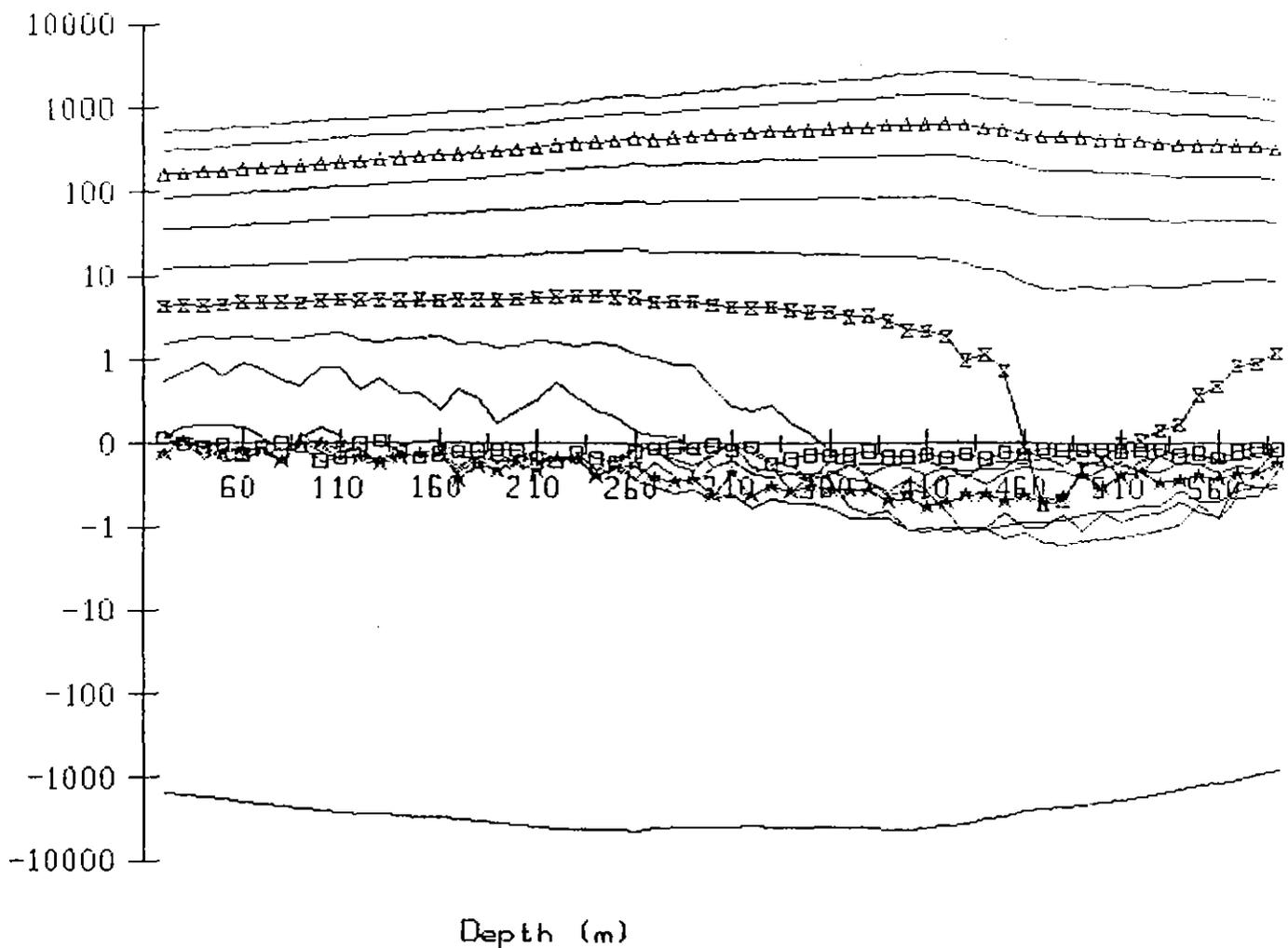
PLOTTING SYMBOLS

- △ Channel 4
- ⊗ Channel 8
- ☆ Channel 12
- Channel 16

DOWNHOLE SIROTEM SURVEY

PROSPECT: High Point
 DRILLHOLE: DDH HP2
 LOOP: 16

STANDARD TIME
 CHANNELS 1-16



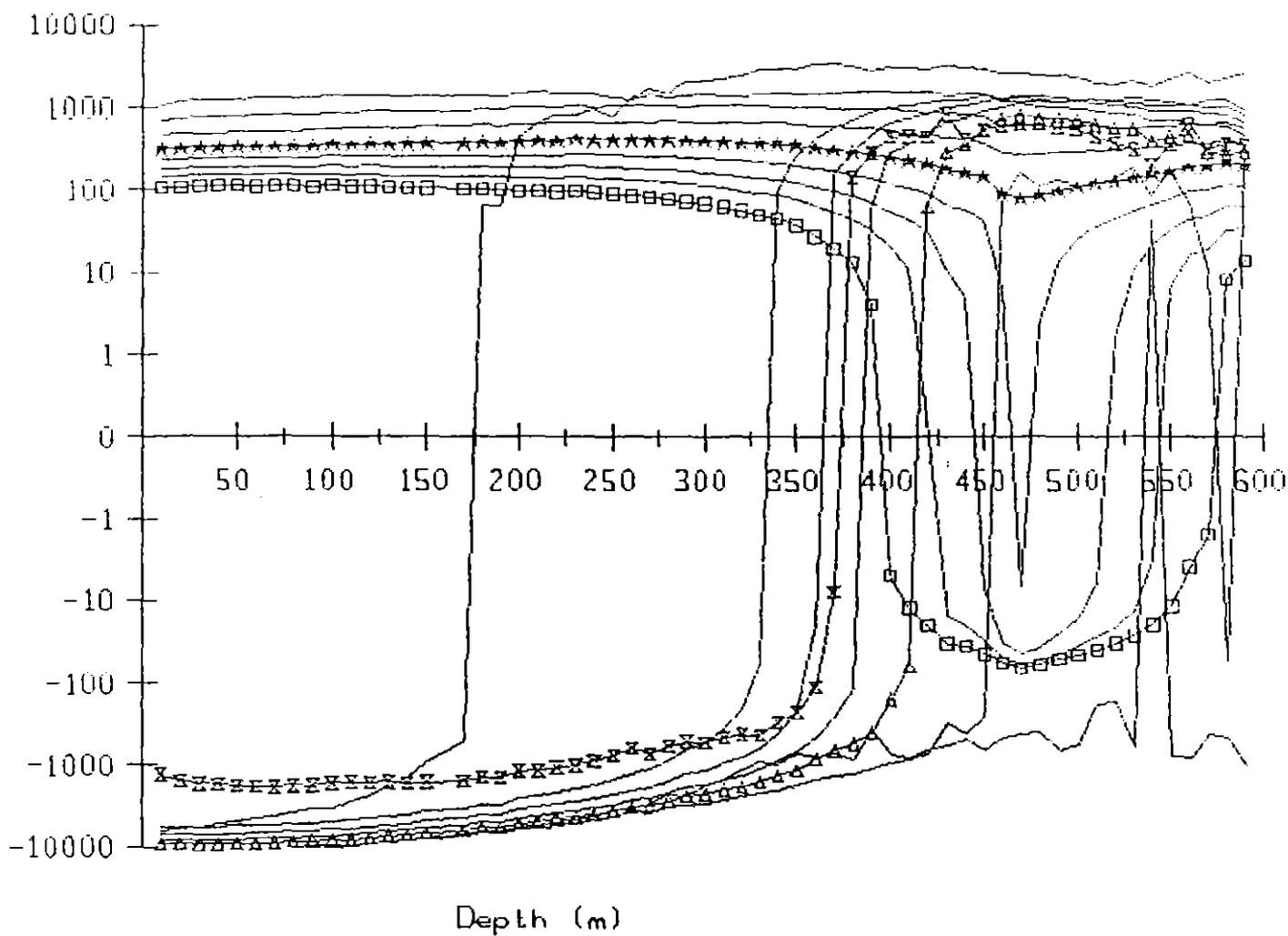
PLOTTING SYMBOLS

- △ Channel 4
- ⊗ Channel 8
- ☆ Channel 12
- Channel 16

DOWNHOLE SIROTEM SURVEY

PROSPECT: High Point
DRILLHOLE: DDH HP2
LOOP: 17

EARLY TIME
CHANNELS 1-16



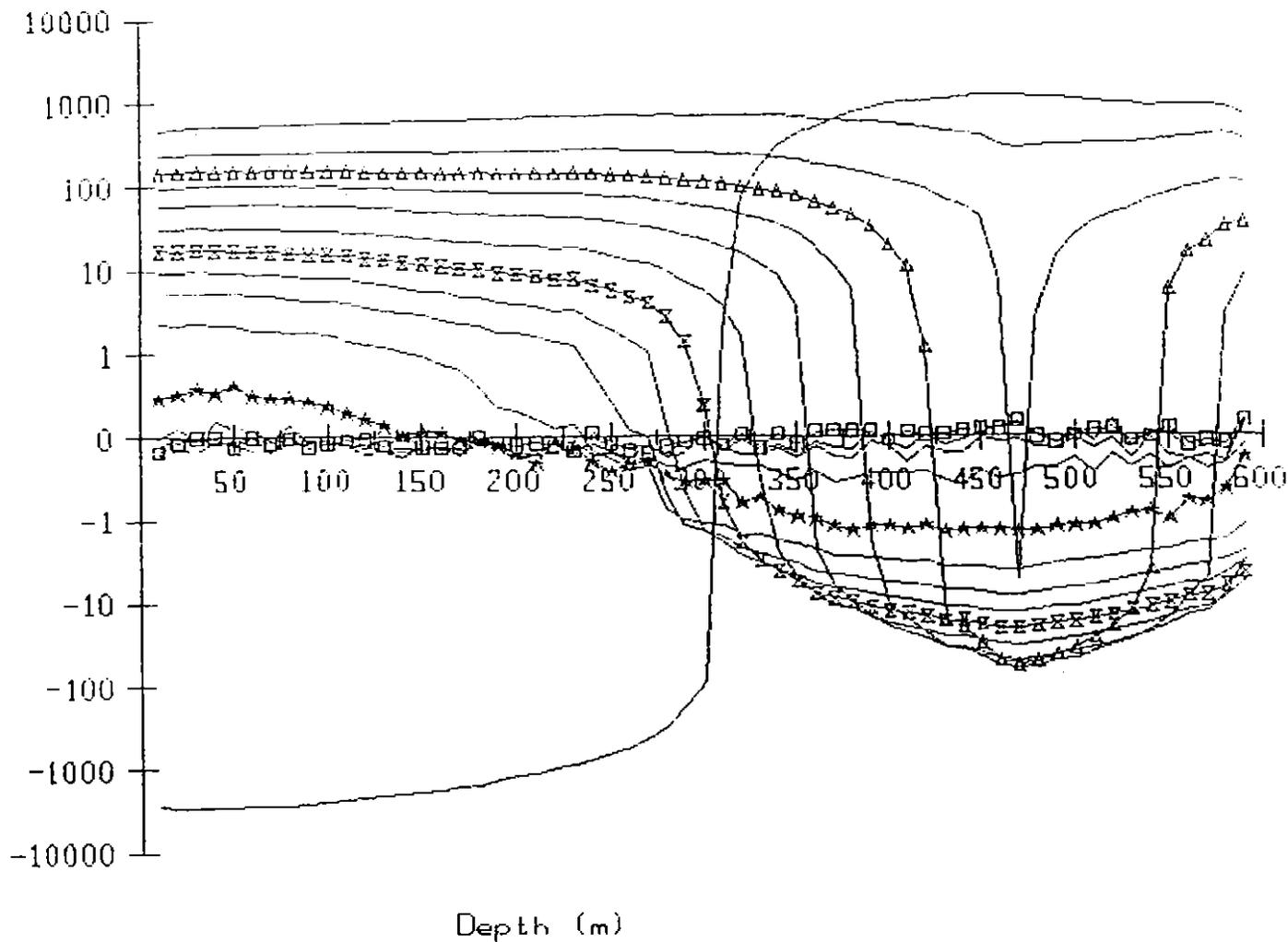
PLOTTING SYMBOLS

- △ Channel 4
- ⊗ Channel 8
- ☆ Channel 12
- Channel 16

DOWNHOLE SIROTEM SURVEY

PROSPECT: High Point
 DRILLHOLE: DDH HP2
 LOOP: 17

STANDARD TIME
 CHANNELS 1-16



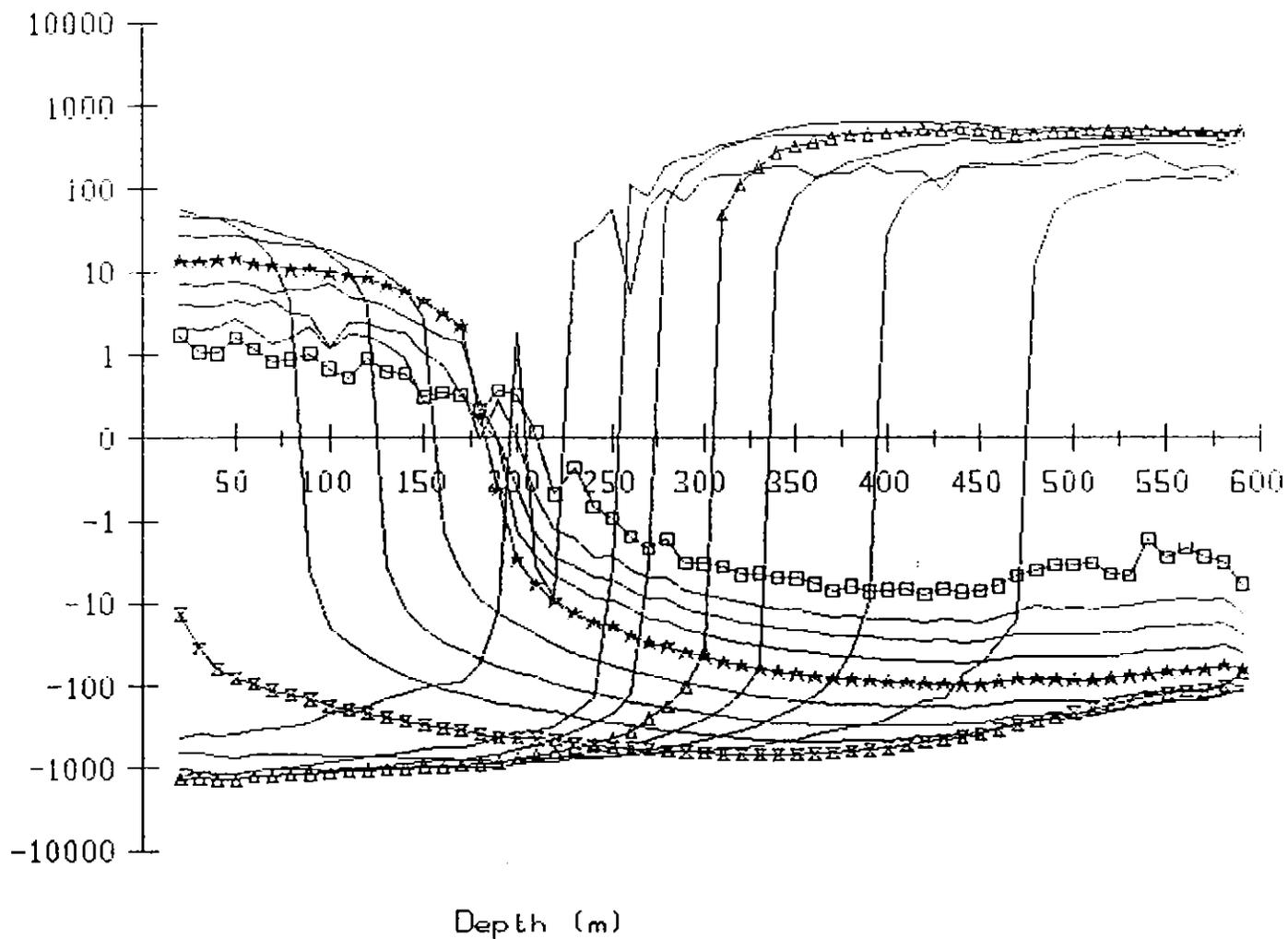
PLOTTING SYMBOLS

- △ Channel 4
- ⊗ Channel 8
- ☆ Channel 12
- Channel 16

DOWNHOLE SIROTEM SURVEY

PROSPECT: High Point
 DRILLHOLE: DDH HP 2
 LOOP: 18

EARLY TIME
 CHANNELS 1-16



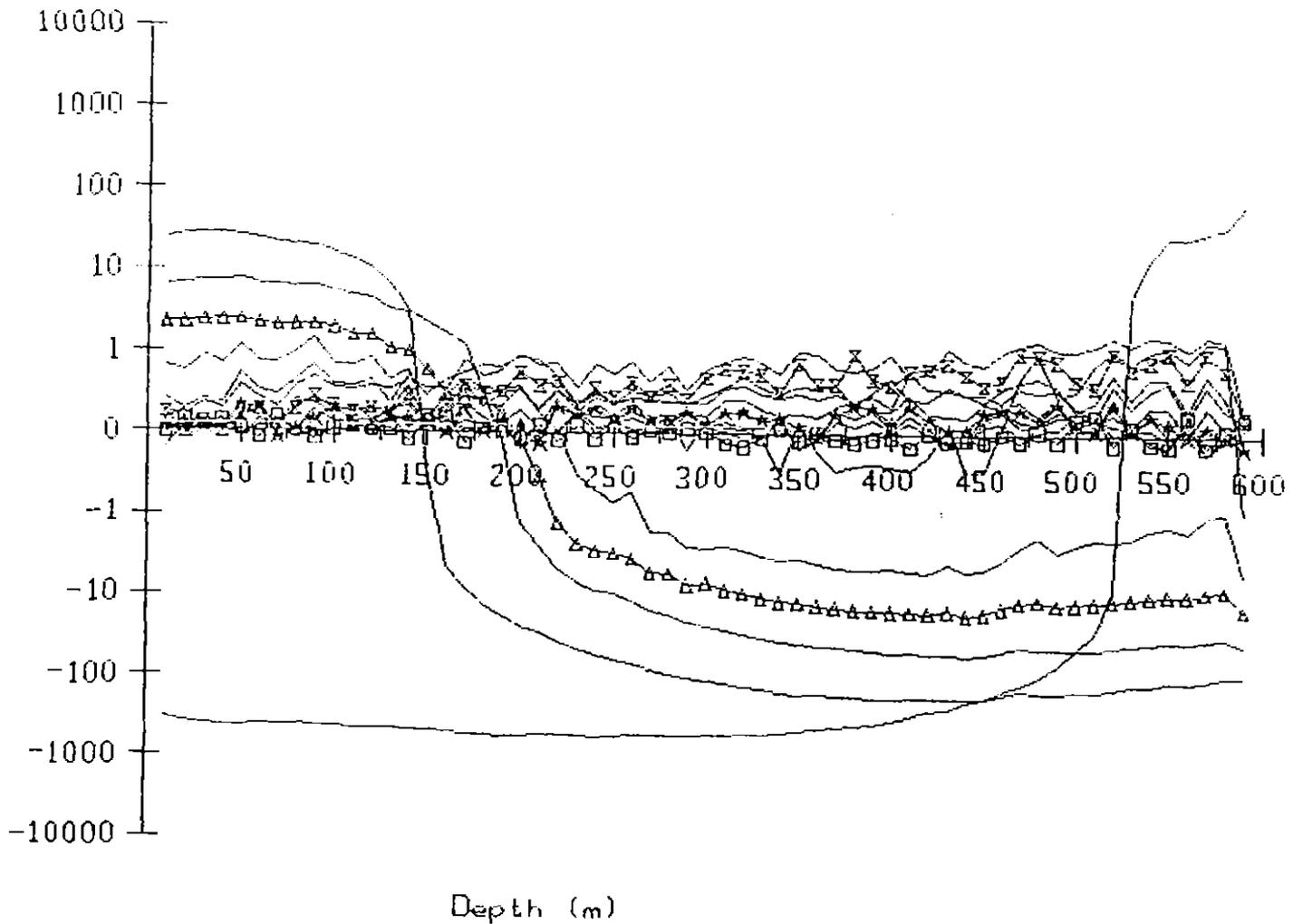
PLOTING SYMBOLS

- △ Channel 4
- ⊗ Channel 8
- ☆ Channel 12
- Channel 16

DOWNHOLE SIROTEM SURVEY

PROSPECT: High Point
 DRILLHOLE: DDH HP2
 LOOP: 18

STANDARD TIME
 CHANNELS 1-16



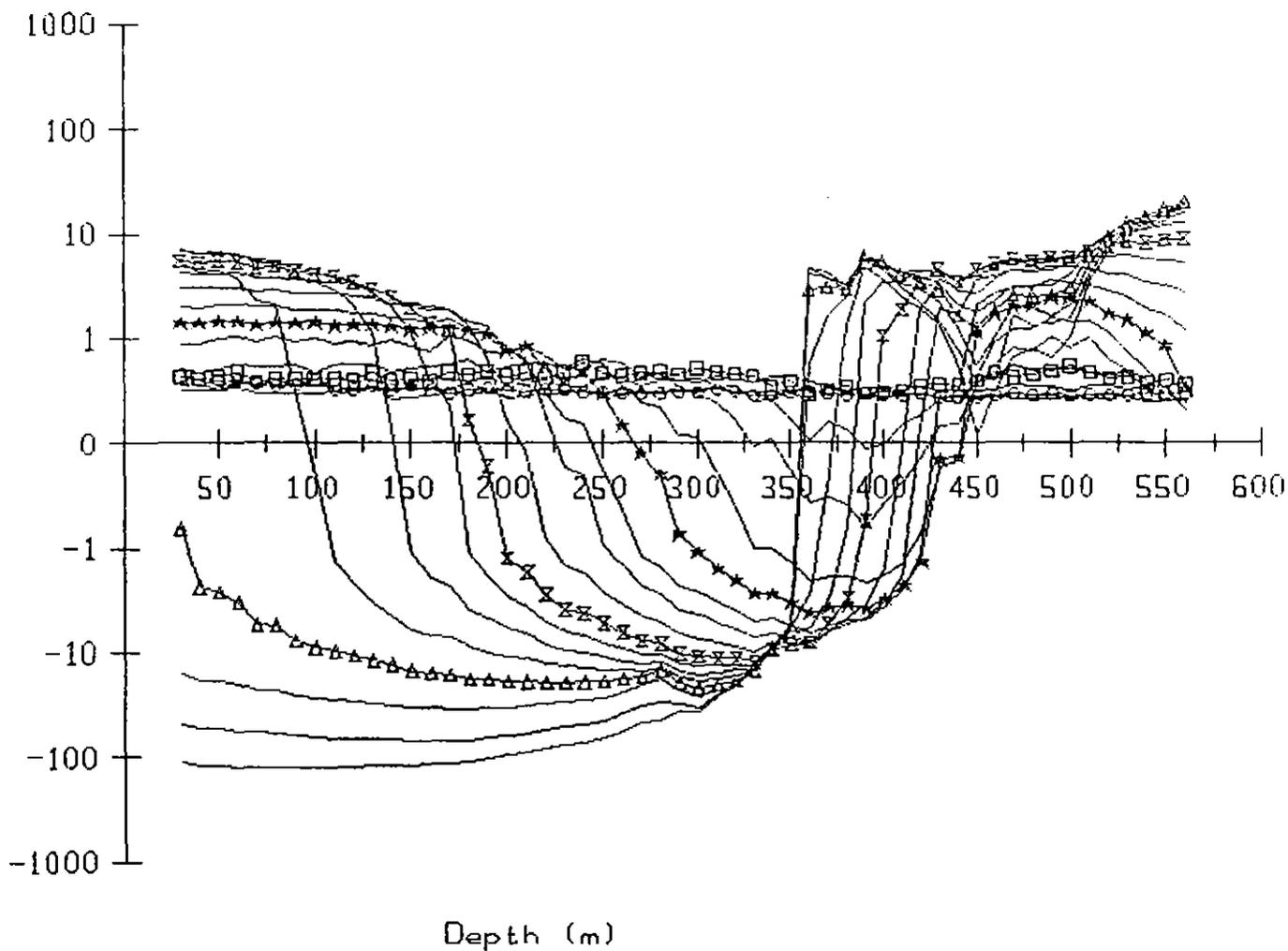
PLOTTING SYMBOLS

- △ Channel 4
- × Channel 8
- ☆ Channel 12
- Channel 16

DOWNHOLE EM37 SURVEY

PROSPECT: High Point
 DRILLHOLE: DDH HP3
 LOOP: 14

HIGH FREQUENCY
 CHANNELS 1-20



PLOTTING SYMBOLS

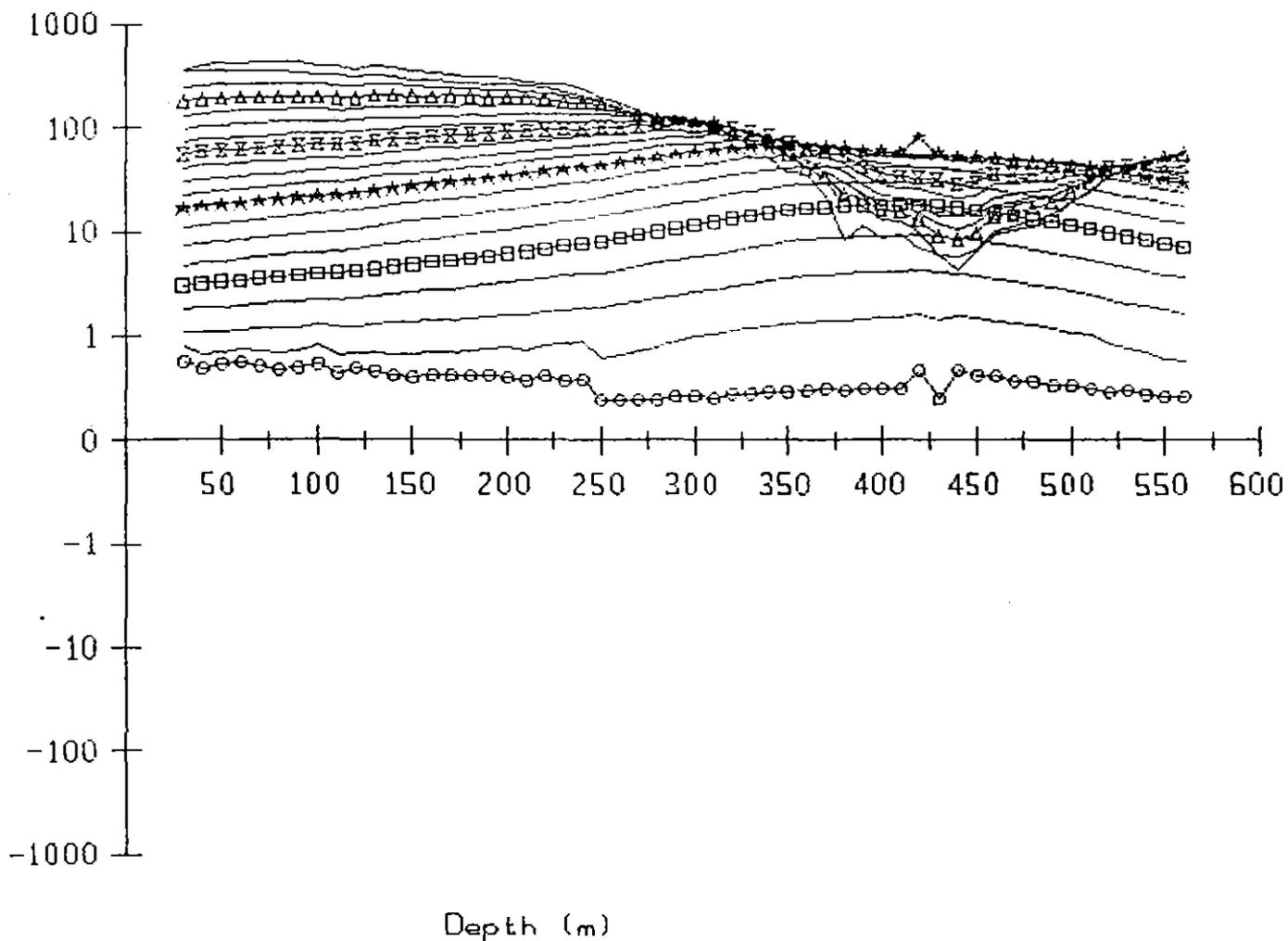
- △ Channel 4
- ⊗ Channel 8
- ☆ Channel 12
- Channel 16

DOWNHOLE EM37 SURVEY

630183

PROSPECT: High Point
 DRILLHOLE: DDH HP3
 LOOP: 15

HIGH FREQUENCY
 CHANNELS 1-20



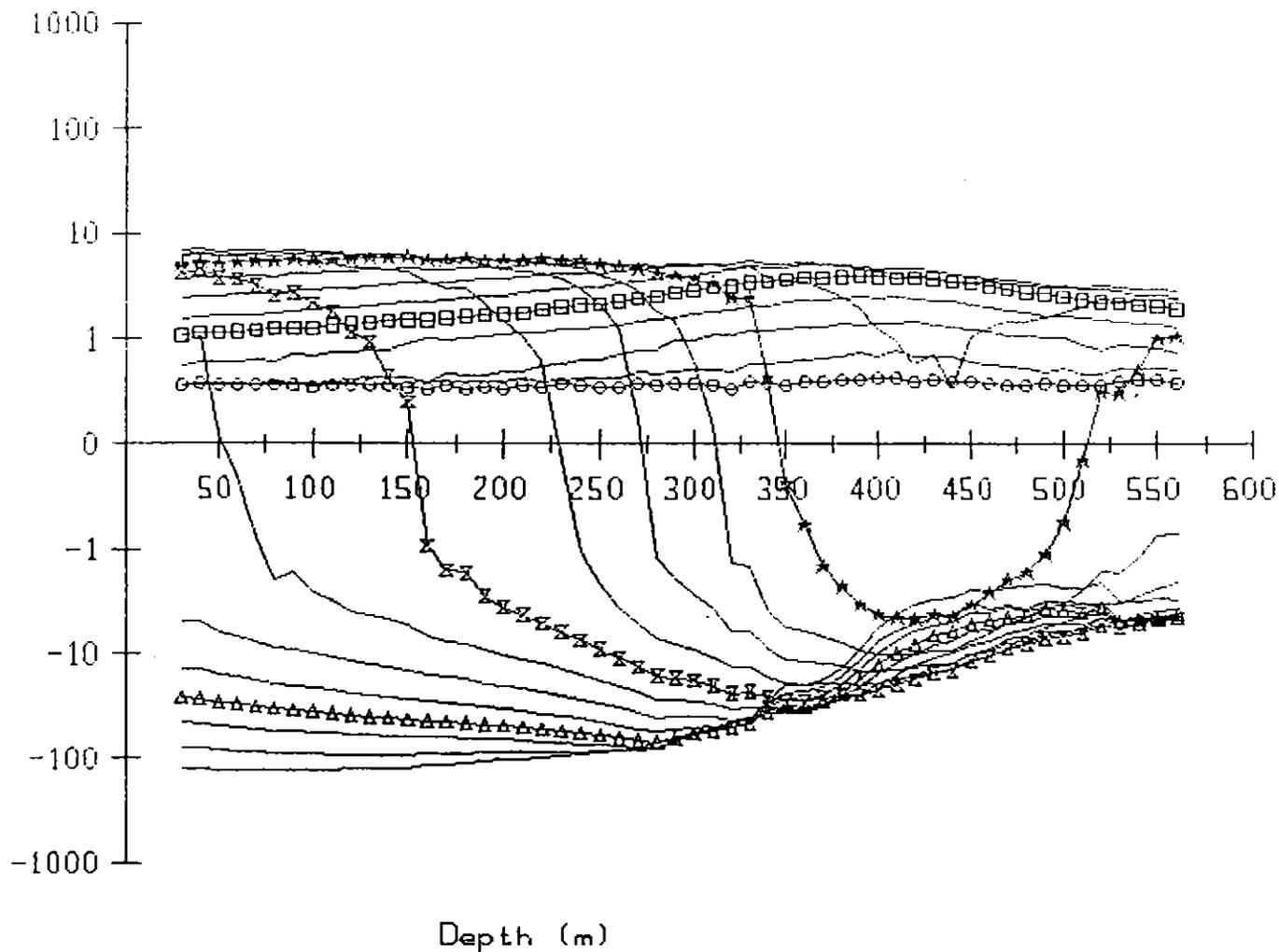
PLOTTING SYMBOLS

- △ Channel 4
- ⊗ Channel 8
- ☆ Channel 12
- Channel 16

DOWNHOLE EM37 SURVEY

PROSPECT: High Point
 DRILLHOLE: DDH HP3
 LOOP: 16

HIGH FREQUENCY
 CHANNELS 1-20



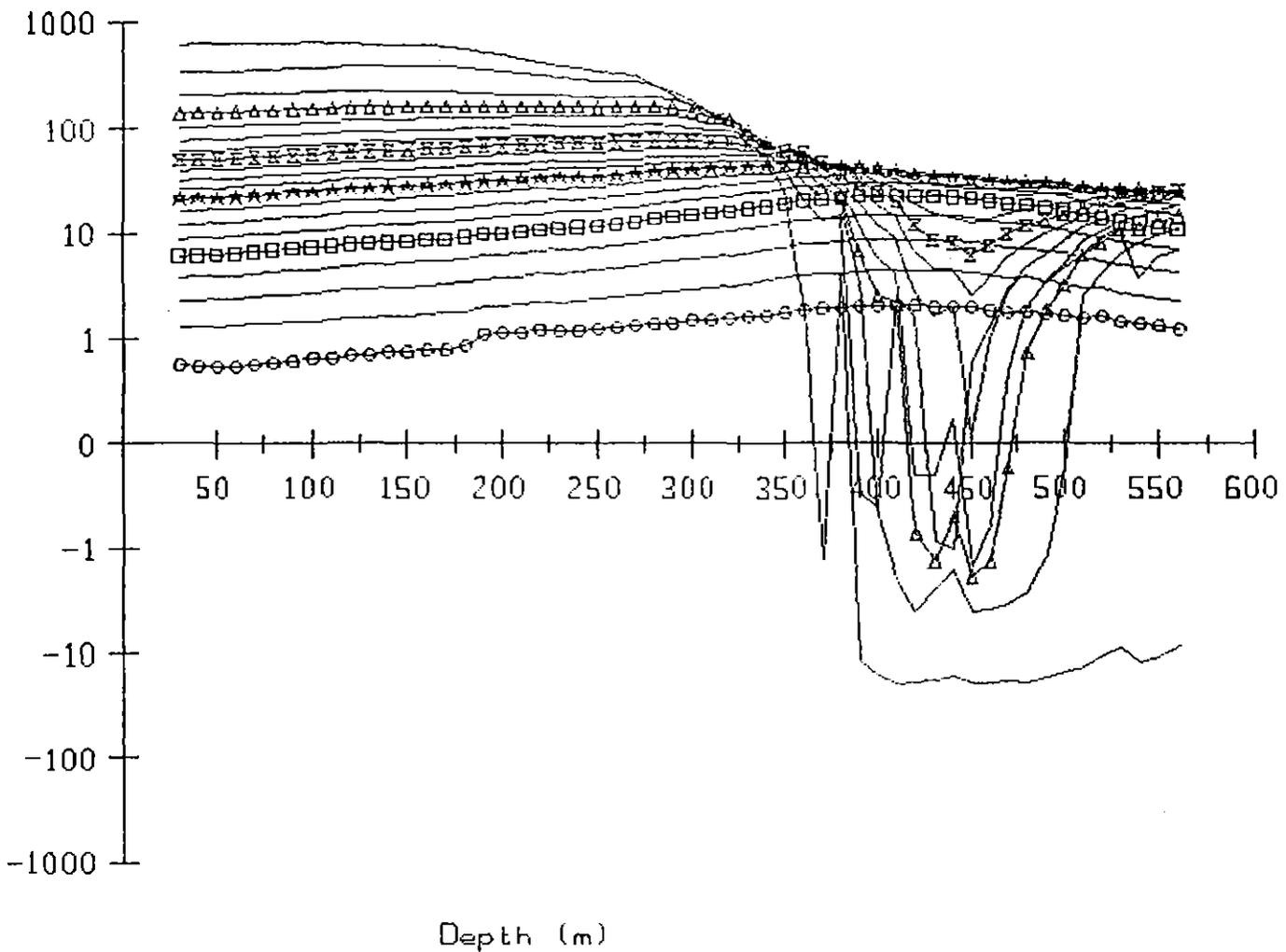
PLOTTING SYMBOLS

- △ Channel 4
- ⊗ Channel 8
- ☆ Channel 12
- Channel 16

DOWNHOLE EM37 SURVEY

PROSPECT: High Point
DRILLHOLE: DDH HP3
LOOP: 17

HIGH FREQUENCY
CHANNELS 1-20



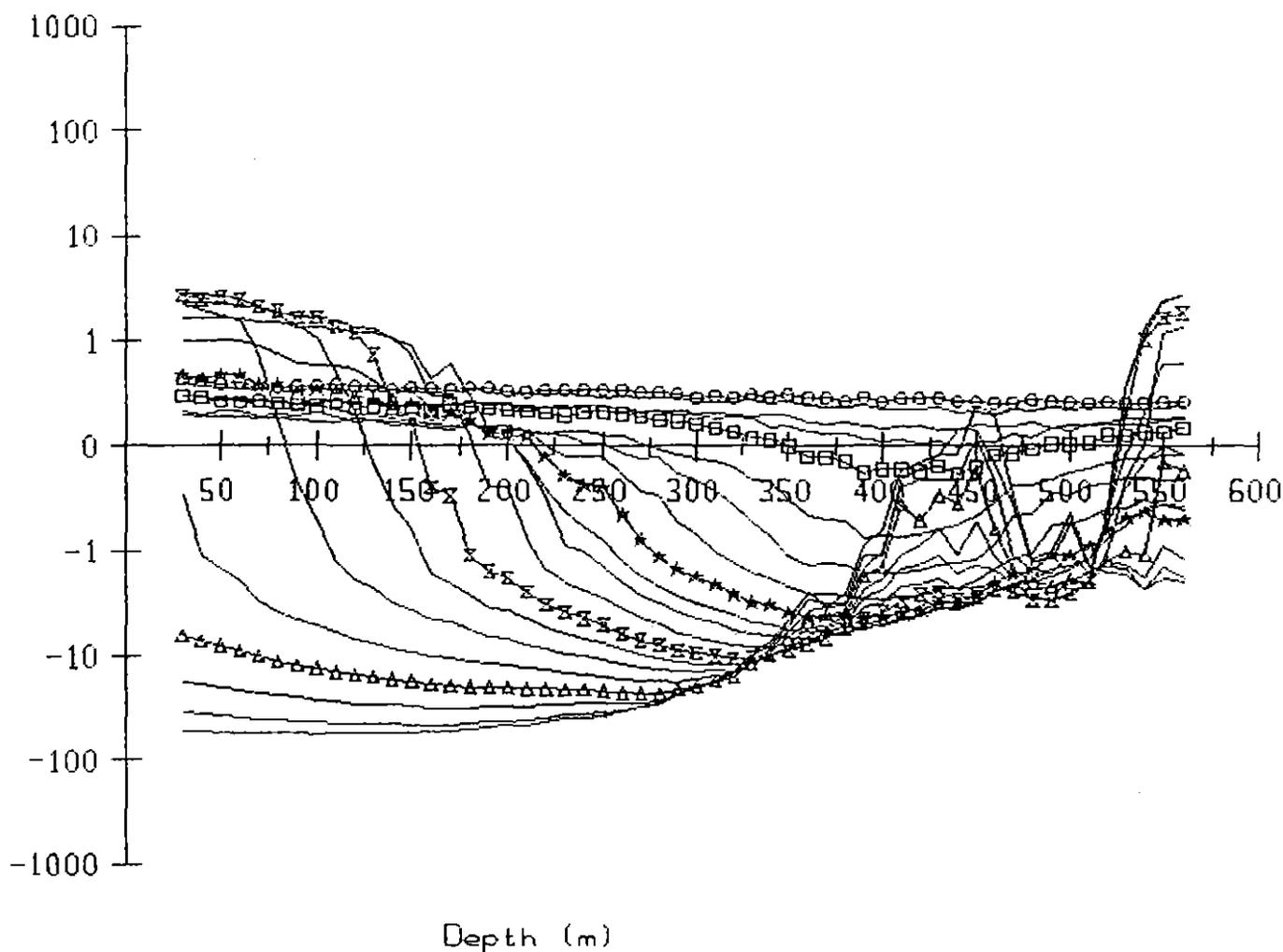
PLOTTING SYMBOLS

- △ Channel 4
- ⊗ Channel 8
- ☆ Channel 12
- Channel 16

DOWNHOLE EM37 SURVEY

PROSPECT: High Point
 DRILLHOLE: DDH HP3
 LOOP: 18

HIGH FREQUENCY
 CHANNELS 1-20



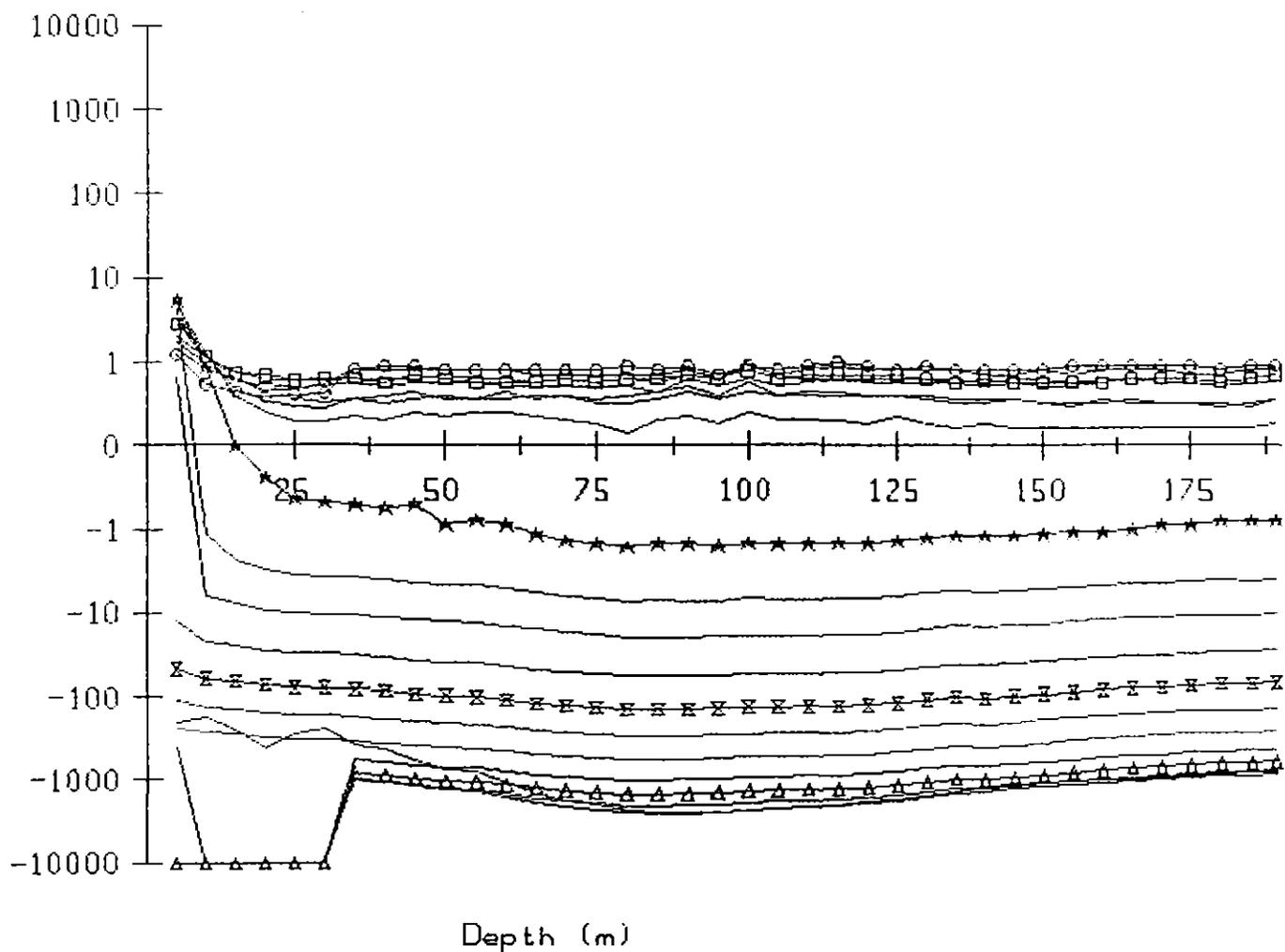
PLOTTING SYMBOLS

- △ Channel 4
- ⊗ Channel 8
- ☆ Channel 12
- Channel 16

DOWNHOLE EM37 SURVEY

PROSPECT: Sock Ck South
 DRILLHOLE: DDH SCS4
 LOOP: AC1

HIGH FREQUENCY
 CHANNELS 1-20



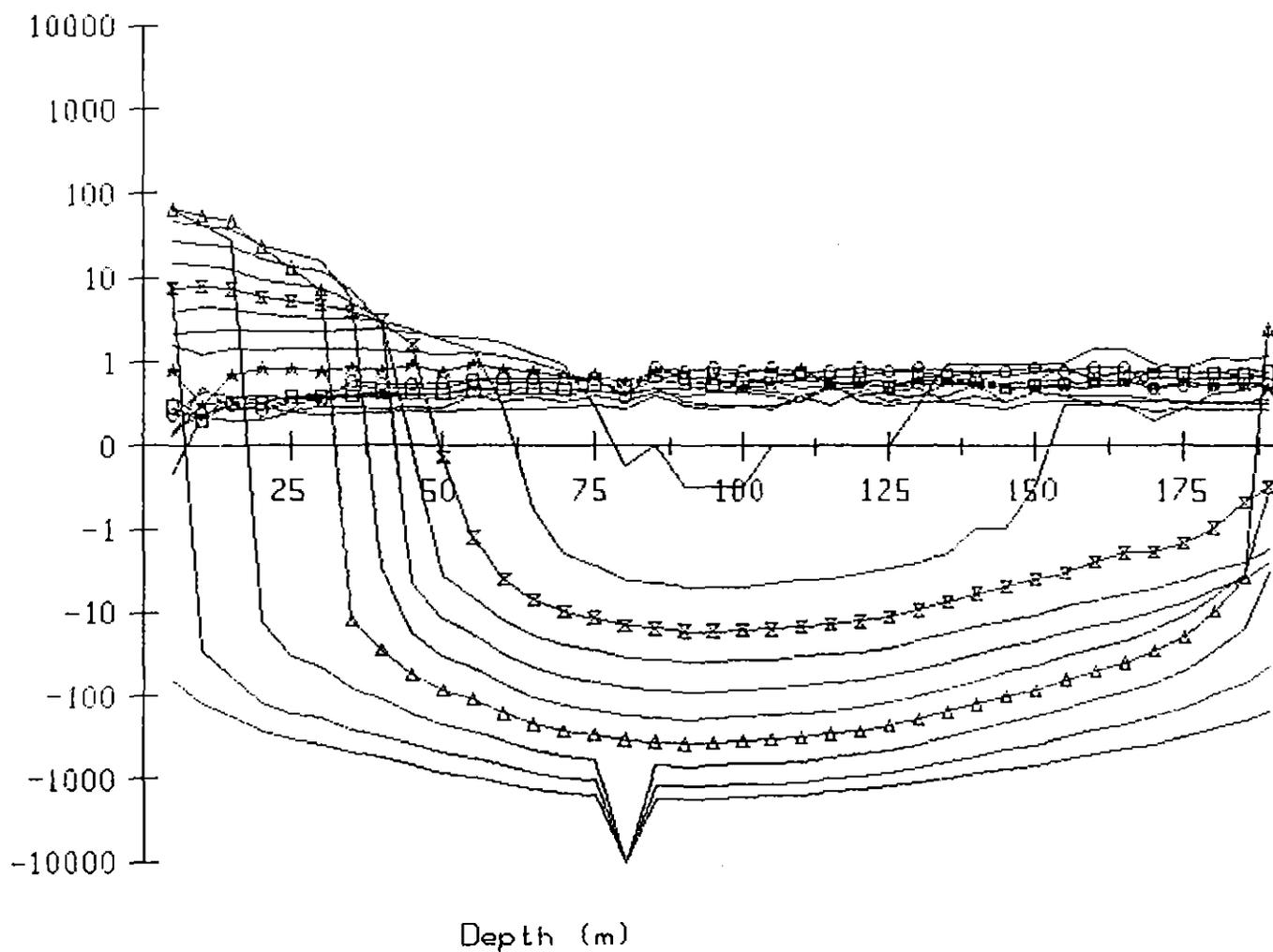
PLOTTING SYMBOLS

- △ Channel 4
- ⊗ Channel 8
- ☆ Channel 12
- Channel 16

DOWNHOLE EM37 SURVEY

PROSPECT: Sock Ck South
 DRILLHOLE: DDH SCS4
 LOOP: AC2

HIGH FREQUENCY
 CHANNELS 1-20

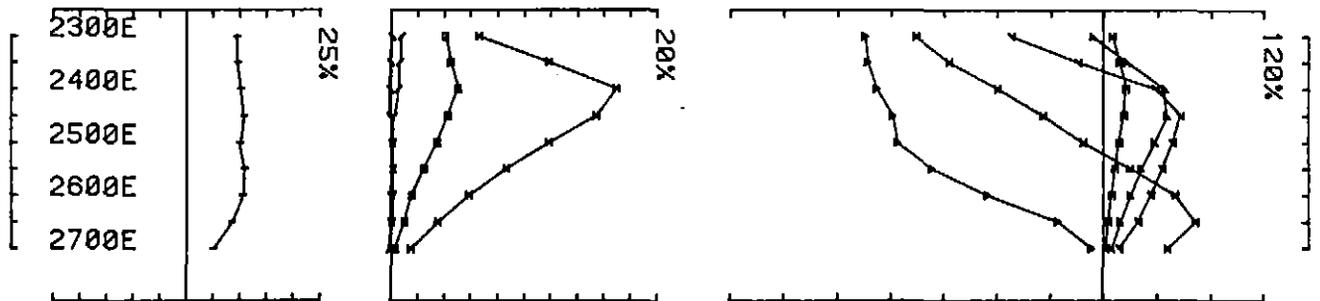


PLOTING SYMBOLS

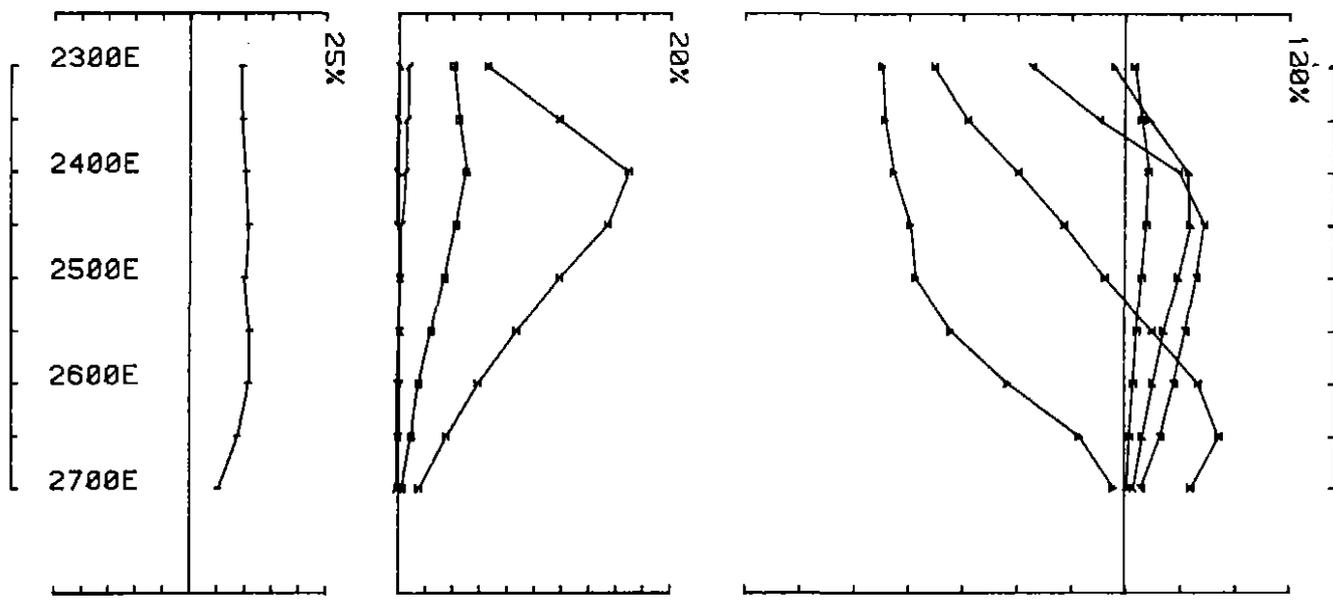
- △ Channel 4
- × Channel 8
- ☆ Channel 12
- Channel 16

APPENDIX 6

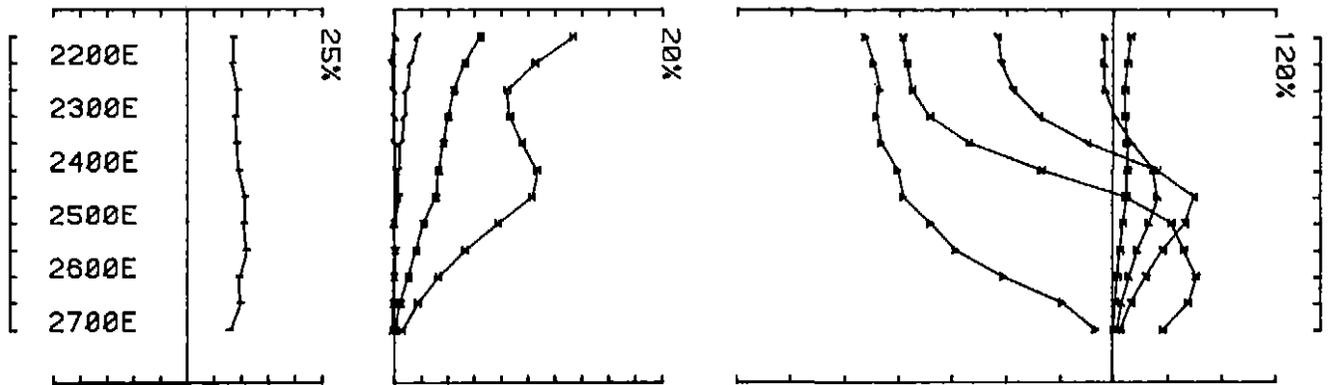
UTEM DATA - SOCK CREEK SOUTH



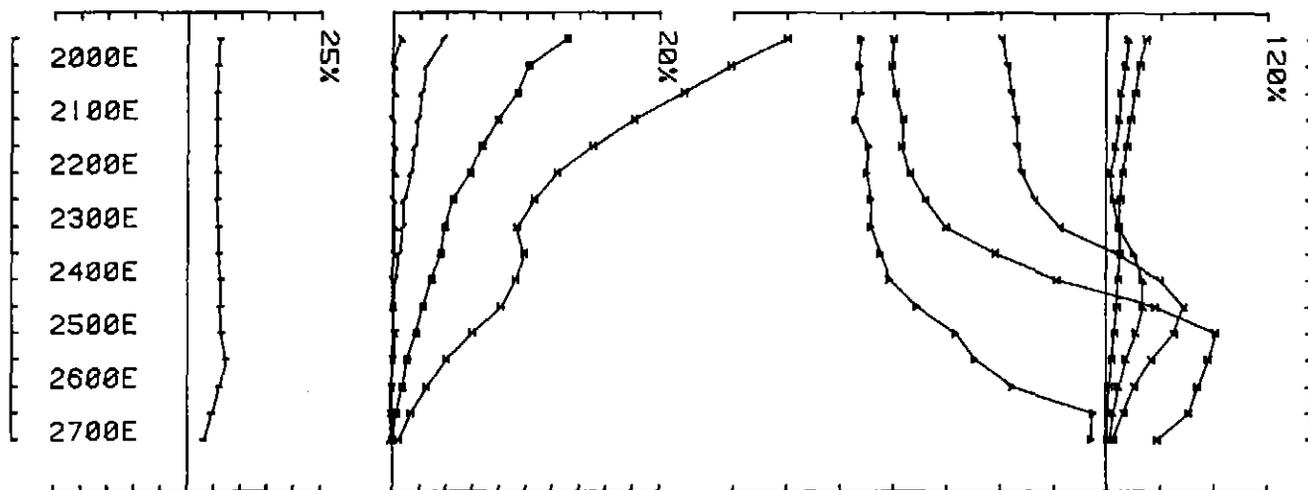
UTEM SURVEY at SOCK CREEK SOUTH PROSPECT for B.H.P. - UTAH MINERALS INT.
 conducted by LAMONTAGNE GEOPHYSICS. Job 8903 base freq (hz) 33.409 Mar 89
 loop no 1 line 3600N component Hz secondary field Ch 1 contin. norm.



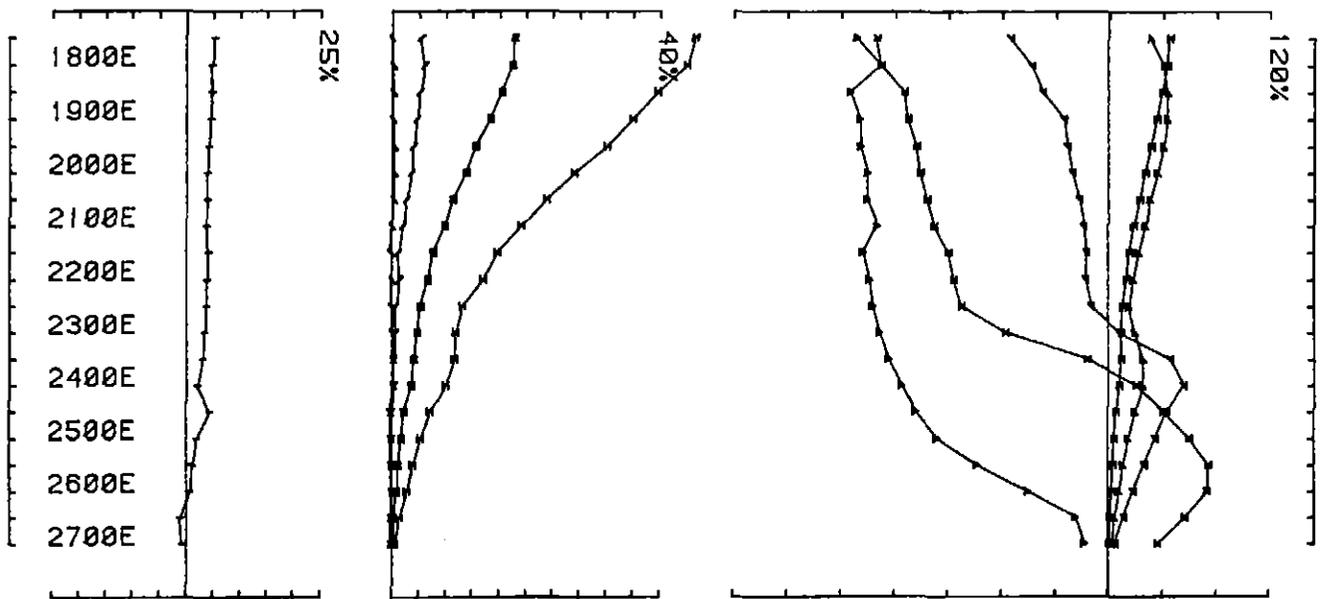
UTEM SURVEY at SOCK CREEK SOUTH PROSPECT for B.H.P. - UTAH MINERALS INT.
conducted by LAMONTAGNE GEOPHYSICS. job 8903 base freq (hz) 33.409 Mar 89
loop no 1 line 3600N component Hz secondary field Ch 1 contin. norm.



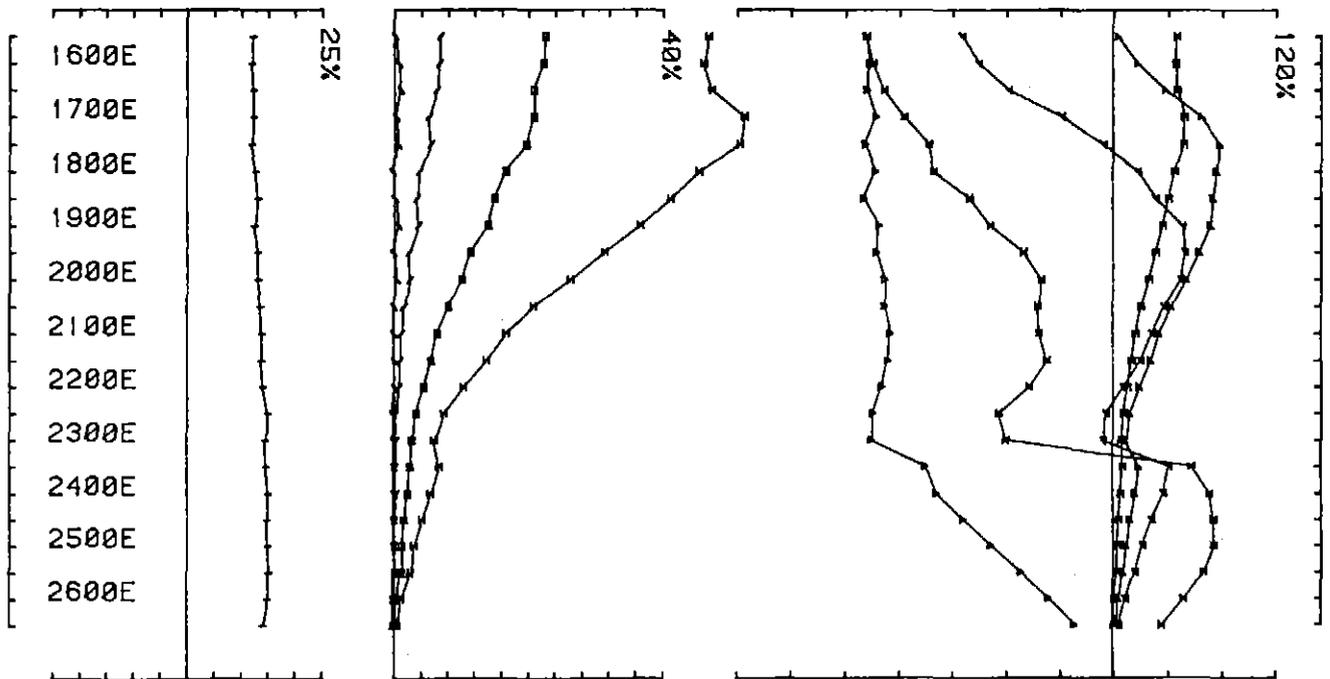
UTEM SURVEY at SOCK CREEK SOUTH PROSPECT for B.H.P. - UTAH MINERALS INT.
 conducted by LAMONTAGNE GEOPHYSICS. Job 8903 base freq (hz) 33.409 Mar 89
 loop no 1 line 3800N component Hz secondary field Ch 1 contin. norm.



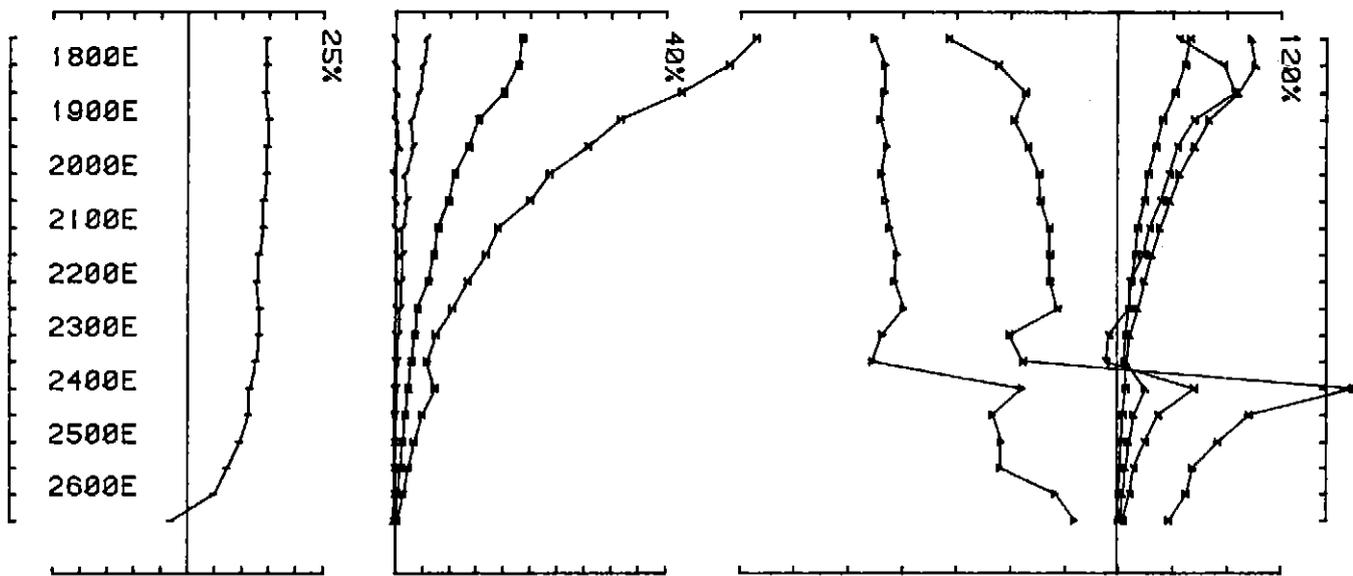
UTEM SURVEY at SOCK CREEK SOUTH PROSPECT for B.H.P. - UTAH MINERALS INT.
conducted by LAMONTAGNE GEOPHYSICS. Job 8903 base freq (hz) 33.409 Mar 89
loop no 1 line 4000N component Hz secondary field Ch 1 contin. norm.



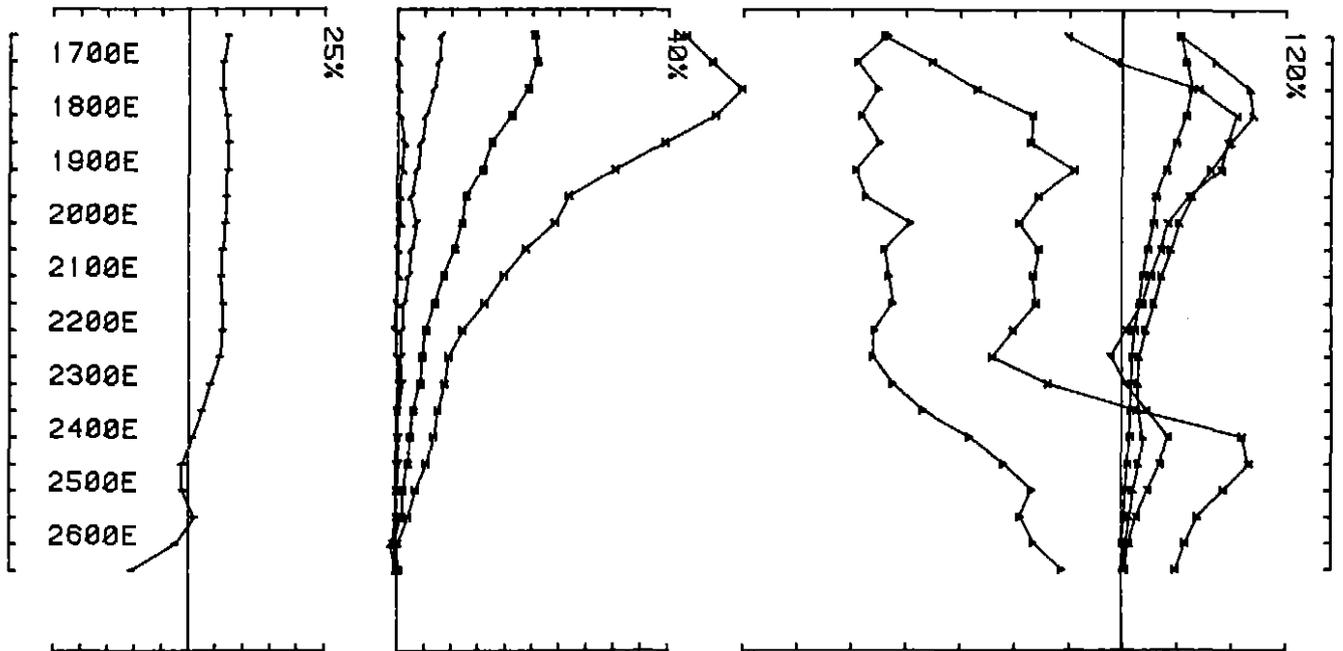
UTEM SURVEY at SOCK CREEK SOUTH PROSPECT for B.H.P. - UTAH MINERALS INT.
 conducted by LAMONTAGNE GEOPHYSICS. Job 8903 base freq (hz) 33.409 Mar 89
 loop no 1 line 4200N component Hz secondary field Ch 1 contin. norm.



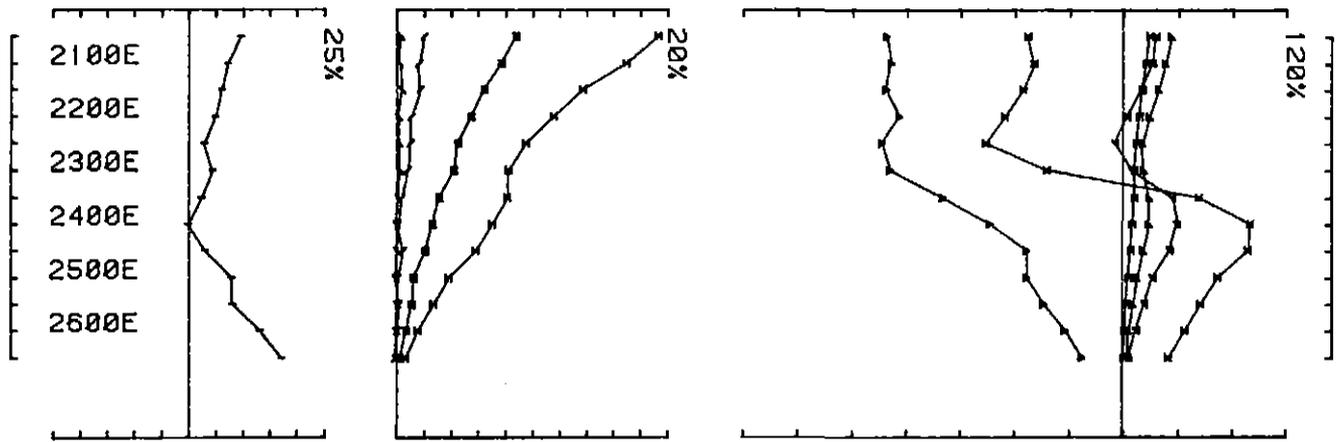
UTEM SURVEY at SOCK CREEK SOUTH PROSPECT for B.H.P. - UTAH MINERALS INT.
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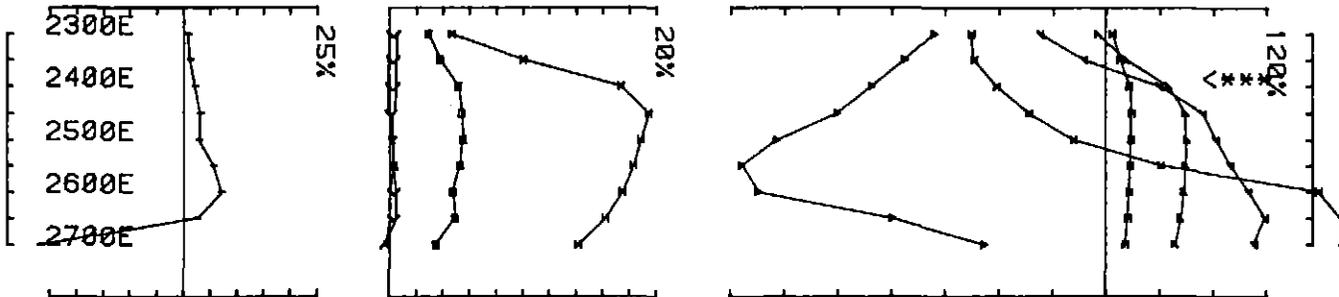
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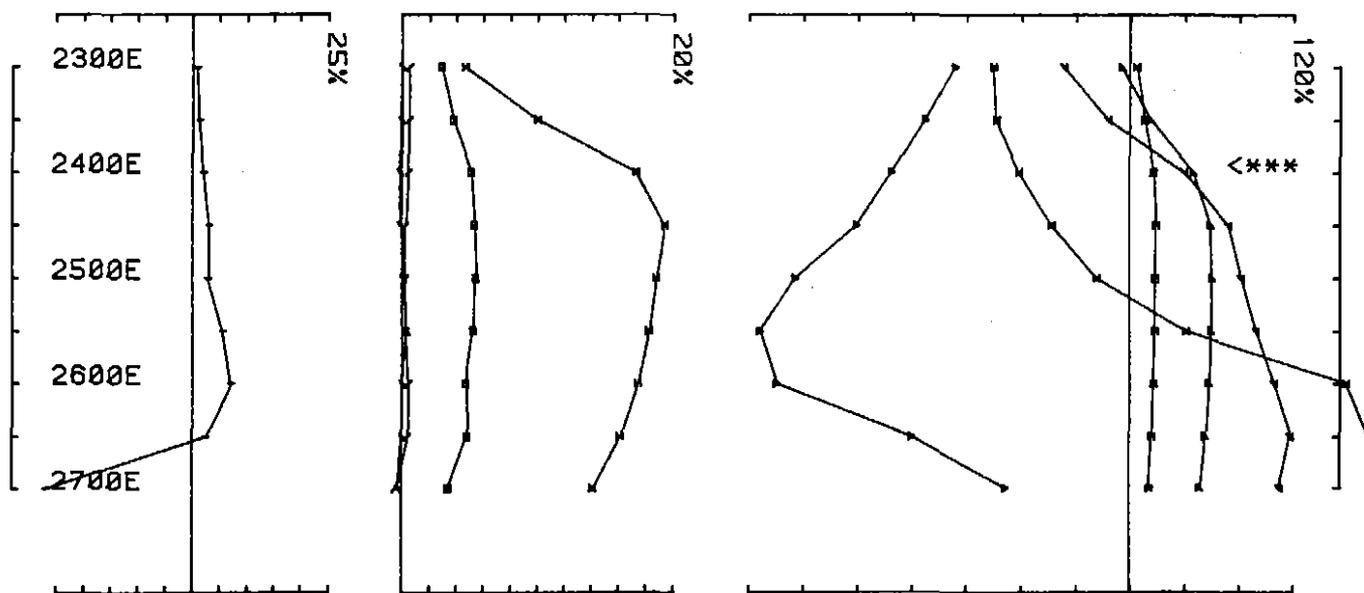
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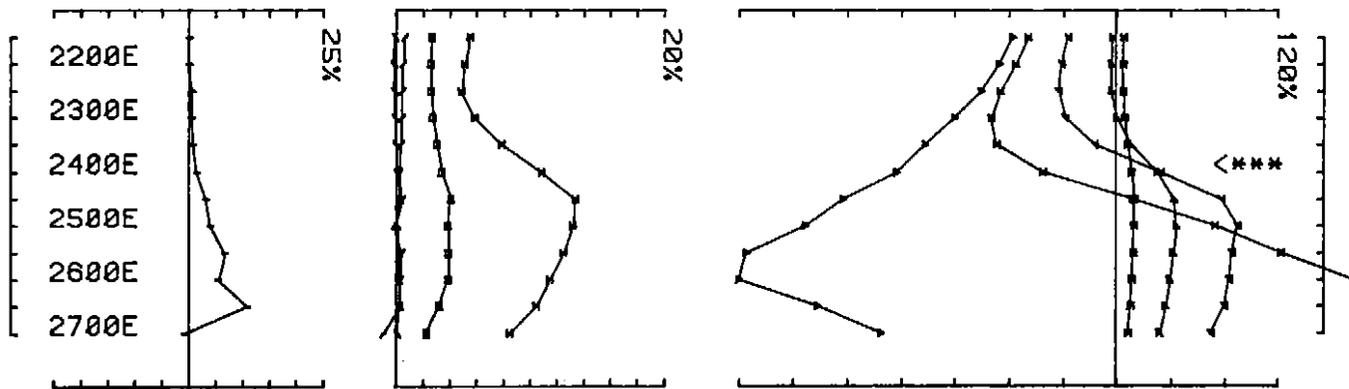
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UTEM SURVEY at SOCK CREEK SOUTH PROSPECT for B.H.P. - UTAH MINERALS INT.
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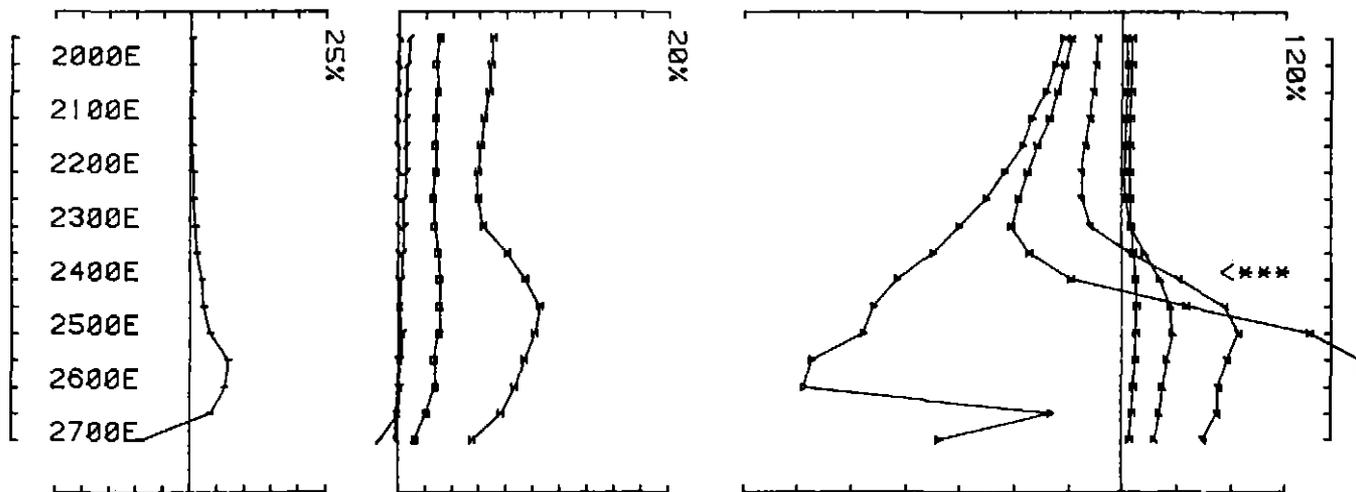


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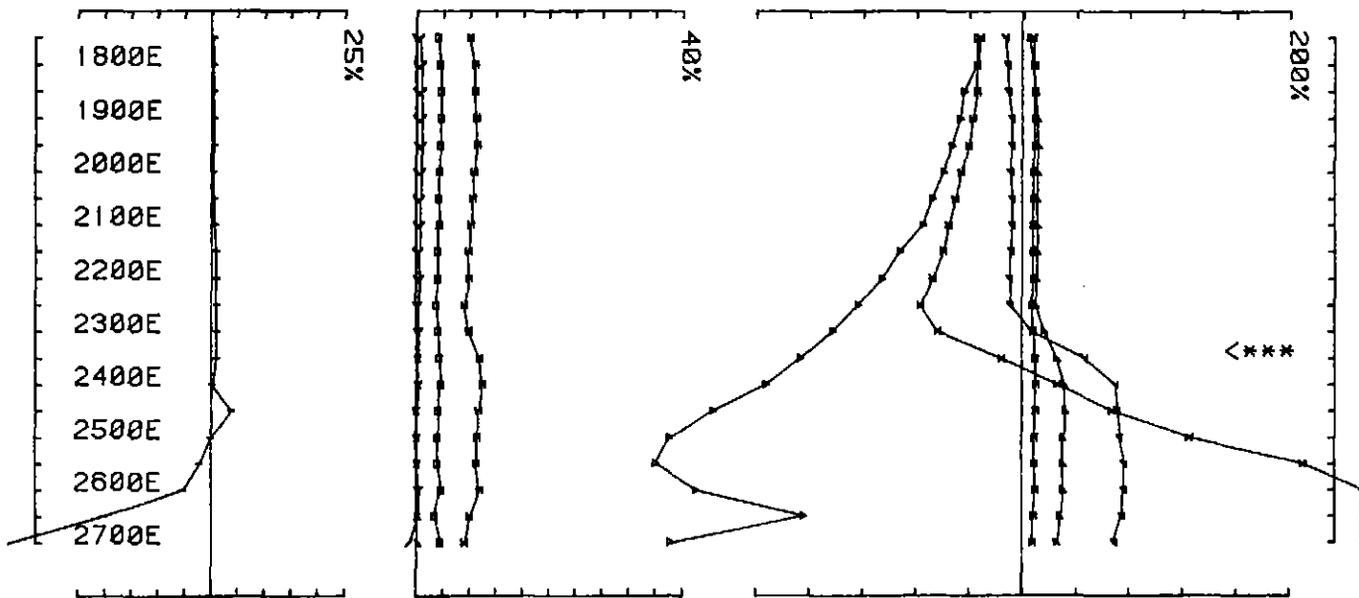


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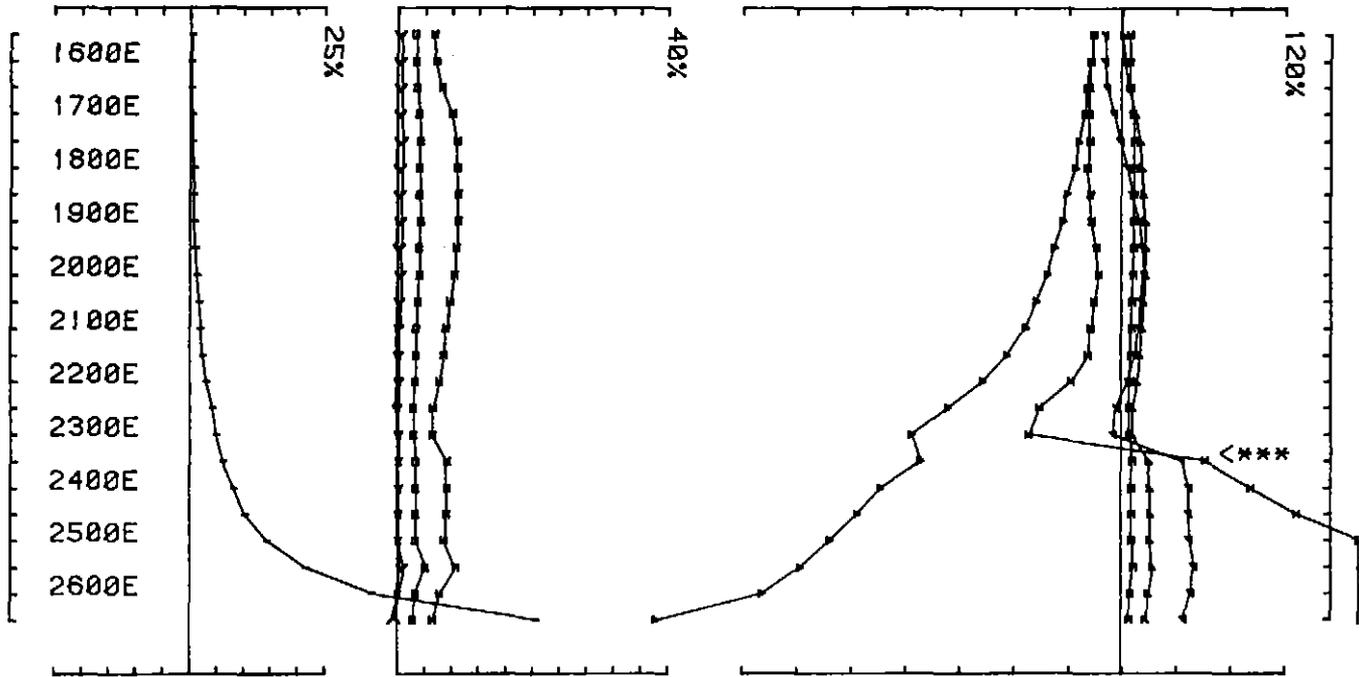
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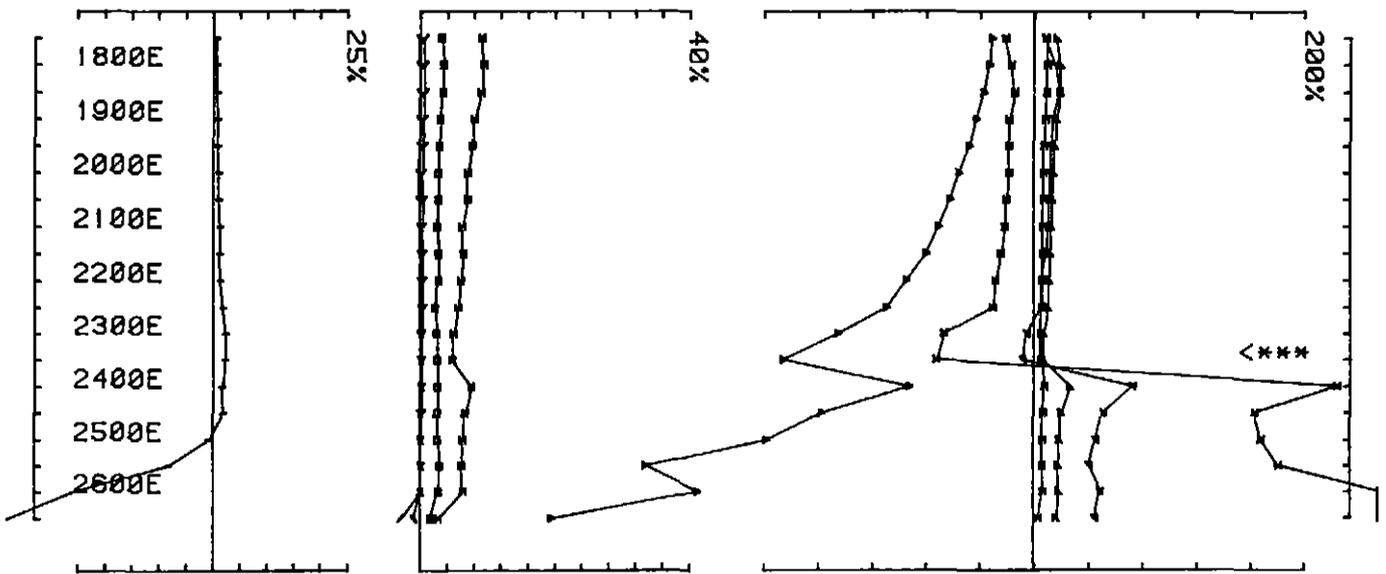
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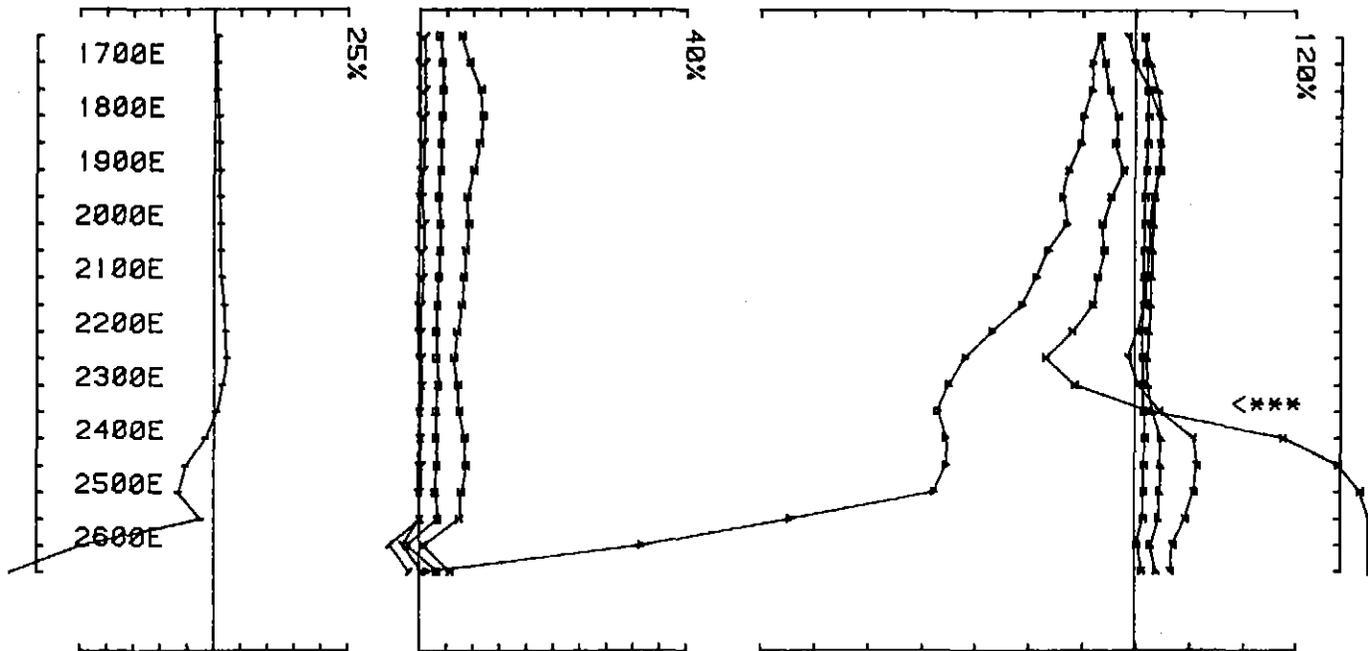
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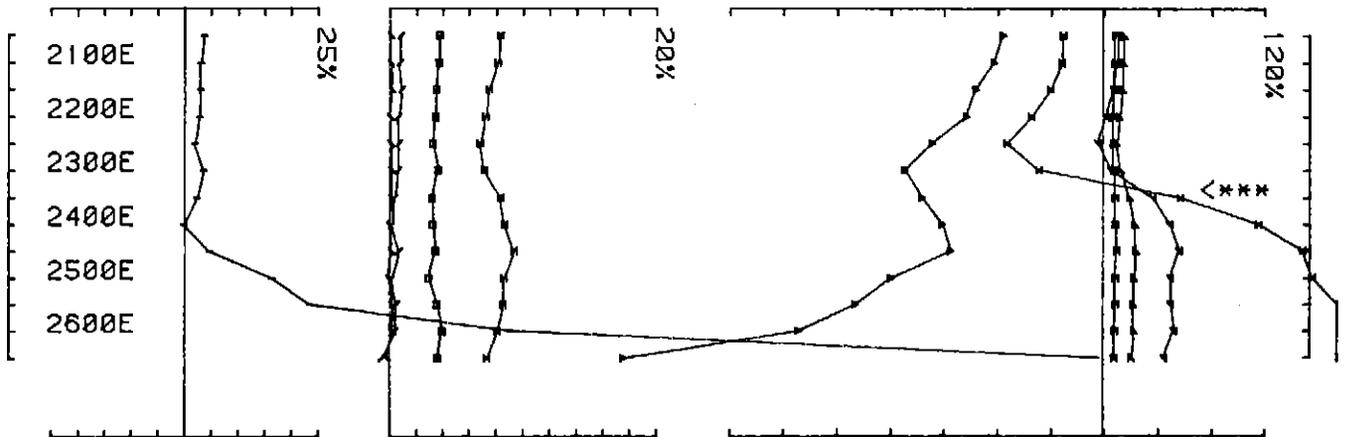
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UTEM SURVEY at SOCK CREEK SOUTH PROSPECT for B.H.P. - UTAH MINERALS INT.
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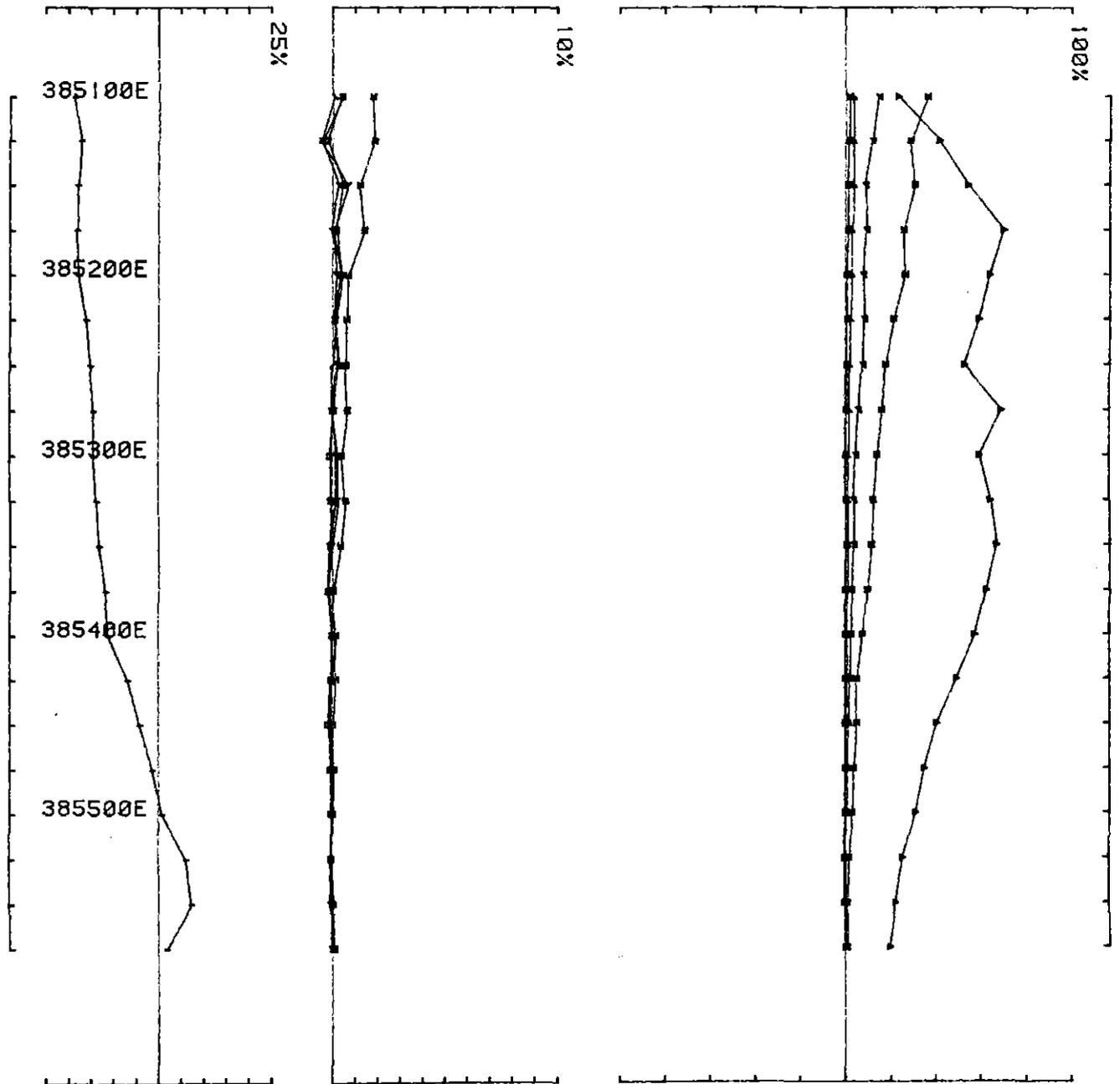
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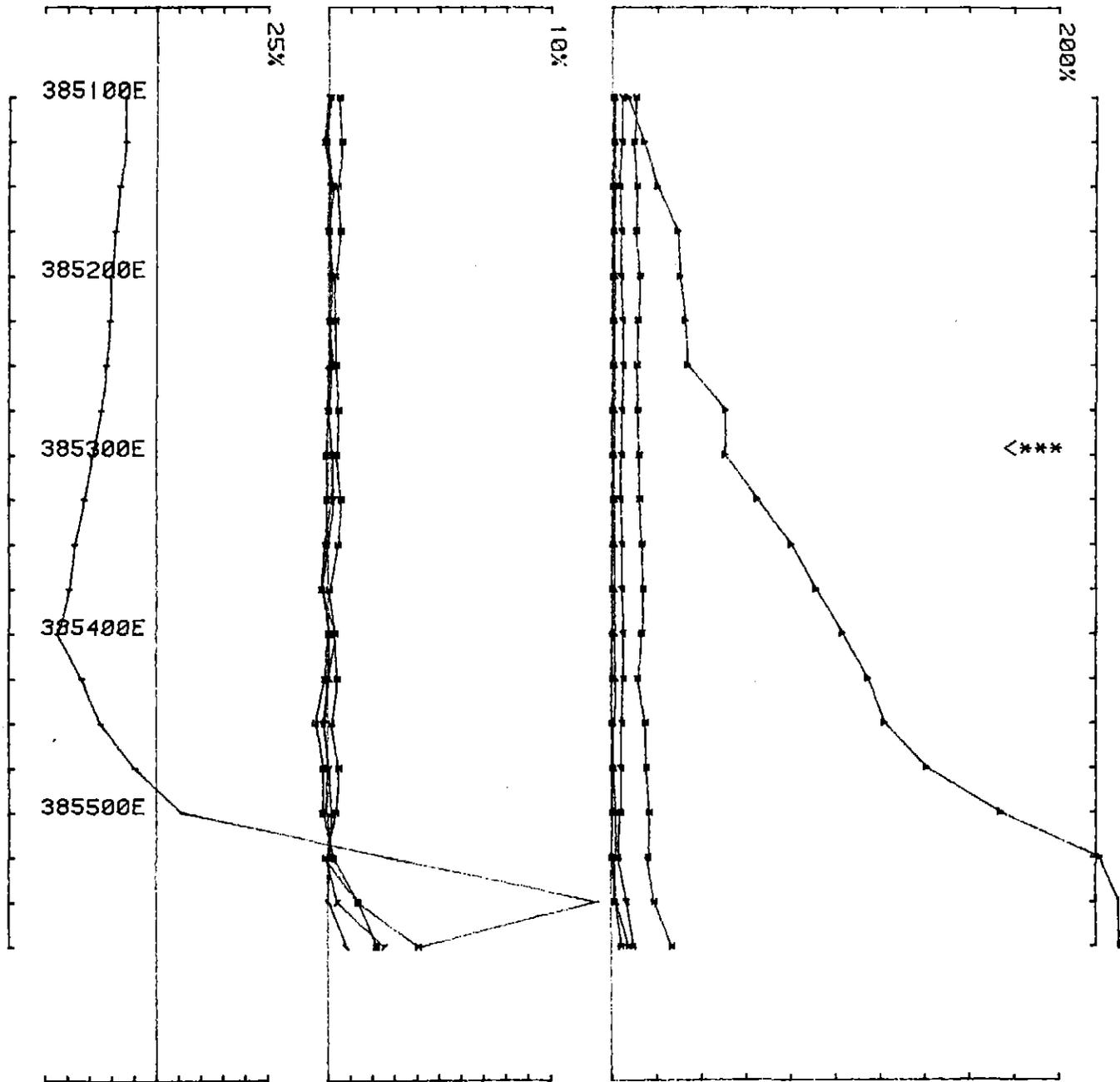
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APPENDIX 7

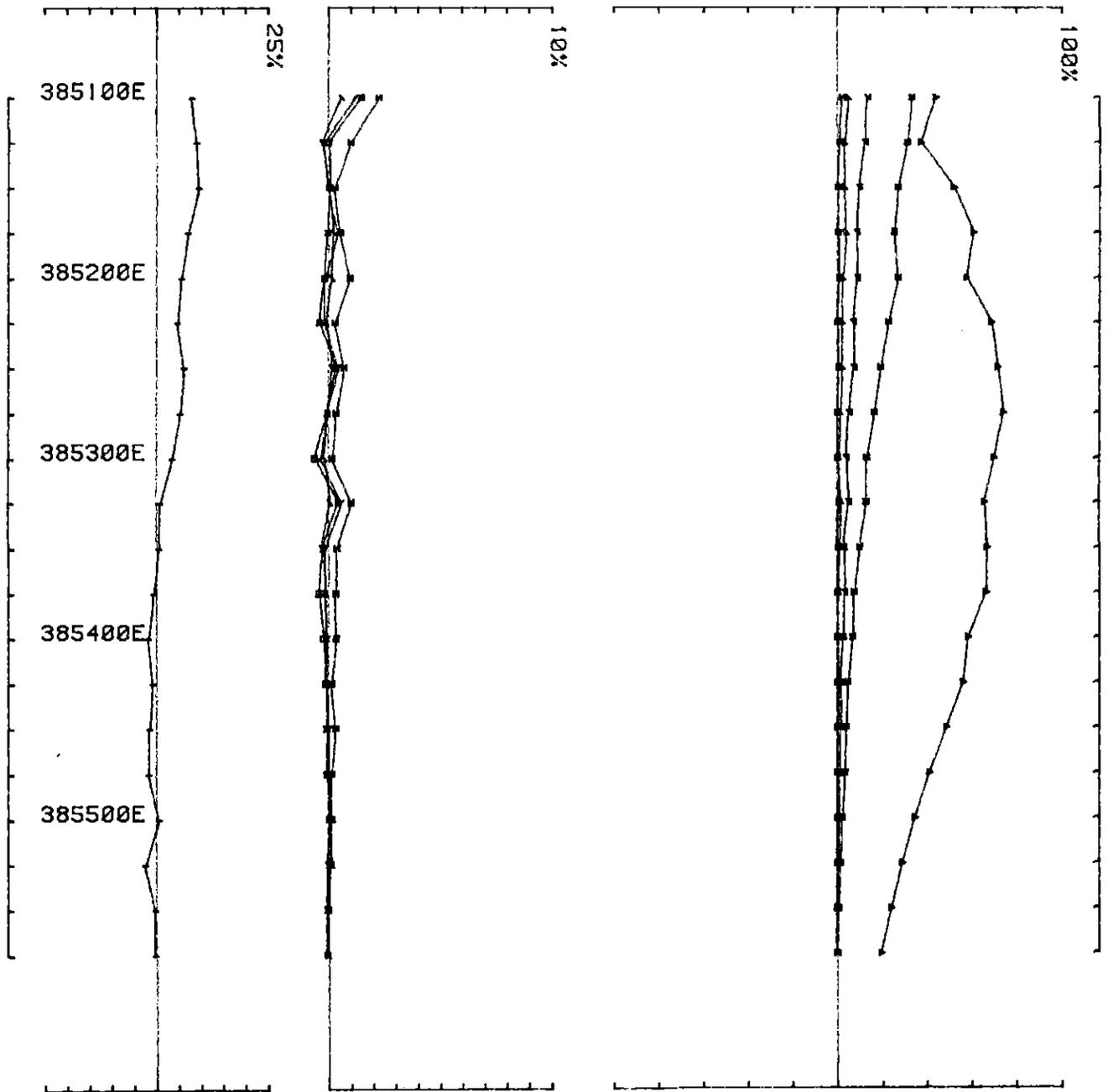
UTEM DATA - TULLABARDINE GORGE



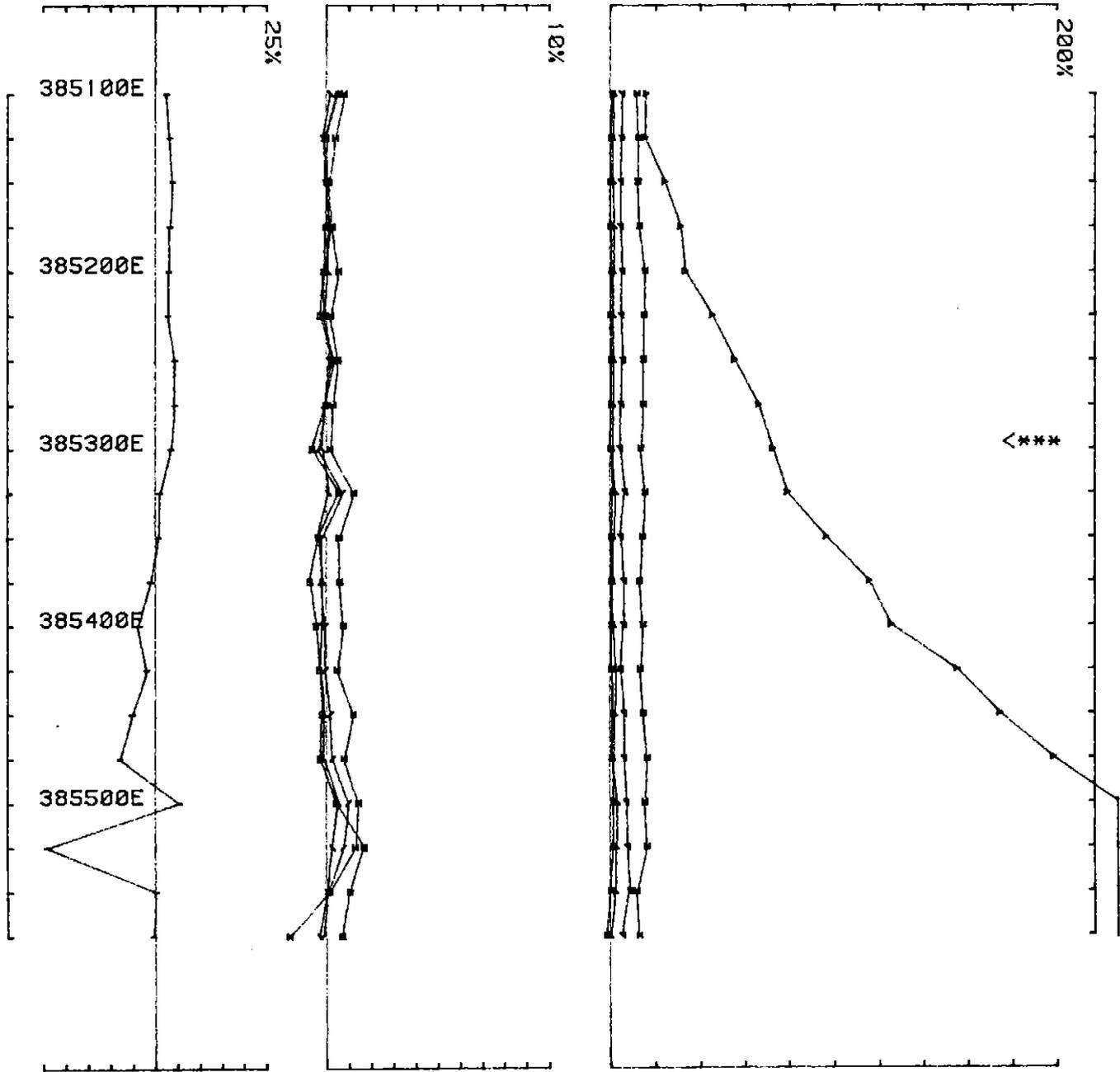
UTEM SURVEY at TULLABARDINE for BHP-UTAH MINERALS INTERNATIONAL
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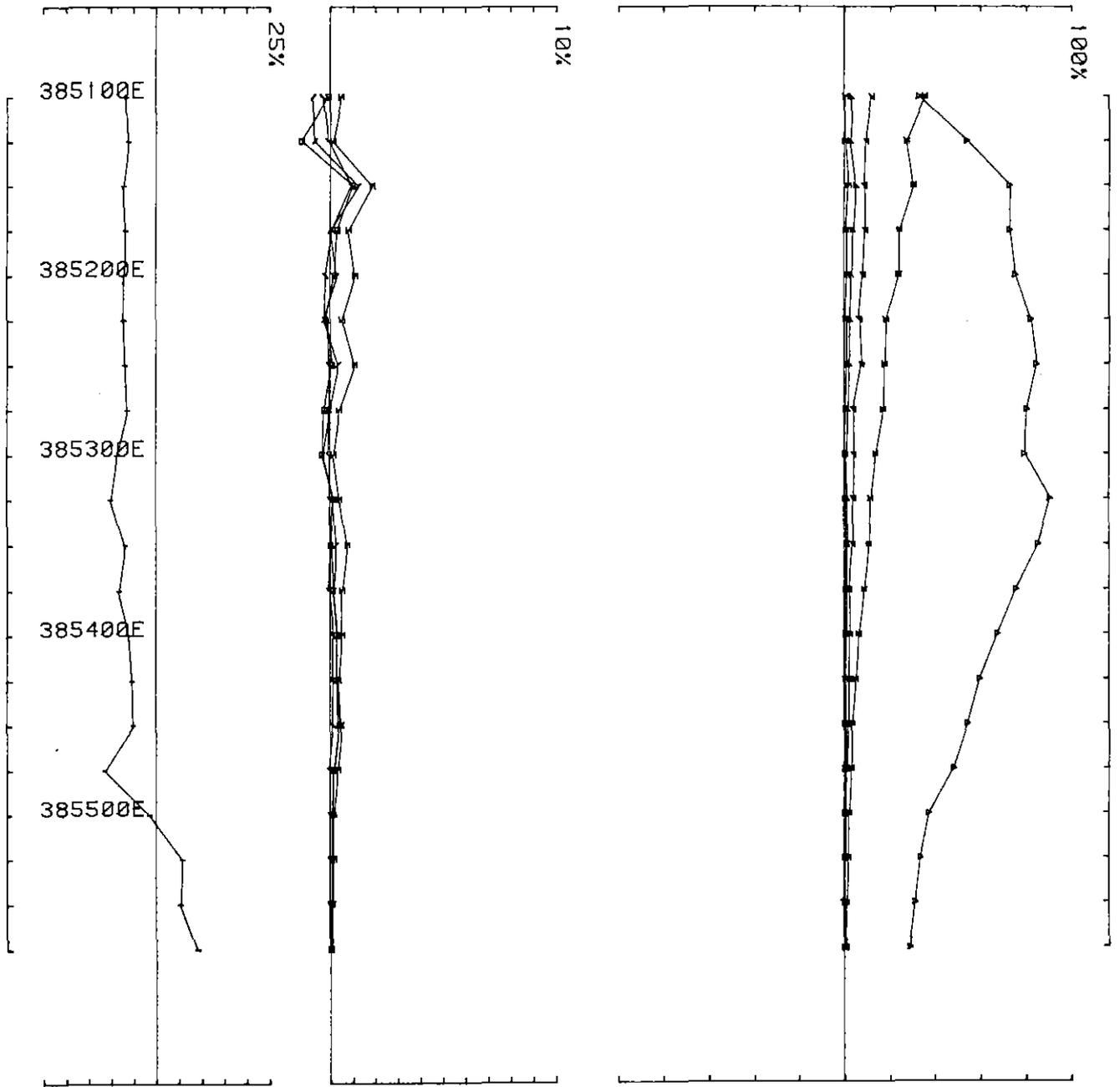
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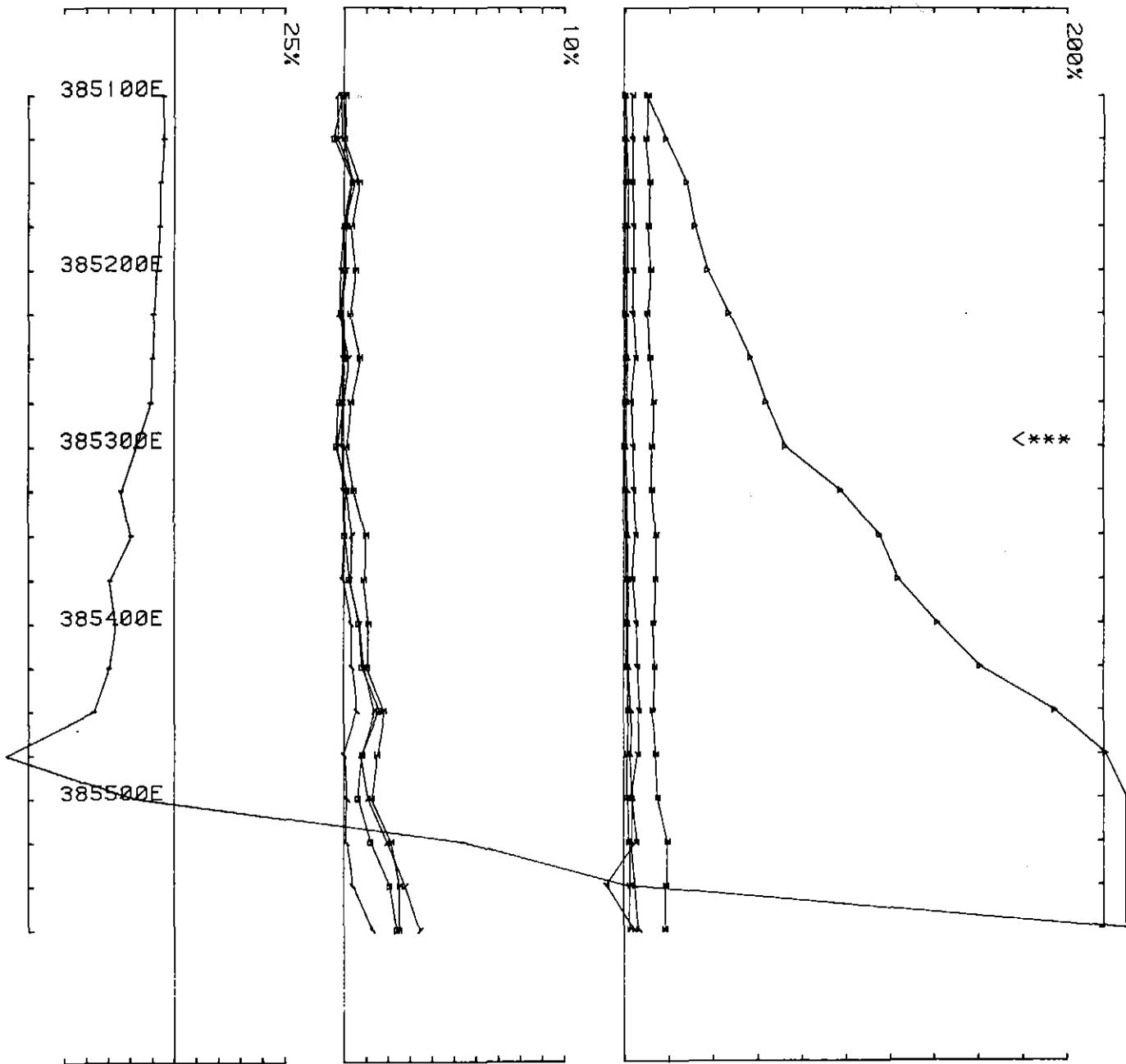
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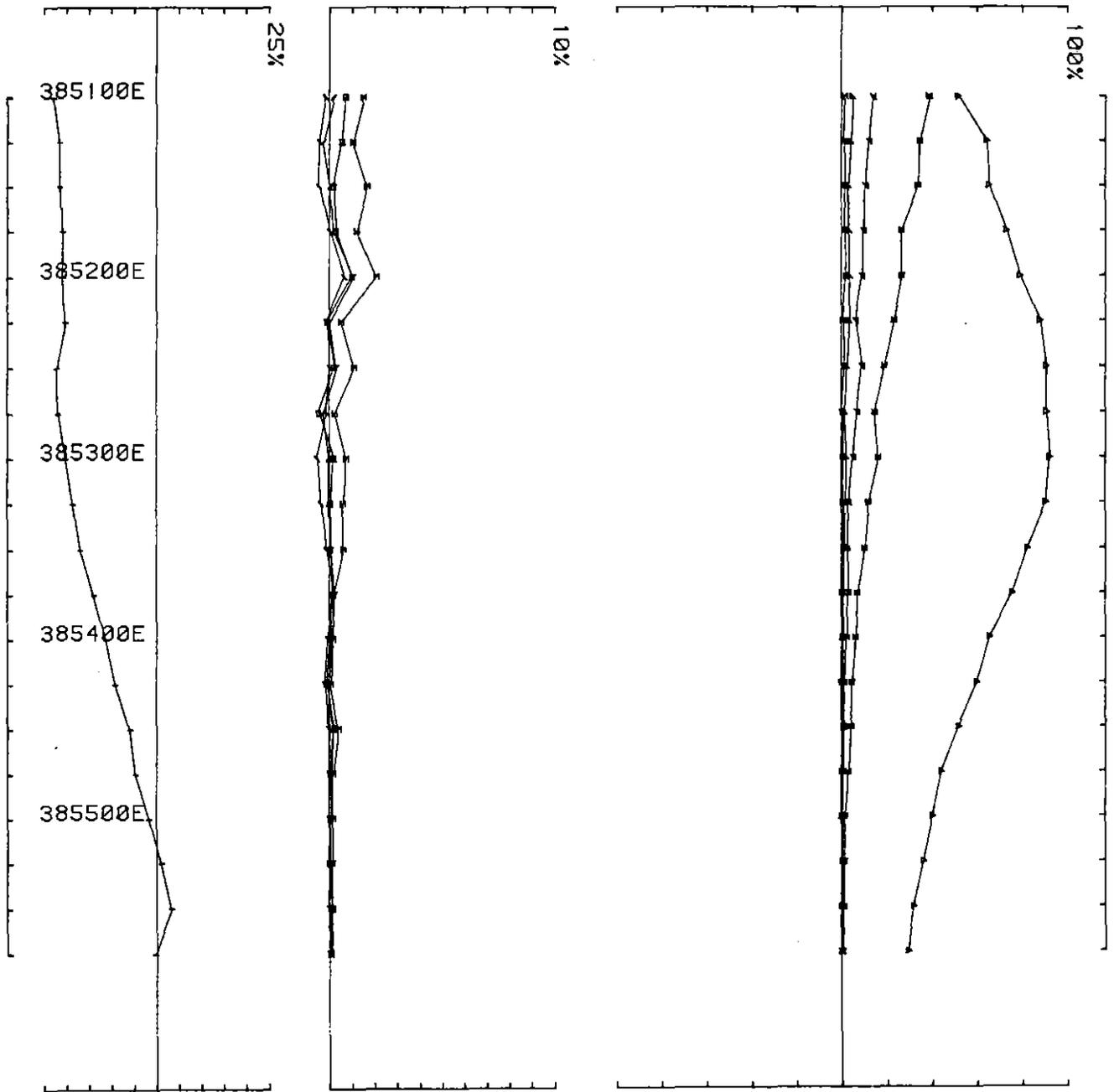
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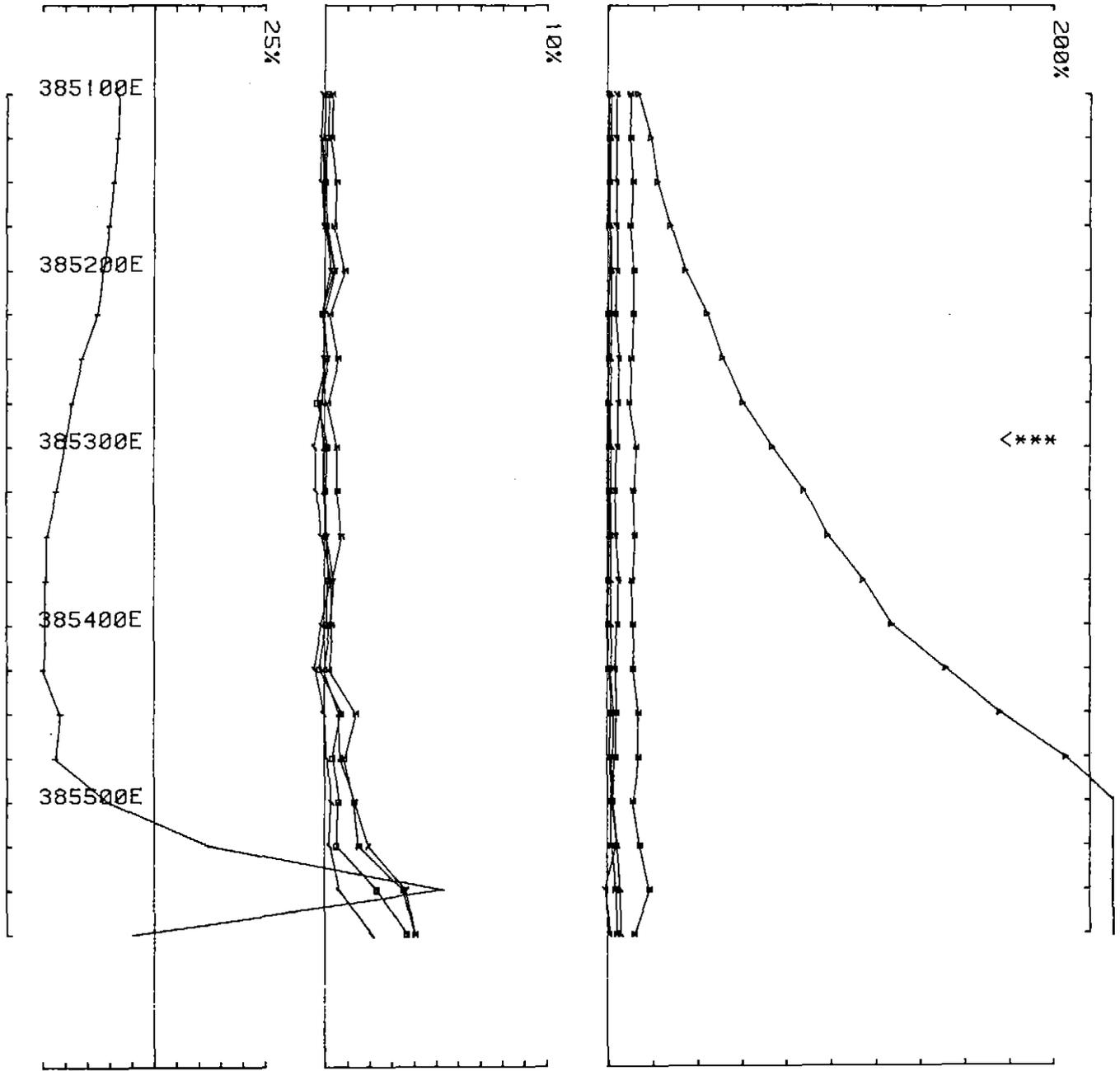
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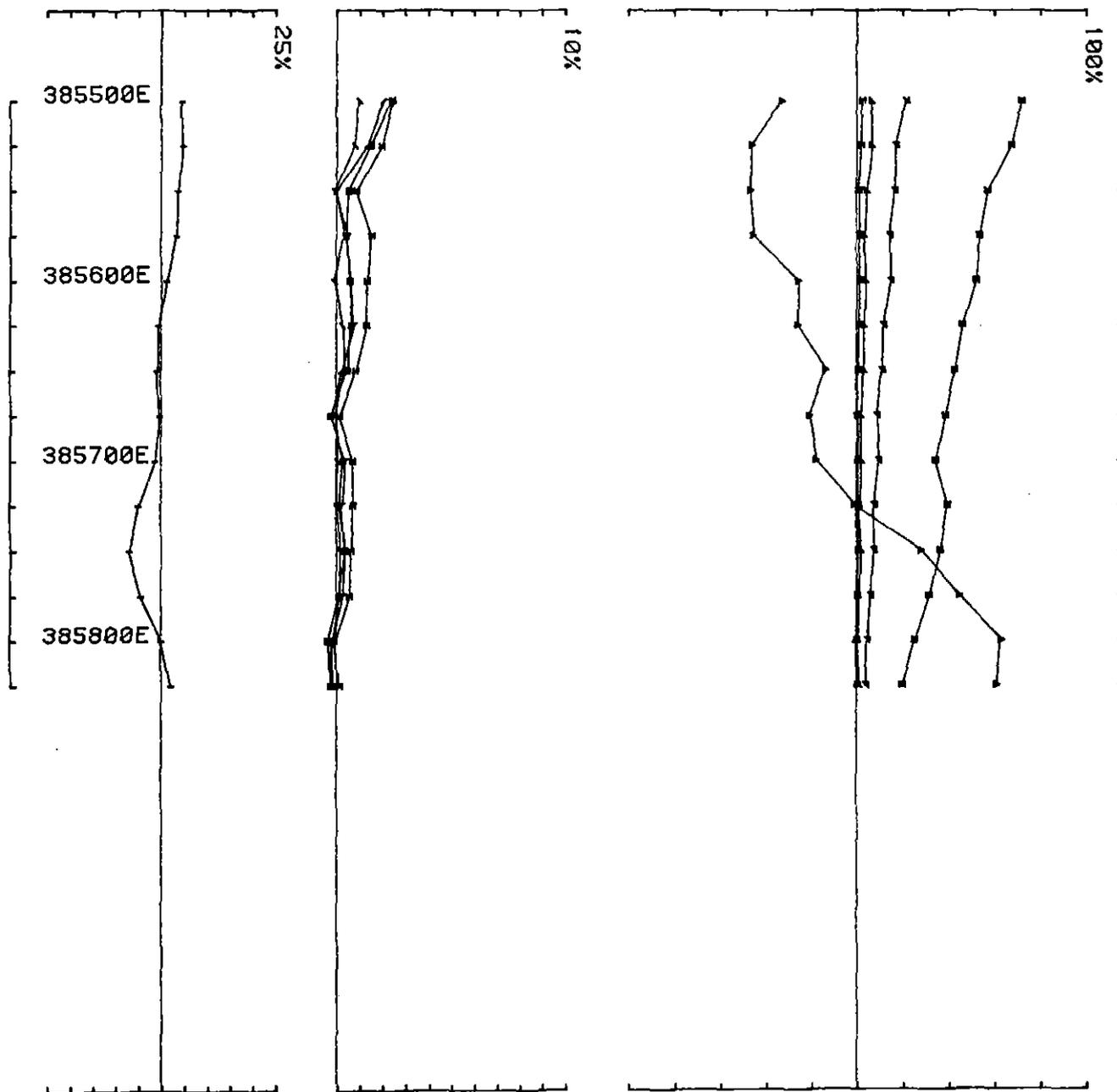
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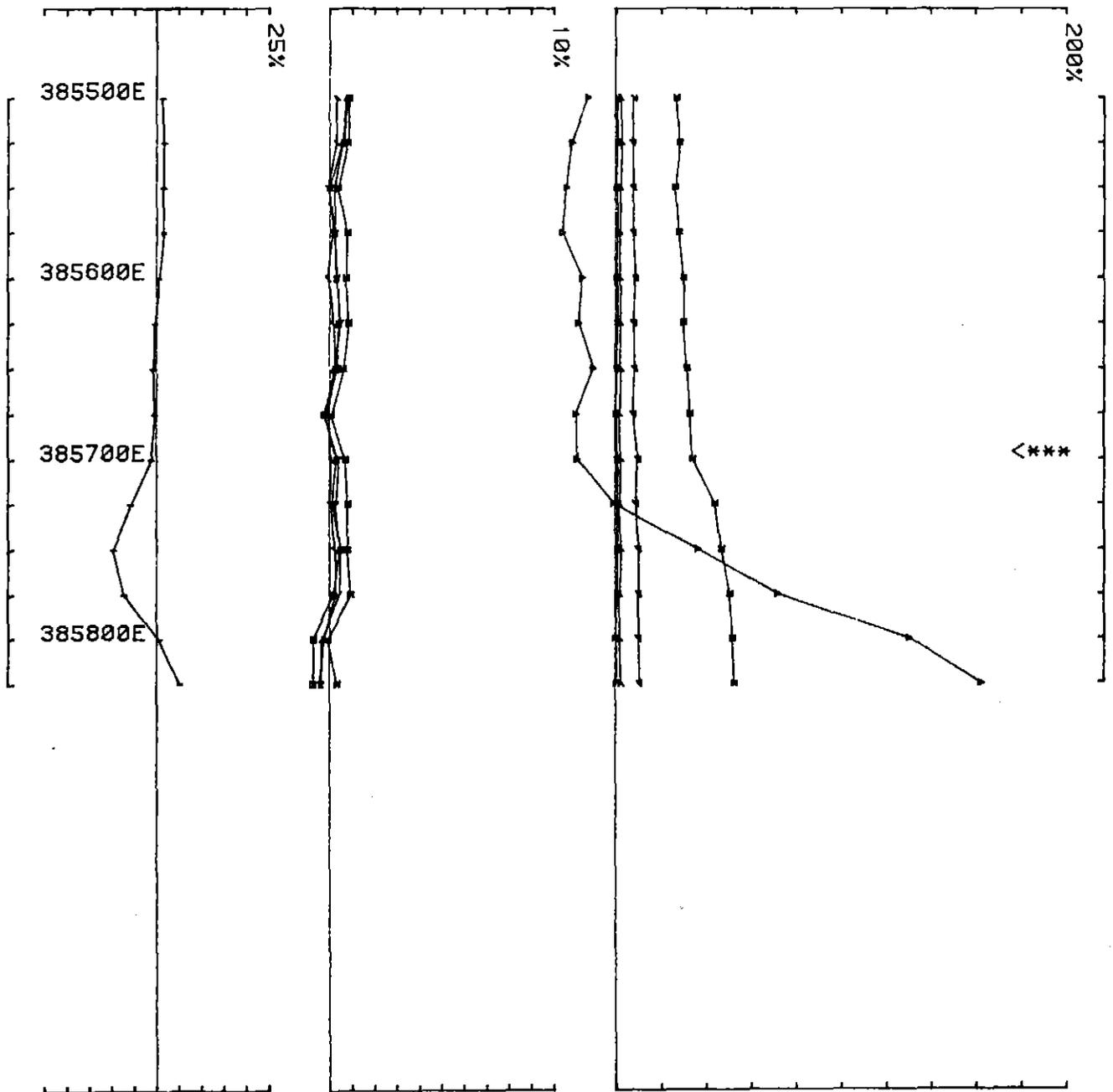
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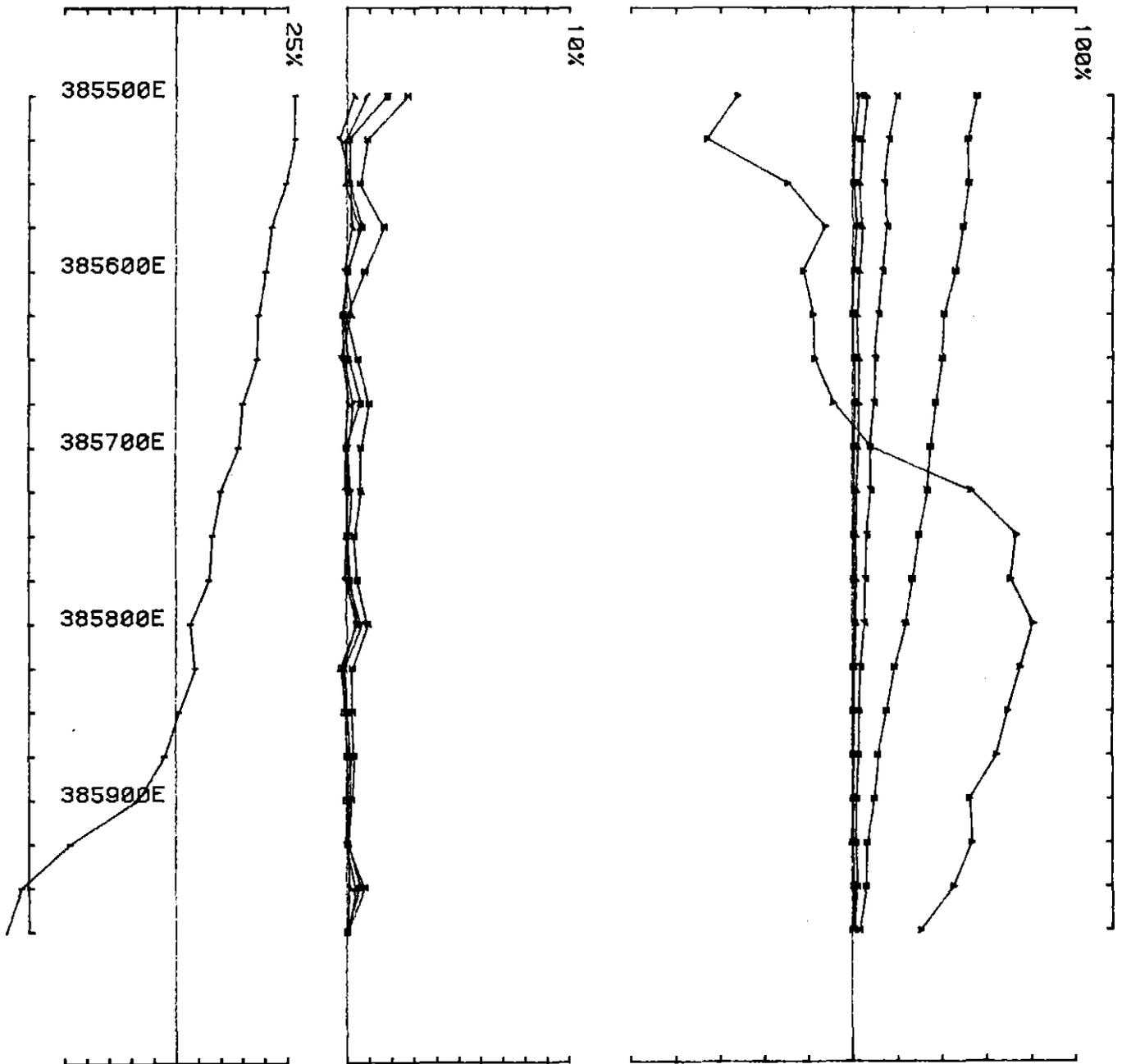
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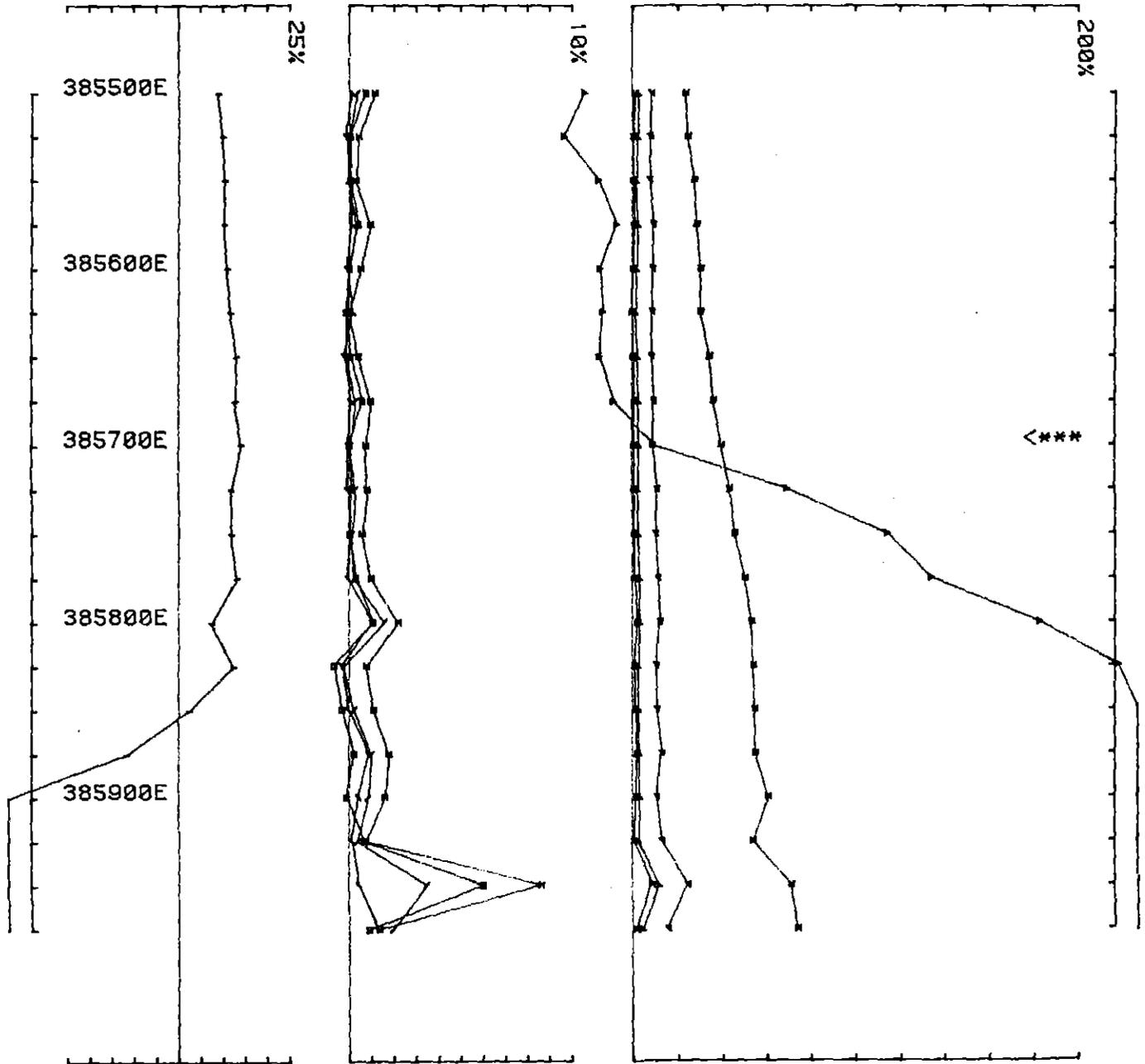
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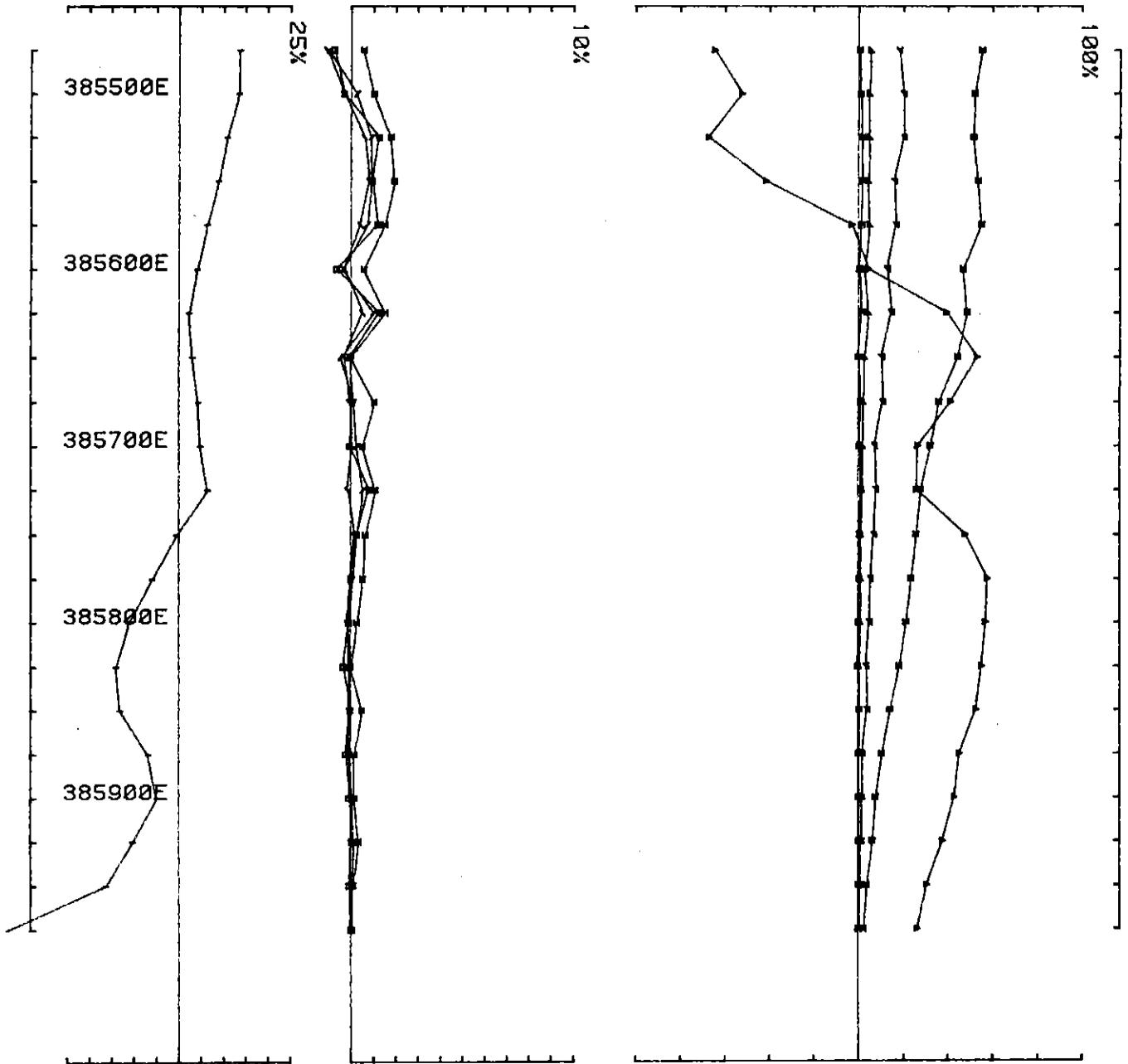
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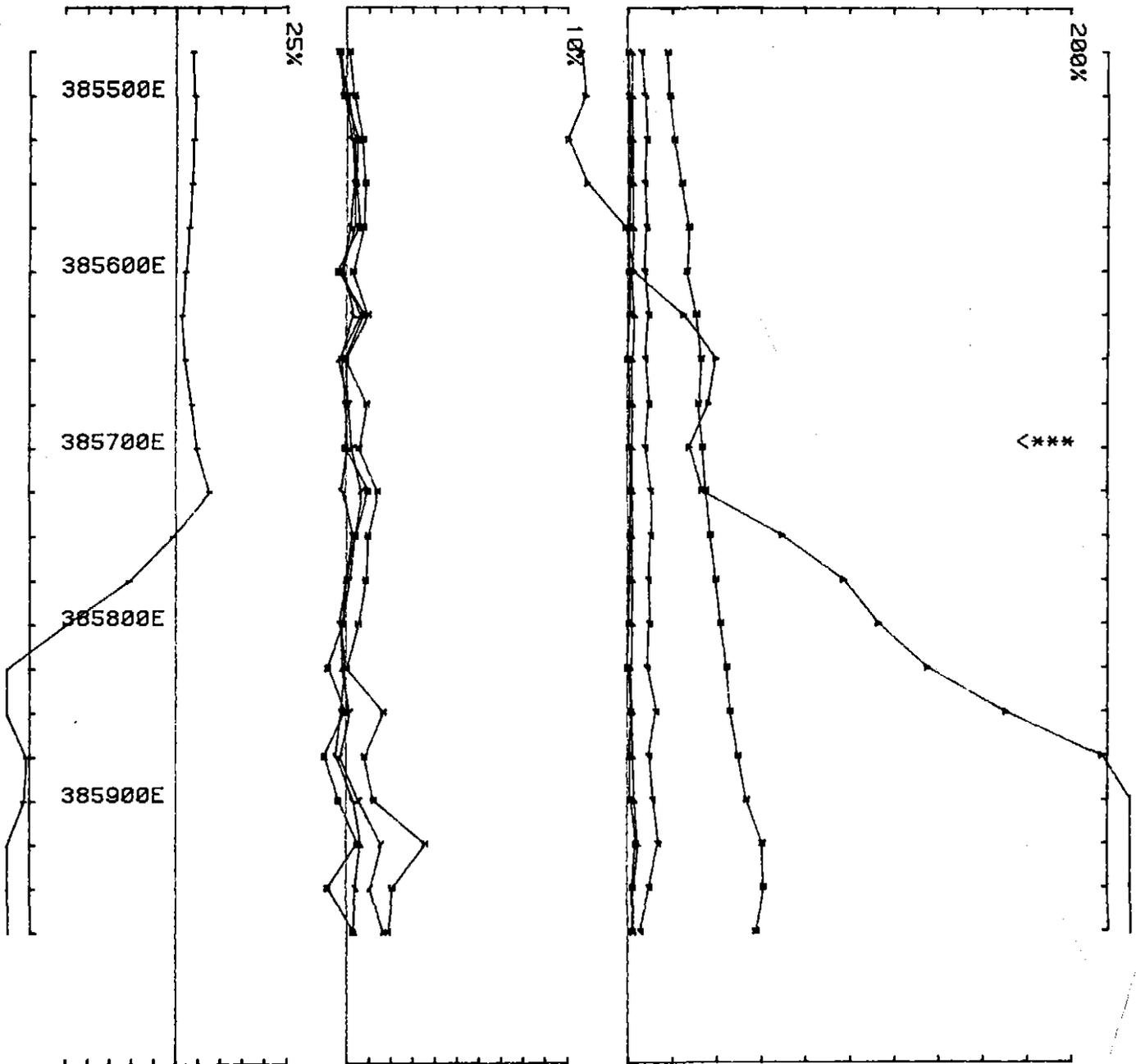
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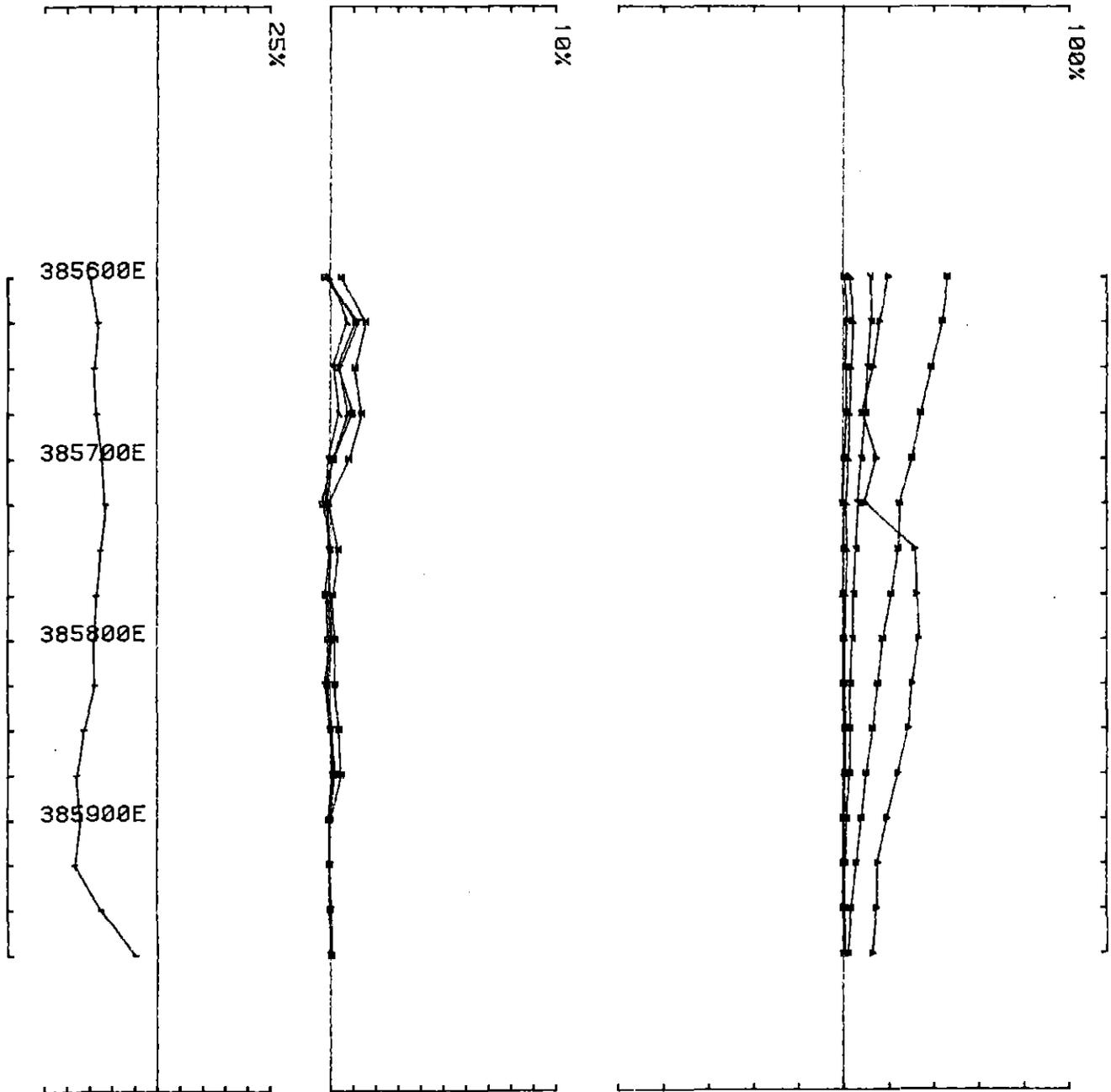
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UTEM SURVEY at TULLABARDINE for BHP-UTAH MINERALS INTERNATIONAL
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UTEM SURVEY at TULLABARDINE for BHP-UTAH MINERALS INTERNATIONAL
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UTEM SURVEY at TULLABARDINE for BHP-UTAH MINERALS INTERNATIONAL
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