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NORGOLD LIMITED
 &
 THE SHELL COMPANY OF AUSTRALIA LIMITED
 STERLING VALLEY JOINT VENTURE
 E.L. 1/62
 Relinquishment Report

90-30881

OPEN FILE

Author : J.P. Randell
N. Hungerford

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Date : February 1990

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DEPARTMENT OF MINES - TASMANIA MINERAL INDUSTRY UNPUBLISHED REPORT DATA SHEET	REPORT NUMBER _____ TCR _____ <input type="checkbox"/> CF <input type="checkbox"/> RF <input checked="" type="checkbox"/> OF
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AUTHOR(S): J. P. RANDELL

N. HUNBERFORD

DATE: _____

TITLE: E.L. 1/62 RELINQUISHMENT REPORT

COMPANY(S): BILUTON AUSTRALIA

FORMAT: No. of Volumes: 1 Structure: 7 FIGS 3 APPEND.

COMPANY REF. (if any): 08.

LICENCE / LEASE: EL1/62

LOCALITY: SK55- 1 2 3 4 5 6 7 8

Map sheet: BURAGE ROSEBURY 8014-111 (Rose/perm)

Geographic: STERLING VALLEY
(not in title)

MAPPING - GEOLOGICAL <input checked="" type="checkbox"/> Surface - scale: <u>1:5000</u> <input type="checkbox"/> Mine/Underground DRILLING <input checked="" type="checkbox"/> Diamond <input type="checkbox"/> Percussion <input type="checkbox"/> Auger <input checked="" type="checkbox"/> Logs <input type="checkbox"/> Analysis <input type="checkbox"/> Metallic Minerals <input type="checkbox"/> Non-metallic Minerals	GEOPHYSICS GND/AIR <input type="checkbox"/> Magnetic <input checked="" type="checkbox"/> Electromagnetic <input type="checkbox"/> Radiometric <input type="checkbox"/> A.P. <input type="checkbox"/> S.P. <input type="checkbox"/> E.P. <input type="checkbox"/> E.I.P./M.I.P <input type="checkbox"/> Resist. <input type="checkbox"/> Gravity <input type="checkbox"/> Seismic - Refraction <input type="checkbox"/> Seismic - Reflection <input type="checkbox"/> On - shore <input type="checkbox"/> Off-shore <input type="checkbox"/> Well-logging	GEOCHEMISTRY <input type="checkbox"/> Stream Sediment <input type="checkbox"/> Soil : _____ <input checked="" type="checkbox"/> Rock - chip <input type="checkbox"/> Gossan <input type="checkbox"/> Water : _____ <input type="checkbox"/> Biogeochemistry <input checked="" type="checkbox"/> Cu <input checked="" type="checkbox"/> Pb <input checked="" type="checkbox"/> Zn <input checked="" type="checkbox"/> Sn <input checked="" type="checkbox"/> W <input type="checkbox"/> Mo <u>Ag, Al, Fe, Li, Ni, Ti, V, Pb</u> <input type="checkbox"/> Rock: <input type="checkbox"/> Maj. <input type="checkbox"/> Tr.	<input checked="" type="checkbox"/> PETROLOGY <input type="checkbox"/> ORE GENESIS <input type="checkbox"/> ORE RESERVES <input type="checkbox"/> FEASIBILITY STUDY <input type="checkbox"/> MINERAL PROCESSING <input type="checkbox"/> MINING <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> ENGINEER. GEOLOGY <input type="checkbox"/> INDUST. MINERALS <input type="checkbox"/> CONSTRUCT. MAT. <input type="checkbox"/> FUELS : _____
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MINERALS: Copper Lead Zinc Gold

MINE / DEPOSIT NAME(S): _____

OTHER KEY WORDS: Cambrian Tyrrell Group Hartly Fault

ANNOTATION: A programme of mapping, rock chip sampling, UTEM surveying and diamond drilling failed to produce evidence of economic mineralization within the Tyrrell Group volcanics. No further work is recommended on these rocks or at the Asner Reserve adjacent to the Hartly Fault.

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1. INTRODUCTION

This report details the results of exploration completed by Billiton Australia on behalf of the Sterling Valley Joint Venture within EL 1/62 during the 1989 licence year.

2. LOCATION & ACCESS

The tenement is located adjacent to the southern shore of Lake Rosebery, approximately 3 kms south of Tullah. The Murchison Highway transects the northern portion of the licence and the tenement is serviced by several HEC and old logging tracks.

3. LAND TENURE

EL 1/62 until recently, was considered in two adjoining parts, subject to two separate joint venture agreements. (Fig. 1). Part one, of 6 km², was the subject of the Rosebery East JV between Billiton Australia, Norgold and Little River Resources. Part two, of 3 km², forms the Sterling Valley JV, between Billiton Australia and Norgold. Billiton Australia is the Manager/Operator of both joint ventures.

The entire tenement, 9 km², was renewed by the Department of Mines for a 12 month period ending 22nd January, 1990. This renewal period represents the second extension of tenure granted to the joint venture since expiry of the licence on 22nd January 1988.

Part one of the tenement was voluntarily relinquished by the Rosebery East Joint Venture partners in September 1989 (Billiton Report 08.4176).

Part two of the tenement (3 km²) was current until 22nd January 1990 and as an extension of tenure was not sought by the Sterling Valley Joint Venture, the licence expired at this time.

This report, then, details the results of the exploration completed within Part two of EL 1/62 as part of the Sterling Valley Joint Venture programme.

4. GEOLOGICAL SETTING

The Henty Fault is a major structure within the Mt. Read Volcanics (MRV), and divides them into two series. (Fig 2). The MRV are part of the late Precambrian-Cambrian Dundas Trough, situated between the unmetamorphosed Precambrian Tyennan Block to the SE.

Within the MRV, the Central Volcanic Sequence represents a core of calc alkaline acid-intermediate volcanics and minor sedimentary intercalations. North and west of the Henty Fault, the CVS is in faulted (thrust) contact with the Dundas Group sediments to the west.

East and southeast of the Henty Fault the southern CVS is a complex association of felsic domes, flows, ignimbrites and pyroclastics. It is extensively overlapped by both the Tyndall Group and Owen Conglomerate. The Tyndall Group is a volcani-clastic sequence that only occurs east of the Henty Fault and its correlates are interpreted to extend from Queenstown to north of Hellyer. The sediments with minor intercalated tuffs of the Farrell Sequence (previously Farrell Slates), occur adjacent to the east side of the Henty Fault and are regarded as a part of the Tyndall Group or its correlates.

The Henty Fault is now known to extend for at least 60km and to have a deformation zone up to 1km wide. Both brittle and ductile effects are evident, and a complex multi-phase history seems likely. Over-thrusting of the Owen Conglomerate by Cambrian rocks has occurred at Mt. Farrell.

Four principal stratigraphic/structural features are present. From west to east these are:

1. Central Volcanics - massive intermediate lavas and volcani-clastics with a general E-facing sequence.
2. Henty Fault Zone - a well defined structure (strike 010° AMG, dip 65°W) whose deformation extends up to 1km in width.
3. Farrell Sequence - a complex interplay of shale, greywacke, arenaceous volcanoclastics and vitric ashes. Facing evidence is common but variable to the east and west.
4. Murchison Volcanics- quartz and feldspar phyric lavas and volcanoclastics included within the Tyndall Group.

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5. PREVIOUS EXPLORATION

The reader is referred to the following Billiton reports which detail the exploration history of EL 1/62 since 1986: 08.3412; 08.3910; 08.2498; 08.4242; 08.4244; 08.4176.

6. EXPLORATION COMPLETED 1989-90

The exploration programme has focussed on the base metal potential of the Murchison Volcanics (Tyndall Group) and has encompassed EL 29/88 as part of this programme.

Within EL 1/62 the following exploration methods have been utilized:

- Gridding : a total of 8.8 line kms have been cut to establish a 200m line spacing over the volcanics with a 1km base line (Fig. 3).
- Geological mapping : the grid has been mapped at 1:5000 scale and data recorded onto a topographic base map to which grid lines have been recovered and added (Fig. 4). A total of 49 rock chip samples have been collected and assayed for Cu Pb Zn Ag As Ba Au (Appendix 1).

- UTEM Surveying : Lamontagne Geophysics carried out a fixed loop survey over the gridded area (6.5 line km) from one set loop (800m²) located within EL 29/88. (Fig 5). Surveyed lines are listed below:

<u>Line</u>	<u>Easting</u>
374 800N	384 800E - 386 000E
374 600N	384 760E - 386 000E
374 400N	384 720E - 386 000E
374 200N	384 640E - 386 000E
374 000N	384 600E - 386 000E

Data is presented in Appendix 2.

- Diamond Drilling : One drill hole, SVD 89-3, was sited to test a combined anomaly position. The hole was completed at 364m depth and 154 samples were collected and despatched for assay. (Appendix 3). In addition, nine samples were collected and petrographic descriptions carried out. (Appendix 3).

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7. EXPLORATION RESULTS 1989-90

7.1 Grid Geology & Geochemistry

Geological mapping was carried out by both J. Randell and C. Creagh on an alternate line basis and an abbreviated logging system was utilized to aid interpretation. The geology is presented on one fact map at 1:5000 scale. (Fig 4).

7.1.1 Lithologies

In a gross sense, there are three major subdivision of sequences within the licence boundaries, viz the Central Volcanic Sequence, Farrell Sequence and Tyndall Group. The Central Volcanic Sequence (CVS) does not occur within the main gridded area but outcrops can be observed along the Murchsion Highway. Regionally the eastern portion of the CVS is dominated by andesitic lava and volcanoclastics. The lavas are feldspar phyric and generally massive whilst the volcanoclastics often have a pumiceous character and are well layered. Alteration can be quite strong, especially against the Henty Fault, and is expressed as silicification, chloritization, carbonatization and/or pyritization.

The Farrell Sequence abuts the CVS on its eastern faulted margin and despite poor outcrop, appears to be a complex interplay of volcanoclastic sandstones-

siltstones, black laminated + pyritic shales, fine to coarse epiclastics and minor acid lavas. Alteration within the volcanoclastic units is usually quite strong and is typified by pervasive sericite with lesser carbonate. Quartz veining is quite common but often appears to be of tension gash style. There appears to be a general zonation of lithotypes from south to north within the Farrell Sequence. The southern area, particularly in the vicinity of the Sterling Valley Mine, is dominated by multiple lenses of mixed black shale - volcanoclastic siltstone. Thicker and more uniform black shale development occurs to the north whilst in the extreme north of the licence within EL 1/62, volcanoclastic sandstones are dominant. These changes are probably reflecting paleo-environmental differences within the 4km strike from a restricted basin with considerable volcanic detritus input to a quieter basinal setting and then to a more active perhaps turbiditic environment.

The change from Farrell Sequence to Tyndall Group rocks is not sharp nor particularly easy to define. Mapping along 4km of strike failed to discern any obvious faulting or structural changes but merely a general decrease in acid lava and proportional increase in volcanoclastic detritus.

034

The Tyndall Group lithologies are represented by acid to acid-intermediate rhyolitic to dacitic lavas and volcaniclastics with minor basaltic dykes. Rhyolitic lavas are massive, blocky, sometimes flow banded and often quartz phyrlic with fine to coarse quartz phenocrysts. Observed alteration is expressed as ubiquitous chlorite (low percentage content), K-feldspar (the pink alteration), magnetite (very variable), silica and sericite. Pyritic alteration is minor and represented by minor disseminations within the lava matrix.

Rhyodacitic lavas are typically quartz and feldspar phyrlic with a poorly defined fabric and variably altered. Sericite and chlorite alteration is generally more noticeable than in rhyolitic lavas but magnetite alteration shows no obvious pattern. Indeed, within individual outcrops there is obviously an erratic distribution of magnetite.

Dacitic rocks are a minor constituent of the overall sequence and are typically feldspar phyrlic and chloritized. The field description of dacite may in fact be a function of this chloritic overprint and it is unclear whether they are in fact linear intrusives or lavas.

012

Volcaniclastic units vary in composition from rhyodacitic to dacitic and may be feldspar or quartz-feldspar phyric. They are generally well layered and apparently pumiceous and often strongly sericitized. Grain size is typically fine and some units may be adequately described as "cherty ash". These rocks are sometimes quite massive but more often are finely banded or laminated.

Alteration is dominated by sericite with minor carbonate and pyrite while magnetite was not recorded in any outcrop.

Identifiable epiclastic rocks are rhyodacitic to dacitic in composition and contain medium to coarse lithics of angular to sub rounded nature. Sericite-chlorite alteration is often quite intense obscuring the composition of the lithics but they appear to be dominantly acid lava or clastic fragments. The rocks are not magnetic and are rarely pyritic.

7.1.2 Structure

Within the Tyndall Group, bedding measurements (11 in total) have been made from outcrops of laminated or layered volcaniclastics/epiclastics. They are considered to represent true bedding and not a later imposed

deformation. All readings show a consistent westerly dip in the range 60°-85° with bedding strikes in the range of 315°-00° Mag. Cleavage measurements taken from both lava and clastic units mimic the bedding and range from 335°-355° Mag/42°W-90.

Within the Farrell Sequence bedding strikes are quite consistent (00°-010° Mag) but dips vary considerably from 75°E in the south to 65°W in the northern part of the licence. These bedding measurements mimic the trace and attitude of the Henty Fault and are considered to be modified differentially due to the ductile nature of the sediments in comparison to the more competent Tyndall Group volcanics. This apparent 10-20° variation in strike in the adjacent Tyndall Group and Farrell Sequence rocks can also be explained by invoking a structural or erosional discontinuity between the two sequences. In the absence of supporting evidence for these conclusions the less dramatic option of sediment ductility is preferred.

Facing criteria (scour marks, graded bedding, cross bedding) were not observed within any of the volcanoclastic outcrops despite particular attention being paid to this observation. It is hoped however that a more detailed search on particular horizons may provide some evidence. Regionally the entire sequence east of

the Henty Fault is assumed to face west and facing criteria from an area north of the licence would confirm this inference. However, the drilling recently completed on IP targets adjacent to the Henty Fault provided evidence of an east facing sequence, at least within the Farrell Sequence. It is quite possible that the units in the vicinity of the Henty Fault have been structurally overturned thus providing a reverse facing. However, it is assumed in this report that the overall west facing is correct and that the Farrell Sequence lies stratigraphically above the Tyndall Group.

Faulting within the licence area has been interpreted from regional studies (eg MRV Mapping Project), from ground magnetics and detailed mapping. The most obvious feature is the Henty Fault, a major regional fault that may well have been an original Mid-Cambrian basin margin feature. The attitude of this structure is consistently 00° - 010° Mag with a steep westerly dip. Of more interest to this discussion, is the interpretation mainly from the ground magnetic data of three sub-parallel linear structures of attitude 330° Mag that appear to be splay faults from the Henty Fault, intersecting the latter at Lake Rosebery. Whilst the proof of these structures as faults is not conclusive, several features indicate this probability:

- 010
- the features correspond to clear discontinuities in the ground magnetic pattern obtained from data within EL 29/88.
 - small workings within the Tyndall Group all are confined by these three structures and are usually located along their trace.
 - the gross distribution of lava sequence correlates with these inferred structures.
 - several extensive milky quartz blows correlate with the interpreted position of these structures.

The significance of these faults has not been demonstrated so far but importantly, they do appear to localize mineralization and are probably related to the Henty Fault system.

7.1.3 Distribution of Units

Three broad subdivisions are evident from mapping within EL 1/62 and the adjacent licence: the western zone (385250E) consists of quartz-feldspar phyric rhyodacitic lavas containing 20-30% volcanoclastic/epiclastic units which are more abundant and thicker north of 372500N. Individual units attain thicknesses of up to 150 metres and it is suggested that there is a significant break in volcanism from 372500N-375000N. The central zone constitutes almost 60% of Tyndall Group

exposure and is dominated by massive quartz phyric rhyolite lavas with a central spine of quartz-feldspar phyric rhyodacitic lava. Both lava units of the central zone contain small (100-300m) lenses of volcanoclastics /epiclastics but these constitute no more than 10% of the total zone. The eastern zone is similar to the western zone in gross lithological character although the proportion of volcanoclastic units is no more than 20% of the total zone.

During the course of mapping, alteration assemblages have been recorded and their distribution plotted on the fact map. Dominant alteration minerals are sericite chlorite, K-feldspar and magnetite while pyrite and silica are present in only minor cases. There appears to be no preferential association of minerals with each other and all combinations are possible. The distribution of alteration also shows no clear pattern and while chloritization is widespread, sericite alteration is predominant along the contact of Farrell Sequence rocks with the Tyndall Group. Pyrite and silica alteration is localized only.

7.1.4 Mineralization

A series of prospector workings and geochemically anomalous rock chip samples are recorded on Fig. 4, being derived from either Mines Department maps or from field collection. These are summarized below:

- Maces - not located during field mapping although a small pit was observed 250m to the east.
5374000N 385670E
- Midsons - a small pit was observed at this locality. Weak quartz veining in chloritic rhyolitic lavas was noted.
5374220N 385300E
- Donoghues - several pits, costeans and a small adit occur. Mineralization hosts are strongly sericitized -chloritized pyritic quartz-feldspar phyric rhyolitic lavas. A dump sample collected here (15954) assayed 11.7%Pb, 1.41%Zn, 190g/t Ag, 490ppm W.
5374840N 385640E
- Unnamed Working - A small adit has been cut into a quartz filled shear at the contact of quartz-feldspar phyric rhyodacitic lavas and fine volcanic clastics. A mineralized dump sample collected here (15952) assayed 3.57%Zn, 0.45%Pb, 1.57%As, 30ppm Ag, 550ppm W, 0.3g/t Au.
5374820N 385240E

In addition to old prospector diggings, a total of 15 of the 49 rock chip samples collected returned anomalous assays. These are summarized below:

- Sample 16218 - Chloritic and weakly pyritic (2-3%) rhyodacitic volcanoclastic. Best assays 1580ppm Pb, 520ppm Zn, 2700ppm Ba.
5374400N 385175E
- Sample 16219 - Weakly quartz veined siliceous rhyolitic lava. Anomalous Au assay 0.14g/t.
5374400N 385385E
- Samples 15263,66,70 - Samples collected from road cut. Strongly sericitic, pyritic and chloritic rhyolytic lavas. Maximum assays (non-coincident) of 2.4%Zn, 0.43%Pb, 22g/t Ag, 490ppm Cu.
5374360N 385600-700E
- Sample 16202 - Fine grained chloritic volcanoclastic. A slight gold anomalism (0.16ppm) was recorded.
5374000N 385370E

018

Mineralization is closely associated spatially with the two NNW trending subparallel linears and it is considered that the mineralization style is that of irregular quartz vein nature. The exceptions to this are samples 16202, 16218 in which fine disseminated mineralization is associated with a thick volcani-clastic-epiclastic horizon that separates the central and western zones.

7.1.5 Prospectivity

The initial programme of grid based mapping, and selected rock chip geochemistry has allowed a geological setting to be interpreted and has highlighted the western and central zones north of 5372600N. Here, a thick (150-200m) unit(s) of volcanoclastics-epiclastics extends over a mapped strike length of 2.4kms. Strongly anomalous base metal geochemistry has been detected from selected rock chip samples in which visible pyrite-galena occurs and the presence of fine laminated cherty ash beds provides evidence of tectonic stability between volcanic episodes. Alteration is not obviously marked although given the outcrop density, this observation may be misleading. It is considered that this horizon rates highly on geological grounds as being permissive for the development of volcanogenic base metal mineralization.

7.2 UTEM Survey

In March 1989, Lamontagne Geophysics carried out a UTEM survey on both EL 1/62 and 29/88 using large fixed transmitting loops and measuring the vertical component of the secondary magnetic field with a mobile receiver.

All profile data is shown in Appendix 2 and although many are noisy adjacent to power lines, in general the data is of reasonable quality.

Unfortunately the only responses apparent on the profiles occur on the earliest channels indicating poor and shallow conductors probably related to fracturing or faulting. The strongest responses occur at the far western ends of many of the lines, and these are contained by the thick, graphitic Farrell slates that occur east of the Henty Fault. Some very subtle late channel responses on lines 37400N (at 385400E) and 374400N (at 385320E) are of interest, and require further geophysical and geological interpretation and investigation. These anomalies occur in an area of slightly anomalous gold and base metals in close proximity to a major NNW trending linear and to the central/western zone contact. The anomalies occur just outside EL 29/88 but within the joint venture area covered by EL 1/62.

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7.3 Diamond Drilling

A single diamond drill hole, SVD 89-3, was designed to test a combined UTEM-geochemical-geological anomaly with the following objectives:

1. To explain the source of a subtle late channel UTEM response.
2. To test the nature and thickness of a strike extensive volcanoclastic-epiclastic horizon that separates silicified quartz phyric rhyolite lavas and sericitic-Kspar altered quartz-feldspar phyric rhyodacitic lavas. Mapping has indicated that this horizon contains fine laminated ash beds and disseminated galena-pyrite and that it is permissive for the development of VMS style mineralization.
3. To test strongly anomalous base-precious metal geochemistry partly defined by selective rock chip sampling.
4. To verify the validity of an interpreted NNW trending linear structure that is a probable mineralizing conduit.

023

Details of the drill hole are listed below and in Figs. 6,7 Appendix 3.

Collar : 374400N 385091E
 Dip : 50°
 Azimuth : 078°
 Depth : 364m

Log : 0- 34 Feldspar quartz phyric sericitic dacitic ash.
 34-140 Feldspar phyric dacitic lava.
 140-218 Feldspar + quartz phyric sericitic felsic volcanoclastic.
 218-248 Quartz feldspar phyric rhyodacitic lava.
 248-251 White quartz vein.
 251-273 Quartz feldspar phyric rhyodacitic lava.
 273-280 Silicified and sericitic vitric tuff.
 280-334 Silicified chloritic rhyodacitic lava.
 334-339 Fissile chloritic plug.
 339-364 Silicified chloritic kspar altered rhyodacitic lava.

EOH

The source of the UTEM response was not obvious from examination of the core but this was considered to be a possibility prior to drilling the hole. Modelling could not be carried out as the anomaly was of such a subtle character and close to background noise level. Down hole EM logging has not been carried out due to the unavailability of a contractor.

Core has been sampled and despatched for assay. No economic mineralization was intersected but several geochemically anomalous intersections were recorded.

viz	4.8- 5.6m	0.8m @ 0.31% Pb 1.15% Zn 12g/t Ag 1.53% As
	5.6- 7.0m	1.4m @ 0.11% Pb 0.31% Zn 2.5g/t Ag
	24.3- 26.0m	1.7m @ 0.51% Zn
	26.0- 28.0m	2.0m @ 1.14% As
	168.0-170.0m	2.0m @ 0.25% Pb 0.23% Zn 3g/t Ag
	192.0-194.0m	2.0m @ 0.15% Pb 0.21% Zn 1.5g/t Ag
	194.0-196.0m	2.0m @ 0.27% Zn 2g/t Ag
	264.0-266.0m	2.0m @ 0.29% Cu 5g/t Ag
	296.0-298.0m	2.0m @ 0.42% Cu 5.5g/t Ag

The mineralization typically occurs in fine veinlets or disseminations and is clearly post cleavage. Visible sphalerite, galena, pyrite, chalcopyrite was noted during core logging and it is suggested that this mineralization relates to that observed at surface (eg sample 16218).

Sericite alteration is quite intense especially at the top of the hole within the strike extensive vitric ash unit. The rocks are strongly cleaved making identification difficult, but there appears to be little substantiation of the premise of a major volcanic hiatus at this position. The laminated cherty ash beds observed further south outside of EL 1/62 do not appear to persist at this drill section.

8. CONCLUSIONS

Geological mapping and rock chip sampling of a grid within the Tyndall Group volcanics has enabled extrapolation of a prospective horizon from the adjacent EL 29/88 to the south. This horizon was thought to represent a volcanic hiatus and as such would be a site permissive for the development of base metal volcanogenic mineralization.

A UTEM survey was completed to detect deeply buried conductors within the sequence that could be indicative of mineralization. Two subtle late channel responses were recorded within a sequence of lavas and in close proximity to interpreted NW trending faults.

029

One drill hole was completed to test the better of these anomalies and to provide geological-geochemical verification of surface mapping and sampling. Weakly anomalous mineralization was intersected but it is interpreted as of late stage remobilized style. Evidence for the break in the volcanic cycle was not gained from examination of the core although further south, a different suite of rocks is recognized. The source of the UTEM anomaly was not verified because of the unavailability of a contractor to carry out down hole EM logging. However, the nature of the anomaly from surface profiles suggests that it may well represent background noise only.

9. RECOMMENDATIONS

The licence is due for expiry on 22nd January 1990 at which time the ground would be placed into the ETA Mines Department system. A tender document submitted for this ground and the previously relinquished portion of EL 1/62 would involve a comprehensive programme with a concomitant expenditure level which cannot be justified on the basis of our current understanding of the geological setting within the Tyndall Group.

APPENDIX 1

Rock Chip Sample Results



METALS DIVISION

SAMPLE RECORD

Sheet 2 of

SAMPLE TYPE: Rock Chip

LOCATION / PROJECT: STERLING VALLEY

SAMPLER: JR CC

DATE:

MAP / PHOTO REF:

ASSAY LAB:

SAMPLE DESPATCH

ASSAY REPORT NOS:

ORDER NO:

SAMPLE STORAGE:

027

SAMPLE No.	LOCATION		INTER'L (m)	ANALYSES										DESCRIPTION	
	N	E													
16089	373200	385720													Altered chl Kspar rhyolac lava
16090	"	385660													Cracked rhyolac. lava + shocked qtz
16091	"	385595													Working. Chl. q phytic r dacite
16092	"	385650													non lam. sil. chert ash.
16093	373400	385810													Ph. phytic Kspar rhyolac. lava
16094	"	385790													Ph. felds. chl - r/dac. lava + py
16095	"	385580													T.S.
16097	372600	385140													Lam. siliceous chert ash
16098	373600	385130													Remag. qtz used chert sil. ash.
16099	"	385590													Il. py in serie. of rhyolac. lava
16201	373800	385960													Mag. chl. qtz phytic lava + py.
16202	374000	385350													Quined chl. Kspar v. clastic.
16217	372400	385880													Epid. Kspar rhyol. lava + py.
16218	374400	385160													Chl. felds. r/dac. v. clastic + py
16219	"	385370													Shocked quined sil. rhyol. lava
16225	374600	385700													Py ser. chl Kspar q phytic v. clastic

523027

REMARKS:

020



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JOB NUMBER: 9AD0252

Your Reference: 11647/LJ70/JPR

Date Received: 14-FEB-1989 Turnaround 2 days
Date Relayed: 16-FEB-1989
Date Reported: 16-FEB-1989

Number of Samples: 36 Report Analyte Codes
N.A. - Not Analysed.
L.N.R. - Listed But Not Received.
I.S. - Insufficient Sample for Analysis.

Report Comprising: Cover Sheet
Pages 1 to 4

Comments:

Report Dist'n: Carbon Copies(CC), Electronic Media(EM), Magnetic Media(MM)
Type Recipient Location Date Copies

Approved Signature:

for

Harry Fishman
Managing Director.
CLASSIC COMLABS LTD
(Please address any enquiries to Mr. Trevor Francis)

This report relates specifically to the sample(s) tested in so far as that the sample(s) is truly representative of the sample source as supplied.



Job: 9AD0252

O/N: 11647/LJ70/JPR

ANALYTICAL REPORT

689

SAMPLE	Au Avg	Au Dp1	Au Dp2	Au Dp3	Cu	Zn	Ag
16201	<0.01	--	--	--	7	115	<1
16202	0.16	0.09	0.23	--	10	48	<1
16203	0.04	--	--	--	17	50	<1
16204	0.02	--	--	--	9	240	<1
16208	0.04	--	--	--	6	14	<1
16209	0.18	--	--	--	2	84	<1
16210	<0.01	--	--	--	32	160	1
16211	0.09	--	--	--	52	330	2
16212	0.08	--	--	--	12	98	1
16213	0.03	--	--	--	24	140	<1
16214	0.17	0.19	0.15	--	9	90	<1
16215	0.11	--	--	--	6	105	<1
16216	0.02	--	--	--	9	720	1
16217	0.03	--	--	--	3	34	<1
16218	<0.01	--	--	--	110	520	1
16219	0.14	0.13	0.15	--	32	78	1
3600N/8775E	0.06	--	--	--	19	52	<1
3600N/9150E	0.07	--	--	--	16	330	<1
3600N/9175E	0.05	--	--	--	12	40	<1
4000N/8650E	0.01	--	--	--	4	19	<1
4000N/8725E	0.04	0.05	0.02	--	13	90	<1
4000N/8865E	0.01	--	--	--	4	40	<1
4000N/8975E	0.06	--	--	--	3	28	<1
4000N/9095E	<0.01	--	--	--	9	62	<1
4000N/9150E	0.02	--	--	--	14	34	<1
UNITS	ppm	ppm	ppm	ppm	ppm	ppm	ppm
SCHEME	FA1	FA1	FA1	FA1	AAS1	AAS1	AAS2



Job: 9AD0252
O/N: 11647/LJ70/JPR

ANALYTICAL REPORT

SAMPLE	Au Avg	Au Dp1	Au Dp2	Au Dp3	Cu	Zn	Ag
15902	0.07	--	--	--	6	26	<1
15903	0.02	--	--	--	56	72	<1
15916	0.06	--	--	--	10	80	<1
15917	0.03	--	--	--	7	40	<1
15920	0.03	0.03	0.02	--	22	125	<1
15921	0.03	--	--	--	140	125	14
15924	0.06	--	--	--	16	26	<1
15925	0.05	--	--	--	12	7	1
15926	<0.01	--	--	--	6	96	<1
15928	0.10	0.09	0.11	--	160	2450	16
15931	<0.01	--	--	--	220	58	<1
UNITS SCHEME	ppm FA1	ppm FA1	ppm FA1	ppm FA1	ppm AAS1	ppm AAS1	ppm AAS2



Job: 9AD0252
O/N: 11647/LJ70/JPR

ANALYTICAL REPORT

031

SAMPLE	Pb	As	Ba	Sn
16201	46	4	260	4
16202	9	4	520	<4
16203	7	10	890	8
16204	250	8	2150	<4
16208	240	17	350	6
16209	22	7	1720	4
16210	770	42	1060	6
16211	520	34	75	4
16212	34	26	990	8
16213	58	7	440	4
16214	15	12	860	6
16215	19	12	780	4
16216	115	15	2600	8
16217	19	5	440	6
16218	1580	<2	2700	8
16219	270	13	1040	4
3600N/8775E	40	11	930	10
3600N/9150E	100	13	2200	6
3600N/9175E	8	24	520	<4
4000N/8650E	6	4	860	4
4000N/8725E	38	12	600	<4
4000N/8865E	7	12	460	6
4000N/8975E	5	8	600	<4
4000N/9095E	17	11	730	4
4000N/9150E	12	9	900	<4
UNITS	ppm	ppm	ppm	ppm
SCHEME	XRF1	XRF1	XRF1	XRF1

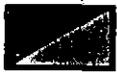


Job: 9AD0252
O/N: 11647/LJ70/JPR

ANALYTICAL REPORT

002

SAMPLE	Pb	As	Ba	Sn
15902	2	7	920	<4
15903	50	16	910	4
15916	10	6	700	8
15917	9	7	1020	4
15920	28	7	1000	4
15921	2250	<2	1580	8
15924	46	6	25	<4
15925	48	5	95	6
15926	22	5	2250	4
15928	15	36	15	4
15931	1140	46	550	<4
UNITS	ppm	ppm	ppm	ppm
SCHEME	XRF1	XRF1	XRF1	XRF1



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305 South Road, Mile End South, South Australia, 5031
Telephone: (08) 43 5722 Fax: (08) 234 0321 Telex: LABCOM AA89323

633

Mr. Jeff Randell
Billiton Australia Ltd
30 Mersey Main Road
Spreyton
Devonport
TAS 7310 Australia

JOB NUMBER: 9AD0168

Your Reference: 11646/LJ70/JPR

Date Received: 31-JAN-1989 Turnaround 2 days
Date Relayed: 2-FEB-1989
Date Reported: 2-FEB-1989

Number of Samples: 18 Report Analyte Codes
N.A. - Not Analysed.
L.N.R. - Listed But Not Received.
I.S. - Insufficient Sample for Analysis.

Report Comprising: Cover Sheet
Pages 1 to 2

Comments:

Report Dist'n: Carbon Copies(CC), Electronic Media(EM), Magnetic Media(MM)
Type Recipient Location Date Copies

Approved Signature:

for

Harry Fishman
Managing Director.
CLASSIC COMLABS LTD

(Please address any enquiries to Mr. Trevor Francis)

This report relates specifically to the sample(s) tested in so far as that the sample(s) is truly representative of the sample source as supplied.



Job: 9AD0168
O/N: 11646/LJ70/JPR

ANALYTICAL REPORT

034

SAMPLE	Au Avg	Au Dp1	Au Dp2	Au Dp3	Cu	Zn	Ag
16077	<0.01	0.01	<0.01	--	270	390	10
16078	<0.01	--	--	--	13	150	1
16085	<0.01	--	--	--	2	48	<1
16087	0.02	--	--	--	7	160	<1
16088	<0.01	--	--	--	9	20	<1
16089	<0.01	--	--	--	4	250	<1
16090	<0.01	--	--	--	6	54	<1
16091	<0.01	--	--	--	125	7200	6
16092	<0.01	--	--	--	4	180	1
16093	<0.01	--	--	--	5	125	<1
16094	<0.01	--	--	--	2	230	<1
16096	<0.01	--	--	--	11	105	1
16097	<0.01	--	--	--	6	50	<1
16098	<0.01	--	--	--	4	46	<1
16099	<0.01	--	--	--	7	130	<1
15909	<0.01	--	--	--	4	150	1
15910	<0.01	--	--	--	190	135	1
15914	<0.01	--	--	--	9	64	<1
UNITS SCHEME	ppm FA1	ppm FA1	ppm FA1	ppm FA1	ppm AAS1	ppm AAS1	ppm AAS2



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Job: 9AD0168
O/N: 11646/LJ70/JPR

ANALYTICAL REPORT

035

SAMPLE	Sn	Pb	As	Ba
16077	600	2550	62	135
16078	6	52	6	1060
16085	8	19	8	115
16087	10	210	8	1360
16088	10	13	6	650
16089	4	230	3	2250
16090	10	15	5	790
16091	78	5100	<2	280
16092	4	70	6	810
16093	10	60	6	970
16094	6	28	12	2050
16096	<4	22	7	1000
16097	6	62	9	1940
16098	8	62	11	2900
16099	8	68	6	900
15909	4	100	5	1940
15910	6	520	4	1760
15914	<4	78	5	135
UNITS SCHEME	ppm XRF1	ppm XRF1	ppm XRF1	ppm XRF1



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523036

305 South Road, Mile End South, South Australia, 5031
Telephone: (08) 43 5722 Fax: (08) 234 0321 Telex: LABCOM AA89323

030

Mr. David Hall
Billiton Australia Ltd
30 Mersey Main Rd
Spreyton
DEVONPORT
TAS 7310 Australia

JOB NUMBER: 8AD1744

Your Reference: 08454/LJ70,LJ50/CJC

Date Received: 23-MAY-1988 Turnaround 4 days
Date Relayed: 27-MAY-1988
Date Reported: 27-MAY-1988

Number of Samples: 54

Report Comprising: Cover Sheet
Pages 1 to 6

Comments:

Report Dist'n: Carbon Copies(CC),Electronic Media(EM),Magnetic Media(MM)
Type Recipient Location Date Copies

15253 - 15277 - 4570

Approved Signature:

for

15377 - 15397 } RED 88-2
15515 - 15522 }

Harry Fishman
Managing Director.
CLASSIC COMLABS LTD
(Please address any enquiries to Mr. Trevor Francis)

This report relates specifically to the sample(s) tested in so far as that the sample(s) is truly representative of the sample source as supplied.



Job: 8AD1744
O/N: 08454/LJ70/CJC

ANALYTICAL REPORT

037

SAMPLE	Pb	As	Sb	Ba	Sn	W
15253	24	15	6	610	6	<10
15254	20	9	6	840	8	<10
15255	15	9	<4	1040	6	<10
15256	13	7	8	990	<4	<10
15257	270	48	10	1700	<4	<10
15258	240	46	12	320	52	15
15259	50	24	10	440	10	<10
15260	50	20	14	990	16	<10
15261	52	20	4	850	26	<10
15262	360	30	8	650	14	15
15263	4300	26	10	190	12	20
15264	74	24	10	610	32	25
15265	44	12	6	1020	<4	<10
15266	200	42	8	1220	68	<10
15267	24	13	4	1860	10	<10
15268	60	22	8	730	8	<10
15269	28	19	<4	1060	6	<10
15270	1300	26	6	370	8	<10
15271	135	16	6	430	12	<10
15272	52	11	10	1780	8	<10
15273	60	48	10	1540	4	10
15274	40	56	<4	400	22	<10
15275	40	28	<4	910	4	20
15276	240	42	6	510	8	15
15277	280	110	<4	1200	<4	<10
UNITS	ppm	ppm	ppm	ppm	ppm	ppm
SCHEME	XRF1	XRF1	XRF1	XRF1	XRF1	XRF1



523038

Job: 8AD1744

O/N: 08454/LJ70/CJC

038

ANALYTICAL REPORT

SAMPLE	Au Avg	Au Dp1	Au Dp2	Au Dp3	Cu	Zn	Ag
15253	<0.01	--	--	--	11	105	<1
15254	<0.01	--	--	--	12	92	<1
15255	<0.01	--	--	--	6	82	<1
15256	<0.01	--	--	--	10	88	<1
15257	<0.01	--	--	--	18	320	<1
15258	0.04	--	--	--	12	210	<1
15259	0.01	0.01	<0.01	--	11	60	<1
15260	<0.01	--	--	--	7	200	<1
15261	<0.01	--	--	--	4	82	<1
15262	<0.01	--	--	--	8	400	<1
15263	<0.01	--	--	--	330	690	20
15264	<0.01	--	--	--	12	52	<1
15265	<0.01	--	--	--	6	110	<1
15266	<0.01	--	--	--	8	630	1
15267	<0.01	--	--	--	14	120	<1
15268	<0.01	--	--	--	10	130	<1
15269	<0.01	--	--	--	26	140	<1
15270	<0.01	--	--	--	490	2.40%	22
15271	0.01	<0.01	0.01	--	8	330	2
15272	<0.01	--	--	--	9	290	<1
15273	<0.01	--	--	--	24	86	<1
15274	<0.01	--	--	--	14	50	<1
15275	<0.01	--	--	--	9	40	<1
15276	<0.01	--	--	--	7	280	<1
15277	<0.01	<0.01	<0.01	--	8	380	<1

UNITS	ppm	ppm	ppm	ppm	ppm	ppm	ppm
SCHEME	FA1	FA1	FA1	FA1	AAS1	AAS1	AAS2
UPPER SCHEME						AAS1C	

DEPARTMENT OF MINES



TASMANIA

009

523039

Launceston Office:

Chemical and Metallurgical
Laboratory,
287 Wellington Street,
LAUNCESTON 7249

26 May 1989

Enquiries: P L James
Phone: 003 442431
Your ref.: 08467
Our file:

Attent. Jeff Randell

Shell Company of Australia Ltd
Metals Division
PO Box 860
DEVONPORT TAS 7310

Dear Sir

Enclosed please find results of analyses of samples submitted by you.

Determinations were made by methods as follows.

Au: By 50 gram fire assay/AAS finish

Ag, Cu, Zn, Pb, As, Bi: By AAS

Ba, Sn, W, Sb: By XRF

You did require Pb, As and Bi to be determined by XRF. However, there are inherent difficulties in the XRF determination of these elements in the presence of one another, which can cause serious aberrations in results. Some of these became apparent in the work done on your samples and accordingly we are giving you AAS results for these three elements. The method of digestion plus special precautions to retain the elements in solution gives reliable results. All minerals of interest will be in solution unless in the form of refractory silicates.

A further note: The XRF determination of tin indicates total value and does not differentiate between cassiterite and stannite. Your sample No 16329 showed a significant amount of tin present.

Checks on a number of gold assays will follow early next week.

Yours faithfully


(P L James)
CHIEF CHEMIST & METALLURGIST

Enc.

020

Shell Co of Aust. Reg. No 893282-324

g/t O/No 08467

<u>Reg. Nos</u>	<u>Desc.</u>	<u>Ag</u>	<u>Cu</u>	<u>Zn</u>	<u>Pb</u>	<u>As</u>	<u>Ba</u>	<u>Sn</u>	<u>W</u>	<u>Bi</u>	<u>Sb</u>	<u>Au</u>
893282	15946	<5	90	55	30	3500	1800	25	55	40	<10	<0.05
283	947	<5	55	20	<5	<200	630	<10	<50	<10	<10	<0.05
284	948	<5	40	15	50	<200	<20	160	<50	<10	<10	<0.05
285	949	<5	100	25	90	300	35	35	75	<10	<10	0.06
286	950	<5	40	320	110	<200	3660	<10	50	10	<10	<0.05
287	951	<5	80	60	380	<200	30	<10	<50	15	<10	<0.05
288	952	30	960	35700	4500	15700	700	10	550	15	15	0.30
289	954	190	70	14100	19000	<200	220	<10	490	<10	20	<0.05
290	16301	10	90	110	930	770	230	<10	<50	25	10	0.97
291	302	<5	60	70	35	<200	410	<10	60	<10	<10	<0.05
292	303	<5	50	60	55	<200	450	<10	<50	<10	<10	<0.05
293	304	<5	40	80	20	<200	590	<10	60	<10	<10	<0.05
294	305	<5	35	70	25	<200	660	<10	<50	<10	<10	<0.05
295	306	<5	55	50	20	<200	540	<10	<50	<10	<10	<0.05
296	307	<5	10	10	55	<200	40	<10	<50	<10	20	<0.05
297	308	<5	40	15	10	<200	230	<10	55	<10	<10	<0.05
298	309	<5	45	35	20	<200	510	<10	85	<10	<10	<0.05
299	310	<5	40	15	20	<200	70	<10	70	<10	<10	<0.05
300	311	<5	45	35	5	<200	130	<10	<50	<10	<10	<0.05
301	312	<5	60	10	10	<200	<20	<10	<50	30	<10	<0.05
302	313	<5	60	90	30	<200	230	<10	<50	<10	<10	<0.05
303	314	<5	50	55	65	640	130	<10	<50	10	20	1.18
304	315	<5	40	15	10	<200	60	<10	<50	<10	<10	<0.05
305	316	<5	55	25	<5	<200	170	<10	<50	<10	<10	<0.05
306	317	<5	50	20	<5	<200	200	<10	<50	<10	15	<0.05
307	318	<5	75	45	10	<200	280	<10	<50	<10	<10	<0.05
			30	10	<5	<200	360	<10	<50	<10	<10	<0.05

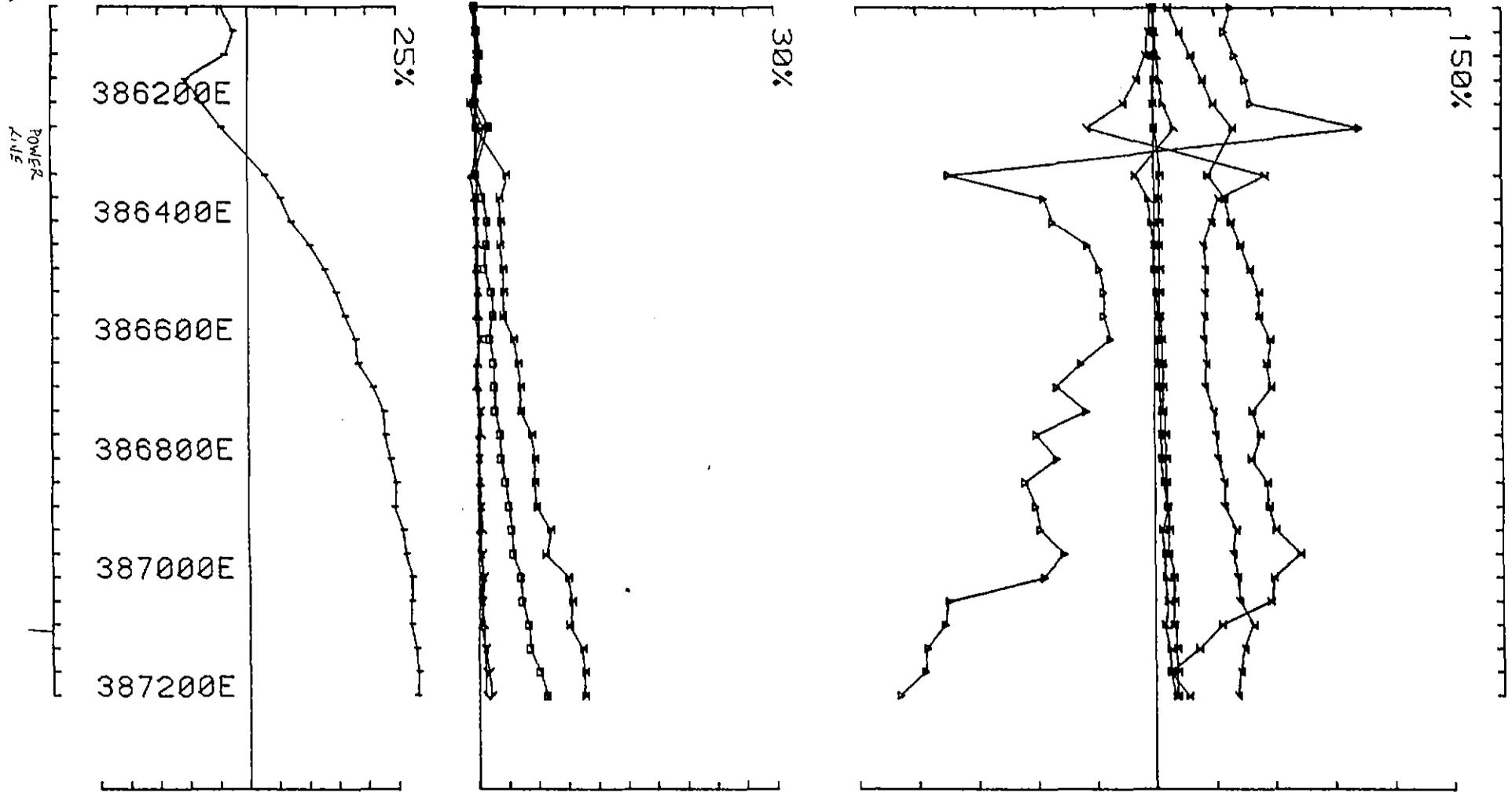
523040

523041

011

APPENDIX 2
UTEM Survey Profiles

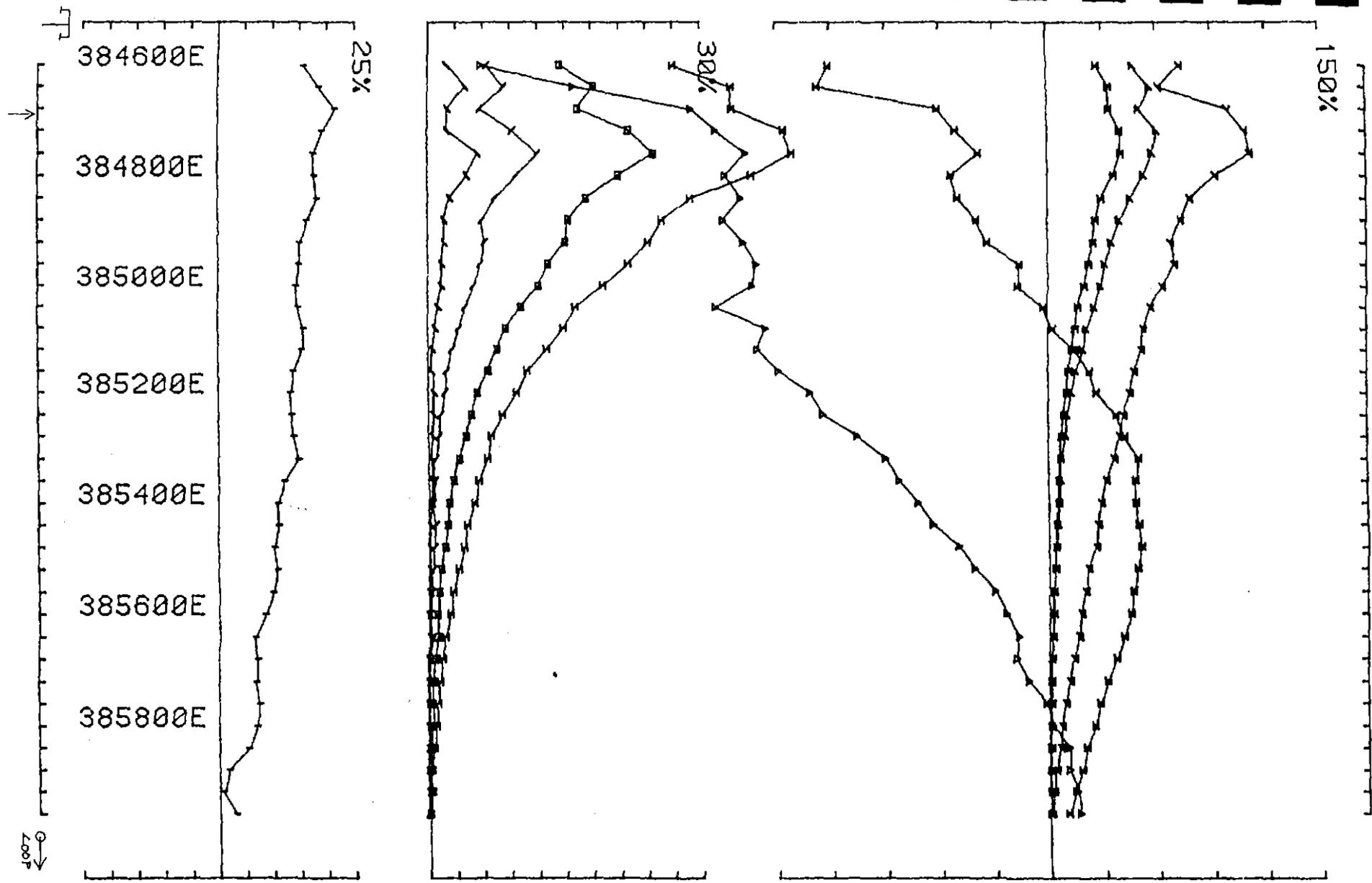
TX LOOP
←



UTEM SURVEY at STERLING VALLEY for BILLITON AUSTRALIA (SHELL)
conducted by LAMONTAGNE GEOPHYSICS. Job 8902 base freq (hz) 33.409 MAR 1989
loop no 2a line 374000N component Hz secondary field Ch 1 contin. norm.

012

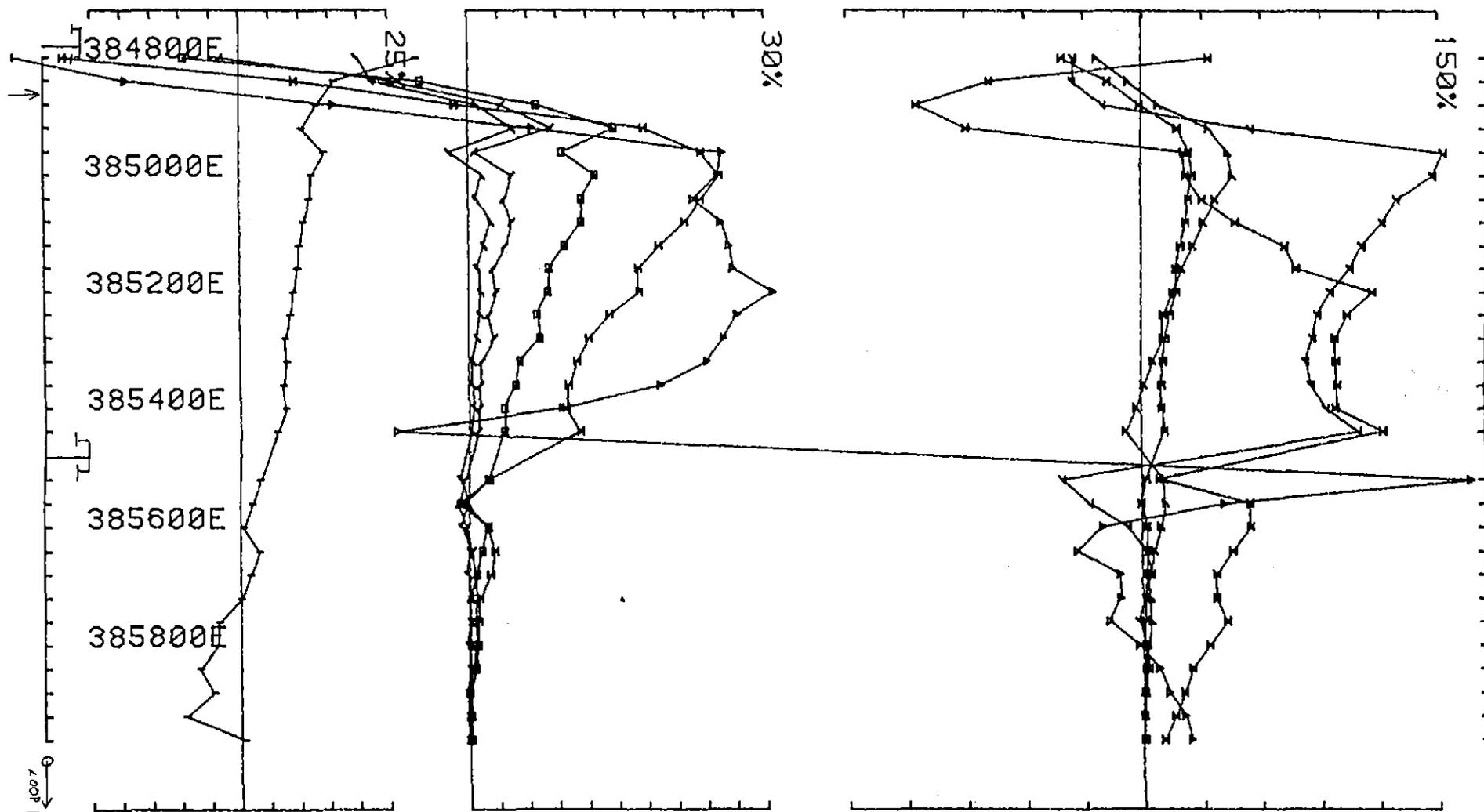
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UTEM SURVEY at STERLING VALLEY for BILLITON AUSTRALIA (SHELL)
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043

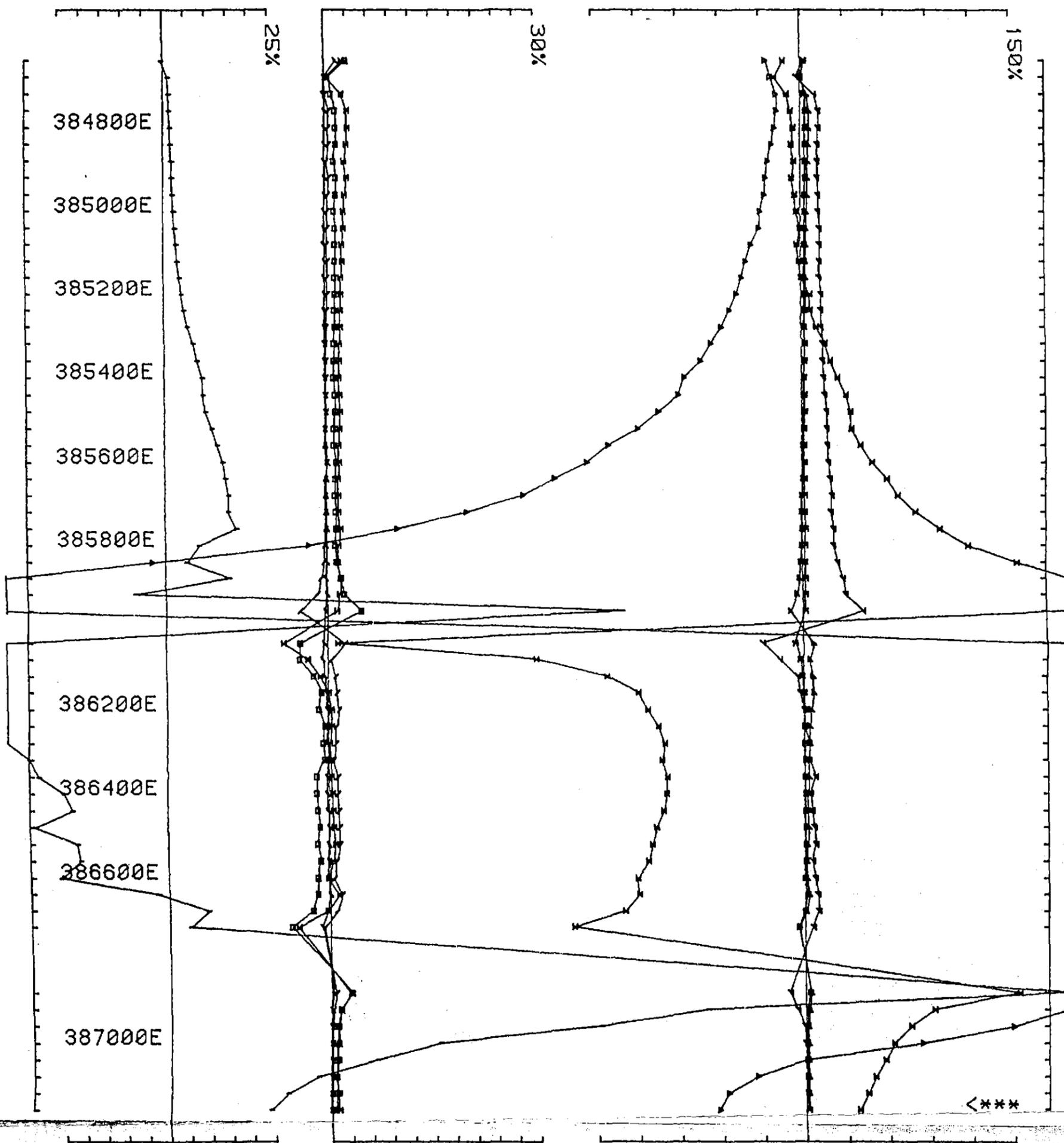
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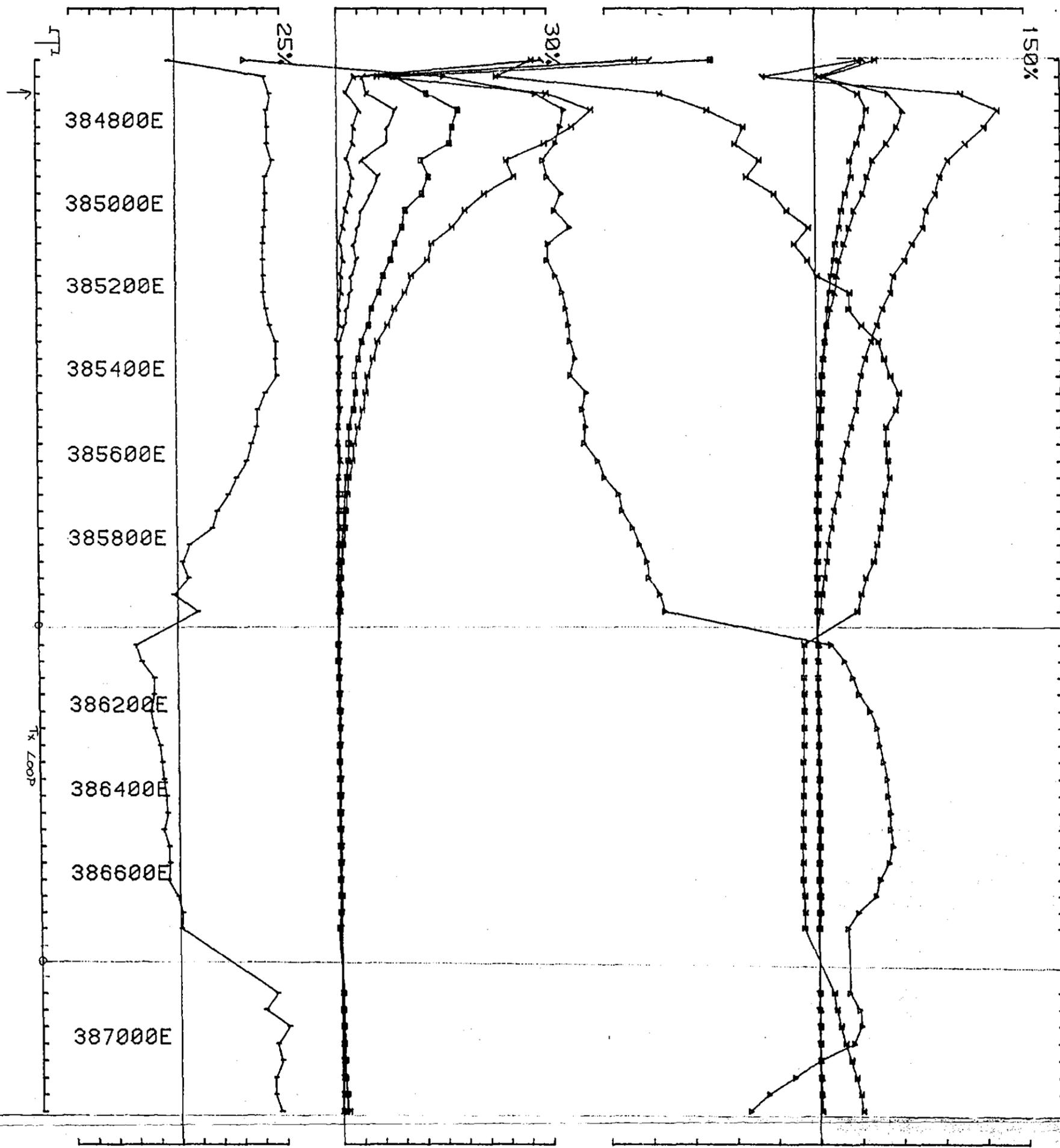
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041

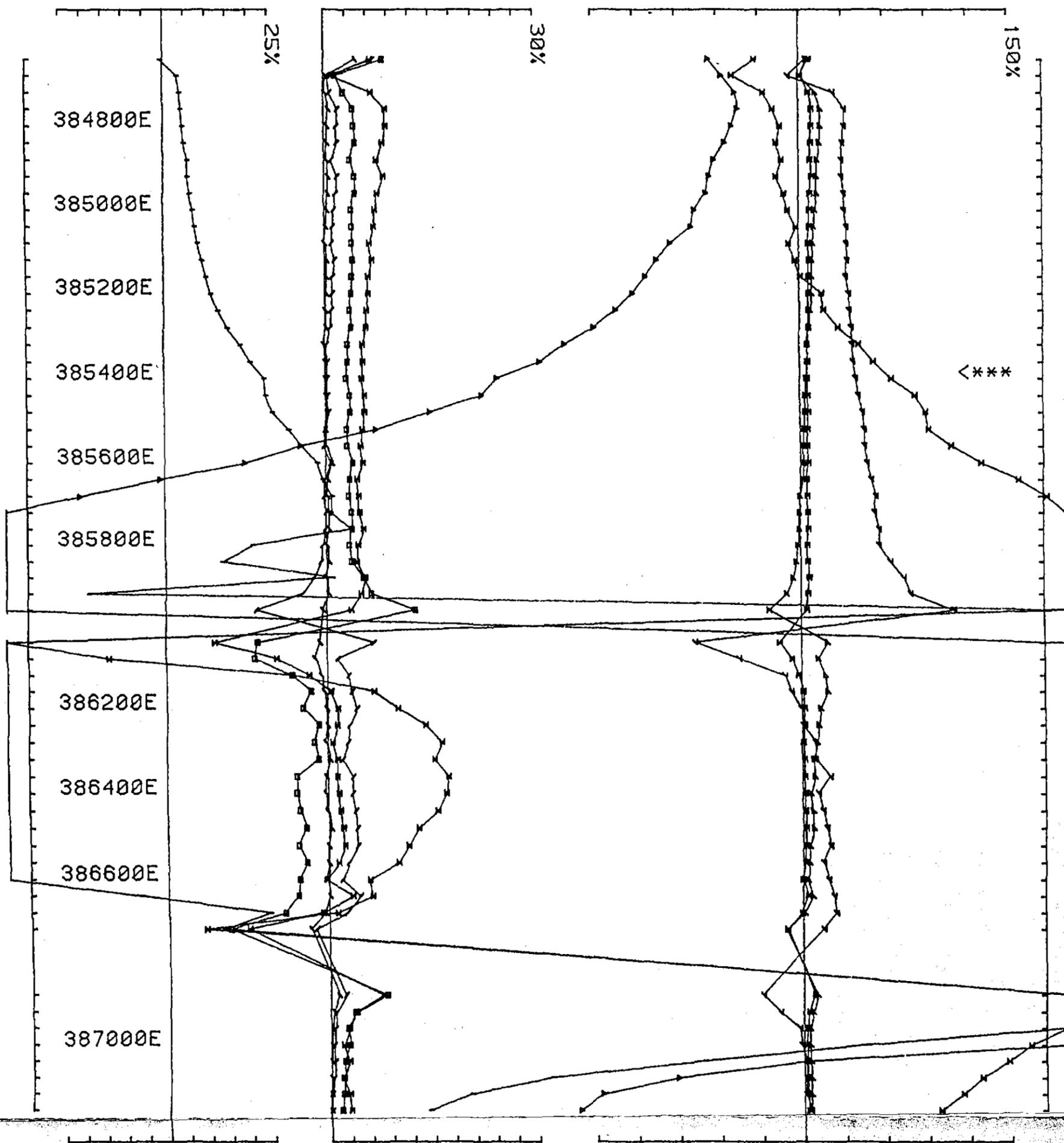
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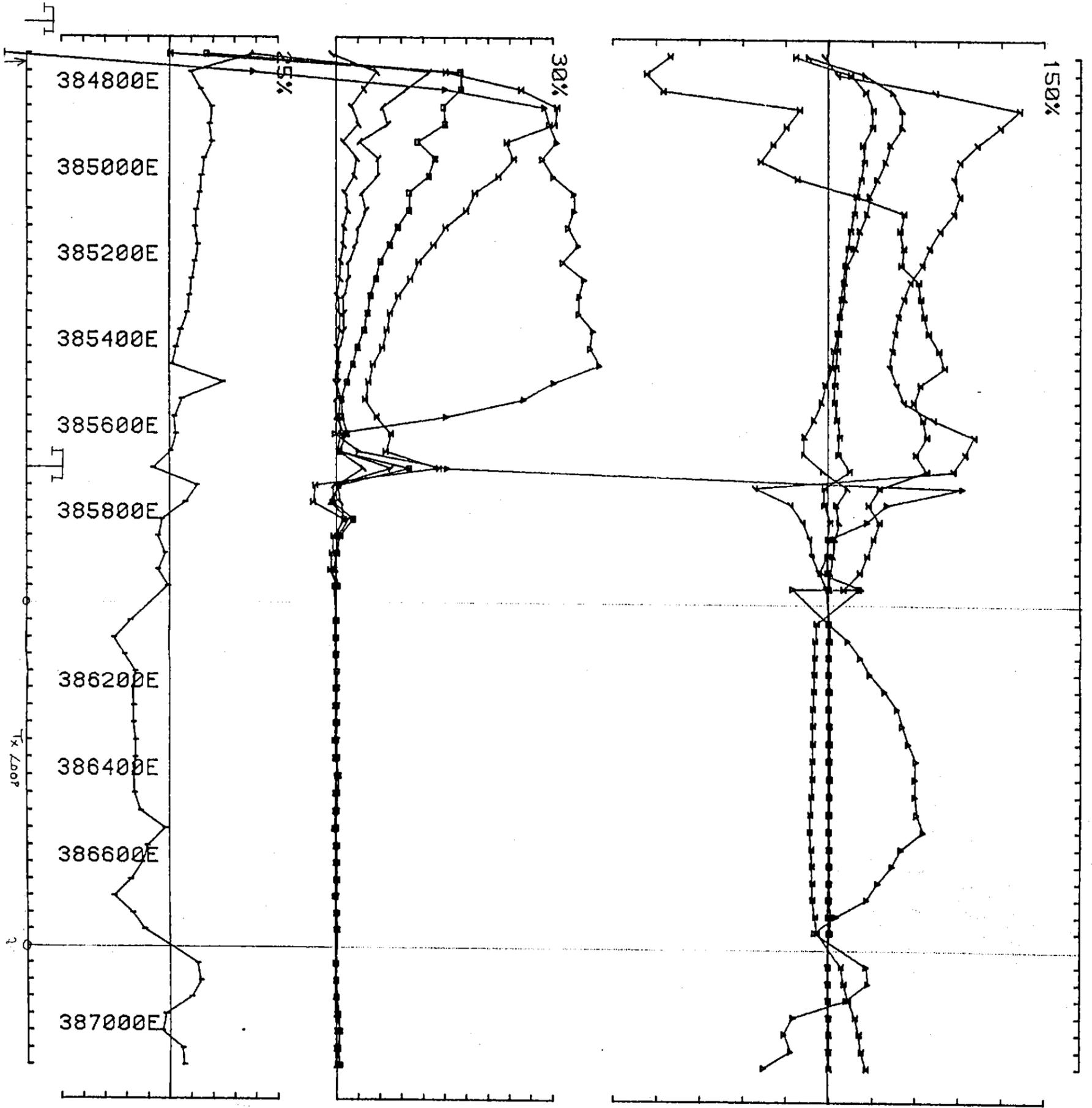
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 loop no 1 line 374200N component Hz secondary field Ch 1 point norm.



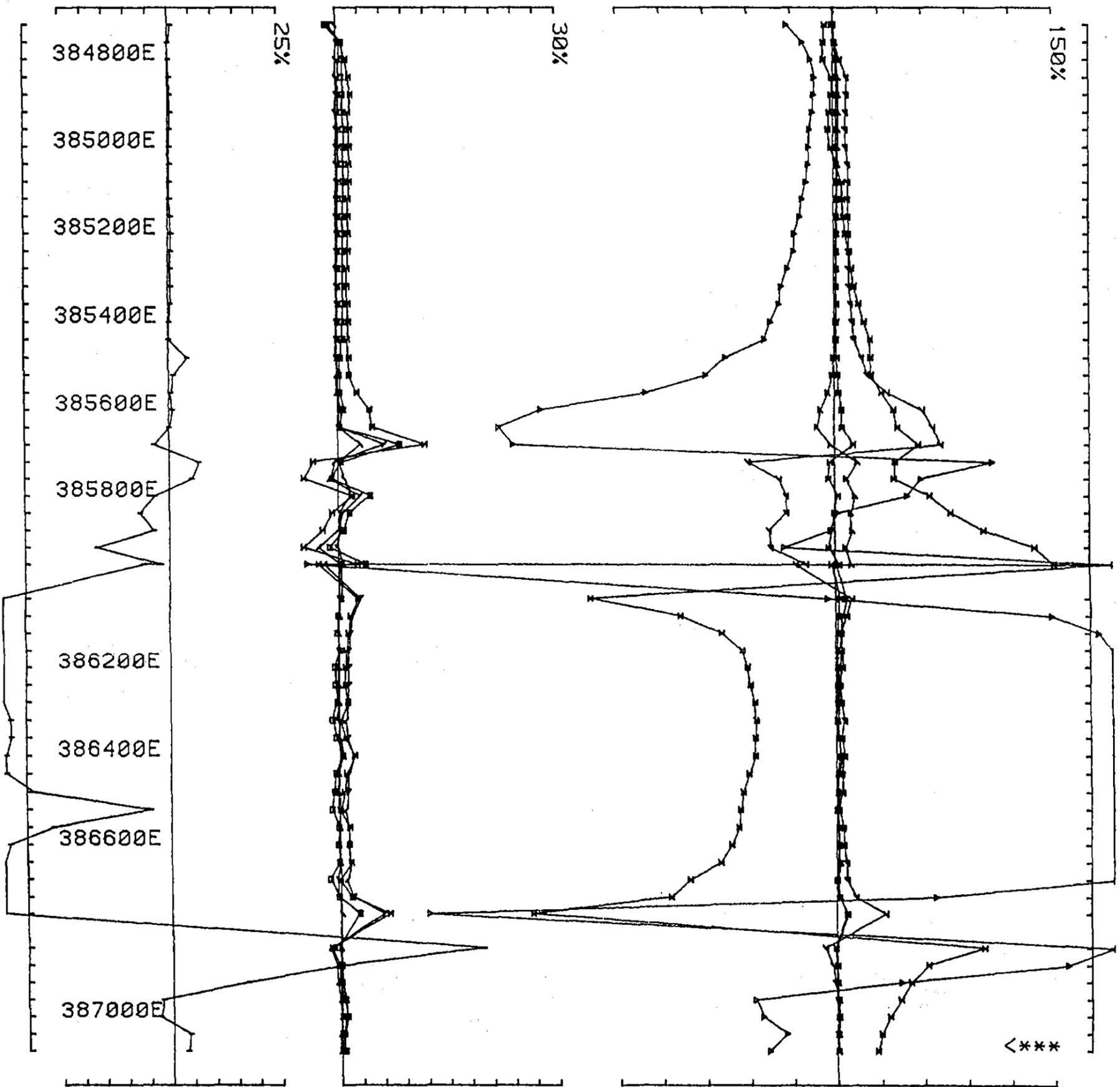
UTEM SURVEY at STERLING VALLEY for BILLITON AUSTRALIA (SHELL)
conducted by LAMONTAGNE GEOPHYSICS. Job 8902 base freq (hz) 33.409 Mar 89
loop no 1 line 374200N component Hz secondary field Ch 1 contin. norm.



UTEM SURVEY at STERLING VALLEY for BILLITON AUSTRALIA (SHELL)
 conducted by LAMONTAGNE GEOPHYSICS. Job 8902 base freq (hz) 33.409 Mar 89
 loop no 1 line 374200N component Hz secondary field Ch 1 point norm.

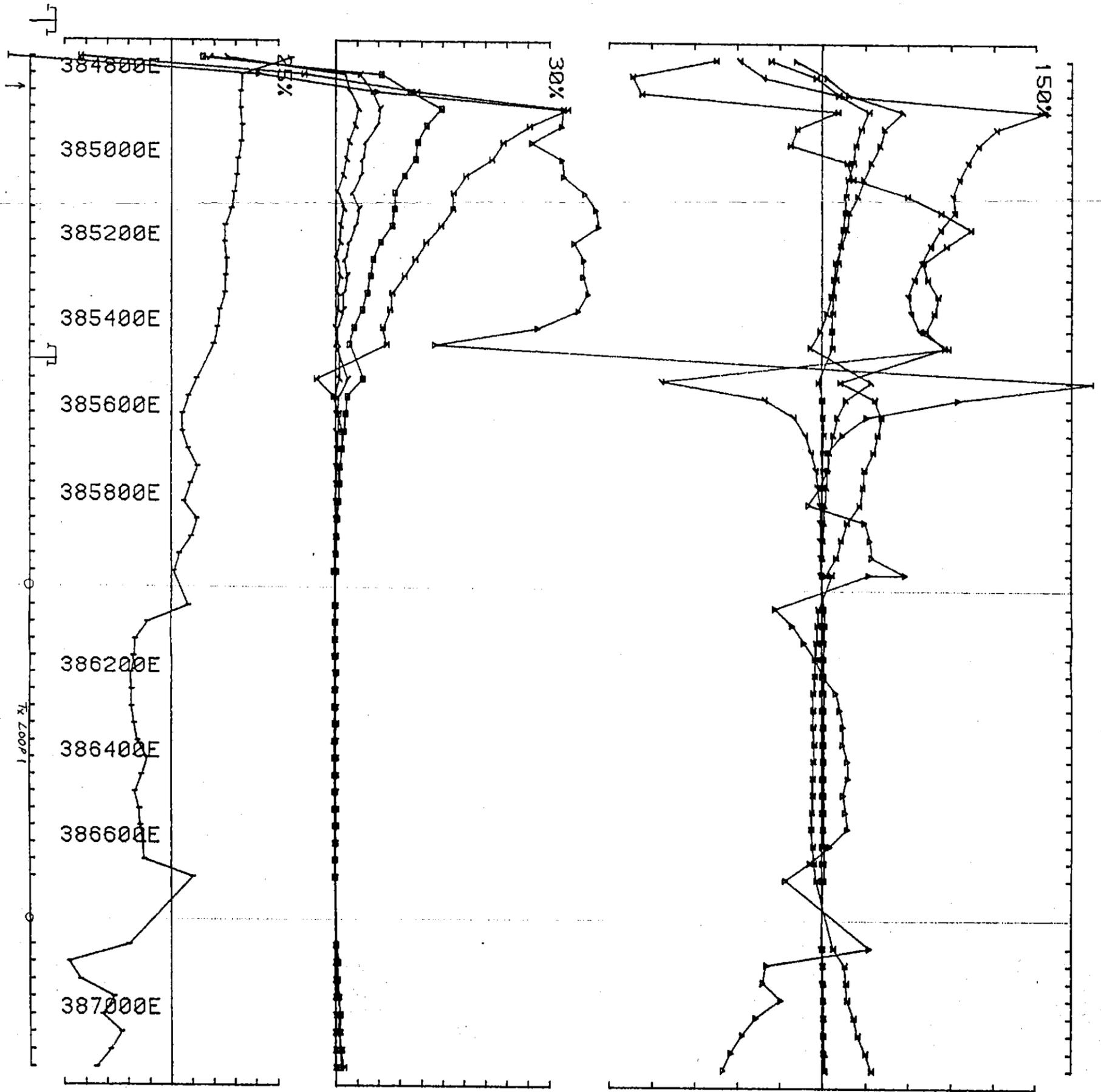


UTEM SURVEY at STERLING VALLEY for BILLITON AUSTRALIA (SHELL)
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 loop no 1 line 374400N component Hz secondary field ch 1 contin. norm.



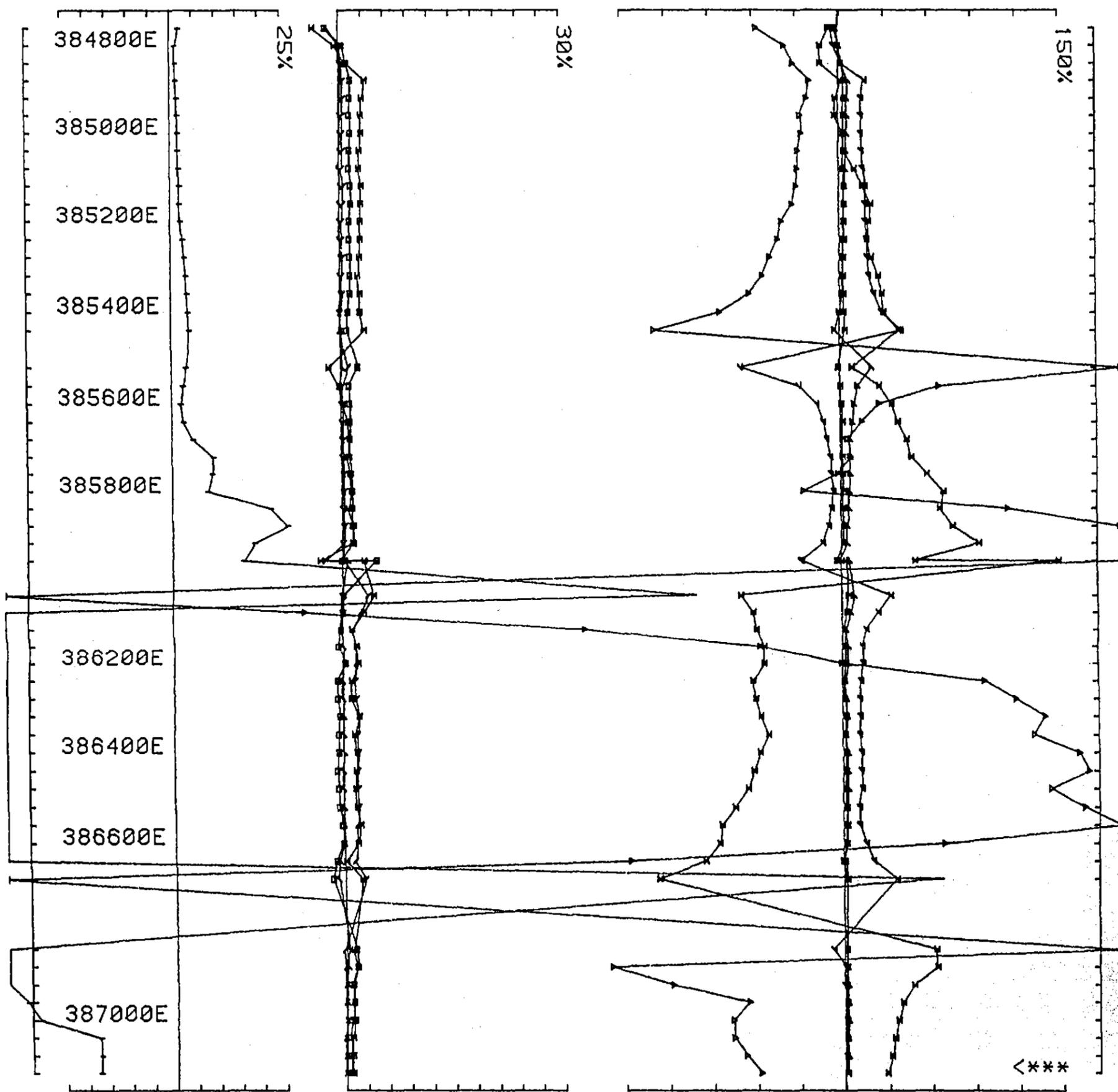
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 loop no 1 line 374400N component Hz secondary field Ch 1 point norm.

523050

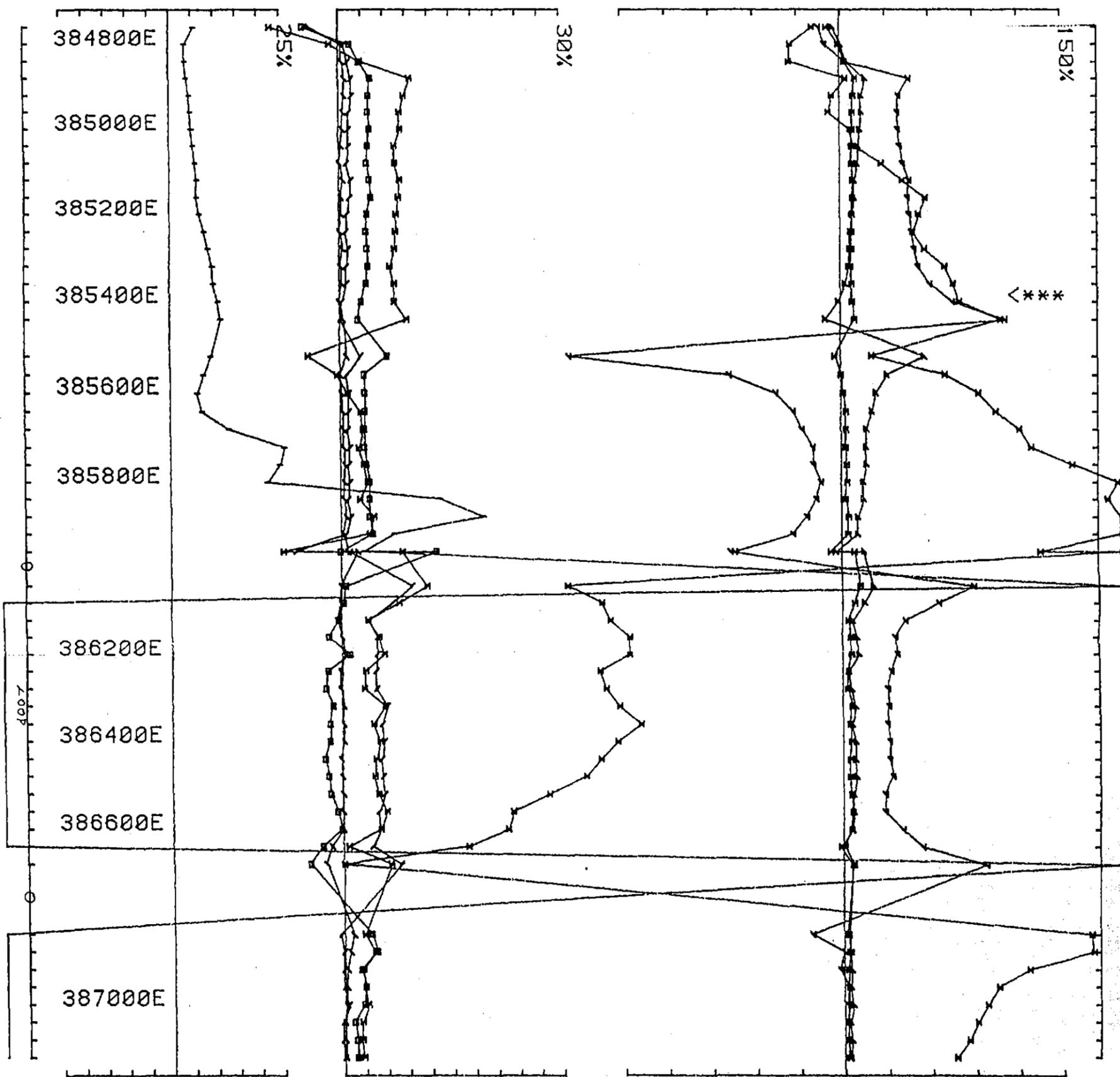


UTEM SURVEY at STERLING VALLEY for BILLITON AUSTRALIA (SHELL)
 conducted by LAMONTAGNE GEOPHYSICS. Job 8902 base freq (hz) 33.409 Mar 89
 loop no 1 line 374600N component Hz secondary field Ch 1 contin. norm.

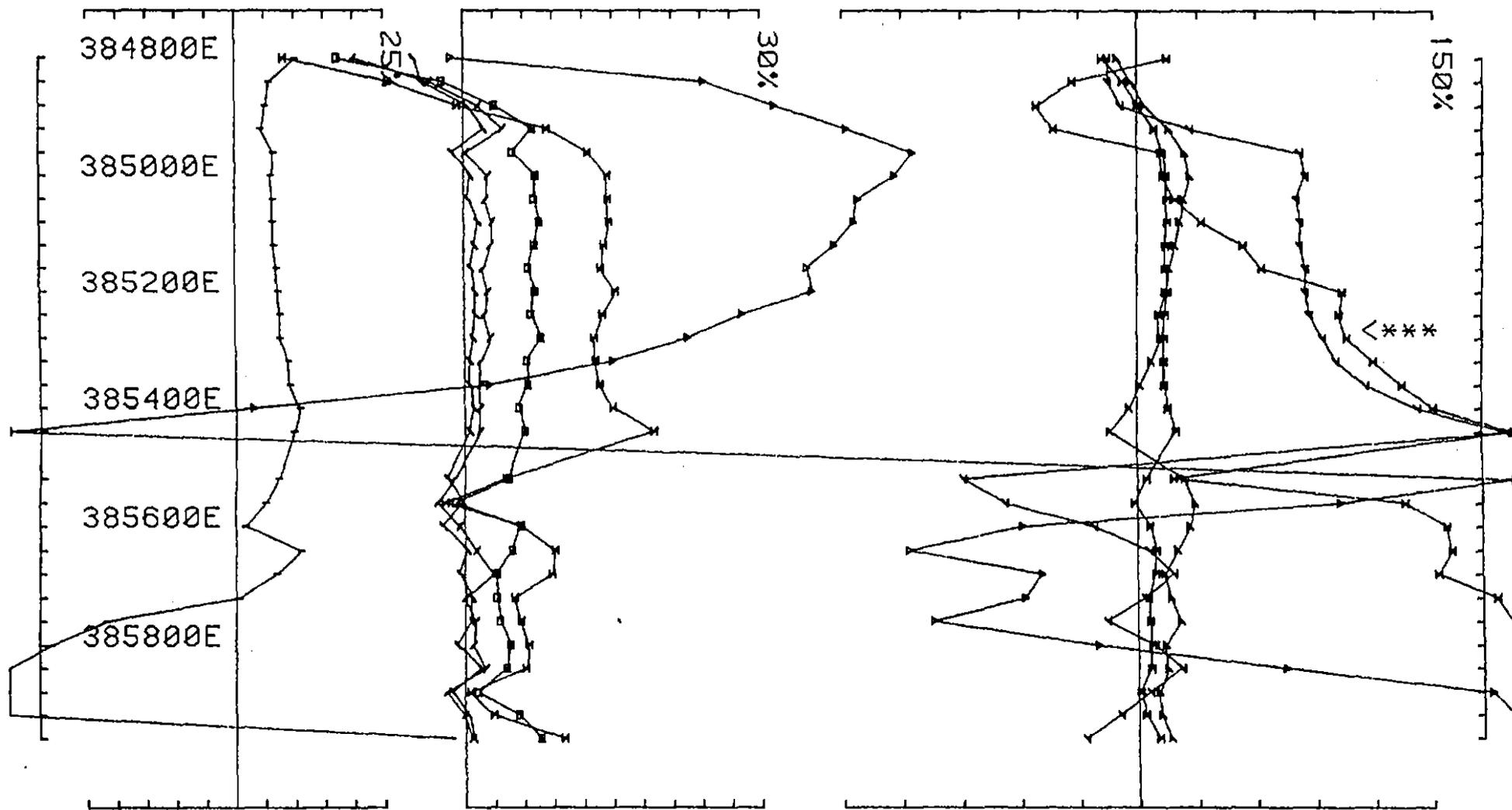
9195



UTEM SURVEY at STERLING VALLEY for BILLITON AUSTRALIA (SHELL)
conducted by LAMONTAGNE GEOPHYSICS. Job 8902 base freq (hz) 33.409 Mar 89
loop no 1 line 374600N component Hz secondary field Ch 1 point norm.



UTEM SURVEY at STERLING VALLEY for BILLITON AUSTRALIA (SHELL)
 conducted by LAMONTAGNE GEOPHYSICS. Job 8902 base freq (hz) 33.409 Mar 89
 loop no 1 line 374600N component Hz secondary field Ch 1 point norm.

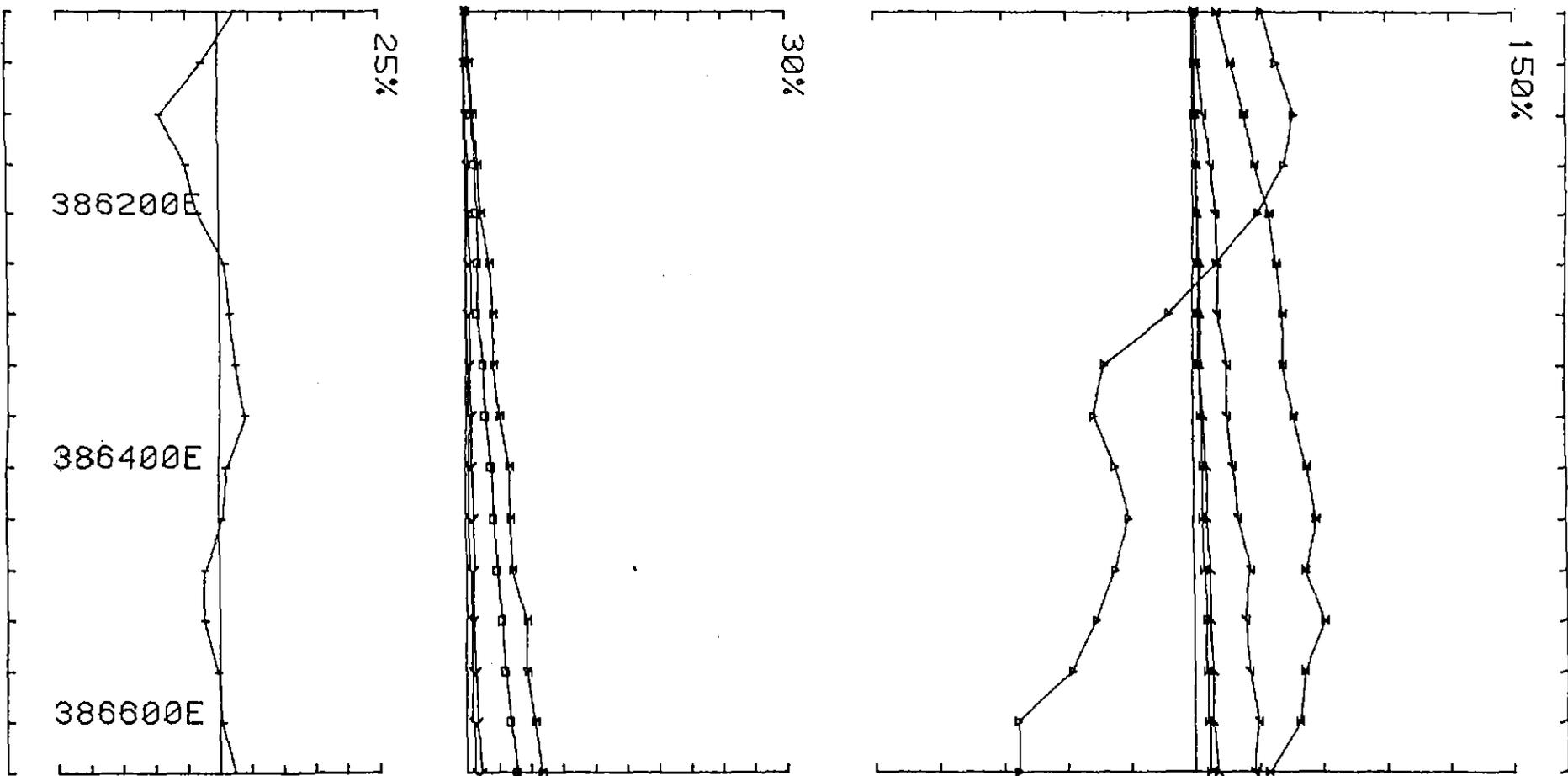


040

UTEM SURVEY at STERLING VALLEY for BILLITON AUSTRALIA (SHELL)
 conducted by LAMONTAGNE GEOPHYSICS. Job 8902 base freq (hz) 33.409 Mar 89
 loop no 1 line 374800N component Hz secondary field Ch 1 point norm.

523053

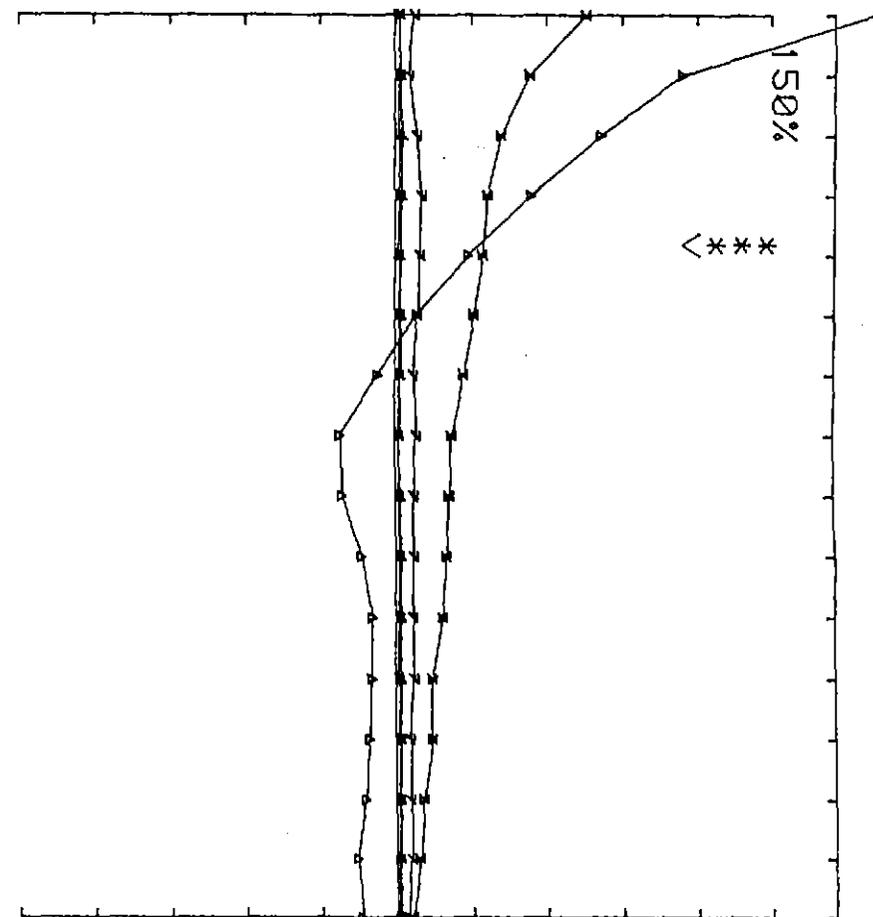
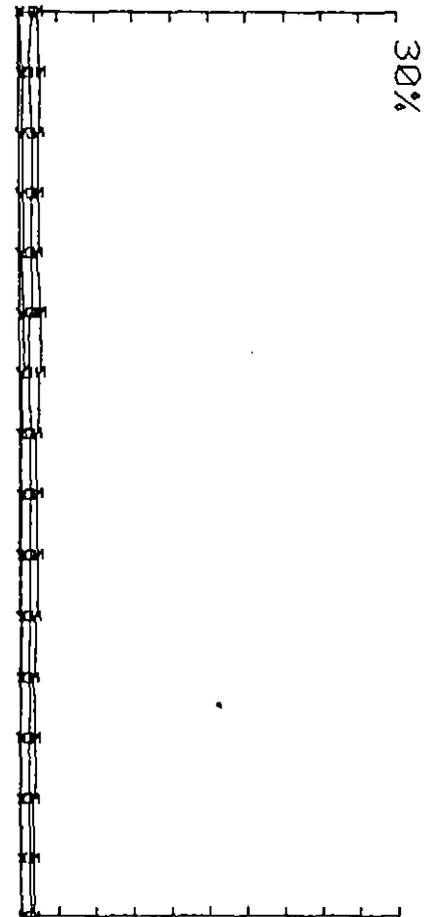
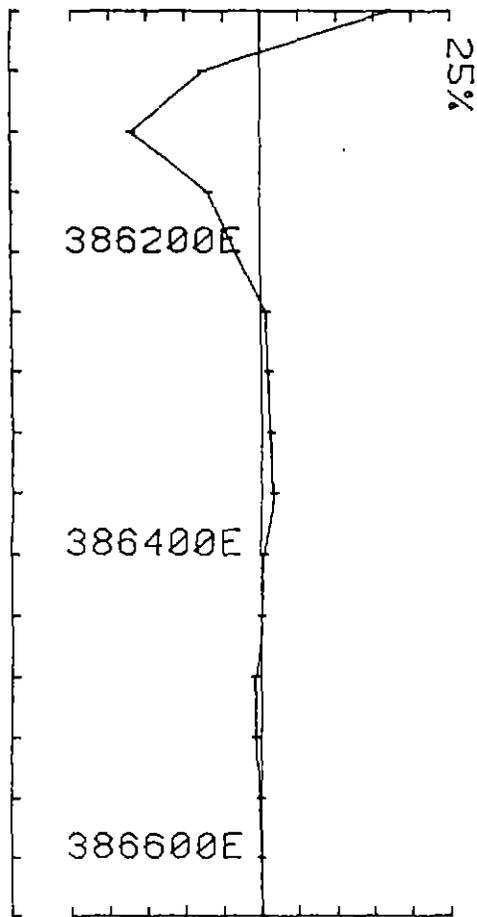
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Tx 4000' 1a
⊙



UTEM SURVEY at STERLING VALLEY for BILLITON AUSTRALIA (SHELL)
conducted by LAMONTAGNE GEOPHYSICS. Job 8902 base freq (hz) 33.409 MAR 1989
loop no 1a line 374800N component Hz secondary field Ch 1 contin. norm.

043

523054



0.00

UTEM SURVEY at STERLING VALLEY for BILLITON AUSTRALIA (SHELL)
 conducted by LAMONTAGNE GEOPHYSICS. Job 8902 base freq (hz) 33.409 MAR 1989
 loop no 1a line 374800N component Hz secondary field Ch 1 point norm.

523055

APPENDIX 3

Geological Log & Assay Results SVD 89-3

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523057

11713/LJ71.

File 848

PETROGRAPHIC REPORT

ROCKS FROM Tyndall Gp below Mt Murchison

FOR BILLITON AUSTRALIA LTD

attn JEFF RANDELL

by

**Anthony J. CRAWFORD
Geology Department
Uni of Tasmania
23/12/89**

SAMPLE NUMBER: 16623

SUMMARY:

This is a weakly foliated, sericitic quartz-phyric rhyolitic lava with a notable paucity of feldspar phenocrysts, and is almost certainly Tyndall Group.

HAND SPECIMEN:

This is a pale grey, quartz-phyric felsic volcanic or shallow intrusive rock with a weak foliation defined mainly by sericite.

THIN SECTION:

This sample is clearly either a rhyolitic lava or rhyolitic dome-plug/shallow dyke intrusive rock. It consists of about 5-8 modal % of quartz phenocrysts that range up to at least 2mm across. These are generally entire, euhedral to subhedral, and frequently somewhat resorbed and reacted around their margins, although some crystals have clearly broken up into jigsaw fit aggregates during foliation development. Many contain devitrified small melt inclusions that have partially crystallized to quartz and albite (?). The sample is most unusual in that it shows very few feldspar phenocrysts (<<1 modal%); those that are present are small albite microphenocrysts that are partially sericitized. A few small almost prismatic sericite-rich areas streaked out into the foliation may have been former albite phenocrysts, although this is by no means certain. FeTi oxide microphenocrysts are highly altered and stretched into the foliation, and mafic silicate phenocrysts were apparently not present in this sample.

The groundmass of this sample is pervaded by a mesh of sericite that defines the weak foliation present. The original texture of the groundmass is very difficult to discern. I suggest that small domains of less altered and less foliated groundmass have textures suggestive of relatively fine-grained mosaic intergrowths of quartz-albite±sericite, typically derived from crystallization of devitrified rhyolitic glass. Chlorite and calcite are very minor components of this sample.

The non-broken quartz phenocrysts and the relic groundmass textures mentioned above suggest to me that this sample was unlikely to be a rhyolitic crystal tuff, but rather that it was probably a rhyolitic lava or shallow intrusive. In my experience, shallow intrusives of broadly rhyolitic composition often contain minor biotite, and have small prismatic albite grains intergrown with anhedral quartz in the groundmass. Since neither of these features are present in this sample, I suggest that it was an extremely evolved rhyolitic lava. The mineralogy is certainly more typical of Tyndall Group lavas than Central Volcanic Complex lavas.

051

523059

SAMPLE NUMBER: 16624

SUMMARY:

This is a phyllite derived probably from a fine-grained carbonate+ sericite-altered fine-grained lithic tuff that contained fragments of andesitic and felsic lava or pumice.

HAND SPECIMEN:

This is a strongly foliated grey phyllite derived from a tuffaceous (?) rock with stretched dark lithic clasts, many more than 1cm long, in a pale grey foliated felsic groundmass. The rock is quite fresh but pitted and un-Fe-stained, suggesting some dissolution of carbonate has taken place.

THIN SECTION:

In thin section, this sample is seen to be very fine-grained and very well-cleaved, with a phyllitic texture defined by very fine-grained sericite that is recrystallizing as foliation. Former lithic fragments (?), now composed of foliated chloritic aggregates, may have been andesitic originally, or chloritized pumice fragments. These are very strongly flattened and stretched into the cleavage, and show a pronounced kinking of the cleavage that is not evident in the matrix of this rock. Much less chloritic, stretched lithic fragments are also common, and may have been more felsic rock fragments or unchloritized pumice fragments. A few small subhedral quartz grains less than 0.3mm across may be former quartz phenocryst fragments.

The degree of recrystallization and flattening suffered by this sample totally precludes any definitive assignment of its original texture and paragenesis. The rock was probably a fine-grained felsic tuff. It is clearly derived from a very high strain zone in the sequence. A notable feature of the sample is the relative abundance of pits, noted also in hand specimen. Many of these have rhombic outlines, and are almost certainly holes remaining after dissolution of calcite. The rhombs are elongate in the cleavage, and thus may have formed during cleavage development via recrystallization of matrix carbonate distributed through the protolith pre-deformation.

052

SAMPLE NUMBER: 16226

SUMMARY:

This is a former quartz+feldspar-phyric rhyolitic lava or crystal tuff with strong foliation defined by bands of sericite.

HAND SPECIMEN:

This is a pale grey, foliated quartz-phyric felsic lava with development of pale green sericitic banding parallel to foliation.

THIN SECTION:

This sample is strongly foliated in thin section, with development of bands of sericite up to at least 5mm wide that wrap around former quartz phenocrysts and cut across the highly recrystallized groundmass. Former quartz phenocrysts to several mm across are relatively abundant (5-8 modal%), and retain igneous features such as devitrified rounded melt inclusions and one or more crystal faces. Many former quartz phenocrysts are fractured by the foliation, and some show minor subgrain recrystallization. Less abundant than the quartz phenocrysts are fragments of albite phenocrysts that also show fracturing and patchy recrystallization.

The groundmass of this sample is very heterogeneous in texture and mineralogy. In a few least-texturally altered boudin-shaped areas of groundmass between sericite bands, the texture is clearly that of a quartz-feldspar mosaic intergrowth after glass. This is recrystallized to coarser-grained patches of quartz and albite, and transected by wide and thin bands and meshes of sericite, as well as overprinted by fairly abundant calcite. A coarse-grained secondary quartz-calcite vein cuts the bottom of the thin section.

There is little doubt that the precursor lithology of this rock was a quartz+feldspar-phyric lava, or less likely crystal tuff. It has suffered fairly strong recrystallization and foliation development in a high strain zone. It is not possible to choose between an origin as a lava, or as a crystal tuff, due to the extent of deformation-related recrystallization of this sample.

SAMPLE NUMBER: 16630

SUMMARY:

This is a plagioclase-phyric dacitic lava that has suffered some chloritic alteration.

HAND SPECIMEN:

This is a massive dark grey-green altered dacitic to andesitic lava with scattered former plagioclase phenocrysts, and thin seams of pyrite on fractures.

THIN SECTION:

This sample is a feldspar-phyric dacitic lava with fairly extensive chloritization of the groundmass. Quartz phenocrysts are absent, but the rock carries around 10modal% of albite phenocrysts. These are up to 2mm long, fairly blocky in shape, and vary from slightly to entirely sericitized. The albite phenocrysts commonly occur aggregated in multi-crystal clots. There is no evidence for the original existence of mafic silicate phenocrysts in this sample, but former euhedral FeTi oxide microphenocrysts are not uncommon, and have altered to chlorite, magnetite and possibly tiny crystals of sphene.

The groundmass had an originally vitrophyric texture, with albite microlites and poorly-formed laths set in a matrix of anhedral albite and quartz. Alteration and recrystallization of the glassy component of the groundmass has produced common sericite and chlorite that occurs dispersed through the matrix. Chlorite, in particular, is quite abundant in this sample, and some amount of chloritization-type alteration may have been imposed over the devitrification+recrystallization-produced chlorite, which is rarely this abundant in Mount Rea Volcanics dacitic lavas.

Several en echelon lens-shaped bodies of calcite probably represent a disrupted vein, and calcite is relatively common as tiny patches and pools scattered through the groundmass. Secondary euhedral pyrite has grown along several sharp, clean fractures, and appears to be unrelated to the calcite- or chlorite alteration. Pyrite crystals range up to about 0.5mm across maximum.

This sample was almost certainly a dacitic lava. The relatively large amount of chlorite in the rock suggests some chloritic alteration. It is quite different petrogenetically from the quartz-phyric Tyndall Group rhyolites from higher in the hole, and is considerably less foliated.

SAMPLE NUMBER: 16640

SUMMARY:

This is a weakly foliated crystal-lithic tuff dominated by fragments of glassy quartz+feldspar-phyric rhyolitic lava, and discrete quartz and feldspar crystals and crystal fragments.

HAND SPECIMEN:

This is a mottled green-pale grey formerly feldspar-phyric felsic lava (or crystal tuff?) with a pronounced foliation defined by a dark meshwork of chlorite and sericite.

THIN SECTION:

This rock contains quite common (around 10 modal%) quartz phenocrysts and phenocryst fragments that range up to around 2mm across. Many of these show partial or complete rounding due to reaction with the magma. Somewhat less abundant are albite phenocrysts that also range up to 2mm long, and which are slightly sericitized. These are generally encased in a sheath of fine-grained sericite, and appear to have partially or completely recrystallized internally to small areas of albite that extinguish at different angles. There are no former mafic phases in this rock.

The groundmass texture of this rock is very complex. It is pervaded by a diffuse but strongly-developed interlocking mesh of slightly Fe-stained yellowish sericite. Domains of groundmass between the sericite mesh show a pronounced variation in texture over very small distances that makes me think this sample was not originally a homogeneous massive rhyolitic lava. Textures in the groundmass, dominated by interlocking quartz and albite, but varying from microcrystalline to (relatively) coarse-grained, and from anhedral mosaics to almost holocrystalline, suggest a formerly fragmental nature for this sample. Most of the fragments were rhyolitic or dacitic and highly glassy, although some more crystalline fragments are also present. Chlorite is a very minor phase in this sample.

650

SAMPLE NUMBER: 16642

SUMMARY:

This rock was a formerly glassy quartz+feldspar-phyric rhyolitic or rhyodacitic lava that has a weak sericite+calcite-defined foliation, and strong calcite overprinting.

HAND SPECIMEN:

This is a pale grey quartz+feldspar-phyric felsic lava or tuff, with a band of strong chlorite-calcite alteration at one end of the core segment.

THIN SECTION:

This is a quartz+feldspar-phyric rhyolitic or rhyodacitic lava with an extensively recrystallized groundmass. It contains about 3 modal% of quartz phenocrysts that are slightly rounded euhedra to about 3mm across, with crystallized melt inclusions and some internal strain features. Slightly less abundant than the quartz phenocrysts are quite large (to 2mm long) albite phenocrysts that are partially to completely replaced by dirty brown calcite and sericite. There were no former mafic phases in this sample.

The groundmass of this sample was glassy, and has crystallized to a variably textured matrix that shows local variations in grain size and texture, although not nearly as pronounced as in the previous sample. A very weak foliation is defined by sericite and calcite, and calcite is abundant overprinting the groundmass and phenocrysts alike. Chlorite is a very minor component of this rock, although it definitely becomes more abundant in the section as the dark chloritic(?) vein noted in the hand specimen is approached; unfortunately, this chloritic vein was not completely sampled in the thin section.

This was almost certainly a formerly glassy quartz+feldspar-phyric rhyolitic to rhyodacitic lava

SAMPLE NUMBER: 16648

SUMMARY:

This is a foliated formerly glassy quartz+feldspar-phyric crystal-lithic tuff of rhyolitic to rhyodacitic composition, with strong sericite-calcite alteration accompanying foliation development.

HAND SPECIMEN:

This is a dark grey to brownish quartz+feldspar-phyric crystal tuff or lava of rhyolitic to rhyodacitic composition.

THIN SECTION:

This sample is petrographically very similar to 16640, and consists of quite abundant (each at least 5-8 modal%) quartz and albite phenocrysts and crystal fragments set in a variably-textured groundmass. Most quartz and albite crystals are broken euhedra that show internal strain patches and often jigsaw-fit fracturing. Many albite crystals show strong internal recrystallization to a patchy mosaic of interlocking albite crystals. A few small, completely altered former FeTi microphenocrysts are the only sign of former mafic phases in this rock.

The groundmass is strongly foliated, with the foliation defined by an intense and pervasive meshwork of sericite and minor calcite. One or two quite distinctive groundmass domains composed of interlocking albite laths and anhedral quartz are almost certainly holocrystalline lithic fragments of dacite or rhyolite. Other areas of the groundmass in which the texture and grain size varies notably over small distances may be recrystallized glassy or pumiceous rhyolitic fragments that have had any original texture obliterated during recrystallization.

The broken crystal fragments and the few clearly defined lithic fragments of felsic volcanics suggest to me that this sample was originally a glassy crystal-lithic tuff, clearly of rhyolitic or rhyodacitic composition. Foliation development was associated with strong sericite-calcite alteration.

SAMPLE NUMBER: 16651

SUMMARY:

This sample was probably a quartz+feldspar-phyric rhyolitic or rhyodacitic lava.

HAND SPECIMEN:

This is a dark grey foliated fine-grained quartz+feldspar-phyric crystal tuff or rhyolitic-rhyodacitic lava.

THIN SECTION:

This sample contains around 5 modal% of each of quartz and albite phenocrysts. Both are well preserved, and crystal fragments are about equally as abundant as euhedral entire crystals. Quartz and albite phenocrysts show internal strain and fracturing and kinking associated with the foliation development. Four stretched, lensoid shaped fragments of quartz-albite-chlorite, to about 2mm long, are present in the sample, and are characterized by relatively abundant chlorite and magnetite compared to the remainder of the rock. These may have been flattened pumice fragments.

The groundmass of this sample is foliated and fairly strongly sericitized, and consists mainly of very fine-grained and even-textured quartz-albite intergrowths pervaded by a mesh of sericite. In many places, especially where the sericite-alteration is less intense, the groundmass appears to have a perlitic-crack texture typical of dacitic lavas in the CVC and Que Footwall sequence.

This sample is difficult to diagnose exactly. It shows features typical of felsic lavas, such as perlitic cracks and entire quartz and feldspar phenocrysts, and a few features more typical of a crystal-lithic tuff, including a few chloritized pumice(?) fragments. I lean towards a lav-flow origin for this sample, and suggest that the few pumice(?) fragments may simply have been incorporated into the flow during eruption and flow.

SAMPLE NUMBER: 16657

SUMMARY:

This is a weakly foliated, formerly glassy quartz+feldspar-phyric lava of rhyolitic or rhyodacitic composition.

HAND SPECIMEN:

This is a foliated quartz+feldspar-phyric felsic crystal tuff or lava.

THIN SECTION:

This sample is essentially very similar to the previous sample in most respects. It contains quartz and albite phenocrysts in a strongly sericitized, foliated groundmass. Unlike the preceding sample, it does not contain the chloritic pumice(?) fragments and tourmaline(?) dispersed through the groundmass. Chlorite is not common, and occurs as small veinlets and stringers paralleling the cleavage.

As for the previous sample, I suggest that this was originally a glassy rhyolitic or rhyodacitic lava, although the state of preservation renders it difficult to determine between this origin, and an origin as a glassy crystal tuff.

SOME COMMENTS

1. The abundance of quartz phenocrysts in these samples suggests correlation with the Tyndall Group as defined presently, although I am unhappy with that definition and would prefer to see it restricted to the sediment dominated section higher in the mapped sequences.
2. The fairly strong foliation in most of these samples makes it pretty difficult to talk sensibly about things like palaeoenvironment and mode of emplacement. I am sure we are looking at a rhyolite-dominated lava pile with occasional clear explosive units of crystal tuff derived from the same sources. The only 'odd man out' is the chloritic dacite 16630.
3. The alteration is predominantly sericite-calcite, and is recrystallized during the fairly pervasive foliation-producing event. Chloritization is present only in sample 16630.

4. A feature that I was hesitant to write into the thin section descriptions due to uncertainty is that abundant tiny prisms of a deeply green -pale green pleochroic mineral are scattered liberally through the groundmass of many samples, especially 16623 and 16651. Although I concede that these may be unusually prismatic and uncleaved chlorite (no way hbd would form at this low-T), the possibility should be considered that they could also be dravitic tourmalines. Usually, in the Mount Read Volcanics, tourmaline is associated with Devonian vein assemblages and not dispersed through the rock. I had Garry Davidson (who has seen lots of tourmaline) look at several of these sections to comment on my tourmalines, and he agreed that it could be very fine-grained tourmaline in these samples. More fancy footwork is required to check this, and is probably not warranted. Did you see any coarser-grained vein assemblages that look like they might have tourmaline in them?

5. I don't really see any evidence from the thin sections that a volcanic hiatus exists between the top 3 samples and those below. Certainly the dark chloritic dacite is unusual in this sequence, but the remainder of the samples above and below the dacite seem to me to be quite reasonably part of the same sequence.

Hope these descriptions are of use. I will be in Melbourne from Dec 23rd to Jan 9th, and will be happy to answer any questions after the 9th (I'll be at 002-293831 until back to Uni on 16th Jan). Happy Xmas and prosperous New Year. May all your volcanogenic massive sulphides be exceptionally auriferous!

Best wishes

ANALABS

A division of MacDonald Hamilton & Co. Pty. Ltd.

Phone (09) 458 7999

52 Murray Road, Welshpool, W.A. 6106

Telex AA92560

FAX: 004 31 8890

ANALYTICAL REPORT No. 204 0 08 04777

THIS REPORT MUST BE READ IN CONJUNCTION WITH THE ACCOMPANYING ANALYTICAL DATA

060

The Shell Company of Australia
Metals Division
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Devonport Tasmania 7310

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			DRY	CRUSH	SPLIT	PULVERISE	SIEVE	OTHER SEE REMARKS	NONE	REFER TO ANALYSIS SECTION	PREPARATION	METHOD	
		17,401/552	DC	Prep: 006,010,011,012,013,016							Cu,Pb,Zn,Ag/101		
		17,401/552	DC								Au,AuChk/309		
		17,401/552	DC								Pb,Zn,Ag/104		
		17,401/552	DC	Prep: 006,010,011,012,013,016							Pb,Zn,Ag/104		
		17,401/552	DC								Pb,Zn,Ag/104		

RESULTS TO The Shell Company of Australia
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Devonport Tasmania 7310

RESULTS TO

REMARKS

SVD 89-3
CORE

523068

STATE OF SAMPLES	ANALYSIS - PREPARATION	ANALYSIS - METHOD
whole core	perchloric acid A1	atomic absorption AAS
split core	hydrochloric acid A2	x-ray fluorescence XRF
cutting	nitric acid A3	spectrophotometry SPEC
rock	aqua regia A4	colorimetry COL
soil	nitric-perchloric A5	chromatography CHR
pulp	HF mixture A6	titration TIT
water	HF under pressure A7	other chemical means GHEM
tissue	fusion A8	miscellaneous MISC
stream sediment		fluorescence FLUOR
heavy mineral		inductively coupled plasma ICP

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ANALYTICAL DATA

SAMPLE PREFIX

REPORT NUMBER

REPORT DATE

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PAGE

081

204.0.08.06727

15/01/90

11714

1 OF 14

TUBE No.	SAMPLE No.	Cu	Pb	Pb	Zn	Zn	Ag	Ag	Au	AuCHK
1	17401	15	275	-	130	-	1.0	-	0.011	0.009
2	17402	375	-	3050	-	11500	-	12	0.071	-
3	17403	45	1150	-	3050	-	2.5	-	0.016	-
4	17404	15	80	-	140	-	0.5	-	<0.008	-
5	17405	5	5	-	50	-	<0.5	-	0.012	-
6	17406	5	15	-	65	-	0.5	-	0.009	-
7	17407	5	15	-	35	-	0.5	-	0.015	-
8	17408	5	45	-	90	-	<0.5	-	0.016	<0.008
9	17409	5	15	-	95	-	0.5	-	0.020	-
10	17410	10	20	-	90	-	<0.5	-	0.012	-
11	17411	5	5	-	50	-	<0.5	-	0.011	-
12	17412	10	70	-	80	-	0.5	-	0.014	-
13	17413	55	400	-	5150	-	2.5	-	0.010	-
14	17414	5	110	-	110	-	<0.5	-	0.021	-
15	17415	15	200	-	295	-	0.5	-	0.018	-
16	17416	10	300	-	610	-	0.5	-	0.019	<0.008
17	17417	5	15	-	110	-	<0.5	-	0.008	-
18	17418	125	20	-	350	-	0.5	-	0.009	-
19	17419	10	35	-	225	-	<0.5	-	0.015	-
20	17420	40	30	-	620	-	<0.5	-	0.018	-
21	17421	50	10	-	800	-	<0.5	-	0.009	<0.008
22	17422	60	145	-	870	-	0.5	-	0.009	-
23	17423	60	75	-	860	-	0.5	-	<0.008	-
24	17424	90	25	-	280	-	<0.5	-	0.014	-
25	17425	60	105	-	350	-	0.5	-	0.077	-

Results in ppm unless otherwise specified
 T = element present; but concentration too low to measure
 X = element concentration is below detection limit
 - = element not determined

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TUBE No.	SAMPLE No.	Cu	Pb	Pb	Zn	Zn	Ag	Ag	Au	AuChl
	632									
					204.0.08.06727		15/01/90	11714		
										7 OF 14
1	17426	10	25	-	250	-	<0.5	-	0.014	-
2	17427	35	55	-	1350	-	<0.5	-	<0.008	-
3	17428	5	115	-	330	-	<0.5	-	<0.008	-
4	17429	10	20	-	185	-	<0.5	-	<0.008	-
5	17430	45	255	-	850	-	0.5	-	0.010	-
6	17431	20	60	-	375	-	0.5	-	0.035	0.03
7	17432	15	80	-	275	-	<0.5	-	0.015	-
8	17433	30	425	-	1250	-	<0.5	-	0.010	-
9	17434	10	<5	-	155	-	<0.5	-	0.018	-
10	17435	5	<5	-	135	-	<0.5	-	0.014	-
11	17436	5	80	-	225	-	<0.5	-	0.010	-
12	17437	5	30	-	140	-	<0.5	-	0.080	-
13	17438	15	105	-	235	-	<0.5	-	0.014	-
14	17439	15	125	-	245	-	<0.5	-	0.009	-
15	17440	10	55	-	210	-	<0.5	-	0.017	-
16	17441	50	620	-	1625	-	1.0	-	<0.008	-
17	17442	15	265	-	650	-	<0.5	-	<0.008	<0.0
18	17443	5	20	-	170	-	<0.5	-	<0.008	-
19	17444	25	15	-	180	-	<0.5	-	<0.008	-
20	17445	15	15	-	150	-	<0.5	-	<0.008	-
21	17446	20	10	-	520	-	<0.5	-	0.013	-
22	17447	25	40	-	285	-	<0.5	-	0.017	-
23	17448	10	50	-	240	-	1.0	-	0.019	-
24	17449	<5	40	-	280	-	1.0	-	0.020	-
25	17450	<5	320	-	670	-	2.5	-	0.068	-

Results in ppm unless otherwise specified
 T = element present, but concentration too low to measure
 X = element concentration is below detection limit
 - = element not determined

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ANALYTICAL DATA

SAMPLE PREFIX

REPORT NUMBER

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PAGE

063		204, 0.08, 06727				15/01/90		11714		3 OF 14	
TUBE No.	SAMPLE No.	Cu	Pb	Pb	Zn	Zn	Ag	Ag	Au	AuChk	
1	17451	<5	60	-	175	-	<0.5	-	0.283	0.266	
2	17452	<5	40	-	115	-	<0.5	-	0.020	-	
3	17453	<5	25	-	165	-	<0.5	-	0.010	-	
4	17454	<5	30	-	225	-	<0.5	-	0.075	-	
5	17455	<5	25	-	190	-	1.0	-	0.026	-	
6	17456	<5	25	-	200	-	1.0	-	0.027	-	
7	17457	15	20	-	210	-	1.5	-	0.051	-	
8	17458	<5	20	-	130	-	1.0	-	0.061	-	
9	17459	<5	25	-	130	-	0.5	-	<0.008	-	
10	17460	<5	20	-	120	-	<0.5	-	0.037	-	
11	17461	<5	20	-	140	-	<0.5	-	0.038	-	
12	17462	<5	70	-	365	-	1.0	-	<0.008	-	
13	17463	5	30	-	275	-	<0.5	-	<0.008	-	
14	17464	<5	55	-	200	-	0.5	-	<0.008	-	
15	17465	25	200	-	250	-	2.5	-	<0.008	-	
16	17466	<5	20	-	140	-	<0.5	-	<0.008	<0.008	
17	17467	<5	420	-	450	-	1.0	-	0.017	-	
18	17468	<5	30	-	150	-	1.0	-	0.028	-	
19	17469	<5	30	-	125	-	<0.5	-	<0.008	<0.008	
20	17470	35	35	-	210	-	1.0	-	0.010	-	
21	17471	10	40	-	95	-	0.5	-	0.009	-	
22	17472	10	365	-	385	-	1.0	-	<0.008	-	
23	17473	50	800	-	1580	-	3.5	-	0.018	-	
24	17474	5	210	-	430	-	1.0	-	<0.008	-	
25	17475	10	700	-	800	-	1.0	-	0.010	-	

Results in ppm unless otherwise specified
 T = element present; but concentration too low to measure
 X = element concentration is below detection limit
 - = element not determined

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TUBE No.	SAMPLE No.	Cu	Pb	Pb	Zn	Zn	Ag	Ag	Au	AuChk
1	17476	20	690	-	1575	-	1.0	-	0.010	-
2	17477	25	150	-	195	-	1.0	-	<0.008	-
3	17478	100	310	-	220	-	1.0	-	<0.008	<0.008
4	17479	30	50	-	340	-	<0.5	-	<0.008	-
5	17480	10	180	-	205	-	<0.5	-	<0.008	-
6	17481	10	115	-	320	-	<0.5	-	0.013	-
7	17482	5	30	-	90	-	0.5	-	0.022	-
8	17483	10	40	-	435	-	<0.5	-	0.018	-
9	17484	<5	40	-	75	-	<0.5	-	0.015	-
10	17485	50	2525	-	2310	-	3.0	-	0.068	-
11	17486	<5	350	-	330	-	1.0	-	0.021	-
12	17487	40	230	-	200	-	<0.5	-	0.014	-
13	17488	<5	100	-	370	-	1.0	-	<0.008	-
14	17489	5	45	-	290	-	0.5	-	0.008	-
15	17490	<5	125	-	330	-	1.0	-	0.016	-
16	17491	<5	45	-	80	-	0.5	-	<0.008	<0.008
17	17492	10	50	-	70	-	0.5	-	<0.008	-
18	17493	5	60	-	55	-	1.0	-	<0.008	-
19	17494	10	190	-	410	-	1.5	-	0.009	-
20	17495	5	70	-	45	-	0.5	-	<0.008	-
21	17496	5	120	-	200	-	0.5	-	<0.008	-
22	17497	20	1525	-	2100	-	1.5	-	0.045	0.015
23	17498	20	755	-	2700	-	2.0	-	0.014	-
24	17499	5	90	-	95	-	<0.5	-	0.011	-
25	17500	<5	90	-	100	-	1.0	-	0.012	-

Results in ppm unless otherwise specified
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TUBE No.	SAMPLE No.	Cu	Pb	Pb	Zn	Zn	Ag	Ag	Au	AuChk	
065		204.0.08.06727				15/01/90		11714		5 OF 14	
1	17501	25	135	-	360	-	2.0	-	0.012	-	
2	17502	10	200	-	255	-	1.0	-	0.011	-	
3	17503	10	200	-	330	-	2.0	-	0.012	-	
4	17504	10	80	-	75	-	1.0	-	0.011	-	
5	17505	10	60	-	100	-	1.5	-	0.011	-	
6	17506	15	320	-	365	-	0.5	-	0.013	-	
7	17507	5	290	-	105	-	2.0	-	0.010	-	
8	17508	5	250	-	145	-	2.0	-	0.013	-	
9	17509	<5	180	-	100	-	1.5	-	<0.008	-	
10	17510	<5	25	-	45	-	0.5	-	<0.008	-	
11	17511	45	25	-	40	-	2.5	-	<0.008	-	
12	17512	5	70	-	65	-	2.0	-	<0.008	<0.008	
13	17513	5	100	-	40	-	1.5	-	<0.008	<0.008	
14	17514	5	120	-	100	-	0.5	-	<0.008	-	
15	17515	5	95	-	40	-	1.0	-	<0.008	-	
16	17516	<5	50	-	45	-	2.0	-	<0.008	-	
17	17517	<5	75	-	45	-	<0.5	-	<0.008	-	
18	17518	5	80	-	50	-	0.5	-	<0.008	-	
19	17519	5	160	-	45	-	1.0	-	<0.008	-	
20	17520	5	150	-	55	-	1.0	-	<0.008	-	
21	17521	5	120	-	300	-	1.5	-	<0.008	-	
22	17522	5	20	-	35	-	1.5	-	<0.008	-	
23	17523	5	20	-	95	-	0.5	-	<0.008	-	
24	17524	<5	<5	-	50	-	0.5	-	<0.008	-	
25	17525	<5	<5	-	25	-	1.0	-	<0.008	-	

Results in ppm unless otherwise specified
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TUBE No.	SAMPLE No.	Cu	Pb	Pb	Zn	Zn	Ag	Ag	Au	AuChk
1	17526	<5	10	-	35	-	1.5	-	<0.008	-
2	17527	100	100	-	540	-	2.5	-	<0.008	<0.008
3	17528	5	35	-	105	-	0.5	-	<0.008	-
4	17529	5	20	-	40	-	0.5	-	<0.008	<0.008
5	17530	5	20	-	40	-	1.5	-	<0.008	-
6	17531	5	50	-	85	-	1.0	-	<0.008	-
7	17532	150	220	-	100	-	1.5	-	0.009	-
8	17533	2860	55	-	215	-	5.0	-	0.011	-
9	17534	35	50	-	35	-	1.5	-	<0.008	-
10	17535	30	40	-	45	-	1.0	-	<0.008	-
11	17536	115	10	-	70	-	2.0	-	<0.008	-
12	17537	10	30	-	115	-	<0.5	-	<0.008	-
13	17538	10	105	-	85	-	1.5	-	<0.008	-
14	17539	5	35	-	80	-	1.0	-	0.030	-
15	17540	5	55	-	50	-	0.5	-	0.011	-
16	17541	400	20	-	155	-	2.0	-	<0.008	-
17	17542	4150	75	-	400	-	5.5	-	0.020	-
18	17543	35	30	-	250	-	1.0	-	<0.008	-
19	17544	180	130	-	225	-	1.5	-	<0.008	-
20	17545	160	10	-	130	-	2.0	-	<0.008	<0.008
21	17546	35	<5	-	100	-	<0.5	-	<0.008	-
22	17547	325	50	-	455	-	2.5	-	<0.008	-
23	17548	115	200	-	645	-	2.5	-	<0.008	-
24	17549	105	30	-	295	-	1.5	-	<0.008	-
25	17550	5	20	-	125	-	0.5	-	<0.008	-

Results in ppm unless otherwise specified.
 T = element present but concentration too low to measure
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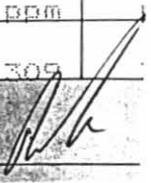
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TUBE No.	SAMPLE No.	Cu	Pb	Pb	Zn	Zn	Ag	Ag	Au	AuCh
1	17551	15	20	-	150	-	1.0	-	<0.008	
2	17552	135	20	-	170	-	<0.5	-	<0.008	
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23	DETECTION	5	5	25	5	25	0.5	2	0.008	0.1
24	UNITS	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
25	METHOD	101	101	104	101	104	101	104	309	

*Results in ppm unless otherwise specified
 T = element present; but concentration too low to measure
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 - = element not determined

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TUBE No.	SAMPLE No.	As	As	Ba	Ba					
G88		204.0.08.06727				15/01/90		11714		8 OF 14
1	17401	100	-	1100	-					
2	17402	>2500	1.53	710	-					
3	17403	160	-	870	-					
4	17404	45	-	1650	-					
5	17405	8	-	1100	-					
6	17406	8	-	1900	-					
7	17407	30	-	1100	-					
8	17408	20	-	890	-					
9	17409	5	-	690	-					
10	17410	10	-	780	-					
11	17411	2	-	660	-					
12	17412	15	-	1050	-					
13	17413	60	-	1750	-					
14	17414	<2	-	>2500	1.14					
15	17415	<2	-	1700	-					
16	17416	10	-	1100	-					
17	17417	20	-	1400	-					
18	17418	2	-	1200	-					
19	17419	<2	-	1250	-					
20	17420	230	-	1650	-					
21	17421	100	-	2000	-					
22	17422	20	-	1850	-					
23	17423	5	-	2000	-					
24	17424	300	-	2000	-					
25	17425	10	-	1850	-					

Results in ppm unless otherwise specified.
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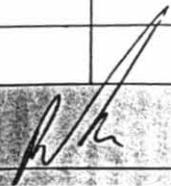
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TUBE No.	SAMPLE No.	As	As	Ba	Ba				
	009	204.0.08.06777		15/01/90		11714		9 OF 14	
1	17426	2	-	1600	-				
2	17427	2	-	1400	-				
3	17428	<2	-	1600	-				
4	17429	<2	-	1500	-				
5	17430	70	-	1750	-				
6	17431	8	-	1850	-				
7	17432	<2	-	1700	-				
8	17433	35	-	1150	-				
9	17434	<2	-	1750	-				
10	17435	<2	-	1950	-				
11	17436	4	-	2200	-				
12	17437	<2	-	>2500	0.32				
13	17438	8	-	2500	-				
14	17439	<2	-	1500	-				
15	17440	3	-	1300	-				
16	17441	70	-	1250	-				
17	17442	55	-	1250	-				
18	17443	<2	-	1250	-				
19	17444	3	-	1450	-				
20	17445	4	-	1300	-				
21	17446	2	-	1400	-				
22	17447	<2	-	1250	-				
23	17448	3	-	1400	-				
24	17449	2	-	1350	-				
25	17450	7	-	1250	-				

Results in ppm unless otherwise specified.
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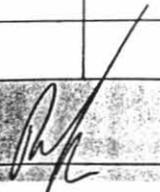
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TUBE No.	SAMPLE No.	As	As	Ba	Ba				
1	17451	15	-	1350	-				
2	17452	6	-	1200	-				
3	17453	<2	-	1100	-				
4	17454	6	-	1500	-				
5	17455	15	-	1450	-				
6	17456	5	-	1500	-				
7	17457	2	-	1400	-				
8	17458	4	-	1150	-				
9	17459	<2	-	1300	-				
10	17460	<2	-	1200	-				
11	17461	3	-	1250	-				
12	17462	5	-	1500	-				
13	17463	<2	-	1250	-				
14	17464	<2	-	1350	-				
15	17465	3	-	1200	-				
16	17466	4	-	1300	-				
17	17467	<2	-	1200	-				
18	17468	<2	-	1150	-				
19	17469	<2	-	1300	-				
20	17470	4	-	1350	-				
21	17471	<2	-	1250	-				
22	17472	<2	-	1000	-				
23	17473	15	-	980	-				
24	17474	<2	-	1050	-				
25	17475	<2	-	830	-				

Results in ppm unless otherwise specified
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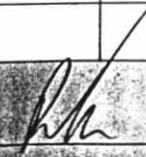
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TUBE No.	SAMPLE No.	As	As	Ba	Ba					
1	17476	9	-	750	-					
2	17477	<2	-	1000	-					
3	17478	<2	-	950	-					
4	17479	2	-	790	-					
5	17480	<2	-	1000	-					
6	17481	<2	-	820	-					
7	17482	45	-	870	-					
8	17483	20	-	900	-					
9	17484	2	-	1650	-					
10	17485	<2	-	940	-					
11	17486	<2	-	820	-					
12	17487	<2	-	820	-					
13	17488	<2	-	1050	-					
14	17489	<2	-	950	-					
15	17490	<2	-	780	-					
16	17491	6	-	650	-					
17	17492	<2	-	750	-					
18	17493	10	-	890	-					
19	17494	9	-	1100	-					
20	17495	<2	-	1050	-					
21	17496	<2	-	960	-					
22	17497	8	-	850	-					
23	17498	<2	-	860	-					
24	17499	<2	-	1050	-					
25	17500	-	-	-	-					

Results in ppm unless otherwise specified
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TUBE No.	SAMPLE No.	As	As	Ba	Ba					
										OF 12 OF 14
				204	0.08	06727	15/01/90	11714		
1	17501	<2	-	820	-					
2	17502	<2	-	820	-					
3	17503	<2	-	970	-					
4	17504	<2	-	760	-					
5	17505	<2	-	1900	-					
6	17506	<2	-	1200	-					
7	17507	<2	-	1050	-					
8	17508	<2	-	1050	-					
9	17509	<2	-	1000	-					
10	17510	<2	-	1200	-					
11	17511	<2	-	1150	-					
12	17512	<2	-	1100	-					
13	17513	<2	-	1150	-					
14	17514	<2	-	980	-					
15	17515	<2	-	1150	-					
16	17516	<2	-	1150	-					
17	17517	<2	-	1300	-					
18	17518	<2	-	1400	-					
19	17519	<2	-	1100	-					
20	17520	<2	-	1200	-					
21	17521	<2	-	1350	-					
22	17522	<2	-	1350	-					
23	17523	<2	-	1350	-					
24	17524	<2	-	1200	-					
25	17525	-	-	-	-					

Results in ppm unless otherwise specified
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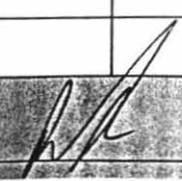
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TUBE No.	SAMPLE No.	As	As	Ba	Ba				
1	17526	2	-	920	-				
2	17527	3	-	1500	-				
3	17528	<2	-	1050	-				
4	17529	<2	-	1100	-				
5	17530	<2	-	1400	-				
6	17531	<2	-	1100	-				
7	17532	<2	-	1350	-				
8	17533	<2	-	1600	-				
9	17534	<2	-	1500	-				
10	17535	<2	-	1050	-				
11	17536	<2	-	1350	-				
12	17537	2	-	1200	-				
13	17538	<2	-	850	-				
14	17539	<2	-	820	-				
15	17540	<2	-	830	-				
16	17541	2	-	1700	-				
17	17542	10	-	2300	-				
18	17543	3	-	2400	-				
19	17544	<2	-	2150	-				
20	17545	<2	-	2300	-				
21	17546	2	-	2000	-				
22	17547	2	-	1200	-				
23	17548	<2	-	630	-				
24	17549	<2	-	1300	-				
25	17550	2	-	2300	-				

Results in ppm unless otherwise specified
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 X = element concentration is below detection limit
 - = element not determined

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TUBE No.	SAMPLE No.	As	As	Ba	Ba				
	074								
						204.0.08.06727	15/01/90	11714	14 OF 14
1	17551	<2	-	>2500	0.31				
2	17552	2	-	1950	-				
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23	DETECTION	2	0.01	10	0.01				
24	UNITS	ppm	%	ppm	%				
25	METHOD	401	404	401	403				

Results in ppm unless otherwise specified
 T = element present, but concentration too low to measure
 X = element concentration is below detection limit
 - = element not determined

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078

DRILL LOG SHEET

CONTINUATION SHEET

PROJECT	STERLING VALLEY	HOLE NAME	SVD 89-3
LOGGED BY	J. RANDALL	TOTAL DEPTH	364.2m

I	2	DISTANCE FROM COLLAR		Cu	Pb	Zn	Ag	Au	As	Ba	SAMPLE NO	CORE ANGLE	ROCK TYPE	DIAM	DESC CODE	GRAPHIC LOG	DESCRIPTIVE LOG
		TO TOP	TO BOTTOM														
SP		21.0	23.0								17411						Thin fine grained pink laminations at 19.4m.
		23.0	24.3								17412						
		24.3	26.0	55	400	5150	2.5			60	1750	17413					20.1-24.3. Strong sericite poor chlorite permic. minor chlorite developed down hole.
		26.0	28.0							42	1760	17414					Some silicification and elongate quartz boudins from 23.4-24.3.
		28.0	30.0									17415					Fine layering at 85° LCA.
		30.0	32.0									17416					
		32.0	34.0									17417					
		34.0	36.0									17418					
		36.0	38.0									17419					
		38.0	40.0									17420					24.3-28.4. Very strong sericite, mod silicification
		40.0	42.0									17421					T.S. in crystal rich (quartz + feldspar) fine grained
		42.0	44.0									17422					16626 ash. Weak quartz veining.
		44.0	46.0									17423					273m Minor veinlets and blebs sph + gn ± py from
		46.0	48.0									17424					24.3-31.8. Mod veinlets subparallel to layering.
		48.0	50.0									17425					Other sulphide in quartz veinlets.
		50.0	52.0									17426					
		52.0	54.0									17427					28.4-34.0. Strong sericite + silica in crystal
		54.0	56.0									17428					rich volcanoclastic.
		56.0	58.0									17429					Sharp contact 55° LCA.
		58.0	60.0									17430					
		60.0	62.0									17431					
		62.0	64.0									17432					34.0-140.0 MASSIVE FELDSPAR PHYRIC
		64.0	66.0									17433					DACTIC LAVA.
		66.0	68.0									17434					
SP		68.0	70.0									17435					34.0-37.4. Weakly feldspar phyric, moderate

SAMPLE NUMBER: 16226

SUMMARY:

This is a former quartz-feldspar-phyric rhyolitic lava or crystal tuff with strong foliation defined by bands of sericite.

SAMPLE NUMBER: 16630

SUMMARY:

This is a plagioclase-phyric dacitic lava that has suffered some chloritic alteration.

T.S.

16630

523m

56.2-56.4. Strong white quartz + pink K-spar veining.

61.3-62.0. Mod. silicification, broken core.

64.2-65.0. Mod. broken, strongly feldspar phyric.

Trace disseminated gal-py throughout.

67.4-69.0. Mod. layering in chloritic lava/clastic at 60° LCA.

523084

DRILL LOG SHEET

CONTINUATION SHEET

PROJECT	STERLING VALLEY	HOLE NAME	SVD 89-3
LOGGED BY	J. RANDELL	TOTAL DEPTH	364.2m.

S	DISTANCE FROM COLLAR		AS	BS	SAMPLE NO	CORE ANGLE	ROCK TYPE	DIAM	DESC CODE	GRAPHIC LOG	DESCRIPTIVE LOG
	TO TOP	TO BOTTOM									
518	70.0	72.0			174436						72.1-73. Weak K-spar alteration.
	72.0	74.0	K2	3200	174437						
	74.0	76.0			174438						78.0-79.5. Mod. chloritic, vague layering.
	76.0	78.0			174439						
	78.0	80.0			174440						80.8-82.1. Mod. broken core.
	80.0	82.0			174441						
	82.0	84.0			174442						86.4-87.2. 2-5% Stringer pyrite in silicified lava.
	84.0	86.0			174443						
	86.0	88.0			174444						92.6-93.3. Irregular 2-4% stringer pyrite.
	88.0	90.0			174445						
	90.0	92.0			174446						96.5. 10cm bleached lava + 2-4% stringer pyrite.
	92.0	94.0			174447						
	94.0	96.0			174448						98.5-99.4. Strongly broken core.
	96.0	98.0			174449						
	98.0	100.0			174450						99.8-100.0. Strongly silicified + bleached + 5-7% dissemin. pyrite.
	100.0	102.0			174451						
	102.0	104.0			174452						
	104.0	106.0			174453						101.3-102.6. Irregular mod. K-spar alteration.
	106.0	108.0			174454						
	108.0	110.0			174455						106.3-106.5. Strong silica + K-spar alteration.
	110.0	112.0			174456						
	112.0	114.0			174457						
	114.0	116.0			174458						109.4-110.5. Intensely K-spar + silica altered.
	116.0	118.0			174459						
	118.0	120.0			174460						112.1-113.5. Irreg. thick zones of quartz (carb) veins.
	120.0	122.0			174461						
	122.0	124.0			174462						
	124.0	126.0			174463						118.2-118.4. Intensely broken core.
	126.0	128.0			174464						- 119.2. Strong quartz-filled K-spar veins.
	128.0	130.0			174465						- 120.7. Mod. strong zones of K-spar + silica alter.
	130.0	132.0			174466						- 122.1. In lens pink K-spar + silica alteration.
519	132.0	134.0			174467						
518	134.0	136.0			174468						122.4-123.0. Strongly broken, strongly K-spar alteration some quartz veining.
											Rare specks pyrite throughout core.
											125.5-126.3. Mod. broken core.
											127.4-128.9. Mod. broken core.
											128.9-130.7. SHEAR ZONE. Intensely broken core. Some quartz + fluorite veining, strongly bleached + silicified.
											130.7-135.4. Mod. strong broken core, mod. chloritic, minor zones of mod. K-spar alteration.

ASSAY INFORMATION

523055

078

DISTANCE FROM COLLAR		Cu	Pb	Zn	Ag	Au	As	Ba	SAMPLE NO	CORE ANGLE	ROCK TYPE	DMM	DESC CODE	GRAPHIC LOG	DESCRIPTIVE LOG
TO TOP	TO BOTTOM														
SP	136.0								17469						137.2-138.1. Mod. broken cor.
	138.0								17470						138.1-140.0. Weak-mod. broken.
	140.0								17471						Contact quite sharp at 60° LCA.
	142.0								17472						140.0-218.5 // MEDIUM GRAINED FELDSPAR + QUARTZ PHYRIC SERICITIC FELSIC VOLCANICLASTIC.
	144.0								17473						T.S. 140.0-143.9. Mod. broken cor, well layered 16640 at 65-70° LCA.
	146.0								17474						141.3m
	148.0								17475						143.4. 2mm. ven sph gal.
	150.0								17476						143.9-147.8. Strong to intensely broken cor. Trace pyric + gal-sph.
	152.0								17477						147.8-150.2. Strongly broken cor.
	154.0								17478						149.5-151.2. Very strong pumiceous and sericitic. Trace dissem. gal.
	156.0								17479						T.S. 151.5-156.4 Weak to mod. layering 65-70° LCA, 16642 poorly feldspar phyric, strongly sericitic, mod. 152.2m silicified.
	158.0								17480						158.0-159. Puggy clayey zone in fractured volcaniclastics.
	160.0								17481						159.8-160. 2mm vented sph(gal) + trace blebs gal.
	162.0								17482						160.7. 1mm vented sph-(gal)
	164.0								17483						159-166.2. Moderately sericitic + weakly silicified generally massive some layered zones defined by wispy thin chlorite 70° LCA.
	166.0								17484						165.6-165.8. Rare thin 1mm vented sph-phy
SP	168.0		2525	2310	3.0	0.068			17485						166.2-168.2. Fine grained strongly sericitic + silicified, feldspar phyric.
															168.2-170.2. Irregular subrounded silicified boundaries in weakly chloritic matrix. Some crystal rich zones and silica rich zones.
															168.8. 1mm vented sph.

SAMPLE NUMBER: 16640

SUMMARY:

This is a weakly foliated crystal-lithic tuff dominated by fragments of glassy quartz+felspar-phyric rhyolitic lava, and discrete quartz and felspar crystals and crystal fragments.

SAMPLE NUMBER: 16642

SUMMARY:

This rock was a formerly glassy quartz+felspar-phyric rhyolitic or rhyodacitic lava that has a weak sericitic+calcite-defined foliation, and strong calcite overprinting.

ASSAY INFORMATION

523036

DRILL LOG SHEET

CONTINUATION SHEET

079

DEPTH (m)	DISTANCE FROM COLLAR		Cu	Pb	Zn	Ag	Au	As	Ba	SAMPLE NO	CORE ANGLE	ROCK TYPE	DIAM	DESC CODE	GRAPHIC LOG	DESCRIPTIVE LOG	
	TO TOP	TO BOTTOM															
170.0	170.0	172.0								17486						170.1-170.2. 5 x 1mm veinlets gal-sph (py).	
172.0	172.0	174.0								17487							
174.0	174.0	176.0								17488							170.2-175.5. Irregular strong zones of K-spar alteration in silicified crystal rich vicinity.
176.0	176.0	178.0								17489							
178.0	178.0	180.0								17490							170.0. 0.5mm veinlet sph.
180.0	180.0	182.0								17491							
182.0	182.0	184.0								17492							
184.0	184.0	186.0								17493							Minor quartz physis component throughout. From 175.5, definite quartz + feldspar physis.
186.0	186.0	188.0								17494							
188.0	188.0	190.0								17495							175.5-178.7. Weak K-spar alteration.
190.0	190.0	192.0								17496							
192.0	192.0	194.0	20	1525	2100	1.5	0.045			17497							
194.0	194.0	196.0	20	755	2700	2.0	0.014			17498							178.7-184.3. Mod. fine layering 65-70° LCA, strongly sericitic.
196.0	196.0	198.0								17499							
198.0	198.0	200.0								17500							
200.0	200.0	202.0								17501							179.2. 1.5cm blob sph.
202.0	202.0	204.0								17502							
204.0	204.0	206.0								17503							
206.0	206.0	208.0								17504							184.3-189.8. Moderate irregular K-spar in irregular crystal rich + spar zones. Some silicified.
208.0	208.0	210.0								17505							
210.0	210.0	212.0								17506							
212.0	212.0	214.0								17507							189.8-190.1. White massive quartz. Upper contact sharp at 75° LCA.
214.0	214.0	216.0								17508							
216.0	216.0	218.0								17509							190.1-196.2. Weak to moderately irregular K-spar, variable layering 75° LCA. Unit appears to be lava-like in place.
																	192.5. blobs gal-(py).
																	194.9. " sph-gal.
																	195.7-195.9. Irregular boudin quartz.
																	196.2-201.0. Weak to moderate crystal portions feldspar + quartz physis. Weakly chloritic. Some fine layering 65° LCA.
																	201.0-204.6. Weak to moderate K-spar, some quartz physis volcanic.
																	T.S. 204.6-208.4. Strongly quartz physis + feldspar physis, fine layering. 70° LCA. Weak K-spar.
																	208.4-211.4. Moderately chloritic strongly silicified, fine grained well layered 65° LCA.
																	211.4-218.4. Weak K-spar. Fine grained well layered. Moderately quartz physis. Seems to be gradual change to more uniform vit to, little evidence for clastic texture. Becoming more lava like.

SAMPLE NUMBER: 16648

SUMMARY:

This is a foliated formerly glassy quartz + feldspar-physis crystal-lithic tuff of rhyolitic to rhyodacitic composition, with strong sericite-calcite alteration accompanying foliation development.

T.S. 204.6-208.4. Strongly quartz physis + feldspar physis, fine layering. 70° LCA. Weak K-spar.

208.4-211.4. Moderately chloritic strongly silicified, fine grained well layered 65° LCA.

211.4-218.4. Weak K-spar. Fine grained well layered. Moderately quartz physis. Seems to be gradual change to more uniform vit to, little evidence for clastic texture. Becoming more lava like.

ASBAY INFORMATION

523057

DRILL LOG SHEET

030

CONTINUATION SHEET

L	E	DISTANCE FROM COLLAR		Cu	Pb	Zn	Ag	Au	As	Ba	SAMPLE NO	CORE ANGLE	ROCK TYPE	DIAM	DESC CODE	GRAPHIC LOG	DESCRIPTIVE LOG
		TO TOP	TO BOTTOM														
17510	218.0	220.0									17510						218.5-248.2 // QUARTZ FELDSPAR PHYRIC RHYODACITIC LAVA.
17511	220.0	222.0									17511						
17512	222.0	224.0									17512						
17513	224.0	226.0									17513						
17514	226.0	228.0									17514						T.S. Variable K-spar, weak to moderate. Some
17515	228.0	230.0									17515						16651 layered rocks, medium grained phytic component
17516	230.0	232.0									17516						220m quite consistent, often massive. Moderate
17517	232.0	234.0									17517						silicification. Minor zones of chloritic
17518	234.0	236.0									17518						pyrite.
17519	236.0	238.0									17519						229-232. Quartz + feldspar phytic becoming
17520	238.0	240.0									17520						finer grained.
17521	240.0	242.0									17521						Vague layering 70° LCA.
17522	242.0	244.0									17522						
17523	244.0	246.0									17523						235-1. Several m. grained py xstals.
17524	246.0	248.0									17524						
17525	248.0	250.0									17525						241-242.4. In situ albitization + silicification.
17526	250.0	252.0									17526						
17527	252.0	254.0									17527						248.2-251.3 // WHITE QUARTZ VEIN.
17528	254.0	256.0									17528						Upper contact diffuse over 10cm.
17529	256.0	258.0									17529						Overall composition 80% quartz, 10% K-spar,
17530	258.0	260.0									17530						10% volcanics.
17531	260.0	262.0									17531						
17532	262.0	264.0									17532						
17533	264.0	266.0	2860	55	215	5.0	0.0	0.11			17533						251.3-272.5 // QUARTZ + FELDSPAR PHYRIC
17534	266.0	268.0									17534						ALTERED RHYODACITIC LAVA.
17535	268.0	270.0									17535						
17536	270.0	272.0									17536						Irregular distribution K-spar, massive, consistent
17537	272.0	274.0									17537						quartz + feldspar phytic.
17538	274.0	276.0									17538						
																	253-254.9. Weak K-spar alteration, some
																	thin chloritic veins. Some chlor banding.
																	261.6-262.8. Strong silica, weak K-spar
																	chlor banded.
																	264.0. 5mm veinlets by Gg
																	264.6-264.8. 70% white quartz, irregular veins.
																	265.0. 3cm. 20% by Gg stringers.
																	271.3-272.5. 40% quartz-carbonate-K-spar
																	veins, quite irregular.
																	272.5-280.3 // SILICIFIED (+SERICITIC) RHYODACITIC LAVA WITH TRUFF.
																	T.S.
																	16657 272.5-276. Mod. layered 65° LCA, strong
																	275m quartz-feldspar phytic component, some K-spar

ASSAY INFORMATION

SAMPLE NUMBER: 16651
SUMMARY:
This sample was probably a quartz+feldspar-phyric rhyolitic or rhyodacitic lava.

SAMPLE NUMBER: 16657
SUMMARY:
This is a weakly foliated, formerly glassy quartz+feldspar-phyric lava of rhyolitic or rhyodacitic composition.

523038

081

DRILL LOG SHEET

CONTINUATION SHEET

PROJECT	STORLING VALLEY	HOLE NAME	SVD 89-3
LOGGED BY	J. RANDEL	TOTAL DEPTH	364.2 m.

I	E	DISTANCE FROM COLLAR		Cu	Pb	Zn	Ag	Au	As	Ba	SAMPLE NO	CORE ANGLE	ROCK TYPE	DIAM	DESC CODE	GRAPHIC LOG	DESCRIPTIVE LOG
		TO TOP	TO BOTTOM														
SA		276.0	278.0								17539						7 silica alteration. Some chlorite zones. Strong sericite towards 276 m.
SA		278.0	280.0								17540						276-278.4. Fine grained sericite with sil. Fine quartz physis.
																	276.4-278.2. Chlorite-sericite zone silification.
																	278.2-279.2. Strong sericite, fine layering and fine grained calc. Dominantly quartz physis.
																	279.2-280.3. Strong feldspar physis, chlorite poor layering.
																	280.3-334.1 // SILICIFIED CHLORITIC RHYOLITIC-RHYODALCIC LAVAS
																	Contains gradational. Strongly silicified, poorly feldspar (+ quartz) physis, generally massive. Abundant fine chlorite network veinlets. Some flow banding.
																	282.1-282.3. Trace blebs Py Gg.
																	285.7-287.4. Fine grained basaltic dyke + remnant chlorite thin. Perhaps this is mostly intense alteration.
SA		294.0	296.0								17541						296.9-297.0. Trace stringer Py (Gg)
SA		296.0	298.0	4.150	75	400	5.5	0.020			17542						297.3-297.4. Up to 10% stringer Gg Py.
SA		298.0	300.0								17543						299.3-300.9. Intense K-spar in strongly quartz veined volcanics
																	304.5-305.9. Mod. to strongly broken calc. Minor quartz-calc. veinlets
																	307.2-310.8. Fine grained volcanics massive strongly silicified, chloritic + weak K-spar. Minor physis component.
																	310.8-311.8. Weak - strongly broken calc.
																	313.1-313.8. Strongly bleached, silicified with fine chlorite veinlets.
																	314.5-314.7. 80% white quartz.

ASBAT INFORMATION

523039

SHEMET SYSTEM
METRIC
DECIMAL POINTS AS REQUIRED

082

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

PROJECT *STERLING VALLEY* HOLE NAME *SYD 89-3*
LOGGED BY *J. RANDALL* TOTAL DEPTH *364.2 m.*

L	I	DISTANCE FROM COLLAR		SAMPLE NO	CORE ANGLE	ROCK TYPE	DIAM	DESC CODE	GRAPHIC LOG	DESCRIPTIVE LOG
		TO TOP	TO BOTTOM							
SP		316.0	318.0	17514						317.9-318.0. Trace Gpy.
SP		318.0	320.0	17515						321.8-325.9. Very strongly broken core, mod. chlorite.
										325.9-331.0. Irregular phytic component, mod. chlorite often silicified. Irregular patches and zones of K-spar alteration.
										331.0-334.1. As above but increasing sericite alteration, vague flow banding. Increasing chlorite towards bottom.
SP		332.0	334.0	17546						334.1-339.1 // FINE GRAINED FISSILE CHLORITIC ALTERATION ZONE. Contact sharp 85° LCA. Abundant to strongly broken core, trace 875° LCA. No obvious bedding but fairly consistent layering. Fracture-carbonate borders that sub-parallel veins. Rare phytic laminae at 337.4. Gradually increasing silicification from 337m. Sharp lower contact at 60° LCA.
SP		334.0	336.0	17547						
SP		336.0	338.0	17548						
SP		338.0	340.0	17549						
										339.1-364.2 // MASSIVE SILICIFIED CHLORITIC K-SPAR ALTERED RHYODAKITIC LAVA
										Generally massive, irregular zones of K-spar and chlorite in strongly silicified lava.
										339.9-341.1. Strong K-spar + irregular quartz veins.
										341.9-344.1. Strong but irregular zones of chlorite.
SP		346.0	348.0	17550						348.4. Small zone of magnetite veinlets
SP		348.0	350.0	17551						349.9-350.0. Scarcely visible Gpy.
SP		350.0	352.0	17552						350.2-364.2. Strongly silicified massive, weakly to non-phytic abundant chlorite + K-spar.
										E.O.H. 364.2 m.

100% CORE RECOVERY IN ENTIRE LOG

523090

9108

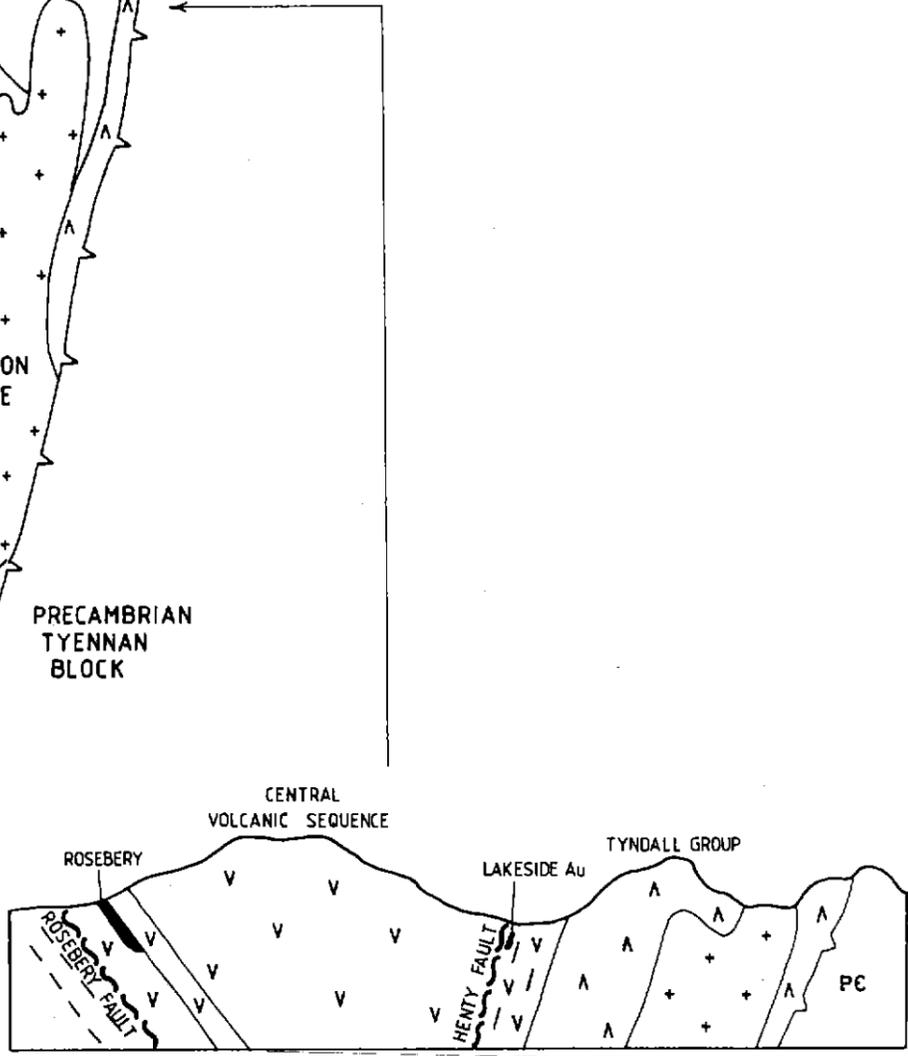
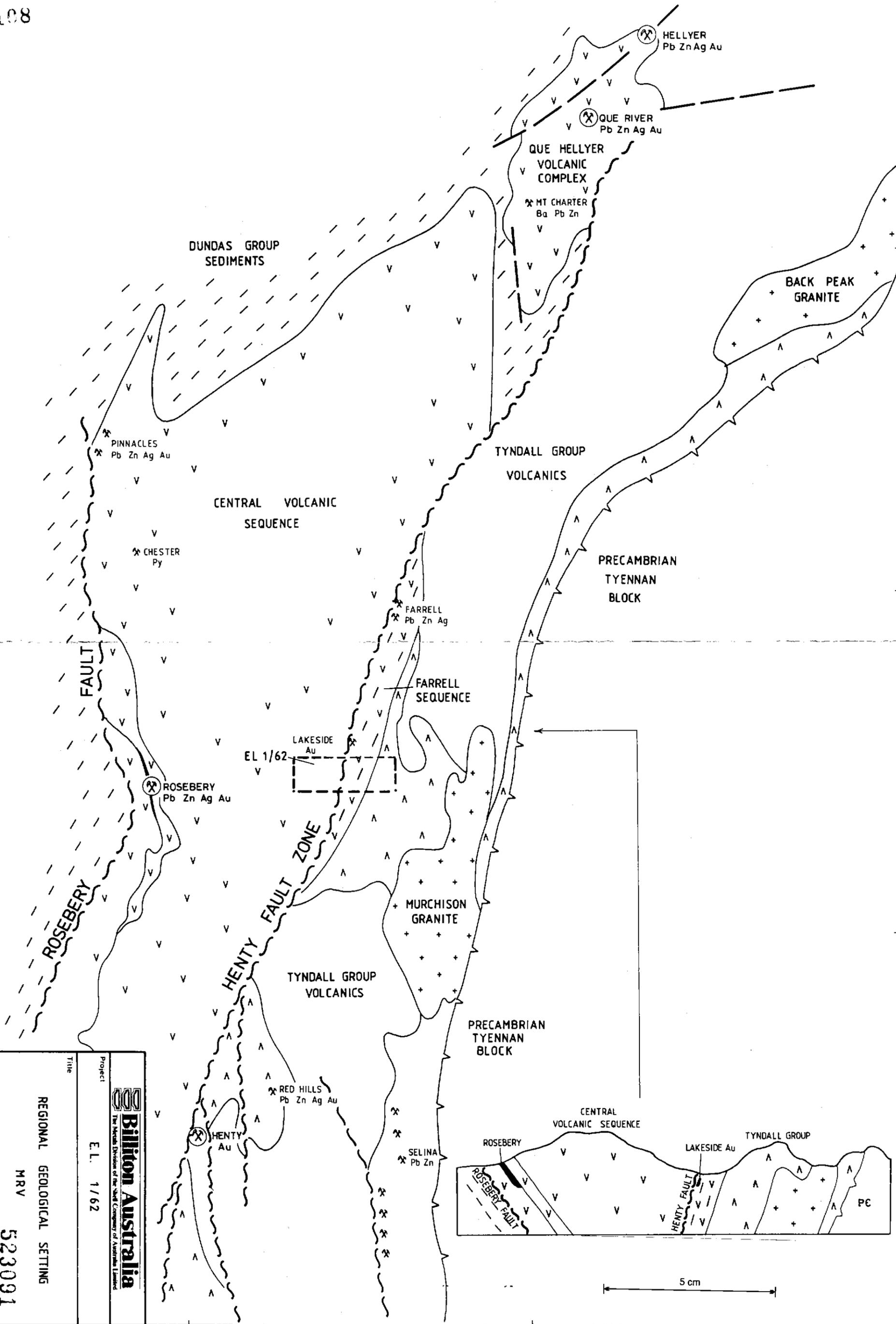
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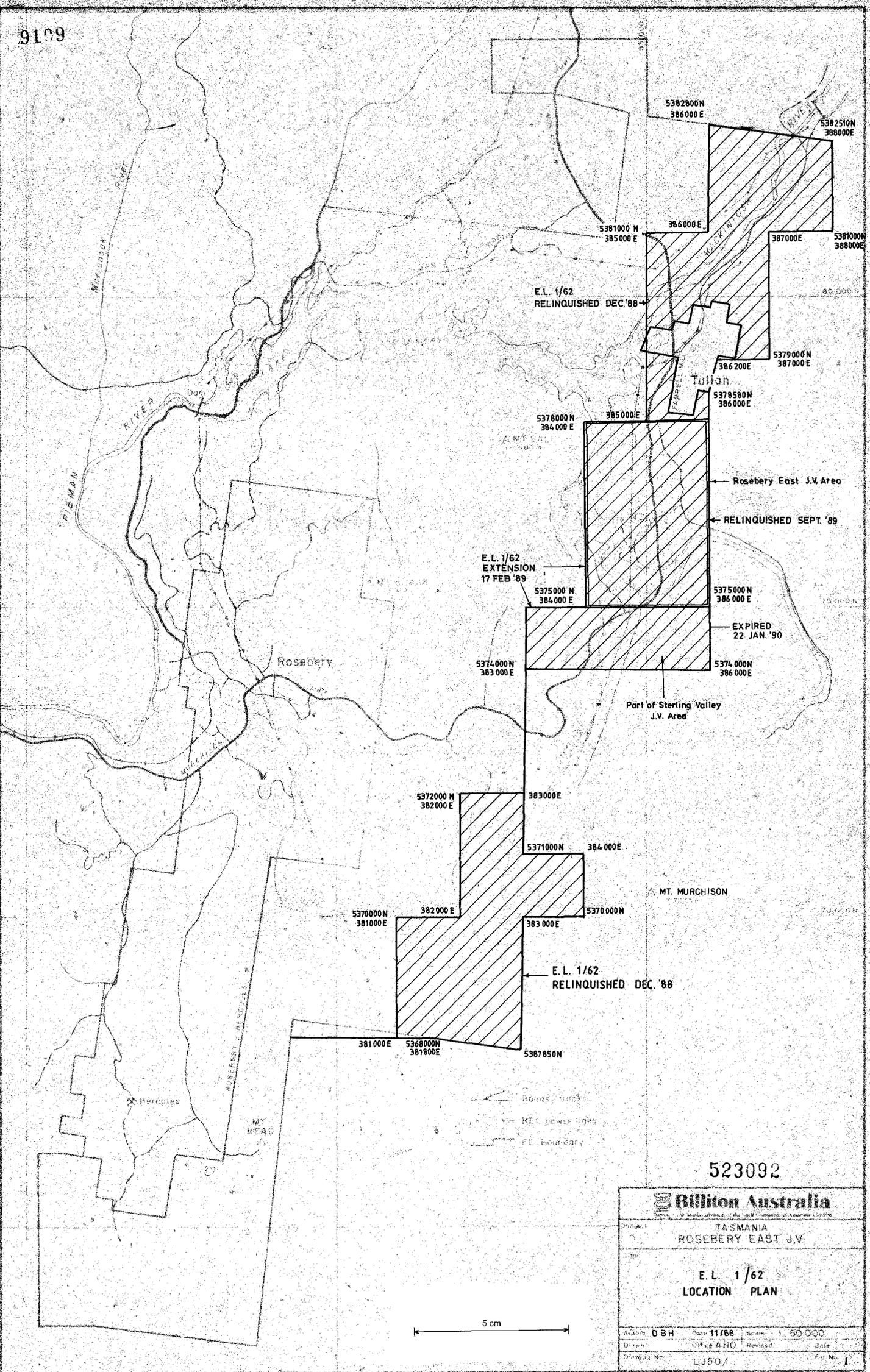
390 000 N

380 000 N

370 000 N



<p>Bilton Australia The Metals Division of the Steel Company of Australia Limited</p>	
Project	E.L. 1/62
Title	REGIONAL GEOLOGICAL SETTING
Author	JPR Date 3/89
Drawn	OH Office TAS
Drawing No.	D / LJ 50 / 047
Scale	1 : 100 000
Revised	
Date	
Fig. No.	2
<p>MRV</p> <p>523091</p>	

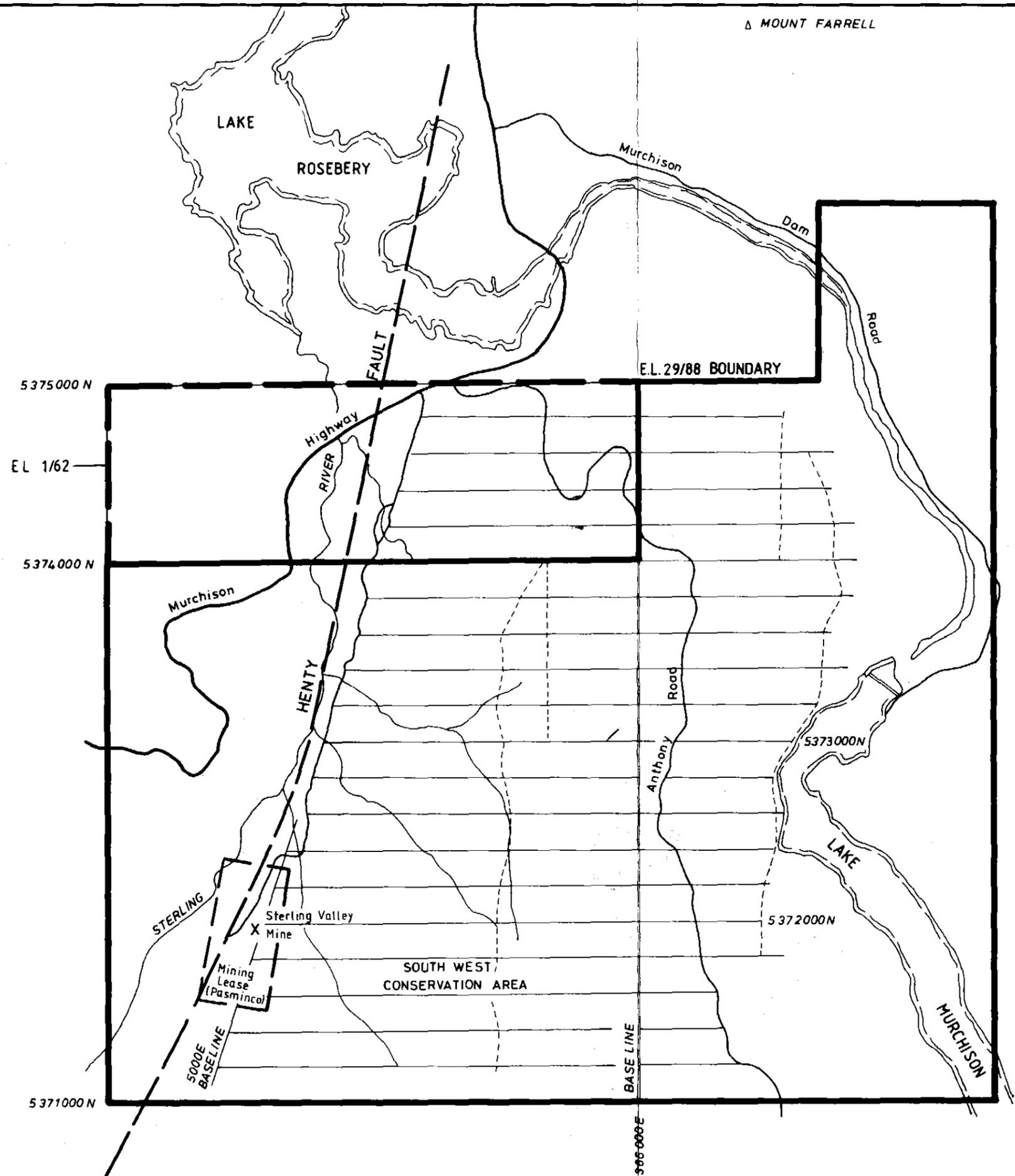


523092

Billion Australia			
TASMANIA ROSEBERY EAST J.V.			
E.L. 1/62 LOCATION PLAN			
Author: DBH	Date: 11/88	Scale: 1:50,000	
Drawn: Office AHO	Revised:	Site:	
Drawing No: L050/			

5 cm

9110



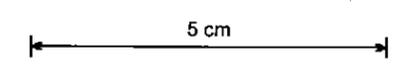
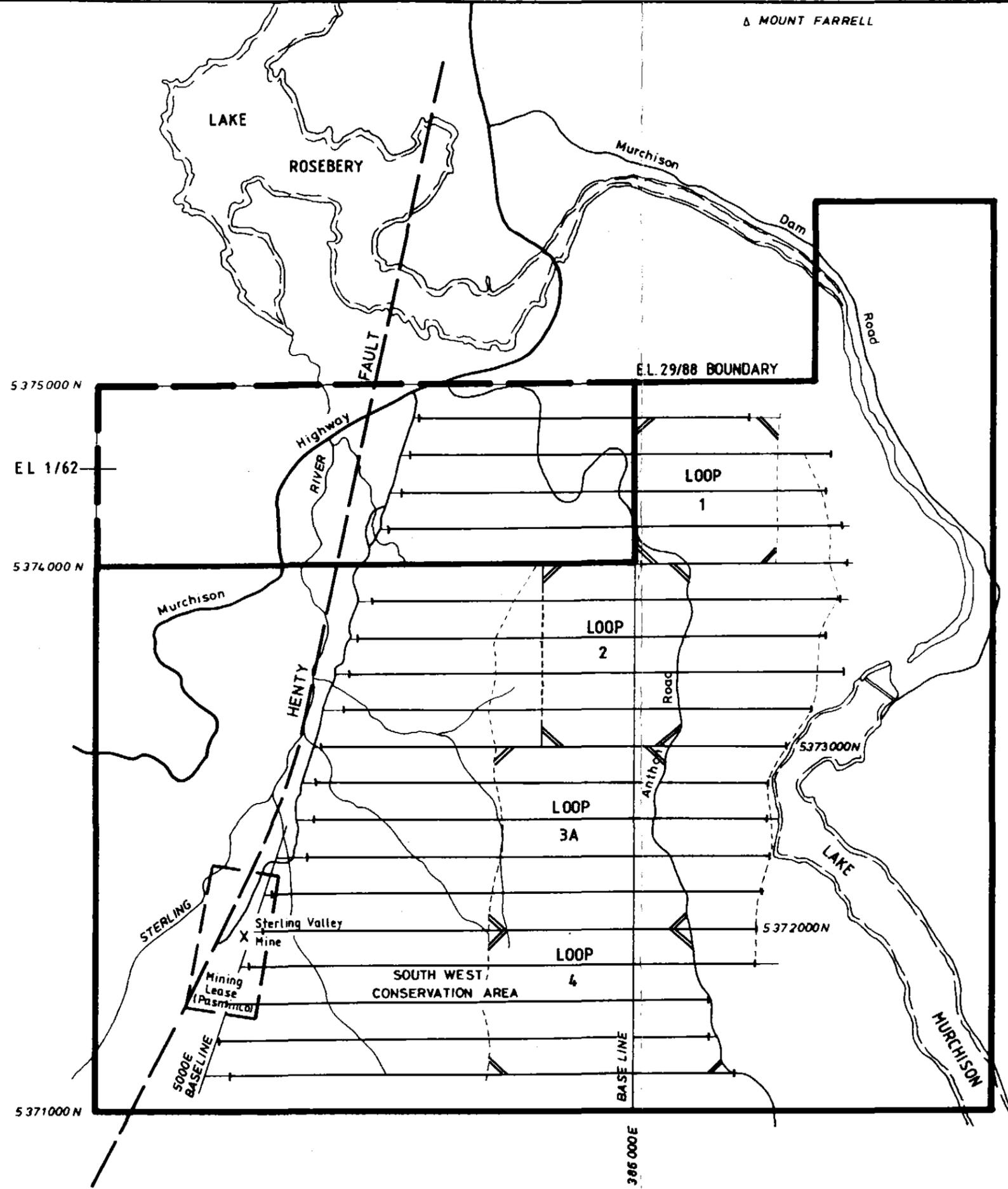
Walking track (Loop access)
 Grid Line

523093

5 cm

 The Metals Division of the Shell Company of Australia Limited			
Project		STERLING VALLEY J.V.	
Title		LOCATION OF GRID	
Author	JPR	Date	8/89
Scale	1:25000		
Drawn	OH	Office	TAS
Revised	Date		
Drawing No.			Fig No 3

9112



- Walking track (Loop access)
- Grid Line
- UTEM coverage
- Loop edge

523095

Billiton Australia <small>The Murch Division of the Shell Company of Australia Limited</small>			
Project STERLING VALLEY J.V.			
Title LOCATION OF GRID AND UTEM LOOP LAYOUT / COVERAGE			
Author	JPR	Date	8/89
Scale	1:25000		
Drawn	OH	Office	TAS
Revised		Date	
Drawing No.		Fig. No.	5

▲ MOUNT MURCHISON

9113

375 000 N

MURCHISON HIGHWAY

ANTHONY ROAD

E.L. 1/62

E.L. 29/88

STERLING VALLEY POWERLINE TRACK

FARRELL SHALES SILTS SANDS

MAJOR VOLCANICLASTIC-EPICLASTIC HORIZON

SVD 89-3

UTEM

0.2 Au
1.57% As
3.57% Zn
0.45% Pb

DONOGHUES
14.1% Zn
11.7% Pb

1580 Pb
2700 Ba
520 Zn

0.14 Au

2.4% Zn
300 Pb
32 Ag
490 Cu

330 Cu
690 Zn
20 Ag
4300 Pb

QUARTZ FELDSPAR PHYRIC RHYODACITIC LAVA

RHYOLITIC LAVAS

MIDSONS

QUARTZ PHYRIC RHYOLITIC LAVAS

QUARTZ FELDSPAR PHYRIC RHYODACITIC LAVAS

0.16 Au

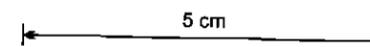
UTEM

E.L. 1/62

E.L. 29/88

MACES

MAJOR LINEARS (FAULTS)



x Rock chip sample and result



374 000 N

385 000 E

386 000 E

523096

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The Metals Division of the Shell Company of Australia Limited

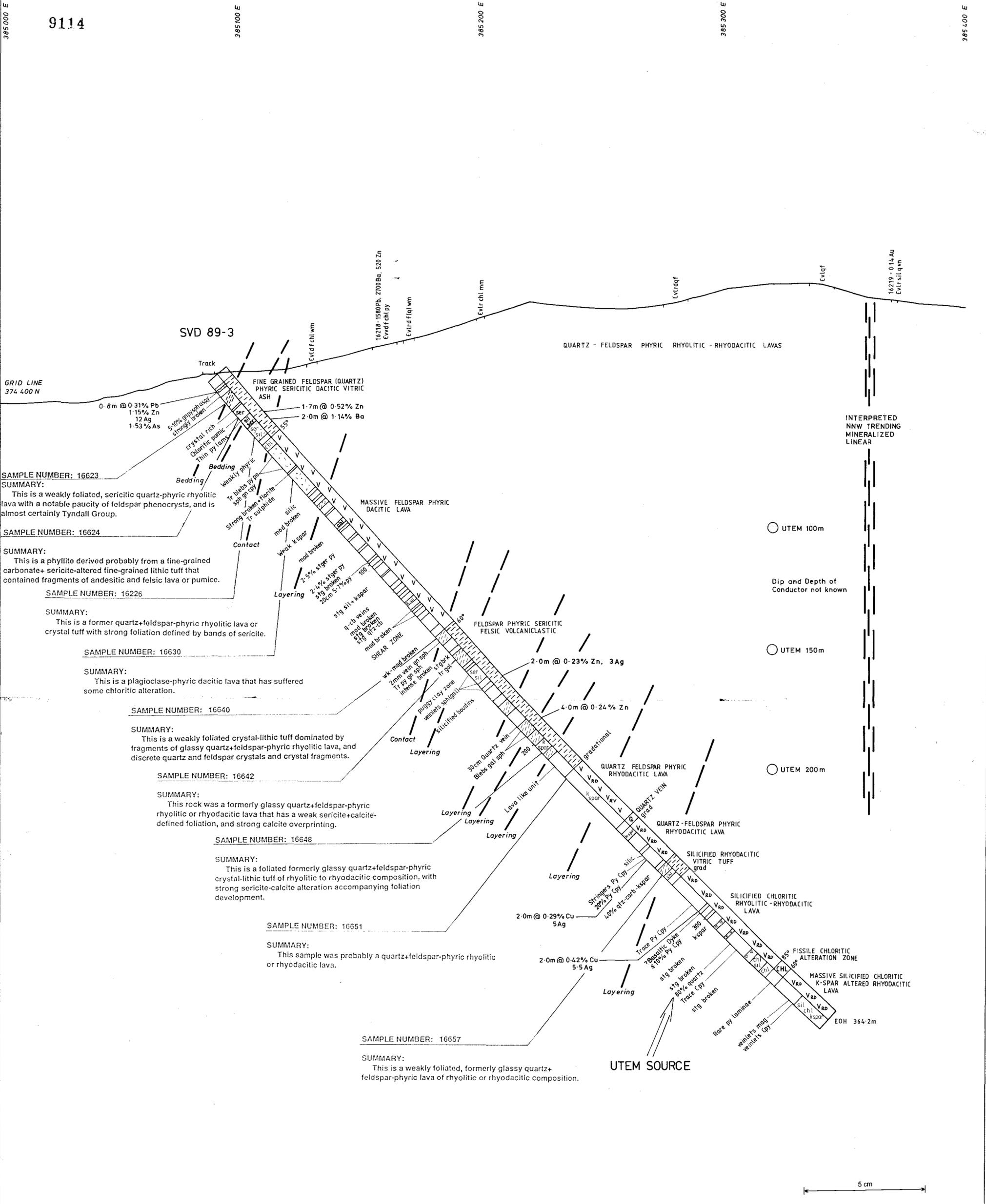
Project E.L. 1/62

Title
GEOLOGICAL SETTING
SVD 89-3

Author JPR Date 9/89 Scale 1:5000

Drawn OH Office TAS Revised Date

Drawing No. D/LJ 70/016 Fig No 6



GRID LINE
374 400 N

SAMPLE NUMBER: 16623

SUMMARY:
This is a weakly foliated, sericitic quartz-phyric rhyolitic lava with a notable paucity of feldspar phenocrysts, and is almost certainly Tyndall Group.

SAMPLE NUMBER: 16624

SUMMARY:
This is a phyllite derived probably from a fine-grained carbonate+ sericite-altered fine-grained lithic tuff that contained fragments of andesitic and felsic lava or pumice.

SAMPLE NUMBER: 16226

SUMMARY:
This is a former quartz+felspar-phyric rhyolitic lava or crystal tuff with strong foliation defined by bands of sericite.

SAMPLE NUMBER: 16630

SUMMARY:
This is a plagioclase-phyric dacitic lava that has suffered some chloritic alteration.

SAMPLE NUMBER: 16640

SUMMARY:
This is a weakly foliated crystal-lithic tuff dominated by fragments of glassy quartz+felspar-phyric rhyolitic lava, and discrete quartz and feldspar crystals and crystal fragments.

SAMPLE NUMBER: 16642

SUMMARY:
This rock was a formerly glassy quartz+felspar-phyric rhyolitic or rhyodacitic lava that has a weak sericite+calcite-defined foliation, and strong calcite overprinting.

SAMPLE NUMBER: 16648

SUMMARY:
This is a foliated formerly glassy quartz+felspar-phyric crystal-lithic tuff of rhyolitic to rhyodacitic composition, with strong sericite-calcite alteration accompanying foliation development.

SAMPLE NUMBER: 16651

SUMMARY:
This sample was probably a quartz+felspar-phyric rhyolitic or rhyodacitic lava.

SAMPLE NUMBER: 16657

SUMMARY:
This is a weakly foliated, formerly glassy quartz+felspar-phyric lava of rhyolitic or rhyodacitic composition.

UTEM 100m

Dip and Depth of Conductor not known

UTEM 150m

UTEM 200m

UTEM SOURCE

INTERPRETED
NNW TRENDING
MINERALIZED
LINEAR

5 cm

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Project STERLING VALLEY			
Title DIAMOND DRILL SECTION SVD 89-3			
Author	JPR	Dept. TAS	Scale 1:1000
Drawn	OH	Date 2/90	Revised Date
Checked		Date	S'ceded Date
Sheet No.	FIG. 7	Drawing No.	

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