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78-1277

ANNUAL REPORT

EXPLORATION LICENCE 2/70

MACKINTOSH

Tasmania

For 12 months ending June 1, 1978.

C.H.YOUNG
JUNE,1978.

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249002

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SUMMARY

This report details exploration work conducted over the Mackintosh Licence during the period June 2nd 1977 to June 1st, 1978.

The exploration programme included; detailed and regional geological mapping, soil geochemical sampling with computer analysis of geochemical data, the commencement of a whole rock geochemical sampling programme, I.P. geophysics and trenching.

In the Mackintosh West area near the Que River Zn-Pb deposit I.P. geophysics was used as follow up of both geological and geochemical targets. The targets were those previously delineated in the Southwell River grid area to the north-east of the Que River and in the Barite Creek area to the south and one found by recent mapping in the area to the east of Mt.Charter.

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

In the Mackintosh East area near Cradle Mountain four bulldozer trenches were completed, within the Back Peak grid, over coincident soil geochemical and I.P. geophysical anomalies overlying Cambrian acid volcanic rocks. Reconnaissance geological investigation of iron occurrences, reported to occur in Ordovician rocks, was conducted.

An Honours student from Monash University Melbourne, has completed a thesis titled, "The Geology of the Que River Area, West Tasmania". Primary hornblende in the hangingwall andesites near Que River is noted. This may help to distinguish footwall-hangingwall positions in the andesite sequence.

INTRODUCTION

Mackintosh River Exploration licence 2/70, now incorporating the area previously covered by the Mayday Exploration licence 5/74, is held by Abminco 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 & Exploration Co.Ltd. Current equities are Paringa 10%, Cominco Ltd. 27% and Abminco N.L. 63%. The licence expires on 30/6/78. It may be renewed at six monthly intervals.

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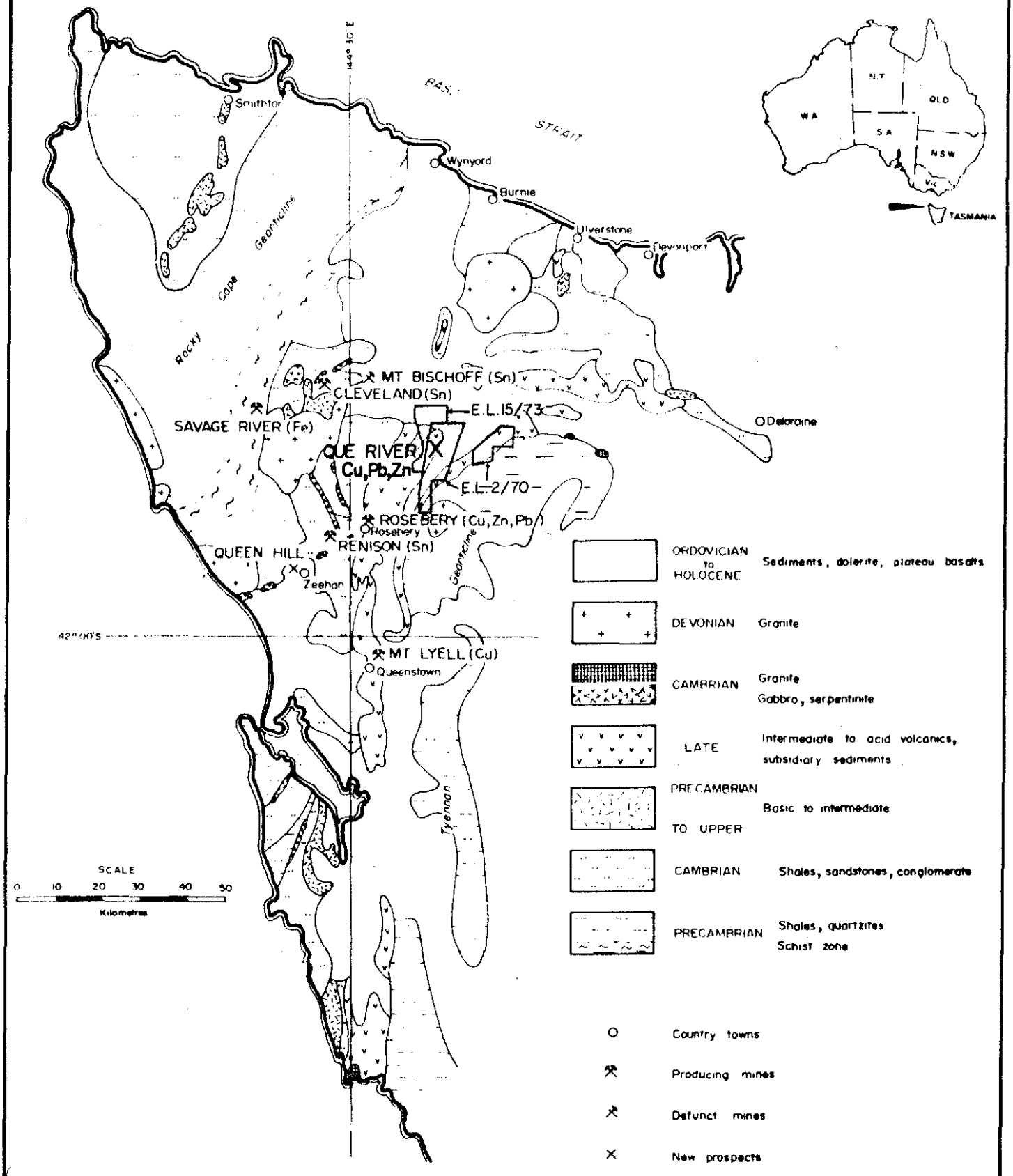

Fig. 1

5 cm

Abminco Exploration

Drawn:	GEOLOGY	Location code:
Traced: A.E.R.	OF	Date: June 1978
Checked:	NORTH WEST TASMANIA	Scale: 1:1,250,000 approx.
Revised by: Date	(after Williams 1976, Gee 1977)	Plate N°: DT 80

During the 1977-1978 summer season detailed follow up was completed over the areas recommended in the 1977 annual report.

In the Southwell River grid area located 2 - 2.5 km north east from Que River (soil anomalies Nos. 11 and 12, plate QR 100) attractive stratigraphy was indicated by the presence of fragments of massive base metal sulphides within altered andesitic-dacitic pyroclastic rocks. Due to the swing of the stratigraphy to an east-west trend, follow up consisted of the establishment of a rectilinear E-W, N-S grid, geological mapping and C-horizon soil geochemistry on all lines and dipole-dipole I.P. geophysics on the four N-S lines. No first order targets were detected.

In the Barite Creek area, located 2.5 km south from Que River, sheared and altered rhyolites with both barite and pyrite mineralisation were found by creek mapping. Two lines of detailed geological mapping, C-horizon soil geochemistry and dipole-dipole I.P. geophysics were completed. No significant anomalies were detected.

The mapping of dacitic rocks on line 4900N immediately east of Mt. Charter was followed by C-horizon soil geochemistry and dipole-dipole I.P. geophysics (an extension of the major I.P. survey in the adjoining Hatfield E.L. 15/73). No anomalies were detected.

Computer analysis of a greater part of the C-horizon soil geochemical data for the Mackintosh Licence was completed. Cumulative frequency percent values for Cu,Pb and Zn were determined and a frequency histogram plot was prepared.

As part of a world-wide study on stratiform Cu-Pb-Zn deposits, the Federal Institute for Geosciences and Natural Resources in Hannover, Germany, has started a research programme in Australia in which it is hoped to evaluate parameters for a genetic approach to mineral exploration. In the Que River and Mackintosh area a programme of whole rock and trace element analysis of core and surface samples was commenced. It is hoped the programme will eventually aid in the detection of blind ore bodies.

In the Mackintosh East area near Cradle Mountain exploration by Paringa on behalf of the Aberfoyle Group commenced in November 1969 and was designed to test for volcanogenic massive sulphide deposits within a belt of Cambrian acid volcanics. A programme of stream sediment sampling followed by gridding (The Back Peak grid), soil sampling, mapping and bulldozer trenches was

completed. Several well defined lead anomalies were outlined over a strike length exceeding 500 metres. The lead anomalies overlie Cambrian acid volcanics adjacent to the north-western margin of the pre-Cambrian Tyennan Massif.

Subsequent to the entry of Cominco into the Aberfoyle Group in 1972 an AEM/magnetometer programme was conducted with ground follow up of anomalies in 1973/74. In 1975 four lines of dipole-dipole I.P. geophysics were run over the main lead geochemical anomalies. Weak I.P. anomalies were detected.

Due to the intensive exploration and development programme at Que River in the western part of the Mackintosh E.L. follow-up of coincident I.P. and lead soil geochemical anomalies were delayed until 1978 when four bulldozer trenches were completed. In the trenches high metal values are clearly derived from fine grained disseminated sulphides localised in fissures along north and north-west trending fractures.

To assess the potential of skarn scheelite mineralisation reconnaissance geological investigation of iron occurrences reported to occur in Ordovician rocks was conducted. They were found to be hematitic Ordovician quartzite and localised exotic limonite on limestone formed by induration at the base of a Tertiary basalt flow.

SURVEY

Gridding along cut lines at 50m intervals has been an on going programme since the initial ground EM evaluation of anomaly 8 (Que River).

During the past year compass and chain survey with clinometer control for slope corrections was used to extend earlier gridding. A total of 27,900 metres of gridding was accomplished, details are given below and summarised on Plate MAC 63, in text.

In the Southwell River grid area 21,900 metres of line cutting and pegging as base lines and cross lines as follows:-

Baselines	Length Metres
5900E	1000
6050E	600
6300E	1000

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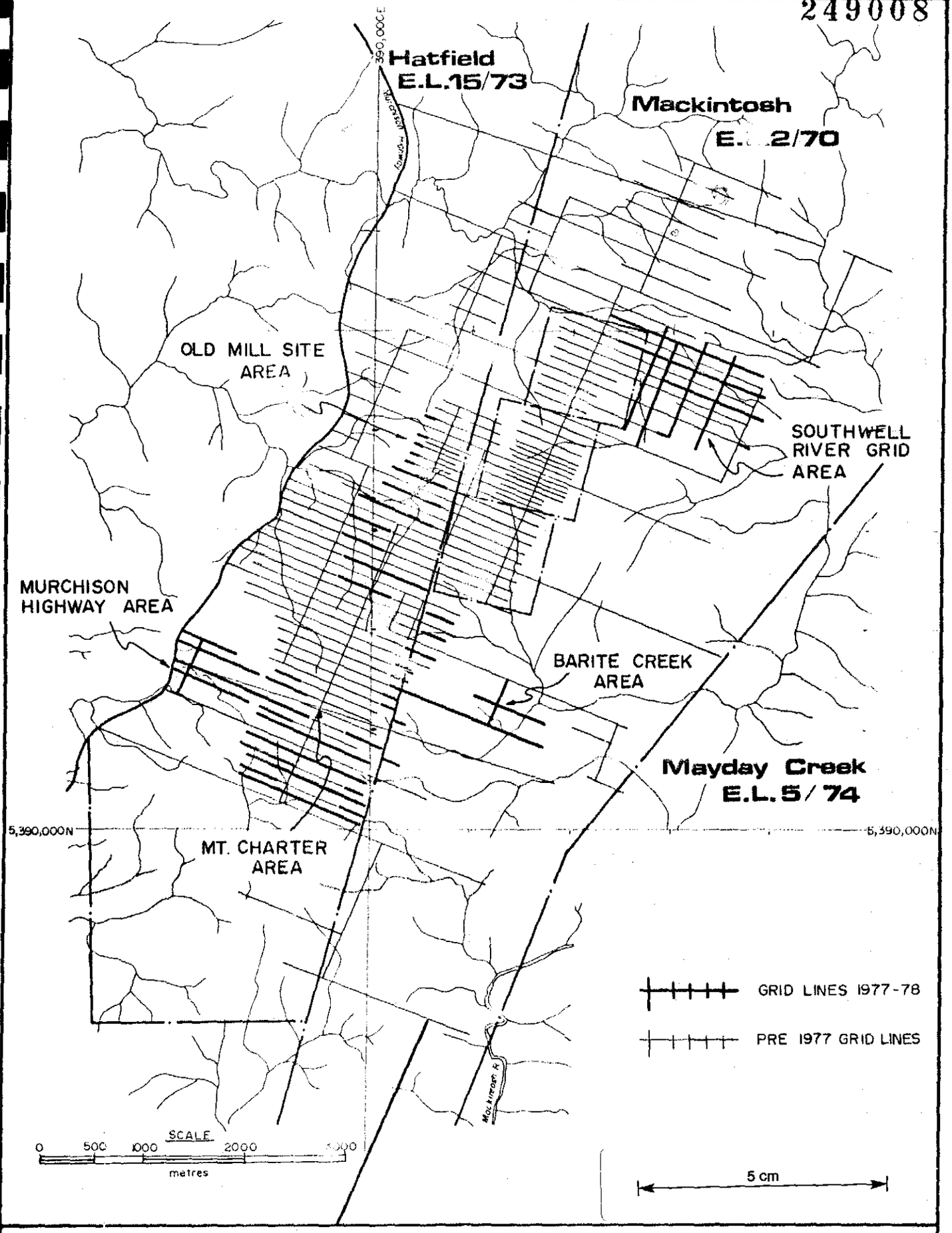

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FIG. 2.

Drawn	C.H.Y.	NORTH WEST TASMANIA Mackintosh West/ Hatfield Licence Areas GRID & SOIL GEOCHEM. COVERAGE 1977-78	Location code
Traced	R.J.E.		Date June., 1978
Checked			Scale 1 : 50,000
Revised by	Date		Plate No Mac. 63

Baselines Contd.	Length Metres
6600E	1000
6950E	100
	3700
Cross Lines	18,200
	Total 21,900 metres.

In the Barite Creek area 3,000 metres as follows:-

Baselines	Length Metres
5800E	500
Cross Lines	2500
	Total 3000 metres.

Near Mt.Charter 900 metres of cross lines added as part of the "blanket" I.P. survey in the adjoining Hatfield licence.

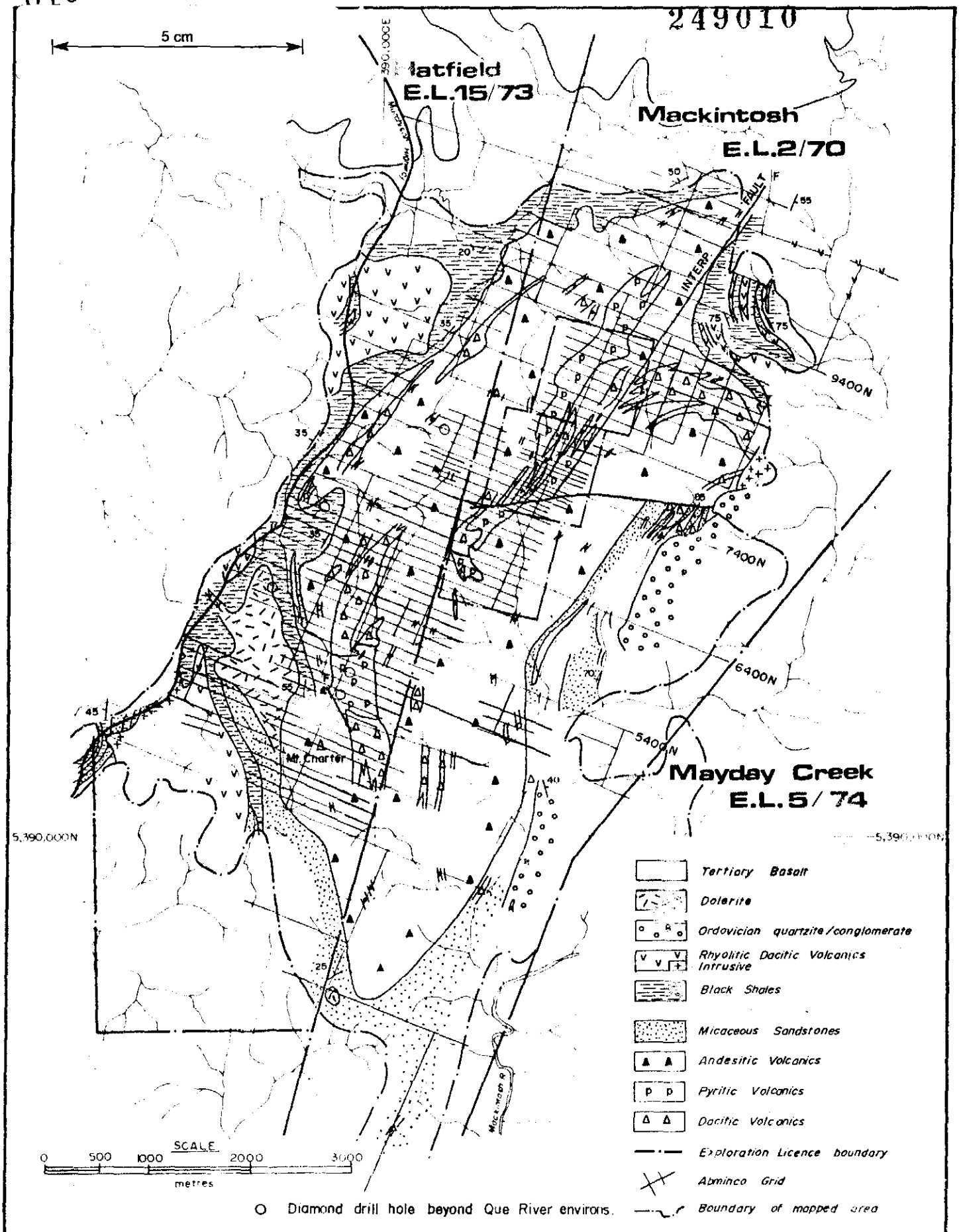
To improve access in the south-eastern part of the licence area a base line of 2,100 metres established south from line 1900N at 6400E to meet forestry tracks in the Murchison River valley.

GEOLOGY

Grid mapping was plotted at 1:2,500 scale and compiled at 1:10,000 and 1:50,000 scale. Hand specimens were systematically collected and thin sections prepared as required. Petrological reports are appended (A).

In the Mackintosh West area geological mapping of the Southwell River Grid, the Barite Creek area, the east flank of Mt. Charter on line 4900N, base line 6400E and line 1900N was completed.

In the Southwell River Grid area a sequence consisting of barren dacite lavas intercalated with pyritised and altered andesitic-dacitic pyroclastics has a strike length of at least 1200m and a width of approximately 300m. The sequence trends at about 080° magnetic and dips 60°-80° to the north. (Plate MAC 60)



Abminco Exploration

FIG. 3.

Drawn	C.H.Y.	NORTH WEST TASMANIA QUE RIVER REGIONAL GEOLOGY SUMMARY MAP	Location code
Traced	R.J.E.		Date June, 1977
Checked			Scale 1:50,000
Revised by	Date		Plate No. Mar. 53

The Southwell River Grid sequence may be the north extension of the Que River Mine sequence transposed southwards some 1.5 km by faulting. (Plate MAC 53 in text). The position of the fault is suggested by an air photo lineation trending at about 020° magnetic and passing some 200m east of the Que River ore deposit. To the north of the east trending Southwell River grid sequence, the 020° magnetic trending contact between the Que River Beds and andesite is thus rationalised as a fault contact.

Lithologies within the Southwell River Grid sequence include barren dacite (D), a fine grained quartz feldspathic rock, commonly subject to carbonate alteration. Flow banding in this rock has aided the determination of strike and dip of the sequence. Andesitic-dacitic pyroclastics (ADP) are abundant within the sequence. Fragment size ranges from fine tuff (0.5 - 10 mm) to coarse agglomerate with fragments up to 20 cm. Fragments up to 15 mm of high grade base metal sulphide of both Zn - Pb and Cu were noted. Mineralisation and alteration is not as intense as near the Que River deposit, disseminated pyrite is common but generally less than 5%. Alteration of feldspars to carbonate and sericite and bright green illite-hydromuscovite is common.

In the Barite Creek area a paucity of outcrop has prevented a meaningful determination of the geology. Creek outcrop has provided the only evidence of mineralisation, that is barite and pyrite within sheared and chloritised rhyolites.

An extensive outcrop of carbonate altered dacitic rock was mapped in the vicinity of line 4900N about 400 metres east of Mt. Charter. However no significant mineralisation was found in this locality.

On the 6400N base line and line 1900N, sandstones of the "Farrell Slate" formation appear almost continuous with the sandstones of the Que River beds, trending south-east from the Mt. Charter area. The only volcanic rock noted in this locality is Jurassic dolerite in the vicinity of 5400E. The dolerite in this location lines up with an elongation in the outcrop pattern of the dolerite on the west flank of Mt. Charter. This suggests the emplacement of the dolerite was structurally controlled along a plane striking 335° magnetic (Plate MAC 53, in text). The lack of a stratigraphic extension to the south, of the favourable andesitic sequence, past about 1900N, thus may be

attributed to both thinning of the volcanic pile and possible truncation by faulting.

In his thesis, titled "The Geology of the Que River area West Tasmania", submitted in 1977 in part fulfillment of Bachelor of Science (Hons) Degree at Monash University, A. Bold states that the texture of the "Western" andesites (hangingwall andesites) is similar to that of the "Eastern" andesites (footwall andesites) but "Their mineralogy differs in that primary hornblende is present in some samples", that is, in the hangingwall andesites. This may help to distinguish footwall - hangingwall positions in the andesite sequence away from the immediate Que River area.

In the Mackintosh East area within the Back Peak grid (Plate MAC 59) several well defined Pb soil geochemical anomalies were outlined over a strike length exceeding 600m. These overlie a portion of a narrow belt of west dipping Cambrian rhyolitic volcanics near the contact with the pre-Cambrian Tyennan Massif.

Investigation of the Cambrian volcanics by trenching to bedrock, beneath the best soil geochemical anomalies (to 2500 ppm Pb) coincident with weak I.P. anomalies, indicated the anomalies are not due to stratiform sulphide mineralisation. The underlying rock types are weakly sheared, barren rhyolites. They are occassionally bedded or flow banded with quartz crystal fragments to 1mm, sericitised feldspar crystal fragments to 0.5 mm and lesser amounts of lithic fragments (rhyolitic) to 2.5 mm.

Their matrix consists of microcrystalline quartzofeldspathic material. Minor late-stage intersecting veinlets (rarely >1mm in width) of quartz with accessory chlorite include disseminated patches of sulphides.

Quartz-galena fissure lode veins in Pre-Cambrian schists are exposed at Fleece Creek. These veins are localised at the intersection of north-east and north-west trending faults. In the grid area there are a number of photo lineaments with similar orientations. It is reasonable to conclude that repetitions of the style of mineralisation at Fleece Creek are common in both Pre-Cambrian and Cambrian rocks.

Showings of hematite at the edge of the Vale of Belvoir in the north-west part of the Mackintosh Licence are recorded on the Mines Department 1" to 1 mile

Mackintosh Sheet. Reconnaissance geology was conducted to determine the nature of the Fe mineralisation and to assess the potential for skarn magnetite-scheelite mineralisation.

At the edge of the Vale, west dipping hematitic Ordovician quartzites are overlain by a thin conglomerate unit and then by impure sandstones (Plate MAC59). In the Vale, shallow dipping Ordovician Gordon limestone is well exposed. Tertiary basalt is common in the area.

Two showings of Fe are recorded but only one exposure, the most north western of the two, was located. This exposure consists of limonite - goethite developed on limestone. The other showing is plotted in the vicinity of outcropping hematitic quartzite which may well be the reason for the Fe notation.

The limonite-goethite exposure is adjacent to an outcrop of Tertiary basalt and appears to be an exotic capping formed by induration at the base of a basalt flow. No evidence of a skarn, i.e. magnetite, epidote, garnet or diopside was noted.

TRENCHING

In the Mackintosh East area four trenches (Plates MAC 57,58), were completed as follows:-

Northing (FT)	Easting (FT)	Length	Av.Depth	Comment
8100N	44E-46E	65 m	1 m	Barren unaltered rhyolite.
7300N	45E-47E	55 m	3 m	Barren unaltered rhyolite covered by up to 4 m of glacial scree.
2900N	60E-62E	65 m	3 m	Barren unaltered rhyolite with minor quartz filled fissures containing rare sulphides. Covered by up to 4 m of glacial scree
2100N	60E-64E	120 m	1 m	Barren unaltered rhyolite.

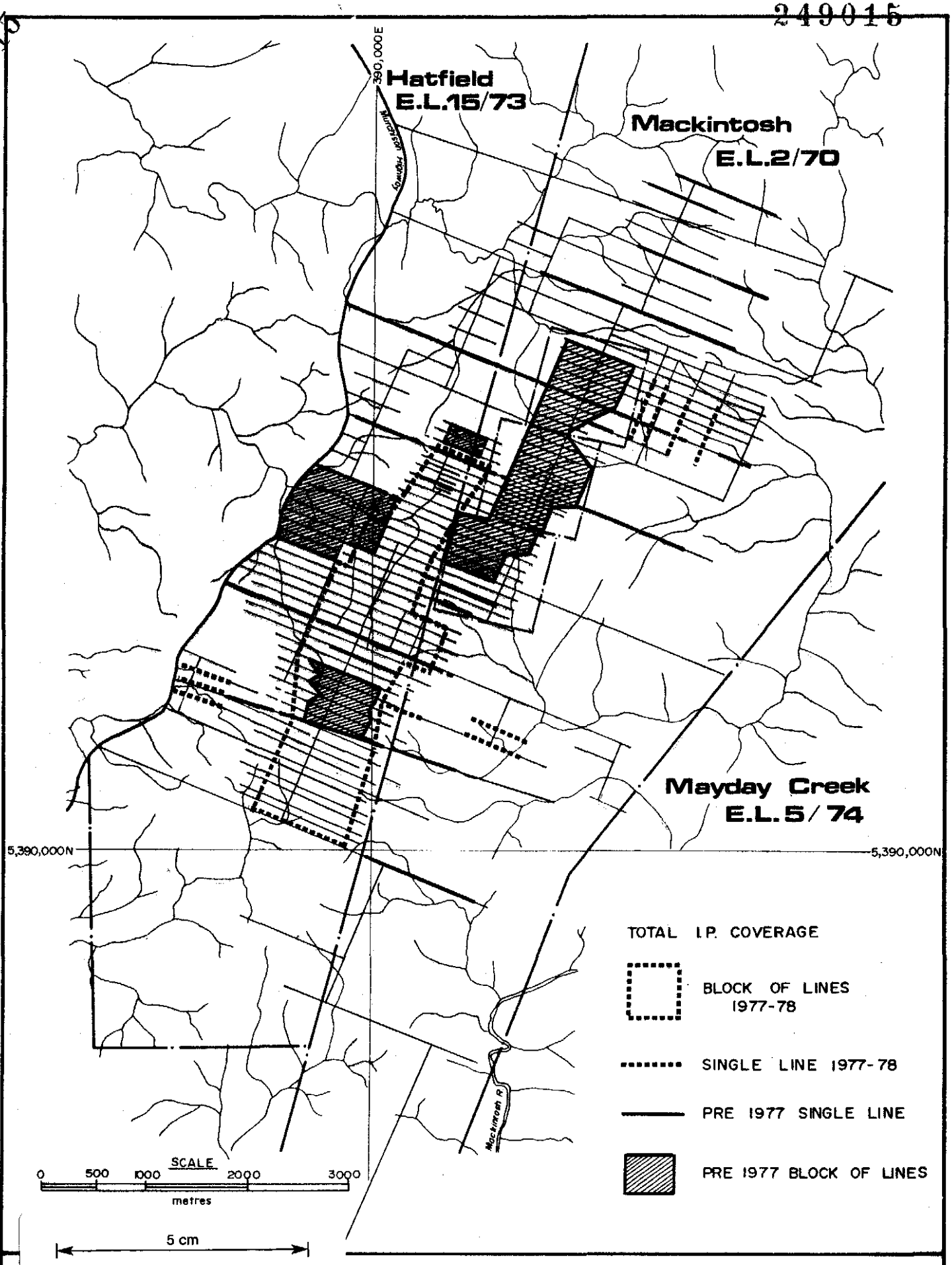
The trenching programme indicated the source of the Pb-soil geochemical anomalies was complex but not due to stratiform sulphide mineralisation. An obvious source is fine grained disseminated sulphides localised in small (up to 2 cm) fissures along north, north-east and north-west trending fractures. A less obvious source is the thick cover of glacial scree exposed in two of the trenches.

Layers of glacial scree exposed in 2900N trench.

The scree contains boulders and cobbles of black shale and quartzite derived from the Pre-Cambrian where quartz-galena lode mineralisation is known. The ultimate source of a significant component of the soil anomalies thus may be fissure-lode mineralisation in the Pre-Cambrian.

GEOPHYSICS

A summary plan, Plate MAC 62 in text, outlines the total area now covered by I.P. traverses.



Abminco Exploration

FIG. 8.

Drawn C.H.Y.	NORTH WEST TASMANIA	Location code	
Traced R.J.E.	Mackintosh West/ Hatfield Licence Areas	Date June, 1978	
Checked	I.P. COVERAGE 1977-1978	Scale 1 : 50, 000	
Revised by: Date:		Plate No Mac 62	

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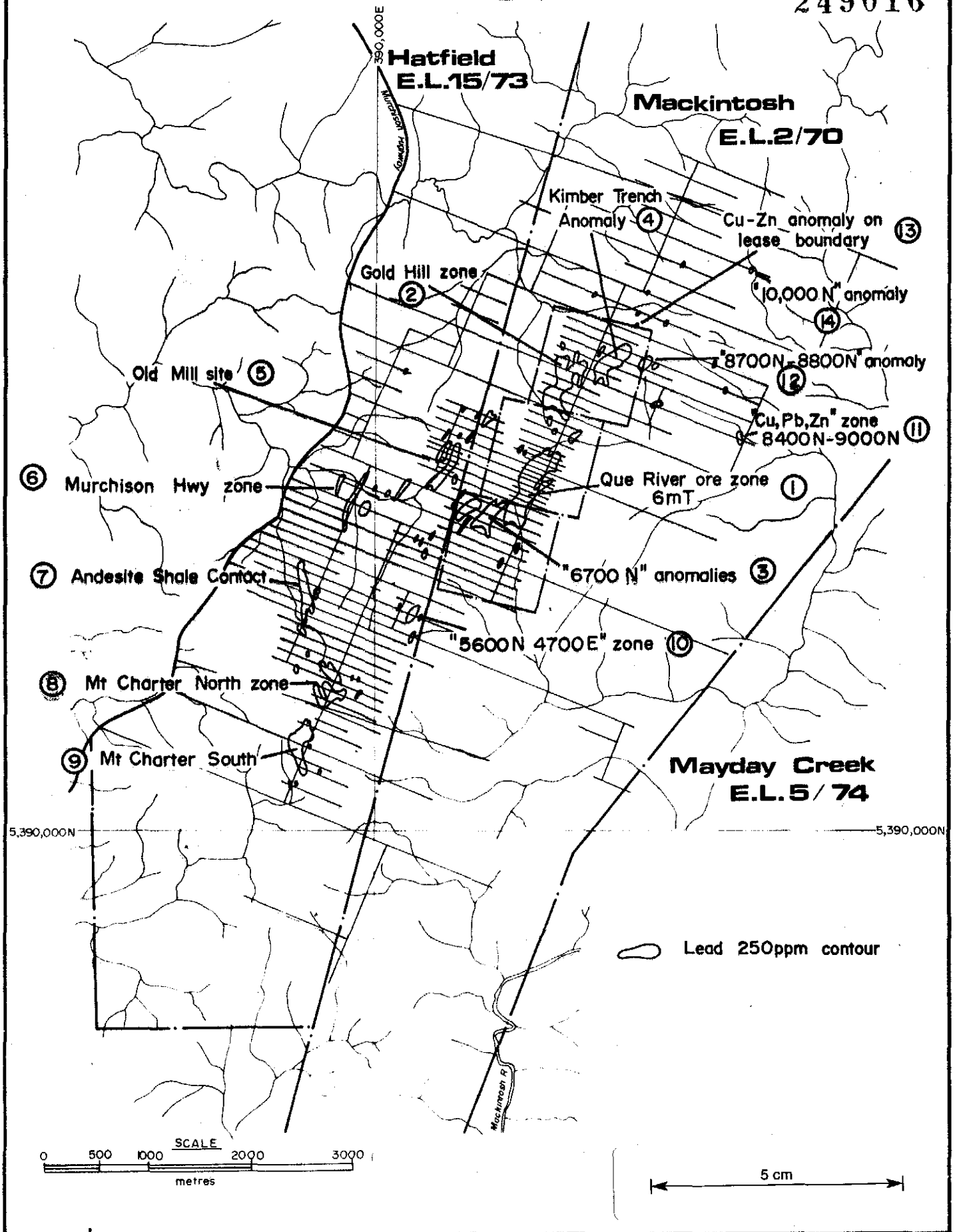


Abminco Exploration

FIG. 10.

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

In the past year 3,500 m of 50 metre dipole-dipole I.P. traversing was completed. No significant anomalies were obtained. I.P. profiles are appended (B).

In the Southwell River Grid area the sequence of dacitic lavas and andesitic-dacitic pyroclastics that contain pyrite and fragments of base metal sulphides was tested by four I.P. traverses conducted in north-south lines: 5900E, 6050E, 6300E and 6600E. Weak frequency effect responses were recorded and appear to reflect weak mineralisation of the type located by geological mapping. (Plate MAC 61).

In the Barite Creek area two I.P. traverses were completed on lines 4900N and 5100N, in an area where weakly altered and pyritised rhyolite and dacite were mapped. Only very weak frequency effect responses were recorded.

On line 4900N, immediately east of Mt.Charter, dacitic rocks were indicated by mapping. One I.P. traverse (an extension of the major I.P. survey in the adjoining Hatfield E.L. 15/73) was completed. Only a weak frequency effect response was recorded.

SOIL GEOCHEMISTRY

Soil sampling along all cut grid lines is a prime technique in the exploration of the Mackintosh licence area. The grid summary plan (Plate MAC 63 in text) illustrates the total area and the area covered during the past year by grid lines and hence by soil geochemistry.

In the past year all soil samples were collected by hand auger at 20 metre intervals in three areas; the "Southwell River Grid", Barite Creek and lines 1900N - 6400E. Where possible, the C-horizon was taken. Sample analysis was for Cu,Pb,Zn by atomic absorption spectroscopy of the minus 80 mesh fraction. No first order anomalies were outlined.

The relative immobility, and hence discrimination of lead with respect to zinc and copper is well illustrated over the Que River Ore zone. A summary plan (Plate QR 100 in text) showing lead geochemistry outlined by the 250 ppm contour illustrates the anomalies detected in the Licence area.

Computer analysis of a greater part of the C-horizon soil geochemical data for the Mackintosh licence was completed. Cumulative frequency values for Cu, Pb and Zn were determined and a frequency histogram plot was prepared. Analysis of the soil sample data includes samples from both the Mackintosh and Hatfield licence areas (Appendix C). The data was combined because the boundary between the two licences virtually bisects a single project area.

Threshold values for Cu,Pb,Zn for each rock group, as discussed in the 1977 Annual Report, have not yet been prepared as the programme was delayed pending the completion of this years soil sampling programme. It is anticipated that the above computations will soon be complete.

ROCK GEOCHEMISTRY

As part of a world wide study on stratiform copper, lead and zinc deposits the Federal Institute for Geosciences and Natural Resources in Hannover, Germany, has started a research programme in Australia in which it is hoped to evaluate parameters for a genetic approach to mineral exploration. In the Que River and Mackintosh area a programme of whole-rock and trace element analysis of core and surface samples was commenced.

To date 36 surface samples have been analysed for the major elements;

SiO_2, TiO_2, Al_2O_3, Fe_2O_3, MgO, CaO, Na_2O_3, K_2O and P_2O_5.

The following trace elements have also been determined;

Ba, Ce, Co, Cr, Ca, Hg, La, Mn, Nb, Ni, Pb, Rb, Sc, Sr, Th, V, Y, Zn, Zr.

In may 1978 a further 15 surface samples were dispatched to Germany for analysis.

An interpretation of the data is not yet available.

It is hoped the programme will eventually aid in the detection of blind ore bodies.

CONCLUSIONS

Subsequent to airborne E.M. surveys and stream sediment sampling; geological mapping, soil geochemical sampling and I.P. geophysics have featured as prime

techniques in the exploration of the Mackintosh licence area.

First derivative exploration of the attractive volcanic stratigraphy within the Mackintosh licence, that is, detailed surface exploration using the techniques mentioned above, is now virtually complete. No coincident first order soil geochemical and I.P. targets were detected.

Soil geochemistry is a reliable technique for the detection of near surface base metal sulphides. The technique is, however, relatively indiscriminate in that high order anomalies occur over both ore and trace disseminated mineralisation. For instance, the andesite in the Que River region has a high background for Pb and Zn and in many instances disseminations and aggregates of galena and sphalerite in small quartz-carbonate filled fractures give rise to significant geochemical anomalies. Geophysical techniques can be used to filter the geochemical data. However, if a blind ore deposit, say below about 100 metres, is sought, conventional geophysical techniques would also have difficulty in detecting massive sulphides. As well, the relative immobility of lead is such that only low order soil anomalies would be formed from an ore deposit at depth.

Second derivative methods, such as a programme involving whole rock and trace element geochemical zoning studies designed to locate blind ore deposits, are now in progress.

Soil geochemical data assessment by computer processing to allow rapid geographical identification of anomalous values and improved statistical treatment of data has begun and it is anticipated that final computations and interpretation will soon be complete.

At Mackintosh East, follow up of coincident lead soil geochemical and weak I.P. anomalies, underlain by Cambrian acid volcanic rocks, were achieved by trenching. The high metal values are clearly derived from fine grained disseminated sulphides localised in fissures along north and north-west trending fractures.

EXPENDITURE

Expenditure E.L. 2/70 Mackintosh for the twelve months to 6 June 1978 :

Geology	13,612
Survey	7,532
Geophysics	3,467
Geochemistry	2,509
Trenching	3,045
Diamond Drilling	98
Tenure	1,606
	36,304

REFERENCE

Young C.H. Annual Report.
Young C.H.
Exploration Licence 2/70
Mackintosh, Tasmania.
For 12 months ending June 1,1977.

Signed by: C.H. Young

C.H.Young
Project Geologist

Endorsed by: K.R. Yates

K.R.Yates
Chief Geologist

APPENDIX A

PETROLOGICAL DESCRIPTIONS

MACKINTOSH EAST

TRENCHES

REPORT CMS 78/3/27 - PETROLOGICAL DESCRIPTIONS

MACKINTOSH EAST TRENCHES

182735 (TS 23662) K-stain positive. 8100N 4600E

This is an altered and stressed rhyolitic tuff.

The rock is weakly bedded and poorly sorted with sizing in the 50μ - 3mm range. Recognisable clasts are angular to subrounded and comprise mainly poorly resolved rhyolitic lava clasts with slightly subordinate alkali feldspar and quartz in roughly equal proportions. Thinly dispersed devitrified shards are present and these features show some evidence of abrasion suggesting at least partial reworking. The matrix consists of microcrystalline quartzofeldspathic material with poor optical contrast against the lava fragments.

The rock carries accessory traces of apatite zircon and chloritised primary biotite (biotite rhyolite). Feldspar has beeh variably sericitised. There are sporadic discontinuous veins (to 1.5mm) of quartz with accessory feldspar (albite, K-spar including minor adularia) chlorite and pale phlogopite. A late phase of stress is reflected in mottled extinction in calstic- and vein quartz.

182738 (TS 23663) K-stain negative 8100N 4525E

This is a pervasively sericitised and incipiently sheared rhyolitic vitric crystal tuff.

The rock consists largely of compact aggregates of weakly orientated sericitic illite-hydromuscovite with subordinate closely intergrown ultrafine quartz. Vague sericite semi-pseudomorphs of feldspar crystal fragments (50-400μ) are sparsely disseminated throughout and there are frequent angular to splintery quartz crystal fragments. These features are accompanied by thinly dispersed devitrified and silicified microshards. Much of the sericite also appears to represent altered shards on the basis of microtextural features.

Occasional vague limonitic/partly degraded chlorite flakes appear to represent accessory biotite flakes and provide a genetic link with 182735. There are accessory traces of apatite, zircon and leucoxenised opaques. Frequent late-stage intersecting veinlets (rarely > 100μ in width) of quartz with accessory chlorite include disseminated patches and films of limonite which at least locally represents oxidised Fe-sulphide disseminations.

182874 (TS 23664) K-stain negative 7300N 4650E

This is a sericitised and incipiently sheared rhyolitic vitric crystal tuff similar and closely related to 182738.

Disseminated relict splintery to angular quartz crystal fragments (mean 150-200μ) are accompanied by subordinate to minor completely sericitised feldspar

grains and occasional vague leucoxene-stained sericite aggregates after ?biotite flakes. These features are enclosed in a compact incipiently directed sericite-quartz aggregate with abundant relict shard textures.

Shards are slightly coarser than those in 182738 and show a fairly marked preferred orientation locally manifest in a very vague incipient flow banding. Thus this rock has a certain ignimbritic character.

Thin discontinuous veinlets of quartz and sericite occur sporadically. Accessory leucoxenised opaques are relatively abundant with minor associated traces of zircon and apatite. There is no evidence of sulphides.

206685 (TS 23666) K-stain negative. 2175N 6125E

This is a pervasively sericitised and incipiently sheared biotite rhyolite recognisable as a lithic vitric crystal tuff and conceivably an ignimbrite.

General features are similar to 182738 and 182874. However, this rock is characterised by a relatively well developed flow banding manifest partly in the distribution of abundant chloritised and leucoxene-stained biotite flakes. These features show a marked preferred orientation parallelled by a faint relict eutaxitic-like microtexture defined by the poorly preserved (devitrified, sericitised) microshards.

Quartz- and completely sericitised feldspar crystal fragments are present but are relatively fine grained (mean 75μ) and subordinate to the altered biotite flakes. There are occasional completely sericitised lava clasts (to 1.2mm)

with incipiently porphyritic fabrics. Rare recrystallised quartz microspherulites are present and in common with the previous rhyolitic tuffs this rock includes accessory traces of leucoxenised opaques, zircon and apatite.

206692 (TS 23667) K-stain positive. 2150N 6330E

This rock is best termed a lava flow breccia. It is of rhyolitic composition although in contrast to the associated specimens there is no evidence of primary biotite.

The rock is incipiently layered and consists essentially of randomly sized and poorly sorted clasts (0.5 - 5mm) generally closely packed and partly moulded onto one another. In places there is a sparse cement of microcrystalline quartzofeldspathic material (devitrified, altered glass) with sporadic quartz and feldspar phenocrysts. The clasts are similarly largely devitrified and altered weakly porphyritic rhyolites. There are occasional discrete crystal fragments and a few clasts are clearly pyroclastic in origin (vitric-crystal and lithic-crystal tuff). The subordinate pyroclast component and the gross fabric are suggestive of a flow top breccia. Accessory apatite zircon and leucoxenised opaques provide a probable link with the biotite rhyolites.

Alteration is fairly marked with disseminated irregular aggregates and discontinuous veinlets of chlorite quartz and alkali feldspar (largely albite). Sphene is a minor accessory alteration phase and there are thinly dispersed limonite pseudomorphs of fine grained pyrite.

024

206700 (TS 23668) K-stain negative. 2900N 6000E 249024

This is a pervasively sericitised and weakly sheared rhyolitic lithic-vitric-crystal tuff of probable ignimbritic origin.

The rock contains abundant relict crystals and crystal fragments of quartz enclosed in a weakly schistose matrix of near-massive sericite. Quartz grains are sized in the <50 - 1mm range and are accompanied by sporadic sericite semi-pseudomorphs of feldspar grains, occasional degraded mica (?phlogopite) semi-pseudomorphs of ?hornblende crystals and thinly dispersed degraded/leucoxene-stained ?biotite flakes.

Vague but nonetheless definite relict eutaxitic-like shard microtextures persist in the sericitic matrix. In addition there are occasional recognisable thoroughly sericitised quartz-porphyritic lava clasts (to 2.5mm) and a few more angular clasts which a-pear to represent recemented pyroclasts. Thus the rock shows some definite relict ignimbritic features and some evidence of flow or autobrecciation which is semi-characteristic of ignimbritic tuffs.

Degraded aggregates of fine grained secondary phlogopite or biotite are disseminated throughout this rock and tend to be concentrated into pressure shadow areas (e.g. adjacent to quartz grains). This feature is typical of marginal biotite grade greenschists and reflects a slightly higher grade of metamorphism in comparison with the associated sericitic greenschists.

Inferred primary composition is again biotite rhyolitic. In this sense these rocks can be contrasted with the bulk of the Mt. Read Volcanics where more intermediate types, particularly dacites, predominate.

D. Cowan, B.Sc.

APPENDIX B

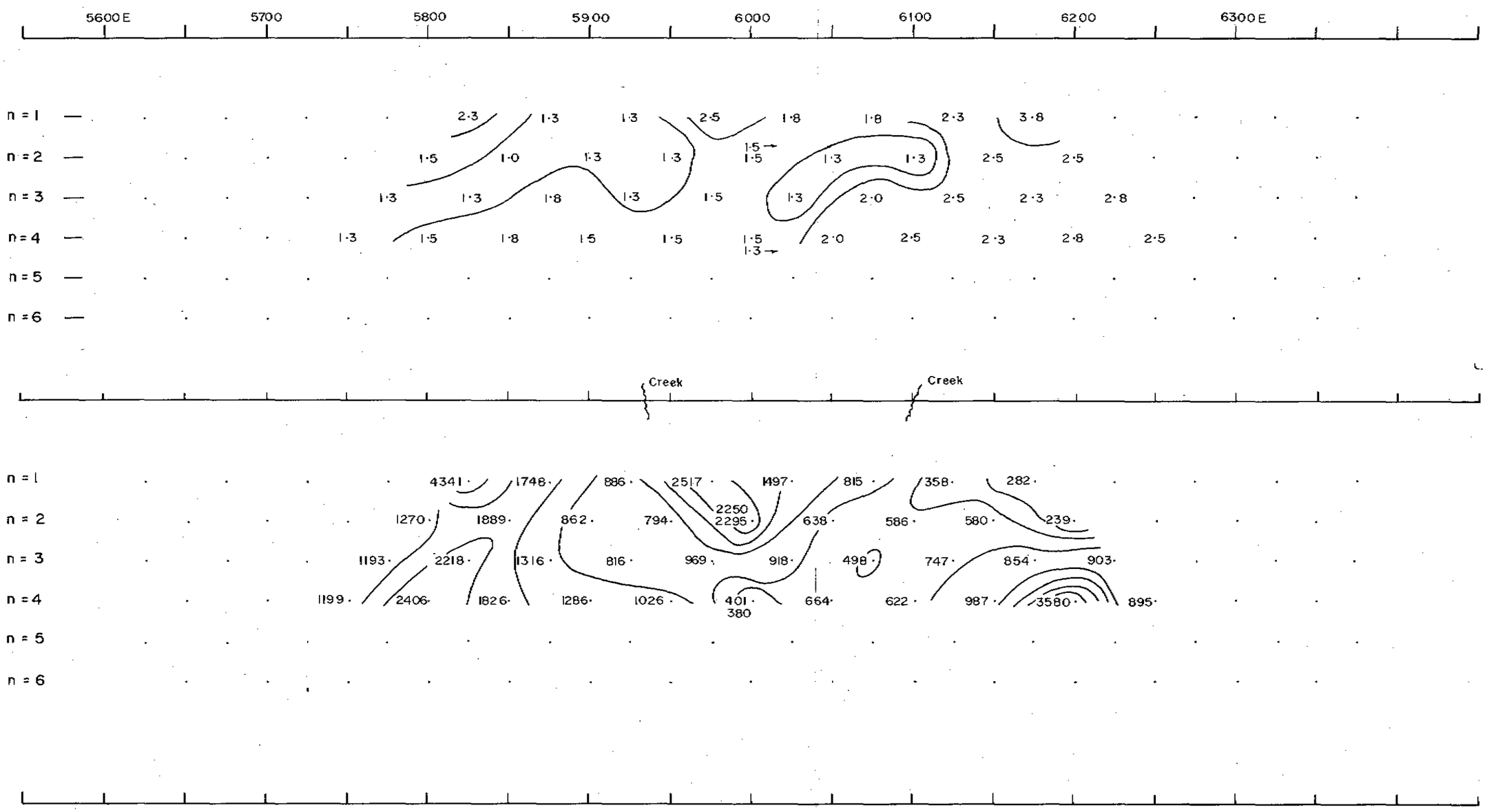
I.P. PROFILES

Lines 4900N & 5100N

5900E

6050E

6600E



Transmitter type McPher P660

Frequencies 0·3 & 2·5 Hz

Dipole Length 50 metres

Survey by Geoex Pty. Ltd., Sept. 1977

249026

5 cm

Abminco Exploration

Survey: Geoex	NORTH WEST TASMANIA 006
Drawn: Geoex	BARITE CREEK
Traced: R.J.E.	I.P. & RESISTIVITY SURVEY
Checked:	LINE 4900 N
Revised by: Date:	

Location code:

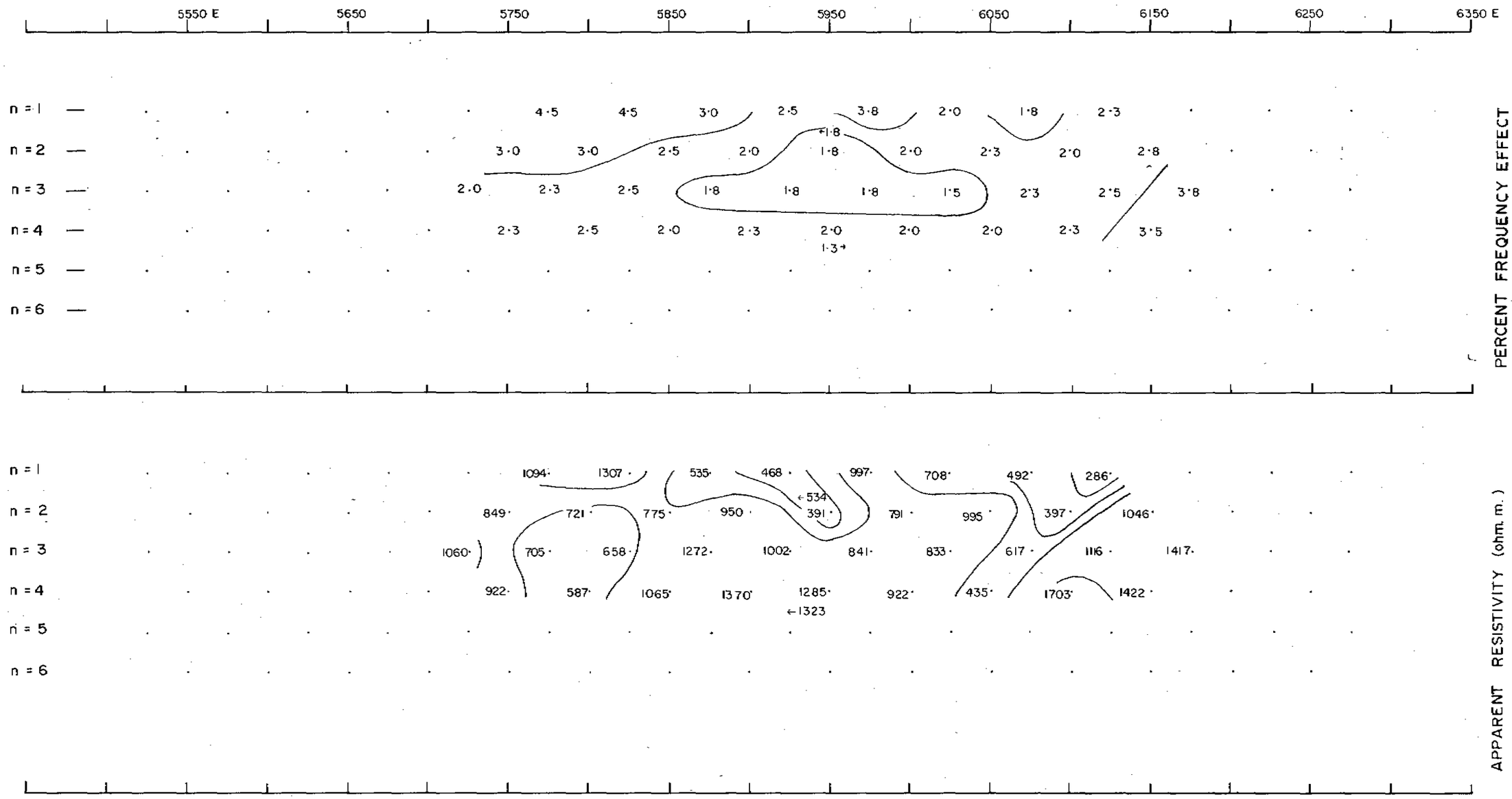
Date: July, 1978

Scale: 1 : 2,500

Plate No: Mac. 64/4900

78-1277.

249027



Transmitter type McPher P660

Frequencies 0·3 & 2·5 Hz

Dipole Length 50 metres

Survey by Geoex Pty. Ltd., Sept. 1977

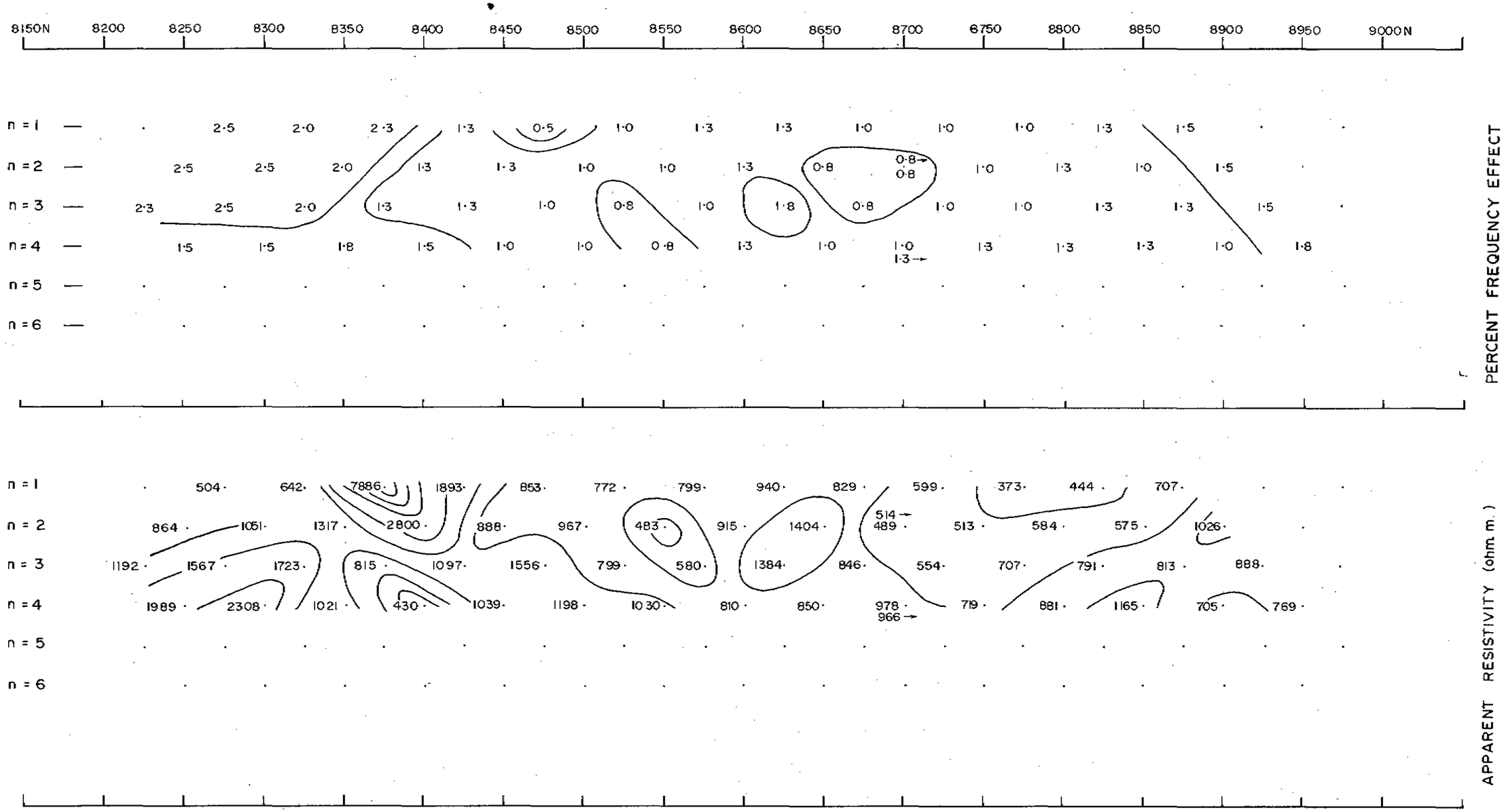
5 cm

Abminco Exploration

Survey : Geoex	NORTH WEST TASMANIA 007 BARITE CREEK I.P. & RESISTIVITY SURVEY LINE 5100	Location code:
Drawn: Geoex		Date: July 1978
Traced: J.R.		Scale: 1:2,500
Checked:		Plate No Mac 64/5100
Revised by: Date:		

78-1277

249028



Transmitter type McPher P660

Frequencies 0·3 & 2·5 Hz

Dipole Length 50 metres

Survey by Geoex Pty. Ltd., Sept. 1977

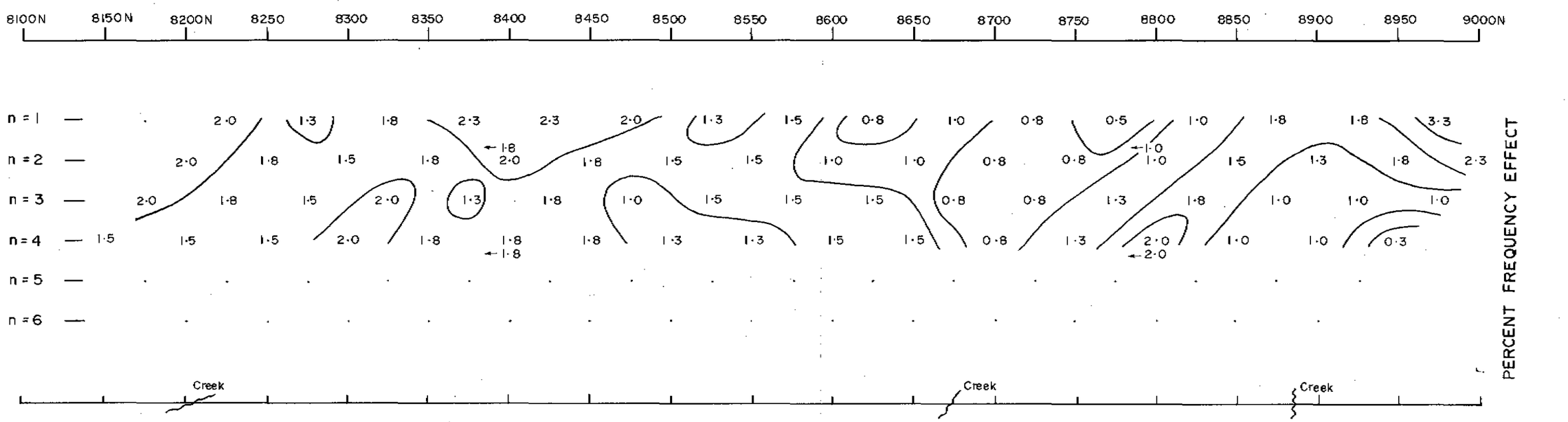
Abminco Exploration

Survey : Geoex.	NORTH WEST TASMANIA 003
Drawn: Geoex	SOUTHWELL RIVER.
Traced: R.J.E.	I.P. & RESISTIVITY SURVEY
Checked:	LINE 5900 E
Revised by: Date:	

Location code:	
Date	July, 1978
Scale.	1: 2500
Plate No	Mac 64/5900

78-1277.

249029



5 cm

Transmitter type McPher P660

Frequencies 0·3 & 2·5 Hz

Dipole Length 50 metres

Survey by Geoex Pty. Ltd., Sept. 1977

Abminco Exploration

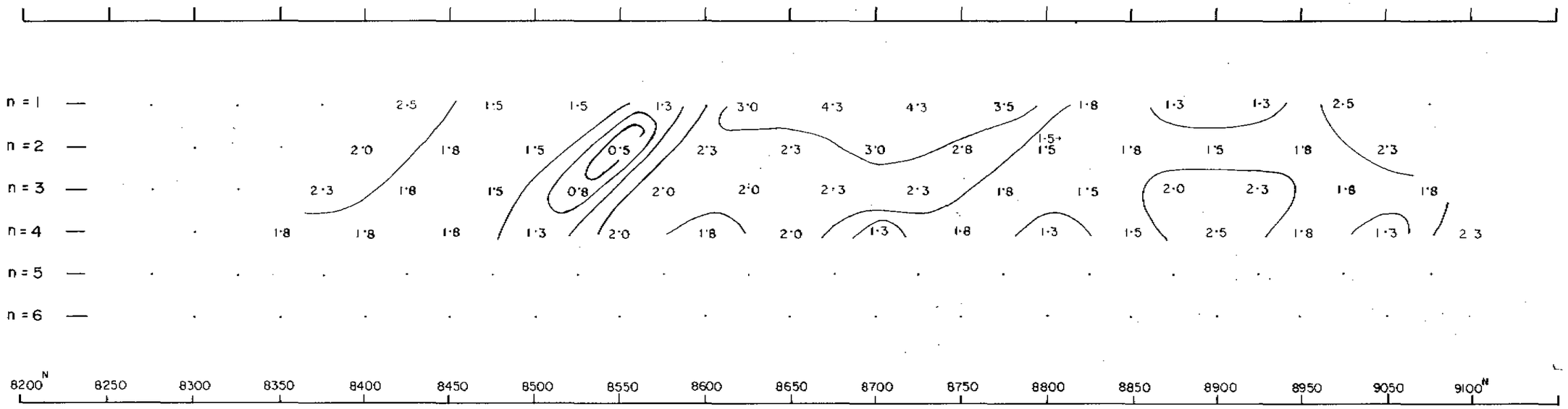
Survey:	Geoex.
Drawn:	Geoex.
Traced:	R.J.E.
Checked:	
Revised by:	Date:

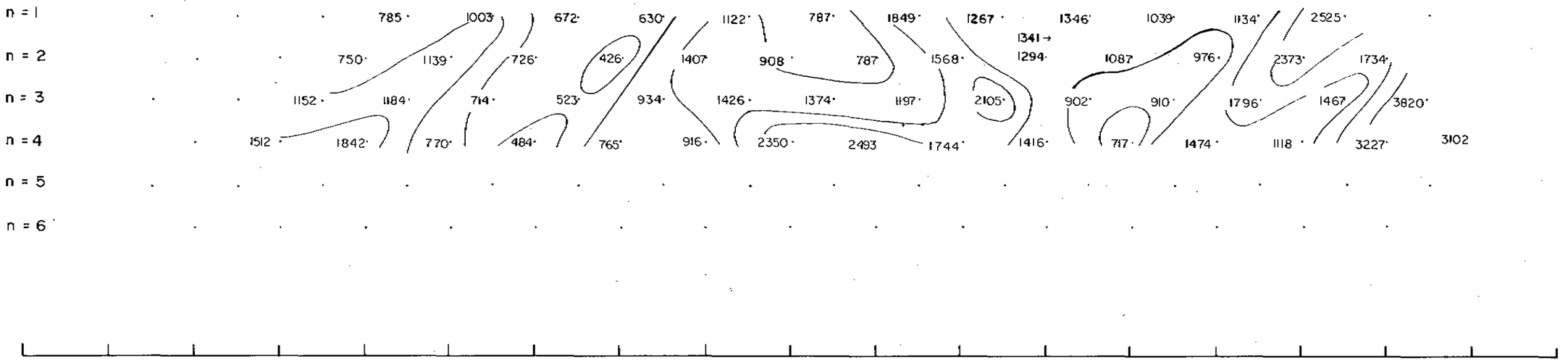
NORTH WEST TASMANIA 009
SOUTHWELL RIVER
I.P. & RESISTIVITY SURVEY
LINE 6050 E

Location code	
Date	July, 1978
Scale	1: 2,500
Plate No	Mac 64/6050

78-1277

249030





Transmitter type McPher P660

Frequencies 0·3 & 2·5 Hz

Dipole Length 50 metres

Survey by Geoex Pty. Ltd., Sept. 1977

5 cm

Abminco Exploration

Survey : Geoex	NORTH WEST TASMANIA 010 SOUTHWELL RIVER I.P. & RESISTIVITY SURVEY LINE 6600E	Location code:
Drawn: Geoex		Date July 1978
Traced: J.R.		Scale. 1:2,500
Checked:		Plate No Mac 64/6600
Revised by: Date:		

78-1277

APPENDIX C

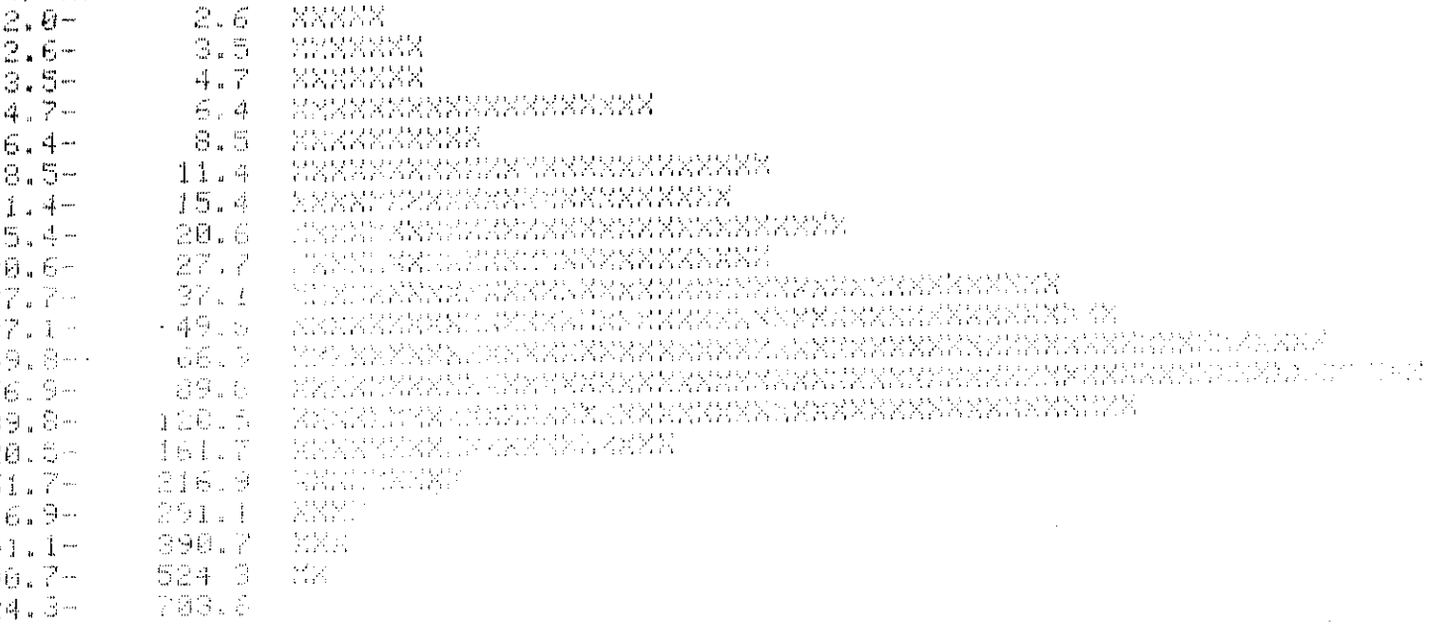
SOIL GEOCHEMICAL COMPUTER DATA

```
NUMBER OF VARIABLES:- 3
COLUMNS USED
 4     5     6

DETECTION (OR LOWER) LIMITS OF VARIABLES
 0     0     0

UPPER LIMITS OF VARIABLES
 20000    20000    20000
MACKINTOSH/HATFIELD SOIL GEOCHEMISTRY
NUMBER OF VARIABLES:- 3
COLUMNS USED
 4     5     6

DETECTION (OR LOWER) LIMITS OF VARIABLES
 2     20     2

UPPER LIMITS OF VARIABLES
 20000    20000    20000

CASSETTE 1
 FILES USED:- 1     TO 30
CASSETTE 2
 FILES USED:- 1     TO 30
CASSETTE 3
 FILES USED:- 1     TO 16
```

MACKINTOSH/HATFIELD SOIL GEOCHEMISTRY
COPPER
NUMBER OF SAMPLES= 3733
MAXIMUM VALUE= 700
MINIMUM VALUE= 2
ARITHMETIC MEAN= 60
VARIANCE=1 4233.27
STANDARD DEVIATION= 65.06
NUMBER OF SAMPLES BELOW DETECTION LIMIT= 90
PERCENTAGE SAMPLES BELOW DETECTION LIMIT= 0.02
NUMBER OF SAMPLES NOT ANALYSED= 77
NUMBER OF SAMPLES ABOVE POP'N LIMIT= 0
LOGARITHMIC INTERVAL= 0.29

CLASS INTERVAL FROM TO (PPM)	FREQ	FREQ%	CU.FREQ
2.0- 2.6	51	1.37	51
2.6- 3.5	62	1.66	113
3.5- 4.7	69	1.85	182
4.7- 6.4	172	4.61	354
6.4- 8.5	95	2.54	449
8.5- 11.4	219	5.87	668
11.4- 15.4	205	5.49	873
15.4- 20.6	256	6.86	1129
20.6- 27.7	225	6.03	1354
27.7- 37.1	352	9.43	1706
37.1- 49.8	379	10.15	2085
49.8- 66.9	476	12.75	2561
66.9- 89.8	521	13.96	3082
89.8- 120.5	390	10.45	3472
120.5- 161.7	175	4.69	3647
161.7- 216.9	79	2.12	3726
216.9- 291.1	36	0.96	3762
291.1- 390.7	27	0.72	3789
390.7- 524.3	22	0.59	3811
524.3- 703.6	7	0.19	3818

HISTOGRAM
FROM TO (PPM)



KINIUSH/HATFIELD SOIL GEOCH...
END
UMBER OF SAMPLES= 2810
IMUM VALUE= 8600
IMUM VALUE= 9
RITHMETIC MEAN= 213
IANCE=1 2.33E+05
NDARD DEVIATION= 482.75
UMBER OF SAMPLES BELOW DETECTION LIMIT= 381
ERCENTAGE SAMPLES BELOW DETECTION LIMIT= 0.14
BER OF SAMPLES NOT ANALYSED= 709
BER OF SAMPLES ABOVE POP'N LIMIT= 0
OGARITHMIC INTERVAL= 0.34

CLASS INTERVAL FROM (PPM)	TO	FREQ	FREQ%	CU.FREQ
8.8-	12.4	0	0.00	0
12.4-	17.5	0	0.00	0
17.5-	24.7	220	7.83	220
24.7-	34.8	392	13.95	612
34.8-	49.1	479	17.05	1091
49.1-	69.2	414	14.73	1505
69.2-	97.6	303	10.78	1808
97.6-	137.6	365	12.99	2173
137.6-	193.9	258	9.18	2431
193.9-	273.4	184	6.55	2615
273.4-	385.4	162	5.77	2777
385.4-	543.3	121	4.31	2898
543.3-	766.0	107	3.81	3005
766.0-	1079.8	72	2.56	3077
1079.8-	1522.2	47	1.67	3124
1522.2-	2145.9	25	0.89	3149
2145.9-	3025.1	16	0.57	3165
3025.1-	4264.6	8	0.28	3173
4264.6-	6011.9	8	0.28	3181
6011.9-	8475.1	2	0.07	3183

```
HISTOGRRAM
FROM      TO
(PPM)
   8.8-     12.4
  12.4-     17.5
  17.5-     24.7  XXXXXXXXXXXXXXXXXXXXXXXXXXXX
  24.7-     34.8  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
  34.8-     49.1  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
  49.1-     69.2  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
  69.2-     97.6  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
  97.6-    137.6  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
 137.6-    193.9  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
 193.9-    273.4  XXXXXXXXXXXXXXXXXXXXXXX
 273.4-    385.4  XXXXXXXXXXXXXXXXXXXXX
 385.4-    543.3  XXXXXXXXXXXXXXXX
 543.3-    766.0  XXXXXXXXXXXXXX
 766.0-   1079.8  XXXXXXXXX
1079.8-   1522.2  XXXXXX
1522.2-   2145.9  XXXX
2145.9-   3025.1  XX
3025.1-   4264.6  X
4264.6-   6011.9  X
6011.9-   8475.1
```

UMBER OF SAMPLES= 3820
AXIMUM VALUE= 4800
I MUM VALUE= 2
R THMETIC MEAN= 97
ARIANCE= 20734.14
TA DARD DEVIATION= 143.99
UM ER OF SAMPLES BELOW DETECTION LIMIT= 54
ERCENTAGE SAMPLES BELOW DETECTION LIMIT= 0.01
UMBER OF SAMPLES NOT ANALYSED= 26
UM ER OF SAMPLES ABOVE POP'N LIMIT= 0
OGARITHMIC INTERVAL= 0.39

CLASS INTERVAL FROM	TO	FREQ	FREQ%	CU.FREQ	
(PPM)		FREQ	FREQ%	CU.FREQ	
2.0-	2.9	10	0.26	10	
2.9-	4.3	20	0.52	30	
4.3-	6.3	105	2.75	135	
6.3-	9.3	159	4.16	294	
9.3-	13.8	266	6.96	560	
13.8-	20.4	337	8.82	897	
20.4-	30.1	314	8.22	1211	
30.1-	44.5	332	8.69	1543	(
44.5-	65.8	514	13.46	2057	
65.8-	97.2	594	15.55	2651	
97.2-	143.7	408	10.68	3059	
143.7-	212.3	405	10.60	3464	
212.3-	313.7	218	5.71	3682	
313.7-	463.6	126	3.30	3808	
463.6-	685.0	39	1.02	3847	1
685.0-	1012.1	16	0.42	3863	1
1012.1-	1495.5	3	0.08	3866	1
1495.5-	2209.8	2	0.05	3868	1
2209.8-	3265.2	0	0.00	3868	1
3265.2-	4824.7	1	0.03	3869	1

```
HISTOGRAM
FROM          TO
(PPM)
   2.0-      2.9  X
   2.9-      4.3  XX
   4.3-      6.3  XXXXXXXXXX
   6.3-      9.3  XXXXXXXXXXXXXXXX
   9.3-     13.8  XXXXXXXXXXXXXXXXXXXXXXXXXX
  13.8-     20.4  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
  20.4-     30.1  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
  30.1-     44.5  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
  44.5-     65.8  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
  65.8-     97.2  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
  97.2-    143.7  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
 143.7-    212.3  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
 212.3-    313.7  XXXXXXXXXXXXXXXXXXXXXX
 313.7-    463.6  XXXXXXXXXXXX
 463.6-    685.0  XXX
 685.0-   1012.1  X
1012.1-   1495.5
1495.5-   2209.8
2209.8-   3265.2
3265.2-   4824.7
```

— REFERENCE —

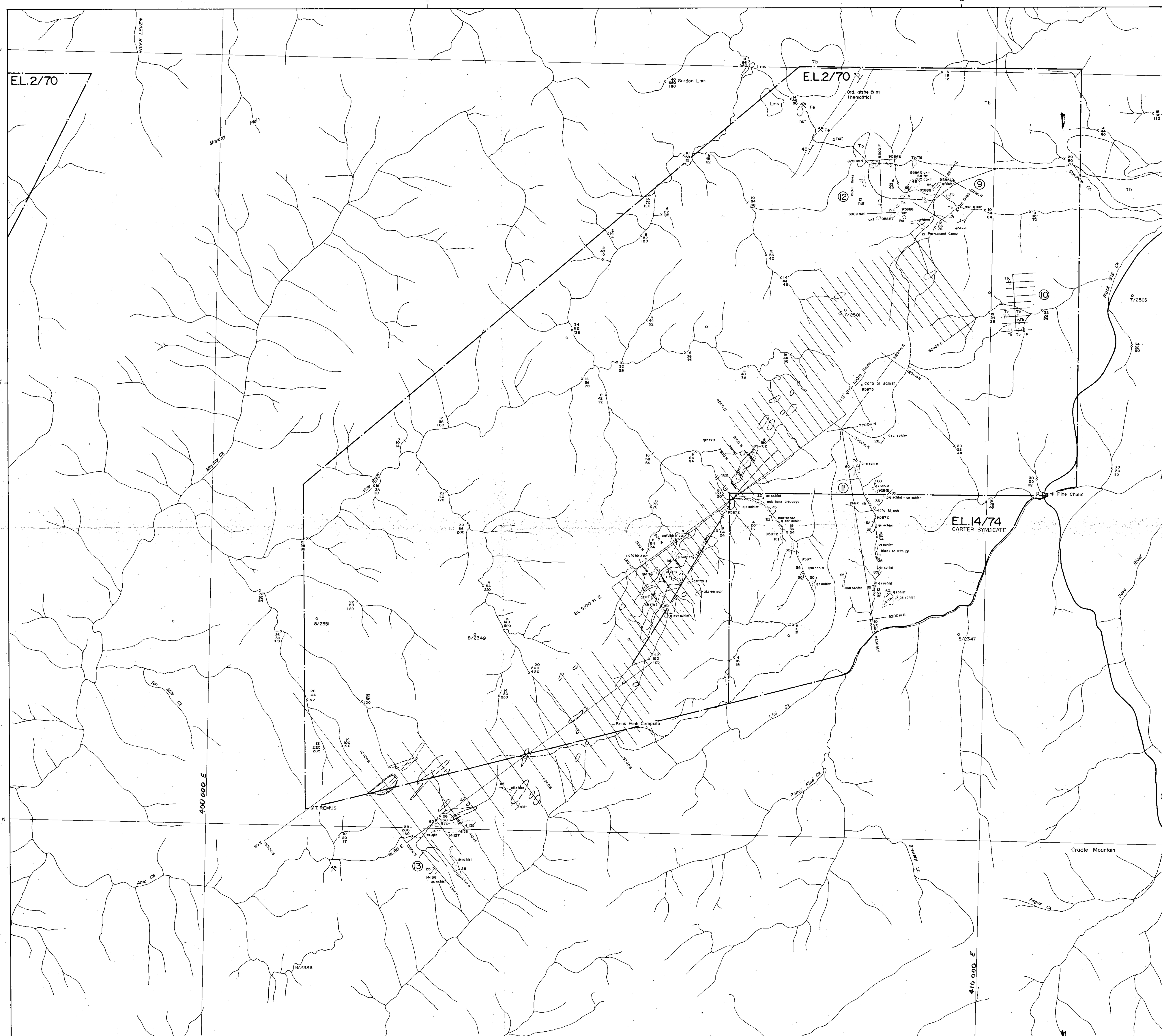
No.	CODE	NAME/COMPOSITION	OCCURRENCE
27	RVD	Rhyolite - Dacitic Volcanics Volcanic Porphyry	
53	Bsh	Black Shale	
48	A	Andesite	Flow and intrusive
49	AP	Andesitic Pyroclastics	Pyroclastic, lava breccia
46	ADP	Andesitic Dacitic Pyroclastics	
63	D	Dacite (includes MD, DTL, & DP, see Plate QR84	
10	PD	Porphyritic Dacite	Flow and intrusive (auto brecciated fract.) Altered & mineralised
6	PyP	Pyritic Pyroclastics (includes PDP, DPWT, DSHT and SP see Plate QR84	Pyroclastics Altered & mineralised
55	sts	Mica Sandstone	Sandstone, Greywacke, Grits & Shales

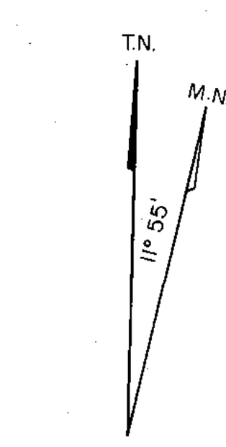
Interpreted Contact

249036

5 cm

Abminco Exploration			78-1277
Geology: C.H.Y.	N.W. TASMANIA		Location code:
Drawn: C.H.Y.	SOUTHWELL RIVER GRID 004		Date: June, 1978
Traced: R.J.E.	MACKINTOSH E.L. 2/70		Scale: 1:2500
Checked:	SUMMARY MAP		Plate No MAC 60 FIG 4
Revised by: Date:			





VOLCANICS

Fragment Size	Rock Composition	Fragment Type	Descriptive/ Genetic Name
4mm	Rhyolite (R) Rhyodacite (RD) Dacite (D) Andesite (A) Diorite (Di) Granodiorite (GDi) Dolerite (Do) Trachyte (T) Basalt (B)	ash, dust etc.	Tuff (t) Tuff - lava (t-lava)
4mm 32mm (20mm fragments add prefix coarse)		lithic (l) pumice (p) (5% l or p component)	Tuff (t) Tuff - lava (t-lava)
vitric fragments, glass shards vis with hand lens		vitric (v)	
(if 4mm add prefix coarse)		hornblende (hb) feldspar (fd) crystal (x) quartz (q) (5% crystal component)	
Fragments 4mm 5-50% fragments 32mm		Rounded fragments define agglomerate and tuff agglomerate angular fragments define breccia and tuff breccia	Tuff Agglomerate (ta) Tuff Breccia (tb)
Fragments 4mm 50% fragments 32mm (add prefix coarse if fragments 10cm			Agglomerate (a) Breccia (b)
No visible fragments			Pumice (p)
Uniform groundmass with phenos		specify phenos, fd, q, etc.	Porphyry (por) Porphyritic lava (por lava)
			Massive structureless volcanic (indicate with composition name above)
INTRUSIONS	as above in volcanics		dyke, sill etc.

SEDIMENTS

Reworked Tuff	(rwt)
Sandstone	(ss)
Siltstone	(sts)
Shale	(sh)
Chert	(ch)
Conglomerate	(co)
Greywacke	(gy)
Limestone	(lms)

Sericite rich, locally sericitic	ser (ser)
Chlorite rich, locally chloritic	chlor (chlor)
Carbonate rich, locally carbonated	carb (carb)
Silicified, locally silicifield	silic (silic)
Vesicular, amygdaloidal	vesic
Probable original character	siliceous
Foliation probable bedding/flow bedding	
Cleavage	
Trenches	

STREAM SEDIMENT GEOCHEMISTRY -80# AAS

Anomalous
Cu > 60ppm
Pb > 110ppm
Zn > 300ppm

×42 138 129

249037

SOIL GEOCHEMISTRY -80# AAS

Zn > 150 ppm in soils

Pb > 300 ppm in soils

5 cm

Mine or prospect

Outcrop

Air E.M. anomalies recommended (McPhar) for follow-up (12)

Other Air E.M. anomalies (A)

Air photo centres 8/2347

NOTE: Grid is in feet

SCALE

metres 1000 500 0 1000 2000 metres

Abminco Exploration

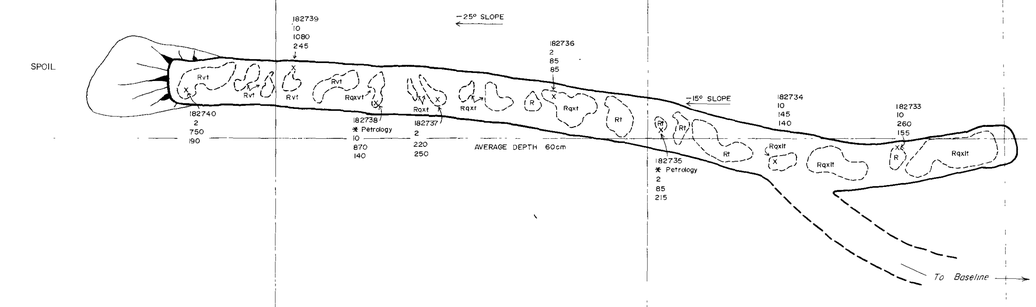
78-1277

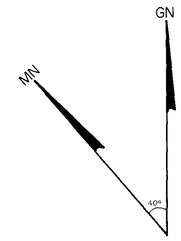
Geology: EHS HLF	NORTH WEST TASMANIA 003	Location code:
Drawn: EHS	MACKINTOSH EAST E.L.2/70	Date: May 1978
Traced: RKY	FACT GEOLOGY AND	Scale: 1:25,000
Checked:	GEOCHEMICAL SUMMARY PLAN	Plate No MAC 59
Revised by: Date:		FIG 5

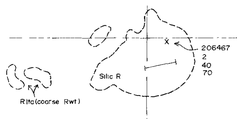
4300 E (ft) | 4400 E | 4500 E | 4600 E | 4700 E | 4800 E | 4900 E (ft)

8100 N (ft) — 8100 N

TRENCH PLAN
8100 N



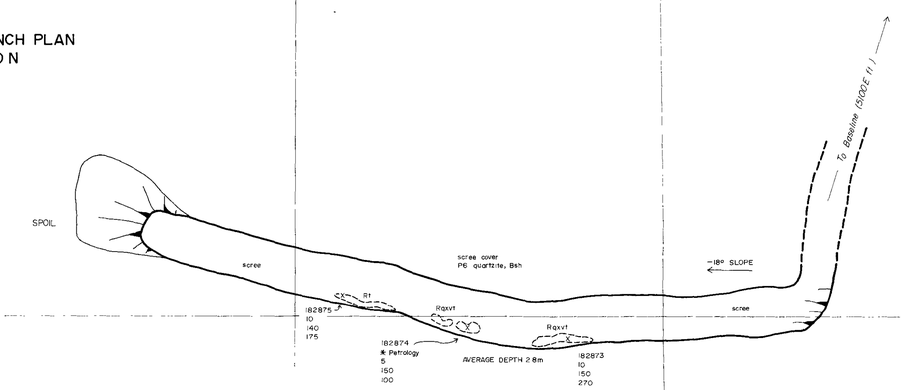




4300 E (ft) | 4400 E | 4500 E | 4600 E | 4700 E | 4800 E | 4900 E (ft)

7300 N (ft) — 7300 N (ft)

TRENCH PLAN
7300 N



REFERENCE

R	rhyolite
qx	quartz crystal
t	tuff
v	vitric
l	lithic

Rock Chip Samples by AAS

X 182873	Sample location and number
10	Cu ppm
150	Pb ppm
270	Zn ppm

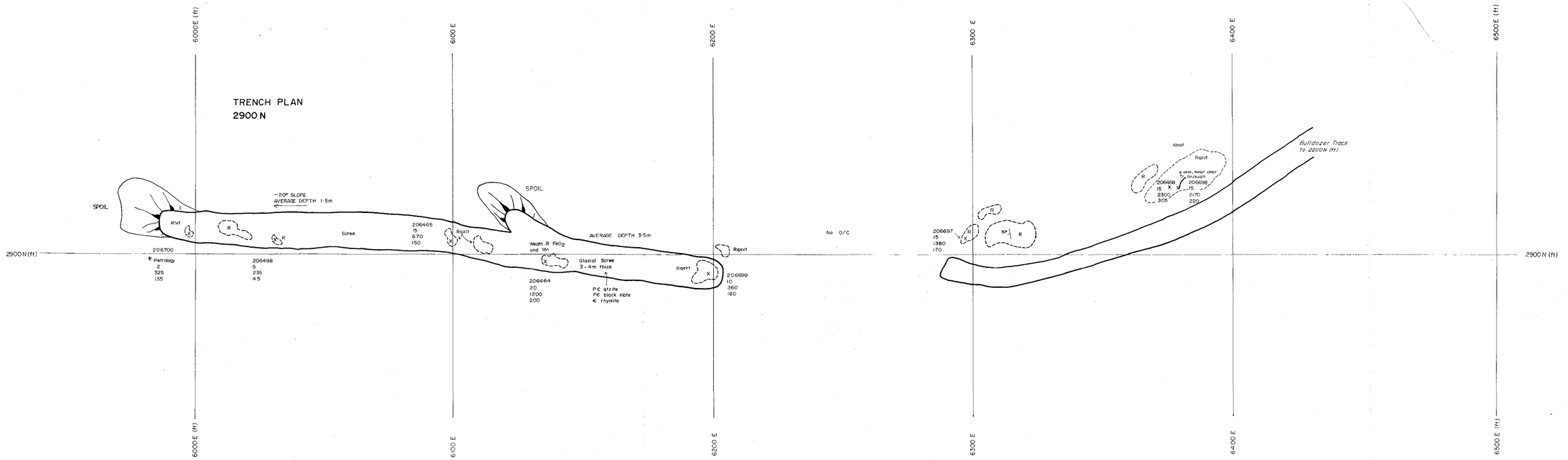
249038

5 cm

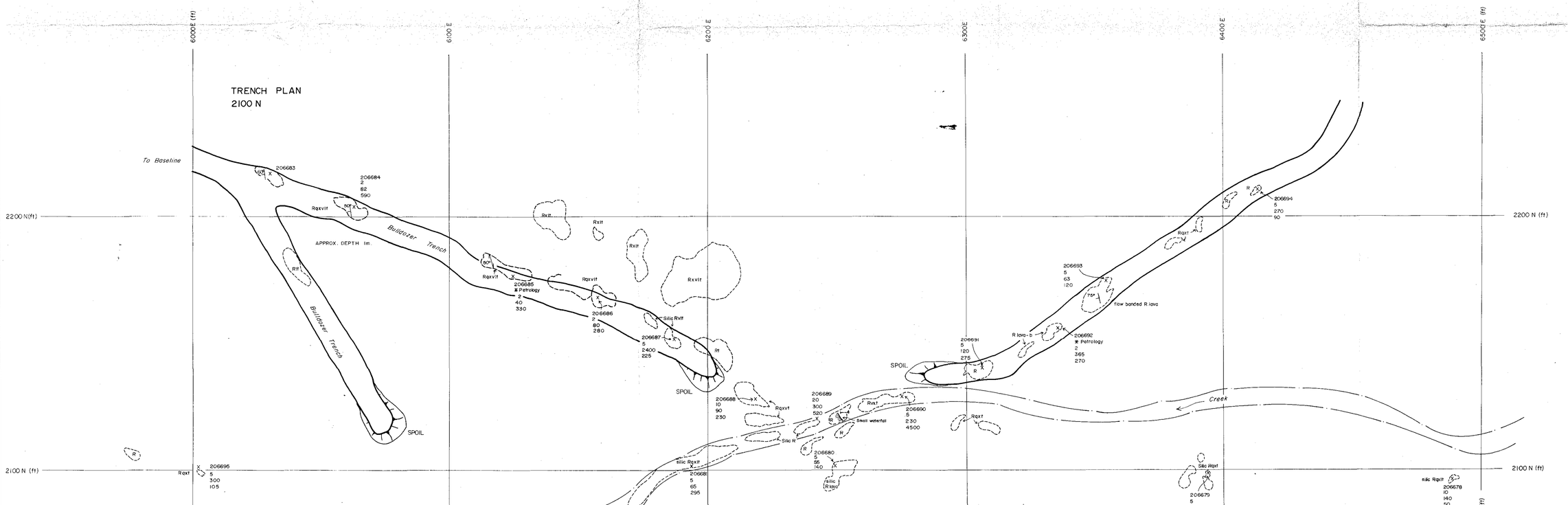
Abminco Exploration 78-1277

Geology C H Y	NORTH WEST TASMANIA
Drawn C H Y	MACKINTOSH EAST E.L. 2/70 001
Traced A E R	TRENCH PLANS
Checked	LINES 7300N & 8100N
Revised by Date	Location code
	Date May 1978
	Scale 1 250
	Plate Nº FIG 6.
	MAC 57

TRENCH PLAN
2900 N



TRENCH PLAN
2100 N



Rock Chip Samples by AAS

X 206694 Sample location and number
20 Cu ppm
300 Pb ppm
520 Zn ppm

REFERENCE

R rhyolite
qx quartz crystal
v vitric
l lithic
t tuff

5 cm

249039

Abminco Exploration			78-1277
Geology: C.H.Y.	NORTH WEST TASMANIA MACKINTOSH EAST E.L. 2/70 002 TRENCH PLANS LINES 2100N & 2900N		Location code:
Drawn: C.H.Y.			Date: May 1978
Traced: A.E.R.			Scale: 1:250
Checked:			Plate No FIG. 7.
Revised by: Date:			MAC 58

5500E 6000E 6500E 7000E 7500E

9500N 9500 N

5950E 6050E 6300E 6600E 6950E

9200 N

9100N

ML 3m/75

9000N 9000 N

8900 N

8800 N

8700 N

8600N

BASE LINE

8500N 8500 N

8400N

8300N

8200N

8100N

8000N

8000 N

5500E 6000E 6500E 7000E 7500E

C. HORIZON SOIL GEOCHEMISTRY

Cu 100ppm

Pb 250 ppm

Zn 200ppm

I. P. COVERAGE

I.P. 100m Dipole

I.P. 50m Dipole

I.P. 25m Dipole

2490**80**

5 cm

Abminco Exploration

78-1277

Geology: C.H.Y.	N.W. TASMANIA
Drawn: C.H.Y.	SOUTHWELL RIVER GRID 005
Traced: R.J.E.	MACKINTOSH E.L. 2/70
Checked:	SUMMARY OF
Revised by: Date:	GEOCHEMISTRY & GEOPHYSICS
Location code:	
Date: June, 1978	
Scale: 1:2500	
Plate No MAC 61 FIG 9.	