ANNUAL REPORT

EXPLORATION LICENCES 2/70 AND 15/73

MACKINTOSH AND HATFIELD

TASMANIA

For 12 months ending June 1, 1977.

Abminco Exploration Division

C.H.Young

Geologist.

2nd August, 1977.

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SUMMARY

This report describes the exploration programme carried out over the adjoining Hatfield and Mackintosh licences during the period June 30, 1976 to June 1,1977. Reporting for the two licence areas was combined because the boundary between the two virtually bisects a single project area.

The exploration programme included detailed and regional geological mapping, gridding, soil geochemical sampling, IP, trenching and diamond drilling. A review of the results of exploration on the licence areas was also completed.

Regional and grid mapping is substantially complete. The gross stratigraphy is now well defined, although detailed stratigraphy and structure are still obscure.

No first order soil geochemical or I.P. anomalies were delineated although improved definition of anomalies located by previous reconnaissance work was achieved.

Two trenches were cut by backhoe to expose the andesite/shale contact and six trenches were cut by bulldozer to expose bedrock underlying some of the more significant soil anomalies. Assay results for the bulldozer trench samples are not yet available.

Two diamond drill holes tested the conceptually attractive black shale - andesite contact near the Murchison Highway. Disseminated pyrite and trace base metal mineralisation was noted.

A continuing programme of exploration including detailed geological mapping, soil geochemistry and I.P. is being pursued.

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INTRODUCTION

Tenure

Hatfield River Exploration Licence 15/73 is held by Cominco Exploration Pty.Ltd, on behalf of the Abex Joint Venture. Licence expiry date is 25/6/77 and the licence may be renewed at six monthly intervals. E.L. 15/73 is partly over private land (Owner: Associated Forest Holdings Pty.Ltd.) A.F.H. have a timber concession covering E.L. 15/73.

Mackintosh River Exploration Licence 2/70 is held by Aberfoyle Tin N.L. Work is managed by Abminco N.L. Exploration Division. The licence is subject of a joint venture between Abminco N.L. and Paringa Mining and Exploration Co.Ltd. Current equities are Paringa 10% Cominco Ltd 27% and Abminco N.L. 63%. The licence expires on 30/6/77. It may be renewed at six monthly intervals.

WORK PROGRAMME

Review of previous exploration

A summary review of the results of exploration on the Mackintosh and Hatfield licence areas was completed.

The review assessed the exploration technique used over the licence areas and outlined a number of areas requiring further detailed work.

These areas are:-

1. Soil anomalies Nos. 11 and 12 (Plate QR 100 in text) overlying andesite-dacite stratigraphy in the area located approximately 1-2 km NE of the Que River ore lenses.
2. Soil anomaly No. 5 overlying andesite-dacite stratigraphy in the "Old Mill Site" area.
3. Soil anomalies Nos. 6,7,9 and 10 overlying andesitic rocks.
4. Soil anomaly No. 8 overlying andesite and altered mineralised dacitic volcanics at Mt.Charter.
5. Anomalous stream sediment values in two creeks located immediately south of the highest point on the Murchison Highway.

Survey

Dense rainforest vegetation in the licence areas necessitates the use of cut lines for access and routine exploration. Gridding along cut lines at 50 m intervals has thus been an on-going programme since the initial ground EM evaluation of anomaly 8 (Que River). The grid now covers an area of approximately 32.0 sq.km. and is made up as follows:-

Baselines	Length Metres
3500E	1400
3700E	2100
4000E	1400
4200E	3000
4300E	700
4500E	600
4700E	1350
5300E	4900
5500E	1400
6050E	400
6300E	200
6950E	1000
7000E	600
7300E	1150
	20,200 m
Cross lines	128,400 m
TOTAL	148,600 m

Compass and Chain survey with clinometer control for slope corrections was used throughout to extend earlier stadia gridding.

During the past year 13,700 metres of new line was cut and pegged in the Hatfield licence. The andesite-shale contact is now covered by 200 m spaced lines, and extensions were added in the Mt.Charter south area.

In the Mackintosh licence 13,650 metres of line cutting and pegging was completed, over the andesite-shale contact north-west of the Que River Leases and extensions were added to the reconnaissance lines extending

south-east of Mt.Charter into the Southwell River valley.

Geological Mapping

Using 1:25,000 scale aerial photographs, grid lines and creek sections, field mapping was plotted at 1:2,500 scale and compiled at 1:10,000 scale (Plates QR 61, A,B,D.). Hand specimens were systematically collected and thin sections prepared as required. Geological mapping of the greater part of the Mackintosh west and Hatfield licences was completed. Approximately 26 line kilometres of grid and 6 km of creek section were mapped.

14 rock samples were thin sectioned and described by consulting petrologists with check examinations by Abminco staff. Reports are appended (B).

Soil Geochemistry

During the past year 966 "C" horizon soil samples were collected from the Hatfield Licence and 664 from the Mackintosh Licence by screw augering to depths of 150 cm, at 10 m or 20 m intervals on grid lines. After drying and sieving to minus 80 mesh, 5 gram samples were digested in perchloric acid and analysed by AAS for Cu,Pb,Zn.

Data are now being compiled for computer processing. It is expected this will allow rapid checking for compilation errors, ready geographical identification of anomalous values and improved statistical treatment of data.

For computer purposes the geochemical data is classified according to the rock groups:-

Name	Code	Rock Number
Andesite	AP	1
Pyritic dacitic volcanics	PDP	2
Que River Beds (Shales and Sandstones)	QRS	3
Upper Rhyolitic - Dacitic Volcanics	RDV	4
Eastern Shales and Sandstones "Farrell Slates"	FS	5
Dolerite (Jurassic?)	DOL	6
Dacitic Volcanics (Within Andesite Suite)	DV	7
Eastern Volcanics("Farrell Slate Group")	FV	8
Ordovician Sediments and Quaternary alluvium	Qa	9

The review of the results of exploration on the licence areas has shown low order soil anomalies to overlie Cambrian acid volcanics in the Mackintosh east area. Five of the original Paringa grid lines have been resampled at 50 ft. intervals and the existing data confirmed - Skey (1974).

Geophysics

The geophysical programme was confined to the I.P. technique, both in reconnaissance and detail work. After orientation surveys with several techniques at Que River, I.P. was shown to be the only geophysical technique that could detect and delineate all the Que River ore bodies.

In the past year 3,800 m of detailed (25 metre dipole) I.P. traversing was completed, between the Murchison Highway and Mt.Charter, in the Hatfield Licence area.

In the Mackintosh Licence 950 m of 25 metre dipole, 2100m of 50 metre dipole and 1700 m of 100 metre dipole I.P. traverses were completed.

A summary plan, (Plate QR 98 in text), outlines the total area now covered by I.P. surveys.

To eliminate terrain distortions and to aid geological interpretation, the airborne magnetic data was re-compiled at 1:10,000 scale, (Plates DT 78, A,B,D.) The magnetic data show several linear trends which are useful markers in correlating geologic units between areas of observed outcrop.

In the Mackintosh East area limited I.P. was conducted by contractor Geoquest Pty.Ltd. over areas of anomalous soil geochemical response, Skey (1975). On two lines, 2100N and 7300N, deep weak frequency effect anomalies are coincident with geochemical anomalies. On 2900N a shallow very weak frequency effect anomaly is marginally offset from a geochemical anomaly.

Trenching

In the Hatfield licence two backhoe trenches were dug in 1976 to investigate the nature of the black shale-andesite contact. One trench was dug in the "Quarry" area, adjacent to the Que River access road (Plates HT 18-19). The contact was shown to be conformable.

The second trench, some 200 metres long was excavated on 5800N covering a shallow I.P. anomaly associated with the contact (Plate HT 21). Bedrock channel samples were collected over 2 metre intervals and analysed for copper, lead, zinc and iron. No base metal mineralisation was noted. Within the black shale immediately adjacent to the andesite, iron values in the rock are of the order 3.5% compared with 1.5 to 2.0% elsewhere in the shale.

In 1977 a bulldozer was used to trench some of the more significant soil anomalies in the Hatfield licence. Six trenches were completed for a total of 330 metres, Plates HT 23. In general bulldozing exposes weathered rock of the lower "C" horizon and occasionally fresh boulders.

The trenches were mapped at 1:250 scale and channel samples collected over 5 m intervals. Results are not yet available. Samples will be analysed for copper, lead and zinc.

In all cases the soil anomalies appear to be associated with massive andesites apparently containing trace disseminated base metal sulphides. Shale bands occur in the western ends of the trenches at 5400N and 6400N and some dacitic fragments were observed in the trenches at 4000N, 6400N and 6600N. A barren dacite unit some 15 metres wide, surrounded by andesite, exposed in the "Old Mill" site trench (7200N) represents an attractive rock association.

Diamond Drilling

Surface exploration, by geological mapping, soil geochemistry and I.P., of the conceptually attractive black shale - andesite contact provided two drill targets, in the vicinity of 6400N near the Murchison Highway (Plates HT17, HT 19). Hole H-1 (HAT1) was completed in October 1976 and intersected broken pyritic black shales, and then intercalated shales and carbonated andesitic volcanics with some inclusions or veins ? of chert. Disseminated pyrite and trace base metals were noted. The second hole H-2 - 2A, intersected similar lithologies. (HAT2)

Six core samples from diamond drill hole H-1 were submitted to Geoex Pty.ltd. for estimation of resistivity and "frequency effect" parameters of the black shale and andesite. These measurements were required as it was not possible to visually identify the source of geophysical anomalies, due to the fine

grained nature of the black shale. Two samples of black shale were found to be very conductive (13 ohm metres) and exhibit high "frequency effect" values (7.5% FE), whilst other samples were not significantly different from the barren andesite sample (3800 ohm metres). The two conductive samples were then examined by thin and polished section and found to contain fine pyrite in sandy laminations (with rare chalcopyrite) and variable graphite.

On the basis of geochemical (iron), geophysical and mineralogical data the target I.P. responses are attributed to variable fine (6 micron) pyrite (up to 10%) and graphite (10%).

Geochemical mapping of the drill core will be conducted to assess the base metal distribution. Continuous 3 metre ground core samples were taken from MC-1 for geochemical assessment, (Skey 1976). Plate HT 1/48. Drill logs are provided in Appendix C, the results of geophysical testing of core samples in Appendix D and appropriate petrological and polished section reports in Appendix E.

REGIONAL GEOLOGICAL SETTING

The Mackintosh and Hatfield Licences are located in the central north-west of Tasmania and overlie part of the Cambrian Mt.Read Volcanics, which occur as an arcuate belt of volcanic rocks on the eastern margin of the Dundas Trough. This trough extends for 200 km from Elliott Bay on the south-western Tasmanian coast to Deloraine in the northern central part of Tasmania (Plate DT 79 in text), and is bounded by Pre-Cambrian nuclei, the Tyennan Geanticline and the Rocky Cape Geanticline.

The western and central part of the Dundas Trough are Upper Proterozoic (?) to Upper Cambrian partly fossiliferous sediments and basic volcanics. The eastern part of the trough, adjacent to the Mt.Read Volcanic belt is less well known.

The eastern and central parts of the Mt.Read Volcanic belt are overlain by Lower Ordovician to Middle Devonian sediments. The basal Ordovician rocks, show conformable, disconformable and unconformable relations with the Cambrian. The northern part is overlain by Tertiary basalt and locally obscured by Quaternary glacial deposits.

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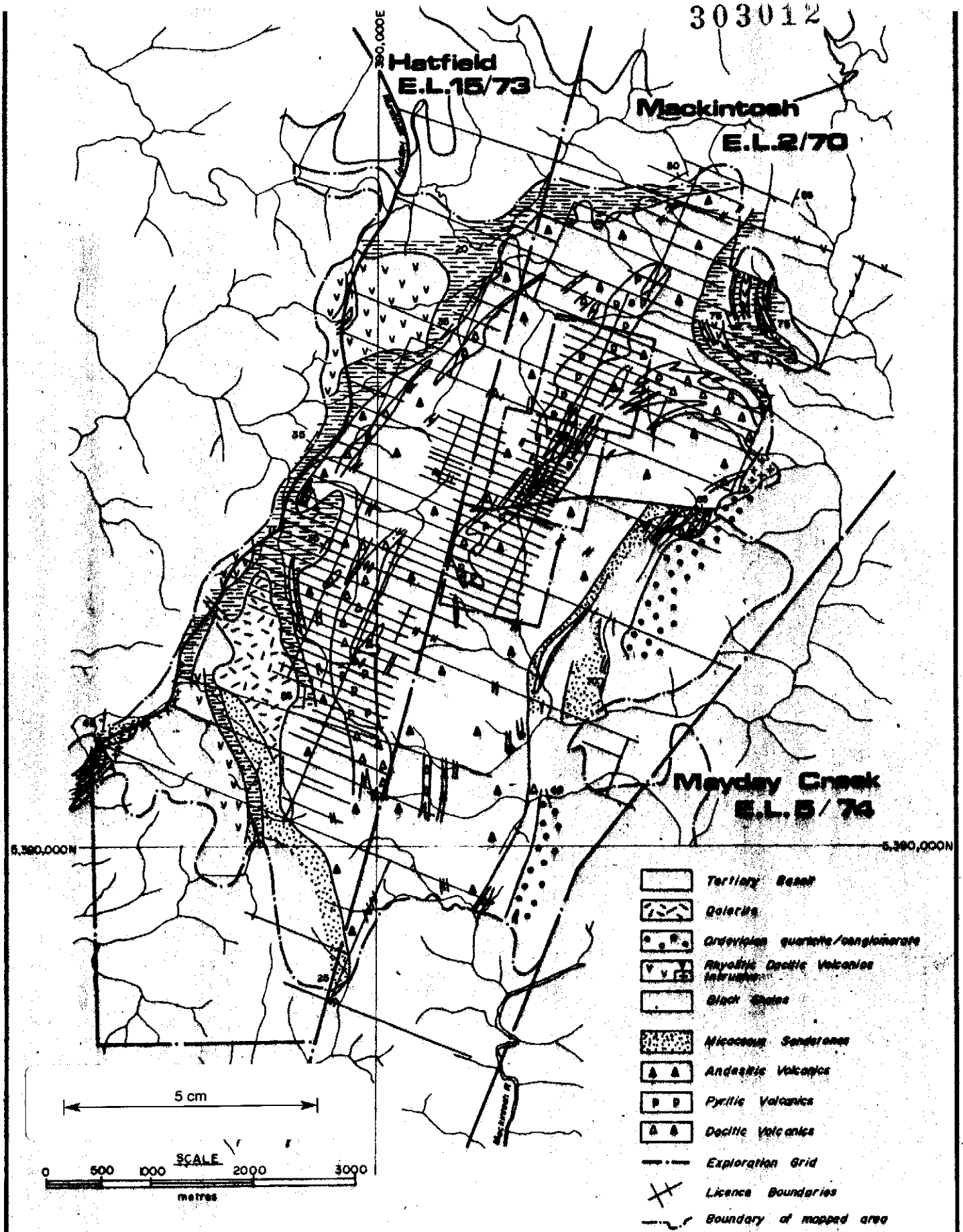

Abminco Exploration

Drawn	C.H.Y.
Traced	R.J.E.
Checked	
Revised by	Date

NORTH WEST TASMANIA

QUE RIVER REGIONAL GEOLOGY SUMMARY MAP

Location code	
Date	June, 1977
Scale	1:50,000
Plate No	Mac.53

The Mt.Read volcanics includes intermediate to acid intrusives, lavas and pyroclastics (Corbett et al.,1974). The volcanics are mineralised, with ore deposits at Mt.Lyell, Williamsford, Rosebery and Que River.

GEOLOGY OF THE MACKINTOSH WEST AND HATFIELD LICENCES

The licence areas cover a west facing and dipping sequence of basaltic and andesitic tuff agglomerates, lava breccias and vesicular lavas with some dacitic lavas, pyroclastics and intrusives. The Que River ore mineralisation is situated within these volcanics, 2.5 km east of the Murchison Highway and 2 km south of the Que River. The predominantly andesitic pile is conformably overlain by a fossiliferous black shale of upper middle Cambrian age (Gee 1970) located about 0.5 km east of the Murchison Highway. Drill holes and costeans confirm the shale-andesite contact to be conformable; dips and facing are to the west. Partly interbedded with, and overlying the shale is a suite of dacitic to rhyolitic pyroclastics, lavas and intrusives with quartz phenocrysts up to 5 mm in some members.

Unconformably ? underlying the andesitic volcanics and located approximately 1 km east of the Que River deposit is a greywacke- shale- volcanic sequence with steep west dips and facing. Current interpretation correlates this sequence with the Farrell Slates.

Ordovician conglomerate and quartzite, Jurassic ? dolerite, Tertiary basalt and Quaternary glacial deposits have been mapped in the licence areas (Plate MAC 53 in text).

STRATIGRAPHY

A columnar section with summary description of the units is shown in Plate QR 96 in the text. The oldest rocks known consist of a series of sheared dacitic volcanics alternating with shales, siltstones, greywackes and grits believed to be the stratigraphic equivalent of the Farrell Slates exposed in the Mackintosh Dam - Sterling Valley areas.

These rocks occur in the centre of EL 2/70 and extend over 4 km from 3400N to above 7800N. There is a general regional strike of about 020° magnetic and dips are 60° - 80° west. Facings are consistently west.

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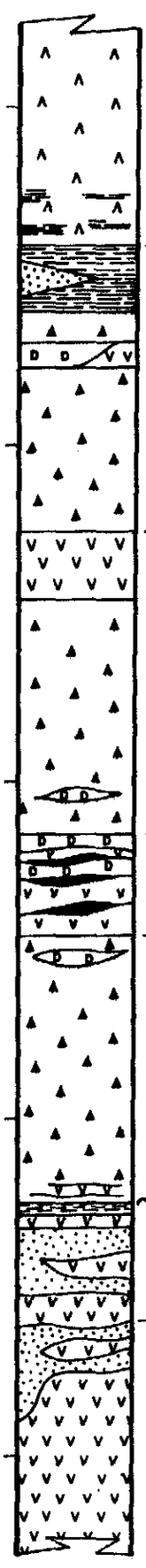

RHYOLITIC - DACITIC VOLCANICS - Massive quartz feldspar porphyry. Fine grained lavas and tuffs, also lithic quartz feldspar crystal tuffs and agglomerates, occasionally with black slate fragments and pumice fiamme. Occasionally pyritic

EPISODE 3

Black shales (locally pyritic)

QUE RIVER BEDS Black shales, micaceous sandstones and grits Rare agnostids.

Dacite

ANDESITIC VOLCANICS - feldspar crystal tuffs, lithic tuffs to agglomerates porphyritic and vesicular lavas and intrusives, lava breccias. Some deuteric silicification and carbonate alteration rare to trace base metal sulphides

Dacitic and andesitic tuffs, lavas and intrusives. Variably altered and pyritised. Minor base metal and barite stringers. Located at Mount Charter.

Andesitic volcanics as above includes minor dacite.

Rare to trace base metal sulphides.

Dacite

EPISODE 2

P lens
Q lens
S lens

QUE RIVER "MINE SEQUENCE" - Dacitic and andesitic tuffs, lavas and intrusives. Variably altered and pyritised. Ore lenses. Includes massive barren dacites.

Dacite

Andesitic volcanics as above, includes some vesicular basalts and minor dacite.

Rare to trace disseminated base metal sulphides.

Rhyolite with barite

POSSIBLE UNCONFORMITY

Shale
Sandstones
Dacite with rare pyrite & magnetite

"FARRELL SLATES" - Dacitic to rhyolitic crystal vitric, lithic tuffs and intrusives alternating with shales, siltstones, sandstones and interfingering with shales, siltstones, sandstones and grits.

EPISODE 1

Acid lavas an intrusives of the Murchison River Gorge

5 cm

Abminco Exploration

Drawn: CHY	Mackintosh West / Hatfield Licence Areas	Location code:
Traced: RKY	**Columnar stratigraphic section of the Mount Read Volcanics**	Date: July 1977
Checked:		Scale:
Revised by: Date:		Plate No QR 96

The contact with the overlying andesitic pile has not been observed. Increased shearing within the "Farrell Slates" suggests the contact is unconformable.

Overlying the "Farrell Slates" is a sequence of basaltic and andesitic through dacitic and rhyolitic volcanics up to 2800 metres thick. It should be noted that significant variations in the thickness of the volcanic pile are common. This sequence is locally mineralised and contains the Que River "Mine Sequence".

Within the andesitic pile, stratigraphic sub-division on the basis of the mineralised/pale-coloured dacitic volcanics has been attempted. At least three horizons of dacite are suggested. Two of these are noteworthy; the Que River "Mine Sequence" dacites and the dacites at Mt.Charter.

The Que River " Mine Sequence" consists of up to 300 m of intermediate to acid volcanics with the pyroclastic derivative dominating. Intrusives exist in the zone along with lavas. Ore lenses appear to be generally conformable with these rock units and appear to be of distinctly proximal disposition. Tuff lavas (welded tuff) are present, indicating that parts of the volcanic pile developed under subaerial conditions, but the pyritic rocks and base metal massive sulphides were deposited in strictly submarine conditions. The regional trend of these volcanics is approximately 020^{o} magnetic. Dips are generally vertical to 50^{o} west, with local reversals to steeply eastward.

The dacites at Mt.Charter consist of about 300 m of altered and mineralised intrusives, lavas and fragmentals. Barren dacites appear to flank the central zone of mineralisation.

Conformably overlying and surrounding the andesitic pile on the west, north-west and north-eastern sides, is a sequence of black shales, micaceous sandstones and grits (Que River Beds). Dips are generally shallow and the beds are upright.

Partly interbedded with, and overlying the Que River beds is a suite of dacitic to rhyolitic pyroclastics, lavas and intrusives. The top of this sequence has not been observed in the Licence area. Skey (1976) proposes a summary group name of Rhyolitic-Dacitic volcanics. (RDV).

Ordovician Owen conglomerate and quartzites unconformably overly the Cambrian volcanics. Outcrop of Ordovician rocks is restricted to the eastern part of the Mackintosh west licence.

Adjacent to the Owen conglomerate, in the vicinity of 8400N, shallow dipping siliceous conglomerate and lithic tuff beds may belong to the Jukes Formation.

A Jurassic? dolerite/diorite mass outcrops between the Murchison Highway and Mt.Charter with minor occurrences elsewhere.

Tertiary flood basalts cover the northern parts of both licences.

Quaternary alluvium and glacial drift cover large tracts of the Southwell River Valley.

LITHOLOGIES

Tertiary Basalt

The basalt is dark green on fresh surfaces and has a red brown weathered surface. Crude columnar jointing is occasionally noted.

Dolerite/Diorite

Green on fresh surfaces due to chlorite, the dolerite weathers to form very hard sub-rounded blocks with a brown coloured skin.

Ordovician Sediments

Pink to white siliceous conglomerates and quartzites, (Owen Conglomerate). Fine grained detrital chromite noted in an argillaceous quartzite suggests correlation with the Pioneer Beds noted at Mt.Lyell (Corbett et al, 1974).

Rhyolitic-Dacitic Volcanics

Massive quartz feldspar porphyry. Fine grained acid intrusives, lavas and tuffs, also lithic crystal tuffs and agglomerates, occasionally with black slate fragments and pumice fiamme. Quartz phenocrysts can commonly be seen. Fresh surfaces are mid to dark grey-green and often vitreous in appearance. Weathered surfaces are distinctive light grey to cream.

Que River Beds

The shales are all black with laminar bedding apparent where cleavage is weak. They contain dispersed extremely fine pyrite and graphite (micron size).

Agnostid trilobites found near the Que River road bridge, were considered by Gee et al (1970) to demonstrate a late Middle Cambrian age.

Dark greenish brown micaceous sandstone, weathering to light grey is common south-west of Mt.Charter. Quartz grains range up to 2 mm, but are most commonly 0.5 mm in size.

Grits, located to the north-east of the Que River prospect are friable and contain sub-angular detritus to 3 mm comprising, quartz, quartzite, grey chert, black shale and muscovite.

Andesite Volcanics

This group includes the rocks termed Andesitic (A), Andesitic Pyroclastics (AP) and Andesitic Streaky Pyroclastics (ASP), (refer appendix A).

Andesite (A) is a green weakly chloritised feldspar pyroxene and/or hornblende porphyry lava, commonly vesicular with carbonate-silica infillings. The contact with the black shales can be marked by a colour change to grey and the occurrence of carbonate amygdules up to 1 cm in diameter, or the development of scoria. The dominant lithologies of the Andesitic pyroclastics (AP) are feldspar crystal lithic tuff to agglomerate and feldspar porphyry lava-breccia occasionally with fresh diopsidic augite crystals to 5 mm.

Fresh colour is green due to weak pervasive chlorite with distinctive white feldspar phenocrysts and common but less apparent chloritised pyroxene or hornblende phenocrysts. Weathered surfaces are generally grey-white and may be studded with quartz eyes due to the deuteric infilling of vesicles or matrix cavities. Composition assessed from thin section examination is in the range andesite to basalt, with deuteric silicification.

A restricted grey coloured lahar or coarse tuff occurs adjacent to the black shales. This unit contains small fragments of pyrite.

Irregular grey cherty inclusions, typically 1 to 5 cm, occur within the andesites. These chert inclusions are most common adjacent to the black shales.

Andesitic streaky pyroclastics (ASP) appear to be a facies equivalent of the andesitic pyroclastics and represent the occurrence of pumice. Green coloured, weakly sheared, lithic crystal vitric tuffs, possibly ash flow tuffs predominate. Eutaxitic micro textures have been noted and aligned "streaky" porphyritic fragments (fiamme) of collapsed pumice are characteristic.

Dacitic Volcanics

A suite of intrusives, lavas, pyroclastics and reworked tuffs include the host rocks of the Que River ore lenses. The currently accepted rock units and symbols used are listed below and a more detailed legend is appended (Appendix A).

Andesitic-Dacitic Pyroclastics	ADP
Dacite, Magnetic Dacite	D,DM
Dacitic Tuff Lava	DTL
Dacitic Pyroclastics	DP
Porphyritic Dacite	PD
Porphyritic Dacitic Pyroclastics	PDP
Dacitic Reworked tuffs	DRwT
Dacitic Shaly tuffs	DSht
Streaky pyroclastics of indeterminate composition	SP

Andesitic Dacitic Pyroclastics (ADP)

Pyritic pyroclastic beds located within the "mine sequence". Characterised by heavily chloritised fragments of porphyritic andesite (average 2 cm) in an otherwise dacitic fragmental matrix. The rock exhibits pyrite - quartz - sericite - carbonate - chlorite alteration and is grey to dark grey in colour.

A unique member of this group is grey to green in colour with conspicuous amygdaloidal andesite lava clasts. When in close proximity to massive sulphides there is an abundance of "chrome" green illite-hydromuscovite aggregates.

Dacite and Magnetic Dacite (D,DM)

Members of these units are lavas and intrusives, commonly buff to pink in colour, fine grained homogeneous, slightly porphyritic for feldspar, occasionally vesicular or flow banded. Often intercalated with the pyritic pyroclastic rocks of the "mine sequence" the dacites are relatively barren evidently being impervious to mineralising fluids.

They are often wedge shaped, widest near surface, thinning rapidly with depth.

Dacitic Tuff-Lava (DTL)

Exists in localised settings, indicative of subaerial volcanism. Texturally and compositionally similar to the dacite, this rock has both extrusive and pyroclastic features. Angular fragments of slightly porphyritic dacite, occasionally flow-banded, are incorporated in a lava matrix of similar composition.

The rock is considered to be a flow brecciated lava and/or a lava contaminated by fragments of tuffaceous origin.

Dacitic Pyroclastics (DP)

Generally marginal or facies equivalent to dacite with a limited distribution. Characterised by fragments of buff to green coloured dacite, occasionally flow-banded, in a grey coloured tuffaceous pyritic - quartz - sericite rich dacitic matrix.

Porphyritic Dacite (PD)

Interpreted to have both intrusive and flow characteristics. Porphyritic dacite is a massive rock porphyritic in feldspar. It is buff to light grey in colour and has been altered by carbonate, sericite and silica. The rock consists of sericite-pseudomorphed, flow-oriented feldspar phenocrysts (to 3 mm average 0.5 mm), often euhedral and a few anhedral quartz phenocrysts in a devitrified siliceous groundmass of quartz - feldspar composition. Fractures filled with disseminated and stringer mineralisation are common. The rock hosts much of the S lens copper mineralisation at Que River and is of widespread distribution being one of the main units at Mt.Charter.

Porphyritic Dacitic Pyroclastics (PDP)

Fragments of porphyritic dacite are ubiquitous, sizes vary from microscopic grains to over 20 cm. Fragments range from unsorted to fairly well-sorted and from angular to sub-rounded. There is a tendency to cyclicity from agglomerate to tuff.

The rock is pale grey to blue grey in colour, due to pyrite-quartz-sericite-carbonate alteration.

Dacitic Reworked Tuffs (DRwT)

Subrounded polymictic lithic fragments (from 0.5mm to 50mm, average 5 mm) are indicative of reworking. Fragments consist of altered porphyritic dacite, sericitised trachyte and recrystallised chert. Irregular quartz aggregates may represent devitrified glass.

The matrix consists essentially of introduced secondary quartz, carbonate and pyrite. The rock is grey to blue grey in colour due to pyrite-quartz-sericite alteration.

Dacitic Shaly Tuffs (DShT)

Pyritic shaly tuff appears to be the immediate host rock for massive sulphides. Beds to 5 m thick are located as selvage (generally beneath) and lateral to ore. The rock is a very fine tuff, highly argillaceous and completely sericitised.

Streaky Pyroclastics of Indeterminate Composition (SP)

Grey, weakly sheared, sericitised and pyritised, lithic vitric crystal tuff, often with a close spatial relationship to dacitic shaly tuff although with a greater lateral extent. Pale grey-white porphyritic fragments are typically "streaky" in appearance. The richly sericitic matrix carries fine feldspar crystals and devitrified shards. This rock appears to reflect occurrence of pumice, giving rise to streaky fiamme textures.

"Farrell Slates"

Exposure of the rocks assigned to this formation, is restricted to the eastern part of the Mackintosh west licence and limited by a cover of Ordovician sediments

The main rock units are grey to black shales, siltstones with local current bedding and micaceous sandstones (greywackes). There is an indicated thickness of over 700 metres. Medium grained grit beds up to 15 cm thick have been noted. Dacitic tuffs and lavas are subordinate.

The volcanics are sheared with the development of a phyllitic cleavage, they include dacitic lithic vitric crystal tuff and dacitic feldspar porphyry lava, often containing primary magnetite.

STRUCTURE

West dips and facing, common through the whole volcanic sequence covered by the Mackintosh west and Hatfield Licence areas, allow an interpretation to be suggested whereby the volcanics are all part of the same west-facing limb of a major NNE trending late Cambrian fold.

Tabberabberan (Devonian) folding appears to have developed simple fold structures. Main axes trend to the NNE with cross-fold axes to the WNW.

The most reliable indication of Tabberabberan fold structures is given by the dips and facings measured in the Que River shale-sandstone units that surround the andesitic volcanics on the west, north-west and north-eastern sides.

South-west of Mt.Charter the apparently complex minor folding in the shales and acid volcanics may result from WNW trending cross-folding.

To the west, in the vicinity of the Murchison Highway and Mt.Charter a conformable andesite-black shale-sandstone contact dipping west at 25^{o} to 50^{o} is indicated.

In the vicinity of 6400N there is a small lobe-like structure, located by mapping and confirmed by I.P. It is not known if this feature is a fold or fault phenomenon. Dips are considered too steep for this feature to be a topographic effect.

A synclinal structure in the shales and overlying acid volcanics is located in the north-west (8000N). This syncline trends NNE but is terminated to the north by apparent WNW anticlinal cross-folding demonstrated by deformation

in the shales exposed in the Que River tributaries.

Located in the vicinity of 9400N, approximately 2 km north-east from the Que River prospect, steep dips (50^{o} to 80^{o}) and facing to the north-east define the east limb of a north-plunging asymmetric anticline (Plate MAC53 in text). It is not clear what effect this structure has on the Que River "Mine sequence".

The marked thinning of the andesite pile between the NNE trending, west dipping and facing "Farrell Slates" and the east dipping and facing Que River beds is poorly understood, but may be attributed to faulting, variations in the thickness of the volcanic pile, cross-folding and later ? intrusion of a quartz feldspar porphyry located in the vicinity of 8400N.

Fault structures indicated by photo, geophysical and geochemical linears and mapping of underground development may be resolved into two main sets, trending 035^{o} to 050^{o} (A) and 315^{o} to 335^{o} (B) magnetic. An example of set (A) is located in the vicinity of the Que River exploration decline portal. This is a major fault trending at 060^{o} magnetic which dips to the SE at approximately 45^{o} and displaces the "mine sequence" some 500 metres to the SW i.e. dextral movement. A NW-SE trending set of faults measured in the andesite at the portal which strike 120^{o} magnetic and dip at approximately 45^{o}NE, provide an example of set (B). Air photo interpretation indicates that a fault with this orientation is likely to be present in the mine area north of the portal.

Shearing might be one expression of faulting. Some shearing, for instance, at the massive sulphide - pyroclastic contact most probably is differential slip along the contact during folding, particularly where two physically dissimilar rocks like massive sulphide and dacite are adjacent. Strike slip shearing has most likely occurred within the highly argillaceous shaly tuff, host for the massive sulphides.

In the vicinity of the andesite-black shale contact, low grade regional metamorphism has produced a common conformable cleavage. Strong platy cleavage is common in the Que River shales with local graphite. Within the andesitic pile regional cleavage is most apparent within the pyritic sericitised "mine sequence" pyroclastics. The cleavage strikes approximately

30° magnetic with subvertical dip. The more competent rock groups (AP,D) show a foliation of similar attitude which in many instances may be bedding or flow banding.

Shearing within the "Farrell Slates" appears to be far more strongly developed than in the other volcanics. The shearing has produced a shaley/ slatey character in the sediments and a phyllitic cleavage in the tuffs.

ALTERATION

Weak chlorite development is ubiquitous in the andesites and is ascribed to deuteric alteration and low grade regional metamorphism of pyroxenes and amphiboles. Deuteric chloritisation, carbonation and silicification of the andesites culminates in the formation of sericite adjacent to the contact with the Que River Beds. Silicification of the andesites is quite common. Quartz (particularly chalcedony) filled vesicles, tension gashes and pervasive silicification of matrix material are commonly observed.

Within the Que River "Mine sequence" and the porphyritic dacite of Mt.Charter the effects of hydrothermal alteration associated with sulphide mineralisation are widespread. As well as pyritisation, the most marked effects are those of silicification, sericitisation and carbonation. Chloritisation is restricted and argillisation has been noted. Most quartz is inferred to be derived from devitrification although common and abundant pervasive silicification is locally developed to an impressive degree. The term sericite is used in a general sense to denote fine white mica, typically as illite grading to chrome green illite-hydromuscovite. Carbonate probably ankerite, occurs as veinlets, matrix permeations and as an alternate to sericite in the replacement of feldspar phenocrysts. Massive chlorite zones are restricted, occasionally up to 5 metres in width as selvages to ore.

Weaker carbonate veining and patchy pervasive carbonate - silica alteration occurs in the area 7000N to 7500N near 4700E (old mill site area) and in massive andesitic fragmentals on the southern slopes of Mt.Charter.

Shales of the Que River Beds contain up to 5% ultrafine graphite and minor recrystallised pyrite. They are locally indurated adjacent to the andesites.

Alteration within the "Farrell Slates" is well developed. Both the sediments and volcanics exhibit sericite, locally illite-hydromuscovite, and minor carbonate. Minor pyrite and chlorite are common although not ubiquitous.

MINERALISATION

Minor stringers and disseminations of pyrite, sphalerite, galena and rare chalcopyrite occur within silicified, sericitised and carbonated intrusives, lavas and pyroclastics, located both north and south of the Que River ore lenses, at Mt.Charter and near the Murchison Highway(6400N, 3150E.)

On the east slope of Mt.Charter, several small pits and trenches and a larger cut, approximately 4 metres deep, are the result of early prospecting activities, circa 1930. A barite vein approximately 70 cm thick occurs, with widespread float on both sides of the watershed. Barite and minor base metal veining is common in drill core from MC 1 and MC 2, though no zones greater than 10 cm of massive barite were found.

Disseminated and minor vein pyrite and base metal sulphides were reported in some of the andesites. Quartz - carbonate veining appears to bear a close relationship to this type of mineralisation. Two areas are noteworthy; the old mill site (7200N 4300E) and Mt.Charter south (4200N 4200E). Speculation as to the proximity of massive base metal sulphides is warranted.

Disseminated to laminar bedding of locally recrystallised pyrite occurs in shales of the Que River Beds.

Within the "Farrell Slates" minor disseminated pyrite and rare base metal sulphides were noted.

SOIL GEOCHEMISTRY

Contour levels for all data determined by inspections are as follows:-

Copper	100 ppm	200 ppm		
Lead	250 ppm	500 ppm	1000 ppm	2000 ppm
Zinc	200 ppm	400 ppm		

The relative immobility, and hence discrimination of lead with respect to

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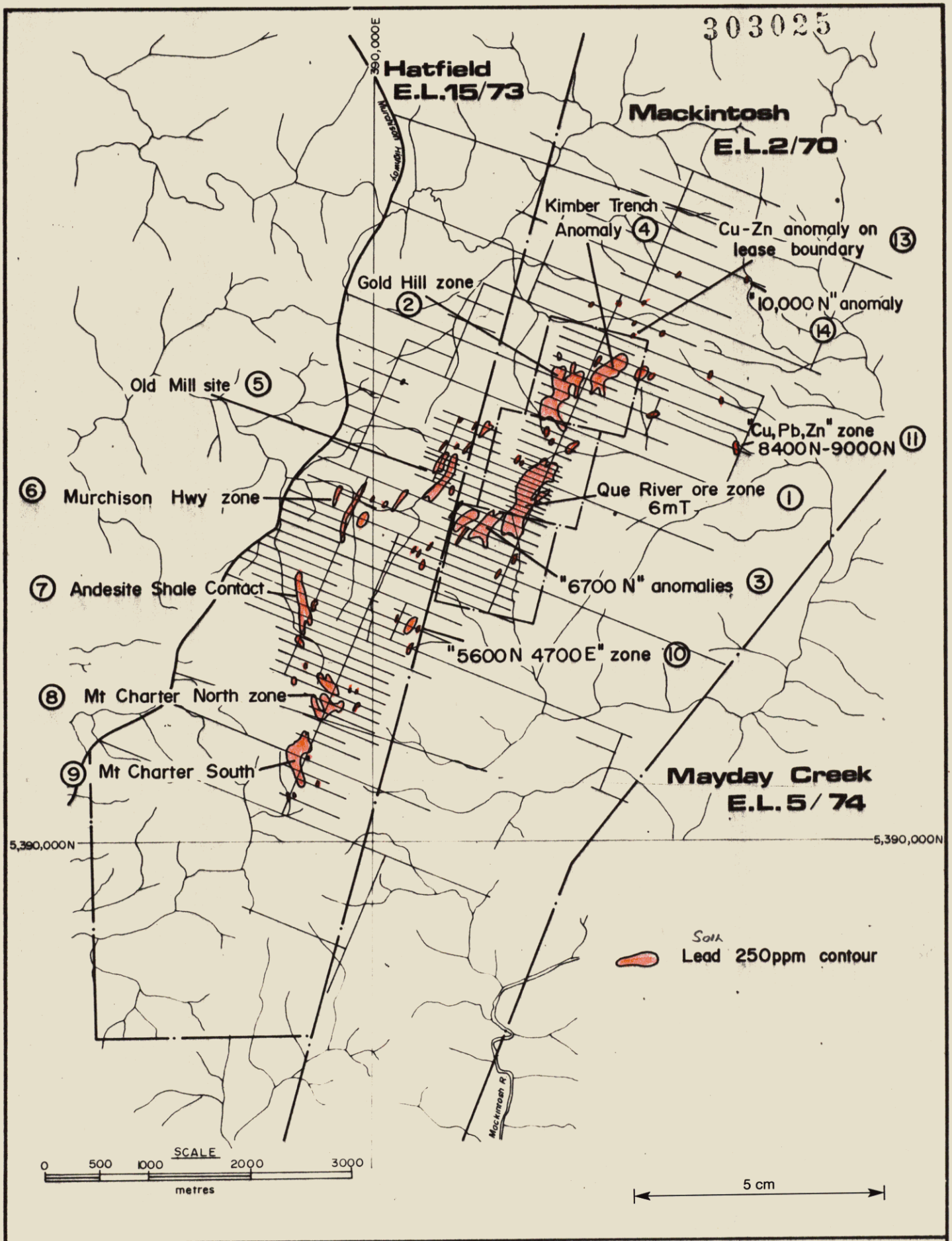

Abminco Exploration

Drawn CHY	Mackintosh West / Hatfield Licence Areas	Location code
Traced RKY	GEOCHEMICAL SUMMARY PLAN	Date June 1977
Checked		Scale 1:50,000
Revised by Date		Plate No QR 100

zinc and copper, is well illustrated over the Que River ore zone. A summary plan showing lead geochemistry outlined by the 250 ppm contour illustrates fourteen anomalies or anomalous zones, (Plate QR 100 in text).

Within the Que River Mineral Leases, four anomalous zones are outlined by the 250 ppm lead contour, anomalies Nos. 1 - 4 (Plate QR 100).

Ten anomalies or zones of interest lying outside the Que River Mineral Leases warrant mention (Plate QR 100).

Anomaly No. 5 "Old Mill Site" Zone

Anomalous values of copper, lead and zinc with lead values to 3,750 ppm. The geology, from both mapping and drilling appears to be carbonated andesite with disseminated galena and sphalerite. Trenching has recently exposed a barren dacite unit in the southern part of the grid.

Anomaly No. 6 "Murchison Highway" Zone

The occurrence of pyritic chert and disseminated base metal sulphides in vesicular andesites, near the shale-andesite contact, was followed-up by a detailed soil sampling programme. Two separate anomalies were distinguished; lead-zinc values related to the chert and andesites and copper-zinc to the shales.

Anomaly No. 7 Andesite-Shale contact towards Mt.Charter

Lead values of up to 3,000 ppm, with supporting zinc, form a distinct anomaly of some 400 metres strike length. Spot values occur to the south-east and merge with the "Mt.Charter North" zone. The strong trend apparent in this anomaly parallels the shale contact but the anomaly is within the andesites.

Anomaly No. 8 "Mt.Charter North" Zone

A bifurcating anomaly of large areal extent with lead values commonly exceeding 500 ppm appears transgressive to the geology but shows similarities to the contoured I.P. data (Plate HT 22). Drilling has confirmed altered dacitic volcanics with disseminations and stringers of base metal sulphides and barite.

Anomaly No. 9 "Mt.Charter South"

Dominated by zinc values in the range 500 to 2,300 ppm. Disseminations and aggregates of galena and sphalerite were observed associated with carbonate veining in massive andesites. Lead soil values attain 1,000 ppm.

Anomaly No. 10 "5600N 4700E" Zone

A two line lead anomaly, maximum 1,400 ppm has a much greater breadth (200m) and strike (600m) in terms of zinc values. The anomaly appears related to disseminated lead and zinc sulphide mineralisation in andesites.

Anomaly No. 11 Cu,Pb,Zn Zone 8400N-9000N

A zone of 100-200 ppm lead values, in the vicinity of 6500E to 7100E, with spot values of 2320 ppm and 750 ppm, enhances the marked copper anomaly (maximum 700 ppm) on line 8400N. The underlying lithologies are andesites with some dacites and pyritic chert.

Anomaly No. 12 Pb,Zn Zone 8000N - 8800N

Three single line lead-zinc anomalies occur immediately east of the mineral leases on lines 8000N, 8400N and 8800N. All appear to be in andesitic to dacitic volcanics.

Anomaly No. 13 Cu,Zn Anomaly on ML 2M/75 Lease Boundary

A small copper-zinc anomaly straddling the northern boundary of ML 2M/75 has associated spot values of anomalous lead. A linear trend apparent in the copper anomaly is in line with the Kimber trench anomaly.

Anomaly No. 14 10,000N Lead Anomaly

A reconnaissance line lead anomaly with values to 900 ppm. Follow up gridding and soil sampling is in progress.

GEOPHYSICS

A summary plan, Plate QR 98 in text, outlines the total area now covered by I.P. traverses.

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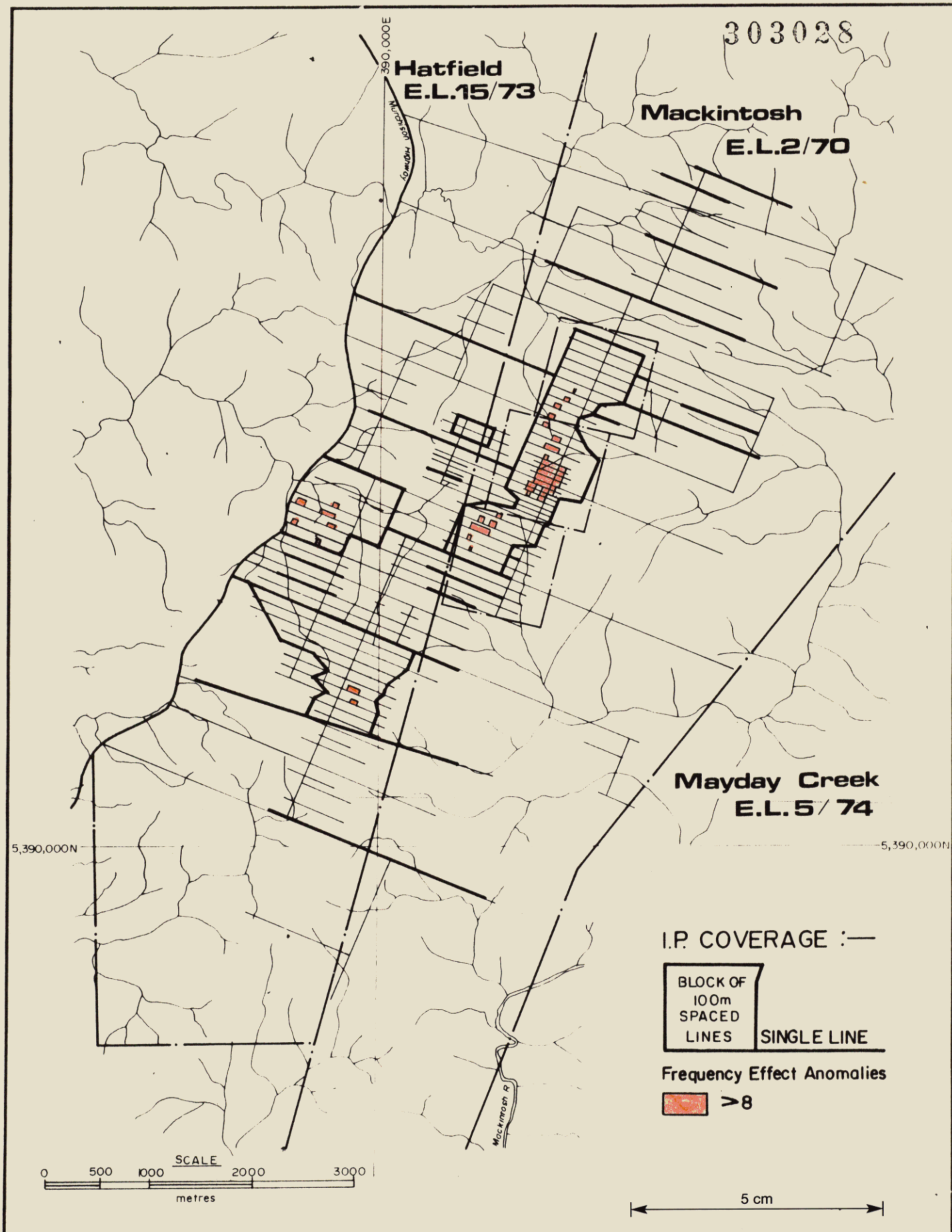

Abminco Exploration

Drawn CHY Traced J D Checked Revised by JJB Date 11/7/77	Mackintosh West / Hatfield Licence Areas GEOPHYSICAL SUMMARY PLAN	Location code Date June 1977 Scale 1:50,000 Plate No QR 98

In the past year 3800m of detailed (25 metre dipole) I.P. traversing was completed, between the Murchison Highway and Mt.Charter, in the Hatfield licence. No significant anomalies were obtained. Summary plan, plate HT 22 shows frequency effect contours illustrating the I.P. coverage of the above area.

In the Mackintosh licence four areas were tested by either detailed or reconnaissance I.P.traverses:-

1. As follow-up to a coincident lead-zinc anomaly at 10,000N, 25 metre dipole I.P. was conducted from 6300E to 6500E, a weak anomaly was obtained. Additional gridding, mapping and soil geochemistry was completed. Sporadic disseminated base metal mineralisation in the upper Rhyolitic-Dacitic volcanic sequence is indicated.

2. On line 8600N, 25 metre dipole I.P. was conducted from 6250E to 7000E as follow-up of a geochemical anomaly. Only weak frequency effects were recorded.

3. 50m dipole I.P. was conducted on lines 10,600N, 10,800N and the H.E.C. survey line near 10,600N in an attempt to more clearly define the shale-andesite contact.

4. 100 metre dipole I.P. was conducted on reconnaissance line 7400N from 5300E to 7000E without defining any new anomalies. I.P. Profiles are appended (F).

CONCLUSION AND RECOMMENDATIONS

A review of the results of all exploration on the licence areas was completed. Subsequent to airborne EM surveys, stream sediment sampling and a variety of orientation geochemical and geophysical surveys conducted at Que River, geological mapping, soil sampling and I.P. have featured as prime techniques in the exploration of the Mackintosh West and Hatfield licence areas. At this stage in the exploration programme it is considered the above techniques should have delineated any near surface ore deposit.

The Que River ore deposit is located in dacitic volcanic rocks which are part

of an essentially andesitic pile. Apart from S lens, where the nature of the mineralisation is seen to be essentially of stringer type, situated in altered porphyritic dacite, all other ore horizons consist of massive sulphides situated within fine grained argillaceous (shaly) tuffs. As well, all ore horizons are located close to, or at least no further than 50 metres from, massive barren dacite and in many instances near andesites. It is considered that further exploration effort be directed towards identifying the stratigraphic continuation or repetition of argillaceous (shaly) tuffs in proximity to massive dacites or, when dealing with the rocks most likely to be found by surface mapping, the contact between andesite and massive dacite. In view of the masking effect massive dacite may have on the geophysical and geochemical response from deeply buried ore bodies, the lack of significant I.P. and soil anomalies should not be considered definitive.

Recent geological mapping has shown soil anomaly zones Nos. 5,11 and 12 (Plate QR 100) to be related to dacite-andesite stratigraphy. Although, in part, downgraded by 25 metre dipole I.P. these zones represent, possibly, the most attractive targets in the licence areas. Further detailed exploration will be conducted.

The presence of disseminations and aggregates of galena and sphalerite within andesitic rocks represents a style of mineralisation different to that at Que River and not directly related to intense alteration and pyritisation. Soil anomalies Nos, 6,7,9 and 10 are believed related to this style of mineralisation.

As massive sulphide ores may be located flanking altered porphyritic dacite (similar to the S lens host rock), the presence of mineralised andesitic pyroclastics overlying the large altered porphyritic dacite at Mt.Charter (soil anomaly No. 8) takes on greater significance.

Further consideration of these anomalies is warranted and testing by trenching is in progress.

Creek mapping of the area, approximately mid-way between reconnaissance lines 4400N and 5400N has found sheared and altered rhyolites which contain pyrite and barite. Closer spaced soil sampling, mapping and possibly I.P. will be conducted.

A programme of rock geochemistry (Cu,Pb,Zn,Hg,Ag,Ba) is recommended to test its potential for defining geochemical characteristics of the stratigraphy. Hopefully, rock geochemistry might provide a means for evaluating relatively weak I.P. and soil geochemical anomalies.

Improved methods of geochemical data assessment by computer processing will allow rapid checking of compilation errors, rapid geographical identification of anomalous values and improved statistical treatment of data.

In the Mackintosh East area coincident soil geochemical and weak I.P. anomalies, apparently within Cambrian acid volcanics, require follow up.

FINANCE

EL 15/73 HATFIELD

Expenditure for the twelve months ending June 7, 1977 is as follows:

Geology	16,271
Survey	9,901
Geophysics	8,578
Geochemistry	6,804
Diamond Drilling	31,114
Tenure	307
Miscellaneous	2,449
	75,424

EL 2/70 MACKINTOSH

Expenditure for the twelve months ending June 7, 1977 is as follows:-

Geology	15,143
Survey	9,424
Geophysics	5,921
Geochemistry	4,579
Tenure	1,103
Miscellaneous	2,702
	38,872

Signed . C.H.YOUNG PER RT

C.H.Young
Geologist

Endorsed K.R.Yates

K.R.Yates
Chief Geologist

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C.E.P.L. Staff (1974)	Progress Report on E.L. 2/70 Mackintosh River Tasmania,Que River Prospect.
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Skey, E.H. and Webster, S.S. (1976)	Annual Progress Report Exploration Licence 15/73, Hatfield River for 12 months ending June 25, 1976.
*Young, C.H. (1977)	Geology of the Que River Lead-Zinc Deposit.
*Young, C.H. (1977)	Summary Review of the results of exploration on Exploration Licences 2/70 Mackintosh River and 15/73 Hatfield River.

LIST OF APPENDICES

APPENDIX A

Plate QR 84, Que River Prospect Geological Legend and Colour Code.

APPENDIX B

Petrological Reports for Rock Samples, Mackintosh and Hatfield Licence areas.

APPENDIX C

Diamond Drill Logs H 1 and H 2 - 2A.

APPENDIX D

Geophysical Testing of Core Samples.

APPENDIX E

Petrological Reports on samples from Diamond Drill Holes, H1, H2, MC1 and MC2.

APPENDIX F

I.P. Profiles Mackintosh Licence area.

7400N	-	25	metres
7400N	-	100	"
10000N	-	25	"
8600N	-	25	"
10800N	-	50	"
10600N	-	50	"

MISSING NOT RECIEVED WITH REPORT.

APPENDIX A

Plate QR 84, Que River Prospect Geological Legend and Colour Code.

034

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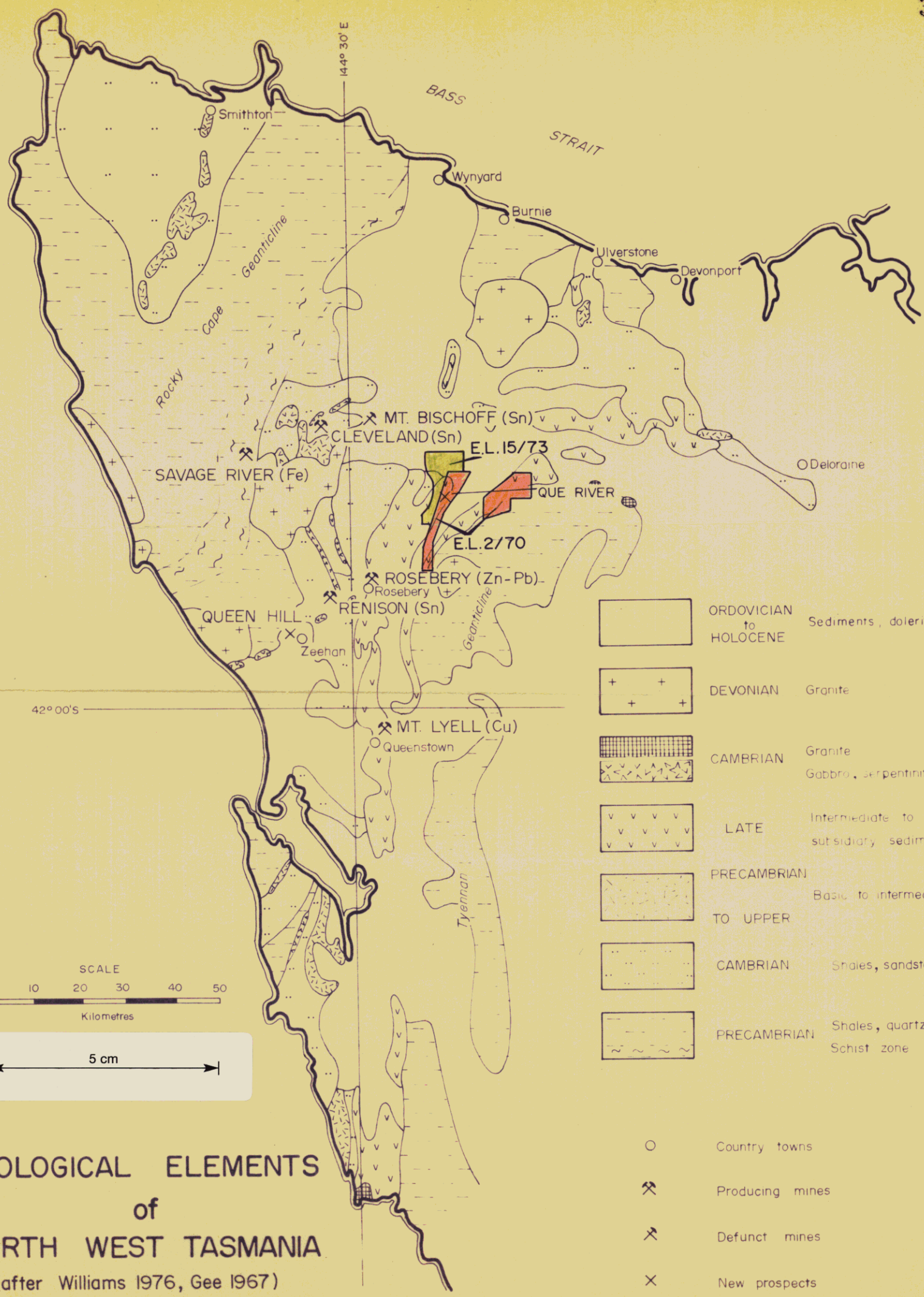

GEOLOGICAL ELEMENTS of NORTH WEST TASMANIA

(after Williams 1976, Gee 1967)

PLATE Nº DT 79

035

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N°	NAME / COMPOSITION	CODE	OCCURRENCE	TEXTURE	ROCK COLOUR	COMMON ALTERATION TYPE	COMMON SULPHIDE CONTENT
48	ANDESITE	A	Flow and intrusive	Por., Vesic., massive - fine grained	Green	Carbonate, chlorite	Py ≤1% rare base metal sulphides
49	ANDESITIC PYROCLASTICS	AP	Pyroclastic	Variously lfdpxhbxt, ta, some amygdaloidal fragments	Green	Carbonate, chlorite	Py ≤1% rare base metal sulphides
46	ANDESITIC STREAKY PYROCLASTICS	ASP	Pyroclastic	lt, lta streaky porphyritic	Pale green	Carbonate, chlorite	Py ≤1% rare base metal sulphides
44	ANDESITIC - DACITIC PYROCLASTICS	ADP	Pyroclastic green andesitic fragments in an otherwise Dacitic Pyroclastic	lt, lta	Grey, dark green (grey matrix)	Carbonate, chlorite sericite, silica	Py ≤10% stringer Sph Gn Cpy
63	DACITE MAGNETIC DACITE	D MD	Flow and intrusive	Fine grained, occasionally Por, vesicular	Buff, pink, green brown	Carbonate (sericite chlorite)	Py ≤1%
59	DACITIC TUFF LAVA	DTL	Pyroclastic (welded, may be in part sub-aerial)	t, lt, lta, a, fragments similar to matrix	Buff - pink green	Carbonate, sericite	Py ≤1%
64	DACITIC PYROCLASTIC	DP	Pyroclastic fragments typically Dacite in grey matrix	t, lt, lta, a	Buff - pink and green fragments	Carbonate (silica, sericite chlorite)	Py ≤3%
18	PORPHYRITIC DACITE	PD	Flow and intrusive (auto brecciated, fractured)	Porphyry	Buff - grey, yellow green (mottled)	Carbonate, sericite (silica, chlorite)	Py ≤10% including stringer mineralisation
6	PORPHYRITIC DACITIC PYROCLASTICS	PDP	Pyroclastic. Fragments typically porphyritic Dacite	t, lt, coarse lt, lta	Blue - grey, grey	Carbonate, sericite silica (chlorite)	Py ≤10% also stringer Sph Gn, Cpy
70	DACITIC REWORKED TUFFS	DRwT	Reworked pyroclastics	t, lt, coarse lt, lta	Blue - grey, grey	Carbonate, sericite	Py ≤10% also minor Sph, Gn, Cpy
68	DACITIC SHALY TUFFS	DShT	Pyroclastic argillaceous	Fine t, t, lt	Grey	Sericite	Py ≤20% also Sph, Gn, Cpy
	INDETERMINATE COMPOSITION						
	FLOWS AND INTRUSIVES	L	Flow and intrusive	Por. vesic. massive - fine grained	Green, buff	Carbonate, chlorite	Py ≤10%
	PYROCLASTICS	P	Pyroclastic	t, lt, lta	Green, grey - buff	Carbonate, sericite chlorite	Py ≤10%
27	STREAKY PYROCLASTICS	SP	Pyroclastic	lt, lta, steaky porphyritic	Green, grey, off-white	Carbonate, sericite	Py ≤10%

REFERENCE

SECTION

- Sericite rich, locally sericitic — ser, (ser)
- Chlorite rich, locally chloritic — chlor, (chlor)
- Carbonate rich, locally carbonated — carb, (carb)
- Silicified, locally silicified — silic, (silic)
- Vesicular, amygdaloidal — vesic
- Probable original character — siliceous
- Foliation, probable bedding/flow bedding
- Cleavage
- Fault unmeasured orietation — F
- Fault measured " — F
- Fault zone unmeasured orietation — FAULT ZONE
- Fault zone measured — FAULT ZONE
- Petrological sample — 141090

DRILL HOLE TRACE

DRILL HOLE TRACE

Py 5 (50)	Pyrite 5%, locally 50%
Py 5-10	Pyrite 5-10%
Gn 2	Galena 2%
Sph 5	Sphalerite 5%
Cpy 15	Chalcopyrite 15%
Ba 5	Barite 5%
q vein	quartz vein
c vein	carbonate vein

PLAN

- Bedding with dip / vertical — 60
- Cleavage with dip / vertical — 80
- Fault with dip / vertical / wet — 60, 80 W
- Joint with dip / vertical / horizontal — 30
- Lineation, direction and plunge — 30

SULPHIDES

21/12 Massive sphalerite - galena Greater than 5% combined Cu, Pb, Zn

29 Massive Pyrite ⩾ 60%

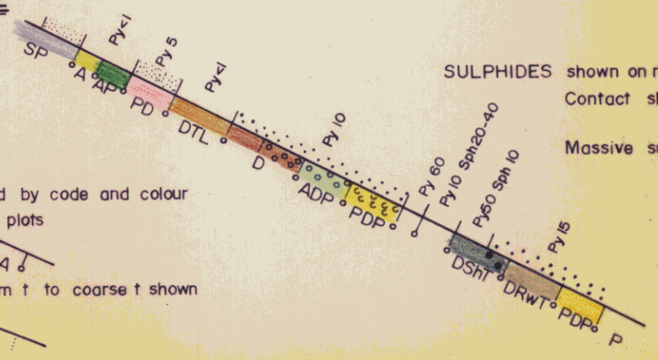
Pyrite ⩾ 10% Pyritic rocks

DOMINANT ALTERATION TYPES

- Carbonate (ankerite)
- Silica
- Chlorite massive / Chlorite disseminated
- Illite hydromuscovite

Alteration illustrated as overprint on same side as rock type.
Contacts shown as

DRILL HOLE TRACE



SULPHIDES shown on right side of drill hole plot as overprint
Contact shown as

Massive sulphide shown as both sulphide and rock type

ROCK TYPES illustrated by code and colour on left side of drill hole plots
Contacts shown as

Interval variations i.e. from t to coarse t shown as

ABMINCO N.L.			
Drawn: E.H.S C.H.Y.	QUE RIVER PROSPECT	Location code:	
Traced: R.K.Y	Geological Legend and Colour Code	Scale:	
Checked:		Date:	
Revised: Date:		Plate N°: QR 84	

APPENDIX B

Petrological Reports for Rock Samples,

Mackintosh and Hatfield Licence Areas.

037

CENTRAL MINERALOGICAL SERVICES PTY. LTD. 303038 Date 31st March 1977

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

IDENTIFICATION
206135
WEAKLY ALTERED MICROGABBRO MACKINTOSH HEC LINE 11425N 6000E

Job No. CMS 77/3/18 Date Received: 28.3.77

Reference Order No. 7/22

Sample No. 206135

Nature of Sample: Hand specimen

DESCRIPTION **SECTION No.** 20888

a. Hand Specimen:

Grey green microgabbro, K stain virtually negative.

b. Microscopic:

This is a weakly altered microgabbro.

The rock is porphyritic towards frequent subhedral grains (to 1.5mm, mean 750μ) of labradorite. These are enclosed in a medium grained groundmass of random labradorite laths (500-200μ) with disseminated granules and crudely subophitic patches (to 500μ) of pyroxene and a semi-pervasive poorly crystalline montmorillonite-stained feldspathic mesostasis. Accessory magnetite is present and there are minor traces of Fe-sulphide as ultrafine particles in the mesostasis.

Two clinopyroxene phases are present with a pale brown pigeonite accompanied by subordinate colorless augite. The two are generally discrete but locally intergrown and overall show identical textural relationships. The rock is thus unusual in that pigeonite occurs as a phenocrystal phase. Additionally rare patches of bastite-like montmorillonite (after ?orthopyroxene) are seen as inclusions in clinopyroxene.

The rock is essentially fresh although feldspar is marginally corroded by the mesostasis. Thin veins (to 350μ) of fibrous semi-radiating scolecite occur sporadically and show semi-continuous selvedges (to 500μ) of zeolitised feldspar. Pyroxenes are often microfractured and weakly stained with Fe-oxide but are essentially unaltered.

D. Cowan, B.Sc.

H&J 65652

038

CENTRAL MINERALOGICAL SERVICES PTY. LTD.

Date 1st April 1977

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

IDENTIFICATION
206136
HYPERSTHENE MICROGABBRO MACKINTOSH HEC LINE 11425N 6000E

Job No. CMS 77/3/18 Date Received: 28.3.77

Reference Order No. 7/22

Sample No. 206136

Nature of Sample: Hand specimen

DESCRIPTION **SECTION No.** 20889

a. Hand Specimen:

Grey fine-grained microgabbro, K stain very weakly positive.

b. Microscopic:

This is an essentially unaltered hypersthene microgabbro. The rock is similar and no doubt closely related to 206135 but is of slightly different composition and fabric.

This rock is weakly porphyritic towards pyroxene subhedra (to 1mm) and clusters but overall is relatively fine and even-grained. It consists of labradorite and pyroxene in roughly equal proportions with accessory ilmenite, hematite, traces of magnetite and a sparse variably montmorillonite-stained cryptopegmatitic feldspathic mesostasis. The fabric is slightly ophitic ("doleritic") and the main contrast here is the finer modal grainsize.

The pyroxenes are variably diallaged diopsidic augite, pigeonite and virtually colorless weakly schillerised hypersthene in order of abundance. All three are discrete to mutually intergrown. Presence of hypersthene tends to confirm the former presence of orthopyroxene in 206135 as a minor accessory phase.

As previously the rock is essentially fresh. Incipient montmorillonite replacement of pyroxene is evident. No sulphideswere detected.

D. Cowan, B.Sc.

039

CENTRAL MINERALOGICAL SERVICES PTY. LTD.

Date 1st April 1977

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

IDENTIFICATION
206337
ALTERED, SHEARED ?LITHIC-VITRIC- CRYSTAL TUFF MACKINTOSH 7700N 6920E

Job No. REPORT CMS 77/3/18 Date Received: 28.3.77

Reference Order No. 7/22

Sample No. 206337

Nature of Sample: Hand specimen

DESCRIPTION **SECTION No.** 20891

a. Hand Specimen:

Grey green chloritic sheared ?fragmental, K stain weakly positive (clays).

b. Microscopic:

This is an extensively altered and sheared tuff of dacitic affinities.

Recognisable clastic material comprises 30 to 50% of the rock and is very poorly sorted in the silt to coarse sand range, (50μ-2mm) with no real evidence of bedding. Angular to subangular lava clasts predominate. These consist typically of sparse sericitised feldspar and rare partly recrystallised quartz microphenocrysts in a chlorite- and sericite-stained microfelsitic groundmass with trace-accessory apatite and leucoxenised opaques. Some of the finer lithic clasts are completely altered to secondary microgranular quartz. Accompanying these are cloudy quartz semi-pseudomorphs of feldspar crystals (to 1mm) and crystal fragments and rare similarly altered shards (max. 50μ).

Probably shards were more abundant than is now evident (hence ?lithic-vitric-crystal tuff). The clastic material is embedded in microschistose chlorite and green sericitic illite-hydromuscovite which are weakly stained with discontinuous microscopic films of leucoxenic TiO_2. No sulphide was detected.

D. Cowan, B.Sc.

HBJ 65652

CENTRAL MINERALOGICAL SERVICES PTY. LTD.

Date 1st April 1977

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

IDENTIFICATION
206338
DEVITRIFIED ALTERED SHEARED PORPHYRITIC PITCHSTONE MACKINTOSH 7730N 6925E

Job No. CMS 77/3/18 Date Received: 28.3.77

Reference Order No. 7/22

Sample No. 206338

Nature of Sample: Hand specimen

DESCRIPTION **SECTION No.** 20892

a. Hand Specimen:

Grey brown altered sheared ?fragmental rock, K stain negative, weakly magnetic.

b. Microscopic:

This is a devitrified altered and sheared porphyritic pitchstone of inferred dacitic primary composition.

Frequent irregular to semi-regular aggregates (mean 500μ, max. 2mm) of sericite are present and on the basis of form the majority of these features represent altered single and sporadically clustered feldspar phenocrysts. A few sericite aggregates are stained with very fine opaques and these represent altered ferromag phenocrysts (?amphibole, shapes are non-diagnostic). There is no evidence of phenocrystal quartz.

The remainder of the rock consists essentially of thoroughly sericite-stained felsitic material. A relict perlitic structure persists in the form of micro-scale sericite veinlets outlining the devitrification cracks. Relict primary magnetite is abundant and traces of apatite are present.

Shearing is reflected in partial orientation of sericite and a flattening of the coarse perlitic structure. Sheared discontinuous chlorite veinlets occur sporadically. There is no evidence of sulphides. Fe-staining results from partial degradation of magnetite which is extensively martitised.

D. Cowan, B.Sc.

041

CENTRAL MINERALOGICAL SERVICES PTY. LTD.

Date 1st April 1977

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

IDENTIFICATION
206350
DEVITRIFIED ALTERED PORPHYRITIC DACITE MACKINTOSH 7400N 6400E

Job No. CMS 77/3/18 Date Received: 28.3.77

Reference Order No. 7/22

Sample No. 206350

Nature of Sample: Hand specimen

DESCRIPTION **SECTION No.** 20893

a. Hand Specimen:

Grey green altered ?dacite, K stain negative.

b. Microscopic:

This is a devitrified, altered and incipiently sheared porphyritic dacite.

Frequent chlorite-sericite semi-pseudomorphs of single (to 1mm) and clustered (to 2mm) prismatic phenocrysts are present. On the basis of shape the majority of these features were feldspar but there are a few definite pyroxene-derived shapes. Rare partly recrystallised quartz microphenocrysts are present and the paucity of these features confirms the intermediate nature of the rock.

The altered groundmass consists largely of heavily sericite-stained anhedral quartz with relict felsitic to crudely spherulitic microtextures. Subordinate similarly textured feldspar is closely intergrown. Accessory leucoxenised opaques are present. A poorly defined flow fabric is outlined in a dimensional preferred orientation of the altered phenocrysts.

Stressed/weakly crenulated quartz veinlets occur sporadically. Minor traces of partly oxidised ultrafine pyrite occur associated with the altered phenocrysts. This rock is a little unusual in carrying (altered) pyroxene phenocrysts but in other respects if typical of the Mount Read Volcanics.

D. Cowan, B.Sc.

H&J 65652

042

CENTRAL MINERALOGICAL SERVICES PTY. LTD.

Date 1st April 1977

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

IDENTIFICATION
206351
DEVITRIFIED, ALTERED, WEAKLY SHEARED PORPHYRITIC "DACITE" MACKINTOSH 6600E 7400N

Job No. CMS 77/3/18 Date Received: 28.3.77

Reference Order No. 7/22

Sample No. 206351

Nature of Sample: Hand specimen

DESCRIPTION **SECTION No.** 20894

a. Hand Specimen:

Grey green altered sheared porphyritic ?andesite, K stain negative.

b. Microscopic:

This is a devitrified, altered and weakly sheared porphyritic lava of andesitic-quartz andesitic ("dacitic") composition.

Texturally the rock is rather similar to 206338 and it appears as a strongly porphyritic perlitic pitchstone. The phenocrysts are completely chloritised-sericitised and these semi-pseudomorphous aggregates (50μ - 1.5mm) are somewhat flattened by shearing. The majority were feldspar but accompanying these were relatively frequent phenocrysts of both amphibole and pyroxene with, probably, accessory amounts of olivine and rare biotite flakes.

The groundmass consists of strongly sericite-stained felsitic/anhedral quartzofeldspathic material with relict perlitic cracks outlined by discontinuous films of chlorite and sericite - leucoxenised accessory opaques are relatively abundant. There are occasional patches of stressed granular secondary quartz and weakly stressed quartz veins (to 3mm) with traces of chlorite sporadically. There is no evidence of sulphides.

This rock, on the basis of inferred mineralogy, is of relatively basic character when compared to the associated specimens. However, in common with them it has a rather felsic (siliceous) groundmass. Conceivably some of the "ferromags" (eg. olivine) were xenocrystal.

D. Cowan, B.Sc.

04

CENTRAL MINERALOGICAL SERVICES PTY. LTD.

Date 3rd May 1977

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

IDENTIFICATION
206349
WEAKLY ALTERED IGNIMBRITIC FLOW BRECCIA MACKINTOSH 3600N 4520E

Job No. CMS 77/4/18 Date Received: 28.4.77

Reference Order No. 7129

Sample No. 206349

Nature of Sample: Hand specimen

DESCRIPTION **SECTION No.** 21058

a. Hand Specimen:

Grey white/dark grey fragmental rock, K stain positive.

b. Microscopic:

This is a devitrified and weakly altered flow- or autobrecciated ignimbrite of potash dacitic (ie. trend rhyodacitic) composition.

The grey angular clasts (to 1cm+) seen in hand specimen have the general appearance of porphyritic dacite lava in thin section with fairly frequent single and clustered plagioclase phenocrysts (now weakly saussurite-stained albite) enclosed in a weakly flow-textured pervasively chlorite-montmorillonite-stained groundmass. These clasts are weakly amygdaloidal with disseminated cuspate quartz-clay infilled vesicles (to 1mm). Very fine cryptocrystalline K-feldspar (?adularia) semi-pseudomorphs of alkali feldspar microlaths occur in some areas of the groundmass. Some areas of these clasts are clearly tuffaceous with recognisable flow lineated microshards (rarely > 20μ) which are locally restricted to discrete elongate/ovoid clasts (to 1mm). Elsewhere there are recognisable lava clasts (to 3.5mm). These clasts can then be classified as tuff lava with a certain pyroclastic component.

The enclosing matrix (grey-white, hand specimen) consists essentially of microfelsitic quartzofeldspathic material enclosing disseminated feldspar crystals/crystal fragments (albitised, mean 250-300μ) and sporadic lava clasts (< 1mm) similar to those described above. Vague but nonetheless definite relict microshard textures are semi-pervasive throughout. Accessory traces of K-feldspar are present but quartz crystals/crystal fragments are completely absent (hence potash dacite). Weak but semi-pervasive montmorillonite staining occurs and minor chlorite occurs in discontinuous microveinlets.

The fabric, overall, is typical of flow-breccias and with the composite of lava, clastic lava and tuffaceous lava clasts in a tuffaceous matrix is most likely a flow-top breccia. Minor oxidised fine grained an- to subhedral pyrite is present and incipient shearing (greenschist metamorphism) is evident.

H&J 65652

D. Cowan, B.Sc.

044

CENTRAL MINERALOGICAL SERVICES PTY. LTD.

Date 3rd May 1977

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

IDENTIFICATION
206348
DETRITAL ? PICOTITE MACKINTOSH 6400N 7430E

Job No. CMS 77/4/18 Date Received: 28.4.77

Reference Order No. 7129

Sample No. 206348

Nature of Sample: Hand Specimen

DESCRIPTION **SECTION No.** 21059

a. Hand Specimen:

Grey white argillaceous quartzite, non-magnetic.

b. Microscopic:

This specimen was examined briefly in thin section and subsequently in polished section and by determination of Vickers Microhardness of the opaque phase appearing as minute black specks in hand specimen.

The rock is a poorly sorted weakly argillaceous orthoquartzite consisting of quartz-cemented fine to coarse sand sized single and composite quartz grains with sporadic (quartzite, chert, and argillite) lithic fragments. Traces of kaolin are included in the quartz cement and the rock is quite markedly stressed.

The opaque phase is an accessory detrital constituent as fairly evenly sized angular to rounded grains (mean about 100μ) comprising 0.2 - 0.5% of the rock. Optical features (opaque to incipiently translucent in dark red brown at thin edges, isotropic, unzoned, grey, low reflectivity) indicate that this is a spinel and one of the more chemically complex varieties most likely a picotite. This could be confirmed by spectography but a larger specimen would be required for initial heavy liquid separation/concentration.

Minor traces of detrital zircon and partly leucoxenised brown rutile are also present.

D. Cowan, B.Sc.

H&J 65652

045

CENTRAL MINERALOGICAL SERVICES PTY. LTD.

Date 20th May 1977

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

IDENTIFICATION
206392
ALTERED RHYOLITIC TUFF MACKINTOSH 5930E 4950N

Job No. CMS 77/5/21 Date Received: 17.5.77

Reference Order No. 7137

Sample No. 206392

Nature of Sample: Hand specimen

DESCRIPTION **SECTION No.** 21200

a. Hand Specimen:

Very pale, fine-grained volcanic rock; abundant fine pyrite. K-stain test negative.

b. Microscopic:

This is believed to be a rhyolitic tuff, probably welded, and thoroughly silicified and sericitised.

Small rounded grains of quartz (possibly pyroclastic) and poorly-defined "felsitic" patches of devitrified and altered glass are interspersed with wispy subparallel streaks of sericite-illite. Relict fine textures are vague but suggest shards and other vitric fragments. Ultrafine leucoxene is characteristic throughout and is relatively abundant, occasionally forming thin streaks and small lenses.

Euhedral pyrite is very common, and is associated with minor, pale chlorite. There are veins and lenses of fairly coarse quartz, carrying larger pyrite crystals and goethite patches possibly representing oxidised chalcopyrite.

The general petrography of this rock would not be out of place in the Mt. Lyell sequence.

H.W. Fander, M.Sc.

H&J 65652

CENTRAL MINERALOGICAL SERVICES PTY. LTD.

Date 20th May 1977

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

IDENTIFICATION
206376
SODIC TRACHYTE MACKINTOSH 5970E 4980N

Job No. CMS 77/5/21 Date Received: 17.5.77

Reference Order No. 7137

Sample No. 206376

Nature of Sample: Hand specimen

DESCRIPTION **SECTION No.** 21199

a. *Hand Specimen:*

Pale, fine-grained volcanic rock. Weak K-stain reaction.

b. Microscopic:

As far as can be determined, this is a sodic trachyte; as is often the case, the groundmass is very fine and indeterminate, and the rock may range into a felsic trachyandesite on the one hand or into a sodic rhyolite on the other. However, the term sodic trachyte ("keratophyre") is probably a reasonable compromise without resorting to a whole-rock analysis.

Small phenocrysts of albite, chlorite pseudomorphs after ?hornblende, and very occasional small quartz crystals, show subparallel flow-alignment and are set in a groundmass of sericitised feldspar laths, chlorite, ultrafine ?epidote and secondary quartz Judging from the K-stain reaction the groundmass feldspar is probably a k-Na variety (perhaps originally sanidine). Accessory leucoxene occurs throughout and is pseudomorphous after ?ilmenite.

Apart from chlorite pseudomorphs, there are other chlorite patches, with different texture, which may be vesicle-fillings. Patches of granular epidote represent deuteric alteration.

The fabric of the rock is fairly homogeneous, and it is possible that it is intrusive, not extrusive.

H&J 65652

H.W. Fander, M.Sc.

947

CENTRAL MINERALOGICAL SERVICES PTY. LTD.

Date 20th May 1977

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

IDENTIFICATION
206375
SHEARED RHYOLITE (WITH BARITE) MACKINTOSH. 5977E 5110N

Job No. CMS 77/5/21 Date Received: 17.5.77

Reference Order No. 7137

Sample No. 206375

Nature of Sample: Hand specimen

DESCRIPTION **SECTION No.** 21198

a. Hand Specimen:

Pale, fine-grained, sheared volcanic rock. K stain test positive.

b. Microscopic:

This is a sheared rhyolite; it was probably microporphyritic and glassy, and has a fairly complex history. It contains barite and there is evidence of sulphides.

Numerous small, rounded patches of quartz occur throughout the rock; these could be small phenocrysts or perhaps spherulitic bodies; they are more abundant in some bands and are sparse elsewhere. The bulk of the rock consists of typical devitrified glass, evidently potassic (positive K-stain test), of brownish color, with intergrown fine quartz and secondary sericite and very pale chlorite.

It would appear that at this stage the rock was mineralised, with the development of pyrite, ?chalcopyrite, and associated barite as lenses and clusters of small crystals. This phase may have been accompanied by some shearing and chloritisation, and was followed by further shearing, which affected all the earlier minerals including the sulphides and barite.

This rock (and its history) would fit in quite well with the Mt. Lyell situation.

H.W. Fander, M.Sc.

H&J 65652

043

CENTRAL MINERALOGICAL SERVICES PTY. LTD.

Date 20th May 1977

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

IDENTIFICATION
206373
SHEARED, ALTERED RHYOLITE MACKINTOSH. 6045E 5270N

Job No. CMS 77/5/21 Date Received: 17.5.77

Reference Order No. 7137

Sample No. 206373

Nature of Sample: Hand specimen

DESCRIPTION **SECTION No.** 21197

a. Hand Specimen:

Pale, fine-grained featureless rock. K stain test negative.

b. Microscopic:

This is a sheared, altered rhyolite or perhaps welded rhyolitic tuff, and is also reminiscent of some of the rocks at Mt. Lyell. Whilst broadly similar to 206006, it differs in some details, especially of texture.

There are quite abundant small, rounded patches of quartz which are assumed to be phenocrysts; many are stressed, fractured and partly recrystallised. They are set in a groundmass of fine quartz and sericite; this has a lensoid fabric, believed to be partly due to flow-banding and partly to subsequent shearing. Some flow-brecciation very probably also took place.

Sericite is abundant in some bands, as relatively coarse interleaved flakes with strong preferred orientation; minor streaks of degraded chlorite are also present (cp. mineralised rocks at Mt. Lyell), generally with associated goethite patches. The goethite is pseudomorphous after small, euhedral pyrite crystals; there is no evidence of other sulphides. Small, irregular aggregates of white, opaque, leucoxene are common.

As in 206006, the term "rhyolite" is used in a broad sense to denote an acid volcanic type; it is not known whether the rock was potassic or sodic or even perhaps dacitic.

H&J 63652

H.W. Fander, M.Sc.

CENTRAL MINERALOGICAL SERVICES PTY. LTD.

Date 20th May 1977

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

IDENTIFICATION
206006
PORPHYRITIC RHYOLITE MACKINTOSH. Mt. Charter Line 3800E

Job No. CMS 77/5/21 Date Received: 17.5.77

Reference Order No. 7137

Sample No. 206006

Nature of Sample: Hand specimen

DESCRIPTION **SECTION No.** 21196

a. Hand Specimen:

Pale volcanic rock with fine pyrite. K-feldspar stain test negative.

b. Microscopic:

Fairly severely altered and thus not as clearly defined in some details as would be needed for an accurate classification, this rock is thought to be a porphyritic rhyolite (in a broad sense) or rhyolitic tuff-lava. It is strongly reminiscent of the host rocks at Mt. Lyell.

Phenocrysts and fragmented phenocrysts of embayed, corroded quartz are fairly common but feldspar phenocrysts are scarce and are completely sericitised. The groundmass now consists of microcrystalline quartz and wisps and streaks of sericite. There are minor textural variations in the groundmass which suggest some tuffaceous components (of the same composition), and clear indications of minor brecciation, very probably flow-brecciation.

Pyrite, and possible other sulphides (positive evidence is lacking), was introduced at a subsequent stage pre-dating a younger phase of mild shearing. The pyrite is now largely oxidised, and fine goethite pervades the rock. It also forms patches with poorly defined cellular textures.

The rock has been termed a rhyolite but since the feldspar cannot now be determined, the term "acid Volcanic" would perhaps be more appropriate.

H.W. Fander, M.Sc.

N&J 65652

050

CENTRAL MINERALOGICAL SERVICES PTY. LTD.

Date 27th September 1976

SAMPLE REPORT (*Mineralogy, Petrology, Ore Microscopy*)

IDENTIFICATION
183190
SHEARED, INDURATED LITHIC GREYWACKE MACKINTOSH Creek adjacent to 2010N 5300E

Job No. CMS 76/9/22 Date Received: 16.9.76

Reference Purchase Order No. 7308

Sample No. 183190

Nature of Sample: Hand specimen

DESCRIPTION **SECTION No. 19611**

a. Hand Specimen:

Dark, medium-grained indurated clastic sediment.

b. Microscopic:

This is a mildly sheared, indurated lithic greywacke, perhaps incipiently metamorphosed.

The framework consists mainly of slightly stressed, angular to subangular, irregularly shaped quartz grains with an average size of 0.2 - 0.3mm; there is some preferred, subparallel orientation of their long axes. Shreds and larger flakes of muscovite are fairly common, also with preferred orientation. The lithic fragments range in size from 0.3mm to 3mm, with occasional larger particles which are generally flat or platy; types include micaceous siltstones, metaquartzite, muscovite-quartz schist, fine mica schists/phyllites, and very occasional ?microdiorites (rather decomposed). Thus the lithic grains are predominantly low-grade metasediments.

Heavy minerals are interesting, the main species being dark brown "chromite" (probably a chromiferous spinel) and leucoxene aggregates representing altered ilmenite; others include apatite and well-rounded zircon, and tourmaline (schorl).

The matrix/cement is mostly pale-green chlorite, with some sericite and quartz, recrystallised and stressed. Quartz veins cut the rock, and there are quartz-chlorite filled shears or fractures.

The components had several sources. The tourmaline and some quartz and coarse muscovite were most likely from an "acid" igneous source. The chromite and ilmenite had an ultramafic(-mafic) provenance, and the chromite occurs as irregular, angular grains suggesting a reasonably close source. The matrix chlorite (a pale Mg-rich variety) could be from the same source. The microdiorite was from an intermediate, ?minor intrusive. The low-grade metasediments are from a regionally metamorphosed sedimentary sequence.

H&J 63652

H.W. Fander, M.Sc.

APPENDIX C

DIAMOND DRILL LOGS H1 & H2-2A

MC-1, MC-2

303053 052

Bonanza

DRILL HOLE RECORD

EL 15/73

Location Mt. Charter | Property Hatfield River | District Tasmania, Australia | Alt./R.L. N/A | Hole No MC-1

Commenced 12/2/76 | Completed 21/2/76 | Core size NQ to BQ to EOH | Co-ordinate 4800N, 4290E | Date

Objective To test the central culmination of an IP (fe) anomaly in attractive volcanics. | % Recovery | Bearing (M) 099° | Grid bearing (M) 8°45' | Logged | Dip 45°

SURVEY DATA				GRAPH DERIVED DATA						REMARKS
DEPTH	DIP	BEARING(M)	INSTRUMENT TYPE	DEPTH	DIP	BEARING(M)	NORTHING	EASTING	ALTITUDE	
0	45	099	Clinometer, tube compass	0	45	99	4800	4290.00	0.00	Collar survey checked
32	42	110	Eastman SS	25	43	105	4798.97	4302.93	-17.36	
50	40	105	"	50	40	102.5	4797.34	4326.57	-33.92	
80	36	104	"	75	37	101	4796.33	4346.10	-49.48	
116	30	100	"	100	33	99.5	4795.80	4366.56	-63.81	
151	26.5	104	"	125	29	97	4795.99	4387.96	-76.68	
176	19.5	98.5	"	150	26.5	99	4796.28	4410.08	-88.32	
				175	20	96	4796.79	4433.00	-98.17	
				195.50	10	93.5	4798.18	4452.67	-103.46	

053

DIAMOND DRILL LOG

Hole N. [illegible] Page N. [illegible]

303054

Feature : Bedding, Foliation, Fragment - size & shape; Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : Trace [illegible]%, Common 5-15%, Abundant 15-[illegible]%, Massive >60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG (TRACE / COMMON / ABUNDANT / MASSIVE)	DEPTH m	MINERALIZATION
3.00	0	PyP1 Mid to light grey, locally bleached (weathered) fine grained dacite or rhyolite lava. Flow banding is wary, typically 30° to subparallel to the core axis. Intermittent fragmental texture is interpreted as lava-breccia (e.g. 5.30 to 6.40)			Pyrite 507% as veinlet and occasional irregular clots of mas fine aggregates.
1.55					
2.95	5	Foliation is typically 30° to core axis is weak and is dominated by irregular fracturing marked by quartz veining (<3mm) and pyrite veinlets. *Possibly silicified and sericitised.*			
0.65					
2.30	10				
1.00					
2.00	12.60	Sheared grey lithic tuff with sericitised (pale green), blue grey, and pyritic fragments.			Note pyrite rich fragm
2.40	15 15.17	?DTL >PyP1 Light grey to buff locally greenish grey, feldspar porphyry lava. Pale green sericitised phenocrysts to 1mm occur densely in a sericite-carbonate rich matrix.		14.96 15.36	Massive vein pyrite 7(
1.65					Veinlets and dissemina tions of pyrite occur throughout averaging 5 possibly 7% locally.
1.70		A strong foliation (streaking of feldspar) is developed at 30-40° to the core axis.			
	20	The unit is very massive (forms a marked topographic ridge), and is the typical Mt. Charter rhyolite as dacite feldspar porphyry lava.			
2.50					
3.10		5 cm			
	25				

DIAMOND DRILL LOG

Page N° 2

Feature : Bedding, Foliation, Fragment - size & shape; Shearing, Fault, Vein; c carbonate, q quartz

Mineralization : Trace, Common, Abundant, Massive >60%

303055

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	DEPTH m	MINERALIZATION
1.00		Occasional quartz veins occur at 90° to the foliation.			
2.30		Rare narrow (<10cm-20cm) zones of agglomerate may be flow tops - viz. 26.90, 30.00.			Pyrite continues 5% as veinlets and disseminated crystals (< 1mm).
3.00	30				
3.00					Vein pyrite averages 10 associated with narrow irregular quartz veins.
	35				
	35.80	PyP1			
3.00		Lithologically identical to adjacent units but dominated by lithic tuff to agglomerate, with massive sericitisation of some fragments, carbonation of others.			Pyrite veining parallel foliation at 25-30° to core axis, 5-7%.
		Foliation is 40° to core axis.			
3.00	40				
1.25					
1.80					
	43.75				
3.00	45	Feldspar porphyry lava continues, pale cream, greenish to buff, light grey.			
		Foliation (streaking of feldspars) is 50° to core axis, some colour banding may be flow banding.			
3.00		Irregular fractures are lined with pyrite and quartz.			
		Below 53m irregular silica filled.			
	50				

5 cm

055

Gamaco

DIAMOND DRILL LOG

Hole Nº MC 1 | Page Nº 3

Feature : Bedding, Foliation, Fragment - size & shape; Shearing, Fault, Vein; c carbonate, q quartz

Mineralization : Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

303056

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
3.00		Zones may be matrix silification coincident with lava solidification, as previously rare breccia and agglomerate zones may be flow tops. Bleaching and oxidation has occurred adjacent to some fractures.							Veinlets and rare massive veins of pyrit
3.00	55	This lava is massive and is only along irregular fractures.							Pyrite 5%
2.75									
3.05	60								
3.10									
3.00	65	Irregular quartz veining is present throughout, traces of barite become apparent below 65m.							Pyrite 5%
3.05	70	The unit continues as massive feldspar porphyry lava, with occasional narrow, (10-20cm) zones of breccia (agglomerate).							
1.00									
2.00									
	75								

5 cm

DIAMOND DRILL LOG

Hole N° MC 1 | Page N° 4

303057

Feature : Bedding, Foliation, Fragment - size & shape; Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

CORE REC'D	DEPTH m	GEOLOGY	MINERALIZATION
3.00	77.00		
3.00		Lithologically identical with above but more heavily veined with quartz and barite, the latter locally 10%. Base metals are also evident.	Pyrite 5-7%, trace disseminated galena an sphalerite, particular with barite veining.
3.00	80		
3.00		84-85m, distinct banding (<1mm) which may be bedding. This unit may in part be a bedded fine tuff. Barite layers or veins occur parallel to this foliation; pyrite silica and barite veins also occur at all angles and cross cut each other.	
3.00	85	Barite veining is possibly later than sulphide and silica, but this may be a post depositional remobilisation.	
3.00			
3.00	90	Lithology is feldspar porphyry lava, possibly crystal and fine tuff locally.	Traces of sphalerite an galena with pyrite veinlets, also with barite veins.
		Foliation now 60° to core axis.	
3.00			
3.00	95		
	97.55	Finely bedded barite 70° to core axis	Fine pyrite with barite
0.60	97.85	Major quartz vein 40 cms ——	
1.95		Pale grey to cream, sericitised carbonated (?) feldspar porphyry lava.	
	100		

5 cm

057

DIAMOND DRILL LOG

Hole N

Feature : Bedding, Foliation, Fragment - size & shape 0% | Shearing, Fault F, Vein c carbonate q quartz

Mineralization : Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

303058

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG (TRACE / COMMON / ABUNDANT / MASSIVE)	DEPTH m	MINERALIZATION
3.00	103	Rare barite-carbonate(?) veining. Foliation is 50° to core axis.			Traces of galena sphalerite in barite veins.
	104	Zone of intense (25%) barite veining(?) lithology as above, feldspar porphyry ~~lava or tuff.~~			Disseminated pyrite, galena, sphalerite (loc ly 2-3%, combined sph. galena)
3.05	105	As above, less intensely veined with barite (5-10% of total), the lava is locally brecciated (probably tectonic deformation? rather than autobrecciation?). Foliation, vein orientation and fracturing tends to be 50-60° to core axis.			
3.00	110				
2.90	112.60				Disseminated sphalerite and galena throughout, with pyrite veining 5-7% locally 10%.
3.00	115	Lithic tuff becoming agglomerate below 117.50m approx. Texture locally destroyed by sericite alteration, and quartz-carbonate veining.			
3.20		Foliation locally strong at 40-45° to core axis.		116	Pyrite 3-5%, no apparen sphalerite or galena, except with barite at 119m. (10cm zone)
3.00	120	Barite veining is common to 114m, then more rarely and with quartz-(carbonate?) below approx. 116.80m. Massive 10cm barite band (foliated or bedded at 119m).			
3.00	123.06	Fine grained feldspar porphyry lava(?) veined by barite and pyrite.			
	125				

5 cm

DIAMOND DRILL LOG

Hole N° [MC 1] Page IV

Feature : Bedding, Foliation, Fragment - size & shape; Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

303059

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	DEPTH m	MINERALIZATION
3.00		Barite veining common towards end of unit.		127.35	Pyrite 10% as massive irregular veins, commo with massive barite. Disseminated sphalerit and galena occur, particularly with barite quartz veins.
	128	Lithic tuff; greento cream sericite-carbonate(?) rich fragments, occur in a grey matrix. Scattered fragments of light grey lava.			
3.05	130	Foliation (cleavage) is 45° to core axis, the sericitic fragments have a characteristic shredded appearance.			Sulphide contact decli to 5-7% (pyrite).
2.85		Barite veins and bands are present throughout. Zones up to 10cm of massive barite with foliation (?bedding or recrystallisation) parallel to the cleavage.			
	135	Later quartz-carbonate veins up to 10cm are typically perpendicular to the cleavage?. These massive veins are concentrated between 133m and 137.20m		135.20	
3.00					Pyrite 3-5% as veins a disseminated quartz.
3.00					
	139.30	Pale blue-grey agglomerate of fine-grained dacitic(?) feldspar porphyry lava. Sericitisation of feldspar is apparent, but the bulk of the rock has a siliceous aspect. The fragments are generally light grey, the matrix dark blue grey. There are rare quartz veinlets only.			
	140				
3.00					
	143.85	Sheared, yellow cream to light grey lithic tuff-agglomerate to agglomerate mixture of yellowish and light grey fragments occur in a grey matrix, much veined by quartz and variable quantities of barite.			Pyrite continues 3-5% fine stringers and disseminated euhedral sub-hedral crystal (< in the rock matrix.
3.00	145				
1.60					
1.30		Alteration is sericite-carbonate(?)—silica(?)			
		Cleavage is 55 to 60° to core axis. Shearing is most intense between 146.68			Rare disseminated sphalerite and galen
	150				

5 cm

059

Cominco

DIAMOND DRILL LOG

Hole N° MC 1 | Page N° 7

Feature : Bedding, Foliation, Fragment - size & shape 0%; Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

303060

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	DEPTH m	MINERALIZATION
2.55		and 152m with much broken core and probable faulted zones.			
3.05		Between 152m and 161.08, the rock is competent, with yellow sericite-carbonate rich fragments after feldspar porphyry (to 5cm) and a mid to dark grey matrix. Foliation (cleavage) continues at 60° to core axis but is not as marked a parting as previously.			Pyrite increase to 7-10% as narrow veinle (<5mm), as halos to ro fragments and as disseminated crystals.
	155	There are occasional barite veins parallel to the foliation.			
3.00					
3.00	160				
	161.08	DTL/PyP1			
3.00		Pale grey fine grained lava or tuff. Feldspar phenocrysts (sericitised) and faint crudely lenticular forms (<2mm) visible at x 10 suggest this rock may be an ash flow tuff or tuff-lava. — Dacitic feldspar porphyry (vitric?) tuff-lava. Petrological specimen collected at 187.50m (No. 183301)			
2.95	165				
1.80		Zones of foliated uniformly macro-textured rock alternate with zones where close packed fragments are apparent.			Pyrite 5-10%, as veins parallel to the foliat commonly bifurcating. Veins vary from < 1mm to 2-5 cms.
	170	These are typically <2cms but some are up to 10cm.			Pyrite is 40% from 168 to 168.90 with barite veins, similarly from 175.29 to 175.92. Els where, vein pyrite without barite locally attains 30%.
3.00		Shapes have been modified by shearing at 70° to the core axis, pyrite veining is quite common.			
2.85		Barite veins occur sparsely throughout, but locally attains 5-10% of the total rock, viz 168.40 to 171.40m, and 175.50 to 176m.			
	175				

5 cm

Commico

DIAMOND DRILL LOG

Feature : Bedding, Foliation, Fragment - size & shape; Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

303061

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG (TRACE / COMMON / ABUNDANT / MASSIVE)	DEPTH m	MINERALIZATION
				175.29	
				175.92	
				176.00	
3.00	180	Patchy sericitisation of some fragments occurs below 178.50, imparting a greenish colour to the unit, shearing is more apparent at 60° to core axis.			Pyrite circa 5% as vesicles and dissemin crystals, rare veins r 1cm below 180m.
2.90					
	181.35	PyP1			
		Greenish yellow to grey sheared sericite tuff-agglomerate.			
2.95		Cleavage is 65° to core axis.			
		Probably an altered variant of the adjacent rock type.			
	185				
3.00					
	187.04	DTL>PyP1		187	
		Light grey feldspar porphyry (vitre?) tuff-lava, brecciated, with dark grey colouration along pyritised fractures. Foliation, possibly sheared out flow-banding or tuffaceous bedding is 45° to core axis.			Pyrite occurs as vein asrare disseminated crystal aggregates (~1mm) typical 3-5%, patchily to 7-10%.
2.80	190				
		Some narrow sericitised zones occur.			
		Petrological specimen at 187.60 (No. 183301)			
3.05					
1.55	195				
	195.5	END OF HOLE			

5 cm

303062

Bonnex

DRILL HOLE RECORD

Location Mt. Charter Property Hat River EL 15/73 District Tasmania, Australia Alt./R.L. N/A Hole N° MC.2

Commenced 22/2/76 Completed 27/2/76 Core size NQ to 33m, BQ to EOH Co-ordinate 4600N, 4290E Date

Objective To test base metal soil geochemical anomalies adjacent to a baryte vein in altered volcanics. % Recovery Bearing (M) 098° Grid bearing (M) 8°45' Logged Dip 45°

SURVEY DATA

DEPTH	DIP	BEARING(M)	INSTRUMENT TYPE
0	45	098	Clinometer, tube compass
43	45.5	104.5	Eastman SS
79	41.5	103.5	"
109	42.5	104.5	"
145	31	97	"
184	24	99.5	"

GRAPH DERIVED DATA

DEPTH	DIP	BEARING(M)	NORTHING	EASTING	ALTITUDE
0	45	98	4600.00	4290.00	0.00
25	45	100	4599.67	4307.67	-17.68
50	44.5	100.5	4599.46	4325.42	-35.28
75	42	99.5	4599.06	4343.62	-52.40
100	42	100	4598.74	4362.20	-69.13
125	39.5	97.5	4598.75	4381.13	-85.45
150	30	93.5	4599.95	4401.55	-99165
175	25	95	4601.68	4423.64	-111.18
187.40	24	96	4602.32	4434.90	-116.32

REMARKS

End of hole.

Note: Stadia pick up to collar not done
Collar chained only along cut line.

Cominco

DIAMOND DRILL LOG

Hole No [MC. 2] Page IV 1

Feature : Bedding, Foliation, Fragment - size & shape 0%, Shearing, Fault F, Vein c carbonate q quartz

Mineralization : Trace 1-5%, Common 5-15%, Abundant 15-30%, Massive >50%

303063

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
		AP							
		Oxidised orange, feldspar porphyry agglomerate; original weak chlorite colouration patchily visible. Very broken, rubbly core.							Oxidised
2.00									
	5								
	10								
SAND COLLECTED		Orange brown feldspathic sand.							
NO CORE.	15								
	20								
	22.40	Pale grey-green feldspar porphyry agglomerate							
	23.0	As above but fresher, feldspar porphyry agglomerate. Partly altered andesite, very broken and locally pug. Note substantial core losses.						23	Pyrite visible 3-5%
1.75	25								

5 cm

063

Bamunce

DIAMOND DRILL LOG

Hole No. MS-2

Feature : Bedding, Foliation, Fragment - size & shape (0%), Shearing, Fault (F), Vein (c carbonate, q quartz)

Mineralization : Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

303064

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	DEPTH m	MINERALIZATION
	25.40				
0.90		FAULT ZONE. Lithology as above, rubbly core with pug. Locally cleaved at 40° to core axis. Alteration is sericite, so that the typical AP character veers towards PyP1.	BROKEN CORE		
2.50	30				
				31.35	Pyrite increases to (locally) 10% as disseminated crystal and crystal aggregat.
3.00		NQ reduced to BQ at 33.37m. Alteration increases below 34m.			
	34.75				
	35	Gradational contact, to PyP1 (>AP) sheared sericite rich lithic tuff to agglomerate. Fragmented texture only locally distinct due to cleavage at 25-35° to core axis. Patchy penetrative weathering is indicated by brown and light cream zones adjacent to fractures.			
2.00					
1.05					
0.90			F		
1.20		Occasionally relict features typical of AP group rocks can be seen (feldspar phenocrysts to 2mm, off white in colour) - Particularly 44.10 to 54.10 - with large fragments (to 5 cms)			
	40				
2.30					
			F		
1.60					
	45				
2.80				44.90	Pyrite 15-20%, netw of veins and string
					Pyrite 10%, locally as disseminated cry stringers and veinl
4.10					
	48.50				
	50	Texture as above (agglomerate) but colour is distinctly yellow-green, (due to sulphide?)			

5 cm

DIAMOND DRILL LOG

Hole N° MC 2 | Page N° 3

Feature : Bedding, Foliation, Fragment - size & shape (0%), Shearing, Fault (F), Vein (c carbonate, q quartz)

Mineralization : Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

303065

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG (TRACE / COMMON / ABUNDANT / MASSIVE)	DEPTH m	MINERALIZATION
1.75					
0.60					
2.45					
	55				
3.05					
	58.40				
2.95	60	Gradational colour change to light mottled grey, sericite-carbonate altered, sheared agglomerate, with occasional carbonate veins. Cleavage is 30° to core axis.		60.60	Pyrite 5%, disseminated crystals and aggregates.
	62.84				
2.95		Agglomerate, - yellow-green fragments in a carbonate-barite(?) bearing matrix; a minor grey chert.			
	65	Cleavage is 35° to core axis. Fragments display 'spotting' of sericitised feldspars and pyrite crystals.			
3.00	65.70				
		Light grey mottled feldspar porphyry agglomerate, rich in carbonate, with sericite and some silica.			
3.00		The fragmental texture is only just apparent. The spotting, due to feldspar phenocrysts (to 2mm) is quite marked.			
	70				
	71.40				
2.95		Light grey fine grained feldspar porphyry lava. DTL?			
	72.30	PyP1			
		Light to mid grey carbonated lithic tuff to tuff-agglomerate, becoming heavily sericitised downwards, particularly below 73.70.		73.50	Increase in pyrite to 7%
2.95				74.70	Pyrite 15% as veins
	75				

5 cm

065

Dominion

DIAMOND DRILL LOG

Hole N° MC 2 | Page N° 4

Feature : Bedding, Foliation, Fragment - size & shape 0%; Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

303066

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
		Colour changes to dark grey. Fragments become close packed suggestive of lava-breccia; internally some are light grey, indicating an original DTL character.							and stringers in the (rather limited) groundmass. The sulph contact is patchily up 30% and down to 7%.
3.00		Some bleaching(?) occurs adjacent to and within the Fault zone (below) within the light grey fragments sericite feldspar phenocrysts can						79.94	
	80								
	80.48								Trace pyrite only with leached, bleached faul zone.
1.60		FAULTED ZONE, bleached, broken core, intermittently sheared and puggy.							
1.15									
0.60									
	84.30							84.36	
	84	be seen.							Pyrite 3-5% as veinlet (<1mm to 5mm)
2.75		Below the fault zone there is limited sericitisation and chloritisation(?) of a massive nature, succeeded by altered lithic tuff.							
	86.35								
		Light grey feldspar porphyry lava to lava-breccia (locally), with variable carbonation and sericitisation. PyP1/DTL							
3.15									
	90	Pyrite veining gives rise to PyP characteristics (blue-grey to white mottling).							
2.85									
		Bleaching and iron staining is common marginal to fractions.							
		Foliation, indicated by alignment of sheared feldspar and by cleavage (locally) is 30-35° to core axis.							
1.25									
	95	Fracturing and carbonate veining appears random. There is minor barite veining.							
3.05									
	97.65							97.65	
		Yellow-grey sheared agglomerate or lava-breccia. Schistosity is 45° to core axis. Alteration is sericite rich. Fragments have grey margins, yellow centres. PyP1 PyPi/DTL							Pyrite 7% as matrix stringers.
2.70									
	99.63							99.63	
	100								Pyrite 5% as veins ar

5 cm

DIAMOND DR. 66

Feature : Bedding, Foliation, Fragment - size & shape; Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

303067

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	DEPTH m	MINERALIZATION
3.10	105	Pale grey, weakly sericitic, siliceous dacitic(?) lava, and lava-breccia, of close-packed fragments. The matrix is veined with pyrite and white carbonate-barite. Foliation is 40° to core axis.			Pyrite continues 3-5% locally 7%.
3.00					
0.85					
2.05					
	109.28	PyP1			
	110	Zone of barite-carbonate veining, with ~~traces of sulphide and digested~~ rock.			Trace galena with barite zone.
1.70	110.35	Sericitised, sheared, siliceous, lithic tuff, much veined with carbonate and barite. Cleavage is 40° to core axis.			
0.50	112.40	Yellow-green to grey feldspar porphyry agglomerate, sheared at 35-30° to core axis.			
1.70	115				
	115.30	FAULT ZONE, minor pug, broken core, rock type change to mottled grey sheared, sericitised, carbonated agglomerate, probably altered variant of adjacent rocks. Patchy carbonate ~~veining is present.~~			Pyrite 3-5% locally 7% as stringers and veinlets.
2.30	118				
2.95	120	Colour varies from grey to yellow-grey, locally orange. Altered (carbonate?) feldspar phenocrysts (to 2mm) occasionally visible, with some fragments of agglomerates. Core is sheared, rubbly between 123.11m and 126.84m.		122.55	Pyrite 2%, disseminated crystals.
2.50					
1.60	125				

5 cm

067

DIAMOND DRILL LOG

Hole N° MC 2 Page N° 6

303068

Feature : Bedding, Foliation, Fragment - size & shape; Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : Trace 1-5%; Common 5-15%; Abundant 15-60%; Massive >60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	DEPTH m	MINERALIZATION
1.63					
	127.93				
3.00		Lithic-tuff agglomerate PyP1>AP of dark grey-green feldspar porphyry in a light-grey carbonate rich matrix. Fragments (up to 10cm) are 50% of the rock.		122.95	Pyrite 5%? with traces of galena.
3.00		PyP1 Greenish grey, strongly deformed (sheared) lithic tuff or agglomerate of sericitised feldspar porphyry with narrow barite-carbonate veins. Cleavage is 50° to core axis.		132.40	Pyrite 7-10% as veins and stringers, massive where shown.
	133.20				
2.80	135	Cream lava-breccia?lithic tuff of carbonated feldspar porphyry, PyP1>DTL with blue-grey colouration developing along pyritised fractions.			
	136.60				
1.20		Sheared sericitic lithic tuff, varying to agglomerate. Locally**. PyP1			
2.00		Zone of FAULTING AND SHEARING. Much cleaved core with some narrow pug zones at 50° to core axis. Refolded cleavage discernable at 144.80.			Pyrite 65-70%.
1.10		** bleached within the faulted zone, with carbonate-barite?? veining irregularly.			
1.40				141.40	Pyrite 2-5%
0.30	143.20				
0.50		Agglomerate - as above, but PyP1>AP fragments are green (sheared chlorite) in a gray matrix, which is variably++			
0.75	144.80	End of faulted zone at 144.80.			
	145				
1.20		++sheared and sericitised. Yellow narrow carbonate veins are common. Green fragments least sheared show carbonated(?) feldspar relicts.			
2.20					
3.00		Foliation is 60-65° to core axis.			
	150				

5 cm

068

Commonwealth

DIAMOND DRILL LOG

Hole N° MC 2 Page N°

Feature : Bedding, Foliation, Fragment - size & shape; Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : 303069 — Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	DEPTH m	MINERALIZATION
		150.00 to 152.00m intense carbonate veining.			Pyrite 2%
2.97	152.00	Mid grey strongly sheared, PyP1 lithic tuff to agglomerate. Shredded sericite fragments at 75-80° to core axis occur in a light grey matrix. The fragments are pale cream to greenish.			
1.35	154.60	PyP1/AP Dark green agglomerate of patchy leached, carbonated vesicular(?) andesite, with sericitised feldspars. Foliation is 45° to core axis.			Pyrite 2%, patchily 10%
1.05	155				
3.05	158.50	PyP1/DTL? Sericitic fragments in a blue-grey matrix - lithic tuff. Fragments are 25% of total.			
3.10	160	Agglomerate. Pale cream fragments of sericitised, carbonated feldspar porphyry are set in a blue grey matrix of sericitised carbonate. Fragments range from <2mm to 10cms. Folation (alignment of small fragments, and feldspars in large fragments) is 45° to core axis. Specimen at 161m (183302).			
3.04	165				
2.98	165.16	Texture as above, agglomerate, however fragments are dirty-yellow green, and show both green (sericite) and white (carbonate) flecking; and alteration variety of the above unit? Specimen at 167.70m (183303)			
	168.88			168.50	Pyrite 10% as matrix veins and stringers.
2.97	170	Idential with penultimate unit. Agglomerate of pale cream seritic-carbonated feldspar porphyry fragments in a blue grey matrix; less matrix than in previous unit. Pervasive pyritisation along planes parallel to foliation (45° to core axis) gives rise to blue-grey and cream wavy striping of large fragments. Rare barite veins.			
3.02					
	174.65	AP?		174.65	Pyrite not apparen
	175				

5 cm

069

Bonanza

DIAMOND DRILL LOG

Hole No. [illegible]

Feature : Bedding, Foliation, Fragment - size & shape; Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

303070

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
3.00		Agglomerate, of pale yellow-green carbonated sericitised feldspar-porphyry. Foliation is 45° to core axis, indicated by elongation of fragments and streaking of sericitised feldspars.							
3.00	180	There is a progressive increase in the number of dark green fragments with white and off white feldspar phenocrysts. These fragments show brown-yellow alteration rims and completely altered ghosts of smaller fragments are visible between the larger fragments. The rock would appear to be an andesite feldspar-porphyry agglomerate showing progressively less carbonation down hole.							
3.00	185	Specimen at 175m (183304). Specimen at 182.75m (183305)							
		The fragments have smoothed out lines.							
	187.40	END OF HOLE							

Note: The petrological problem presented by this hole is the difference (if any) between the cream sericitised carbonate rich feldspar porphyry agglomerates and the carbonated andesite feldspar porphyry agglomerates.

Specimens sent for thin section 183302 - 183305.

5 cm

303071

HATI

DRILL HOLE RECORD

Location Hatfield R. Property E.L. 15/73 District Tasmania, Australia. Alt./R.L. - Hole No H.1

Commenced 20.10.1976 Completed 27.10.1976 Core size NQ to 68.50 m BQ to 160 m Co-ordinate 6200N 3450E Date November 1976

Objective Target was an IP anomaly located at the contact of vesicular andesites and black carbonaceous shales (Que River Slate). % Recovery Bearing (M) 099° m. Grid bearing(M) 8°45' Logged E.H. SKEY Dip -50°

SURVEY DATA

DEPTH	DIP	BEARING(M)	INSTRUMENT TYPE
0	50°	099	Theodolite and Brunton
-	-	-	Surveyors pick up
30 m	51.0°	105.5°	Que River Eastman
60	51.5°	104	"
90	50.0	105.5	"
120	47.0	106.5	"
140	47.0	107.5	"
159	46.5	110.0	"

GRAPH DERIVED DATA

DEPTH	DIP	BEARING(M)	NORTHING	EASTING	ALTITUDE	REMARKS
0	50	099	6200.00	3450.00	0.00	
25	50.5	100.5	6199.72	3465.98	-19.22	
50	51	99.5	6199.44	3481.80	-38.58	
75	51	100.0	6199.24	3497.53	-58.01	
100	49	100.8	6198.78	3513.59	-77.16	
125	47	101.8	6198.05	3530.30	-95.73	
150	47	104.0	6196.82	3547.30	-114.02	
160	46	105.5	6192.10	3554.14	-121.27	End of Hole.

071

DIAMOND DRILL LOG

Hole Nº H.1 Page Nº 1.

Feature : Bedding, Foliation, Fragment - size & shape 0% | Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : 303072 — Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	DEPTH m	MINERALIZATION
210		Massive black (carbonaceous) slate. Fine (<1 mm) laminar bedding uniformly at 55° to core axis to 30 m then 60°.			Slight brown discolouration may be due to fine pyrite (<1%)
295		Below 25 m the rock is less weathered and beds up to 1 cm thick are discernible due to a slight variation in grain size (mud to fine silt) fine mica is present throughout.			
290	5	There is no cleavage but several joint planes are evident at both low and high angles to C.A. with several strike orientations.			Disseminated pyrite on joint surfaces.
285					
	10				
285					
295	15		BROKEN RUBBLE		Rare 1-2 mm beds of pyrite parallel to bedding in shale.
275					
	20				
240		22.00 - 24.00 m Zone of jointing parallel to core axis, with fine (2 mm) quartz vein swarm.			Pyrite on joint surfaces
250					24.25 Elongate pellet of massive pyrite parallel to

5 cm

072

DIAMOND DRILL LOG

Hole N° H.1 Page N° 2.

Feature : Bedding, Foliation, Fragment - size & shape 0%; Shearing, Fault F, Vein c carbonate q quartz

Mineralization : 303073

Trace 1-5%
Common 5-15%
Abundant 15-60%
Massive >60%

CORE REC'D	DEPTH m	GEOLOGY	MINERALIZATION
		Sample at 26.5 m for conductivity testing.	25.65 - 2 cm massive pyrite band parallel to bedding.
260			
			28.50 - 1 cm band massi pyrite parallel to bedding.
275	30		
250			
		34.25 - 46.00 Zone of very broken core and slickensided fragments, some fine quartz veining.	34.10 - 5 mm 'bed' of massive pyrite, but terminated, occupies onl ½ core. Appears to have slumped into place, and been surrounded by fresl deposits of shale.
	35		
255			
		Bedding locally 60 - 65° to core axis.	
285		Sample at 39 m for conductivity testing.	
	40		
270			
245	45		
	46.5	Silty zone, faulted at 46.55, 5 cm pug.	
	46.9		
285		Black shale. Fainter bedding than previously, colour uniformly black. Bedding 50° to C.A. Sample at 49 m for conductivity testing.	Pyrite on joint surface also rare lenticles (to 3 mm) parallel to the bedding.

VERY BROKEN

5 cm

DIAMOND DRILL LOG

Hole Nº H.1 Page Nº 3.

Feature : Bedding, Foliation, Fragment - size & shape; Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : Trace 1-5% Common 5-15% Abundant 15-60% Massive >60%

303074

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	DEPTH m	MINERALIZATION
245					
265		Very broken at 54.00 m.			
	55	Sample at 54.5 m for conductivity testing.			
285					
		Very broken at 58.50.			59.10 m Flattened ball structures in pyrite with black shale centres
275	60				
		Sample at 61 m for conductivity testing.			59.9 - 61.5 m Coarse aggregates of pyrite to 5 mm. Also some dendriti pyrite aggregates.
90					61.5 - 64.85 m Pyrite 2% as disseminations.
15					
	64.65	Light grey chert, gradational contact			
	64.85	with shale.		64.85	Pyrite 3-5% as dissem- inations and aggregates to 1 mm.
	65	Conformable contact gradational over 1 cm to vesicular andesite. Colour is green with white spotting due to carbonate alteration. Irregular veining of carbonate occurs throughout. Minor grey quartz veins have been noted. Vein margins are occasionally pyritic.			
290		Some carbonate zones e.g. 65.9 maybe flow tops. Fragmental andesite is immediately adjacent.			
30		Sample at 67 m for conductivity testing.			
170	70				
300					
	73.60	Sharp contact at 30° to C.A.			
	74.00	Fine grey pyritic chert, fragmental at base.			
250		Fine grained variably vesicular andesite			

5 cm

074

DIAMOND DRILL LOG

Hole N° H.1 Page N° 4

Feature : Bedding, Foliation, Fragment - size & shape, Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : Trace 1-5% Common 5-15% Abundant 15-60% Massive >60%

303075

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	DEPTH m	MINERALIZATION
	75.74	Sedimentary breccia of pyritic chert.		75.74	Pyrite 5%+, bedded
30	76.14	Carbonated amygdaloidal andesite. Weak foliation at 45° to core axis.		76.14	sulphide in chert fragments.
	77.16	Pyritic grey chert, fragmental below 76.3			
295	77.49	Carbonated amygdaloidal andesite. Weakly foliated at 40° to C.A. Occasional cherty inclusions, also irregular masses (xenoliths). Fine carbonate veining is common.			Pyrite 3% veinlets parallel to foliation, also associated with carbonate vesicles.
	79.99				
265	81.22	Zone of deformed (breccia) chert. Upper 5 cm is sedimentary breccia of pyritic chert.			
		81.5 m Fault breccia of chert and andesite healed with carbonate. Below 81.22 m sub-ophitic amygdaloidal andesite-basalt. Amygdules are not common every 5-10 cm and average 1-2 mm in size. The rock is dark green in colour with a foliation at 40° to C.A. Dark grey chert bands or inclusions have been noted, at 30° - 60° to C.A. They show a relict foliation. They appear to occupy the sites of primary joints and fractures.			Disseminated pyrite typically less than 1%.
290					
300					
40					
250					
70					
10	92.25			92.25	
70		Cherty shale and chert. Mostly dark grey in colour, some pale greenish, cream beds (5 mm), discontinuous pyritic beds (1-2 mm) and pyritic mud balls to 1 cm have been noted. Bedding is 60° to C.A.			Pyrite up to 2% local beds and mud balls.
140	94.86	and is laminar.		94.86	
300		Andesitic-dacitic feldspar porphyry agglomerate (lava breccia) with a cherty matrix. Fragments are green (chloritic) and light grey. There are minor quartz veins throughout.			Disseminated pyrite, pyrite in quartz veins
		98.62 - 98.85 m Laminated shale with dropped boulders of andesite at upper contact.			Pyrite lenticles in shale.
250	98.62	15 cm quartz vein at base.		98.8	Galena and pyrite in quartz vein.
	98.85	Altered andesite agglomerate and coarse lithic tuff. Fragments are typically			Pyrite 1-5% as dissemi

5 cm

075

Gamma

DIAMOND DRILL LOG

Hole N° H.1 Page N° 5

Feature : Bedding, Foliation, Fragment - size & shape, Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : 303076 — Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	DEPTH m	MINERALIZATION
30 30		altered feldspars, also pale green (sericitised). Dark green fragments may show slightly bleached rims. Matrix material is typically altered by carbonate and sericite and varies from white to pale green in colour. Carbonate veining is sporadic. Fragments are sub-angular to angular from 0.5 cm to 5 cm. They are occassionally mid grey in colour. The core shows crude jointing.			Pyrite as above.
265					
300	105				
300					
	110				
300					
300					
	115				
295					
	118.50	Tuff-agglomerate as above but with less sericite alteration. Colour is pale green.			
300	120				
	122.06	Textures as above, but with mottled green colour due to sericite-epidote-carbonate. Probably both andesitic and dacitic clasts present. Minor quartz veining shows tension fractures with carbonate.			
300					

5 cm

Gerrance

DIAMOND DRILL LOG

Hole N° H.1 Page N° 6.

Feature : Bedding, Foliation, Fragment - size & shape 0% ; Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : Trace 1 - 5% ; Common 5 - 15% ; Abundant 15 - 60% ; Massive > 60%

303077

CORE REC'D	DEPTH m	GEOLOGY	MINERALIZATION
300	125.95	Mid grey weakly sericitic, carbonated porphyritic dacite. Sparse carbonate and quartz veins.	Trace pyrite throughout
	126.65	Mottled green-grey siliceous dacite feldspar porphyry weakly foliated at 45° to core axis. Patchy carbonate alteration imparts a mottled texture.	
300		There are areas andesitic in appearance with white feldspar phenocrysts to 2 mm in a green lava matrix.	
	130	Narrow carbonate veinlets are present throughout typically at 70° - 80° to C.A.	
115			
180		Thin section specimen 126.5 m No. 179620.	
130		Thin section specimen 135.8 m No. 179621.	
	135		
165			
300			
30			
	140	Broken zone, possible Fault.	
120		Thin section specimen 142.7 m No. 179622.	
120	142.00	Scoriaceous andesite. Numerous closely packed silica filled vesicles have been noted.	
	143.00	Mottled andesite lava as above.	
300	143.63	Midgrey vesicular porphyritic andesite lava. Feldspars and carbonate filled vesicles define a foliation at 50° to C.A. The rock is scoriaceous towards the base of the unit.	
	145		Pyrite 1 - 3%.
	146.10	Mottled porphyritic andesite as above. Distinctly fragmented (lava breccia)? in part.	
300			
	148.85	Massive fine grained grey porphyritic andesite often vesicular, similar to	
300			

5 cm

077

DIAMOND DRILL LOG

Hole N° H.1 Page N° 7

Feature : Bedding, Foliation, Fragment - size & shape 0% | Shearing, Fault F, Vein c carbonate q quartz

Mineralization : Trace 1-5% | Common 5-15% | Abundant 15-60% | Massive >60%

303078

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
	150.05	Altered agglomerate of andesitic to dacitic composition, with dark green porphyritic and mid-pale green sericite-carbonate-epidote(?) rich fragments. Fragments vary up to 5 cm in size. The matrix is both carbonated and silicified. Rare quartz veins of 2 cm are present. There is no distinctive foliation, fracturing is rare.						150.05	Pyrite is rare.
300									
	155								
300									
230									
	160	END OF HOLE.							

5 cm

303079

Bamboo

DRILL HOLE RECORD

Location Hatfield | Property E.L. 15/73 | District Tasmania | Alt./R.L. N/A | Hole No H2 & H2A

Commenced 30.10.1976 | Completed 17.11.1976 | Core size H2 NQ 3.0m-161.50m, H2A BQ 147.0-217.0m | Co-ordinate 5200N 3352E | Date November 1976

Objective Testing of two IP anomalies associated with the black shale - andesite contact. | % Recovery | Bearing (M) 099° | Grid bearing (M) 8°45' | Logged E.H. SKEY | Dip -45°

SURVEY DATA				GRAPH DERIVED DATA						REMARKS
DEPTH	DIP	BEARING(M)	INSTRUMENT TYPE	DEPTH	DIP	BEARING(M)	NORTHING	EASTING	ALTITUDE	
0	-45°	099°	Brunton	0	45	099	3352.00			
30	-45.5	106.5	Eastman	25	46	101.5	3369.51			
60	-44	104.0	"	50	45	100.5	3387.02			
90	-40	101.0	"	75	42.5	97.5	3405.07			
120	-36	100.0	"	100	38.5	96	3424.06			
150	-34	100.0	"	125	35.5	95	3443.98			
				150	34	95	3464.48			
H2A				161.50	34	95	3473.99			
0	-45	099°	Brunton	0	45	99	3352.00			
50	-43	210.0	Eastman	25	46	101.5	3369.51			Inside casing
80	-39	156.0	"	50	43	102	3387.31			Inside casing
130	-28	104.0	"	75	40	101	3406.01			
160	-27	104.0	"	100	33	99.5	3426.06			
184	25	103.0	"	125	28	99.5	3447.58			
199	24	104.0	"	150	27	98	3469.75			
210	26	183.5	"	175	26	99	3492.12			Inside casing approx. 170 m.
217	24	262.5	"	200	24	99.5	3514.77			Inside casing
				217	24	99.5	3530.30			

079

Bamanco

DIAMOND DRILL LOG

Hole N° H.2 Page N° 1.

Feature : Bedding, Foliation, Fragment - size & shape 0%, Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

303080

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
		No Core before 3 metres.							
.05	5	Thoroughly weathered (brown) dolerite. Very broken, possibly densely packed scree, but more likely sub-crop. Fractures are lined with black to dark brown manganese oxide. Rare kernels of fresh dark grey-blue dolerite. Texture is subophitic, but appears to be altered. Note core loss.							No sulphide.
.25									
.10	10								
-									
.15									
.10	15								
.35									
.45	20								
.75									
	25								

5 cm

030

Dominion

DIAMOND DRILL LOG

Hole N° H.2 Page N° 2.

Feature : Bedding, Foliation, Fragment - size & shape; Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : 303081 — Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
.60		Dolerite as above.							
	28.10	Weathered micaceous fine siltstone.							
	28.55	Bedding 40° to core axis.							
	28.75	Weathered dolerite.							
170	30	Micaceous siltstone, becomes fine carbonaceous shale after 25 cm. Siltstone contains small (less than 0.5 mm) feldspars. Bedding is 70° to C.A.							
40		The shale shows beds of less carbonaceous material up to 0.5 cm at 75° to C.A. Bedding is markedly disrupted by minor movement on joint surfaces.							
70		Intermittant development of strong cleavage is at approx. 30° to C.A. and is rotated 20° in strike relative to bedding. This relationship varies between 10° and 30°.	BROKEN CORE						
70	35	With regional cleavage assumed subvertical then steep west dips are implied for the black shale.							Disseminated, trace pyrite apparent on cleavage surfaces from 50 m.
210		The shale does not preferentially break along one plane but varies between bedding, cleavage and joint surfaces.							
100	40	Weathering to a pale grey colour with orange iron staining on fractures persists to 56 m, however the bulk of the rock is substantially fresh below 45 m.							
260									
200	45								
245									
	50								

5 cm

DIAMOND DRILL LOG

Hole Nº H.2 Page Nº 3.

Feature: Bedding, Foliation, Fragment - size & shape, Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization: Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

303082

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
260		Massive black shale with laminar bedding at 70° to C.A. continues to 67 m. Beyond this, bedding is not visible, the rock being rich in carbonaceous material.							Rare pyrite on cleavage surfaces.
230	55	Minor erratic carbonate veining occurs between 56.5 and 58 m, and infrequently thereafter.							
270		Cleavage is 35° - 50° to C.A. but is not well developed. Core also breaks along joints at 60° - 80° to C.A.							
280	60	Fracture surfaces are occassionally carbonate lined (less than 1 mm wide) fresh pyrite may occur on cleavage surfaces.							
295									
295	65							64.8	Large ellipsoidal kernel of massive pyrite 5 cm, parallel to bedding.
300									
285	70	Thin section at 73.05 m, Number 179617.						69.6	Deformed massive pyrite layer (1 cm) in carbona occurs as a circular feature in core surround by shale.
	72.50	Vesicular, carbonated dolerite or andesite dike. Carbonate filled vesicles parallel shale foliation.							
300	73.85	Massive carbonate vein (calcite).							
	74.50	Dike as above.							

5 cm

U32

Geonics

DIAMOND DRILL LOG

Hole N° H.2 Page N° 4.

Feature : Bedding, Foliation, Fragment - size & shape, Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

303083

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
	75.45	Irregular contact with xenoliths of shale within dike.							
300		Massive black shale with carbonate veinlets, broken below 78.5 m, with some slickensides.							Rare 1 mm lenticles of pyrite.
		Thin section at 80.9 m, No. 179618.							
	79.60								
	80	Strongly sheared, carbonate rich dike or volcanic with partly hornfelsed shale xenoliths to 10 cm, lower contact shows							Disseminated pyrite 1 - 2%.
300	80.90	chilled margin merging with shale.						81.1	Two clasts of massive pyrite sub ellipsoidal to 10 cm parallel to foliation. Otherwise pyrite is rare.
		Massive black shale, uniform colour and texture, cleavage foliation is 60° to C.A., with thin (1-2 mm) carbonate veins and fracture fillings, especially at 87.1 - 88.4 m and 94.7 - 97.2 m.							
300									
	85								
280									
285	90		BROKEN CORE						
295									
	95								
290									
290									
	100								

5 cm

083

DIAMOND DRILL LOG

Hole N° H.2 Page N° 5.

Feature : Bedding, Foliation, Fragment - size & shape; Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

303084

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	DEPTH m	MINERALIZATION
300		Massive black shale continued.			
300	105	Thin section at 106.55 m No. 179619.			103.0 m Pyrite occurs in thin partings, (much less than 1 mm wide).
260	106.0	Distinct bedding apparent at 55° to C.A. but showing some gentle undulations. Beds are 1 mm to 2 cm thick and consist of horizons of ultra fine pyrite. Pyrite concentration shows a cyclic variation, increasing to a sharp cut-off succeeded by black shale. This style of bedding is most apparent to 113 m and only occasionally to 120 m.		106.0	Pyrite is very fine, but rare thin layers of euhedral pyrite occur. Sulphide content is approx. 5% locally 20%.
285	110				Thin section and polished section prepared.
300	115	113.5 - 117.5 m, Broken core with fractures at low angles to core axis.	BROKEN CORE		
285					
285	120				
285	122.0	Approx. contact. Bedding of variable sulphide content persists to 129 m at approx. 85° to C.A.		122.0	Very fine pyrite 2-5% locally 10%.
	125				

5 cm

084

DIAMOND DRILL LOG

Hole N° H.2 Page N° 6.

Feature : Bedding, Foliation, Fragment - size & shape; Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

303085

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	DEPTH m	MINERALIZATION
300					
300	129.0	Massive fine grained black shale, with an almost irridescent appearance on broken surfaces.		129.0	Rare pyrite.
300	130				
	133.45	Sheared agglomerate of feldspar porphyry. Colour is orange-brown to light grey, contains chert clasts around which foliation diverges. Similar to SP units at Que River. (Sericite alteration).		133.45	Pyrite 5-7%, stringers, clots, disseminations.
300	135				
	135.35	Massive black shale with occassional thin 1-2 cm bands of wispy tuff with quartz phenocrysts, fine carbonate veining and fracture filling throughout.		135.35	No pyrite.
	137.05	Sheared feldspar porphyry agglomerate.		137.05	Pyrite 3-5%, as clasts, veinlets and disseminated crystals.
235	137.58	Fault zone, sheared and broken core.			
20	139.75			139.75	
	140	Sheared pale grey carbonate-sericite rich feldspar porphyry agglomerate. SP. With wispy pumice (fiamme) and subangular clasts of porphyritic dacite. Fragment size is typically 0.5 - 5.0 cm to 140 m then increasing to 2-7 cm. Carbonate is common with veins between 139.75 and 139.9 m.			Trace pyrite.
195					
300					
	145				
	145.10	Gradational contact to less altered agglomerate of feldspar porphyry of andesite. (Lava breccia). Fragments are are angular to subangular all sizes up to 7 cm, dark grey-green in colour becoming greener with depth. The matrix is light grey in colour with white carbonate and minor quartz veinlets. Foliation (schistosity) is 45° to C.A. White feldspar (altered to carbonate) become very prominent (to 1 mm) down			
300	150				

5 cm

085.

Bethlehem

DIAMOND DRILL LOG

Hole Nº H.2 Page Nº 7.

Feature : Bedding, Foliation, Fragment - size & shape (0%), Shearing, Fault (F), Vein (c carbonate, q quartz)

Mineralization : Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

303086

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	DEPTH m	MINERALIZATION
		Both green andesitic and grey dacitic fragments occur.			
300					
	155				
300					
300					
	160				
140					Traces to 5% sphalerite in last 50 cm of core.
	161.50	Hole ends.			

5 cm

086

DIAMOND DRILL LOG

Hole N° H.2A Page N° 1.

Feature : Bedding, Foliation, Fragment - size & shape; Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

303087

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
	130	New hole commenced from same collar and drilled adjacent to H.2. Tricone used to 147.7 m.							
	135								
	140								
	145								
330	147.70	Massive <u>feldspar porphyry agglomerate</u> of andesite but with grey fragments of possibly dacitic composition.							Trace sphalerite and galena.

5 cm

087

Gamma

DIAMOND DRILL LOG

Hole N° H.2A Page N° 2

Feature : Bedding, Foliation, Fragment - size & shape, Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

303088

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
300	155	Rock colour is dominantly dark green with carbonate-silica alteration of matrix, also minor carbonate veining. Fragments vary in size up to 7 cm average 3-4 cm.						157.0	Disseminated sphalerite 1% as small grain aggregates, also rare galena and trace sphalerite.
255									
290	160	Fragmental texture becomes diffuse due to deuteric alteration of the matrix by carbonate and silica.							
300									
295	165							164.0	Sphalerite averages less than 1% with rare galena.
300									
280	170								
300									

5 cm

U88

DIAMOND DRILL LOG

Hole N° H.2A Page N° 3.

Feature : Bedding, Foliation, Fragment - size & shape; Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

303089

CORE REC'D	DEPTH m	GEOLOGY	MINERALIZATION
300		Altered carbonate-silica andesitic agglomerate continues.	
280	180		
300			
300	185		
		Fractures sub-parallel to core axis.	
270			
	190		
	190.78		
205		Massive quartz veim.	No sulphide associated with veim.
	191.50		
100		Massive silicified andesitic agglomerate or lava breccia. Colour is dominantly green, with white feldspar phenocrysts to 1 mm. The colour varies locally to pale fawn and pink due to carbonate alteration. Rare carbonate veins are present.	Disseminated rare sphalerite and galena.
300	195		
300			
	200		

VISUAL LOG: BROKEN CORE

5 cm

089

DIAMOND DRILL LOG

Hole N° M.2A Page N° 4.

Feature : Bedding, Foliation, Fragment - size & shape, Shearing, Fault, Vein (c carbonate, q quartz)

Mineralization : 303090 — Trace 1-5%, Common 5-15%, Abundant 15-60%, Massive >60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	DEPTH m	MINERALIZATION
295					
175		Fragment boundaries often corroded.			Trace sphalerite and galena, associated with quartz veinlets.
300	205				
95					
300	210				
300		Rare massive chlorite veins 1 - 2 cm minor epidote with some veins of carbonate.			
300	215				
	217.0	End of Hole.			

5 cm

APPENDIX D

Geophysical Testing of Core Samples

091

GEOEX PTY. LTD.

303092

Submitted by
Company
Area
Date Sub
Date Tested
Tested by

PHYSICAL PROPERTY ROCK TEST

Sample No. Owner	Sample No. Geoex	Description	Wet Density gm/cc.	Dry Density gm/cc.	Dimensions: Cross Section X x Y or diam. (cms)	Dimensions: Length between measuring electrodes (cms)	Magnetic Susceptibility c.g.s. units	Resistance ohms.	Resistivity Freq. 2.5 Hz Ohm-m.	P F E % Freq 0.3 & 2.5 H
		Geoex Test Sample			3.5	8.8		3.2K	35	
26.5m		H1			4.7	5.1		8.8K	300	
39m		H1			4.7	7.2		66K	1600	5.
49m		H1			4.7	6.9		900	23	
54m		H1			4.7	6.1		450	13	
61m		H1			4.7	5.3		14K	460	
67m		H1 Andesite			4.7	8.5		186K	3800	2.8

APPENDIX E

Petrological Reports on samples from Diamond Drill Holes H1 & H2, MC1 & MC2.

H1 - 39m: black shale; evenly dispersed extremely fine pyrite (5-7%) and ultrafine graphite (5%)

Macroscopically, and as viewed in thin section this is a laminated black shale. Individual laminae and/or thin beds consist of variable concentrations of clays, ultrafine sericite, opaque grains and relatively minor quartz and felspar silt and some chlorite. Variation in composition and grain size between laminations is very minor, certainly less than in sample H1-54m.

In polished section fine pyrite is seen quite evenly dispersed throughout the rock, forming an estimated 5-7% of it. These grains range in size from 0.002 mm to 0.04 mm, average about 0.006 mm, (i.e. 6 microns). One exception to this is a single irregular segregation of chalcopyrite which has a maximum dimension of 0.4 mm.

This is mainly framboidal and spheroidal pyrite, with subordinate generally coarser subhedral to euhedral crystals.

Trace chalcopyrite very rarely occurs as inclusions in this pyrite, and even more rarely occurs as single grains.

.../

H1-39m contd. :

Ultrafine graphite is ubiquitous throughout the clay fraction of the rock. It occurs essentially as a finely divided "dust" with individual flakes rarely greater than 0.01 mm although several, extremely thin, variably continuous laminae occur sporadically along the bedding. Some of this finest "dust" may not be truly crystalline carbon, i.e. not genuinely graphite.

The fine size and diffuse, dispersed distribution of the graphite makes it difficult to ascertain its abundance, but it is estimated at about 5%.

If the exact quantity of C becomes important in resolving the geophysical problem, then a chemical analysis for this element is recommended.

Likewise, if the exact quantity of pyrite becomes important for the same reason, then an analysis for total sulphur is recommended (since this resides almost exclusively in pyrite.) An Fe analysis may also be considered, however this may be not as diagnostic due to probable Fe in minor chlorite through the rock.

H1 - 54m: black shale; dispersed and minor locally aggregated pyrite (up to 10%) and extremely fine graphite (7-10%)

This is also a laminated black shale. In thin section it is seen to be somewhat more sericitic than at 35m and slightly more silty. The quartz (and felspar) silt has a consistent average size in a given lamination, which is generally very slightly coarser than at 39m, and layers up to very fine sand size occur at irregular intervals through the sequence.

The opaque material is slightly less dense than at 39m, apparently due to a slightly greater average size.

Fine grains of framboidal and spheroidal pyrite, and subordinate subhedral to euhedral pyrite are also dispersed throughout this core. Generally the size of these is about the same as at 39m, but the abundance of this pyrite appears to be marginally more than at 39m, possibly up to 10%, as a result the individual grains are slightly more closely packed.

In addition to being dispersed, minute spheroids of pyrite form clusters up to 0.1 mm across, and these, and trace, single euhedral crystals up to 0.05 mm are scattered along fine sandy layers. These account for about one quarter of the total pyrite.

.../

H1-54m contd. :

Ultrafine graphite is ubiquitous throughout the clays and fine micas which form a large proportion of this rock. The graphite is marginally more distinct as micron-size flakes, rather than the dominant finely divided "dust" at 39m. Maximum size of the graphite however is also about 0.01 mm, and several thin foliae of graphite are present as at 39m.

The graphite appears to be slightly more abundant than at 39m (7-10%).

179617 (DH, H2 at 73.05m)

amygdaloidal andesitic glassy lava; complete pervasive replacement by deuteric carbonate, subordinate silica and minor associated chloritisation

Field comment: amygdaloidal andesite dyke, carbonate filled vesicles

Most of this rock consists of a fairly homogeneous groundmass in which the primary minerals are completely replaced by carbonate and subordinate silica.

Primary textures are preserved and consist of a combination of: fine-scale (0.3 mm) spherulitic textures characteristic of glass; fine laths which are locally similarly flow-oriented; more or less interstitial bleb-like vesicle fillings average size 0.15 mm; larger randomly scattered amygdules (or vesicles) greater than 1 mm in diameter.

Most individual crystals have been completely pseudomorphically replaced by microcrystalline carbonate. Some crystals are replaced by chlorite. Interstitial areas within, or forming the glassy textures are represented by fine chlorite and/or diffuse, cryptocrystalline quartz (?devitrified glass).

...../

179617 contd. :

The small bleb-like vesicles consist of chalcedonic gradational to microcrystalline silica of deuteric origin.

The amygdules are filled by extremely fine carbonate commonly mixed with cryptocrystalline varying to fibrous chalcedonic silica. These represent concentrations of deuteric carbonate and silica, inherent to this host rock. Accessory very fine oxidised magnetite is disseminated.

The textural characteristics indicate that this is most likely an extrusive lava (rather than the suggested dyke, which implies an intrusive genesis.)

The primary composition is almost certainly andesitic but possibly basaltic. It is difficult to determine which, due to complete pervasive replacement by carbonate, and related silicic-chloritic alteration.

179618 (DH, H2 at 80.90 m) :

fine tuff grading to laminated shale, against a very fine andesitic lava, or tuff lava; the volcanic is later and imposes localised silicification and sericitisation at the contact

Field comment: andesite dyke against hornfelsed black shale; cherty inclusions in andesite

Both facies in this sample are dark grey and extremely fine grained, one is a "sediment", the other is a "volcanic". The sediment is composed of ultrafine quartz, clouded with clays, chlorite and minor sericite; it is macroscopically "tough" and conceivably, incipiently silicified. These materials are too fine to differentiate between, or to meaningfully estimate their abundance.

Irregular, roughly lath-shaped and some rhomb-shaped "porphyroblasts" of clouded carbonate (0.1 x 0.3 mm) are scattered through part of the shale away from the contact forming 20% of it. These are similarly aligned, conformable to the contact, and thus apparently bedded. A cleavage occurs in the same plane.

The sediment 7-10 mm in from the contact is devoid of carbonate and relatively enriched in silica and sericite. Several veinlets of quartz and/or carbonate, rarely plus trace pyrite are oblique to the cleavage.

.../

179618 contd. :

Minor ultrafine opaque material suggests that the field term "black shale" is an appropriate classification for this rock. However it does appear to be very finely tuffaceous, at least in the layers containing "porphyroblasts", grading to a laminated, sericitised and silicified shale at the contact.

The "volcanic" is dominated by extremely fine and somewhat wavy cleavage planes, conformable to the contact; very closely spaced adjacent to the contact, but widening further away from it. It consists of a felted mass of completely argillised and chloritised primary flow-oriented microlites, with coarser (1 mm) lath-form crystals and apparent, elongate glass fragments evenly distributed in the same plane. These crystals and fragments are completely replaced by chlorite and clay-sericite. Accessory minute grains of pyrite and trace magnetite are scattered, rarely in clumps.

The volcanic is identified as an andesitic lava, possibly tuffaceous. It appears to have generally indurated the adjacent tuffaceous-shale and selectively sericitised and silicified the immediate contact zone. Thus it is later than the shale, conceivably a flow, or an extremely shallow small tongue-like dyke into it. Both facies have suffered the same low grade regional metamorphism to produce a common, conformable cleavage.

179619 (DH, H2 at 106.55 m):

carbonate-rich, graphitic and pyritic black shale; bedding laminations of fine pyrite vaguely cyclical

Field comment: black shale, cyclic bedding due to fine ?pyrite

This is indeed a black shale, much blacker and less indurated than in 179618. The laminations seen in hand specimen are in fact bedding. A poorly defined cleavage (slaty cleavage) cuts across this bedding and vaguely forms axial planes to microscopically kinked sericite.

The rock consists of ultrafine quartz (silt) intimately mixed with subordinate sericite and carbonate, clouded by extremely fine opaque material. Minor small patches of carbonate and fine quartz sand grains are scattered.

In polished section the opaque material is identified as mainly pyrite. This occurs as generally spheroidal, less commonly framboidal, and rarely subhedral grains ranging in size from 0.001 to 0.1 mm, average about 0.02 mm.

As suggested in your covering notes, the pyrite does form laminations in which the concentration of the pyrite gradually increases over a sequence of laminae totalling about 10 mm thick to a layer composed of about 50% pyrite. Successive layers contain only 1-2% disseminated pyrite but these grade into layers carrying 5-10% disseminated pyrite, also localised patches up to 0.1 mm of ultrafine spheroidal pyrite.

..../

179619 contd. :

Examined in oil immersion at magnifications of x1200, submicron-size graphite and possible amorphous carbon is seen to have an even distribution through intergranular areas of the shale. It forms an estimated maximum of 5% of the rock.

Certainly it is the vaguely cyclical layered concentration of fine pyrite which gives rise to the bedding laminations, rather than variations in graphite distribution.

17962D (DM, H1 at 126.50 m):

slightly vesicular glassy andesite; groundmass shows complete alteration to (and consequent enrichment in) silica, minor chlorite and potash felspar; phenocrysts sericitised, disseminated pyrite

Field comment: altered andesite (carbonated)

Euhedral to subhedral crystals of plagioclase (30%) and several amygdules (3-5%), average size about 0.8 mm, are generally randomly disposed through an altered microcrystalline groundmass. These crystals are very extensively replaced by sericite and minor, clouded saussurite, rare chlorite and carbonate.

The groundmass consists of diffuse patches of extremely fine rather feathery quartz, intimately mixed with chlorite and minor extremely fine granular carbonate and potash felspar. (The potash felspar is highlighted on the slide offcut stained with sodium cobaltinitrite.) These components outline poorly defined spherulitic textures and minor, localised microlites, indicating a primary groundmass composed largely of glass, partly of microcrystalline lava.

The amygdules are filled by deuteric quartz, minor irregular patches of brown clouded baryte, carbonate and chlorite. Carbonate forms an estimated maximum of 5-7% of the rock.

Fine pyrite (5-7%) commonly in clusters, is scattered throughout.

The mode of occurrence of plagioclase phenocrysts, and lack of primary quartz phenocrysts or potash felspar indicates that

.../

179620 contd. :

this rock has an original andesitic composition. However it has been extensively altered, involving extensive enrichment of quartz, minor potash felspar and chlorite in the groundmass.

The gross rock chemistry thus now approaches a rhyolitic composition.

179621 (DH, H1 at 135.80 m) :

slightly porphyritic perlitic glass of andesitic composition, with adsorbed relatively potassic xenoliths also of perlitic glass; completely altered

Field comment: mottled andesite felspar porphyry, lithic tuff, carbonatised and silicified

Most of this rock consists of an extremely fine, clouded and rather diffuse matrix o ultrafine quartz, subordinate chlorite and minor potash alteration products after glass. Primary perlitic and spherulitic textures of this primary glass are ubiquitous.

Small irregular amygdules (10-15%) up to 2.5 mm across are randomly scattered, and filled by deuteric quartz ± minor carbonate sericite chlorite and low temperature felspar or zeolite. Minor small plagioclase phenocrysts are completely replaced by sericite, carbonate, quartz ± chlorite and epidote.

Accessory fine pyrite is disseminated, also pyrite occurs in some veinlets of quartz carbonate ± ?zeolite.

Irregular patches up to 1.5 mm across, with gradational boundaries into the glassy matrix described, give the rock a pseudo-fragmental texture. These patches have a similar composition, and the same spherulitic-perlitic textures as the majority of the rock, although staining of the offcut indicates that they are more potassic. These are interpreted as more or less in-situ xenoliths of the glassy lava partly adsorbed by the larger volume of glassy lava host.

.../

179621 contd. :

The abundant, well-preserved glass textures and dominance of siliceous and local potassic material indicates that it is largely a silicified perlitic glass, however the mode of occurrence of the altered plagioclase phenocrysts indicates a primary andesitic component.

179622 (DH, H1 at 142.70 m):

amygdaloidal and porphyritic glassy lava of trachy-andesite composition; amygdules enriched in deuteric quartz

Field comment: siliceous amygdaloidal (?) andesite

The fine mottled texture of this rock, on a scale of about 2 mm is due to the primary, largely glassy nature of the groundmass, forming a 'fuzzy' reaction rim around the numerous amygdules incorporated in this glass, and around the evenly scattered phenocrysts. This texture considered together with the fine microlite mat indicates quick cooling.

Euhedral phenocrysts of plagioclase (25%), average size about 0.6 mm, and smaller primary bleb-like segregations of quartz (5-7%), are scattered and rarely clumped together (glomeroporphyritic). Also, larger (2 mm) amygdules (20-25%), filled with zoned spherulitic quartz, are all evenly distributed with similar orientation.

They occur in a matrix composed of flow oriented minute microlites of potash felspar, with minor wavy networks and interstitial largely siliceous glass. The abundance of potash felspar is highlighted on the stained offcut.

.../

179622 contd. :

This groundmass has an essentially glassy trachytic composition. The mode of occurrence of the plagioclase phenocrysts, and lack of genuine quartz phenocrysts, is characteristic of an andesite. Thus the rock is interpreted as a glassy trachy-andesite, rapidly cooled, and vesicular and quite extensively enriched in deuteric quartz, i.e. silicified. As a result of this silica enrichment, and the primary potassic (trachytic) groundmass, a total rock analysis of this rock, would no doubt indicate a rhyolite composition.

APPENDIX F

I.P. Profiles Mackintosh Licence Area.

E.L. 15/73

E.L. 2/70

ML 3M/75

ML 2M/75

4M/75

Mt Charter

Note. Lithological symbols ommited between 7300N and 7900N in ore bearing zone.

Base sheet and contours enlarged from 1:31,680 Tasmanian Lands Dept. Topo. Contour interval 50 feet.

303111

Compiled from fact geology (1971-77 mapping) soil geochemistry and Induced Polarization data.

Main road
Secondary road
Track
Railway
Abandoned railway
Power trasmission line
Fence
Mine

Quarry or pit
Trig station
River, creek
Survey line
Tenure boundary
Walking Track

Quaternary Qa Alluvium
Tertiary 68 Tb Basalt
Jurassic ? 38 Dolerite - Diorite
Ordovician 78 Conglomerate, grit sandstone

Cambrian 27 Dacite - Rhyolite lavas and pyroclastics with visible quartz (commonly) light grey cream or orange cuburation. Intrusions shown (+) overprint.
63 Mica sandstones, grits. Dark greenish brown when fresh, light grey in o/c
53 Shales (black, grey)
53 Breccia (sedementary)
22 Cherts (blue grey, white, black)
49 Andesite - Basalt (lavas, lithic tuff, agglomerates, lava breccias) Typically green. Intrusions shown (+) overprint.
49 Scoriaceous and coarsely vesicular (>3mm) andesite - basalt lavas
56 Intermediate to acid (dacite-rhyolite) lavas and pyroclastics within andesite sequence and Farrell slates (includes DTL and MTL mine groups. Typically white, pink, light red brown to Fawn coburation.
6 Altered (sericite - carbonate chlorite) and pyritic fragmentals and lavas (PyP of mine sequence) Blue grey colour when fresh

Dip & strike of bedding
Dip & strike of cleavage
L Lineament
F Fault (Interpreted)
Barite occurence
Magnetite occurence

STATE G.N. M.N. Grid G.N.
19° 24' 26" 8° 41' 00"
Magnetic north correct 1975 - annual change easterly by 04'

5 cm

Index to adjoining sheets

	Sheet B	
	Sheet A	
	Sheet D	

COMINCO EXPLORATION PTY. LTD.

NORTH WEST TASMANIA
DUNDAS TROUGH 001
Preliminary Interpretive Geology
Contour interval 50 feet

77-1223

Drawn by E.H.S.	Traced by R.J.E.		
Checked by			
Location code K55/6/44		Scale 1:10000	Date July, 1977	Plate DT 62A

E.L. 15/13

E.L. 2/10

Marthwan Highway

Base sheet and contours enlarged from 1:31,680 Tasmanian Lands Dept. Topo. Contour interval 50 feet.

NOTE: See Sheet 'A' for Legend

5 cm

Index to adjoining sheets

Sheet C | Sheet B | Sheet F | Sheet A

303112

COMINCO EXPLORATION PTY. LTD.

Drawn by E.H.S.	Traced by A.E.R.	NORTH WEST TASMANIA 02 002
Checked by G.O.B. C.H.Y. May 77		DUNDAS TROUGH
		Preliminary Interpretive Geology
		Contour interval 50 feet
Location code K55/6/44	Scale 1:10,000	Date ... 977

77-1222

Plate 27-62B

E.L. 15/73

E.L. 2/70

E.L. 5/74

PEARCE'S COPPER REWARD

Mackintosh River

Base sheet and contours enlarged from 1:31,680 Tasmanian Lands Dept. Topo. Contour interval 50 feet.

NOTE
See Sheet A for Legend

5 cm

Sheet A
Sheet D
Sheet E
Index to adjoining sheets

303113

77-1228

COMINCO EXPLORATION PTY. LTD.

Drawn by E.H.S | Traced by A.E.R
Checked by
SOB, CHY May 1977

NORTH WEST TASMANIA 003
DUNDAS TROUGH
Preliminary Interpretive Geology
Contour interval 50 feet

Location code K55/6/44
Scale 1:10,000 Date May 1977 Plate DT 82 D

E.L. 15/73

E.L. 2/70

E.L. 5/74

Mt. Charter

GOLD HILL Shaft

Bulgobac River

Murchison Highway

5395000 N
4000 N
3000 N
2000 N
1000 N
5390000 N

387000 E
388000 E
389000 E
390000 E
391000 E
392000 E
393000 E
394000 E
395000 E

5 cm

Main road
Secondary road
Track
Railway
Abandoned railway
Power trasmission line
Fence
Mine
Quarry or pit
Trig. station
River, creek
Survey line
Tenure boundary

o 1878 Photo-identified point used for correction of flight line and photo distortions.

STATE G.N. M.N. COMINCO G.N.
13° 24' 26" 6° 41' 00"
Magnetic north correct 1975 - annual change easterly by 04'

	Sheet B	Sheet F
	Sheet A	
	Sheet D	

Index to adjoining sheets

303114 77-1222

COMINCO EXPLORATION PTY. LTD.

Drawn by E.H.S.	Traced by JJB
Checked by	
Location code K55/6/44	

NORTH WEST TASMANIA 004
DUNDAS TROUGH

AIRBORNE MAGNETICS (1975)

Contour interval 5 & 20 gammas

Scale 1:10000 | Date June 1977 | Plate DT 78 A

E.L. 15/73

E.L. 2/70

Hagshaw Highway

*1878 Photo-identified point used for correction of flight line and photo distortions.

Index to adjoining sheets

Sheet C

Sheet B

Sheet A

5 cm

303115 77-1222

COMINCO EXPLORATION PTY. LTD.

Drawn by E.H.S	Traced by R.K.Y	NORTH WEST TASMANIA
Checked by		DUNDAS TROUGH 005
		AIRBORNE MAGNETICS (1975)
		Contour interval 5 & 20 gammas
Location code K55/6/44	Scale 1:10,000	Date June 1977 Plate DT 78 B

387000 E 388000 E 389000 E 390000 E 391000 E 392000 E 393000 E 394000 E 395000 E

5390000 N

9000 N

8000 N

7000 N

6000 N

5385000 N

E.L. 15/73

E.L. 2/70

E.L. 5/74

Mackintosh River

*1878 Photo-identified point used for correction of flight line and photo distortions

5 cm

Index to adjoining sheets

Sheet A

Sheet D

Sheet E

303116 77-1222

COMINCO EXPLORATION PTY. LTD.

Drawn by E H S | Traced by JJB

Checked by

NORTH WEST TASMANIA

DUNDAS TROUGH C 006

AIRBORNE MAGNETICS (1975)

Contour interval 5 & 20 gammas

Location code K55/6/44 | Scale 1 10,000 | Date June 1977 | Plate DT 78 D

3000 E
3500 E
4000 E
4500 E
6500N
6000 N
5500 N
5000 N
4500 N

1975 AEM ANOMALY

MURCHISON HIGHWAY

vesicular andesite with Sph Cpy Gn

vesicular andesite

pyritic chert

Slate

QUE RIVER SHALES

DOLERITE

TALUS

MOUNT CHARTER PD group

PyP

A

H1

H2

MC 1

MC 2

Bsh

LEGEND

A Andesite

PD Pyritic dacite

PyP Pyritic pyroclastics

Interpreted geological boundary

Geochemistry

Cu > 100 ppm

Pb > 250 ppm

Zn > 200 ppm

Geophysics (I P)

5 Frequency effect (averaged)

Frequency effect

>8%<10% >10%

5 cm

Abminco Exploration

TASMANIA

MURCHISON HIGHWAY - MOUNT CHARTER AREA

HATFIELD E.L. 15/73

Summary Plan 007

77-089

Geology	
Drawn	EHS/CHY
Traced	JJB
Checked	
Revised by	Date

Location code K55/6/44

Date JUNE 1977

Scale 1 2500

Plan No HT 22

303117

MN

MYRTLE

TRACK

MYRTLE

silic vesc Afdpor

TRENCH

ox to yellow amyg fd por (fd's to 1mm max)

EUCALYPTS

weath vesic A? fd por

pink weathered a

yellow fine t or lava ?

yellow sheared ox lt

pink-green weathered to yellow vesic a

greenish vesic agglom forms bar across trench

agglom

fine yellow-pink tuff

green vesic a with pink silica-lim alt A matrix

TRACK

TO QR SITE

cliff o/c contact could be gentle dip surface

GIF peg ser lim lt?

sheared argill silic vesic ta

grey soft argill brec lava?

75

patchy o/c's argill lta with ox py

fine argill. t or sts

EUCALYPTS

silic. lim greenish lta, some purple Fe colour

bleached sheared lt py lim shaley lenticles

80

blue grey - yellow (ox) lt some vesic frags some py frags

zone of colour change, grey to west, greenish to east (possibly indicative of increasing py to west)

TRENCH

fine lt lim. layers (py ox ?)

blue grey py lt

silic alt lt. lim after py

silty tuff minor sh

fine med gr lt

70

bsh

grey brown argill lta occassional bars of resistant rock silic.?

RAMP

light- grey brown argill lta, vesic frags ox py

68

bsh lcm band massive py

fine light grey shale or tuff

coarse grey lt lim after py, light grey tuff fines westwards

BOULDERS

NOTE No faulting observed at any contact

bsh

grey tuff

bsh

grey tuff, with shaly matrix (carbonaceous) also mauve grey tuff with shale lenticles, some fdxt

SOIL

bsh

no o/c

EUCALYPTS

TRACK

SOIL

trenches not joined at 22/9/76

bsh

38?

SOIL

mud no o/c

OPEN (cleared)

45

TRENCH

massive bsh dusty py 2-5 %

SCRUB

mud no o/c

SCRUB

FALLEN TIMBER

SCRUB

bsh rubble

QR ACCESS ROAD

GIF peg

bsh rubble

BUTTON GRASS

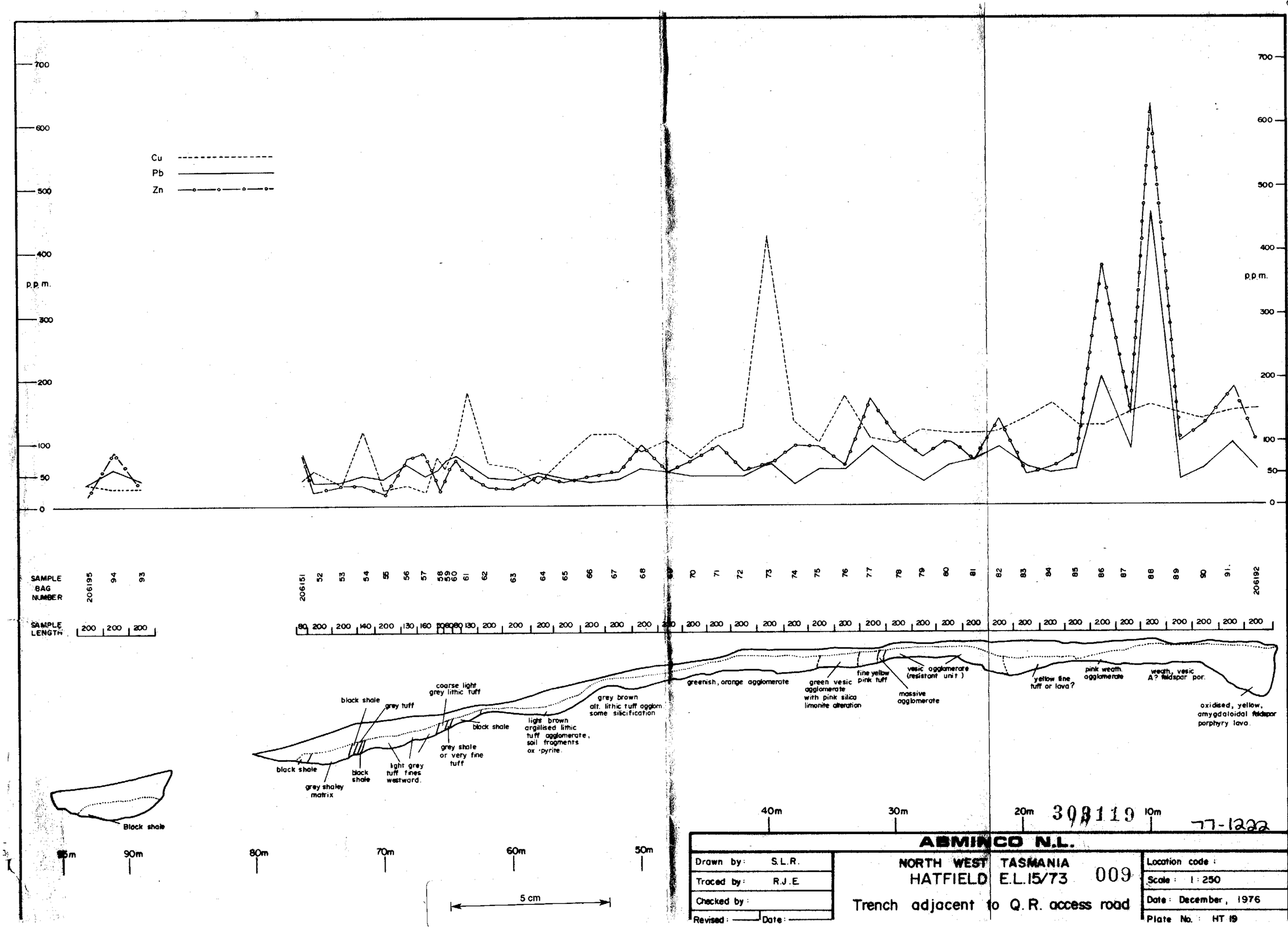
5 cm

303118

77-1222 008

ABMINCO N.L.

Drawn by E.H.S	NORTH WEST TASMANIA	Location code: K55/6/44
Traced by R.J.E.	HATFIELD E.L.15/73	Scale: 1 500
Checked by	Fact Geology of the "Quarry Area"	Date: December, 1976
Revised: — Date: —		Plate: HT 18



ABMINCO N.L.			
Drawn by: S.L.R.	NORTH WEST TASMANIA		Location code :
Traced by: R.J.E.	HATFIELD E.L.15/73	009	Scale : 1 : 250
Checked by :	Trench adjacent to Q.R. access road		Date : December, 1976
Revised : Date :			Plate No. : HT 19

308119

77-1222

3350 E

3400E

3450 E

10%

5%

Fe (%)

0

Horizontal scale 1:500

500

400

ppm.

300

200

100

50

0

Cu ----------

Pb ——————

Zn —o—o—

Sample bag No.

182852 182850 182845 182840 182835 182830 182825 182820 Sample Length (every 2m) 182800 182795 182790 182785 182780 182775 182770 182765 182760 182755 182753

rubbly black shale

fractured, faulted black slate

bedding strike 035° dip 45° W cleavage 015–035° dip vertical

black shale, massive cleavage 015°/ vertical

black slate

? cleaved contact

orange-red weathered andesitic (?) agglomerate white feldspar phenocrysts part vesicular (no fresh rock seen)

3300 E

5 cm

3350E

3400E

3450E

3500 E

303120 77-1222

Abminco Exploration

Drawn by : E.H.S.	NORTH WEST TASMANIA	Location code :
Traced by : R.J.E.	HATFIELD E.L.15/73	Scale : 1 : 500
Checked by :	Trench 5800 N 010	Date : January, 1977
Revised: — Date: —		Plate : HT 21

5 cm

116.

Drawn: GOB
Traced: JD
Checked:
Revised by: Date:

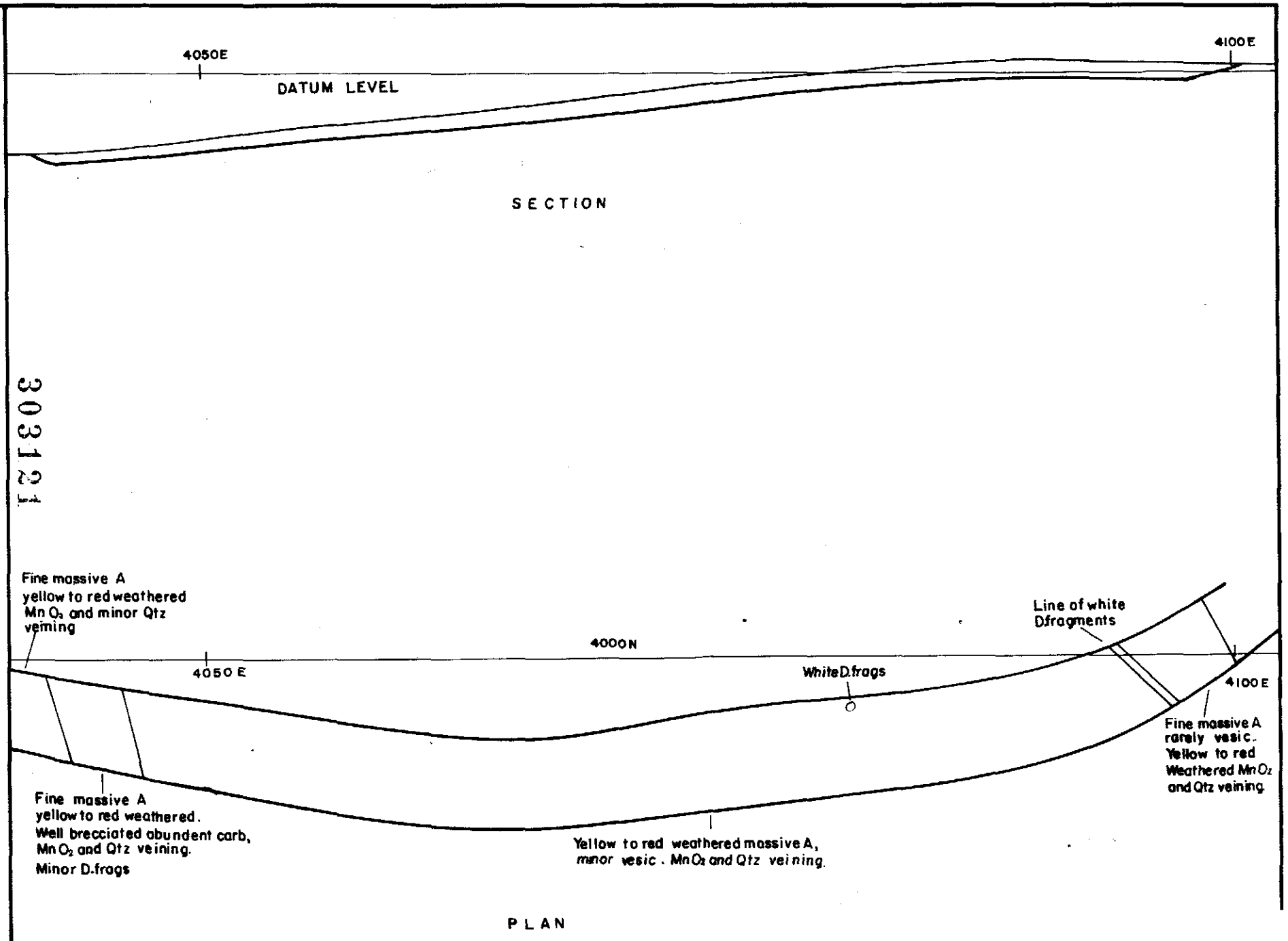
Abminco Exploration

NORTH WEST TASMANIA
HATFIELD E.L.15/73
Costean Line 4000N
PLAN and SECTION

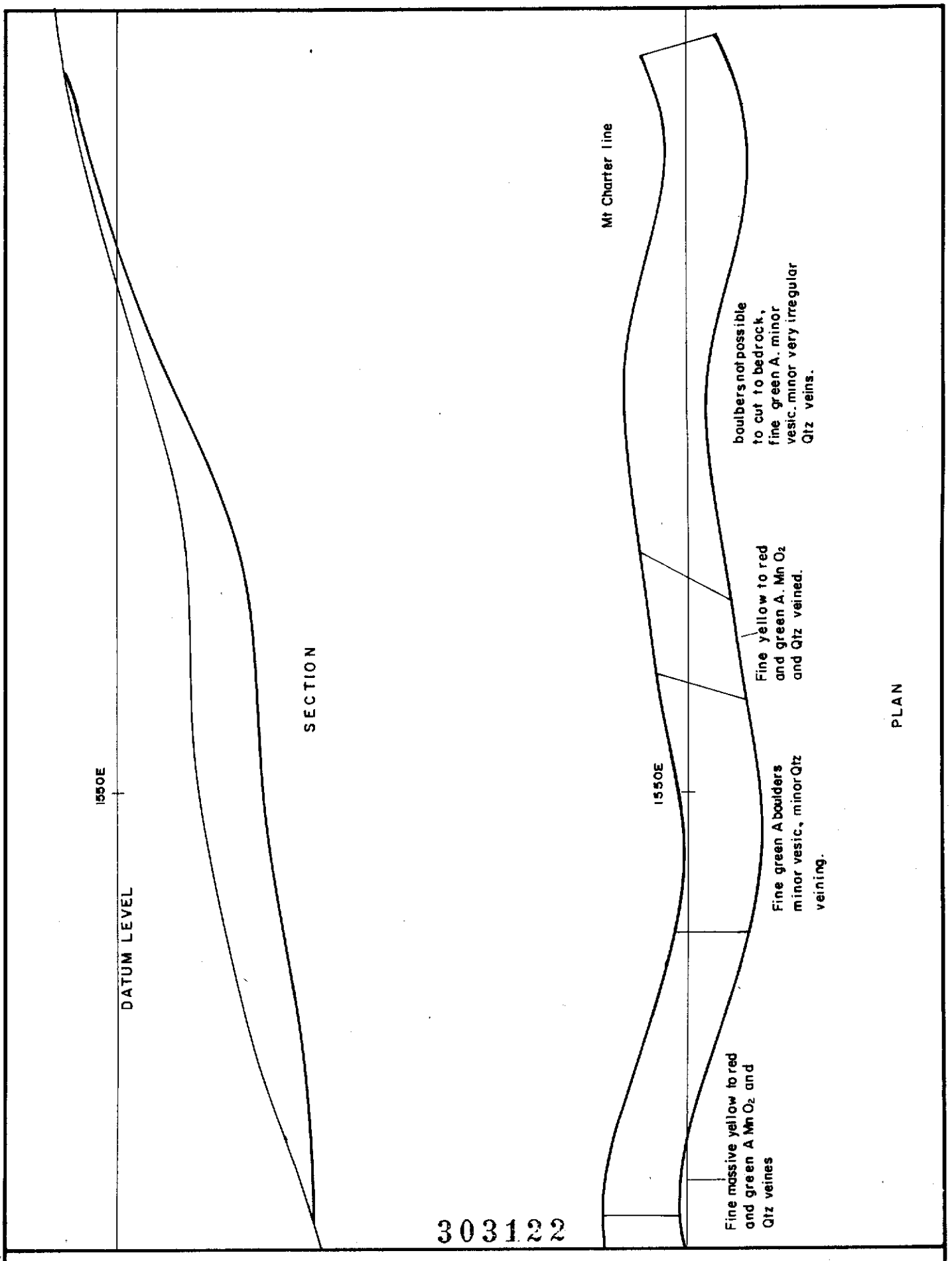
Location code:
Date: JULY 1977
Scale: 1:250
Plate No HT 23/4000

7-1222

303121



110



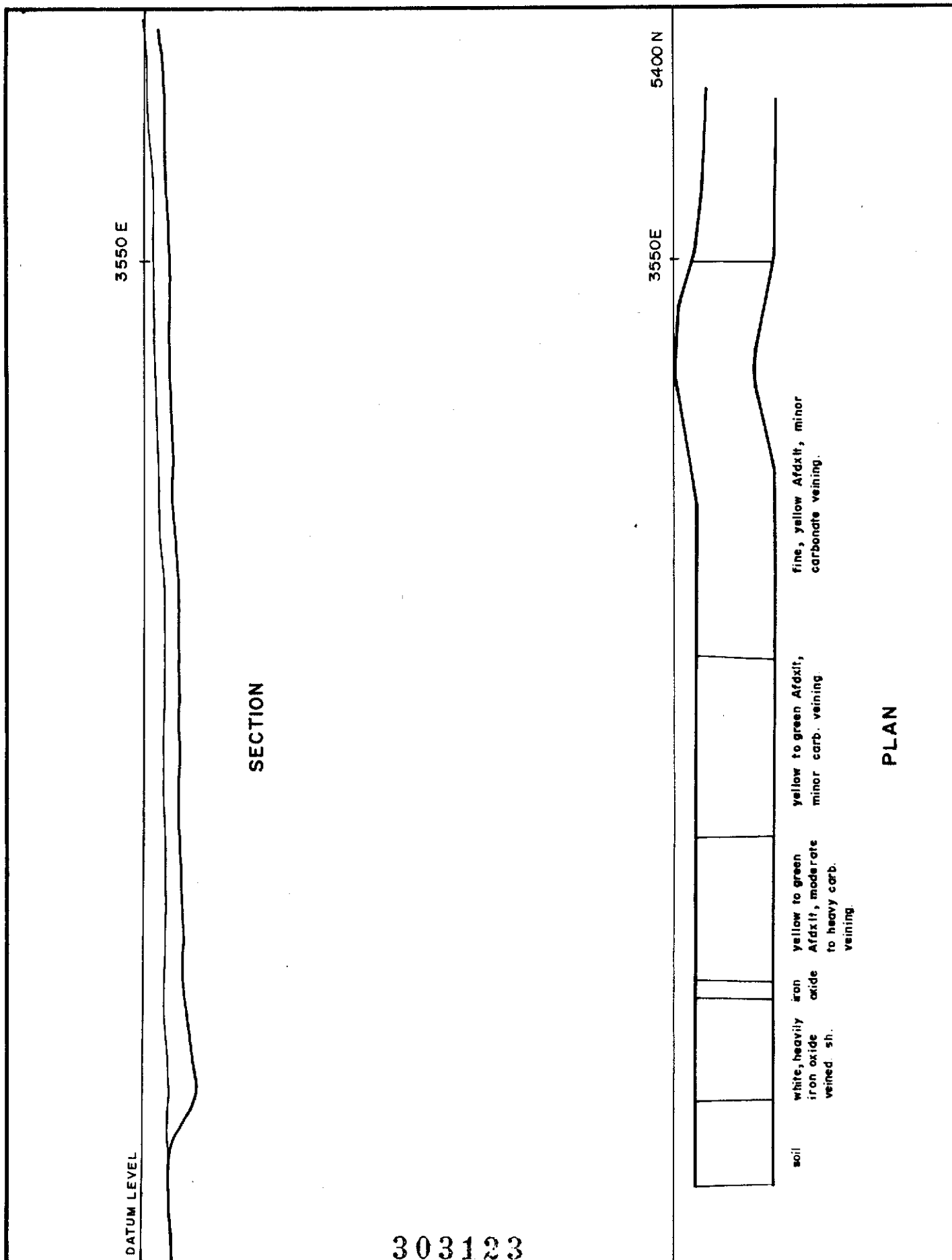
303122

Abminco Exploration

77-1222

Drawn: GOB	NORTH WEST TASMANIA	Location code:
Traced: JD	HATFIELD E.L.15/73	Date: JULY 1977
Checked:	Costean Line Mt Charter (4400N)	Scale: 1:250
Revised by: Date:	PLAN and SECTION	Plate No HT 23/ 4400

111



5 cm

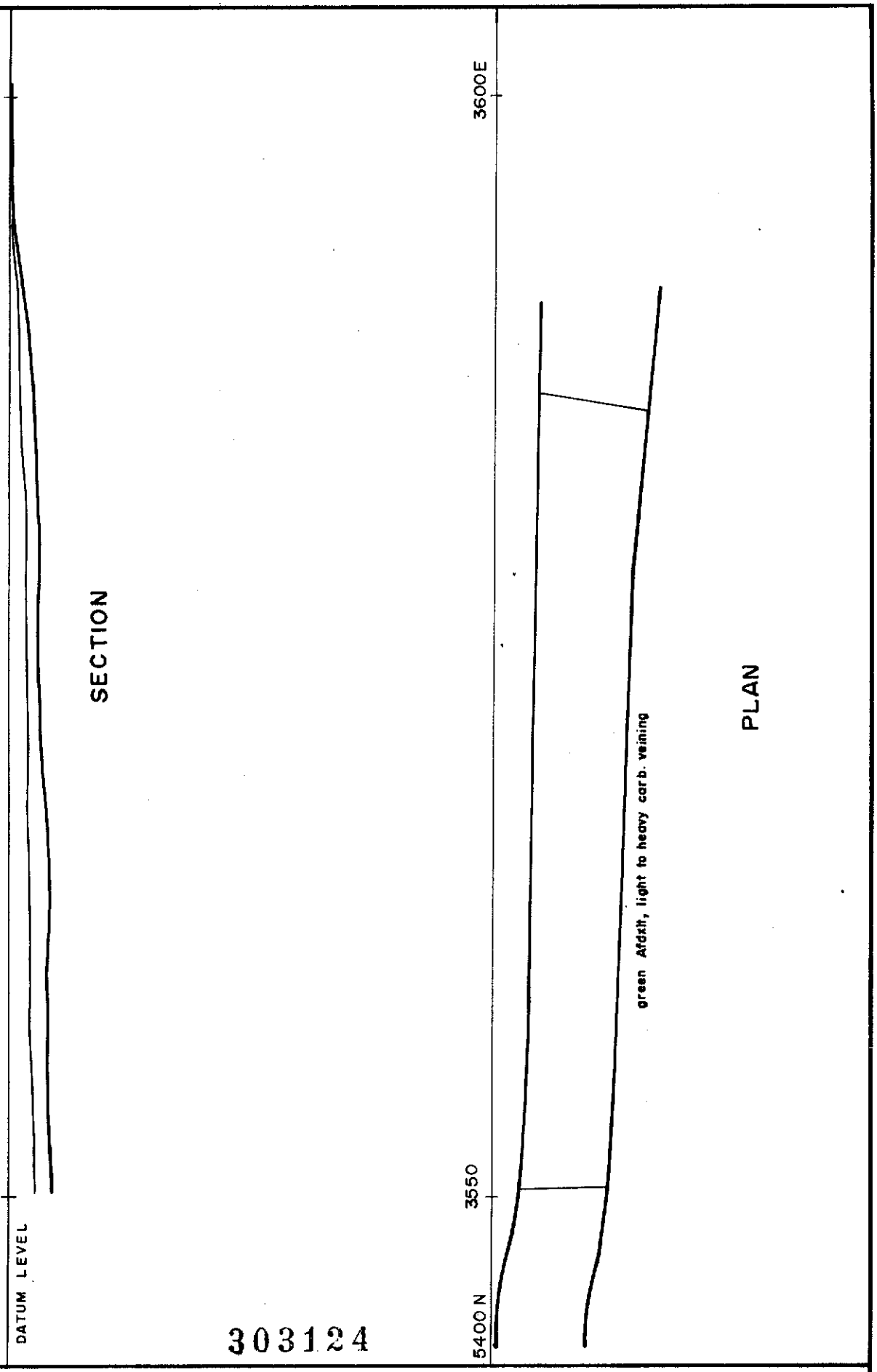
303123

Abminco Exploration

77-1222

Drawn: G.O.B.	NORTH WESTERN TASMANIA	Location code:
Traced: A.E.R.	HATFIELD E.L.15/73	Date: July 1977
Checked:	Costean Line 5400 N	Scale: 1: 250
Revised by: Date:	PLAN and SECTION	Plate No Hat 23/5400a

112



5 cm

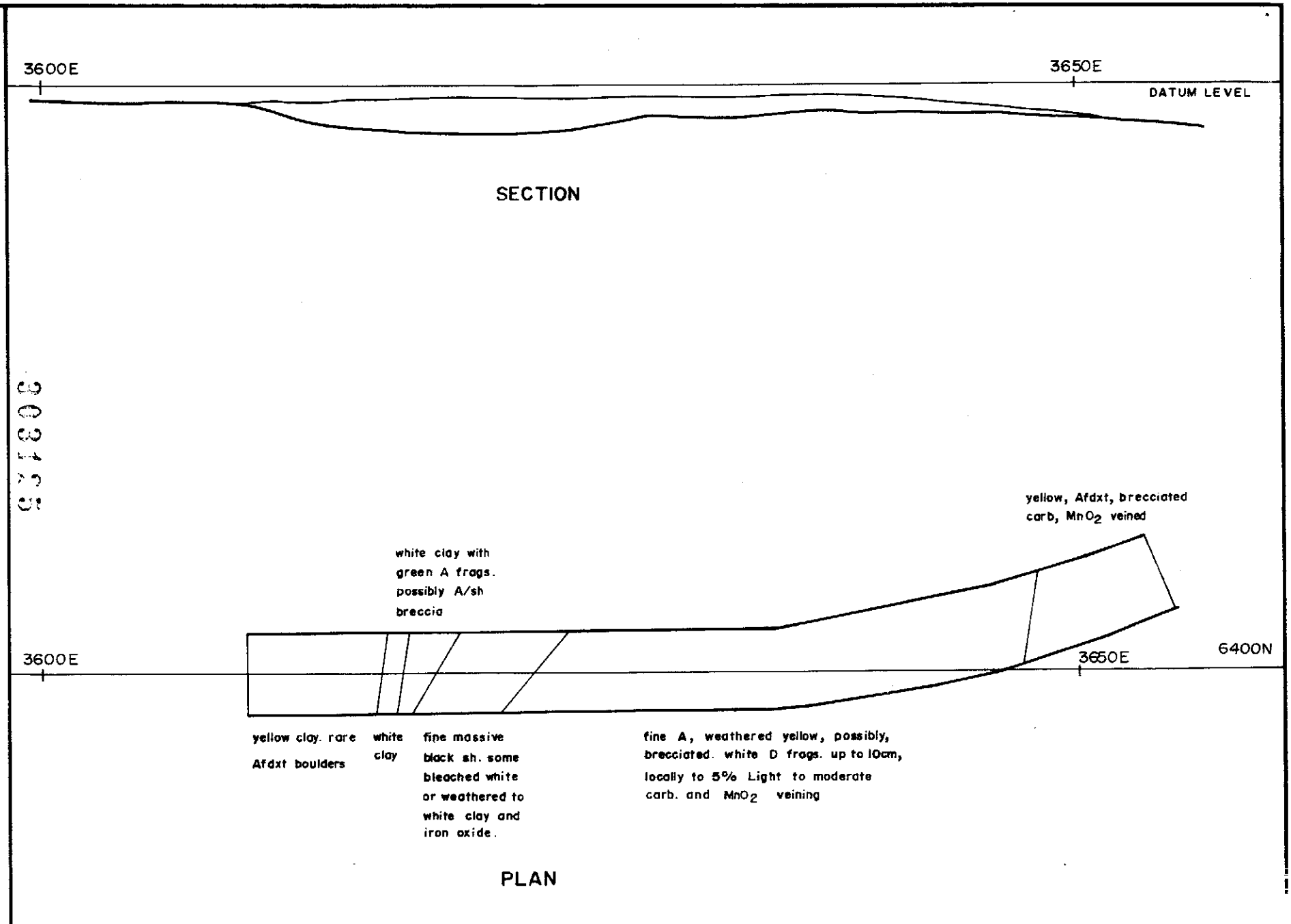
303124

Abminco Exploration

77-1222

Drawn: G.O.B.	NORTH WESTERN TASMANIA	Location code:
Traced: A.E.R.	HATFIELD E.L.15/73	Date: July 1977
Checked:	Costean Line 5400 N	Scale: 1 : 250
Revised by: Date:	PLAN and SECTION	Plate No Hat 23/54006

5 cm



Abminco Exploration

NORTH WESTERN TASMANIA

HATFIELD E.L.15/73

Costean Line 6400 N

PLAN and SECTION

Drawn: G.O.B.
Traced: A.E.R.
Checked:
Revised by: Date:

Location code: 77-1222

Date: July 1977

Scale: 1 : 250

Plate No Hat 23/6400

5 cm

Abminco Exploration

Drawn: G.O.B
Traced: A.E.R
Checked:
Revised by: Date:

NORTH WESTERN TASMANIA

HATFIELD E.L.15/73

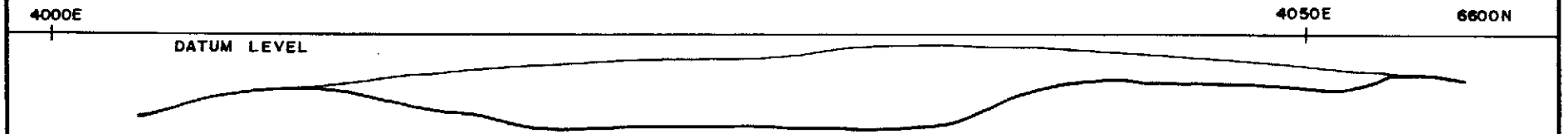
Costean Line 6600 N

PLAN and SECTION

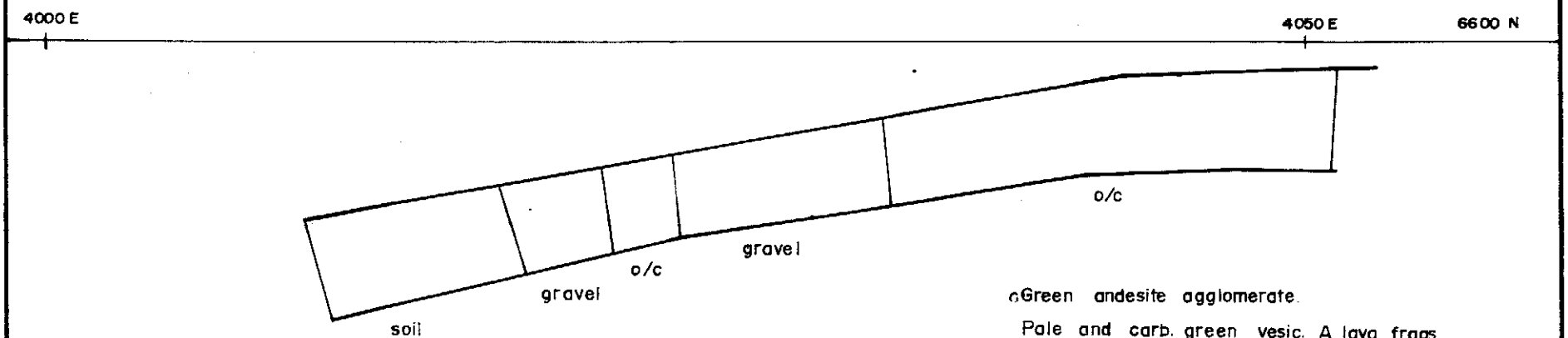
Location code:
Date: July 1977
Scale: 1:250
Plate No Hat 23/6600

77-1822

303126



SECTION



PLAN

oGreen andesite agglomerate.
Pale and carb. green vesic. A lava frags.
Very rare D fragments.
Minor carbonate veining.

5 cm

Drawn: GOB
Traced: JD
Checked:
Revised by: Date:

Abminco Exploration

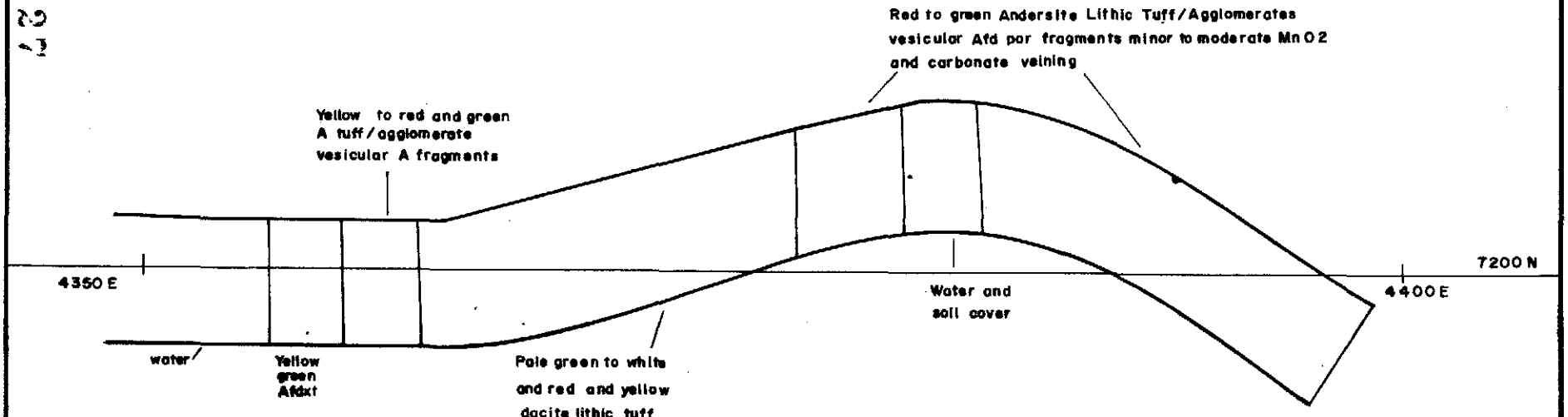
NORTH WEST TASMANIA
HATFIELD E.L. 15/73
Costean Line 7200N
PLAN and SECTION

Location code:
Date: JULY 1977
Scale: 1:250
Plate No HT 23/7200N

77-1282

303127

SECTION



PLAN


3300E
3350E
3400E
3450E
3500E
3550E
3600E
H1
No outcrop at surface
No outcrop at surface
0
50m
100m
150m
200m
5 cm
303128
ABMINCO N.L.
77-1222
Drawn by: E.H.S.
Traced by: R.J.E.
Checked by:
CHY/JD
MAY 77
NORTH WEST TASMANIA
HATFIELD E.L.15/73
SECTION 6200N
011
Location code: K55/6/44
Scale: 1:500
Date: November, 1976
Plate: HT 17

303129

ABMINCO N.L. 77-1222

Drawn: E.H.S.	**Traced:** R.J.E.
Checked:	
CH Y/JD	MAY 77

NORTH WEST TASMANIA

HATFIELD E.L. 15/73

SECTION 5200N

012

Location code: K55/6/44 | **Scale:** 1:500 | **Date:** January, 1977 | **Plate:** HT 20

NB Collar elevation above Sea Level not available.

5 cm

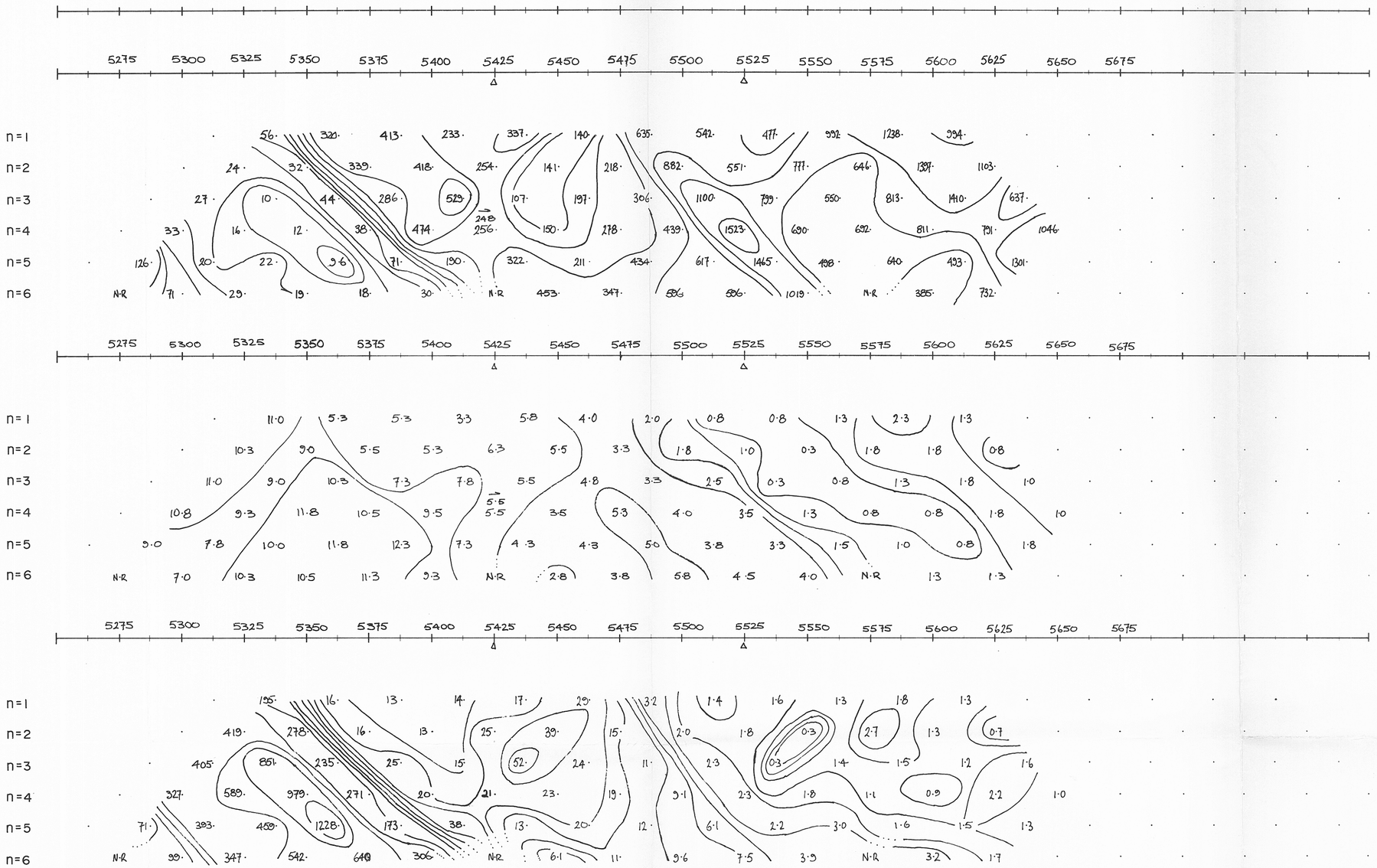
303130

77-1222

COMINCO EXPLORATION PTY. LTD.

Drawn by: E.H.S	Traced by: J.I.H.	NORTH WEST TASMANIA HATFIELD RIVER EL 15/73 MT. CHARTER AREA SECTION 4800N
Checked by		013
Location code · K55/6/44	Scale 1 : 500	Date MAY 1976 · Plate HT 1/48

77-1222



SOLO GEOPHYSICS AND CO.

INDUCED POLARIZATION & RESISTIVITY SURVEY

CLIENT Abminco N.L.

AREA Que River

GRID

LINE 7400 N

ARRAY Dipole - Dipole

DIPOLE SPREAD 25 Metres

FREQUENCIES 0.3 + 2.5 Hz

TRANSMITTER TYPE Mc Phar P660

RECEIVER TYPE Mc Phar P660

ELECTRODE TYPE Single Foil

SURVEYOR Steve Bronskill

DATE OF SURVEY 19.1.76

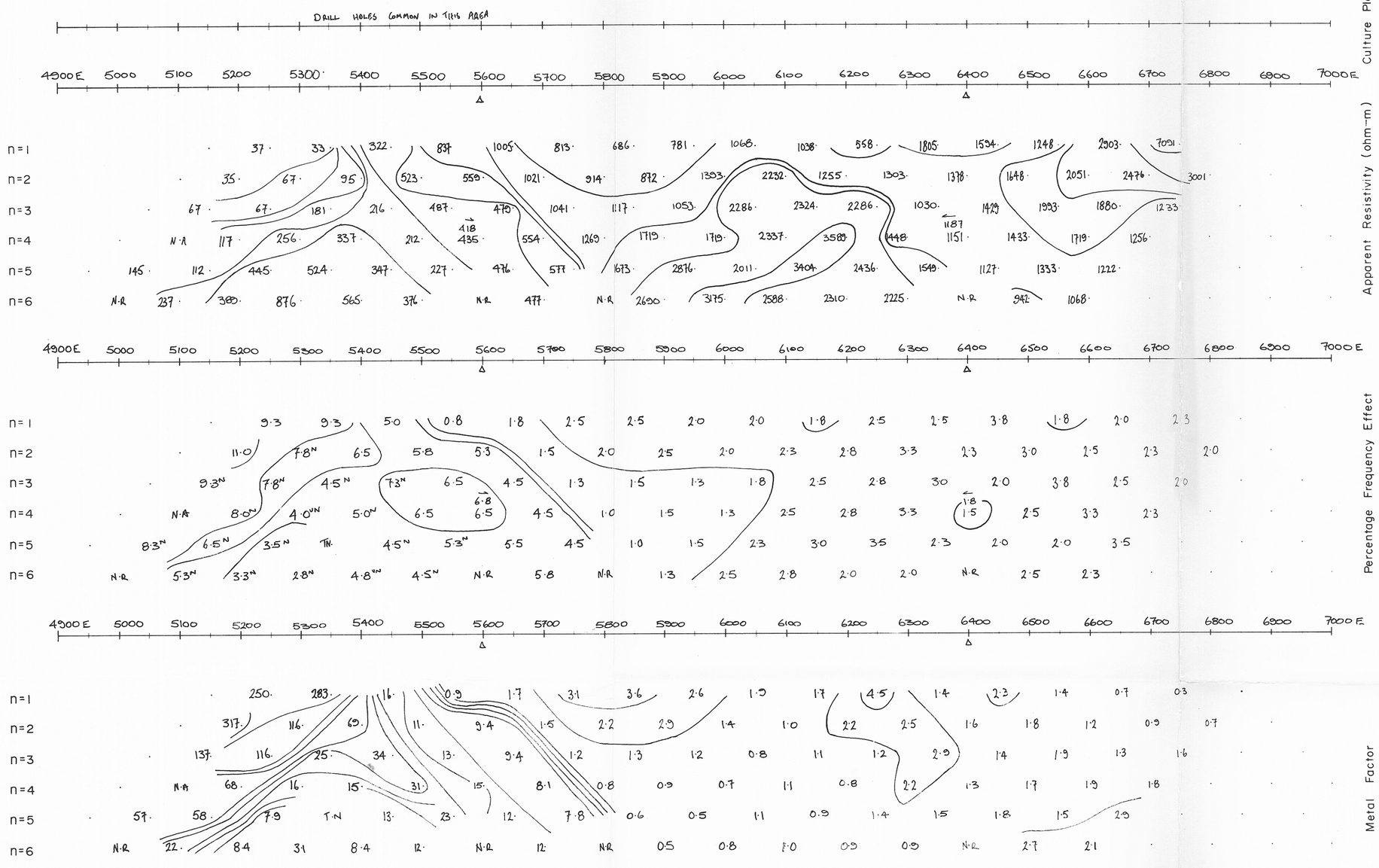
PLOTTED BY Nic Limb

COMMENTS

77_1222 Page 131

5 cm

77-1222



SOLO GEOPHYSICS AND CO.

INDUCED POLARIZATION & RESISTIVITY SURVEY

CLIENT Abminco N.L.

AREA Que River

GRID

LINE 7400 N

ARRAY Dipole - Dipole

DIPOLE SPREAD 100 Metres

FREQUENCIES 0.3 + 2.5 Hz

TRANSMITTER TYPE Mc Phar P660

RECEIVER TYPE Mc Phar P660

ELECTRODE TYPE Single Foil

SURVEYOR Steve Bronskill

DATE OF SURVEY 9+10.2.77.

PLOTTED BY Nic Limb

COMMENTS

77_1222 Page 132

5 cm

77-1222

SOLO GEOPHYSICS AND CO.

INDUCED POLARIZATION & RESISTIVITY SURVEY

CLIENT ABMINCO N.L.

AREA QUE RIVER

GRID

LINE 8600 N

ARRAY DIPOLE DIPOLE

DIPOLE SPREAD 25 METRES

FREQUENCIES 0.3 + 2.5 Hz

TRANSMITTER TYPE Mc PHAP P660

RECEIVER TYPE Mc PHAR P660

ELECTRODE TYPE SINGLE FOIL

SURVEYOR STEVE BRONSKILL

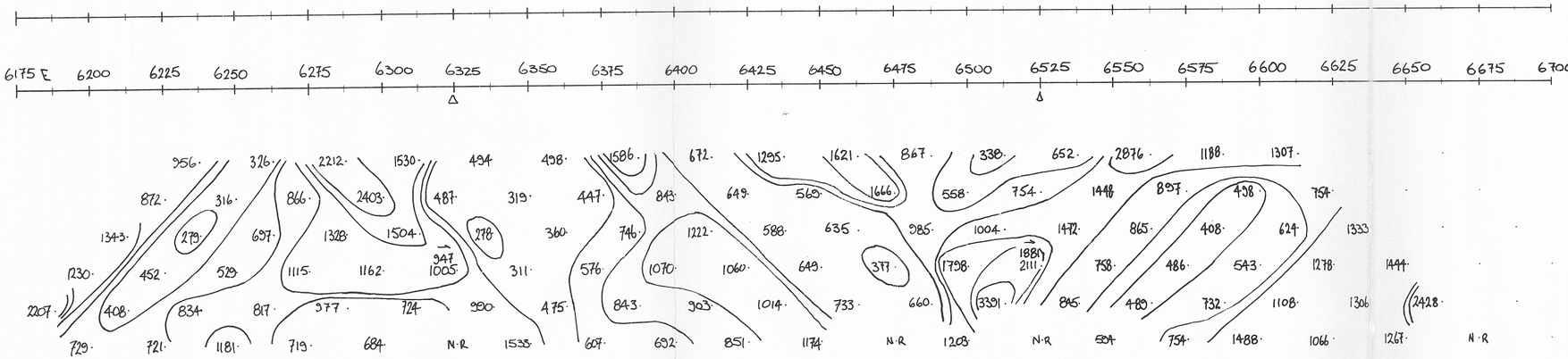
DATE OF SURVEY 1/2 + 2/2/77

PLOTTED BY NIC LIMB.

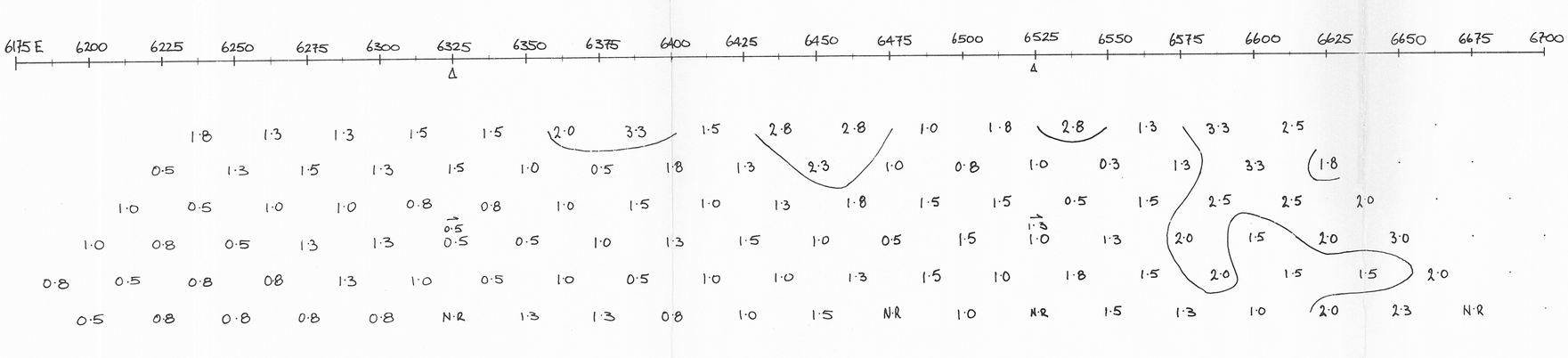
COMMENTS

Culture Plan

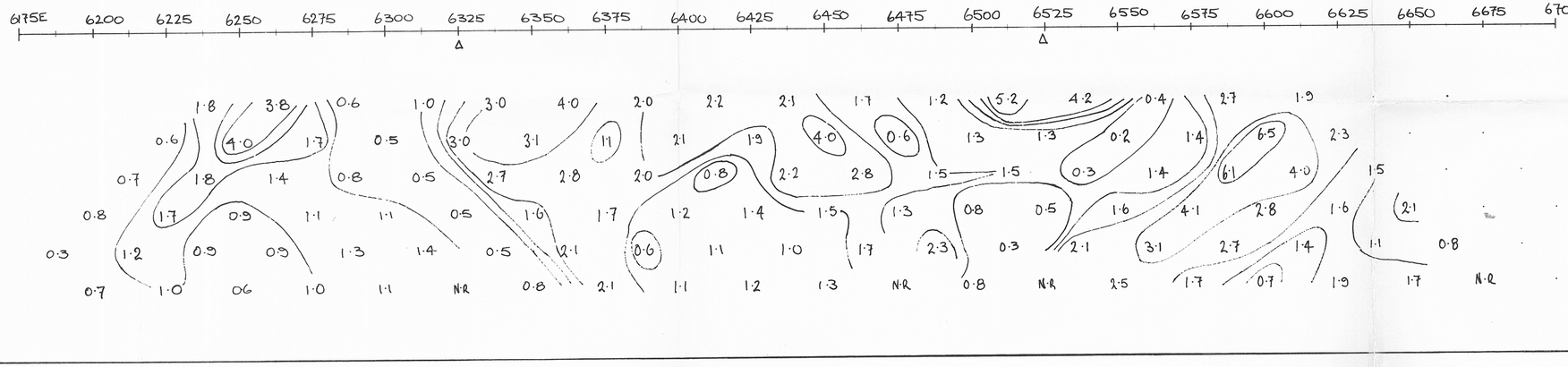
Apparent Resistivity (ohm-m)



Percentage Frequency Effect



Metal Factor



77-1222 Page 133

5 cm

77-1222

SOLO GEOPHYSICS AND CO.

INDUCED POLARIZATION & RESISTIVITY SURVEY

CLIENT ABMINCO N.L.

AREA QUE RIVER

GRID

LINE 10,000 N

ARRAY DIPOLE - DIPOLE

DIPOLE SPREAD 25 m

FREQUENCIES 0.3 / 2.5 Hz

TRANSMITTER TYPE McPhar P660

RECEIVER TYPE McPhar P660

ELECTRODE TYPE Alfoil

SURVEYOR S. BRONSKILL

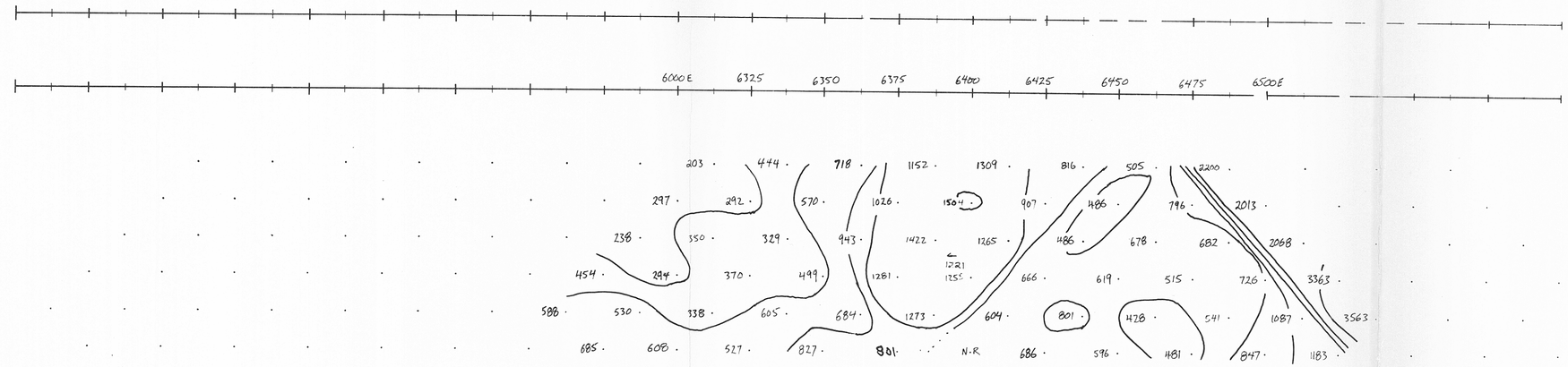
DATE OF SURVEY 3/2/77

PLOTTED BY S.B.

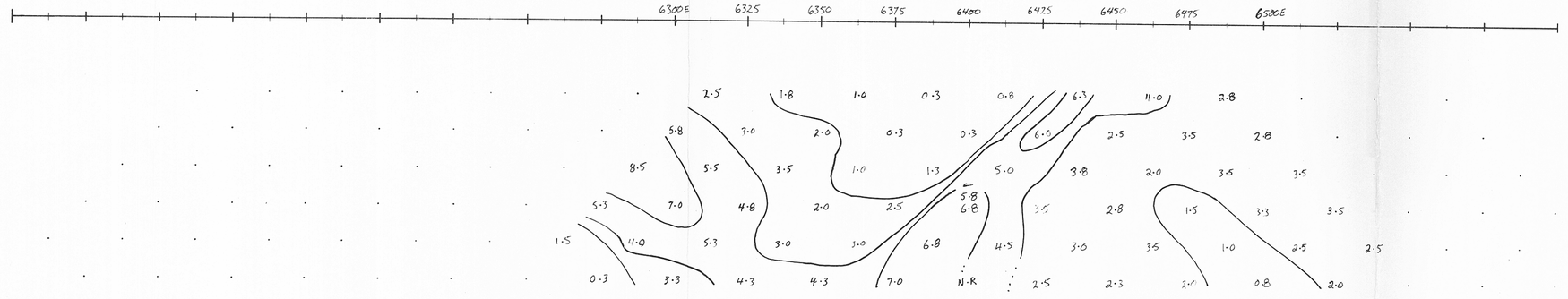
COMMENTS

Culture Plan

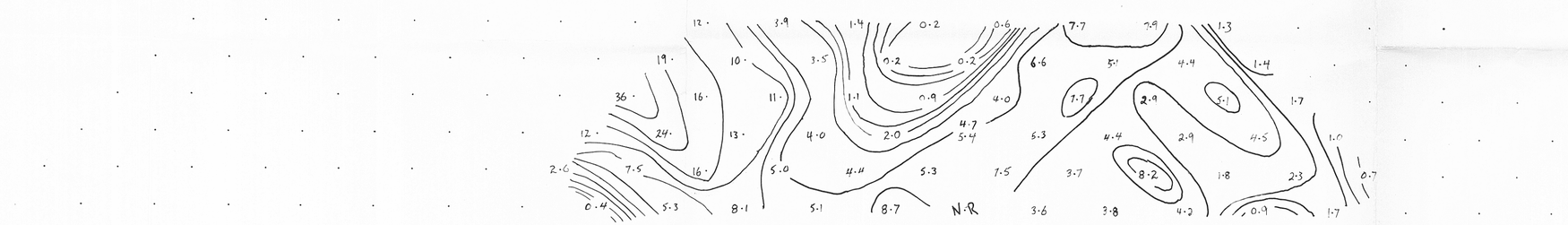
Apparent Resistivity (ohm-m)

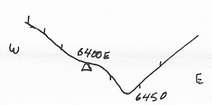


Percentage Frequency Effect



Metal Factor





77-1222 Page 134

5 cm

77-1222

SOLO GEOPHYSICS AND CO.

INDUCED POLARIZATION & RESISTIVITY SURVEY

CLIENT ABMINCO N.L.

AREA QUE RIVER

GRID

LINE 10600N

ARRAY DIPOLE - DIPOLE

DIPOLE SPREAD 50 METRES

FREQUENCIES 0.3 + 2.5 Hz

TRANSMITTER TYPE MC PHAR P660

RECEIVER TYPE MC PHAR P660

ELECTRODE TYPE SINGLE FOIL

SURVEYOR STEVE BRONSKILL

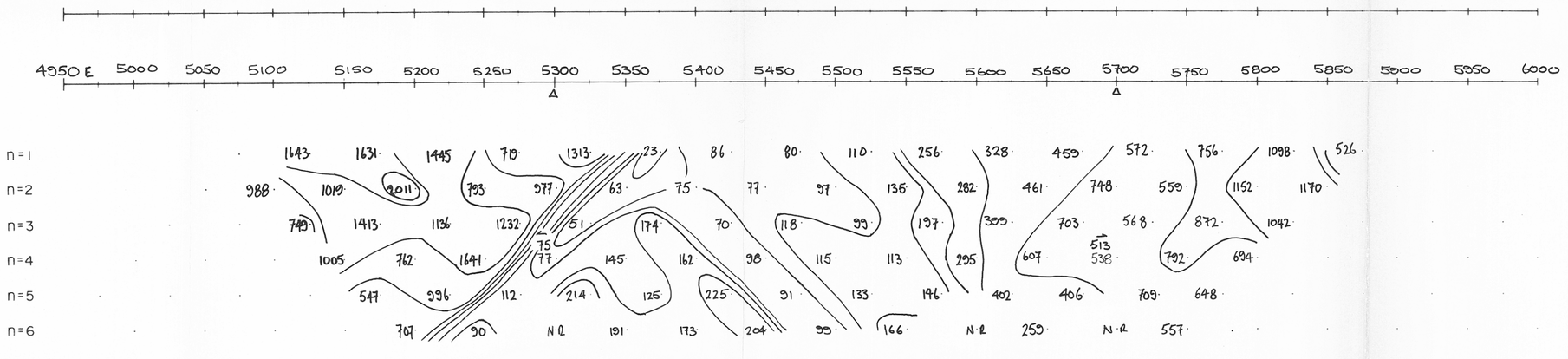
DATE OF SURVEY 12.2.77

PLOTTED BY NIC LIMB

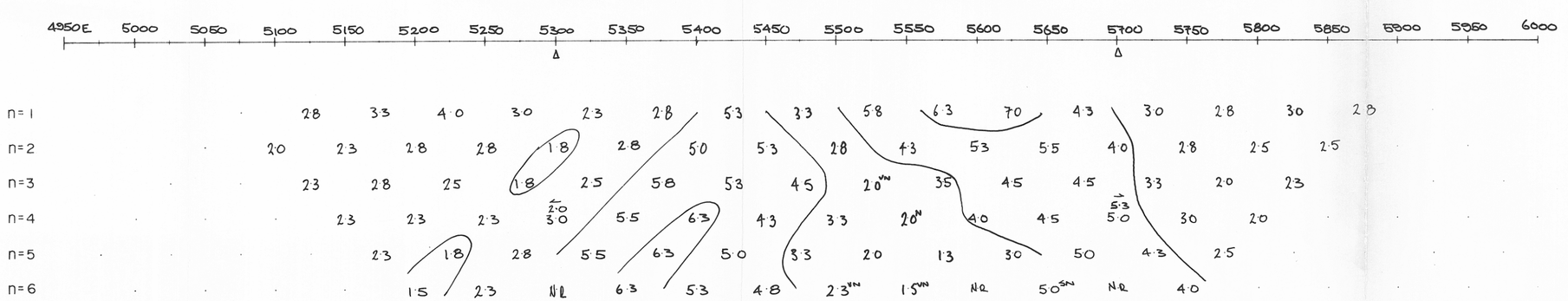
COMMENTS

Culture Plan

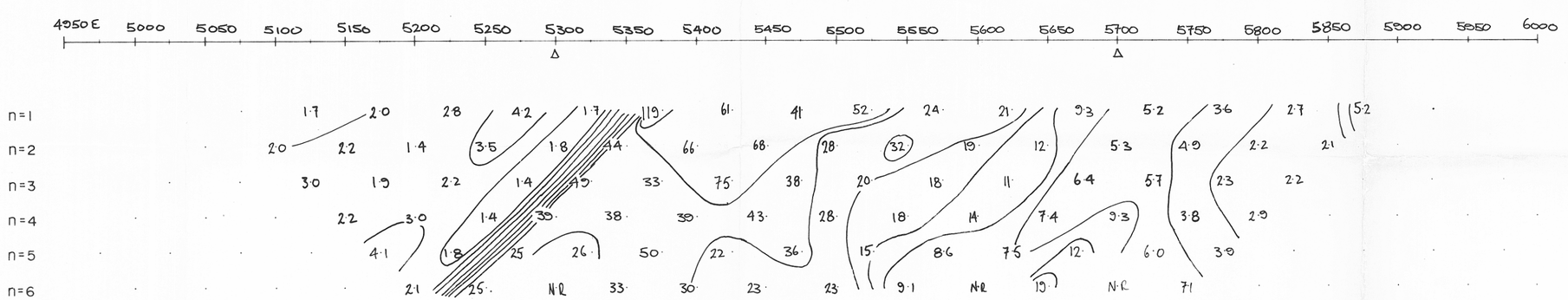
Apparent Resistivity (ohm-m)



Percentage Frequency Effect



Metal Factor



77-1222 Page 135

5 cm

77-1222

SOLO GEOPHYSICS AND CO.

INDUCED POLARIZATION & RESISTIVITY SURVEY

CLIENT ABMINCO N.L.

AREA QUE RIVER.

GRID

LINE 10,800 N

ARRAY DIPOLE - DIPOLE

DIPOLE SPREAD 50m

FREQUENCIES 0.3 / 2.5 Hz

TRANSMITTER TYPE McPhar P666

RECEIVER TYPE McPhar P660

ELECTRODE TYPE Alfoil

SURVEYOR S. BRONSKILL

DATE OF SURVEY 12/2/77

PLOTTED BY S.B.

COMMENTS

Culture Plan

Apparent Resistivity (ohm-m)

Percentage Frequency Effect

Metal Factor