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PROJECT NAME:

TITLE: REPORT ON EXPLORATION IN EXPLORATION LICENCE 5/63,

PART 4, IN TASMANIA, AUSTRALIA

VOLUME 1

AREA NAME/S, STATE 1:250,000 SHEET NO/S & COORDINATES: Burnie Sheet S 55/3
Area centred at 378000E, 5382000N

COMMODITY/IES: Copper,Lead,Zinc

TEXT PAGES NO: 48

PLAN NOS: See Section 11

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APPENDICES:

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AUSTRALIAN ANGLO AMERICAN LIMITED

Incorporated in the State of Victoria

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COMSTAFF PROPRIETARY LIMITED

REPORT ON EXPLORATION IN EXPLORATION LICENCE 5/63, PART 4, IN TASMANIA, AUSTRALIA

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SUMMARY

An exploration programme has been carried out on the gridded areas of Exploration Licence 5/63, Part 4, comprising of Pinnacles (EAA Grid), East Chester (EAB Grid) and Chester (EAD Grid). Exploration techniques utilised comprised geological mapping, surface geochemical sampling, ground magnetometer surveys, self potential surveys, costeaning and costean channel and chip sampling. (TAS/2/1586, 1408).

Previous geological mapping and follow up exploration programmes in the individual grid areas had indicated an extremely variable sequence of rocks within this portion of the Mount Read Volcanics. The 1977/1978 exploration programme has gone a long way to elucidating the regional stratigraphy and structure. Geological mapping in the area separating EAA and EAD, and adjacent to EAB, has indicated that the EAB sequence can be extended into the EAD grid area, but the mineralised portion of the Pinnacles grid area has been tectonically removed.

Exploration of the Pinnacles area since the presentation of Report TAS/9 by G.K. Krummei has consisted essentially of checking rock types and structures. The area can now be integrated into the regional structure.

The East Chester grid has been explored in detail, including mapping of the complete grid, geophysical testing of favourable zones and costeaning of anomalous areas. The exposure afforded by the costeaning programme has been most useful in elucidating the regional structure. A weakly mineralised zone of siliceous (cherty) tuffs, containing up to 4.55% Zn, 33% Ba and 19.8 g/t Ag and minor Pb and Cu, was exposed in the 2540S access track, and has been traced southwards by costeaning. No major sulphide zone was exposed, but the horizon represents a favourable target for further detailed exploration.

Exploration in the Chester grid area comprised geological mapping, ground geophysical surveys and limited costeaning of the north-west portion of the grid. Outcrop over the acid volcanic sequence was minimal, so the correlation of units is not possible. Outcrop of the sediments west of the Owen Shear is reasonable on the steep east bank of the Marionoak River valley. No definite targets have been outlined in the area, but more geophysical testing will be recommended.

The regional interpretation indicates that the sequence in the Chester grid faces and dips steeply east, as stated by

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Perkin (1). A series of north to north-east plunging anti-clines and synclines develop in the Pinnacles-East Chester area, with the development of significant sedimentary horizons. In the vicinity of Holloway Rivulet, north of the Chester grid, there is a hinge-zone from which the strike of the Primrose Pyroclastic sequence changes from north-south in the Chester area, to north-east in the East Chester area. This is caused by east-west compressive forces, bending the sedimentary bearing portion of the Primrose Pyroclastics around the more competent massive volcanics of the Mount Black Volcanics.

No significant base metal concentrations have been discovered in the sedimentary facies of the Primrose Pyroclastics in the East Chester area. However, the proportion of sediments exposed is very low and these units represent high priority targets for detailed testing.

1. INTRODUCTION

1.1. General

This report relates to exploration carried out in the western part of Exploration Licence 5/63, Part 4, comprising grid areas EAA, EAB and EAD. The work has comprised geological mapping, geochemical sampling, ground geophysical surveys and costeaning carried out on grid extensions of the three areas. Data compilation and assessment has been an important part of the programme in order to relate the local stratigraphy and structure to the regional geology.

The field work, data compilation and reporting occupied the period August 1977 to June 1978. Discussions with other personnel who have been involved with exploration on various parts of the gridded areas have been invaluable, and their findings are incorporated in the main body of this report.

1.2. Objectives and Terms of Reference

The objective of the programme was:

(a) A regional geological interpretation of the western portion of Exploration Licence 5/63, Part 4, utilising the geological data obtained in the three individual gridded areas.

(b) To define specific target areas suitable for detailed follow up work and testing by drilling.

The terms of reference consisted of:

(a) Geological mapping of the north-west and north extensions of grid EAD, the east and west extensions of grid EAB and the north extensions of grid EAA.

(b) Geological mapping of costeans and access tracks put in on grids EAD and EAB.

(c) Check mapping of specific areas of interest necessary for a meaningful geological interpretation.

(d) Carry out geochemical sampling of the grid extensions, and check the validity of the A^0 sampling programme in areas of glacial cover.

(e) Channel sample all new costeans in order to relate geochemical response to lithology.

(f) Carry out proton precession ground magnetometer surveys as a possible aid to mapping.

(g) Carry out self potential surveys of particular areas of interest, as a possible direct guide to mineralisation and as a possible mapping tool for particular lithological units.

(h) Carry out induced polarisation surveys over selected target areas as a guide to sub-surface mineralisation.

(i) Excavate costeans in areas of positive geological, geochemical and geophysical response to expose the bedrock presumably responsible for the response.

(j) Proposals for future testing of defined target areas.

1.3. Tenement

The area of interest covered in this report lies within Exploration Licence 5/63, Part 4, held by Comstaff Proprietary Limited. The licence is subject to renewal at six-monthly intervals.

1.4. Location and Access

The project area is located in North Western Tasmania, approximately 80 km south-south-west of Burnie, and 10 km north of the township of Rosebery. (Plan TAS/2/1586).

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Access is via the sealed Murchison Highway to a point approximately 5 km north of Tullah, thence westward along a bulldozed dirt track passable by four-wheel drive vehicles all year round. Alternative access to the southern part of the area is available from the Hydro-Electric Commission gravel road south of Chester, (Plan TAS/2/1608).

Access within the area is available via several tracks bulldozed into the individual grid areas.

1.5. Physiography and Climate

The area is situated in dense rain-forest with open areas of button grass plain, usually overlying transported (glacial) soils. The area represents a drainage divide between Boco Creek to the east and the Marionoak River to the west; both of which flow southward into the Pieman River. The western part of the Chester grid is the long, steeply sloping, east bank of the Marionoak River, deeply incised by westward flowing tributaries.

Burns Peak, the Pinnacles and Mount Kershaw are the outstanding topographic features, and bear evidence of frost action during the Pleistocene glaciation. The whole area has been affected to some degree by this glaciation, the most obvious result of which is the widespread deposition of glacial till. Periglacial deposits are present in the western part of the Pinnacles grid in the form of varved clays, laminated clays and sandy foreset beds formed in the Marionoak valley from waters draining off a retreating valley glacier.

The north-east of the Chester grid, the southern part and much of the eastern part of the East Chester grid are covered by varying thicknesses of glacial till. This till has a strong masking effect on surface geochemistry, reduces the chance of discovering outcropping bedrock, and possibly affects geophysical surveys.

There is evidence that the glacier reached a present altitude of about 520m, leaving Mount Kershaw, Burns Peak and the Pinnacles as nunataks. The ice appears to have spread from the east as a sheet, entered the Marionoak valley through Holloway Rivulet, and spread north and north-west along the valley.

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There was obviously considerable glacial scouring of pre-existing creeks which are now filled with coarse debris, possibly the result of frost-heave action. Several of these debris-filled valleys are visible on the new Hydro-Electric Commission road on the north side of the Pieman River.

Most of the till covered areas are open button grass plains with low bauera and tea tree scrub developed on them. The higher peaks and ridge tops also have button grass and low scrub developed. The remainder of the area is covered by rain forest, substantial areas of horizontal growth and occasional thick regrowth.

The climate of the area is characterised by short, cool to warm, damp summers and long, cold, wet winters. Snow is not uncommon.

1.6. Infrastructure

This section has been adequately covered in previous reports by G. Krummei (Tas/9) and D.J. Perkin (Tas/6). Reference should be made to these reports for details.

A major factor that has to be faced in the planning of any exploration or mining activity in the area is the activities of Environment Protection agencies, both Government and non-Government. Strict controls are being laid down as to the type and extent of any earthworks undertaken. In the event that an economic ore deposit is discovered in the area, these environmental controls need to be taken into consideration in the planning of infrastructure facilities.

2. PREVIOUS WORK AND SOURCES OF INFORMATION

A brief history of exploration and mining in the Pinnacles area has been adequately covered by G. Krummei (Tas/9). In addition to the ore deposits at Pinnacles and Silver Falls, the only other deposit of consequence is the Chester Pyrite Mine.

The Chester Pyrite deposit was discovered by Kershaw and Sandison in 1896, who attempted to develop the property as a copper mine. However, it was soon discovered that the base metal content of the deposit was negligible, and the property was not developed. In 1908, the Mount Lyell Company took over the prospect as a Pyrite mine. From

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1909 to 1913 a total of 36 000 tonnes of ore, containing 37% S, was exported. Another 60 000 tonnes of lower grade ore, 21% S, was stockpiled at the mine site.

Rio Tinto Australia Exploration carried out a substantial geophysical and geochemical exploration programme between 1956 and 1962, including ground electromagnetics, ground magnetometer and gravity surveys. This programme indicated that the area requiring detailed exploration was in the vicinity of the Chester Mine. There is no record of them having carried out any detailed exploration in this area, and no drilling was done.

Comstaff Proprietary Limited acquired an Exploration Licence over the region in 1963 and commenced regional exploration in 1968. Initial exploration consisted of stream sediment sampling and reconnaissance stream geological mapping. Follow up work was concentrated in the vicinity of the Pinnacles mines and the Chester Pyrite Mine and consisted of gridding, grid mapping, geochemical surveys and limited induced polarisation and electromagnetic surveys. On the basis of this work, two diamond drill holes were drilled at the southern end of Pinnacles (CP 1 and CP 2) and one hole (CP 3) to the south of the Chester Mine which intersected 2.4m of economic grade lead-zinc sulphides.

Further detailed work was carried out in 1974/1975, consisting of the cutting of a metric grid at Pinnacles and at Chester. An A° horizon geochemical survey was completed over both grids and provided the basis for follow up drill testing. Remapping of the grids was completed, and a gradient array induced polarisation survey was carried out over the Pinnacles grid. As a consequence of this work, a further 12 diamond drill holes were drilled at Chester, and a further 8 holes at Pinnacles. Only low grade mineralisation was intersected at Pinnacles, related to the mineralisation seen at the surface at the South Trench and Thomas' and Brown's Tunnels. The Chester drilling failed to intersect economic grades of mineralisation, either associated with the previous intersection or associated with the surface geochemical anomalies.

Since the entry of Preussag Australia Limited into the Joint Venture, a detailed exploration programme was completed over the Pinnacles grid and has been reported in Preussag Report Tas/9 by G. Krummei. D. Perkin of Preussag completed a detailed exploration programme over the eastern and south-western portions of the Chester grid area and the results are presented in Preussag Report Tas/6.

Comstaff reports by various authors have been utilised in the presentation of this report, particularly the 1969/1970 and 1971 Interim Reports by M.P. Everett, 1972 Geophysical Work by D.B. Trussell, 1973/1974 Summer Field Season Report by R.N. Smith and 1975 Interim Report by D.B. Orr and R.N. Smith.

Detailed exploration by G. Pigott in the East Chester area was carried out in 1977 but no formal presentation of data was made. This work has been incorporated in this report.

3. FIELD WORK STATISTICS

Activity	Area EAA	Area EAB	Area EAD	Total
1. Line Cutting (m)	4 000	10 926	6 482	21 408
2. Geological Mapping:				
a) Grid lines (m)	4 000	26 793	36 880	67 673
b) Tracks and roads (m)	-	13 432	760	14 192
c) Costeans (m)	-	3 028	235	3 263
3. Costeaning:				
a) Access tracks (m)	-	2 632	760	3 392
b) Costeans (m)	-	2 498	235	2 733
4. Geochemistry:				
a) A^{o} soil samples	172	464	301	937
b) Auger samples	42	11	75	128
c) Costean (chip and channel)		831	57	888
d) Random rock chip	15	18	116	149
5. Geophysical:				
a) Ground magnetics (m)	-	22 540	24 520	47 060
b) Self Potential (m)	900	4 334	2 000	7 234
c) Induced Polarisation (m)	2280	2 880	-	5 160
d) Crone EM (m)	-	880	-	880

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4. MODUS OPERANDI

4.1. Grid Cutting

In order to facilitate the detailed exploration surveys of the area, it was necessary to erect surveyed grids. These grids were utilised for geological mapping, geochemical sampling and geophysical surveys. Major grid cutting programmes were done by outside contractors, with Comstaff personnel being used for some infilling and extension work. It was important for the lines to be sufficiently wide for the transport of bulky geophysical equipment, but some of the earlier lines were poorly cut and access is restricted.

4.2. Surveying and Compilation

All tracks, grid lines and costeans were surveyed using tape and compass. The surveys have been tied in to National Metric Co-ordinates to facilitate transfer of the data to recently compiled 1:5000 base sheets of the region. All the field data has been transferred to survey data sheets and dispatched to Technical Computing Services of Melbourne for processing. The intention has been to have all the survey data computerised, and computer print outs of all plans made available for the addition of field data.

Several problems have been encountered with this method of plan preparation, not least of which has been the time lag between the presentation of the field data and the production of the final print out in a usable form. Errors are inherent in any tape and compass survey, especially in this area of severe relief and dense vegetation, but there is no allowance for this in a strict computer programme. It has been necessary in many instances to manually plot the slope corrected field data in order to produce a usable plan. In this way, all coincident survey points can be plotted to represent their actual field relationship.

Computer plots of profiles have proved useful where the topographic, geochemical and geophysical profiles can be combined on a single plan.

The standard scale of plan for presentation of data

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is 1:5000. This has been found most suitable for all types of surveys, as two A_1 standard sheets cover the Chester grid (EAD), and two A1 sheets also cover the East Chester grid (EAB). 1:2500 scale plans have been prepared in certain cases to cover areas of particular interest, e.g. the western costeans in EAB. All costean data, geological and geochemical, has been plotted at 1:500 scale.

4.3. Geological Mapping

All roads, tracks, costeans and grid lines have been mapped and the data transferred to suitable scale plans.

Roads and tracks provide reasonably good outcrop, except in areas of particularly deep soil cover, or areas of glacial overburden. Outcrop on grid lines is minimal, and is often very weathered, thus hindering positive identification of many of the rock units. Confidence in recognising many of the rock types is gained by mapping experience in the area, particularly where bulldozing has exposed fresh bedrock that can be related to weathered outcrop.

Costeaning has provided good exposure in certain areas and detailed, accurate mapping is possible. This mapping has provided essential data for the geological interpretations presented in this report.

4.4. Geochemical Sampling

The main geochemical surveying technique utilised in this area has been A^o horizon sampling. This method has been used in the area since orientation surveys were carried out over the Pinnacles grid in 1973/1974. A critique of this orientation survey and the usefulness of the A^o sampling programme has been presented in Preussag Report Tas/8 by D.B. Hall.

As a result of this critique, a technical meeting was held to discuss the findings and recommend alternative techniques and further orientation work.

The major recommendation that effected the standard sampling procedure was "in future, prior to routine geochemical surveys, each grid is to be traversed by a geologist skilled or instructed in the recognition of major pedalogical units so as to map the main soil types prior to, and as a guide to, the selection of the appropriate soil sampling technique and aid to subsequent interpretation." In theory this is a suitable approach, particularly in a new exploration area, but in practice on an on-going project, a compromise situation prevails. In the case of this project area, much of the gridded area had previously been A^{o} sampled, and for the sake of continuity, all grid lines were sampled using the A^{o} horizon. However, more attention was paid to the soil types over which the samples were taken during assessment of the results; the intention being to test with hand auger drilling any anomalous A^{o} responses. Also, it proved to be convenient to collect the A^{o} sample in conjunction with the surveying of the grid lines. This meant that there was a significant saving of time as the field hands did not have to traverse the line a second time to take samples.

Some hand auger sampling was carried out as a check on A^{o} anomalies, mainly in the Chester area. The augering was designed to penetrate the overburden into bedrock. The recognition of bedrock in the environment is difficult at times with the substantial leaching that has taken place.

4.5. Geophysical Surveys

4.5.1. Ground Magnetometer Surveys

These were carried out using a McPhar Proton Precession Magnetometer. Although there is no evidence that any particular rock units or lithologies are anomalously magnetic, it was decided to cover all recent gridding with ground magnetometer surveys. It was hoped that with this precision instrument, any major lithological boundary may show up.

On the grid line surveys, readings were taken at 20m intervals except where a significant variation from background occurs, and intermediate 10m station intervals were recorded.

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Results have been corrected where necessary for any significant diurnal variation and plotted as profiles.

4.5.2. Self Potential Surveys

A limited amount of self potential was done in the area with a twofold purpose. The first purpose was to test for any anomalous zones that may represent primary sulphide mineralisation. However, there were no obvious responses that can be said to represent base metal sulphides. A detailed assessment by a geophysicist will be necessary to confirm these conclusions.

The second purpose was to investigate the applicability of self potential as a mapping tool. Surveys over known geology, from costeaning in EAB, indicated that certain pyritic shales/ siltstones gave a specific response. This enabled the strike extent of this unit to be traced beneath glacial cover.

4.5.3. Induced Polarisation Surveys

A small induced polarisation programme was completed in the area by Geoterrex Limited of Sydney, using a Scintrex IPR-7 receiver unit. The method used was time-domain dipole-dipole with a 60m dipole spacing to give total chargeability and apparent resistivity, to n=6. (60m)

The survey was designed to test for responses from primary sulphide mineralisation in areas of favourable geology and geochemistry.

4.5.4. Ground Electromagnetic Surveys

An in-house Crone electromagnetic unit was utilised on one test line at East Chester to test for any significant response over pyritic sediments. A 160m coil separation was used with medium frequency. ?

4.6. Costeaning

A Caterpillar D6 bulldozer was utilised to excavate costeans in areas of soil cover. This is the only means available to obtain bedrock exposure to test the geological sources of geochemical and geophysical anomalies. Access tracks put in to the costeans also provided useful geological data.

4.7. Data Compilation and Reporting

All geological data has been compiled at a scale of 1:5000 as plans, on A1 standard sheets, designed to overlay each grid area. A regional geological map has been prepared at a scale of 1:10 000, covered by a single A1 sheet. This has proved most suitable for the geological interpretation of the project area.

All soil geochemical data has been compiled on the same standard sheets as the geological plans. This has enabled contour plans to be prepared that can be directly overlaid on the geological plans.

Grid line profiles have been prepared from computer plots at a scale of 1:5000. These have been slope corrected, and contain topographic profiles, soil geochemical profiles for individual elements and geophysical data where applicable.

All relevant plans, both drafted and computer plots, are stored at the Waratah Office of Comstaff Pty. Ltd., and have been allotted an individual filing number.

The introductory part of this report has been made as comprehensive as possible in order to facilitate the extraction of relevant data required for any future exploration in the area.

Each category of exploration, geology, geochemistry, and geophysics, will be described for the total project area. The data obtained from the separate grid areas will be incorporated into each category.

5. GEOLOGY

5.1. Regional Geology

The geology of Western Tasmania has been subjected to continual review and re-interpretation since the discovery of economic sulphide deposits in the late 19th Century. The latest state of the art is adequately covered in recent publications by Williams et. al. (5) and Solomon et.al. (6). However, there is still no consensus of opinion as

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to the detailed geological history of the region.

The region is dominated by two Precambrian massifs, the essentially unmetamorphosed Rocky Cape massif in the north-west, and the strongly metamorphosed Tyennan massif of the Central Highlands region. These two blocks have had a profound influence on the Palaeozoic geology of the region.

Between the two Precambrian nuclei, a broad arcuate trough developed (Dundas Trough), which now consists of a thick sequence of Palaeozoic sediments, volcaniclastics, basic to acid lavas/pyroclastics and intrusives. The whole has been subjected to strong orogenic movement, particularly during the Tabberabberan Orogeny in the Devonian. There was also a late Cambrian phase of uplift and gentle folding, but there was probably continual movement within, and peripheral to, the Dundas Trough from Lower Cambrian times through to Devonian.

The Dundas Trough contains a great thickness of Cambrian Sediments, approximately 7500m, overlain in part by Ordovician clastic rocks (Jukes and Owen Conglomerates), inturn overlain in part by Ordovician-Devonian shelf sediments, up to 2000m of limestone, mudstone and sandstone. Tertiary flood plain basalts extend northwards from north of the Que River, and effectively mask the underlying geology in the northern part of the Dundas Trough.

The major base metal deposits in the region, as represented by Mount Lyell, Hercules, Rosebery, Tullah-Farrell, Que River and Chester-Pinnacles, are associated with acid to intermediate volcanic rocks of Cambrian age, the Mount Read Volcanics. The relationship of the Mount Read Volcanics to the Cambrian Sedimentary sequences is not clear. Many learned treatises have been published on the geology of the region, but it is impossible to find any reference to a non-faulted contact between the volcanics and the sediments.

The Cambrian Sedimentary sequence has been broadly sub-divided into three "groups"; the Success Creek Group (oldest), the Crimson Creek argillites and the Dundas Group (youngest: middle to upper Cambrian). The Success Creek Group consists of quartzite, sandstones and shales and is conformably

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overlain by the Crimson Creek argillites. The latter consists of a thick, monotonous sequence of mudstones and lithic wackes. Throughout this part of the sequence there is no real evidence to suggest that major volcanism was occurring at the geosynclinal margins.

The Dundas Group consists of about 3800m of mudstone, shale, greywacke, lithic wacke and conglomerate. Fossil evidence in mudstones gives an age of Middle to Upper Cambrian for part of the group.

The Mount Read Volcanics form a broad arcuate mass between the sediments of the Dundas Trough to the west, and the stable Tyennan Nucleus to the east. They are dominantly rhyolitic and dacitic lavas and pyroclastics, with minor andesitic units, and local developments of sedimentary rocks, essentially mudstones. Marine fauna in sediments in the upper part of the succession at Que River indicate a late Middle to early Late Cambrian age (7), which would be the time equivalent of part of the Dundas Group to the west.

The genesis of the Mount Read Volcanics is still not clear, but is certainly related to the development of the Dundas Trough. The mode of formation of the Dundas Trough is still in doubt, and it has been described at various times as a geosyncline, a series of rift valleys, a back arc basin associated with a west dipping subduction zone, and as a collision zone between the two Precambrian nuclei following closure of an oceanic basin by subduction down an east dipping Benioff Zone.

It is suggested here that the Dundas Trough was essentially a geosyncline, as evidenced by the great development of clastic sediments, including turbiditic types, seen in the Success Creek Group and the Crimson Creek argillites. A zone of weakness, probably related to fundamental crustal lineaments, developed at the eastern edge of the geosyncline, with large rift valley type tension faults being developed. These deep seated faults provided suitable conduits for the extrusion of mainly acid lavas and derivatives from deep in the crust. It is suggested that the Mount Read Volcanics are in part contemporaneous with the development of the Dundas Group, with probable

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interdigitation. However, the contact relationships are obscure, and it is not stated in the literature that a non-faulted western contact of the volcanics has been seen.

In the project area, and in the Pieman River to the south, the contact between the clastic sediments to the west and the Mount Read Volcanics to the east, is a shallow angle fault (thrust ?), dipping east at 35°-40°. The development of about 2cm of pug at the fault, and the severe contortions within the incompetent sediments, suggest significant movement on the thrust. Since the thrust truncates tectonic features that are accepted as being due to the Tabberabberan Orogeny, the thrust is either related to a late phase of this Orogeny or a separate, later phase of orogenesis.

The Mount Read Volcanics can be subdivided into two broad rock groupings, termed the Primrose Pyroclastics, and the Mount Black Volcanics, in this part of the belt (8). The older Primrose Pyroclastics are essentially a thick sequence of ash flow and ash fall tuffs, coarse pyroclastics, ignimbrites, rhyolitic lavas, subordinate intrusive porphyries and intercalated marine sediments. The Mount Black Volcanics comprise a thick (2200m) sequence of massive andesitic, dacitic, rhyolitic and keratophyric lavas, autoclastic tuffs and ignimbrites.

The equivalents of these units are present in the Queenstown area to the south, and are there referred to as the Queenstown Pyroclastics and the Central Lavas.

The recognition of substantial ignimbritic units within the volcanic units indicates significant sub-aerial activity. Siltstone and shale lenses within the volcanics testify to local subaqueous conditions, some obviously marine, and some possibly lacustrine. Braithwaite (11) suggested that the Rosebery ore, formed near the western margin of the volcanics, may have developed in shallow water, lacustrine or lagoonal conditions.

The association of the major base metal deposits of the region with the Primrose Pyroclastics has focused a great deal of attention on these rocks.

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5.2. Local Geology

5.2.1. Chester Grid (EAD)

The bulk of the Chester area was mapped by D.J. Perkin in 1977, and previous exploration had been carried out by Comstaff prior to 1977.

Perkin mapped the new Hydro-Electric Commission road, north of the Pieman River, in detail in order to elucidate the stratigraphy within the Primrose Pyroclastics. On the basis of this detailed mapping and substantial petrological work, the Primrose Pyroclastics were subdivided into seven units as follows:

Youngest	Unit 7	Upper ignimbrites (vitric lapilli tuffs).
	Unit 6	Fine grained sediments (clastics and volcaniclastics) including shale and chert.
	Unit 5	Lower ignimbrites (vitric lapilli tuff) with quartz veinlets and some disseminated galena/sphalerite.
	Unit 4	Fine grained chloritic and sericitic volcaniclastics and clastics, strongly sheared and foliated.
	Unit 3	Chloritised re-worked acid tuff with shale fragments, quartz carbonate veinlets and minor disseminated galena-sphalerite.
	Unit 2	(Sheared) black shale with tuffaceous interbeds carrying blebs and transgressive veinlets of galena and sphalerite.
Oldest ?	Unit 1	Medium grained ash fall tuff (aquagene quartz-plagioclase crystal acid tuff) minor disseminated galena and sphalerite.

Attempts to trace these units through the grid to the north have not met with a great deal of

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success. Outcrop across the acid volcanic sequence is negligible on the grid lines. The Rosebery Group sediments to the west of the Owen Shear outcrop reasonably well on the steep east slope of the Marionoak River valley. The Owen Shear is not recognised on any of the grid lines, but its position can be interpreted with a fair degree of confidence, (TAS/2/1556, 1557).

The Rosebery Group sediments consist of interbedded shales, siltstones, sandstones, argillites, pebble conglomerates and fine grained tuffaceous units. The pebble conglomerates provide the most consistent recognisable unit and can be traced from line 800N northwards to Holloway Rivulet. They consist mainly of silicified argillite, claystone, siltstone and occasional fine sandstone pebbles in a matrix of clays, silt and quartz sand. Distinctive green chlorite is fairly widespread and they may be fuchsitic. Similar pebble conglomerates have been exposed on the Hydro-Electric Commission road south of the grid area, and can be related to these further north. Other conglomerates have been recorded from the Pieman River (9).

The sediments in the grid area all have an easterly dip, and from rare facing data, they are younging eastward. There is evidence for minor drag folding and occasional tight folding, with a consistent northerly plunge of 20°-40°. This is best seen in the Marionoak River at the western end of line 3100N, and at the western end of line 1800N. The overall dips are quite variable, from 35°-85°, and are often undulating. At 1800N, 1180W, there is a massive outcrop of conglomerate, underlain by a fine grained green siltstone/argillite. The contact is undulating, probably due to load pressure of the overlying conglomerate; the overall dip is 35° east.

At the southern end of the grid, in the Pieman River section and the Hydro-Electric Commission road cutting, there is evidence for a syncline within the Rosebery Group sediments, beneath, and to the west of the Owen Shear. A northerly plunge is postulated from this syncline. The flexure evident in the Owen Shear at the southern end of Chester would probably account for the truncation of this synclinal structure.

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A cross section of the Primrose Pyroclastics is present on the 400N costean and access track, and along the 1400N track. On the 1400N track there are three andesitic units, vesicular in part, and possibly tuffaceous. Each is approximately 30m wide with some minor acid crystal tuff intercalations. They are separated by about 25m of quartz felspar crystal tuff. Dips and foliations within these units give magnetic north strikes, and steep easterly dips. The andesitic units are variably altered, with some ferruginous staining and significant chloritisation in parts.

To the west of the andesites, and stratigraphically below them, is a sequence of plagioclase crystal vitric tuffs, sericitic schists and altered acid tuffs. A petrological analysis of the vitric tuff described it as a glassy porphyritic lava, or a crystal tuff with a crystal matrix, or having the characteristics of both, thus being a tuff-lava. These rocks represent the oldest unit of the Primrose Pyroclastics exposed on the Chester grid, and are separated from the Rosebery Group sediments by the Owen Shear, which here dips east at 40^{o}.

The costean on 400N was excavated to try and expose the source of A^{o} geochemical anomalies, (TAS/2/1582, 1583) While setting out the costean, two old pits were discovered at 400N, 660W, which may be Gordon's Workings referred to by McIntosh Reid (3). Investigation of these pits failed to reveal any bedrock, but contained highly manganiferous sandy clays, with some exotic boulders of probable glacial origin.

The 400N costean exposed a glacial filled valley, with the usual boulder assemblage of Owen Conglomerate and variable acid volcanics. One sericitic rhyolitic tuff boulder contained about 5% fine disseminated pyrite. At the eastern end of the costean the exposed bedrock was sericitic dacitic tuff, with some weakly silicified acid tuff present. Going down the costean westwards from the glacial material, there is chloritic sericitic acid tuff, underlain by waterlain, poorly bedded tuffs. These tuffs are quite distinctive and are similar in appearance to the sedimentary tuffs exposed in East Chester, at the western contact of the andesites.

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The most distinctive rock unit on the 400N access track is a 70m thick andesite unit. It shows the typical alteration of the andesites in East Chester, developing an ochrous red clay soil and weathering to a ferruginous rock. No contact relationships with the adjacent rocks were visible. Between the andesite and the costean is a sequence of acid crystal lithic tuffs, becoming more dacitic closer to the andesite. The tuffs have been moderately to strongly sericitised, with a weak foliation striking northwards, with a sub-vertical dip. At 482m and 498m on the track, sphalerite and galena are present, associated with quartz-carbonate fracture filling. Pyrite is ubiquitous through these rocks, varying up to 20%, as fine grained disseminations. These rocks may be the equivalent of Perkin's Unit 3, with no shale fragments.

East of the andesite is about 120m of poorly exposed quartz crystal tuff. The quartz crystals are coarse grained, sub-rounded, and appear vesicular. The rock may be a quartz eye volcanic or quartz felspar porphyry. On the first 100m of the access track, there is very poor outcrop of chloritic quartz felspar crystal (lithic?) tuff. There is no evidence of the porphyritic agglomeratic dacitic lava that is present on the upper Chester road at approximately 1200N, 020E. It would appear that the unit has lensed out north of the access track. or faulted out

The agglomerate referred to by Perkin as Unit 3A can be traced along the upper Chester road, roughly along the grid base line to 1200N, then it turns east of north and is seen again on the road between 1500N and 1600N. Two petrological descriptions of rock samples taken on the main Chester road, 100m north of grid point 2000N, 500E, describe the rocks as devitrified rhyolitic lava flow breccia, related to a vent, or near vent, situation. This unit cannot be traced further north where it is obscured by glacial overburden.

Mapping of the three northernmost lines, 2300N, 2800N and 3100N, was not very productive due to the paucity of outcrop over the Primrose Pyroclastics. The few small outcrops seen consisted essentially of quartz felspar crystal tuffs, acid tuffs and some leached, fine grained flow banded rhyolite (?) at 2300N, 800W. Small

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outcrops of andesitic lavas and tuff lavas at the eastern end of 3100N and 2800N, and along the baseline at 2520N, 2700N and 2970N, can be extrapolated north-eastwards into the East Chester grid.

On line 2800N, 666W, there is outcrop of a coarse dacitic lapilli tuff containing thin (<5cm) black shale interbeds and clasts, and weakly pyritic. At 690W on the same line is an outcrop of a massive cherty fragmental rock, with fragments of acid tuff, dacite (?) and pyritic silicified black shale in a matrix of grey cherty rock. This is underlain to the west by a massive grey fine grained pyritic cherty unit. These silicified, cherty, shale bearing rocks are assigned to the Primrose Pyroclastics, although the Owen Shear is not exposed to provide direct evidence. This unit cannot be traced along strike, and there is no exposure in Holloway Rivulet that bears any resemblance to it. On line 2300N, at 800W, there is a leached, fine grained, net vein fractured rhyolite containing some flow banded rhyolitic/dacitic fragments, possibly representing a lava breccia; at 853W there is float of a brownish fine grained to coarse grained grit, containing angular to sub-rounded fragments, occasionally up to 10mm in diameter, of chert, limonite and kaolin.

It has not been possible to extrapolate Perkin's lithological units through to the north of the grid, and any inferred relationship is only tentative. The outcrop of dacitic tuff with black shale fragments and interbeds at 2800N, 666W, bears a striking resemblance to the Unit 3 description. If this interpretation is accepted, then Units 1 and 2 have been either tectonically removed by the Owen Shear, or the inferred northerly plunge of the sequence has meant that the lower units have disappeared beneath the younger ones.

No particular effort has been made to define more precisely the contact between the Primrose Pyroclastics and the Mount Black Volcanics to the east. The position of the contact as proposed by Perkin is accepted here. The northern extent of the contact cannot be determined as glacial till completely masks the area in the

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north-east of Chester, and to the south-east of the East Chester grid.

It is obvious that there is a substantial thickening, or apparent thickening, of the Primrose Pyroclastics as the sequence is traced northwards from the Pieman River. Perkin quotes a thickness of 710m for the section of the Primrose Pyroclastics exposed on the Hydro-Electric Commission road, but across the Chester grid, through the Chester Pyrite Mine, there are 2000m. There is no direct evidence of structural thickenings in the form of synclinal or anticlinal structures, although it must be recognised that with the poor outcrop and substantial alteration effects, it would be difficult to recognise such structures. The most logical conclusion is that the thickening is due to increased depositional thicknesses of units.

There are also indications of changes in lithology from south to north. The Hydro-Electric Commission road sequence is essentially one of fine grained sediments, reworked tuffs, aquagene ash-fall tuffs, cherts and ignimbrites; all indicating a medial or distal zone of deposition. To the north, there is evidence of increasing proportions of acid to intermediate lavas, lava breccias and agglomeratic facies, indicating proximity to the source area of the rocks. This would cause a substantial increase in thickness of the Primrose Pyroclastics.

5.2.2. Pinnacles Grid (EAA)

A detailed mapping programme was completed over this grid by G.K. Krummei between December 1976 and February 1977, and reported in Preussag Report Tas/6, (TAS/2/1485).

The structure and stratigraphy of the area are complex, and any interpretation is tentative at best, (TAS/2/1587). However, a better understanding of the structure is possible in the light of recent work in the East Chester grid(EAD) The unit of siltstone and argillite in the east of the grid, extending from 1700S, 1000W, to 2100S, 1100W, is the east limb of a north-east plunging syncline (Burns Peak Syncline). The west limb is present

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on 1600S, 1040W to 1100W, and 1700S, 1080W to 1140W. On a bulldozed track extending northward from 2200S, 1220W, between 2120S and 2160S, is a zone of intensely sheared argillites and sandstones. The shearing, trending east of north, has tended to mask any bedding visible in the outcrop. Some bedding is visible, and is variable, but overall has an east-west strike, dipping north. This zone is interpreted as being the nose of the plunging syncline, and the schistocity is related to the anticlinal axis about 100m to the west (Pinnacles Anticline).

At 1180S, 1000W, a rock described in thin section as an impure chert or cherty argillite (tuffaceous), can be related to a pyritic, cherty sediment on 1400S, 1080W, and then to a similar cherty unit on 1600S, 1160W. This unit is on the west limb of the Burns Peak Syncline, and stratigraphically below the argillite-siltstone unit described above. A complementary pyritic cherty unit (with traces of galena) can be traced to the west of the anticlinal axis, from 1400S, 1190W, to 1700S 1380W.

There are two major structural features in the Pinnacles area, the Owen Shear and the Pinnacles Anticline. The Owen Shear can be traced in outcrop, and from drilling, from the CP1/CP2 costean to the south, through 2800S, 1700W, striking at 340° magnetic, through Thomas' Creek (approximately 1600S, 2040W), through the Marionoak River, and presumably northwards to the Silver Falls Mine. The dip of the shear (thrust?) is 35° to 40° east, with unknown throw and direction of movement. It is suggested here that this structure is a thrust (?zone), with the eastern volcanic sequence (Primrose Pyroclastics) thrust westwards over the Rosebery Group sediments. Although probably not having any bearing on the genesis of the mineralisation in the area, it has effectively truncated the ore bearing horizons of Pinnacles at a shallow depth.

The Pinnacles Anticline has been so called because it is interpreted as passing through the Pinnacles peaks. The evidence for this anticline is not strong, consisting basically of the extrapolation across the anticline of the pyritic cherty unit mentioned previously, and indirect ?

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evidence along the Silver Falls road. To the north of Pinnacles three costeans were excavated early in the project, and exposed a sequence of marine sediments and tuffs across the Que Syncline. Black pyritic siltstones/shales are exposed on the track to these costeans, about 150m north of EAA line 400S, 1500W. These sediments strike 210° magnetic and dip 70° to the west, and obviously are on the east limb of the north plunging Que Syncline. At the top of this access track, on the Silver Falls road, there is a flow banded rhyolite/tuff, striking 350° magnetic, dipping 70° east. A similar rock, with bedding/flow banding, is present on line 600S, from 1050W to 1080W, with a strike of 340° to 360° magnetic and easterly dips of 50° to 65°. There would thus appear to be a very tight anticlinal structure separating the Que Syncline to the west and the Burns Peak Syncline to the east.

The axis of this anticline passes through the Pinnacles peaks, striking about 10° east of north from 2800S:1340W, through 2500S:1320W, 2300S:1340W, 2000S:1360W, 1900S:1340W, and then veers off to the east and strikes about 30° east of true north to the East Chester road, before changing back to a northerly strike. This would correlate closely with the zone of extrusive vents noted by Krummei (2, Fig 43). It appears as though this anticlinal structure was a primary feature during the period of deposition, probably a line of vents. The Tabberabberan Orogeny would then have affected these primary structures, causing accentuation of the anticline and the flanking synclinal basins. This is evidenced by the strong schistocity developed in the sericitic volcanics and argillites in the southern part of the Pinnacles grid.

The sequence to the west of the Pinnacles Anticline is interpreted as the east limb of the north plunging Que Syncline. As the Owen Shear is approached there is evidence of overturning, particularly of the Pinnacles and Thomas' Tunnel line of lode, and the siltstone/argillite horizon west of the Pinnacles south trench. This overturning is probably related to the development of the Owen Shear. The Rosebery Group sediments west of the thrust are strongly

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contorted, showing evidence of wet sediment deformation (slumping), chevron-style folding and compressional folding.

5.2.3. East Chester Grid (EAB)

Geological mapping of the East Chester grid has proved invaluable in the elucidation of the structure of the area, (TAS/2/1565, 1698).

The dominant feature of the area is the extensive central zone of andesite lavas, which are interpreted as being the core of a north-east plunging anticline. The lavas are microporphyritic in plagioclase, with flow attenuated (ie amygdules) vesicles filled by deuteric quartz. The groundmass is flow textured, glassy to microcrystalline and clouded by chlorite-sericite alteration. Sections show minor fracturing, variably continuous, with some development of localised breccia, invaded and filled by hydrothermal quartz-saussurite-epidote. In part the andesites are tuffaceous, but not a reworked tuff. In the southern part of the grid, on the East Chester road, north of Holloway Rivulet, line 2950S:220W-300W, line 3750S:200W-350W and line 3550S:220W-240W, the andesites have been extensively chloritised, fractured and brecciated. This alteration zone contains variable amounts of pyrite, rarely up to 50%, with rare traces of chalcopyrite.

"ORIGINAL EAB"

In the original East Chester grid area, visible in old costeans on lines 4500 ft S and 5500 ft S, are thin phyllites, micaceous sandstone and pyritic carbonaceous shales/siltstones. These occur as units only a few metres thick within the andesites, and there is some chloritic alteration.

The eastern contact of the andesites, interpreted as a top contact, is relatively sharp. The overlying intermediate to acid tuffs and lavas dip, and are assumed to face, east. There is a distinct unit of trachyandesitic lavas, described in thin section as weakly vesicular and microporphyritic, enriched in late magmatic quartz and occasionally chlorite. These lavas possibly represent a transition from intermediate volcanicity to an essentially acid type. The acid volcanic rocks are represented by rhyodacitic

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flows (tuffs?), acid crystal vitric tuffs and quartz-trachyte lavas. Unfortunately these rocks are extensively hidden beneath glacial overburden, and outcrop is restricted to roads and tracks.

The sequence overlying the andesites to the west has been well exposed in costeans and access tracks excavated to trace the source of geochemical and geophysical anomalies*. Costeans 3350S and 2950S exposed andesitic lavas and tuffs, overlain by dacitic tuffs and tuffaceous sediments, inturn overlain by fine grained waterlain tuffs and thin laminated siliceous (cherty?) sediments. Pyritic ferruginous bedded cherts were exposed at the extreme western end of costean 2950S. As this horizon represented a favourable target zone for base metal sulphides, geophysical surveys were utilised to attempt to trace the zone and possibly indicate sulphides. Significant IP anomalies were obtained, and two costeans on 2540S and 2340S were excavated across the zone. Costean 2540S has provided the most complete section across the stratigraphy west of, and above, the andesites, (TAS/2/1612, 1613).

The andesite is massive, weakly vesicular, and typically iron and manganese stained. It grades into a yellowish weathered, tuffaceous dacitic rock, with strong iron staining and relict flow textures; this unit is about 10m thick (exposed). The pyroclastic/sedimentary sequence above the andesites and dacites can be subdivided into the following units, from oldest to youngest:

1) 7.5m of medium grained porphyritic rhyolite, with a tuffaceous appearance. Some carbonate filled joints are present.

2) 36.9m fine grained, waterlain tuffs, poorly bedded, striking 055° magnetic, dipping 30° northwest. The dip increases upwards to about 40°, with some possible graded bedding facing northwest.

3) 9.2m of alternating tuffs and sediments. The tuffs are massive to poorly bedded fine grained. The sediments are laminated, grey/black silicified siltstones and sandstones, with conformable dips

* TAS/2/1301, 1302, 1303, 1304, 1612, 1613, 1614, 1699.

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and strikes and some intraformational slumping.

4) 27.9m of sedimentary, fine grained tuffs, variably silicified, poorly bedded, with increasing interbeds of siliceous laminated tuff and siltstone, showing rippled bedding and micro slumping.

5) 7.3m of tuffaceous, silty sediments, grey to black in colour. The bottom contact with Unit 4 is sharp, striking 235° magnetic, dipping 60° north-west. Some minor slumping is evident.

6) 57.8m of black, indurated, cleaved, pyritic siltstones/shales. Bedding is fairly consistent at about 50° dip north-west. Very fine grained pyrite is common on the bedding plane, and is often the only way of recognising the bedding. A strong cleavage is developed, subparallel to the bedding, and dipping south-east at 60° to 80°. This verifies that the sediments occupy the east limb of a syncline. The top 5m of this unit is more grey coloured and altered, giving the impression of a palaeo-weathering regime.

7) 18.2m of tuffs. The bottom contact is diffuse with some black siltstone fragments present. There is a cherty pyritic boulder immediately overlying the sediments, encased in the tuffs. The tuffs have been altered to a quartz sericite assemblage and grade upwards into altered quartz crystal tuff.

8) 12.7m of massive, siliceous fine grained rhyolite, or possibly a silicified acid tuff. There is flow banding developed at one point, striking 005° magnetic, with a vertical dip.

9) 36.5m of soft, weathered (?) tuff, showing a crude coarse bedding, striking 005° magnetic with a vertical dip.

10) 7m of breccia, apparently brecciation of Unit 9 with angular to subrounded fragments decreasing in size.

11) 13m of very coarse pyroclastic (agglomerate) with angular to subrounded fragments of tuff, rhyolite, cherty material and pyrite. Some very

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coarse euhedral pyrite is present in the medium grained, slightly chloritic, matrix.

12) 23m of coarse lapilli tuff, almost agglomerate. A fine to medium grained quartz felspar matrix. The top 10m is characterised by the development of chlorite clots up to 4cm across.

13) 69m sequence of acid pyroclastics. Coarse angular to subrounded porphyritic rhyolite, tuff and siliceous material, grading upwards into a coarse lapilli tuff, then a felspar quartz crystal lapilli tuff.

14) 47.7m of chloritic felspar quartz crystal tuff, becoming finer grained and limonitic. The basal 10m has a poorly developed colour banding that may represent bedding, striking at 015° magnetic.

15) 65.3m (exposed width) of finely bedded black siltstone/shale. The bottom contact is faulted with up to 2cm of grey pug developed. The basal 12m is very silicified and net vein fractured, with quartz fracture fill. There is strong alteration in places to a sericite schist, which looks similar to sericitised tuff, but can be traced into siltstones. The sediments strike at 170°-190° magnetic and dip at 70°-80° north-west. There are minor (<2m) developments of acid tuffs.

16) 3m of sericitised lithic lapilli tuff. Near the lower contact with Unit 15 are some fragments of siliceous black siltstone.

17) 18m of massive acid volcanics, a felspar porphyritic rhyolite, containing <2% disseminated pyrite.

Poor outcrop above Unit 17 does not enable a complete section to be described. However, 10m above Unit 17 there is 3m of very siliceous (cherty) sediments and grey shales, overlain in turn by a limonitic, very weathered acid tuff.

In costean 2340S, Units 2 to 8 are present, but above Unit 8 is a thin porphyritic andesite, iron and manganese stained. This in turn is overlain by a quartz eye volcanic rock, probably a quartz felspar porphyry. From descriptions by Hopwood (4) this rock would be a normal quartz felspar porphyry, consisting of a massive yellow green

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quartzofelspathic groundmass containing glassy quartz phenocrysts (1 to 10mm). This rock type is common along the 2340S access track, and along the 2540S access track, overlying the siliceous pyritic zone exposed in the western costeans.

Units 1 to 3 are exposed in the western end of costeans 3350S and 2950S, thus giving a strike length of at least 1000m. It is not clear what happens to Unit 15, the silicified siltstone/shale. This unit is thought to be on the eastern limb of the syncline, but there is a significant difference in strike between it and Unit 6. This change in strike is also evident in the volcanic units above Unit 6, mainly evidenced by flow banding, contacts and poorly bedded tuffs. The same change in strike is also evident in costean 2340S in the volcanics above Unit 6. It would then appear to be a primary feature, possibly caused by folding or subsidence after the deposition of Unit 6, and a different source area for the overlying volcanics.

At the northern end of East Chester, in the original EAB grid, there are two distinct units of pyritic black siltstones/shales. The lower unit is exposed in an old costean on line 1500ft S. In this costean the andesitic unit is more tuffaceous and dacitic, with the typical weathering pattern, and iron and manganese staining. These are overlain by a thin massive, blocky, quartz eye volcanic. This unit is about 10m thick and is overlain in turn by a pyritic black shale, well bedded, poorly cleaved, which strikes 198^{o} magnetic and dips 70^{o} to the west. This unit is also seen on the main road, at the junction of the East Chester road, where it is only a few metres thick. Above these shales on the main Chester road, are approximately 200m true width of acid volcanics, tuffs and lavas. They are mainly quartz felspar crystal tuff, possibly reworked and poorly bedded in part. Thin section analysis (TA986) taken at the intersection of the EAB baseline and the main Chester road, describes an altered porphyritic dacite, with discontinuous/irregular quartz veinlets carrying patches of fine grained chlorite. Another thin section analysis (TA987) taken about 80m west of TA986, is a pervasively altered vitric tuff, probably an ignimbrite.

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A sequence of black siltstones/shales, with a true outcrop width of approximately 80m, is exposed on the main Chester road, stratigraphically above the acid volcanics described above. This sequence consists of grey to black, well bedded, weakly sheared siltstones and shales, with possibly some tuffaceous interbeds. Poorly developed load casts give a west facing, coincident with the observed dips. Overall strike is about 210° magnetic, with a dip of 60° to 80° west. The sediments are overlain by, and interdigitate with, coarse porphyritic rhyolite rocks, possibly tuffs. The sequence is obscured to the west by thick glacial overburden.

These two shale units are correlated with the Unit 6 and Unit 15 shales in costean 2540S. However, there is an obvious displacement and change in strike, and this is thought to be due to faulting.

The west limb of the Burns Creek syncline is exposed along the main Chester road, east and west of the Silver Falls road intersection, in the 2540S access track, and in the western costeans. The evidence for this west limb is rather tenuous, based on limited structural data and "best-fit" regional structures. The dominant feature of this area is the presence of some base metal sulphides associated with variably silicified sericitic lapilli tuffs.

Mapping of the road exposure has failed to reveal any true shale horizons comparable to those in the east limb of the syncline. Between the Silver Falls road and the Pinnacles base line, the sequence is essentially tuffaceous, with crystal tuffs and ash flow tuffs being dominant, usually altered to sericite schist. There are some silicified shale fragments in one zone, vaguely orientated about magnetic north. The overall bedding (?) of these rocks dips east from 70° to 80°.

The sulphide bearing unit, fortuitously exposed in the 2540S access track, about 20m from the junction of the track with the main Chester road, is underlain by very altered sericitic quartz felspar crystal tuff. The mineralised unit is characterised by silicification, and the presence

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of some base metal sulphides with the more strongly silicified parts. The host rock is a sericitic acid tuff, usually a lapilli tuff, or fine agglomerate. Pyrite is present throughout, and minor sphalerite, galena, barite and chalcopyrite is present in three separate very siliceous zones. The best value of rock chip sampling (T6723) gave, over 40cm, 0.15% Cu, 0.11% Pb, 4.55% Zn, 14.4% Ba and 17.8 ppm Ag.

Short, cross-strike costeans were excavated along strike from the exposure on the track, to attempt to trace the mineralised zone, (TAS/2/1614). The amount of base metal sulphide decreases significantly, but the zone of silicification increases in width to approximately 90m. The individual, strongly silicified units continue to the south, occasionally with traces of sphalerite and galena associated with quartz veinlets. In itself this zone is not of economic importance, but it does provide evidence that mineralising fluids were available at this horizon. This zone probably represents a proximal facies, and it remains to test along strike to the north and north-east for any massive concentration of sulphides in the distal facies.

The mineralised silicified zone is directly overlain to the east by a thick, massive quartz felspar porphyry. The contact is visible in the access track and in costeans 2, 3, 4 and 6. The porphyry can be mapped along the 2540S access track, almost as far as the 2540S costean. This massive intrusive (extrusive?) would have a significant effect on the local structure of the area. There is no evidence of any fragments of adjacent rock types in the porphyry that could be related to assimilation. It probably intruded the country rock as a homogeneous mass, causing severe disruption. This may account for the drastic change in strike of the Unit 15 sediment in costean 2540S, where there is quartz felspar porphyry exposed on the 2340S access track.

Recent comments by Govett indicate that the quartz felspar porphyry is probably an extrusive lava, similar in all respects to those associated with many of the New Brunswick volcanogenic base metal deposits. This provides another favourable parameter for this target horizon.

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5.3. Local Structural Geology

Within the Chester Grid (EAD) area, the Primrose Pyroclastics dip and face east, and young from west to east; this probably represents the western flank of a synclinorium as proposed by Perkin (1). The strike of the rocks is approximately north-south, with a thinning of the sequence at the southern end. At the northern end of the grid, the strike changes to north-easterly through the East Chester grid area, (TAS/2/1555).

The structural sequence through the East Chester-Pinnacles grid areas from south-east to north-west is as follows:

1) Western limb of a major synclinorium.

2) East Chester Anticline: along the strike of the EAB andesites, plunging north-east.

3) Burns Peak Syncline: plunging north-east, pinching out south westwards against the Pinnacles Anticline. Tightly folded and sheared at south end.

4) Pinnacles Anticline: a very tight primary feature, affected by Tabberabberan Orogeny. Can be traced to the south of Pinnacles, but not into the Chester area.

5) Que Syncline: plunging northwards to where both limbs are evident.

6) Owen Shear: a thrust (?zone) with a shallow dip to the east of 35° to 40°.

It appears that the East Chester Anticline and the Burns Peak Syncline pinch out to the south-west against the Pinnacles Anticline; and the Que Syncline is truncated by the Owen thrust. It is suggested that both the Que Syncline and the Burns Peak Syncline were intravolcanic basins, as evidenced by the significant development of black shales and siltstones. East-west compression during the Lower Devonian Tabberabberan Orogeny caused tight folding in parts of these basins, with the Pinnacles Anticline acting as a competent buffer.

The Owen shear is possibly related to the same period of folding, but appears to have been a late

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phase, as it truncates Tabberabberan structures in the Rosebery Group and the Primrose Pyroclastics.

Previous regional mapping indicates significant thicknesses of black shales and siltstones to the north-east in the Bulgobac area. These are probably part of the sequence in the Burns Peak Syncline, and possibly stratigraphically higher in the sequence. However, this will require confirmation in future mapping programmes in the area.

6. GEOCHEMISTRY

All grid lines in the three grid areas have been geochemically sampled. The standard procedure has been to sample the A^{o} soil horizon and this has been discussed in section 4.4.

In order to obtain meaningful, useful results from the data, all results have been processed by the VSTAT computer programme. The statistics have been utilised in separating out the various populations for each sampling programme. Contour plans have been prepared for each individual grid area, and for the total area at 1:10 000. The method used to separate the populations was to plot cumulative frequency curves of the log transformed data, and graphically plot the break points in the curve. These break points represent the limits of each population.

6.1. Pinnacles Grid (EAA)

The Pinnacles data has been adequately covered in Preussag Reports Tas/8 and Tas/9. It is contended here that the A^{o} sampling programme in Pinnacles has not proved to be a guide to mineralisation, due to the contamination caused by cultural effects. The weakly anomalous metal values on the eastern side of the grid can probably be related to the sedimentary units at the core of the Burns Peak Syncline, (TAS/2/1588, 1589, 1590, 1591).

6.2. East Chester Area (EAB)

The original EAB grid, from baseline 00S to 1630S, was sampled at the B horizon for copper, lead and zinc. Anomalous values are as follows: (Tables 2, 2(c))

Cu: >8 ppm; Pb: >40 ppm; Zn >80 ppm.

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When these values are contoured, they show three distinct zones. These zones can be correlated with the sedimentary facies within the andesites. Costeaning was carried out to test these anomalies and exposed the shales, siltstones, sandstones and andesites described in section 5.2.3.

The bulk of the EAB grid, lines 1530S to 3950S, has been sampled on the A^{o} horizon. Two sampling programmes have been undertaken, the central part of the grid in 1976, and the east and west extensions in 1978,

The 1976 data produced three distinctly anomalous zones in copper, lead and zinc. These anomalies were tested by costeaning on line 3350S:1100W-1400W, line 2950S:1000W-1380W, line 2750S:460W-1060W. The geology and rock chip geochemistry from these costeans are presented as plans at 1:500. The high values are all associated with the andesite, particularly where it has strong iron/manganese alteration. The costean geochemical results confirm the soil geochemical results. The geochemical statistics are presented as tables, (Tables 2, 2(a), 2(b)).

The 1978 data produced a different set of statistics (see Table 2(c)), and have been plotted accordingly. No plans were available at the time of writing this report, but geochemical profiles have been hand plotted to try and relate the geochemistry to the geology. On the western extensions anomalies can be outlined as follows: (Tables 1700, 1701, 1702, 1703, 1704)

1930S:	Weak	Pb, Zn	1460W-1600W
2130S:	Weak	Cu, Zn	1500W
2130S:	Weak	Pb, Zn, Ba	1800W
2340S:	Moderate	Pb, Zn	1020W-1040W
2340S:	Moderate	Pb, Ba	1380W-1400W
2540S:	Moderate	Zn, Ba	1340W-1480W
2750S:	Moderate	Cu, Zn	1040W-1140W
2750S:	Weak	Zn, Cu, Ba	1260W-1440W
2950S:	Weak	Ba	1420W-1440W
2950S:	Weak	Ba	1620W-1740W
3150S:	Weak	Pb, Zn	1420W-1500W

The responses on lines 1930S and 2130S can be discounted due to their occurring over glacial overburden.

The 2340S anomalies can be related to subcropping

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siliceous black shales, subsequently exposed in costeaning.

The 2540S anomalies are also related to the Unit 15 black siltstones exposed in costean 2540S, with the barium giving the most pronounced response. This was confirmed in the chip sampling of the costean.

Siliceous black shales also subcrop on line 2750S at 1400W, with a related weak zinc, copper and barium anomaly. Also on 2750S, the eastern anomaly is related to underlying andesite.

The weak barium response on 2950S, 1620W to 1740W, occurs on the steep western flank of Burns Peak, where there is very shallow soil cover.

The weak response at the east end of the 3150S west extension line is probably related to the black shales above the sedimentary tuffs.

The eastern extensions of the EAB grid were A^{0} sampled, but subsequent mapping of the grid showed most of the grid to be glacial covered. Occasional spotty, slightly anomalous, copper and zinc values are present but are not regarded as significant.

Costeans 2540S and 2340S were excavated to test IP anomalies and geochemistry. The costeans were chip sampled after the sampling interval had been marked out in relation to the lithology. The chip samples consisted of about 10-12 rock chips taken at regular intervals within the sample interval. It was decided that this would give sufficiently representative results of background values, and was quicker than doing full channel sampling. The geology and geochemical results are presented as a 1:500 scale plan (TAS/2/1613).

The Unit 3 and Unit 6 sediments give fairly normal background values for shales and siltstones. Cu ranges from 5-40 ppm, Pb: 35-245 ppm, Zn: 20-55 ppm and Ba: 220-380 ppm.

The Unit 15 silicified shales gave elevated values for all elements: Cu: 10-385 ppm, Pb: 50-425 ppm, Zn: 10-510 ppm, Ba: 740-3100 ppm.

Values within the andesite were of a high background for copper, lead and zinc. The acid volcanic units

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TABLE 1 (a)

PINNACLES (EAA) GRID: 1978 A° GEOCHEMISTRY

ELEMENT POPULATIONS

Cu	<8	8 - 15	16+	
Pb	<35	35 - 79	80+	
Zn	<20	20 - 79	80 - 219	220+
Ba	<70	70 - 129	130 - 199	200+

TABLE 2

EAST CHESTER (EAB) IMPERIAL GRID: 1973 IMPERIAL GRID GEOCHEMISTRY

STATISTICAL SUMMARY

Element	No. of Values	Range Low	Range High	Mean	Standard Deviation	Variance	Coefficient of Variation
Cu	541	2.0	42.0	5.87	6.45	41.57	1.10
Pb	541	5.0	740.0	34.82	67.92	4613.36	1.95
Zn	541	2.0	370.0	27.02	38.20	1458.99	1.41

CORRELATION COEFFICIENTS

Cu	1.00		
Pb	0.44	1.00	
Zn	0.62	0.63	1.00
	Cu	Pb	Zn

TABLE 2 (a)

EAST CHESTER (EAB) METRIC GRID: 1976 Ao GEOCHEMISTRY

STATISTICAL SUMMARY

Element	No. of Values	Range Low	Range High	Mean	Standard Deviation	Variance	Coefficient of Variation
Cu	708	0.0	62.0	9.05	9.51	90.40	1.05
Pb	708	8.0	1150.0	52.76	90.36	8164.35	1.71
Zn	708	2.0	1200.0	56.10	123.85	15340.06	2.21
Ba	708	30.0	750.0	138.26	84.10	7072.26	0.61
Hg	708	0.0	230.0	65.45	49.11	2411.89	0.75

CORRELATION COEFFICIENTS

Cu	1.00				
Pb	0.45	1.00			
Zn	0.39	0.22	1.00		
Ba	-0.05	0.15	-0.03	1.00	
Hg	0.43	0.25	0.31	-0.14	1.00
	Cu	Pb	Zn	Ba	Hg

TABLE 2 (b)

EAST CHESTER (EAB) METRIC GRID EXTENSIONS: 1978 A° GEOCHEMISTRY

STATISTICAL SUMMARY

Element	No. of Values	Range Low	Range High	Mean	Standard Deviation	Variance	Coefficient of Variation
Cu	461	0.0	30.0	4.08	3.56	12.69	0.87
Pb	461	2.0	780.0	28.08	51.64	2666.78	1.84
Zn	461	4.0	785.0	36.51	69.78	4868.75	1.91
Ba	458	10.0	3200.0	127.87	226.16	51150.00	1.77
Mn	461	5.0	1540.0	38.56	106.46	11333.68	2.76

CORRELATION COEFFICIENTS

Cu	1.00				
Pb	0.39	1.00			
Zn	0.53	0.39	1.00		
Ba	0.13	0.33	0.09	1.00	
Mn	0.24	0.66	0.30	0.19	1.00
	Cu	Pb	Zn	Ba	Mn

TABLE 2 (c)

ELEMENT POPULATIONS: EAST CHESTER (EAB)

1. 1973 IMPERIAL GRID DATA

Cu	<8	8 - 20	21 - 33	34+	
Pb	<8	8 - 39	40 - 199	200 - 499	500+
Zn	<22	22 - 79	80 - 149	150 - 249	250+

2. 1976 METRIC GRID DATA

Cu	<6	6 - 19	20 - 39	40+	
Pb	<20	20 - 54	55 - 149	150 - 549	550+
Zn	<13	13 - 44	45 - 274	275 - 649	650+
Ba	<55	55 - 79	80 - 249	250+	

3. 1978 METRIC GRID EXTENSIONS DATA

Cu	<6	6 - 17	18+	
Pb	<10	10 - 64	65 - 299	300+
Zn	<25	25 - 99	100 - 399	400+
Ba	<65	65 - 999	1000+	
Mn	<30	30 - 99	100 - 249	250+

TABLE 3

CHESTER (EAD) GRID: TOTAL GRID A° GEOCHEMISTRY

Element	No. of Values	Range Low	Range High	Mean	Standard Deviation	Variance	Coefficient of Variation
Cu	4635	0.0	170.0	6.31	9.43	88.90	1.49
Pb	4635	0.0	3100.0	28.45	59.26	3511.93	2.08
Zn	4635	0.0	1900.0	28.40	79.73	6356.54	2.81
Ba	4634	0.0	8400.0	140.70	219.61	48228.67	1.56
Hg	1559	0.0	2200.0	90.50	106.45	11331.73	1.18
Mn	2710	0.0	9999.0	259.21	1031.68	1064368.80	3.98
Fe	141	110.0	9999.0	2317.18	3199.36	10235890.00	1.38

CORRELATION COEFFICIENTS

Cu	1.00						
Pb	0.39	1.00					
Zn	0.25	0.33	1.00				
Ba	0.32	0.23	0.09	1.00			
Hg	0.13	0.10	0.02	0.09	1.00		
Mn	0.26	0.28	0.12	0.21	0.03	1.00	
Fe	0.06	0.12	0.02	0.06	0.13	0.20	1.00
	Cu	Pb	Zn	Ba	Hg	Mn	Fe

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TABLE 3 (a)

CHESTER GRID (EAD): TOTAL GRID A^{0} GEOCHEMISTRY

ELEMENT POPULATIONS

Cu	<7	8 - 34	35 - 84	85+	
Pb	<20	20 - 69	70 - 169	170 - 599	600+
Zn	<20	20 - 79	80 - 399	400 - 1199	1200+
Ba	<80	80 - 519	520 - 1299	1300+	

variations in absolute values.

The results are presented on 1:2500 profiles for comparison, (TAS/2/1609, 1610, 1611).

7. GEOPHYSICS

7.1. Ground Magnetic Surveys

Surveys were completed over the northern part, and the three northern extension lines (2300N, 2800N and 3100N) of the Chester grid (EAD), and over all of the East Chester grid extensions (TAS/2/1571).

7.1.1. Chester Grid (EAD)

The results have been plotted as stacked profiles (TAS/2/1602, 1603), and the major feature is the distinct lack of response in the Primrose Pyroclastics, and the fluctuating response within the sediments of the Rosebery Group to the west of the Owen Shear.

The Rosebery Group responses cannot be related to any specific rock type in the sequence. It is assumed that the fluctuating responses are related to varying lithologies, and do not necessarily represent a significant anomalous zone.

Within the Primrose Pyroclastics there are three recognisable weakly anomalous zones (TAS/2/1602, 1603) referred to as A, B and C.

Anomaly A is seen on lines 2800N and 2300N, with a peak value of 62 580 nT at 2800N:280W over a background of 62 500 nT. It is probably related to an andesite/dacite unit within the sequence, and is thus of little significance.

Anomaly B is a long, well defined zone with an amplitude varying from 115 nT above background (62 500 nT) on line 1900N, to 370 nT above background on line 2000N. It is on the eastern margin of this part of the grid, just to the west of the baseline. The linearity of the anomaly and its cross cutting nature across the stratigraphy, indicates that it is a tectonic or structural feature, subparallel to the Owen Shear

probably caused by the andesites being out or being faulted off

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900m to the west. The anomaly abruptly disappears between 1800N and 1600N, and this may indicate a cross strike structure, probably a fault. Previous geophysical work by Rio Tinto Exploration in the vicinity of the Chester Mine, indicated a cross cutting feature to the north of the Mine, and striking west-north-west to east-south-east. This feature could be the cause of the disappearance of Anomaly B at its southern end.

Anomaly C is a small indistinct feature within the Primrose Pyroclastics. It is best defined on line 600N:360W-500W, with a peak of 100 nT above background. It appears to correspond to a weakly mineralised sericitic tuff exposed on the 400N costean access track. The anomaly is present on 400N, but is more diffuse and extensive. It corresponds to an A^{O} geochemical anomaly that was tested by costeaning. A significant concentration of manganese was exposed in the costean, with associated ferruginous material (see section 5.2.1.). The magnetic response over this material is very weak, up to 60 nT above background, and is probably a function of the strong Mn/Fe development in the overburden.

7.1.2. <u>East Chester Grid (EAB)</u>

This grid presents a rather complex magnetic picture (TAS/2/1615), but the area can be roughly subdivided into two major zones. The western non-responsive zone presents a flat, relatively low response, with a background of approximately 62 600 nT. The eastern zone, approximately east of 500W, is noisy with recognisable definite anomalous areas. Five anomalous zones have been outlined: A, B, C, D and E.

Anomaly A is quite distinctive, with a finite strike length of +400m, from 2750S:600W-800W to 3150S:500W-740W. The anomaly stops abruptly north of 2750S, after giving a well defined sharp anomaly of 500 nT above background at 2750S:720W. The southern end of the anomaly is less well defined with a subdued peak of 150 nT above background on line 3150S. There is still some response along strike on 3350S, but this is probably noisy background. The anomaly is

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produced only background values for all elements, except the Unit 11 agglomerate which contained elevated barium, up to 1800 ppm.

The results indicate that the Unit 15 sediments may represent the most favourable target horizon, since it contains evidence of above average supplies of base metal ions.

The 2540S western costeans (TAS/2/1612) were chip sampled, again on a lithological basis, to obtain the base metal values present in the silicified, weakly mineralised tuffs along strike from the mineralised material exposed in the access track. The best value is in costean 3, 1m (38-39m) of 1200 ppm Cu, 1300 ppm Pb, 2100 ppm Zn and 400 ppm Ba. The remainder of the values were disappointing, usually only giving background values in all elements. It is noticable that barium gave several anomalous values, particularly on the eastern side of the zone, e.g:

Costean 2	X-cut track	33m - 38m	3400 ppm	Ba
Costean 3		23m - 26m	1100 ppm	Ba
Costean 4		16m - 19m	1.6%	Ba
Costean 5		8m - 11m	1.0%	Ba
Costean 6		45m - 50.8m	7800 ppm	Ba

Very high barium values were present in the chip sampling along the access track, up to a maximum of 33%. It appears that this zone has a high barium background, possibly related to the high barium sediments of Unit 15 in costean 2540S.

6.3. Chester Grid (EAD)

All of the EAD grid has been sampled at the A^o horizon. From the contoured results there are six distinctly anomalous zones evident, and each is described individually, (TAS/2/1572 to 1581).

Zone 1

This zone occupies the extreme western edge of the grid, and is best defined by copper values. The lead values are more diffuse, but the zone can be recognised as a distinct entity. Zinc is a bit more patchy, but is still recognisable as a distinct zone. The zone correlates with the

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subcropping Rosebery Group sediments to the west of the Owen Shear, and coincides with the steep eastern slope of the Marionoak valley. The anomalous zone is a function of both these features, as soil cover is very poorly developed on this slope, with bedrock being very shallow. The samples in the majority of cases would be almost C horizon samples, with the remainder representing B horizon. The zone does not represent a favourable target for base metal sulphide deposits.

Zone 2

This zone occurs on grid lines 400N:600W-800W, 500N: 500W-800W, 600N:400W-800W, and can be traced northwards on two prongs to line 900N. All elements, copper,lead,zinc, barium and manganese, outline the anomalous zone. The manganese values are very high, with several values of greater than 1%. A costean was excavated across this zone to test the source of the anomalies. A glacial filled valley was exposed, which in turn was covered by manganese rich sandy clays. Channel sampling of the costean gave a best sample value of 590 ppm Cu, 280 ppm Pb, 1850 ppm Zn 1200 ppm Ba and 11.0% Mn. It is apparent that the above background base metal values are associated with the high manganese. This would also be the relationship within the A^{O} sampling.

Zone 3

This zone occurs in the south-west of the grid area, extending northwards from line 1000S:130W-360W, to line 400S:320W-600W. There is no outcrop in this part of the grid, but float mapping indicates that it overlies a tuffaceous part of the Primrose Pyroclastics. Extrapolation of the geology from the Pieman River and the Hydro-Electric Commission road, indicates that this geochemical zone may be related to Unit 2 of Perkin. This unit of tuffaceous shales is known to contain base metal sulphides where it outcrops on the Pieman River. No detailed exploration has been carried out over this zone, but further work will be recommended.

Zone 4

This is a broad zone of anomalous lead, zinc, copper and barium, extending northwards from 400S: 600E-800E to 300N:500E-800E. The topography

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associated with the zone is quite severe, with a very steep south-east facing slope. The Hydro-Electric Commission road has exposed substantial scree filled gullies, often with strong manganese development. It is thought that the base metal anomalies are due to scavenging by exotic manganese. The zone was intensively tested by diamond drilling as the anomalies are about 1km south of the Chester Pyrite Mine, and it was obviously thought that they may have represented a base metal enriched facies of the Mine horizon.

Zone 5

This is a broad anomaly centred on the Chester Pyrite Mine. The anomaly is not considered significant due to the obvious contamination from the Mine workings. As the Mine is situated near the top of a very steep, east facing slope, any base metals would be easily transported down slope from the Mine, and be concentrated near the base of the slope.

Zone 6

Is a restricted zone anomalous in copper, zinc, barium and manganese. It extends from 1500N:1400E-1600E to 1400N:1400E-1600E and occurs adjacent to the old Chester tramway, and on the west slope of Chester Creek. The anomaly has not been tested in detail as there is no other associated feature that indicates it is a favourable target. The very high manganese values indicate it is possibly a scavenging effect of the exotic manganese, akin to Zone 4.

Three test traverses of hand auger drilling were completed on Zone 2 as follows:

200N: 600W - 860W (20m intervals)
400N: 500W - 900W (20m intervals)
600N: 400W - 900W (10m intervals 400W-800W, then 20m intervals)

Each auger hole was drilled as deep as possible, usually to bedrock, with the intention of sampling the C horizon in order to compare the absolute and relative values of the A^o and C horizon soils. Comparison of the A^o and C horizon values shows reasonable correlation, but with significant

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TABLE 1

PINNACLES (EAA) GRID: 1978 A^{o} GEOCHEMISTRY

STATISTICAL SUMMARY

Element	No. of Values	Range Low	Range High	Mean	Standard Deviation	Variance	Coefficient of Variation
Cu	153	0.0	21.0	3.80	3.43	11.77	0.90
Pb	153	5.0	101.0	22.19	15.70	246.51	0.71
Zn	153	10.0	405.0	54.86	78.64	6184.44	1.43
Ba	153	20.0	300.0	63.79	43.57	1898.89	0.68
Ag	153	0.0	0.2	0.0	0.02	0.0	9.20

CORRELATION COEFFICIENTS

Cu	1.00				
Pb	0.42	1.00			
Zn	0.48	0.39	1.00		
Ba	0.06	0.46	-0.00	1.00	
Ag	-0.00	0.40	-0.00	0.24	1.00
	Cu	Pb	Zn	Ba	Ag

situated within the andesite unit, on the eastern limb of the anticline. Costean 2750S has crossed the anomaly, with no obvious cause for the anomaly being seen in the bedrock. The rock is porphyritic, vesicular, flow textured andesitic lava. The anomaly is unexplained, but must be related to some feature in the andesites at depth. or the andesite itself

Anomaly B is recognised on three lines, each 400m apart, giving a strike length of +800m. The northern end is open due to lack of grid lines for surveying, and the anomaly is not evident south of line 2750S. Line 1930S gives the best responxe of 64 080 nT over a background of 62 600 nT, at 060E. The anomaly has an apparent width of 300m. On the basis of recent geological mapping, the anomaly is associated with the rhyodacitic tuffs and lavas immediately above the andesites. There is nothing in the outcrop along the East Chester road that can be seen to be the cause of the anomaly.

Anomaly C occurs on two adjacent lines, 3150S and 3350S, immediately overlying the eastern contact of the andesites. Outcrop is non-existent, but bedrock is interpreted as being acid crystal tuffs, rhyodacitic lavas and trachyandesite lavas. There is no obvious source of the magnetic anomaly, which has a peak value of 63 600 nT over a background of 62 600 nT.

Anomaly D is possibly an extension of Anomaly B, and is present on lines 3550S:080E-300E and 3950S:180E-400E. It occurs over an area of complete glacial overburden, so it cannot be related to any definite geological feature. It is probably related to a unit of acid tuffs and lavas, probably the same unit causing the Anomaly B response.

There are also some unrelated anomalies which have no apparent strike extent, which represent a small finite source. Line 2130S:240W-500W gives a peak of 63 280 nT at 270W. This response occurs over glacial overburden, but is interpreted as being within the andesites near the eastern contact, and along strike from the interbedded sedimentary units exposed in costean 55S on the original EAB grid.

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On line 3550S, there is a distinct magnetic zone from 440E-660E, occurring over glacial overburden. It is probably related to some feature within the acid volcanic sequence.

A significant feature of the ground magnetics in EAB is the lack of response in the western portion of the grid. The interbedded sediments and acid volcanics west of the andesites have no magnetic response. It was hoped that the ground magnetics would have differentiated between the lithologies and thus be useful as a mapping tool.

7.2. Self Potential Surveys

7.2.1. Pinnacles Grid (EAA) — not enclosed.

Two Self Potential traverses were completed at Pinnacles, one on line 600S, the other on line 2000S.

The 600S traverse was designed to test for any distinctive response from a moderate amplitude Induced Polarisation anomaly in an area of complete soil cover. The only definite response is from 1060W-1140W, with a low value of -46 mV. This corresponds to the interpreted position of the northern extension of the Pinnacles Anticline.

The 2000S traverse was designed to test for any response from the sediments at the southern end of the Burns Peak Syncline. There is a definite drop-off in values west of 1200W, correlating with the western edge of the sediments. Values across the sediments vary from +35 mV to +10 mV. The values across the essentially acid volcanic sequence vary from -14 mV to -80 mV. There is a "trough" of lowest values from 1300W-1340W, corresponding to the Pinnacles Peaks which are on the axis of the Pinnacles Anticline.

7.2.2. Chester Grid (EAD)

Three traverses were completed in this grid area to test for any response that may be associated with significant geochemical anomalies, (TAS/2.1608)

Traverse 500N:300W-1000W tested the Zone 2 geochemistry anomaly and the ground magnetic Anomaly C. No distinctive Self Potential

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response can be related to either of these two features. A zone of low values (-43 mV) from 300W-400W occurs east of the magnetic zone, but cannot be related to any geological feature.

Traverse 1200N:500E-1180E was designed to test for any response along strike from the Chester Pyrite Mine. Only a very weak, -30 mV, response at 680E is evident, but is not significant enough to be interesting. why not?

Traverse 1800N:600W-1140W was designed to test for any response associated with significant geochemical values within the sediments west of the Owen Shear. No Self Potential anomalies are present, but the overall profile appears to separate into responses from sediments and responses from acid volcanics; the boundary being indicated at about 840W. The geological interpretation places the contact at 900W and the discrepancy is probably due to the shallow east dipping Owen Shear.

7.2.3. East Chester Grid (EAB)

A comprehensive Self Potential survey was completed over the western part of the EAB grid. The purpose of the survey was to test for anomalies that may represent mineralisation, and for use as a mapping tool in areas of glacial overburden.

The most significant feature is a narrow, very low response from the base of the black pyritic mudstones of Unit 6. The best response from this feature is on line 2540S, with a maximum of -304 mV at 1115W. The zone is from 1090W to 1120W and is very well defined. The same feature, but with a peak of -145 mV, is present on 2340S:1000W-1030W, again associated with the base of the Unit 6 sediments. There is no response on 2130S where there is glacial overburden, but it is present again on line 1930S: 810W-870W with a peak of -225 mV at 850W. This zone does not continue through to 2750S, where there is evidence that the sediments are present. The response is possibly related to some feature within the sediments, but detailed geophysical interpretation is required to better define it.

A broad zone of low values is present on lines 2540S, 2340S and 2130S, immediately to the west of the previous definite response. This broad zone is best seen on line 2340S:1030W-1300W, where it can be related to a series of acid crystal tuffs and quartz felspar porphyry.

A detailed interpretation by a geophysicist will be necessary in order to fully understand the significance of the results in relation to the geology.

7.3. Induced Polarisation Surveys

A total of seven Induced Polarisation traverses were completed in the area during 1978, four at East Chester and three at Pinnacles.

7.3.1. Pinnacles Grid (EAA)

The three northern traverses, 415S, 600S and 800S, were tested by Induced Polarisation. There is one moderate amplitude anomaly (12 ms) occurring on all three lines, located at:

415S: 1620W
600S: 1680W
800S: 1740W

The source appears to have greatest width (20-60m) on line 600S, and lies less than 25m subsurface. The chargeability anomaly has no distinctive correlating resistivity anomaly. The anomaly has a strike coincident with the east limb of the Que Syncline, and is approximately on strike from a pyrite black shale unit exposed in a costean access track north of 415S:1500W.

7.3.2. East Chester Grid (EAB)

Four Induced Polarisation traverses were completed as follows:

2340S: 860W - 1540W √
~~2750S: 1000W - 1720W~~
2340S ~~2750S~~: 120E - 600W —
3150S: 120E - 600W √

One Induced Polarisation anomaly occurs and is evident on two lines:

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2340S: 970W - 1090W
2750S: 1210W - 1330W

On line 2340S the chargeability anomaly directly correlates with a substantial drop in resistivity (from a background of 600 ohm metres to 120 ohm metres). This resistivity anomaly is less extensive than that of the chargeability, so may not be caused by the same source. The resistivity low on line 2750S is centred at 1240W, which means it is offset slightly from the chargeability anomaly. The chargeability source must be within 20m of the surface. There is some evidence that the source dips west.

Costeaning subsequent to the Induced Polarisation survey, intersected pyritic black shales, which can be correlated with the Induced Polarisation anomaly. The sediments are up to 60m thick and dip west.

8. CONCLUSIONS

8.1. The gross stratigraphy of the area has been clarified, particularly in Pinnacles and East Chester, where substantial costeaning has exposed bedrock. The stratigraphy through the Chester grid area is still tenuous due to very poor exposure.

8.2. A structural interpretation is presented that provides a "best-fit" of presently known geology. The sequence in Chester has been confirmed as dipping and facing east. It is still possible that some faulting and folding has taken place, but the extent of it is impossible to gauge. The Pinnacles Anticline separates two intravolcanic basins, the Que Syncline and the Burns Peak Syncline. This interpretation confirms that the Pinnacles sequence to the west of the Pinnacles peaks is the east limb of the north plunging Que Syncline, and that the west limb has been truncated by the Owen Shear.

The Owen Shear is interpreted as a thrust, with an east dip of 35°-40°. It appears to truncate the stratigraphy of both the Primrose Pyroclastics and the Rosebery Group sediments to the west.

Significant faulting is invoked in East Chester to

....45

account for the substantial off-setting of correlatable units. No evidence for these faults has been seen on the ground, and they must be regarded as interpretive. They are indicated by the aeromag. data, however!

8.3. Mineralisation exposed in costeaning at East Chester is associated with a strongly silicified acid fragmental unit, overlain by a distinctive massive quartz felspar porphyry. It is interpreted as being on the west limb of the north-east plunging Burns Peak Syncline, possibly the time equivalent of the black pyritic mudstones exposed in the east limb costeans. The mineralisation is probably related to hydrothermal fluids precipitating out in unconsolidated material immediately beneath the bedrock-water interface. This would indicate that this horizon presents a favourable target along strike, where exhalative material has entered the overlying water, and any associated sulphides may have been precipitated as stratiform bodies in favourable structural and chemical traps.

8.4. Geophysical methods have not been fully utilised, due mainly to budgetry restraints. Self Potential surveys are a valid mapping tool, and should be carried out as a standard procedure. Ground magnetic surveys do not appear to be a feasible mapping tool, as there is little variation in response from the different lithological units in East Chester. However, it is a rapid test of the ground, and does give some finite responses, the cause of which need to be investigated.

Induced Polarisation is a significant exploration tool, and has successfully delineated the pyritic black shales and mudstones in East Chester. Detailed interpretation of the results in relation to the geology may outline other responses that may be due to sulphide mineralisation rather than lithological response.

8.5. A^{O} geochemical sampling appears to have been successful in East Chester in outlining zones of above background values in bedrock. It is not of itself a definitive tool for precisely locating sources of anomalies, but used as part of a total exploration programme, it is a useful technique.

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9. RECOMMENDATIONS

9.1. The East Chester grid to be extended north and east to the tenement boundary (TAS/2/). The lines should be 200m apart for the preliminary exploration, with a provision for 100m spacing for detailed follow up. A new base line should be erected for these purposes, originating at the intersection of line 1930S with the main Chester road. The grid lines should cover the original EAB grid in order to accurately tie in the previous geology. A total of about 21000m of lines will be required to adequately cover the area.

9.2. Close spaced grid lines, at 60m intervals, erected in the vicinity of the 2540S access track mineralisation, as set out by D.B. Trussell, and a detailed Induced Polarisation survey carried out to test the response of the mineralisation.

9.3. Geological mapping of all grid lines and creeks in the proposed EAB grid extensions, to try and relate the geology to that outlined in this report for the area.

9.4. A^o geochemical sampling of the grid extensions to attempt to outline any anomalous zones requiring detailed testing.

9.5. Ground magnetic surveys of the grid extensions.

9.6. Induced Polarisation surveys on the following EAB lines to test the ground magnetic responses and the interpreted strike extension of the Chester Pyrite Mine horizon:

2340S: 000E - 720E
2750S: 040W - 680E
3150S: 100E - 820E
3550S: 040W - 680E

9.7. An Induced Polarisation survey over EAD magnetic anomaly C and geochemical zone 2. Three traverses on 700N, 600N and 500N, from 200W to 920W. This will also test the response from the weakly mineralised, altered acid tuffs on the 4N access track.

9.8. Auger sampling of geochemical zone 3 at EAD to confirm the A^o response, and to obtain geological

....47

data. A limited Induced Polarisation survey should be done, say on three lines, to test for the presence of any Unit 2 sediments and any possible associated mineralisation. This could possibly be preceded by a Self Potential survey to better define the objective.

9.9. Reassess previous exploration work in the Bulgobac area of Exploration Licence 5/63, part 2. This area appears to be along strike from the Burns Peak Syncline, and is a prospective target area for massive stratabound zinc-lead sulphide deposits.

9.10. Review the Sock Creek area of Exploration Licence 5/63, part 3. This area is further along strike from East Chester/Bulgobac, with some evidence for a reversal of plunge.

9.11. Continue regional mapping using the Chester-Pinnacles-East Chester area as a base. Structural interpretation will be important in trying to confirm the presence of a specific chronostratigraphic horizon that has been shown to carry sulphide mineralisation at Pinnacles and East Chester.

D.B. Hall

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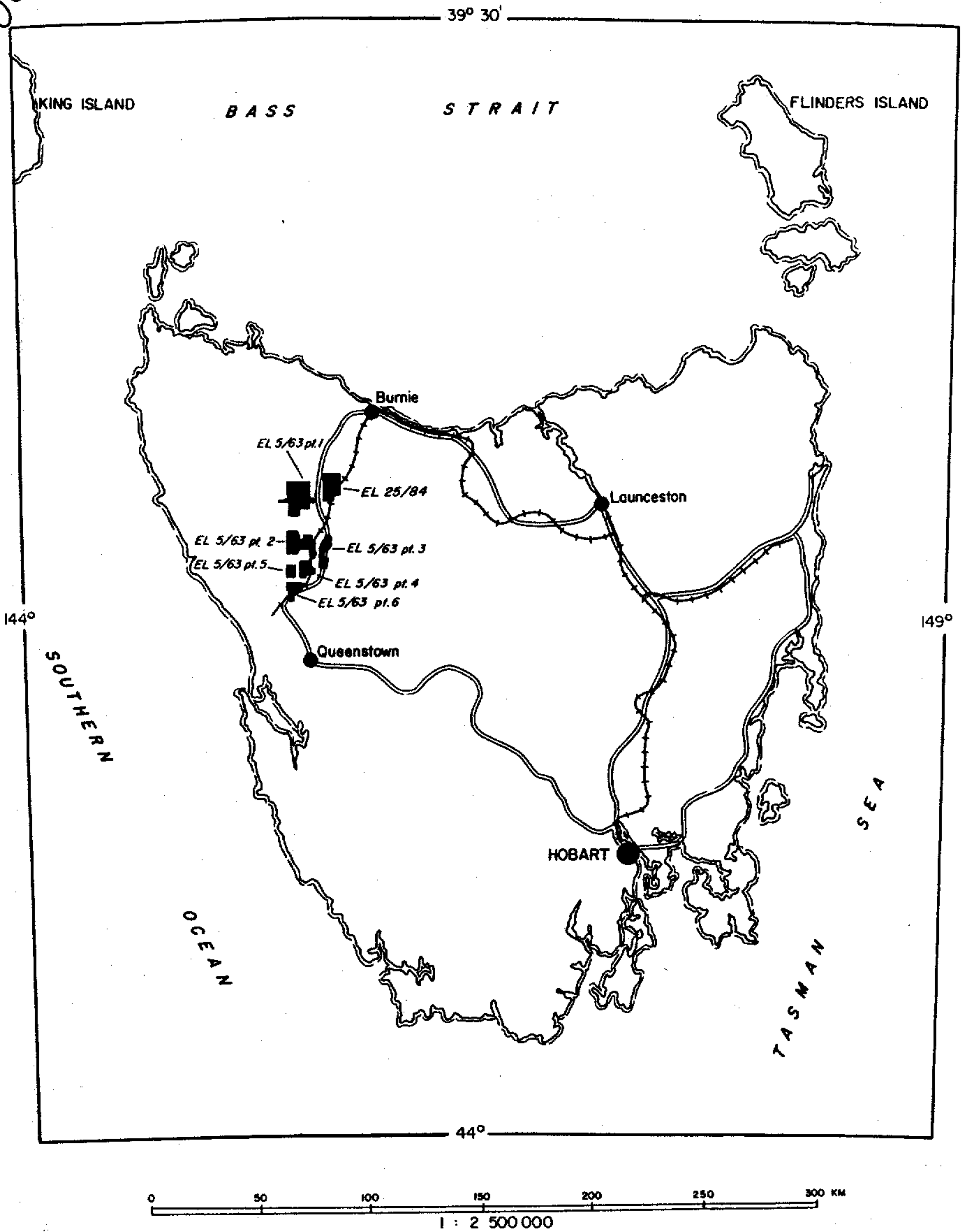
....49



133061

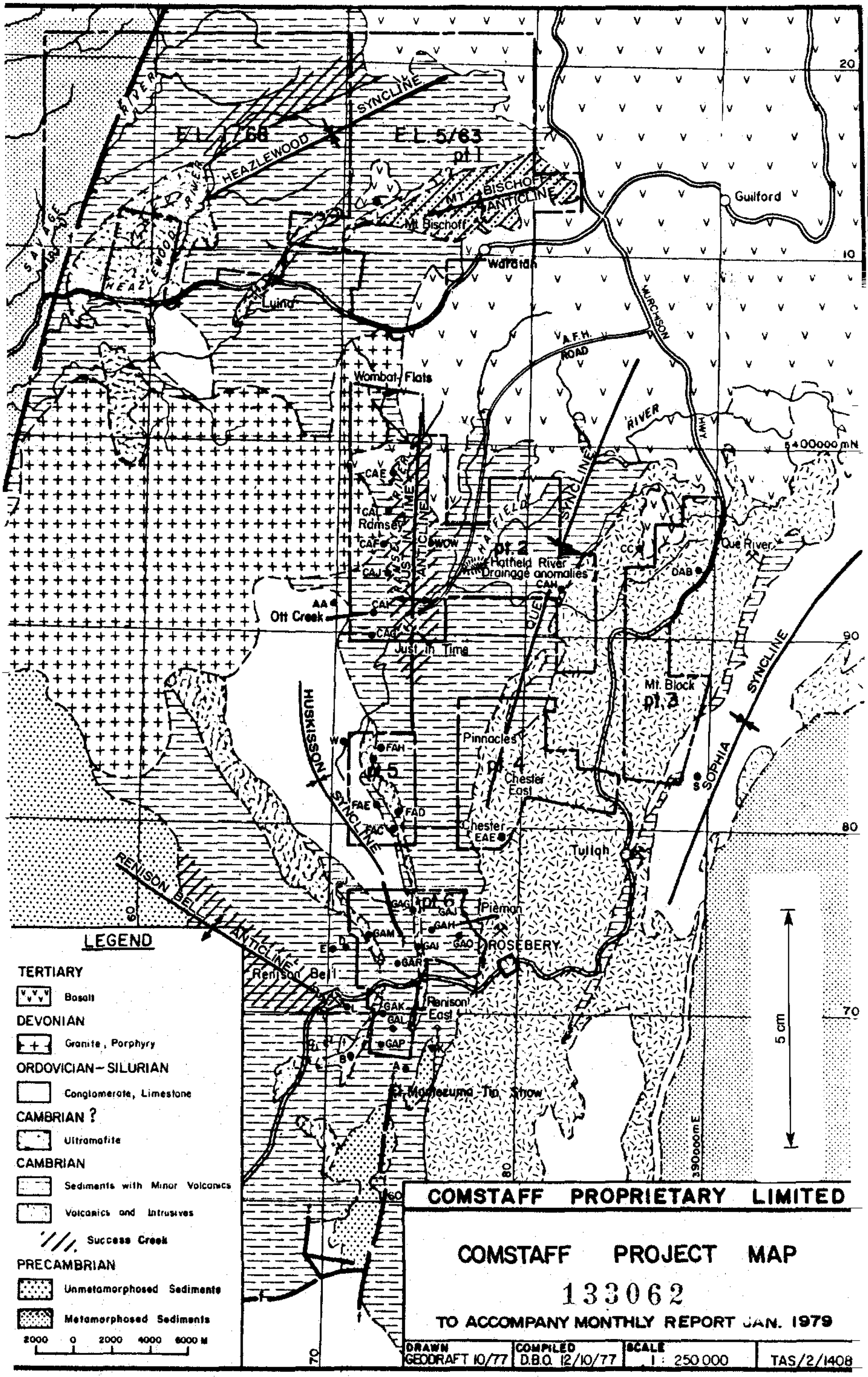
Major roads
Major railways
● Burnie Major towns
Comstaff lease areas

5 cm

COMSTAFF PROPRIETARY LIMITED

LOCATION OF COMSTAFF LEASES IN TASMANIA

DRAWN	COMPILED	SCALE	
GEODRAFT 7/78		1 : 2 500 000	TAS/2/1586


COMSTAFF PROPRIETARY LIMITED
COMSTAFF PROJECT MAP
133062
TO ACCOMPANY MONTHLY REPORT JAN. 1979
DRAWN GEODRAFT 10/77
COMPILED D.B.O. 12/10/77
SCALE 1 : 250 000
TAS/2/1408
LEGEND
TERTIARY
Basalt
DEVONIAN
Granite, Porphyry
ORDOVICIAN–SILURIAN
Conglomerate, Limestone
CAMBRIAN ?
Ultramafite
CAMBRIAN
Sediments with Minor Volcanics
Volcanics and Intrusives
Success Creek
PRECAMBRIAN
Unmetamorphosed Sediments
Metamorphosed Sediments
2000 0 2000 4000 6000 M
5 cm
E.L. 1/68
E.L. 5/63
pt 1
pt 2
pt 3
pt 4
pt 5
pt 6
HEAZLEWOOD SYNCLINE
SAVAGE RIVER
HEAZLEWOOD RIVER
MT BISCHOFF ANTICLINE
Mt Bischoff
Guilford
Waratah
Luina
MURCHISON HWY
A.F.H. ROAD
Wombat Flats
RIVER
SYNCLINE
HATFIELD
CAE
CAL
Ramsey
CAF
CAJ
CAI
CAG
WOW
Hatfield River
Drainage anomalies
CAH
Ott Creek
AA
Just in Time
JUST IN TIME ANTICLINE
QUE
Que River
CC
DAB
Mt. Block
SOPHIA SYNCLINE
HUSKISSON SYNCLINE
Pinnacles
Chester East
Chester
EAE
FAH
FAE
FAD
FAC
W
Tullah
Pieman
ROSEBERY
GAG
GAJ
GAH
GAM
GAI
GAO
GAR
Renison Bell
RENISON BELL ANTICLINE
GAK
GAL
GAP
Renison East
Montezuma Tin Show
5400000 mN
390000 mE
20
10
90
80
70
60
80
70

061

133063

INDEXED

9447
Vol 2 of 4

PROJECT NAME: APPENDIX IV

TITLE: REPORT ON EXPLORATION IN EXPLORATION LICENCE 5/63 PART 4, IN TASMANIA, AUSTRALIA

VOLUME 2

AREA NAME/S, STATE 1:250,000 SHEET NO/S & COORDINATES: Burnie Sheet S 55/3
Area centred at 378000E, 5382000N

COMMODITY/IES: Copper, Lead, Zinc

TEXT PAGES NO: 48

PLAN NOS: See Section 11

TABLE NOS: 1, 1(a), 2, 2(a), 2(b), 2(c), 3, 3(a)

APPENDICES:

AUTHOR/S: D. B. Hall

DATE: September 1978

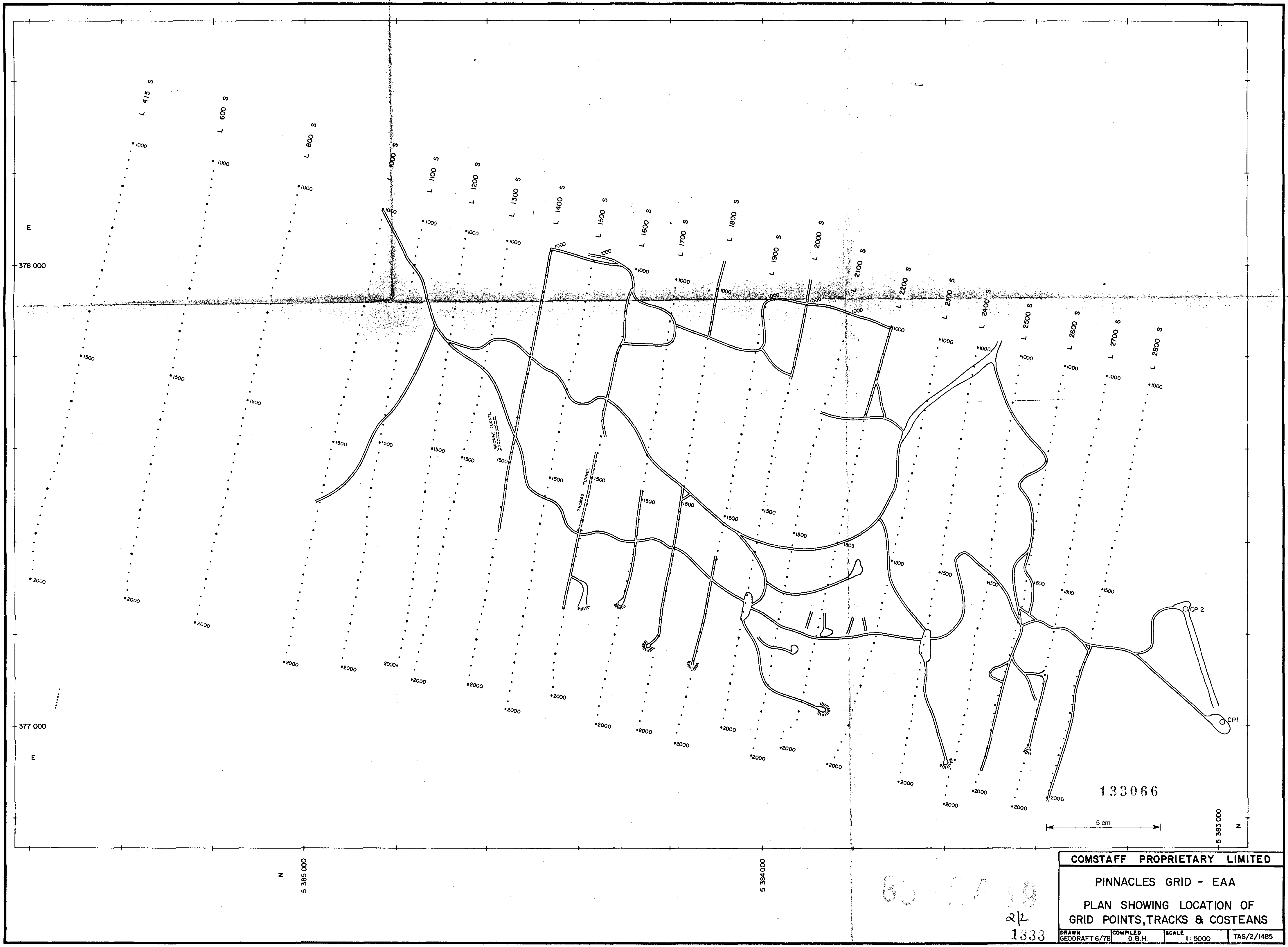
AUSTRALIAN ANGLO AMERICAN LIMITED

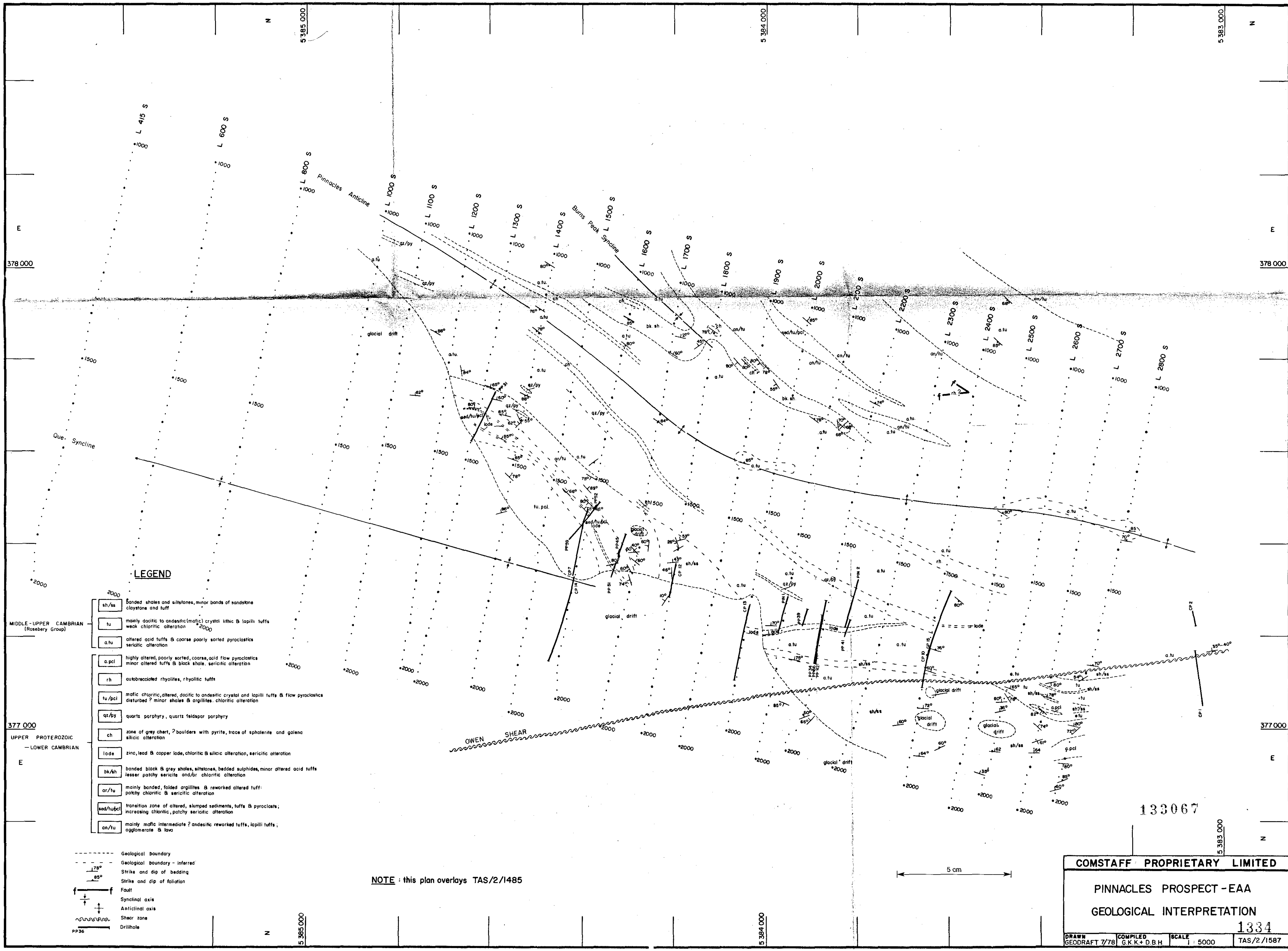
Incorporated in the State of Victoria

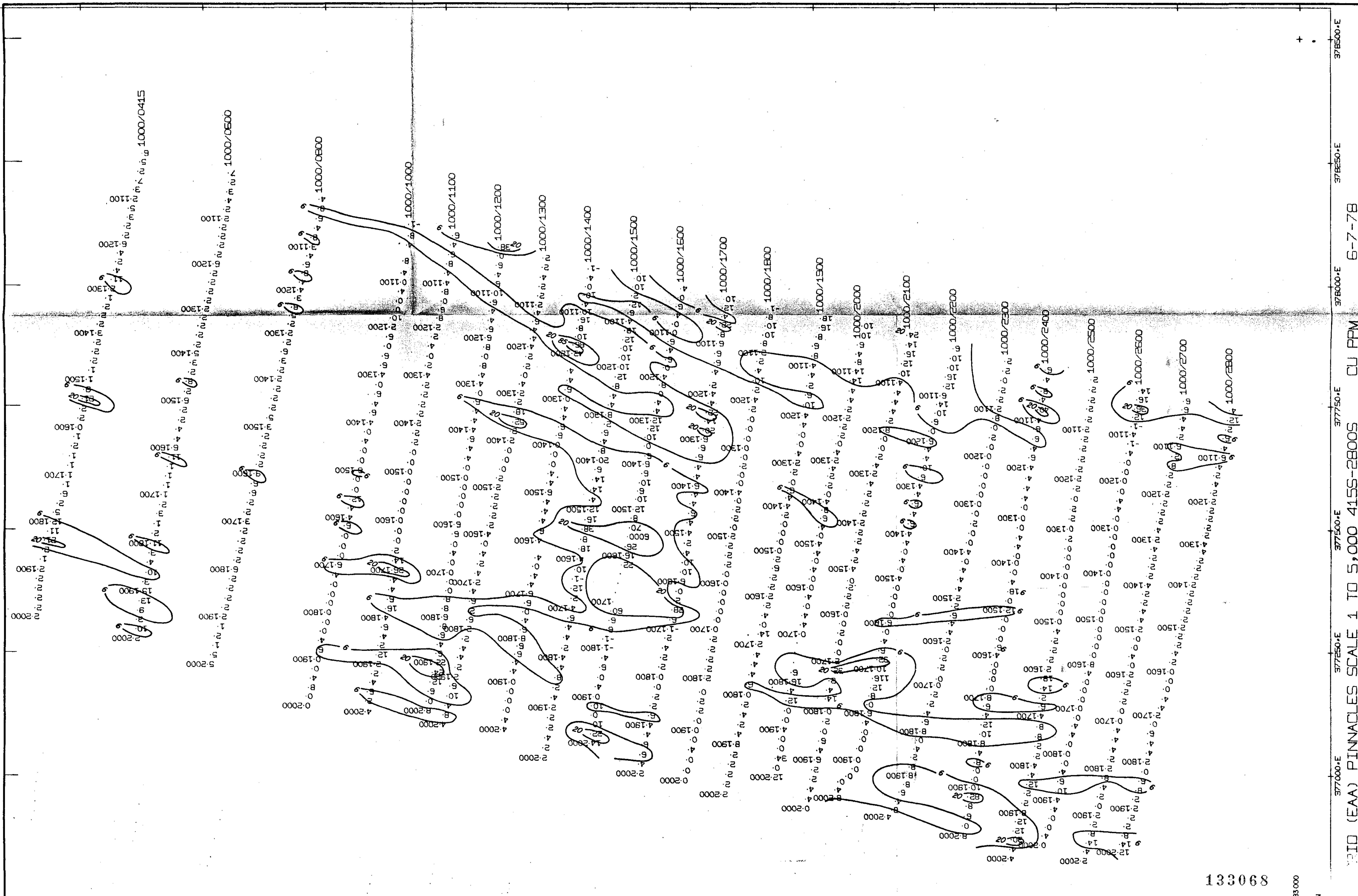

BOUNDARY OF LEASE E.L. 5/63 AREA 4
BOUNDARY OF LEASE E.L. 5/63 AREA 4
LEASE BOUNDARY ALONG RAILWAY
EAA GRID
EAB GRID
EAC GRID
EAD GRID
EAE GRID
OWEN SHEAR
glacial overburden
BASELINE
ss Siltstones
sh Shales (black)
sa Sandstones
ar Argillite
cg Conglomerate
da Dacite
an Andesite
at Andesite Tuff
tu Tuffs (various)
ag Agglomerate
rh Rhyolite
py Porphyry
ch Chert(y)
5 cm
GN MN
COMSTAFF PROPRIETARY LIMITED
CHESTER / PINNACLES AREA
GEOLOGICAL INTERPRETATION
COMPILED D.B.H. 77/78
DRAWN GEODRAFT 14/6/78
AMENDED
SCALE 1 : 10 000
PLAN NO. TAS/2/1555
1331
85 2439 2/2
133064


BOUNDARY OF LEASE E.L. 5/63 AREA 4
ORIGINAL EAB GRID
EAB GRID
EAC GRID
EAA GRID
EAD GRID
BOUNDARY OF LEASE E.L. 5/63 AREA 4
LEASE BOUNDARY ALONG RAILWAY
BASELINE
MARIONOAK
RIVER
LEGEND
Lines traversed by MAGNETOMETER survey
Lines traversed by SELF POTENTIAL survey
Lines traversed by INDUCED POLARISATION survey
METRES
5 cm
133065
COMSTAFF PROPRIETARY LIMITED
CHESTER - PINNACLES AREA
SHOWING LINES TRAVERSED
BY GEOPHYSICAL METHODS
COMPILED D.B.H. 6/78
DRAWN GEODRAFT 5/7/78
SCALE 1 : 10 000
PLAN No. TAS/2/1571
1332

85-2439


COMSTAFF PROPRIETARY LIMITED
PINNACLES GRID - EAA
PLAN SHOWING LOCATION OF GRID POINTS, TRACKS & COSTEANS
DRAWN GEODRAFT 6/78
COMPILED D.B.H.
SCALE 1:5000
TAS/2/1485
133066
2|2
1333
5 cm
378 000 E
377 000 E
N 5 385 000
5 384 000
5 383 000 N
L 415 S
L 600 S
L 800 S
L 1000 S
L 1100 S
L 1200 S
L 1300 S
L 1400 S
L 1500 S
L 1600 S
L 1700 S
L 1800 S
L 1900 S
L 2000 S
L 2100 S
L 2200 S
L 2300 S
L 2400 S
L 2500 S
L 2600 S
L 2700 S
L 2800 S
1000
1500
2000
BROWNS TUNNEL
THOMAS' TUNNEL
CP 2
CP1


5 385 000
5 384 000
5 383 000
378 000
377 000
Pinnacles Anticline
Burns Peak Syncline
Que. Syncline
OWEN SHEAR
L 415 S
L 600 S
L 800 S
L 1000 S
L 1100 S
L 1200 S
L 1300 S
L 1400 S
L 1500 S
L 1600 S
L 1700 S
L 1800 S
L 1900 S
L 2000 S
L 2100 S
L 2200 S
L 2300 S
L 2400 S
L 2500 S
L 2600 S
L 2700 S
L 2800 S
glacial drift
LEGEND
MIDDLE - UPPER CAMBRIAN (Rosebery Group)
sh/ss banded shales and siltstones, minor bands of sandstone claystone and tuff
tu mainly dacitic to andesitic (mafic) crystal lithic & lapilli tuffs weak chloritic alteration
a.tu altered acid tuffs & coarse poorly sorted pyroclastics sericitic alteration
UPPER PROTEROZOIC — LOWER CAMBRIAN
a.pcl highly altered, poorly sorted, coarse, acid flow pyroclastics minor altered tuffs & black shale. sericitic alteration
rh autobrecciated rhyolites, rhyolitic tuffs
tu/pcl mafic chloritic, altered, dacitic to andesitic crystal and lapilli tuffs & flow pyroclastics disturbed ? minor shales & argillites. chloritic alteration
qz/py quartz porphyry, quartz feldspar porphyry
ch zone of grey chert, ? boulders with pyrite, trace of sphalerite and galena silicic alteration
lode zinc, lead & copper lode, chloritic & silicic alteration, sericitic alteration
bk/sh banded black & grey shales, siltstones, bedded sulphides, minor altered acid tuffs lesser patchy sericite and/or chloritic alteration
ar/tu mainly banded, folded argillites & reworked altered tuff: patchy chloritic & sericitic alteration
sed/tu/pcl transition zone of altered, slumped sediments, tuffs & pyroclasts; increasing chloritic, patchy sericitic alteration
an/tu mainly mafic intermediate ? andesitic reworked tuffs, lapilli tuffs; agglomerate & lava
Geological boundary
Geological boundary - inferred
78° Strike and dip of bedding
85° Strike and dip of foliation
f—f Fault
Synclinal axis
Anticlinal axis
Shear zone
PP36 Drillhole
NOTE : this plan overlays TAS/2/1485
5 cm
133067
COMSTAFF PROPRIETARY LIMITED
PINNACLES PROSPECT - EAA
GEOLOGICAL INTERPRETATION
1334
DRAWN GEODRAFT 7/78
COMPILED G.K.K.+ D.B.H.
SCALE 1 : 5000
TAS/2/1587



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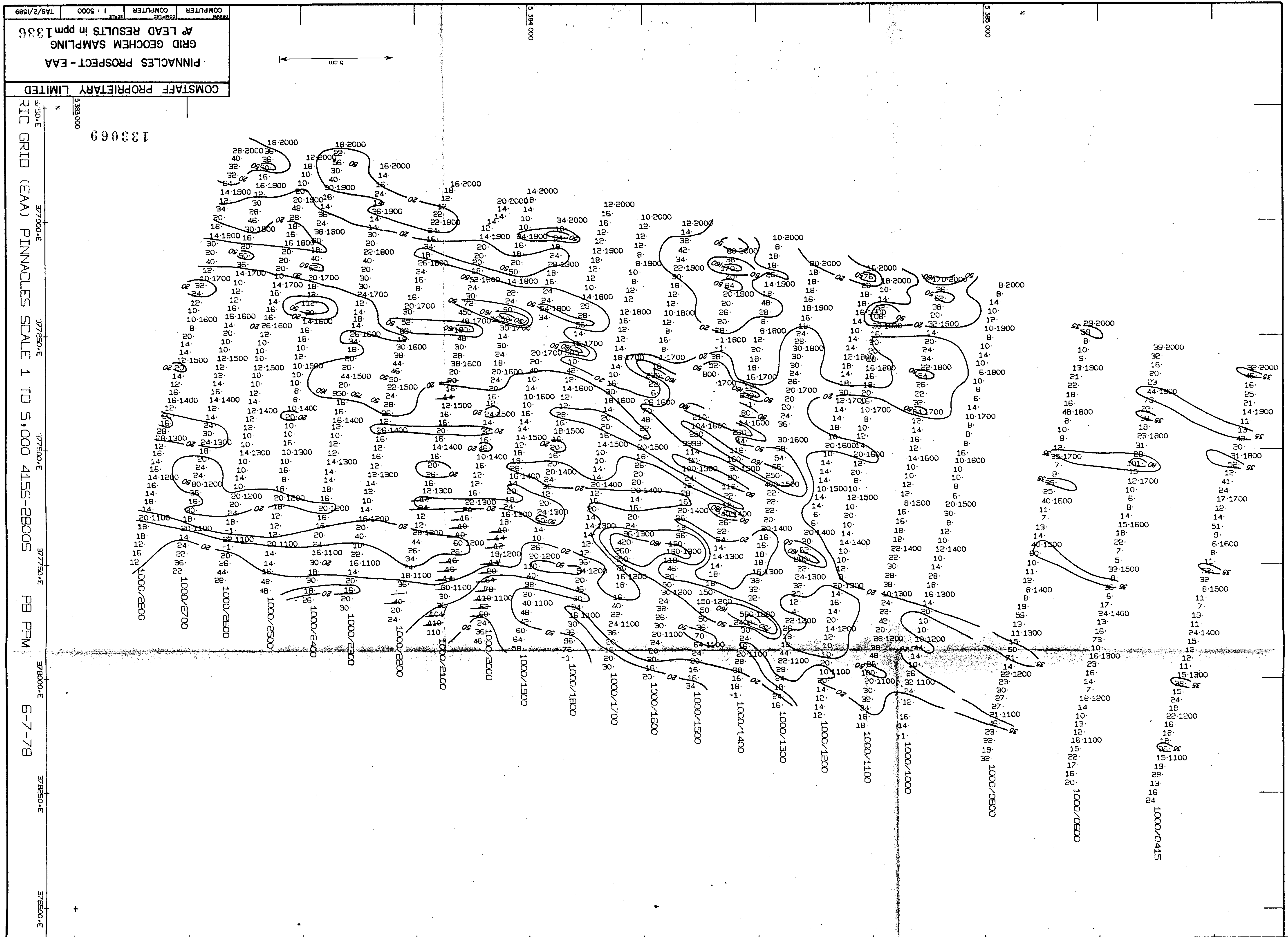
PINNACLES PROSPECT - EAA

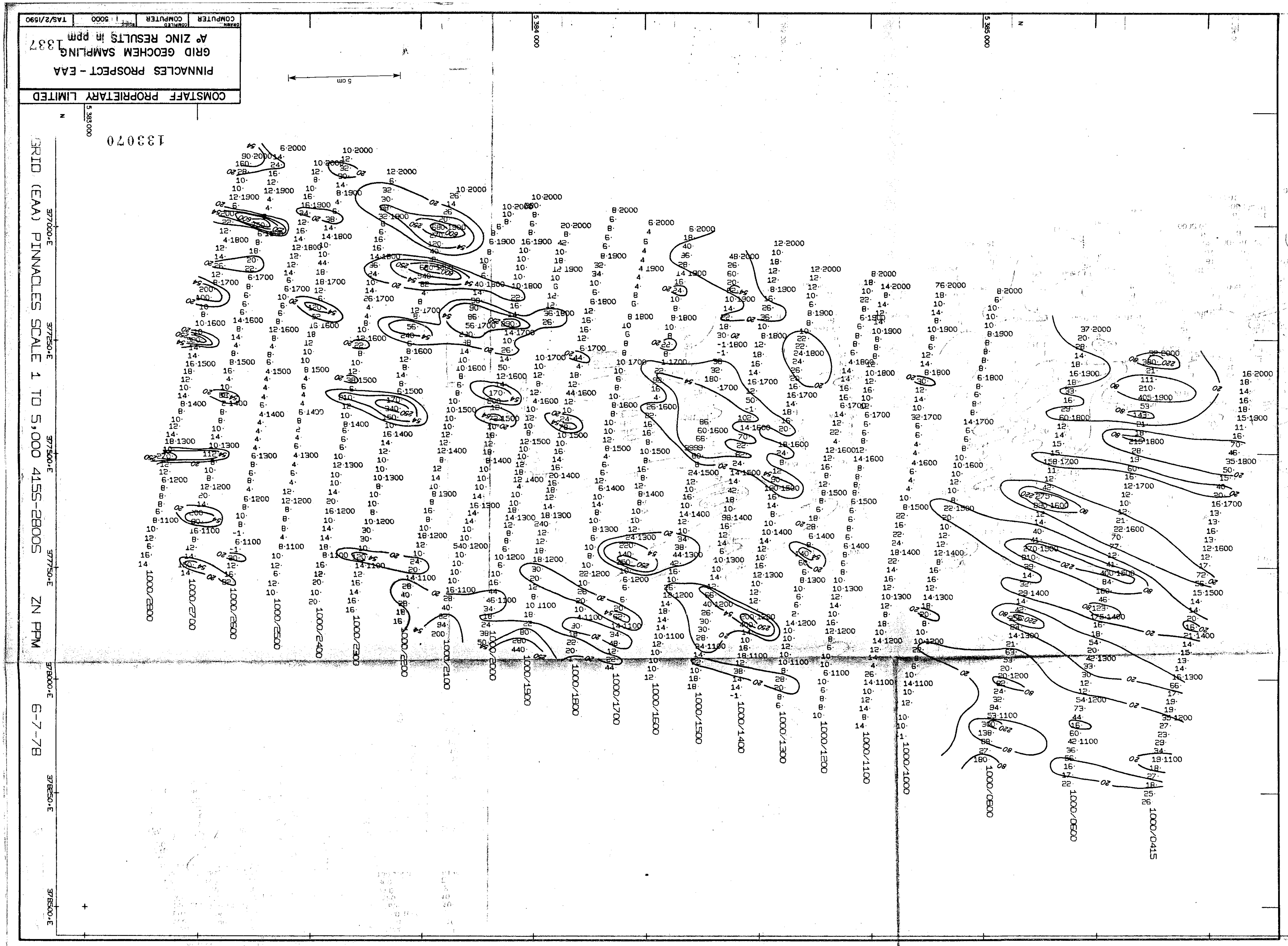
GRID GEOCHEM SAMPLING 1335

A° COPPER RESULTS in ppm

DRAWN	COMPILED	SCALE	
COMPUTER	COMPUTER	1 : 5000	TAS/2/1588

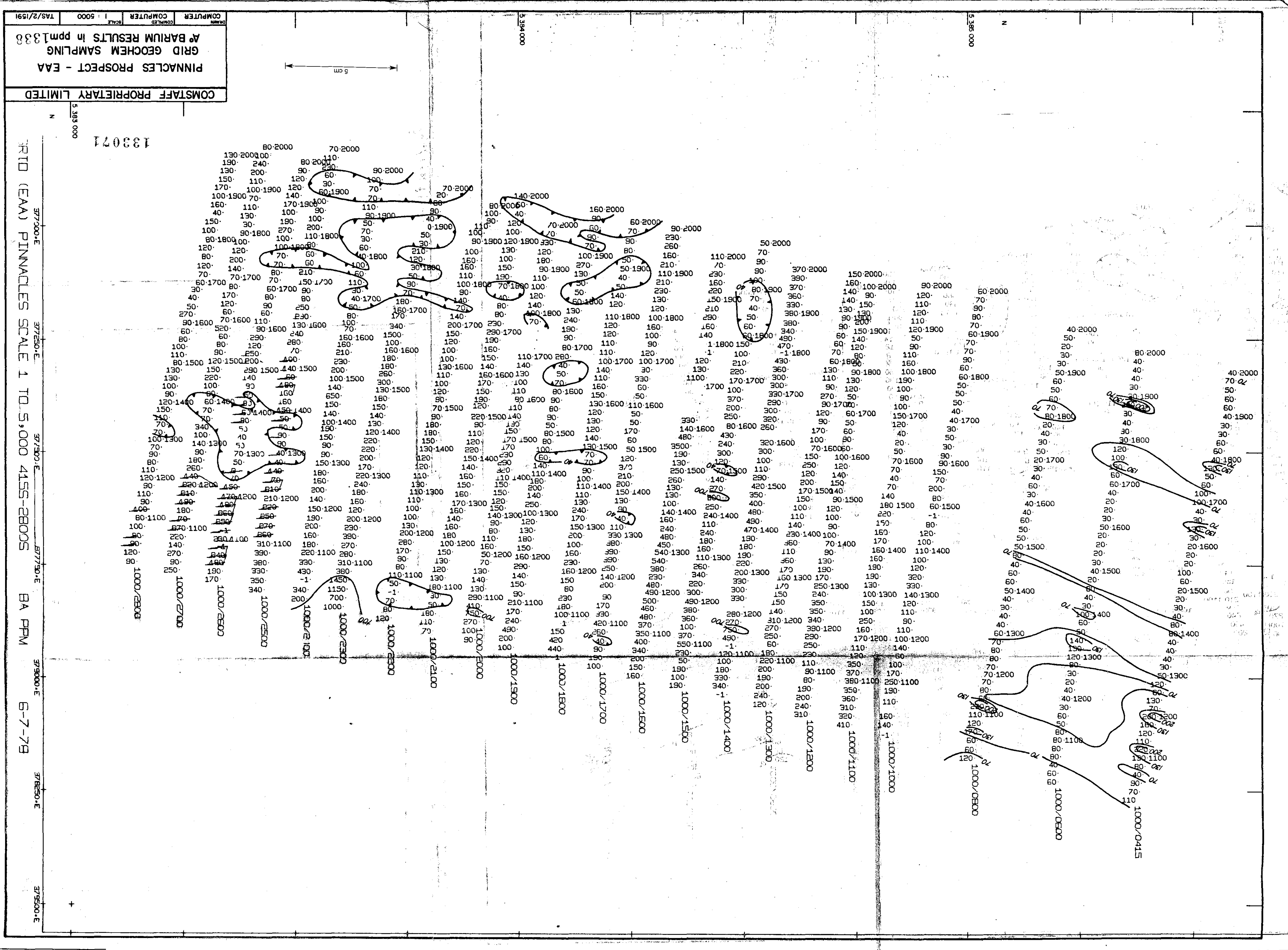


COMSTAFF PROPRIETARY LIMITED
PINNACLES PROSPECT - EAA
GRID GEOCHEM SAMPLING
Ag LEAD RESULTS in ppm
1336
DRAWN COMPUTER
COMPILED COMPUTER
SCALE 1 : 5000
TAS/2/1589
5 cm
133069
RIC GRID (EAA) PINNACLES SCALE 1 TO 5,000 415S-2800S PB PPM
6-7-78



COMSTAFF PROPRIETARY LIMITED
PINNACLES PROSPECT - EAA
GRID GEOCHEM SAMPLING
A° ZINC RESULTS in ppm
1337
COMPUTER DRAWN
COMPUTER COMPILED
1 : 5000
TAS/2/1590
133070
GRID (EAA) PINNACLES SCALE 1 TO 5,000 4155-2800S ZN PPM 6-7-78

85-2439 2/4



COMSTAFF PROPRIETARY LIMITED
PINNACLES PROSPECT - EAA
GRID GEOCHEM SAMPLING
BARIUM RESULTS in ppm
DRAWN COMPUTER
COMPILED COMPUTER
SCALE 1 : 5000
TAS/2/1591
5 cm
133071
GRID (EAA) PINNACLES SCALE 1 TO 5,000 4155-2805 BA PPM 6-7-79
5 383 000 N
5 384 000
5 385 000 N


EAST CHESTER EXTENSIONS (EAB)
ORIGINAL EAST CHESTER GRID
CAMP CHARLIE GRID
BURNS PEAK
CAMP CHARLIE GRID BASELINE
MN
LEGEND
Drainage & water race survey point
Road survey point
Costean sample point
Grid sample point
5 cm
133072
COMSTAFF PROPRIETARY LIMITED
EAST CHESTER - EAB
DETAILED GEOLOGICAL PLAN
DRAWN GEODRAFT
COMPILED D.B.H.
DATE JUNE 1978
SCALE 1 : 5000
1339
TAS/2/1565
85 2479
2/4


Pinnacles Anticline
Burns Peak Syncline
East Chester Anticline
glacial cover
Cherty sediments or silicified rocks
Black grey shales, interbedded arenaceous units
Quartz felspar porphyry extrusive ?
Tuffs acid crystal, lithic lapilli (altered)
Andesite vesicular, flow textured, tuffaceous
Andesite tuff chloritic pyritic
Tuff water-lain, bedded interbedded siliceous sandy units
Rhyolite flow textured, vesicular ?
Sub aerial acid volcanics flow banded brecciated, ashfall tuffs: trachyandesites, ignimbrites ± fiamme
Coarse volcanic breccia
Geological boundary
Fault fault inferred
Glacial cover
Costean
5 cm
0 50 100 200 300 400 500
Metres
COMSTAFF PROPRIETARY LIMITED
EAST CHESTER - EAB
GEOLOGICAL INTERPRETATION
DRAWN C.B
COMPILED D.B.H
DATE Jan 79
SCALE 1 5000
TAS/2/1698
85-2439
24
1340

133074

NOTE :- For abbreviation index see plan TAS/2/1566

COMSTAFF PROPRIETARY LIMITED

EAST CHESTER GRID - EAB

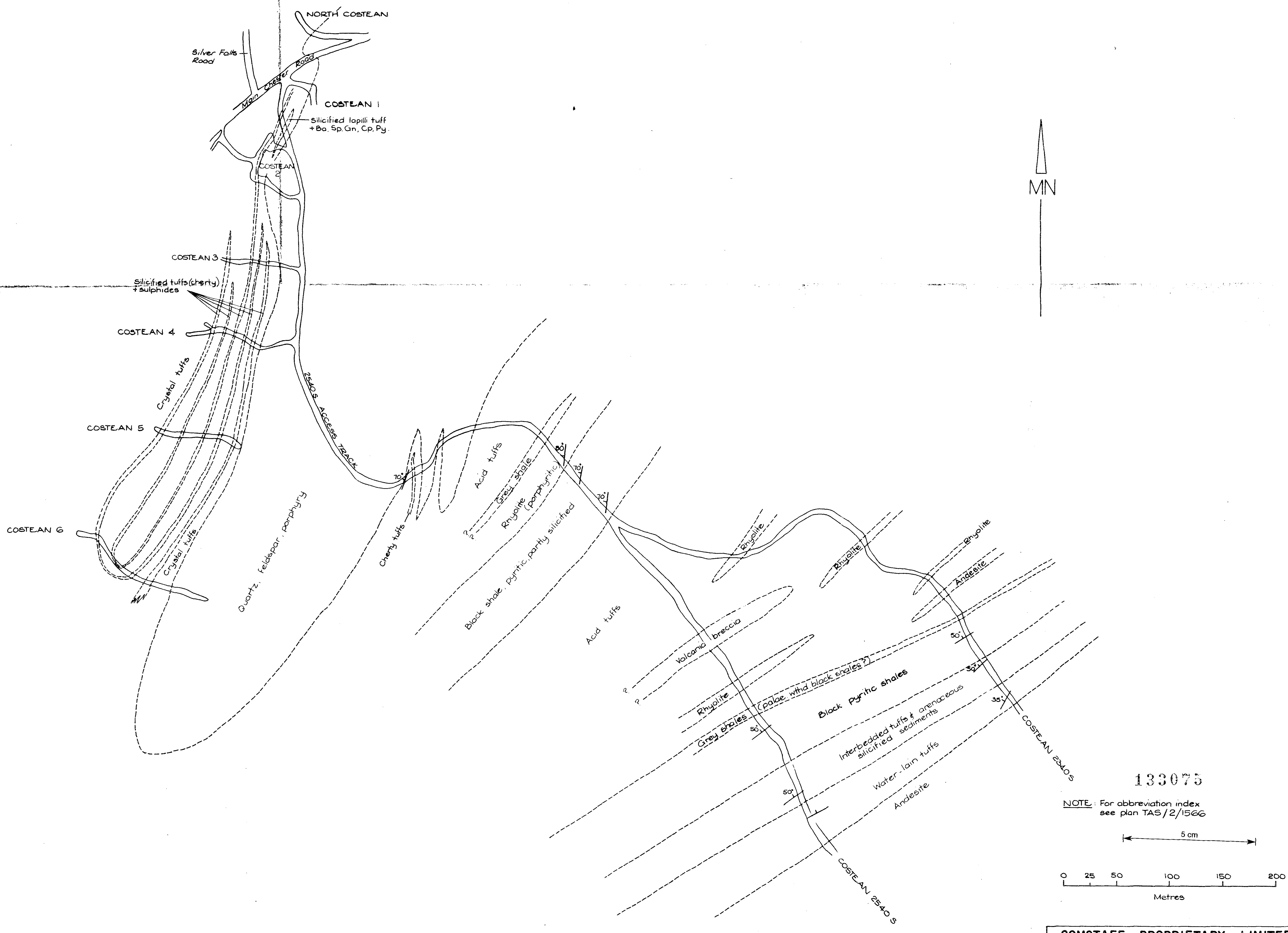
2340S & 2540S COSTEANS

DETAILED GEOLOGY

1341

DRAWN	COMPILED	SCALE	
GEODRAFT 8/78	D.B.H. 6/78	1 : 2500	TAS/2/1614

85-7-39 2/4



133075

NOTE: For abbreviation index see plan TAS/2/1566

COMSTAFF PROPRIETARY LIMITED

EAST CHESTER GRID – EAB

2340S & 2540S COSTEANS 1342

GEOLOGICAL INTERPRETATION

COMPILED	DRAWN	SCALE	
D B H 6/78	CB 1/79	1:2500	TAS/2/1699

85 39

214

133076

COMSTAFF PTY. LTD.

EAST CHESTER GRID - EAB 1343
2340S & 2540S EASTERN COSTEANS & ACCESS TRACKS
GEOLOGY & GEOCHEMISTRY

DRAWN	COMPILED	SCALE	
A. Murray. 6-78.	D. Hall	1 : 500	TAS/2/1613

PROJECT NAME:

APPENDIX IV

TITLE:

REPORT ON EXPLORATION IN EXPLORATION LICENCE 5/63 PART 4, IN TASMANIA, AUSTRALIA

VOLUME 3

9417
Vol 3 of 4

AREA NAME/S, STATE 1:250,000 SHEET NO/S & COORDINATES: Burnie Sheet S 55/3
Area centred at 378000E, 5382000N

COMMODITY/IES: Copper, Lead, Zinc

TEXT PAGES NO: 48

PLAN NOS. See Section 11

TABLE NOS: 1, 1(a), 2, 2(a), 2(b), 2(c), 3, 3(a)

APPENDICES:

AUTHOR/S: D. B. Hall

DATE: September 1978

AUSTRALIAN ANGLO AMERICAN LIMITED

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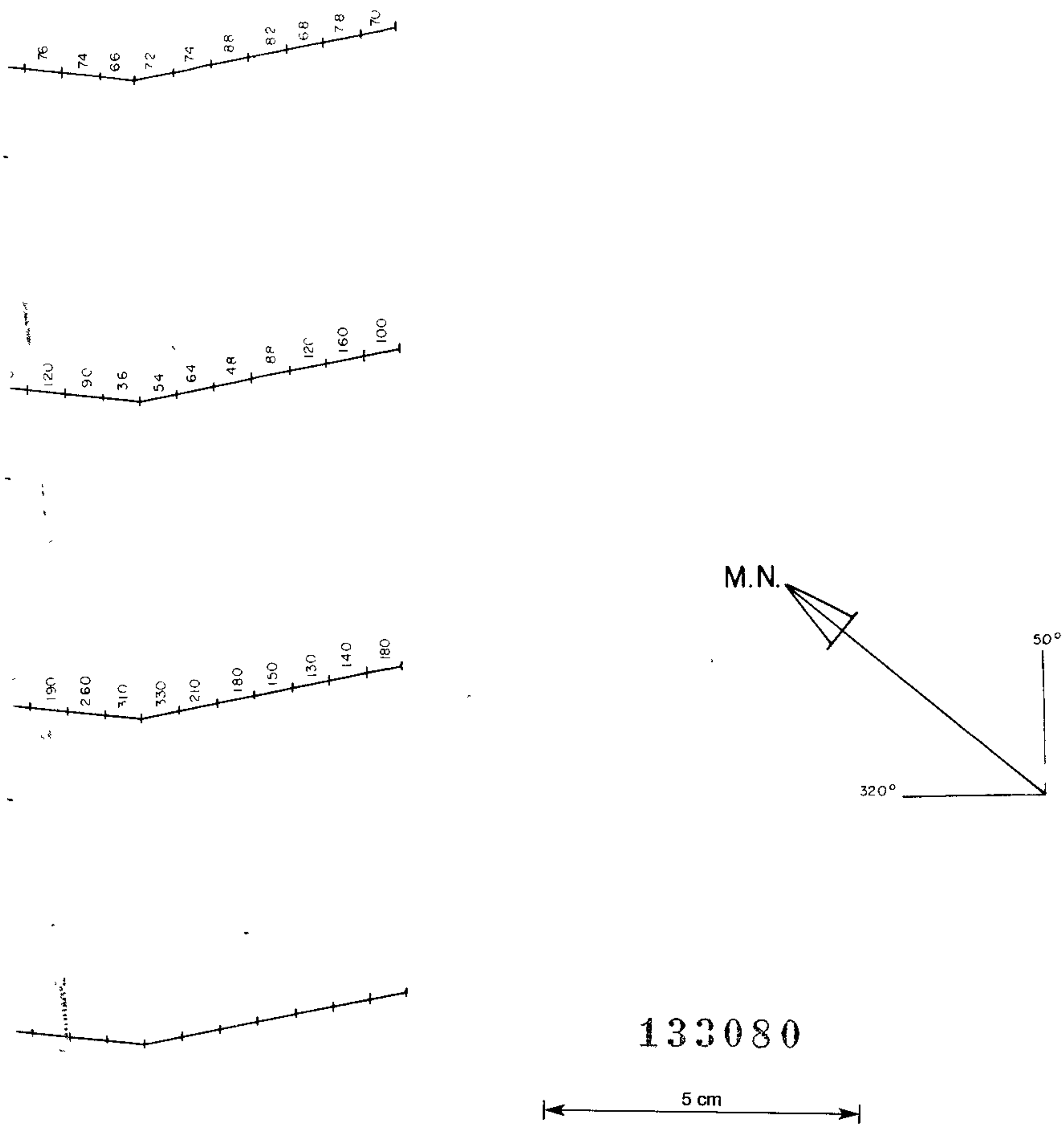
133078

COMSTAFF PTY LTD

EAST CHESTER GRID - EAB 1344
2540 S WESTERN COSTEANS & ACCESS TRACKS
GEOLOGY & GEOCHEMISTRY

DRAWN	COMPILED	SCALE	
A. Murray 6-78	D. Hall	1 : 500	TAS/2/1612

Ag
Zn
Pb
Cu
Sample points
Plan
Section
Cherty with g. sericite seds
C.g. tuffs with acid lithics
Quartz vein 290/50
Well bedded cherty seds.
M.-f.g. alt sed. with acid volc.
B250/40
Pyrite in altered banded chert Galena in qtz veins
Fe stained alt. tuff
Qtz - sericite alteration
White qtz. & tuff sericite
Well bedded chert
B225/44
Well bedded sediments
Massive bedded tuffs/seds.
B225/57N
Finely bedded cherty seds.
Quartz vein
B225/80N
Well bedded sedimentary tuffs with darker well bedded units of grey cherts & soft green seds.
B230/50N
B245/50N
Well bedded f. to c.g. tuffaceous seds.
Gradational contact
J070/43E
Textured green crystal tuffs
J057/70E
Well formed crystals in f.g. groundmass - crystal tuff with quartzose sedimentary tuffs
White bleached f.g. sed. ± f.g. acid volc.
Buff f. textured soft withd. tuff/sed.
Pale green to brown "porphyoidal" dacite tuff.
Patchy - red. with Mn
Green densely granular "porphyoidal" volc. ± with soft white felsic grains in green gm.
Fresher
Occ. rounded quartz grains in withd. basic ? tuffs
Vein
Brick red sections with Mn (more mafic?) v. ferrug. crystals in orange gm.
Densely porphyoidal crystal tuff with fels. & round quartz
Trough of c. glacial boulders
Scatt rounded quartz grains in "porph." volc. - massive tuff
Ferruginous withd c. textured volc. densely porphyoidal - prop tuff
Glacial gravel
Green "porphyoidal" volc. with felsic & mafic phenocrysts
Dk. green - brown cemented subcutcrop to glacials
Glacial boulder gravel with Iron Pan
Ferruginous cemented
White c. cobble gravel
Owen Conglm.
MN
315°
45°
5 cm
123079
COMSTAFF PROPRIETARY LIMITED
EAST CHESTER GRID - EAB
2950 S. COSTEAN
GEOLOGY & GEOCHEMISTRY
1345
DRAWN A M
DATE 5-77
COMPILED G P
SCALE 1:500
TAS/2/1301



133080

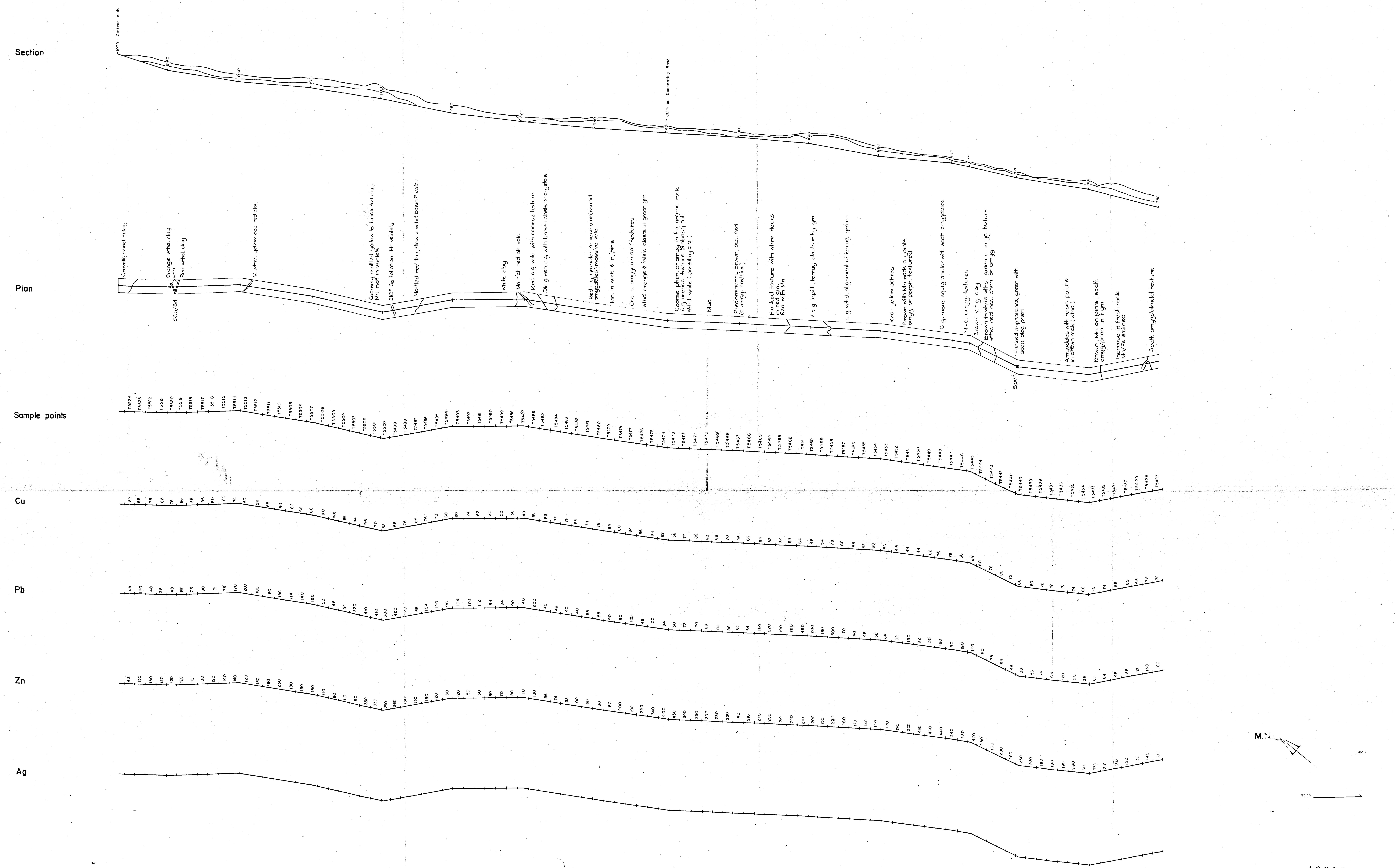
COMSTAFF PROPRIETARY LIMITED

EAST CHESTER GRID - EAB
2750 S COSTEAN (WEST)
GEOLOGY & GEOCHEMISTRY

062

DRAWN	A M
DATE	5 - 77
COMPILED	G P
SCALE	1:500
TAS/2/1302	

3/4



133081

5 cm

COMSTAFF PROPRIETARY LIMITED

EAST CHESTER GRID - E-E

2750 S COSTEAN (WEST

GEOLOGY & GEOCHEMISTRY 1346 TAS/2/1302

133082

COMSTAFF PROPRIETARY LIMITED

EAST CHESTER GRID - EAB
2750 S COSTEAN (EAST)
GEOLOGY & GEOCHEMISTRY 1347

DRAWN	A.M.
DATE	5-77
COMPILED	G.P.
SCALE	1:500
	TAS/2/1303

85-2439

314.

COMSTAFF PROPRIETARY LIMITED

EAST CHESTER GRID - EAB

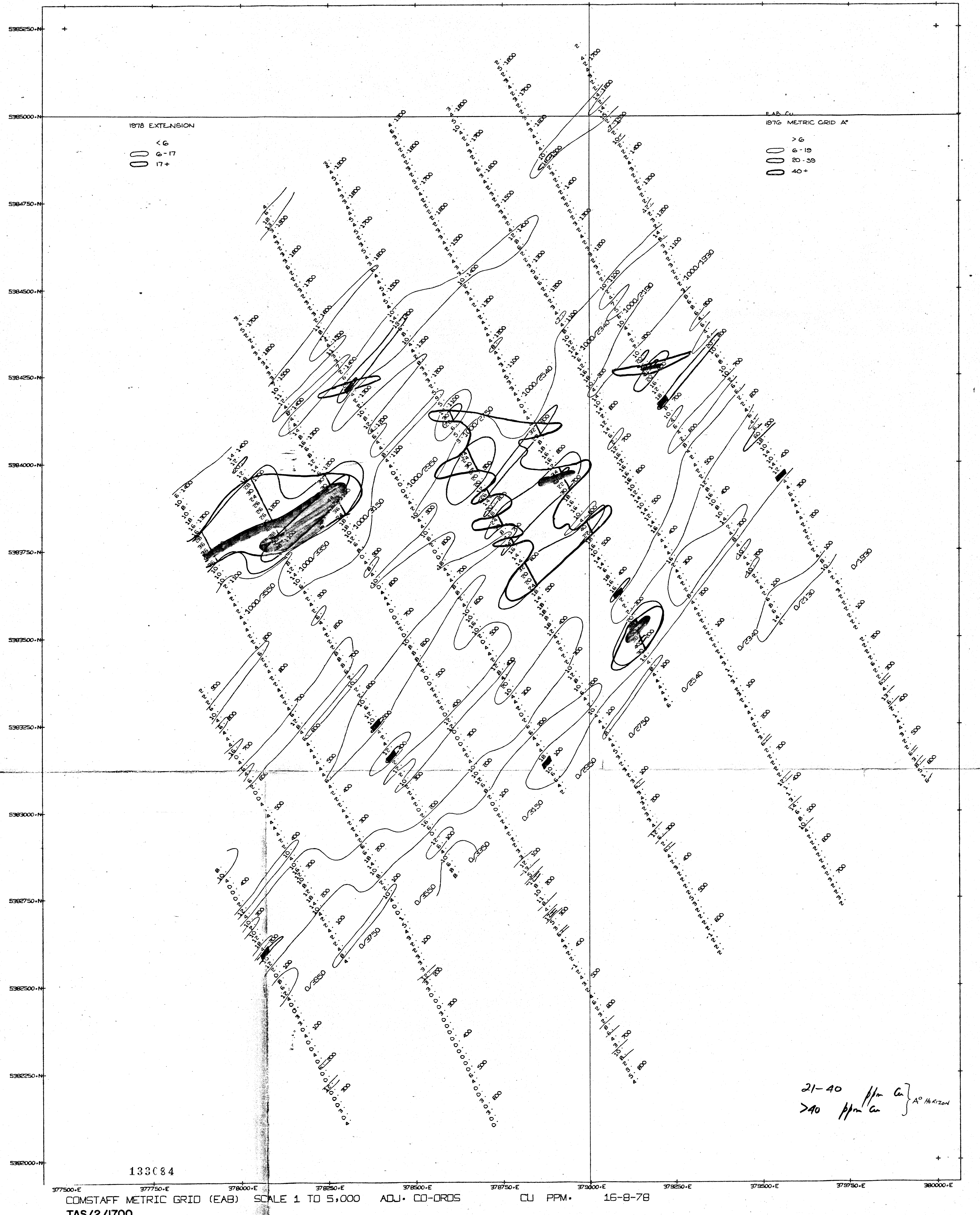
3350 S COSTEAN

GEOLOGY & GEOCHEMISTRY 1348

DRAWN	A.M.
DATE	6 - 77
COMPILED	G.P.
SCALE	1 : 500

TAS/2/1304

133083



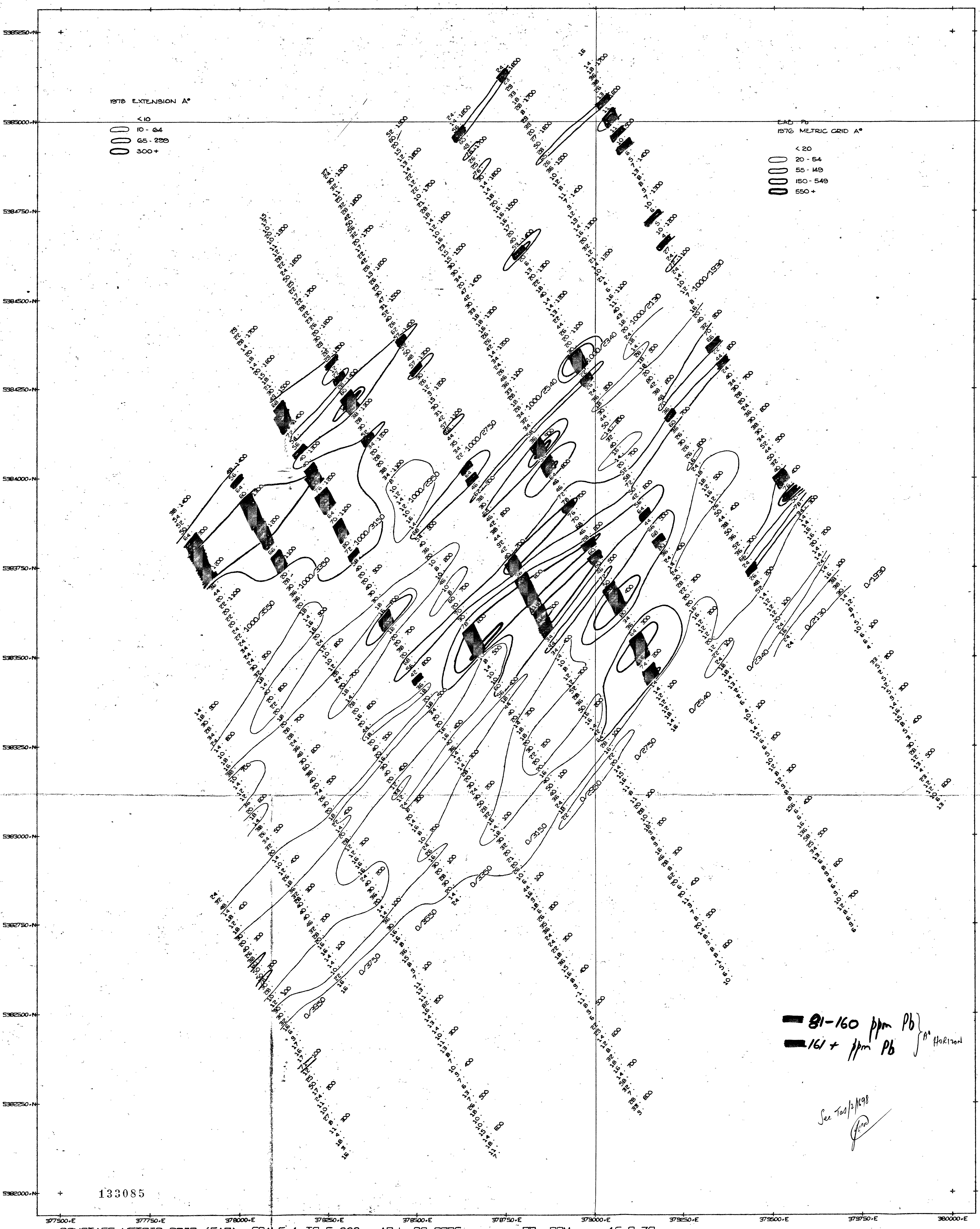
COMSTAFF METRIC GRID (EAB) SCALE 1 TO 5,000 ADJ. CO-ORDS CU PPM. 16-8-78

TAS/2/1700

5 cm

85-2439 3/4

1340



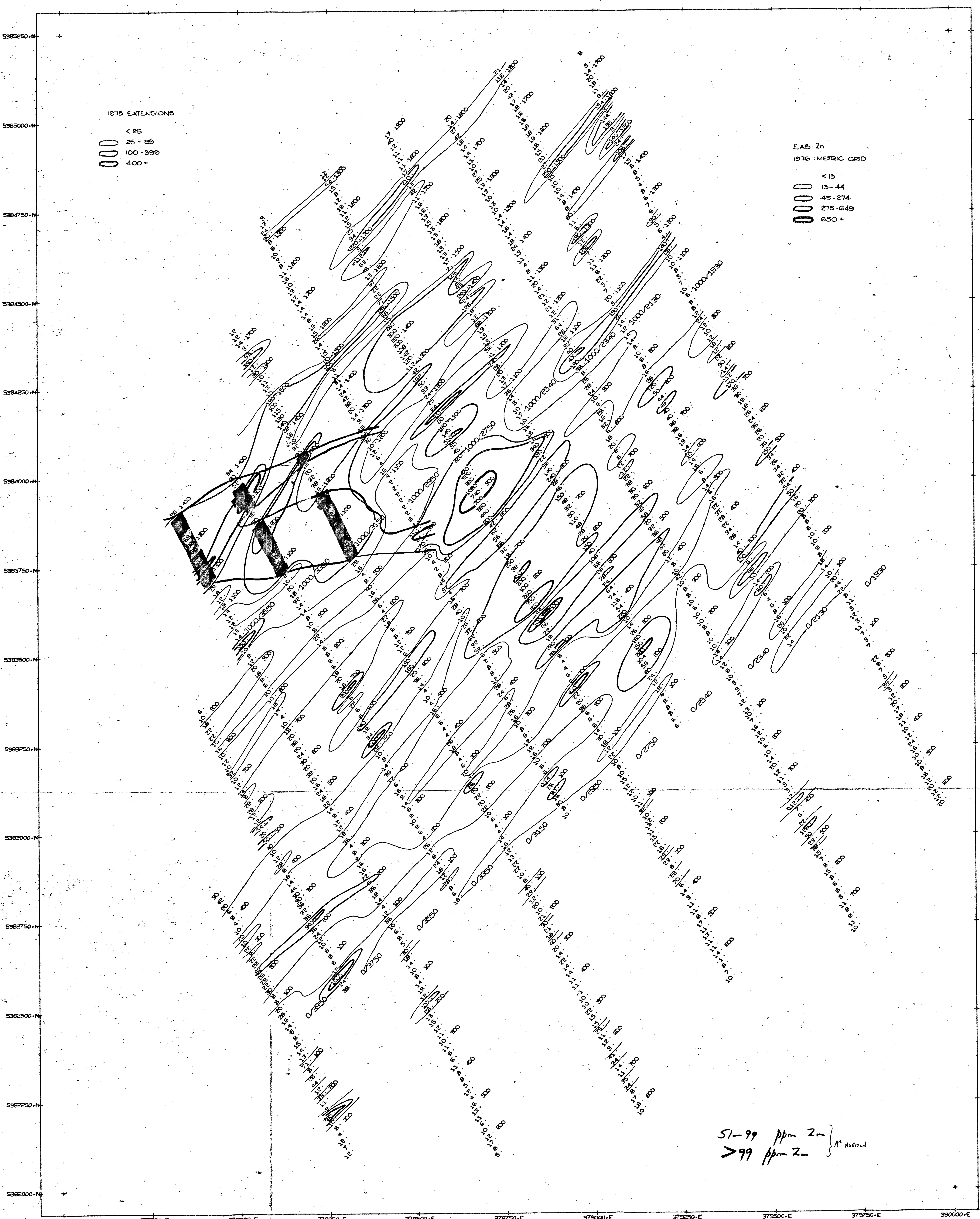
COMSTAFF METRIC GRID (EAB) SCALE 1 TO 5,000 ADJ. CO-ORDS PB PPM. 16-8-78

TAS/2/1701

5 cm

35-2439 3/4

1350

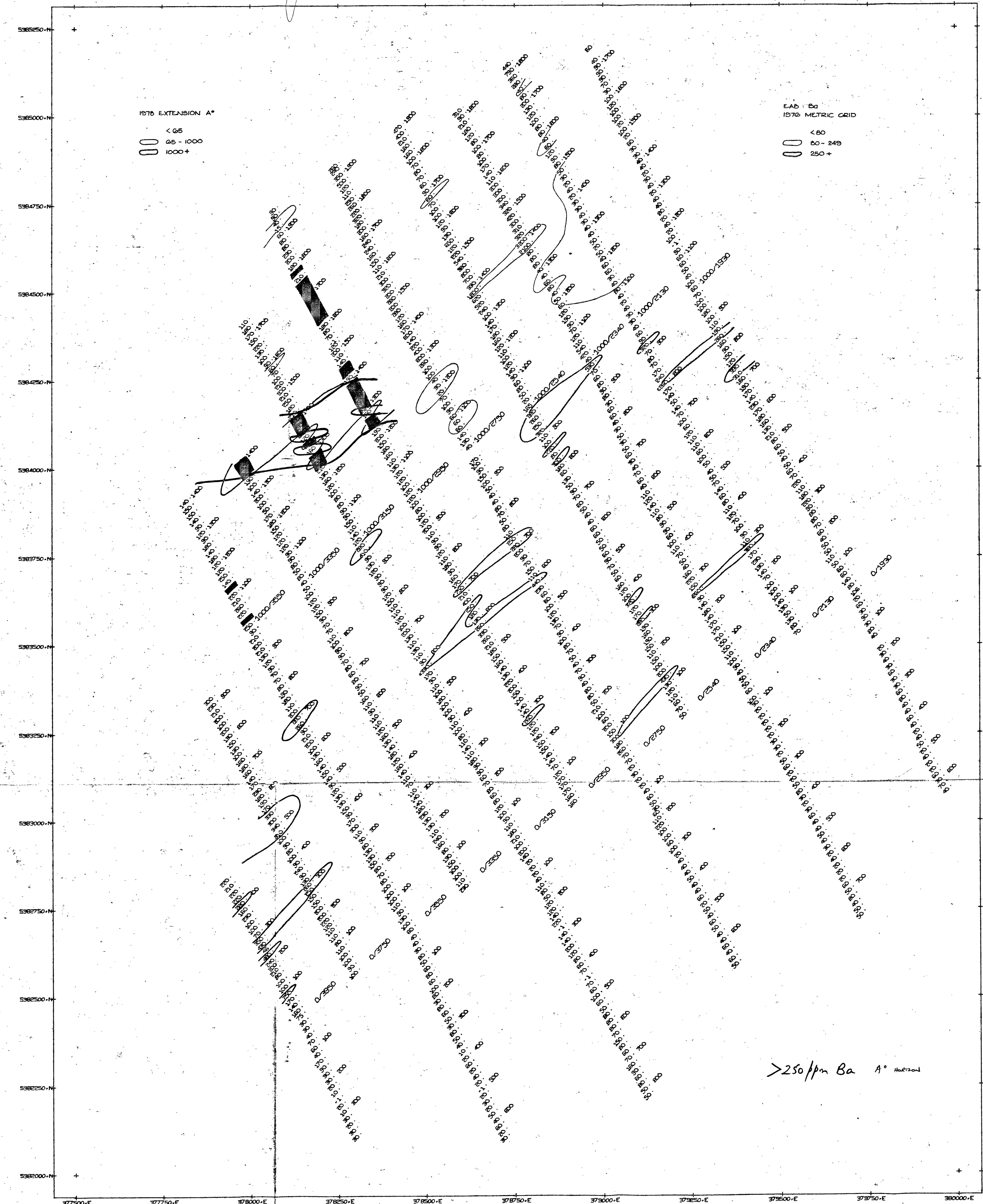


133086 COMSTAFF METRIC GRID (EAB) SCALE 1 TO 5,000 ADJ. CO-ORDS ZN PPM. 16-8-78

TAS/2/1702

5 cm

85-2439 3/4 1351



COMSTAFF METRIC GRID (EAB) SCALE 1 TO 5,000 ADJ. CO-ORDS BA PPM. 16-8-78

133087

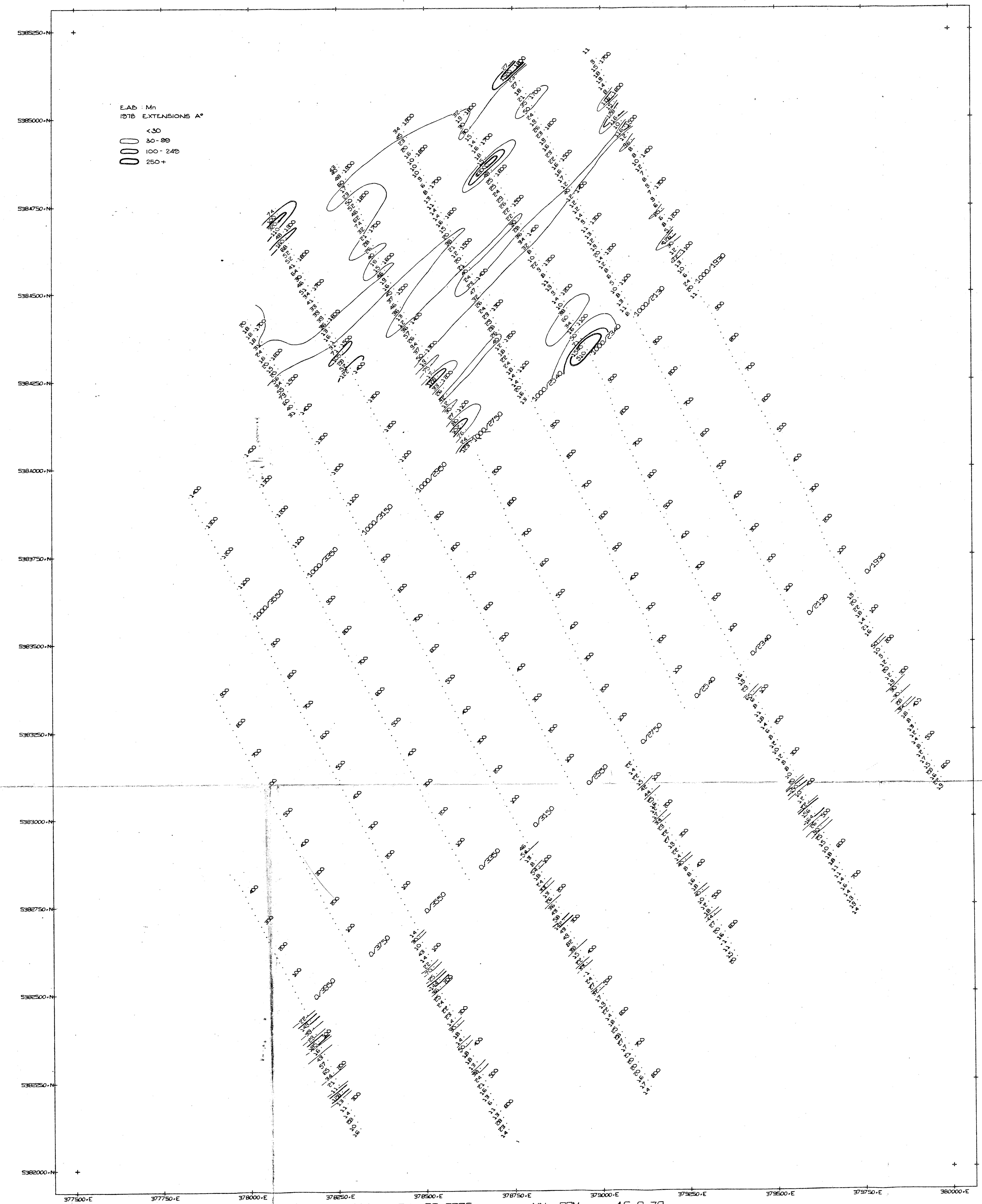
TAS/2/1703

85-2439

5 cm

3/4

1352



COMSTAFF METRIC GRID (EAB) SCALE 1 TO 5,000 ADJ. CO-ORDS MN PPM. 16-8-78

5 cm

TAS/2/1557 ADJOINS

NOTE: FOR ABBREVIATION INDEX SEE PLAN TAS/2/1566

133089

SHEET INDEX

TN

COMSTAFF PROPRIETARY LIMITED

CHESTER-PINNACLES GRID - EAD

DETAILED GEOLOGICAL PLAN

COMPILED	D.B.H. 6/78
DRAWN GEODRAFT	DATE 15/6/78
AMENDED	
SCALE	1 : 5000
PLAN No.	TAS/2/1556

5 cm

C 1354

133090

5 cm

NOTE : FOR ABBREVIATION INDEX SEE PLAN TAS/2/1566

SHEET INDEX

TN

COMSTAFF PROPRIETARY LIMITED

CHESTER - PINNACLES GRID - EAD

DETAILED GEOLOGICAL PLAN

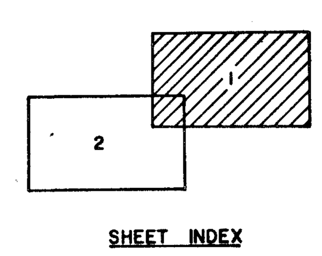
COMPILED D.B.H.	6/78
DRAWN GEODRAFT	DATE 15/6/78
AMENDED	
SCALE	1 : 5000
PLAN No.	TAS/2/1557

1355

85 - 2439 3/4

133091

5 cm



COMSTAFF PROPRIETARY LIMITED	
EAD	COMPILED D. B. Hall
4N Costean and Access Track.	DRAWN A.M. DATE 6 - 78 AMENDED
GEOLOGY & GEOCHEMISTRY	SCALE 1 : 500
Sheet 1. 1356	PLAN No. TAS/2/1582

3/4

COMSTAFF PROPRIETARY LIMITED

EAD

4N Costean and Access Track.

GEOLOGY & GEOCHEMISTRY

Sheet 2

1357

COMPILED	D. B. Hall
DRAWN	A. M.
DATE	6 - 78
AMENDED	
SCALE	1 : 500
PLAN No.	TAS/2/1583

85 - 2409 3/4

9417

PROJECT NAME: APPENDIX IV

TITLE:

REPORT ON EXPLORATION
IN EXPLORATION LICENCE 5/63
PART 4, IN TASMANIA, AUSTRALIA

VOLUME 4

AREA NAME/S, STATE 1:250,000 SHEET NO/S & COORDINATES: Burnie Sheet S 55/3
Area centred at 378000E, 5382000N

COMMODITY/IES: Copper, Lead, Zinc

TEXT PAGES NO: 48

PLAN NOS: See Section 11

TABLE NOS: 1, 1(a), 2, 2(a), 2(b), 2(c), 3, 3(a)

APPENDICES:

AUTHOR/S: D. B. Hall

DATE: September 1978

AUSTRALIAN ANGLO AMERICAN LIMITED

Incorporated in the State of Victoria

376 000 E
377 000
378 000
379 000
380 000 E
5 383 000 N
5 382 000
5 381 000 N
31N
28N
23N
20N
133094
5 cm
TAS/2/1573 ADJOINS
SHEET INDEX
TN
COMSTAFF PROPRIETARY LIMITED
CHESTER GRID - EAD
GEOCHEMICAL SOIL SAMPLING
COPPER A° CONTOURS in ppm
COMPILED D.B.H.
DRAWN GEODRAFT
DATE 7/7/78
AMENDED
SCALE 1 : 5000
PLAN No. TAS/2/1572
1358
85 - 2439

COMSTAFF PROPRIETARY LIMITED

CHESTER GRID - EAD

GEOCHEMICAL SOIL SAMPLING
COPPER A° CONTOURS in ppm

1359

COMPILED D. B. H.	
DRAWN GEODRAFT	DATE 7/7/78
AMENDED	
SCALE 1 : 5000	
PLAN No. TAS/2/1573	

85-2439 4/4

133096

COMSTAFF PROPRIETARY LIMITED

CHESTER GRID - EAD

GEOCHEMICAL SOIL SAMPLING
LEAD A° CONTOURS in ppm 1360

COMPILED D.B.H.	
DRAWN GEODRAFT	DATE 7/7/78
AMENDED	
SCALE 1 : 5000	
PLAN No. TAS/2/1574	

133097

COMSTAFF PROPRIETARY LIMITED

CHESTER GRID - EAD

GEOCHEMICAL SOIL SAMPLING
LEAD A° CONTOURS in ppm 1361

COMPILED D. B. H.	
DRAWN GEODRAFT	DATE 7/7/78
AMENDED	
SCALE 1 : 5000	
PLAN No. TAS/2/1575	

4/4

133098

COMSTAFF PROPRIETARY LIMITED

CHESTER GRID - EAD

GEOCHEMICAL SOIL SAMPLING

ZINC A° CONTOURS in ppm

COMPILED	D.B.H.
DRAWN GEODRAFT	DATE 7/7/78
AMENDED	
SCALE	1 : 5000
PLAN No.	TAS/2/1576

1362

85-2439 44

133099

COMSTAFF PROPRIETARY LIMITED

CHESTER GRID - EAD

GEOCHEMICAL SOIL SAMPLING
ZINC A° CONTOURS in ppm

COMPILED D.B.H.	
DRAWN GEODRAFT	DATE 7/7/78
AMENDED	
SCALE	1 : 5000
PLAN No. TAS/2/1577	

1363

44


376 000 E
377 000
378 000
379 000
380 000 E
5 383 000 N
5 382 000
5 381 000 N
80
520
1300
5 cm
TAS/2/1579 ADJOINS
SHEET INDEX
TN
133100
COMSTAFF PROPRIETARY LIMITED
CHESTER GRID - EAD
GEOCHEMICAL SOIL SAMPLING
BARIUM A° CONTOURS in ppm
COMPILED D.B.H.
DRAWN GEODRAFT
DATE 7/7/78
AMENDED
SCALE 1 : 5000
PLAN No. TAS/2/1578
1364
85-2439

COMSTAFF PROPRIETARY LIMITED

CHESTER GRID - EAD

GEOCHEMICAL SOIL SAMPLING
BARIUM A° CONTOURS in ppm 1365

COMPILED D.B.H.	
DRAWN GEODRAFT	DATE 7/7/78
AMENDED	
SCALE 1 : 5000	
PLAN No. TAS/2/1579	

TAS/2/1581 ADJOINS

133102

SHEET INDEX

TN

COMSTAFF PROPRIETARY LIMITED

CHESTER GRID - EAD

GEOCHEMICAL SOIL SAMPLING
MANGANESE A° CONTOURS in ppm

COMPILED D.B.H.	
DRAWN GEODRAFT	DATE 7/7/78
AMENDED	
SCALE 1 : 5000	
PLAN No. TAS/2/1580	

1366

85 - 2439 414


5 381 000 N
376 000 E
377 000
378 000
379 000
380 000 E
TAS/2/1580 ADJOINS
5 380 000
5 379 000 N
133103
5 cm
SHEET INDEX
TN
COMSTAFF PROPRIETARY LIMITED
CHESTER GRID - EAD
GEOCHEMICAL SOIL SAMPLING
MANGANESE A° CONTOURS in ppm
COMPILED D. B. H.
DRAWN GEODRAFT
DATE 7/7/78
AMENDED
SCALE 1 : 5000
PLAN No. TAS/2/1581
1367

133104

COMSTAFF PROPRIETARY LIMITED

CHESTER GRID - EAD

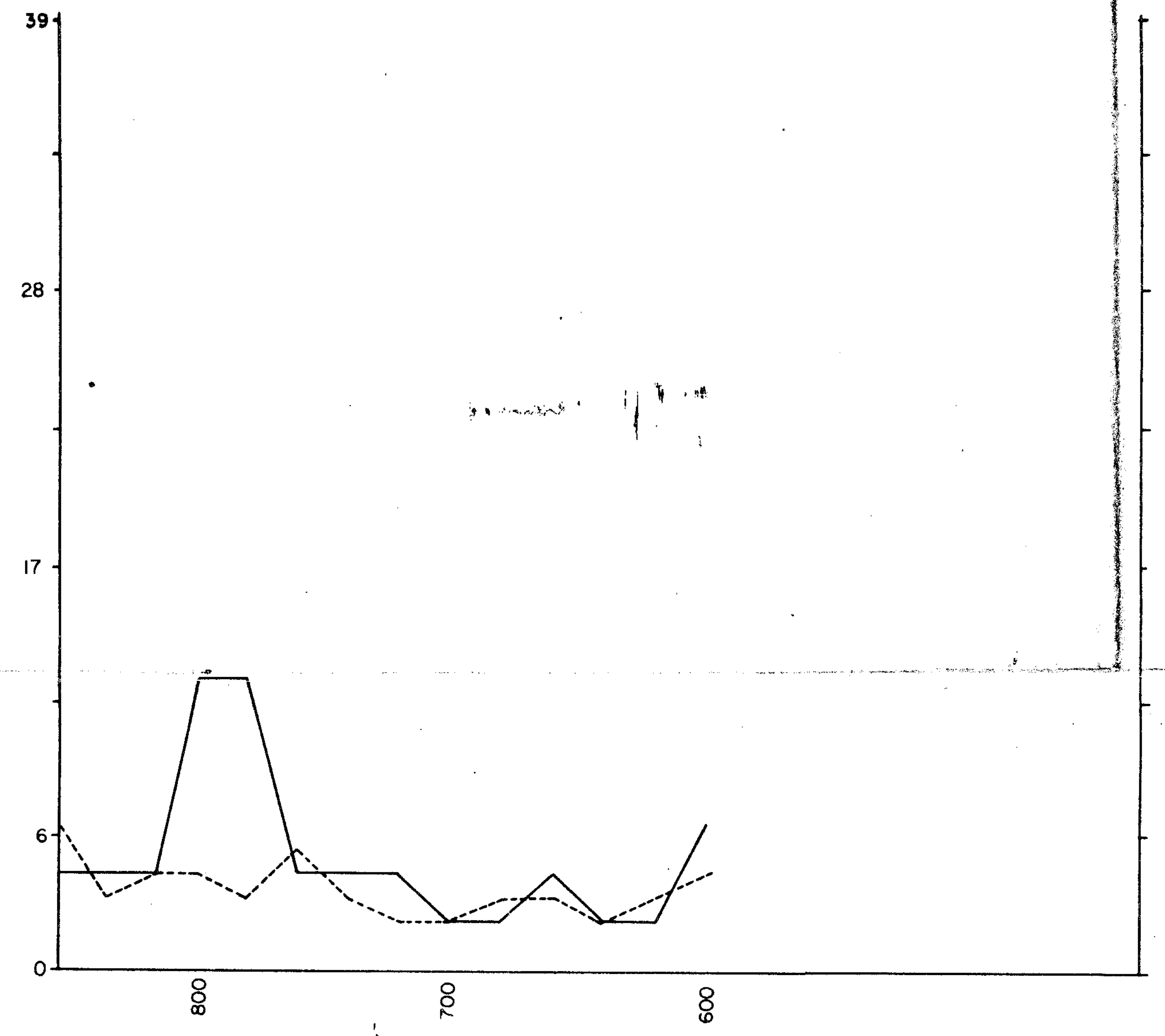
STACKED
GROUND MAGNETIC PROFILES

1368

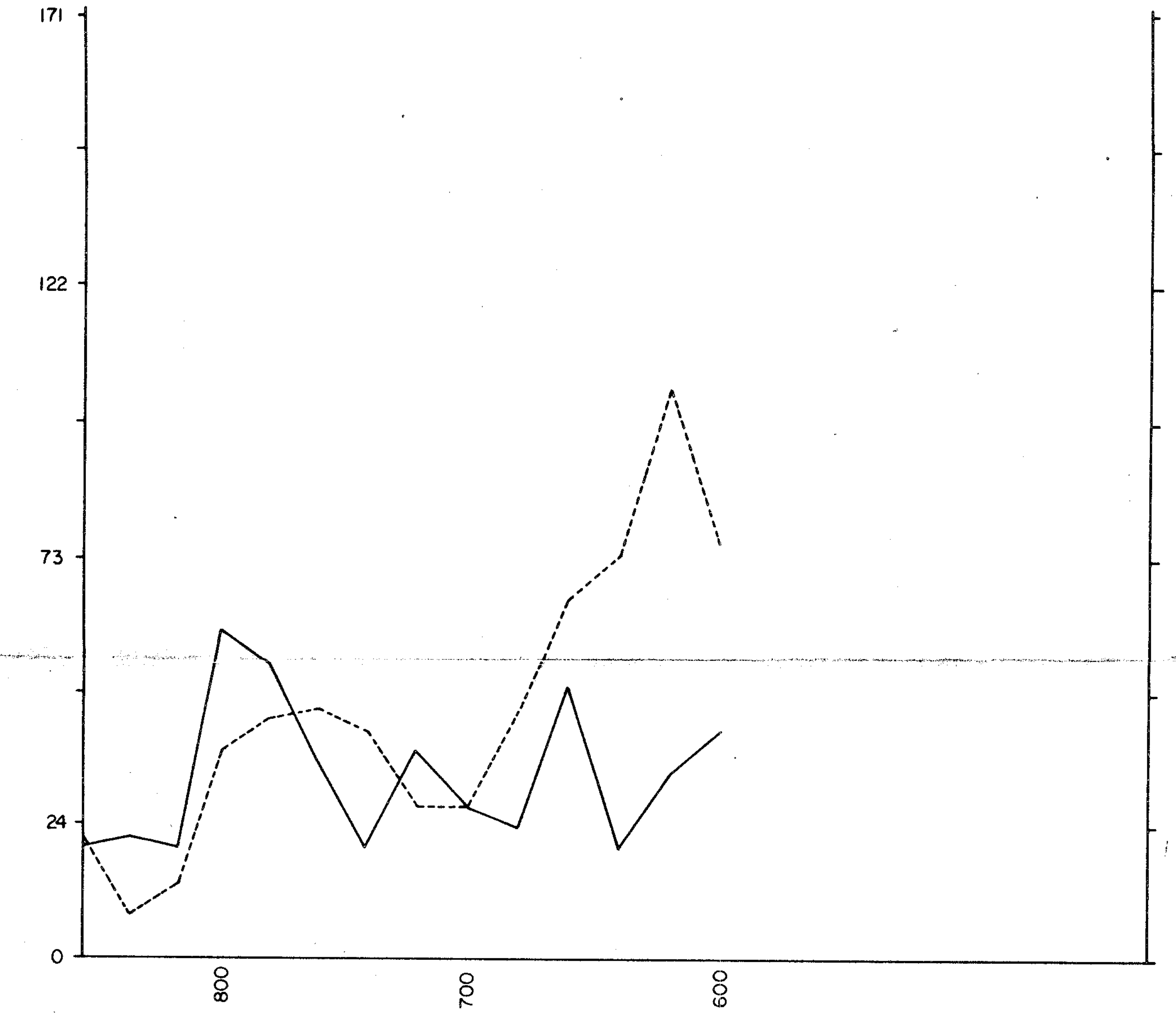
COMPILED	D.B.H. 6/78
DRAWN GEODRAFT	DATE 28/7/78
AMENDED	
SCALE	1 : 5000
PLAN No.	TAS/2/1602

85-24 944

TAS/2/1602 ADJOINS
5 381 000 N
5 380 000
5 379 000 N
376 000 E
377 000
378 000
379 000
380 000 E
62600
62500
nanoteslas
O.S.
C
L 900 N
L 800 N
L 700 N
L 600 N
L 500 N
L 400 N
L 300 N
L 200 N
L 100 N
L 00
L 100 S
L 200 S
L 300 S
L 400 S
L 500 S
L 600 S
L 700 S
L 800 S
L 900 S
L 1000 S
133105
5 cm
SHEET INDEX
TN
COMSTAFF PROPRIETARY LIMITED
CHESTER GRID - EAD
STACKED
GROUND MAGNETIC PROFILES
COMPILED D.B.H. 6/78
DRAWN GEODRAFT
DATE 26/7/78
AMENDED
SCALE 1 : 5000
PLAN No. TAS/2/1603.
1369



COPPER



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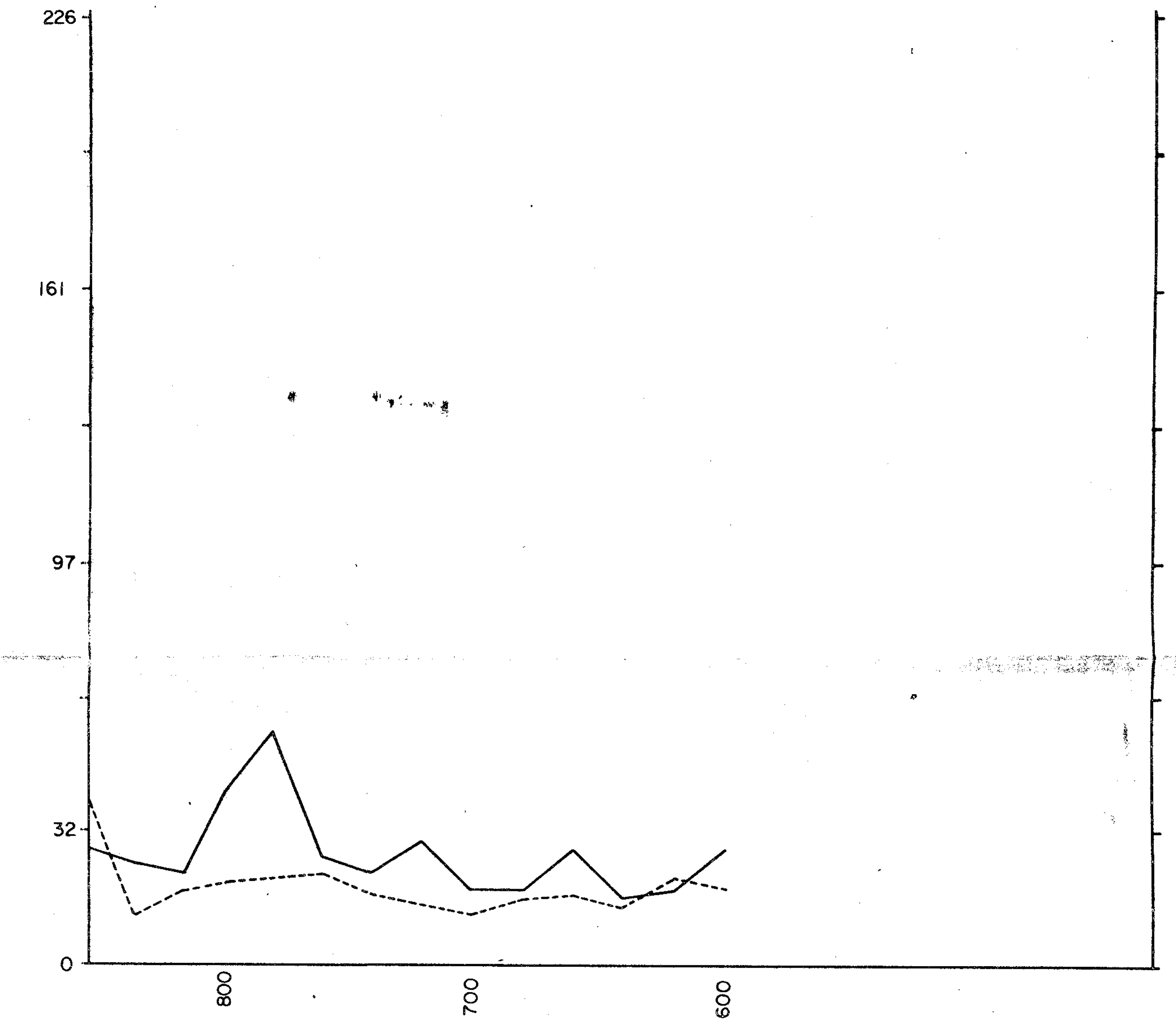
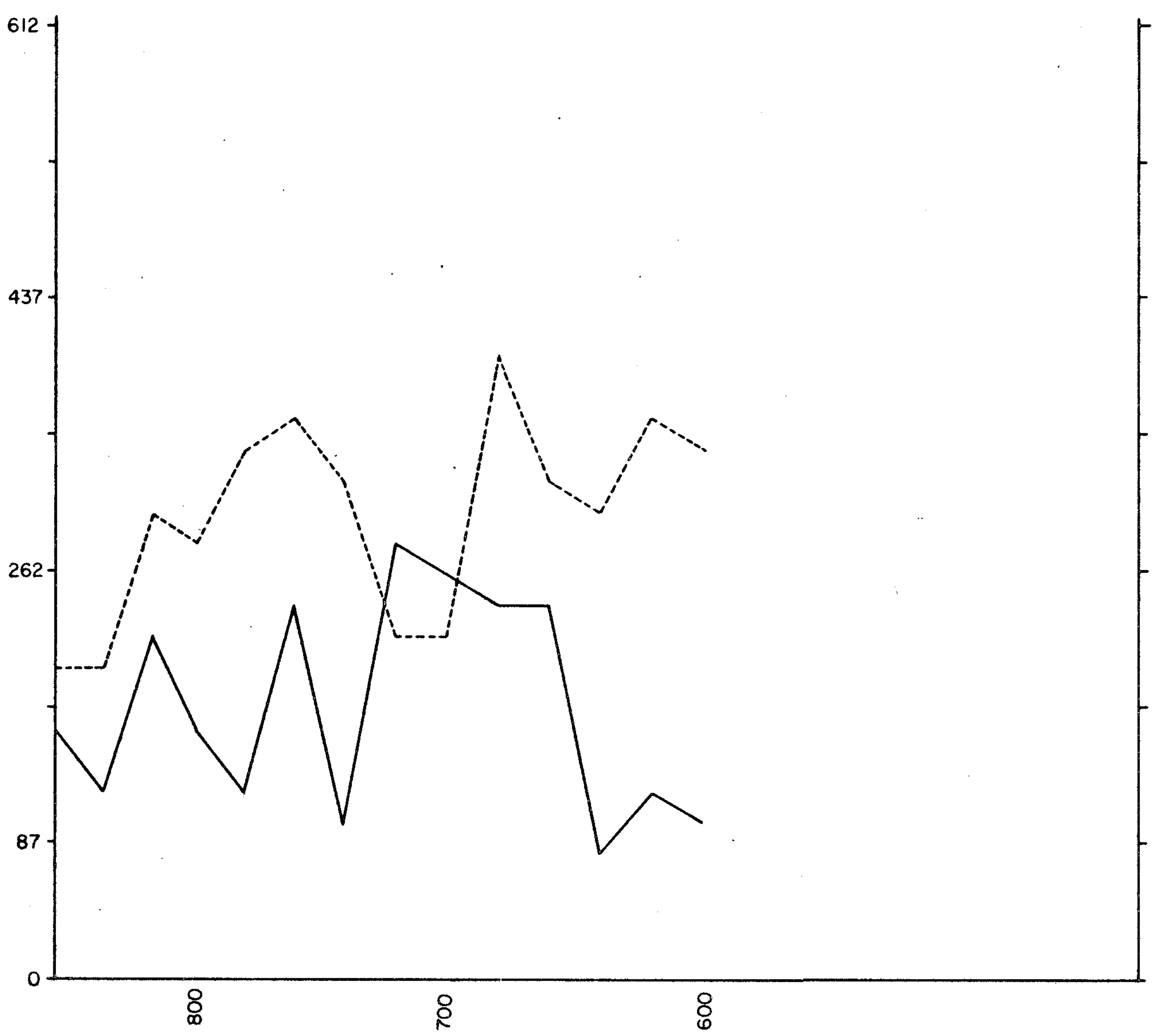
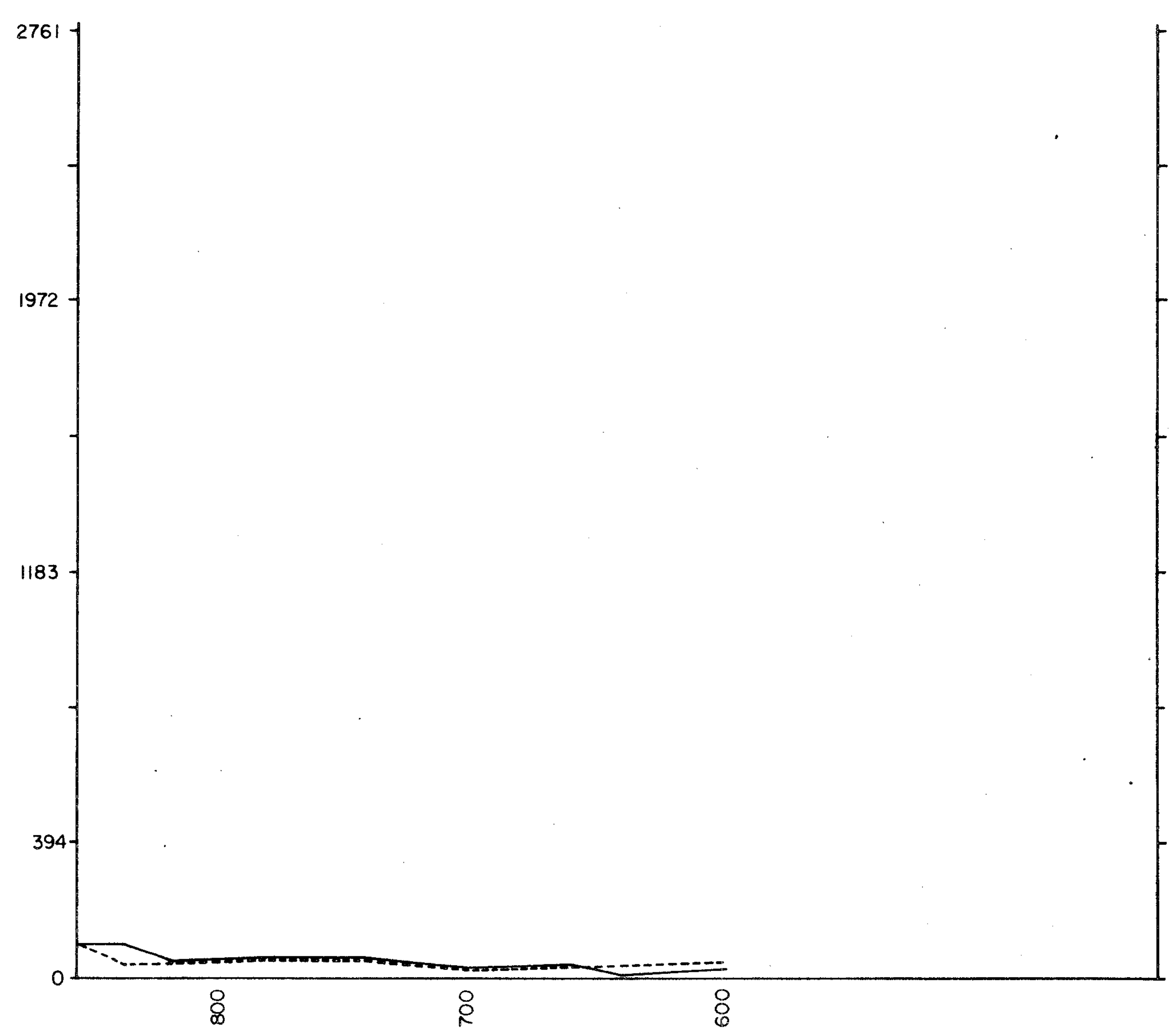


ZINC



BARIUM



MANGANESE

LEGEND

——— A° Horizon

- - - - C Horizon

5 cm

133100

85-2439 4/4

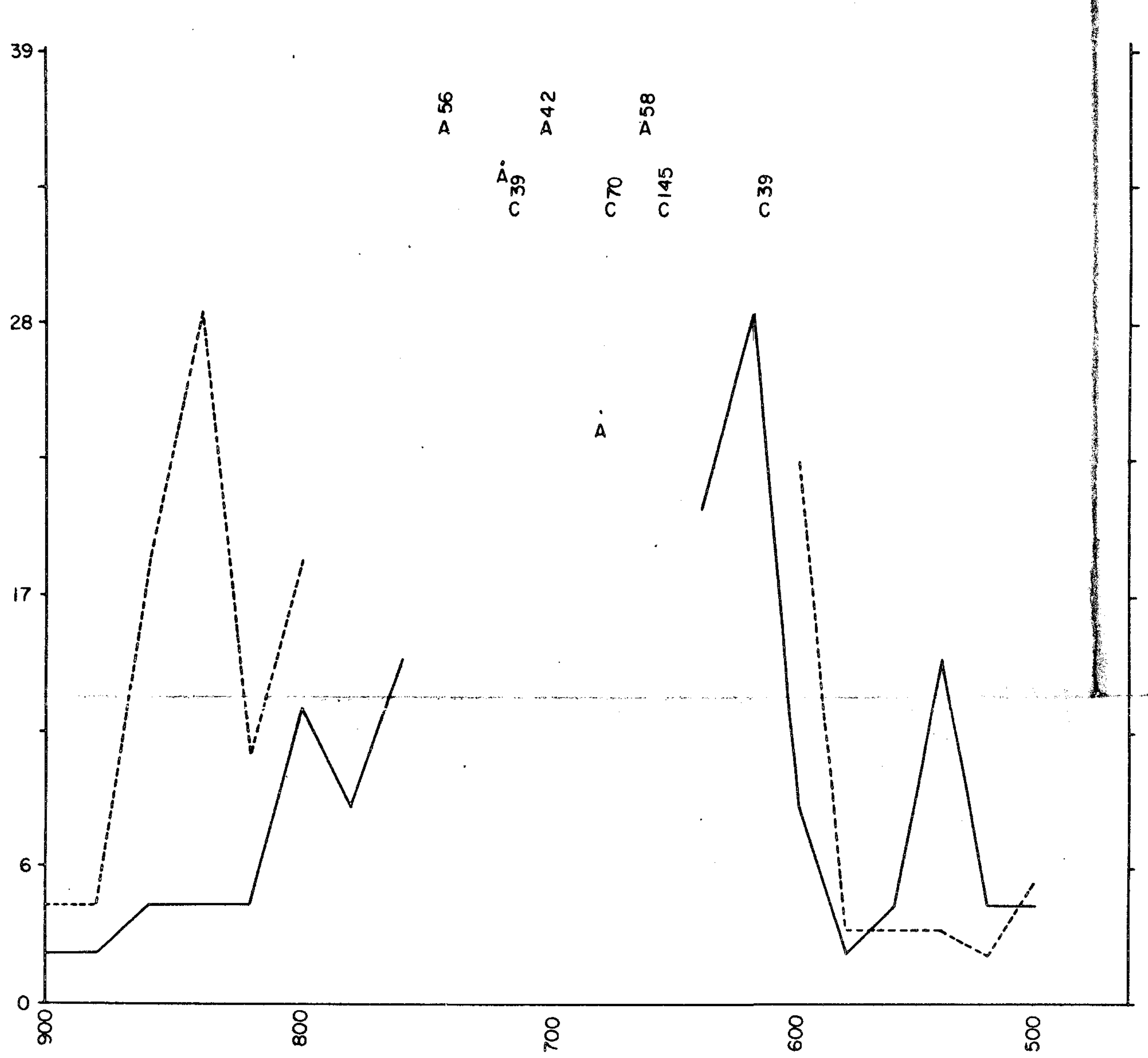
COMSTAFF PROPRIETARY LIMITED

CHESTER/PINNACLES GRID - EAD

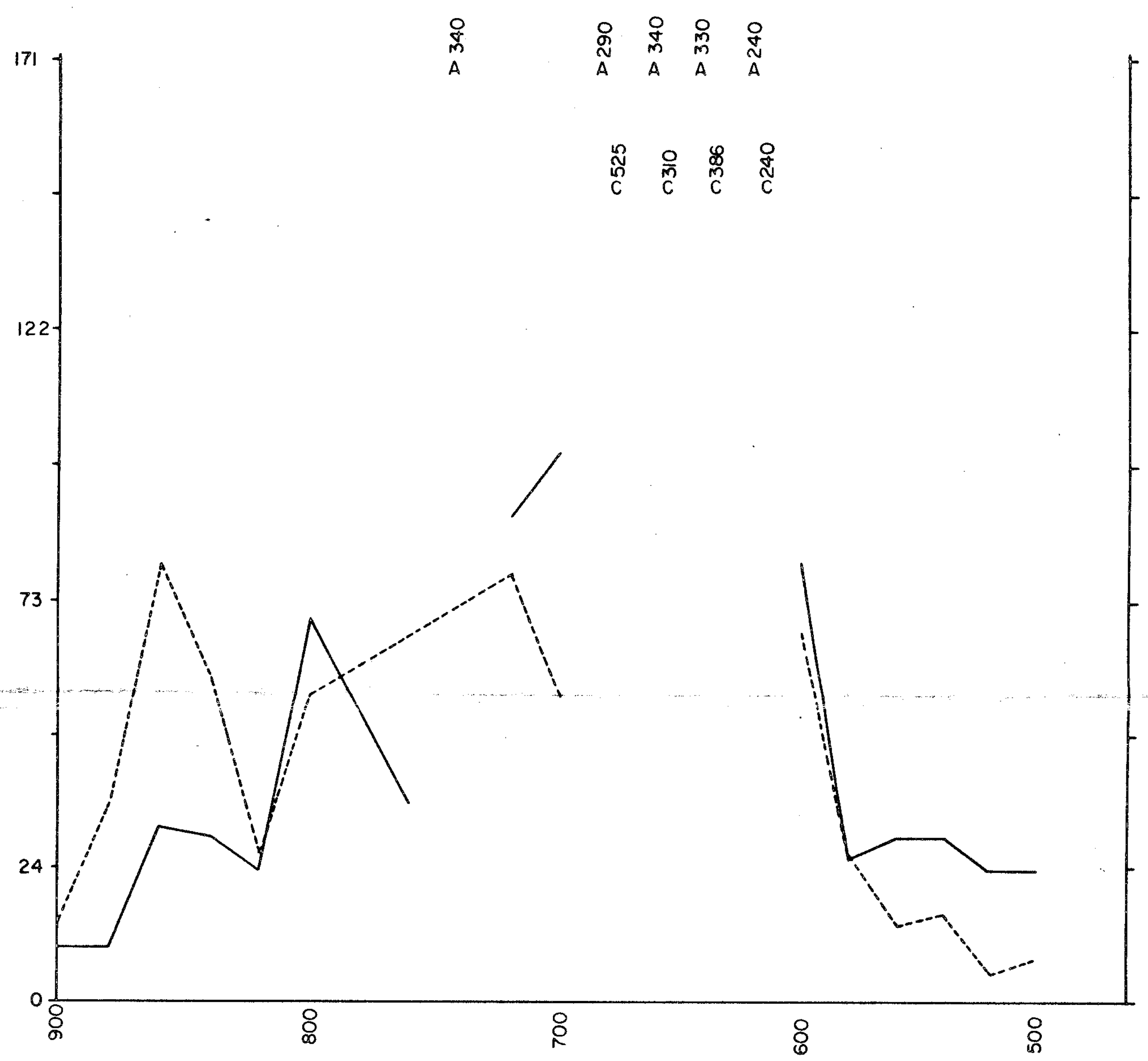
L 200 N 1370

COMPARISON OF A° & C GEOCHEM SAMPLING FOR Cu, Pb, Zn, Ba, Mn

DRAWN	COMPILED	SCALE	
GEODRAFT 8/78	D.B.H. 6/78	1 : 2500	TAS/2/1609



COPPER



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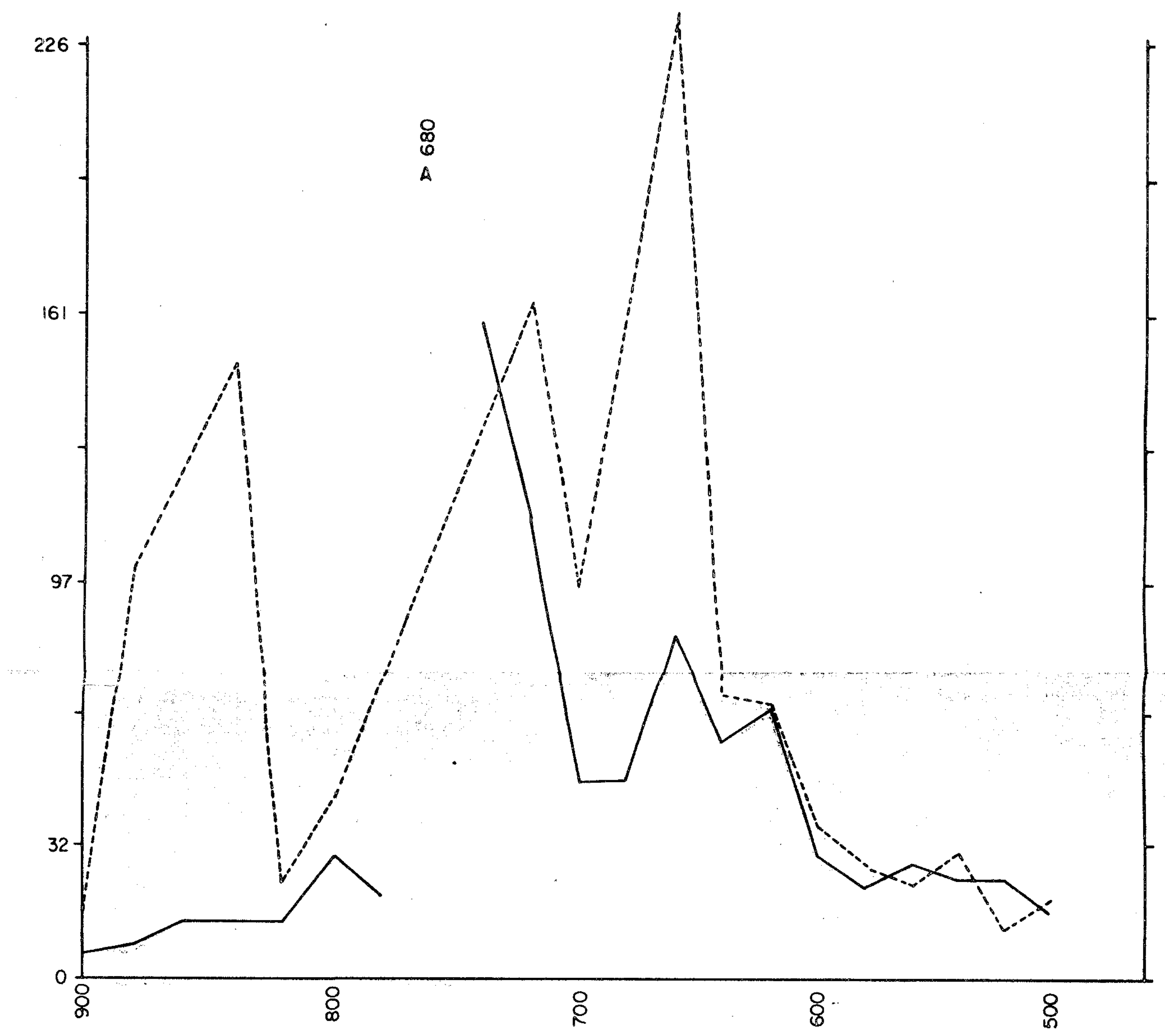

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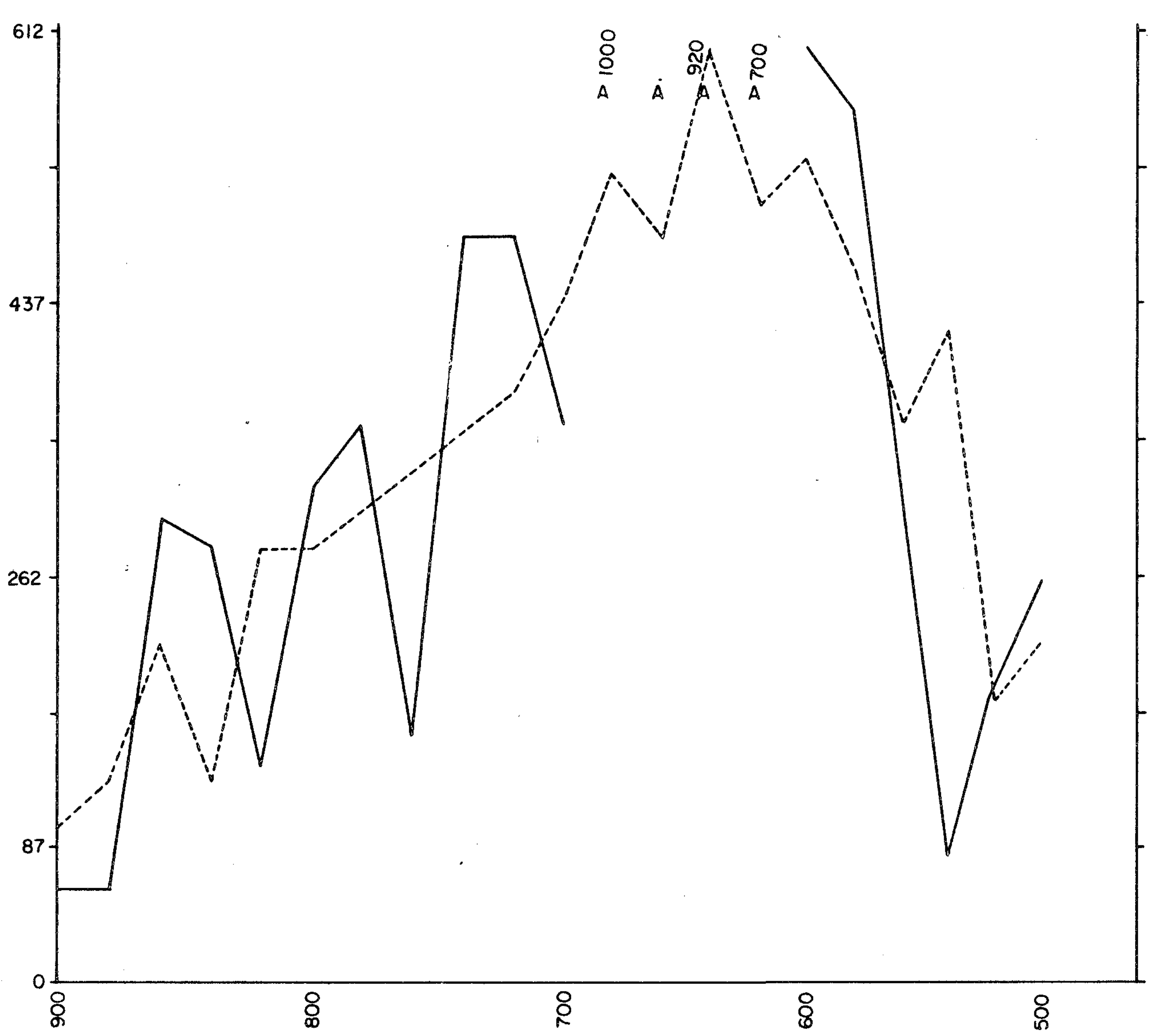
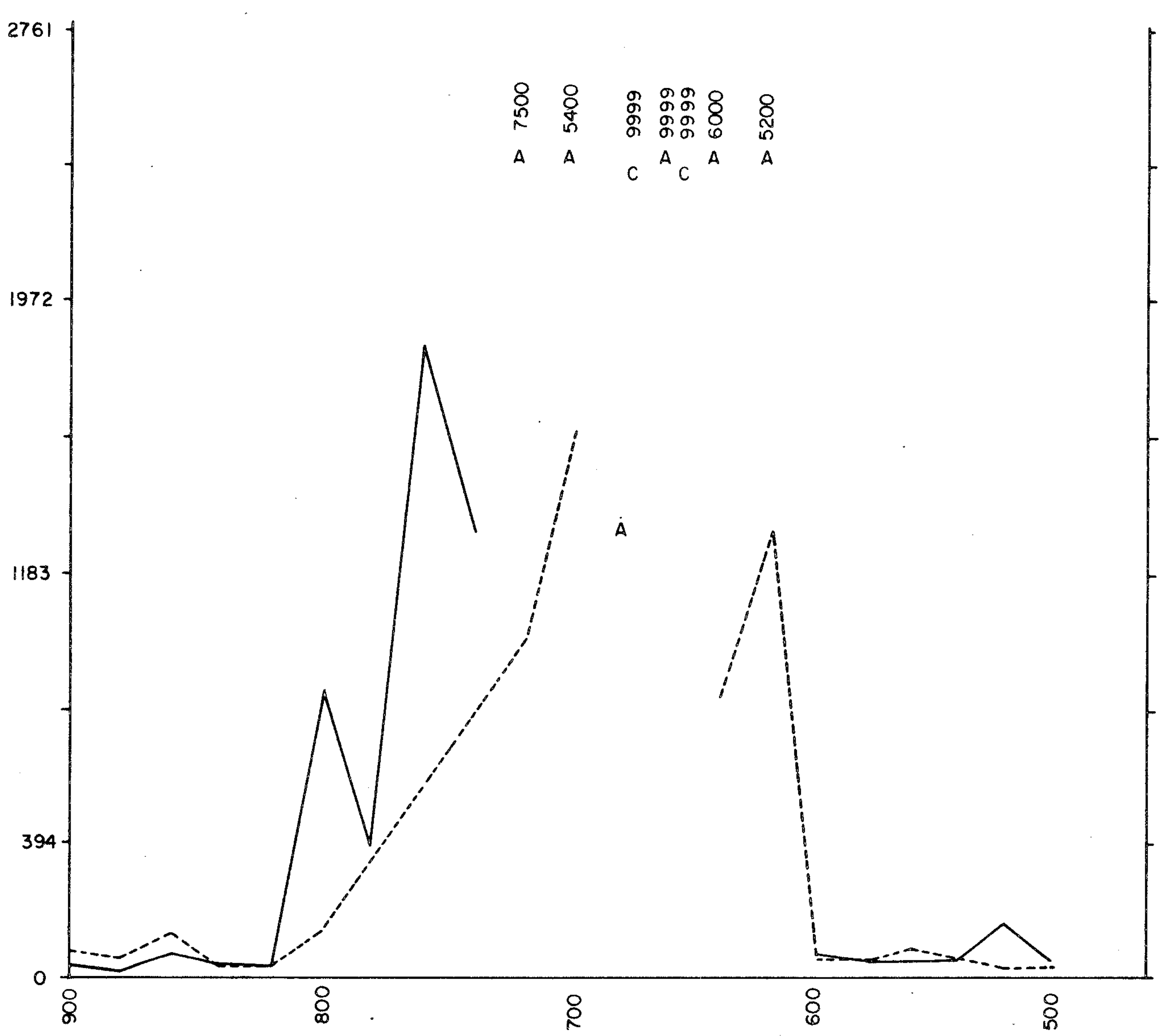


BARIUM



MANGANESE

LEGEND

——— A° Horizon

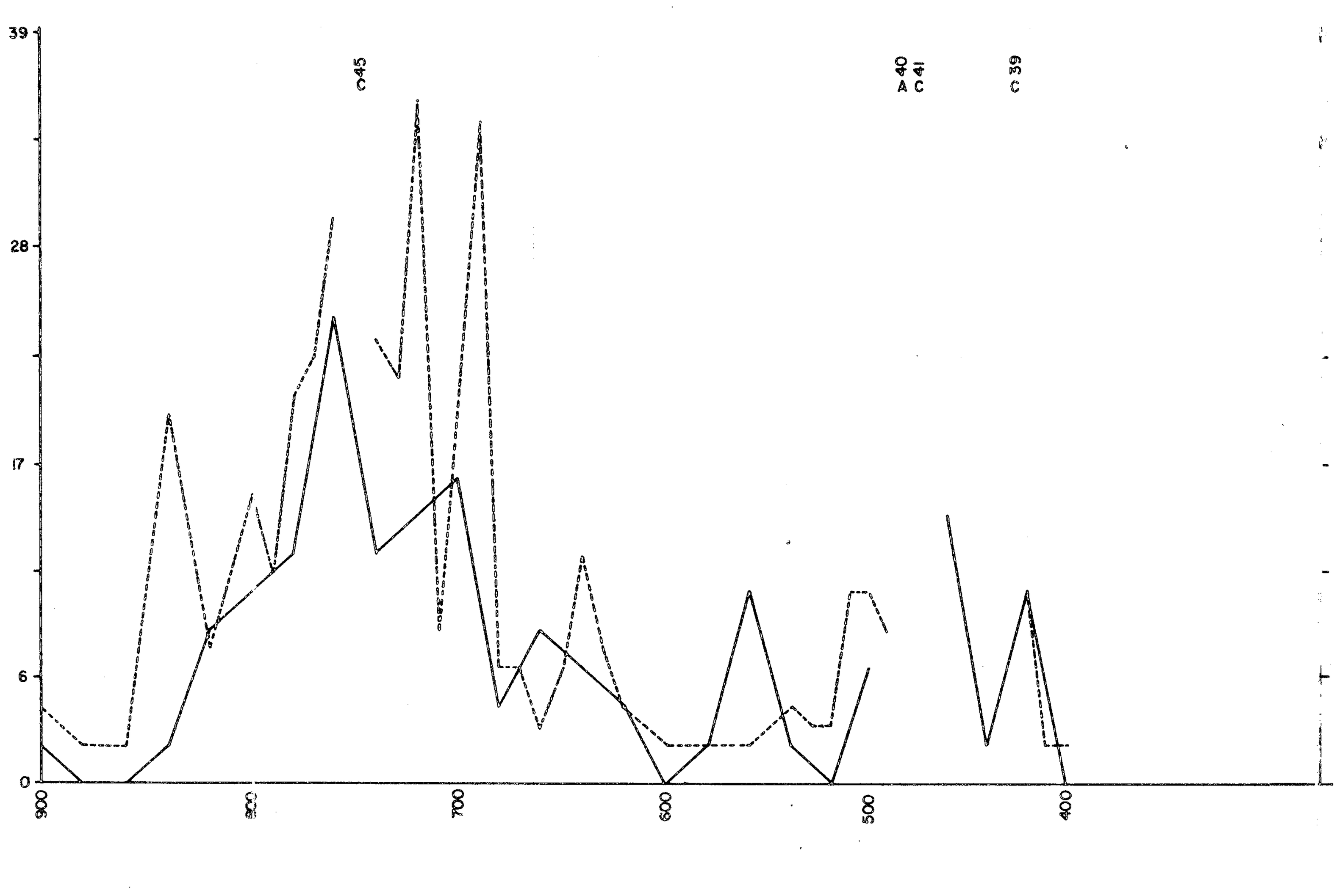
- - - - C Horizon

5 cm

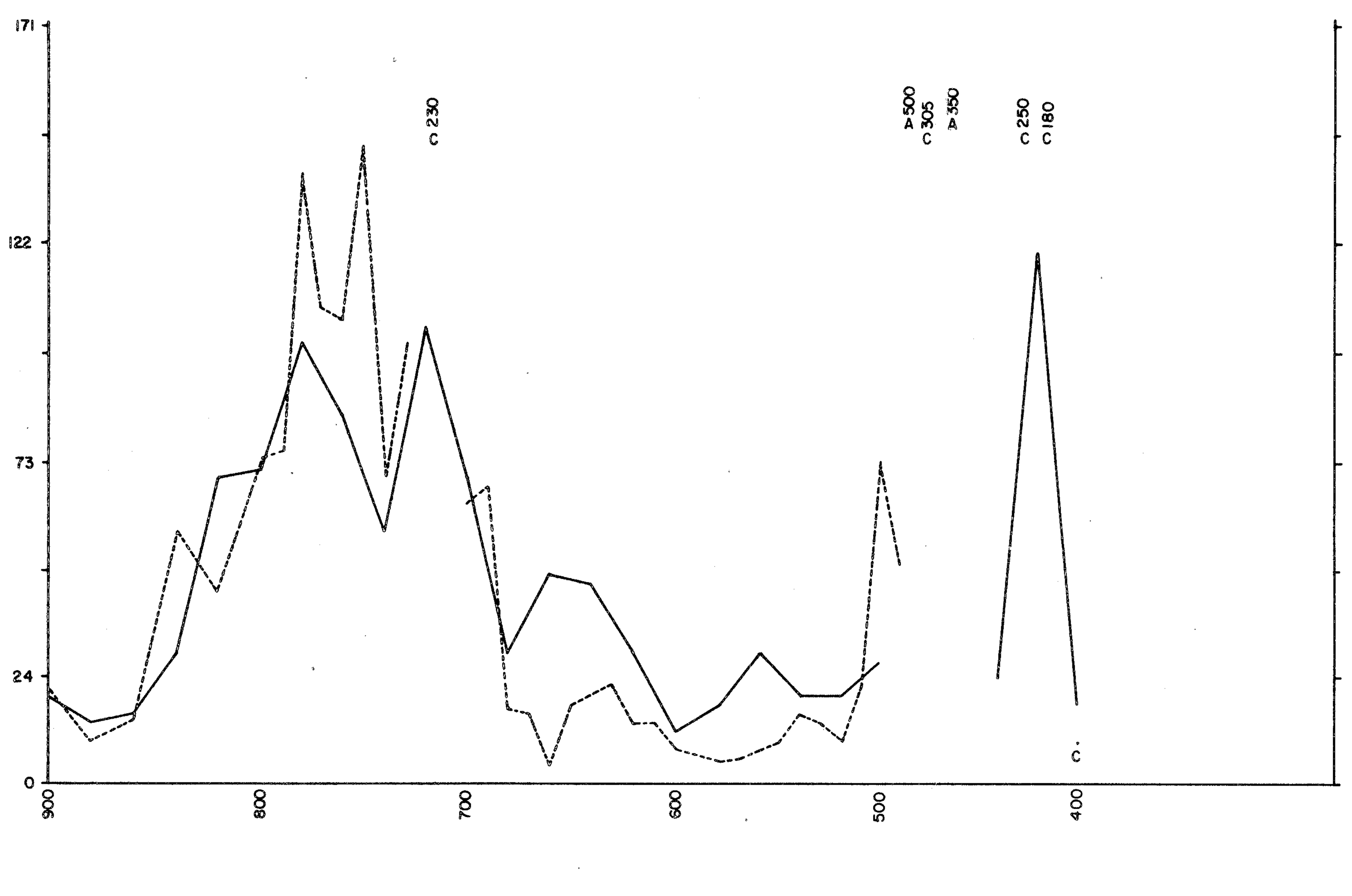
133107

85 - 2439 4/4

COMSTAFF PROPRIETARY LIMITED			
CHESTER/PINNACLES GRID - EAD L 400 N 1371			
COMPARISON OF A° & C GEOCHEM SAMPLING FOR Cu, Pb, Zn, Ba, Mn			
DRAWN GEODRAFT 8/78	COMPILED D.B.H. 6/78	SCALE 1 : 2500	TAS/2/1610



COPPER



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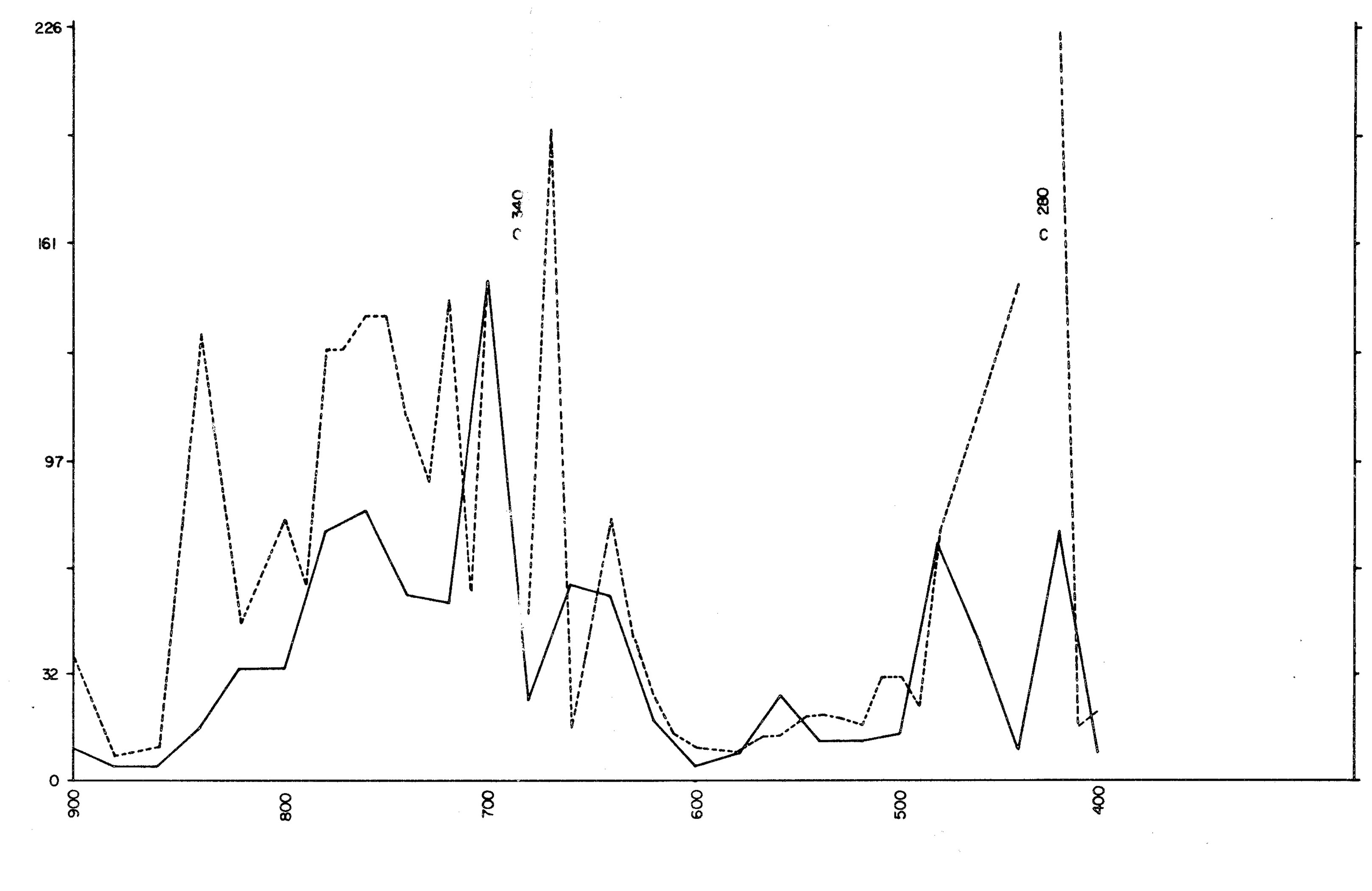

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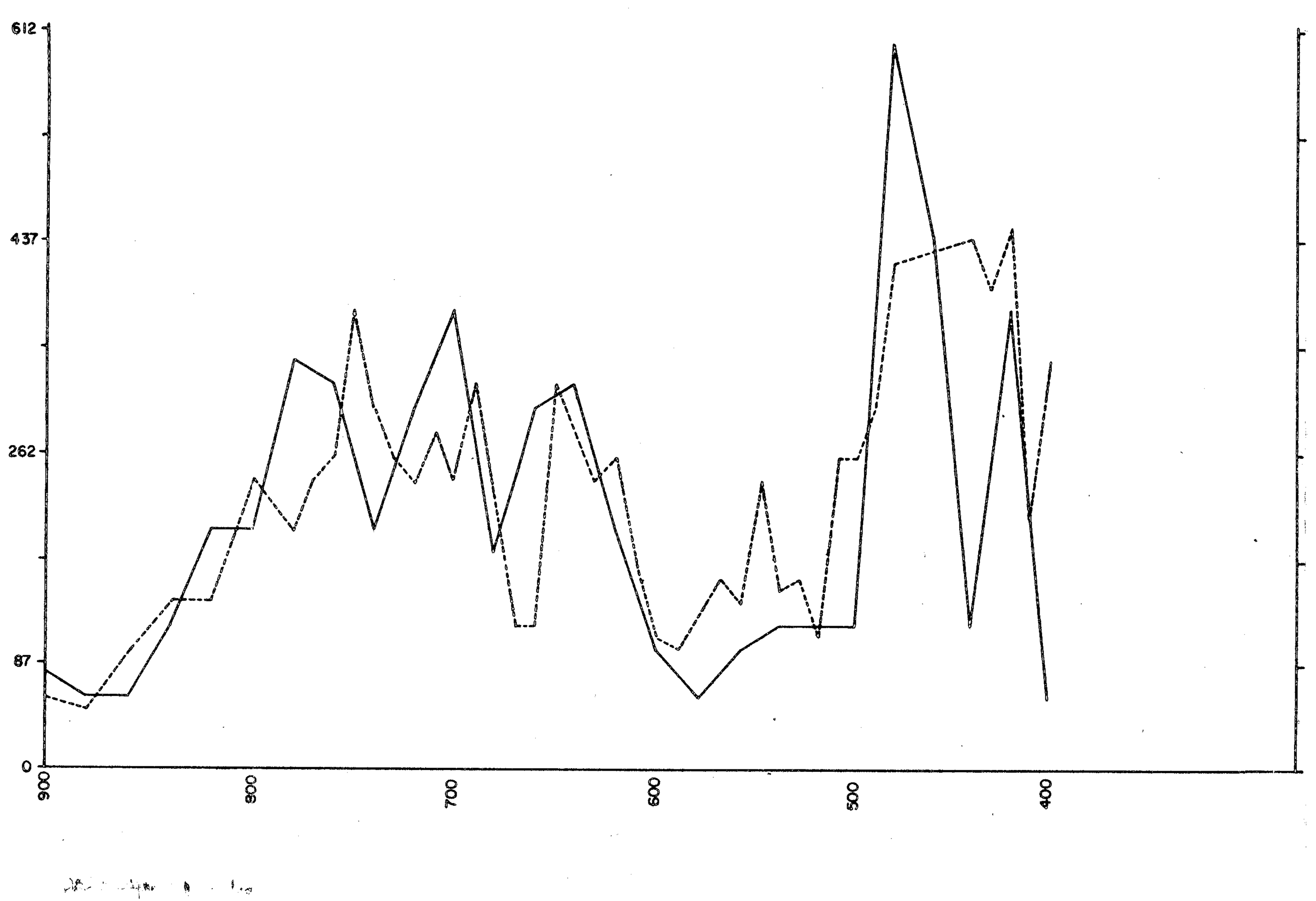

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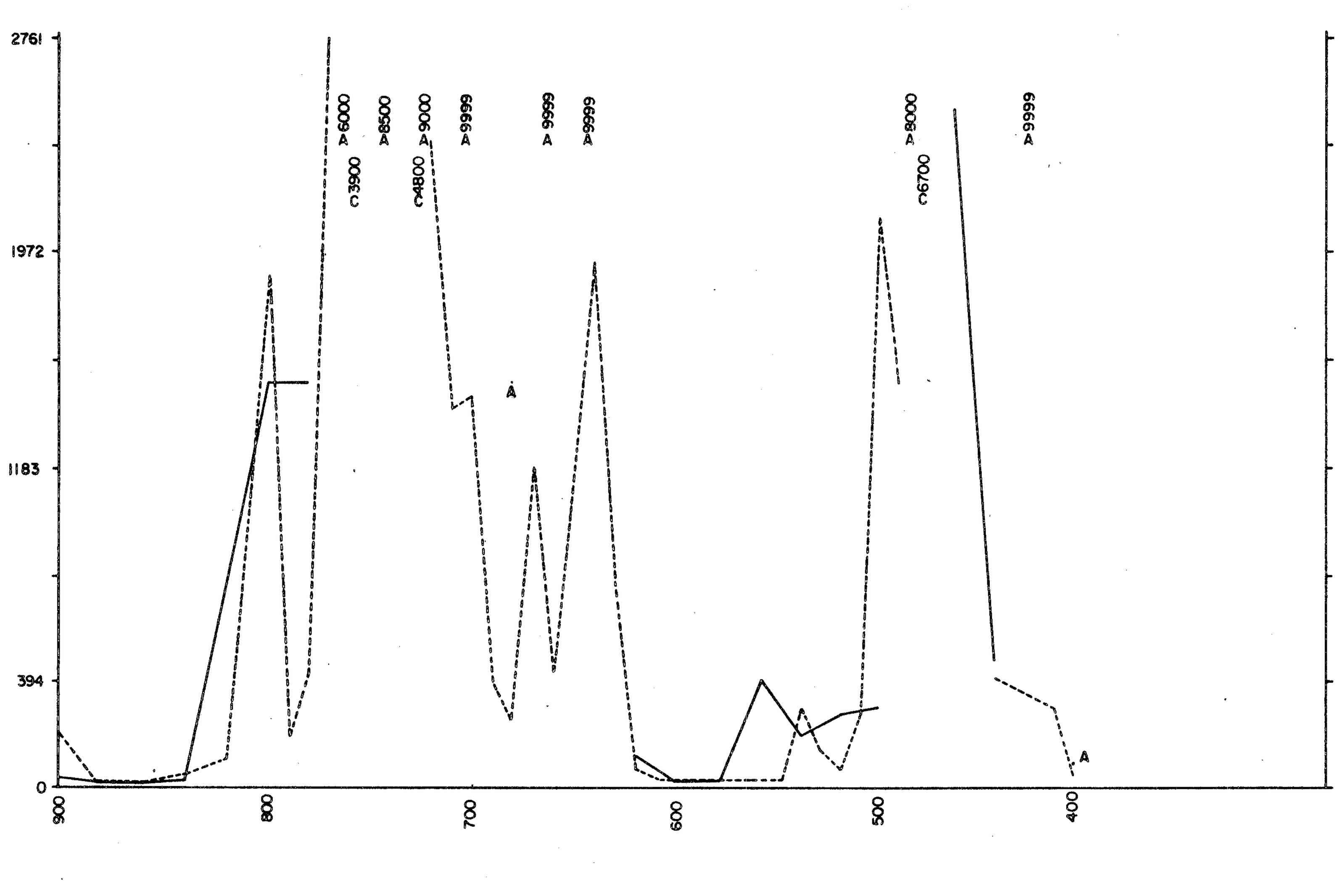


MANGANESE

LEGEND

——— A° Horizon
- - - - C Horizon

5 cm

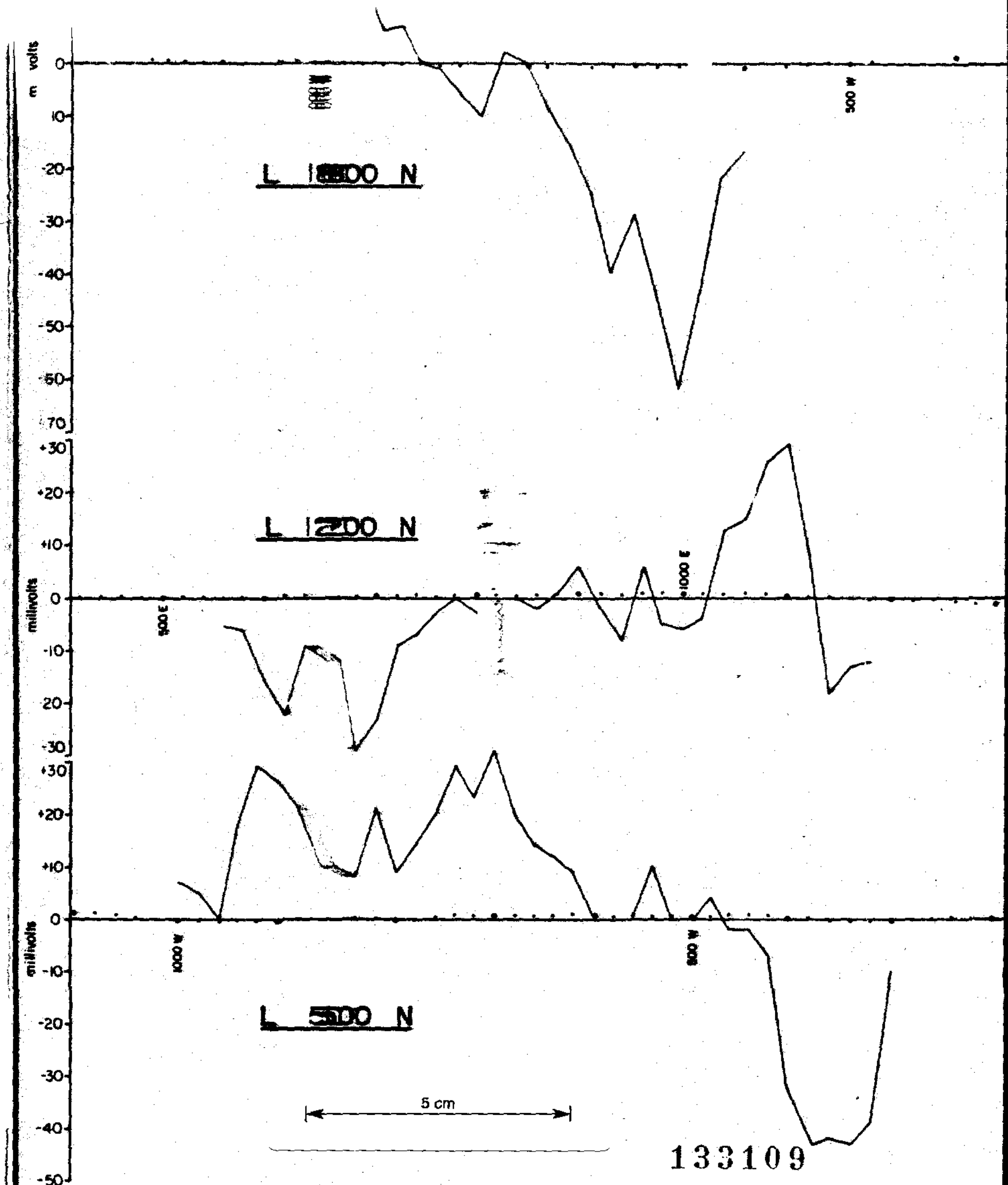
133108 85-2439 44

AUSTRALIAN ANGLO AMERICAN LIMITED

CHESTER/PINNACLES GRID - EAD
L 600 N

COMPARISON OF A° & C GEOCHEMICAL SAMPLING
FOR Cu, Pb, Zn, Ba, Mn 1372

COMPILED D.B.H. 6/78	
DRAWN GEODRAFT	DATE 1/8/78
AMENDED	
SCALE 1 : 2500	
PLAN No. TAS/2/1611	



133109

COMSTAFF PROPRIETARY LIMITED

CHESTER / PINNACLES AREA - EAD

SELF POTENTIAL PROFILES FOR LINES 500 N, 1200 N, 1800 N

DRAWN	COMPILED	SCALE	
GEODRAFT 7/78	D.B.H. 6/78	1 : 5000	TAS/2/1608

-2439

4/4

963