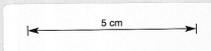




FOR GEOLOGICAL LEGEND SEE PLAN TAS/2/1554
1619

SHEET INDEX

	370				
	1	2	1	2	
	A		A	B	
370	4	3	4	3	370
	1	2	1	2	
	D		D	C	
	4	3	4	3	
	1	2	1	2	
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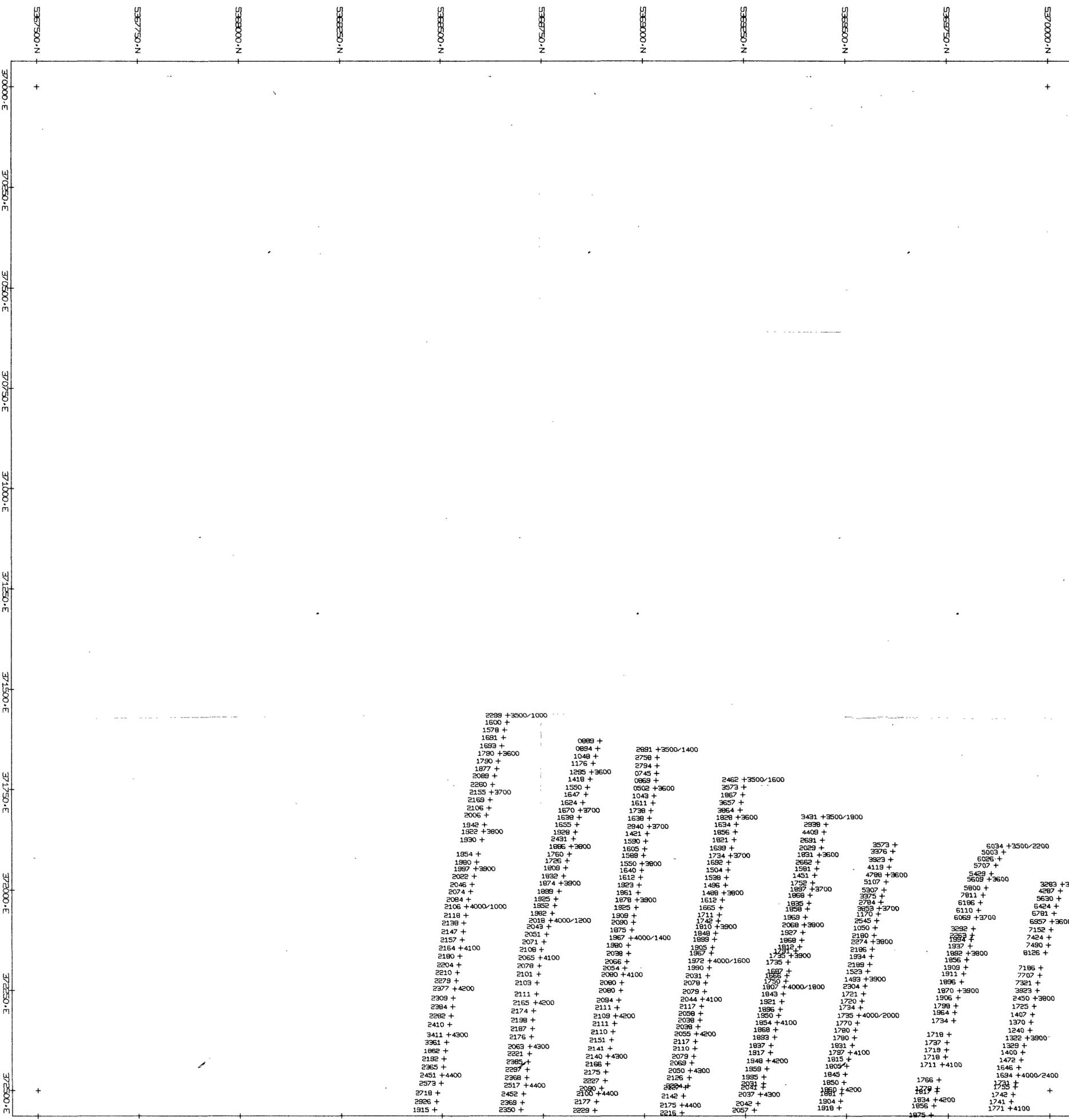


210178 48-1316 - App 1

COMSTAFF PROPRIETARY LIMITED

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DETAILED GEOLOGICAL FIELD PLAN

COMPILED	G. F. P.
DRAWN	DATE
AMENDED	6/78
SCALE	1 : 2500
PLAN NO.	TAS/2/1497



210179

COMSTAFF PROPRIETARY LIMITED

RENISON GRID - GAP

SHEET 370365 - A

596

GEOPHYSICAL PLAN

MAGNETIC VALUES (in nanoteslas)

DATE 3/6/78

COMPILED BY COMPUTER

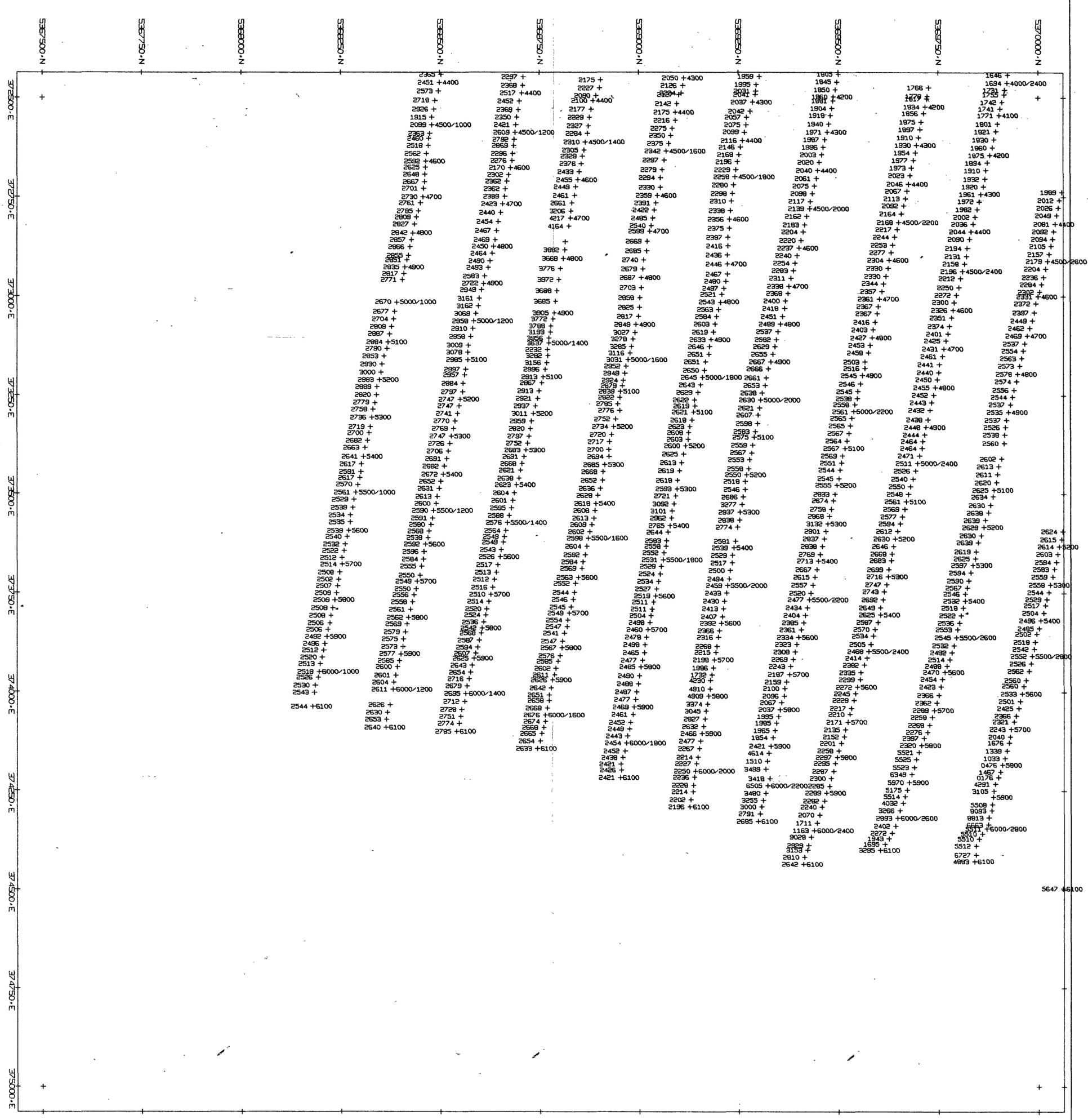
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TAS/2/1518



78-1316

1302



5647 +6100

COMSTAFF PROPRIETARY LIMITED
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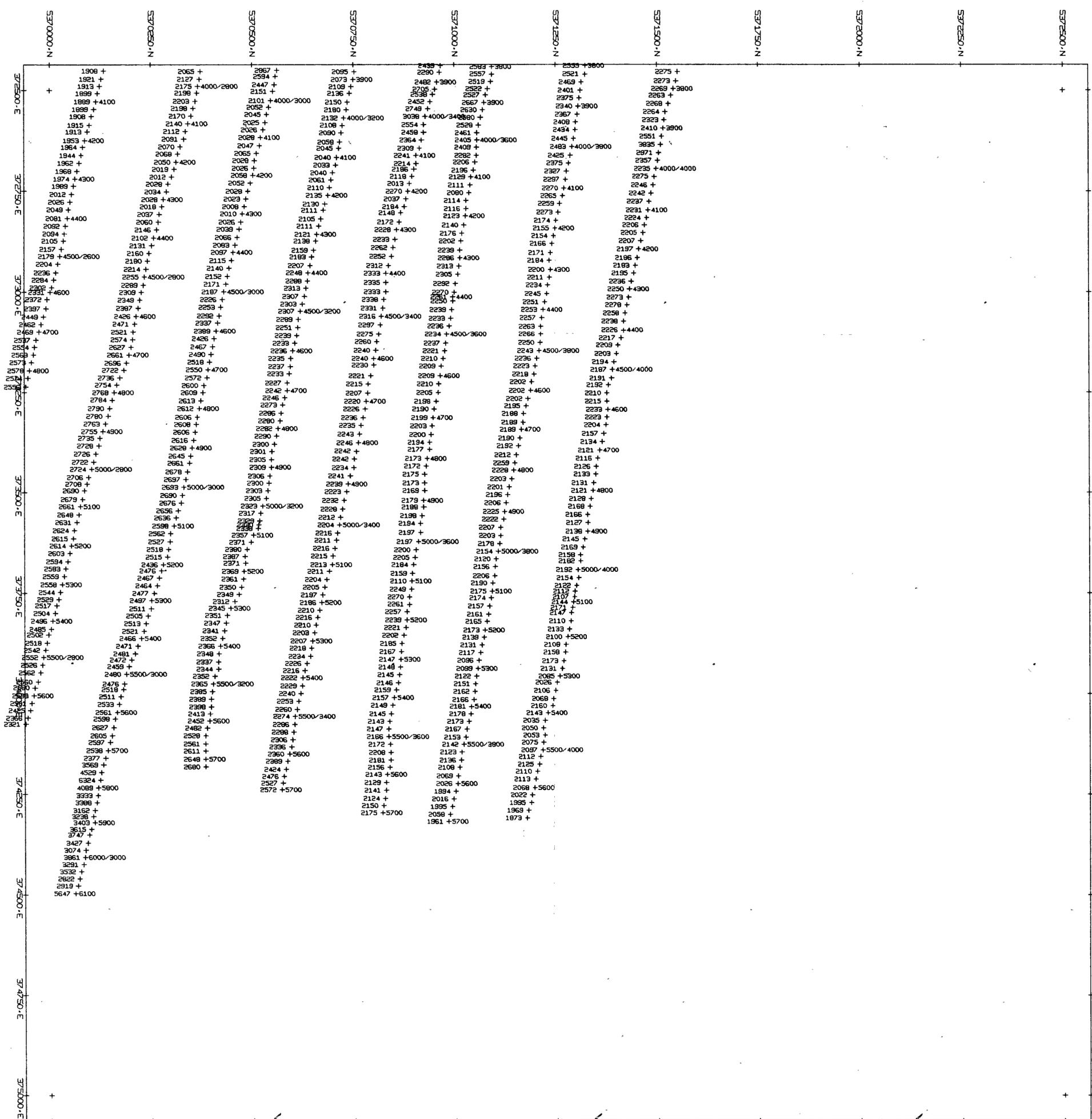
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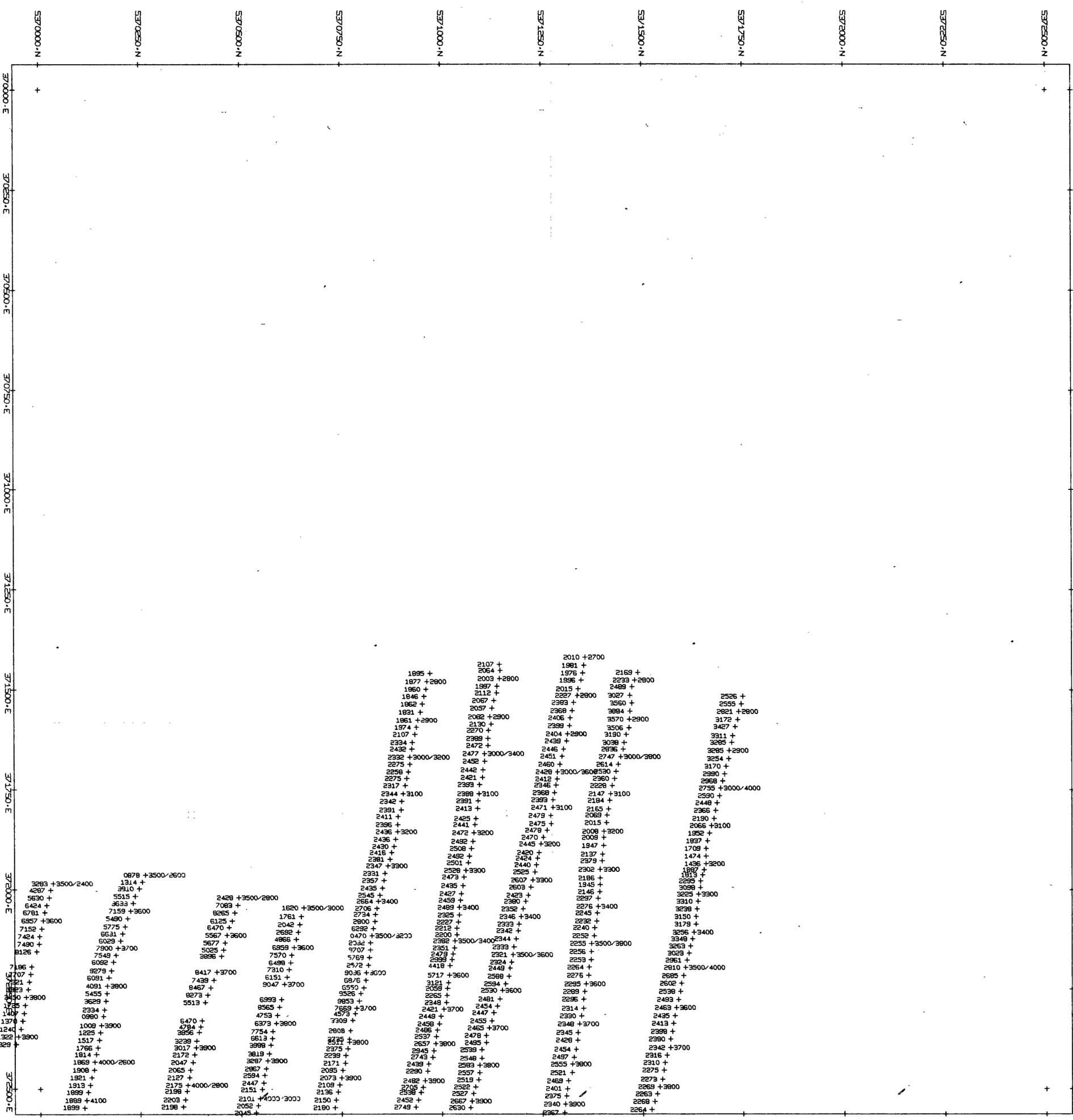


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TAS/2/1519	



210181
 78-316
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COMSTAFF PROPRIETARY LIMITED
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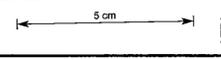




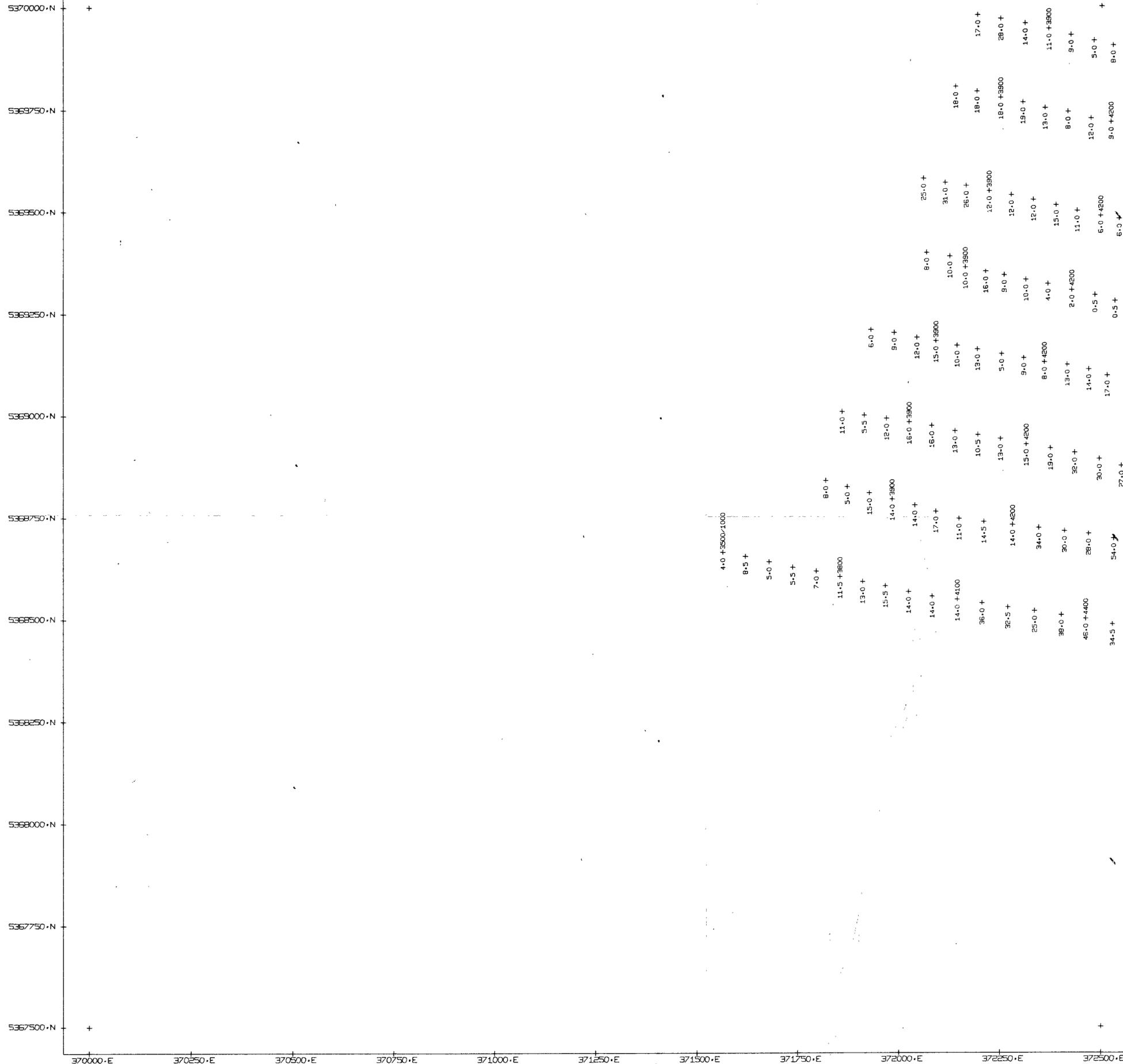
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78-1316 App 1



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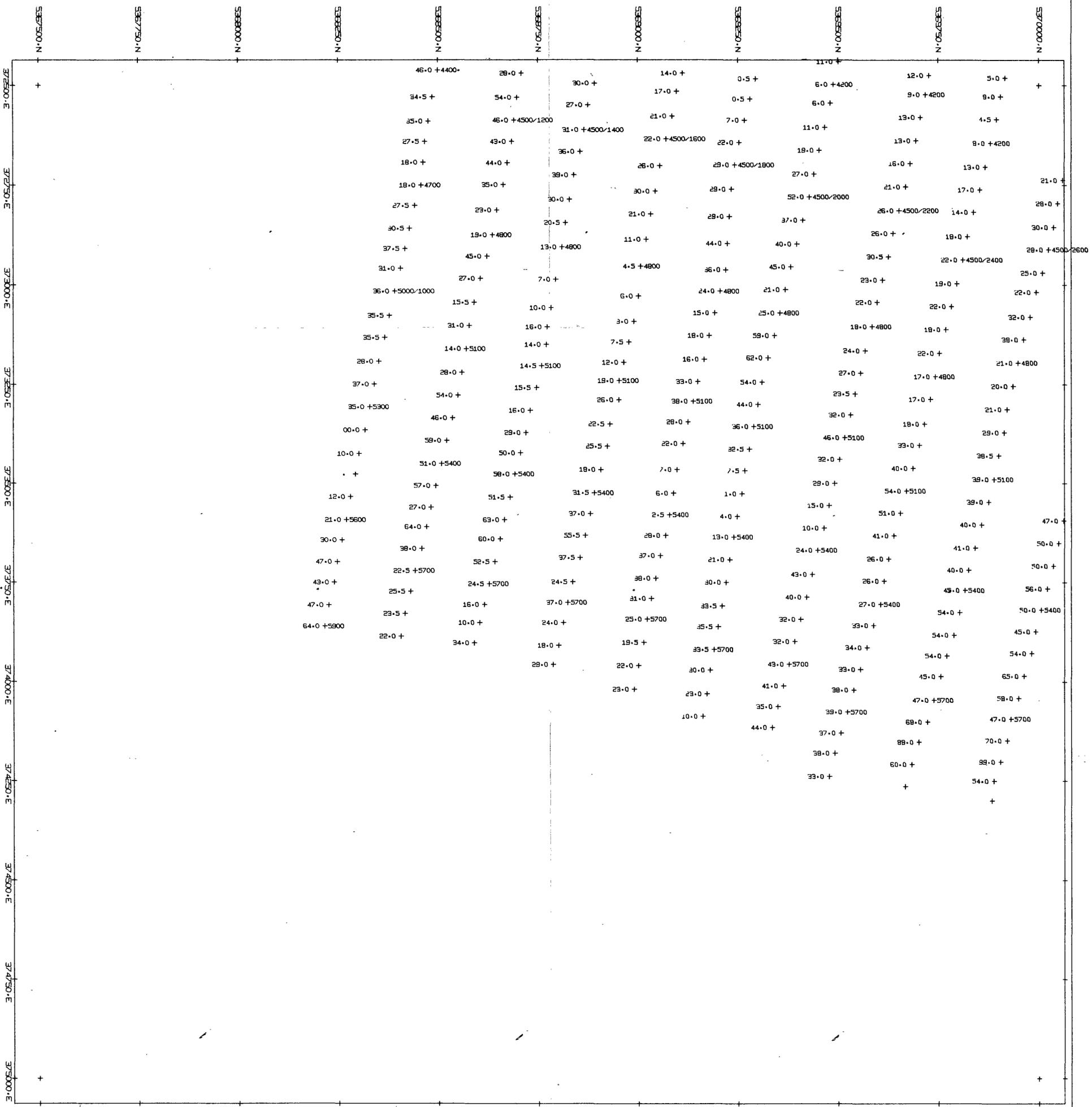


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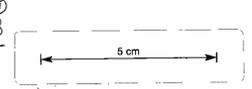
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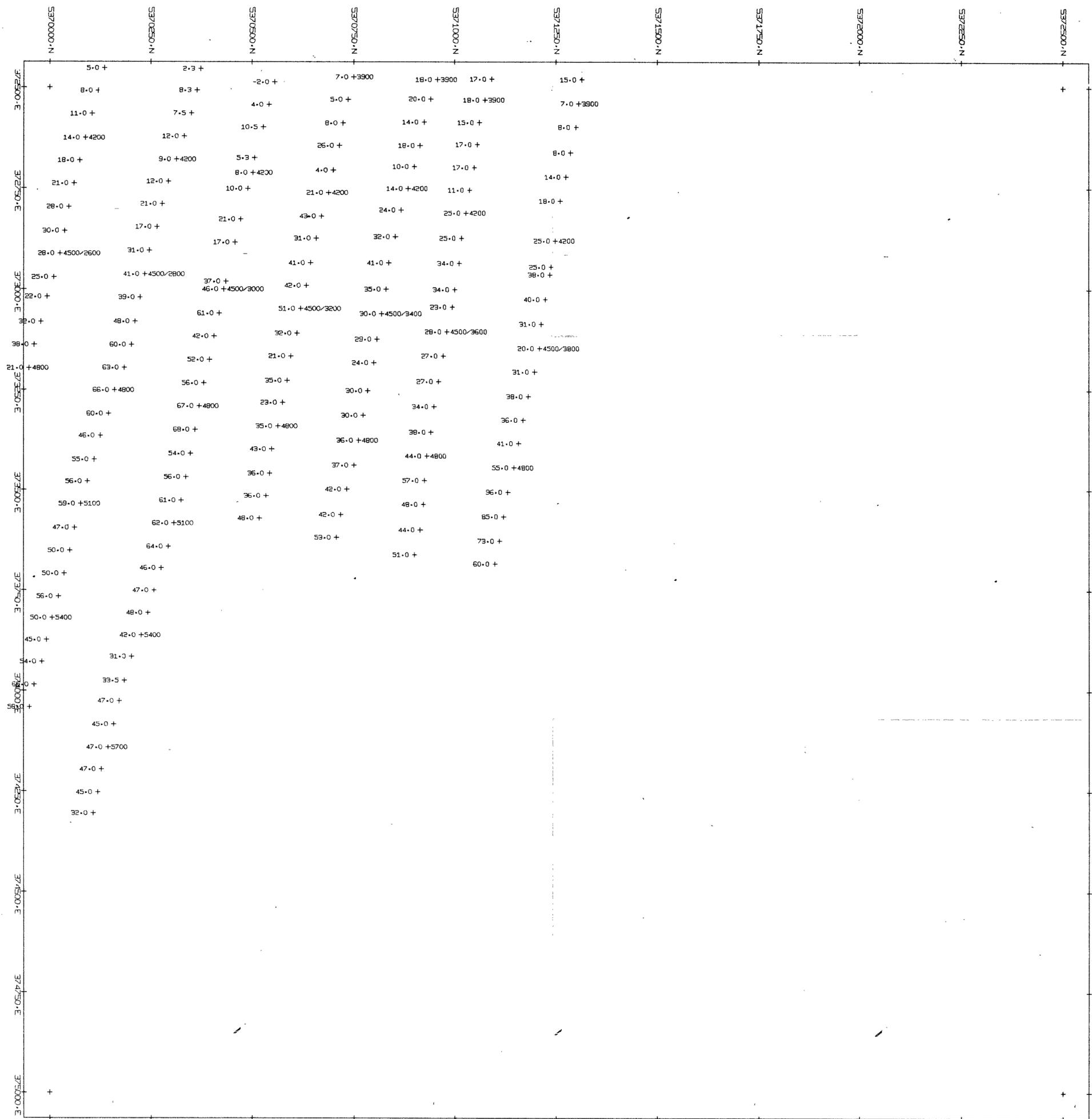
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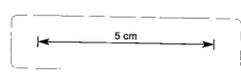


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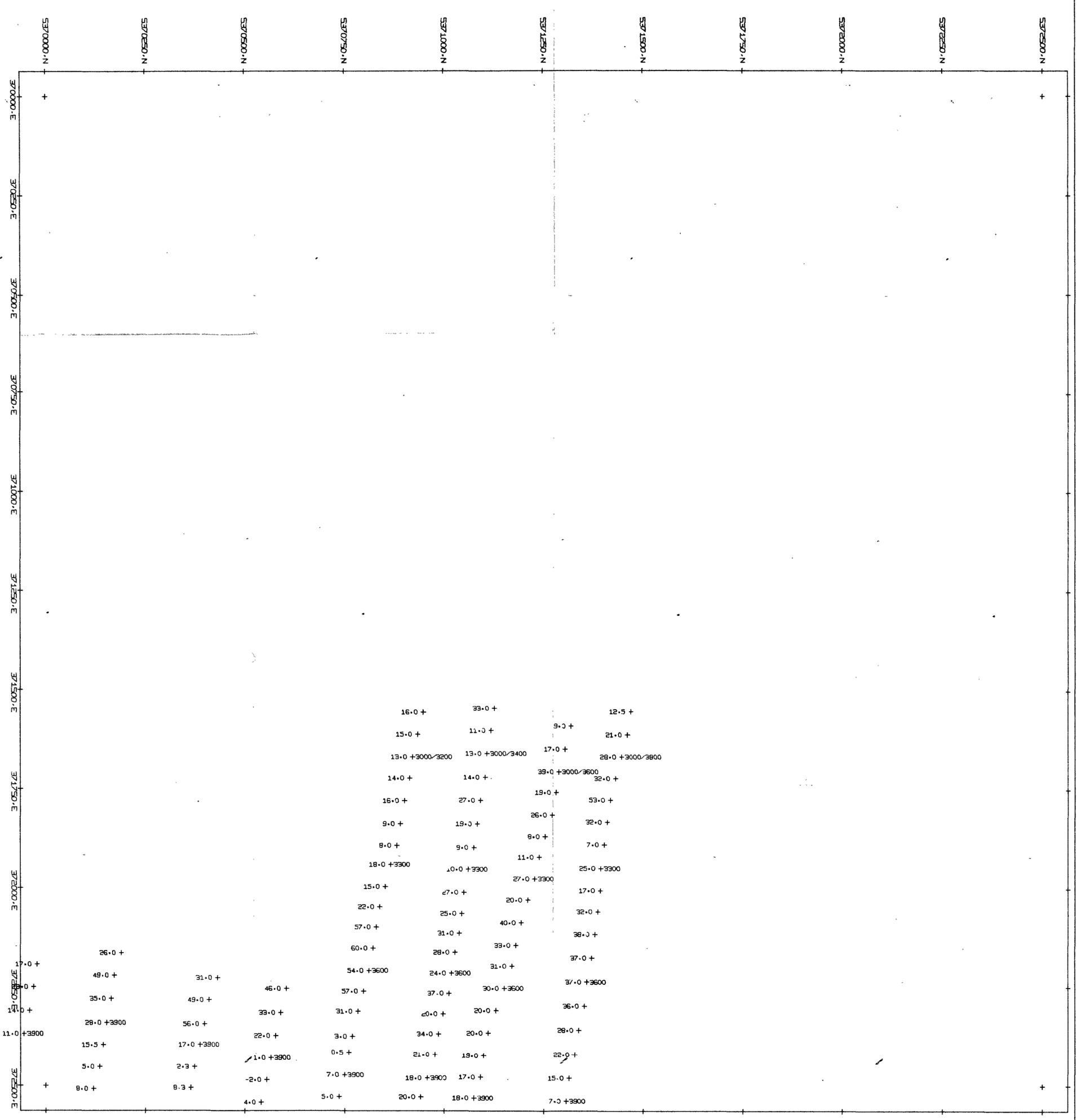




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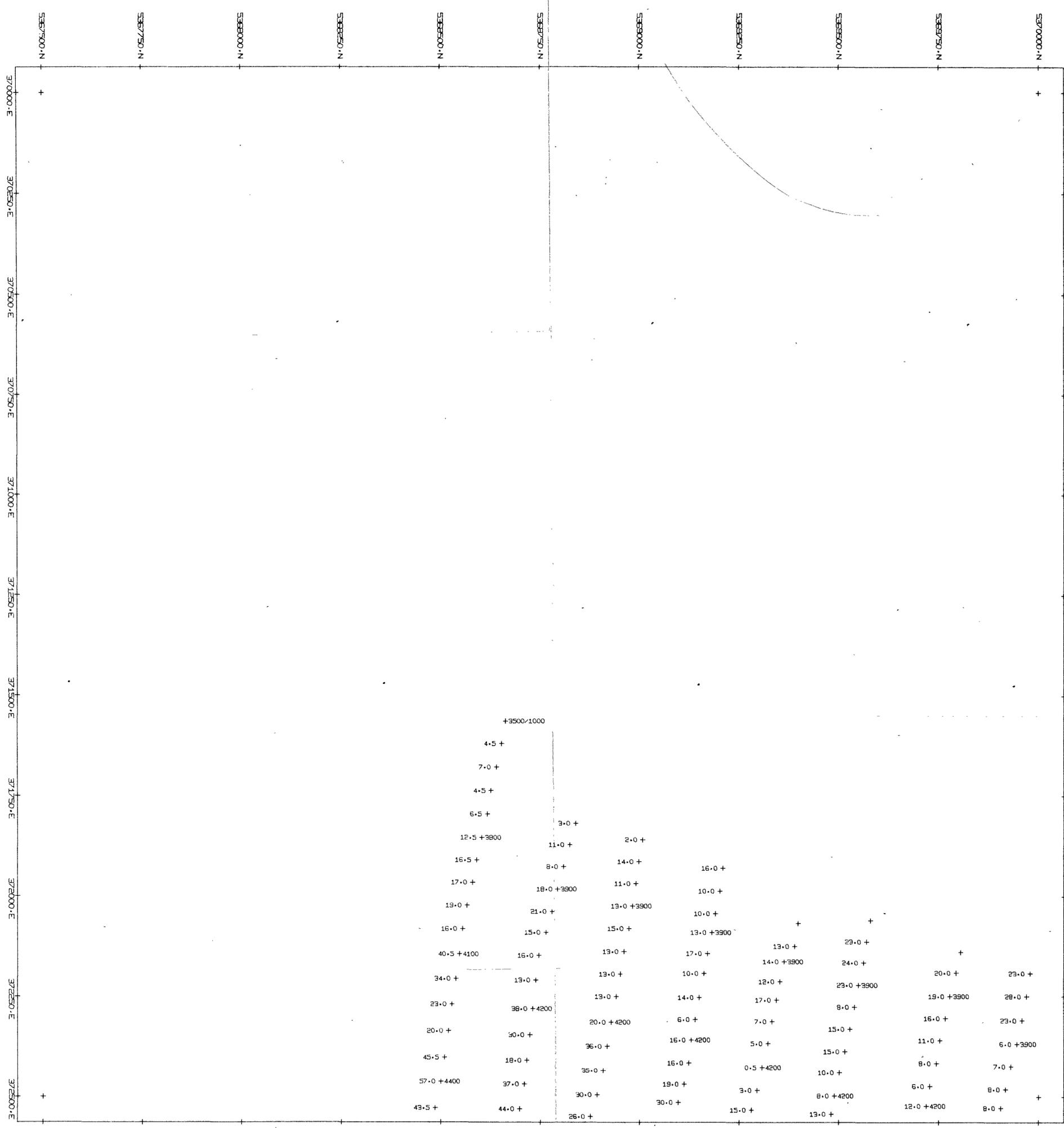
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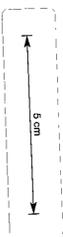
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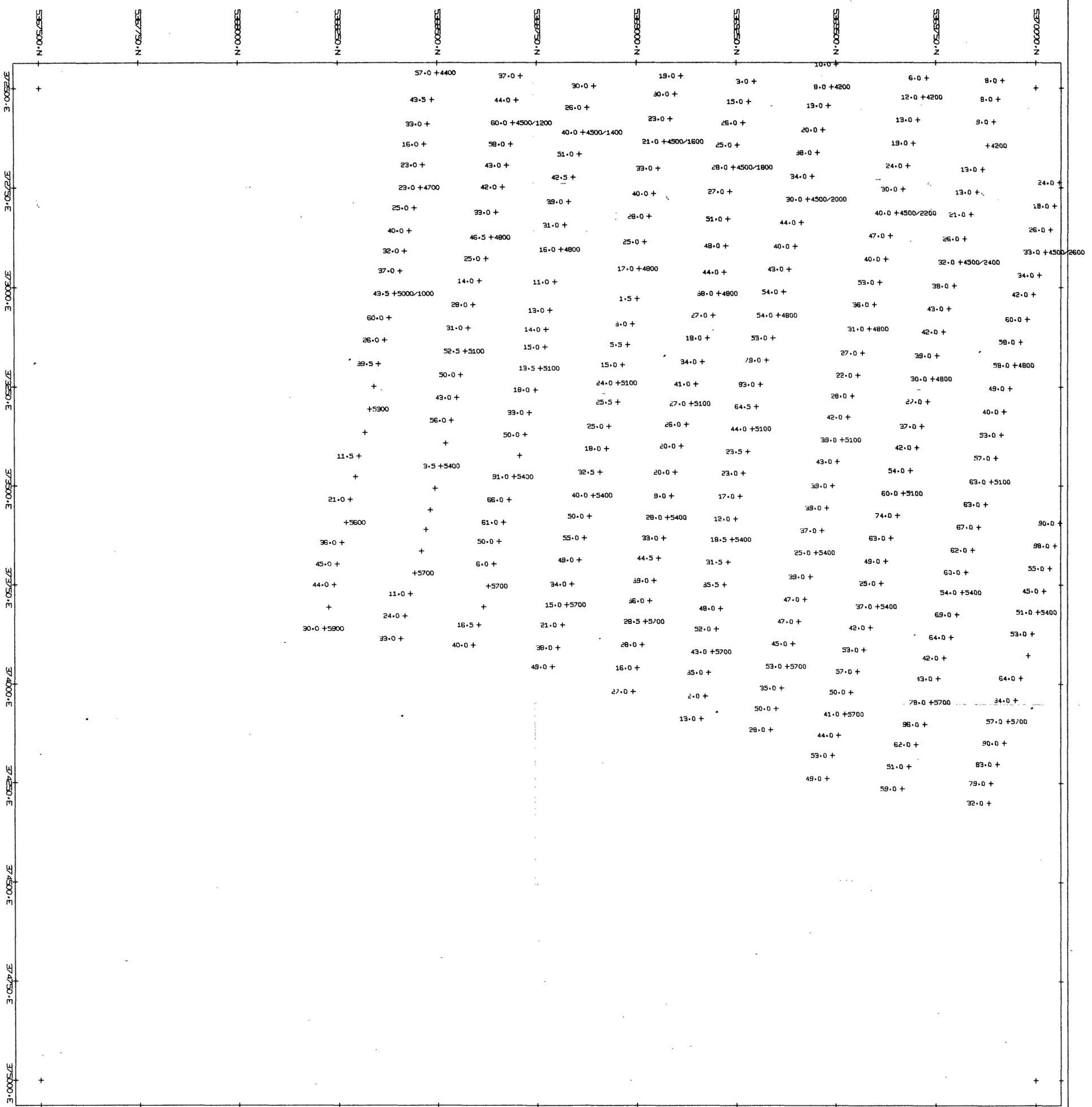




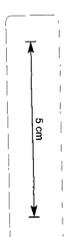
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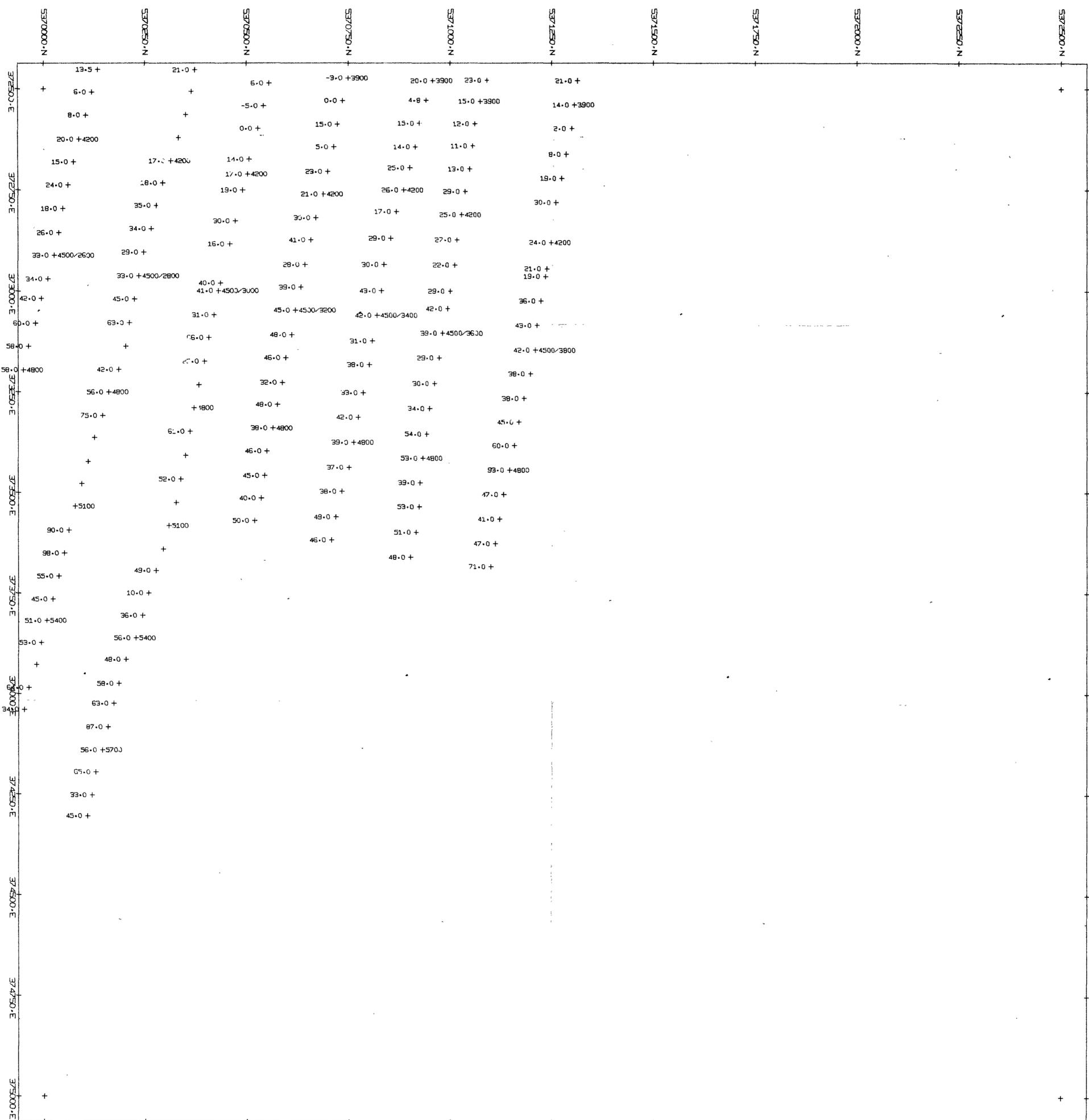


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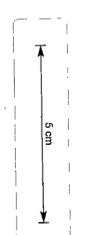


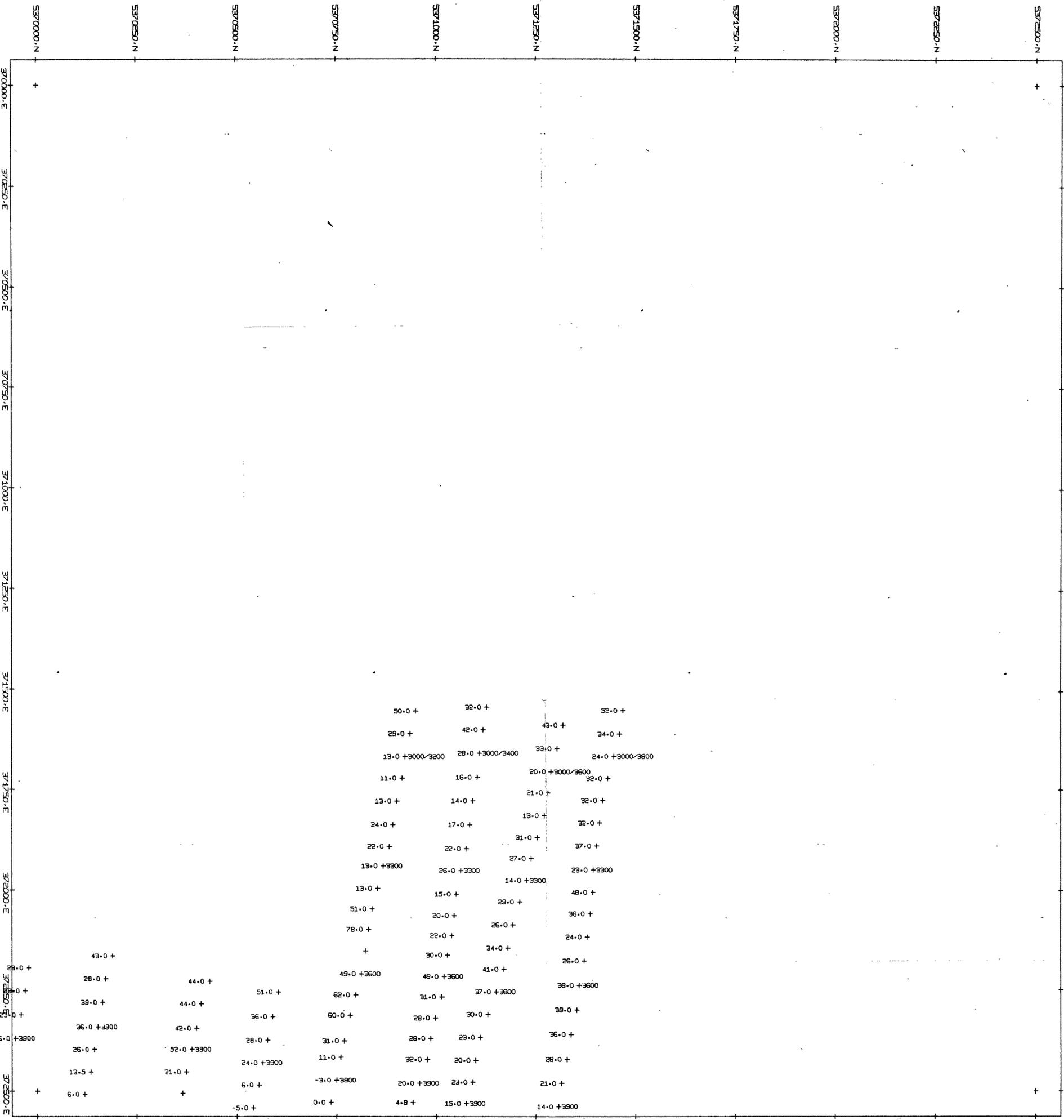
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COMSTAFF PROPRIETARY LIMITED
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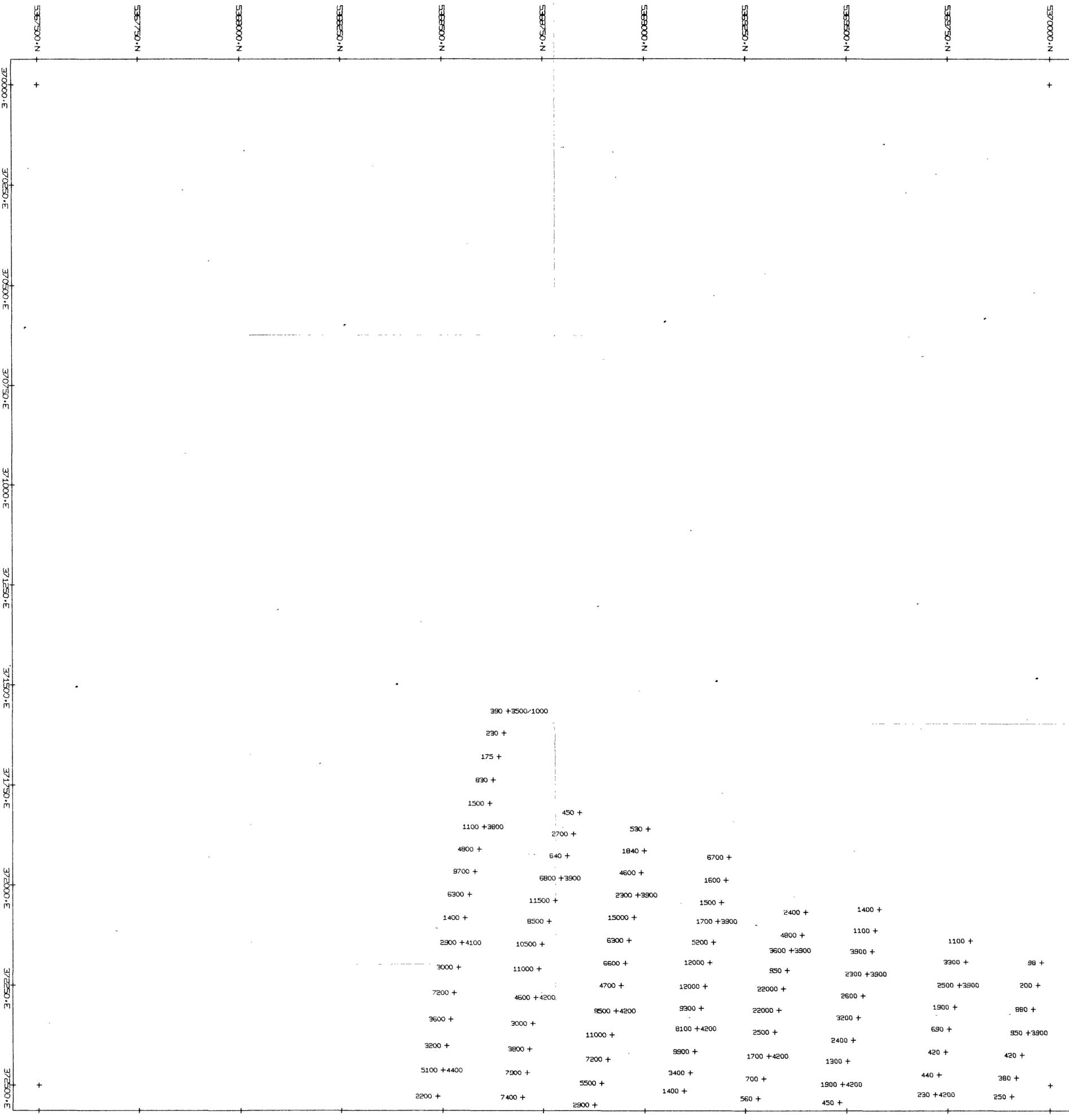
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TAS/2/1525

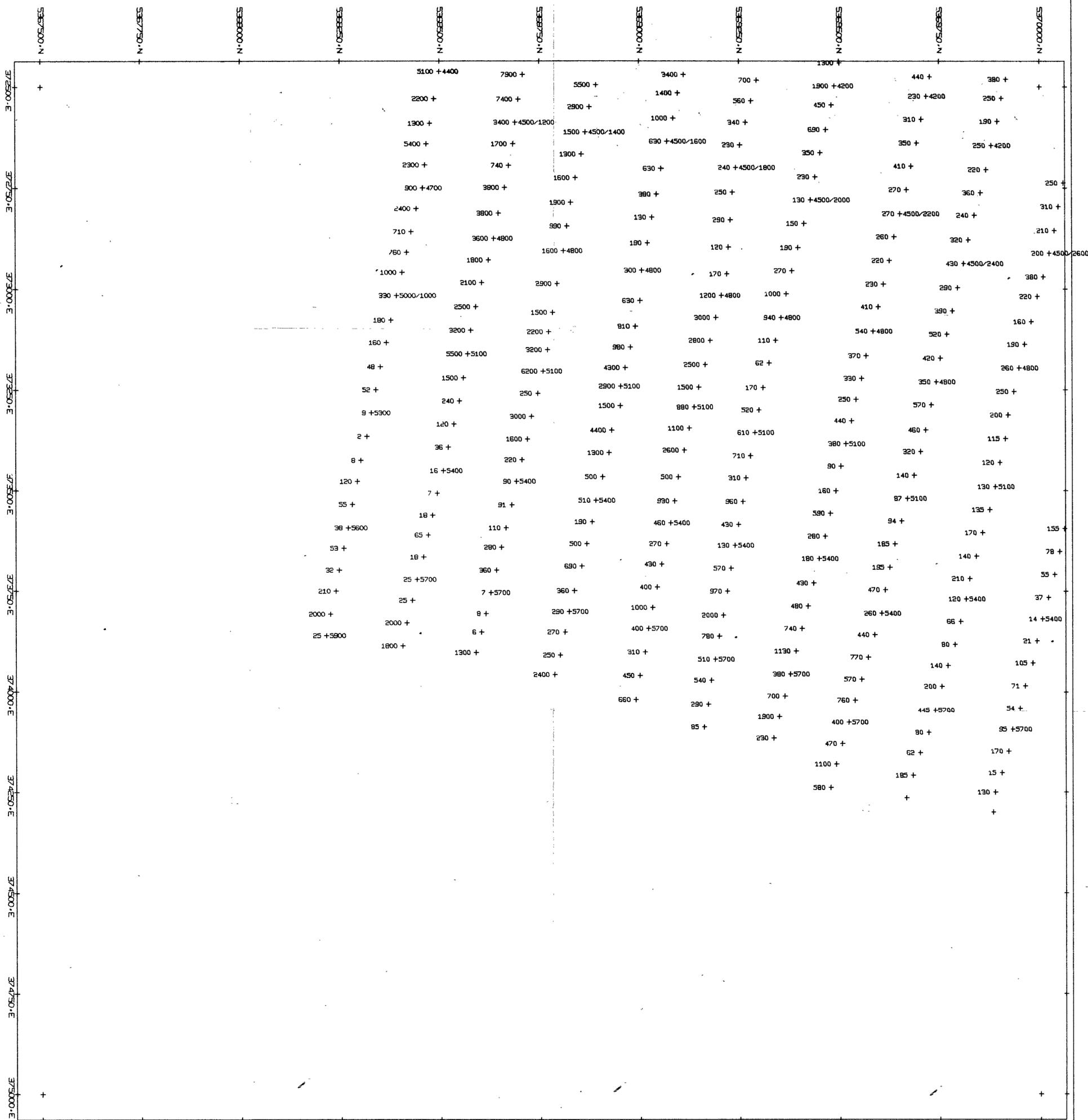


78-12/6 1990.1

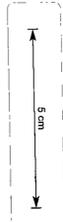


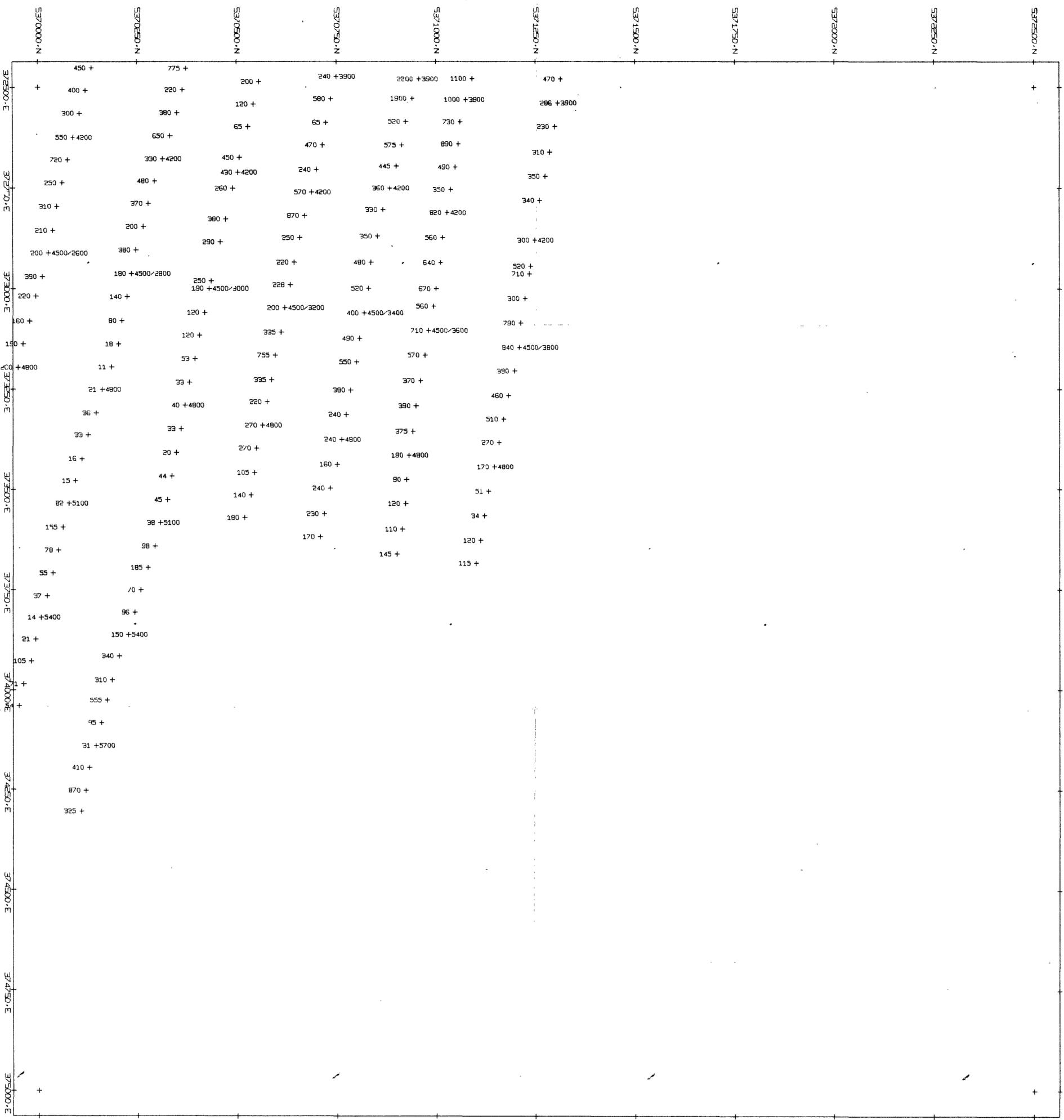
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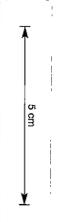


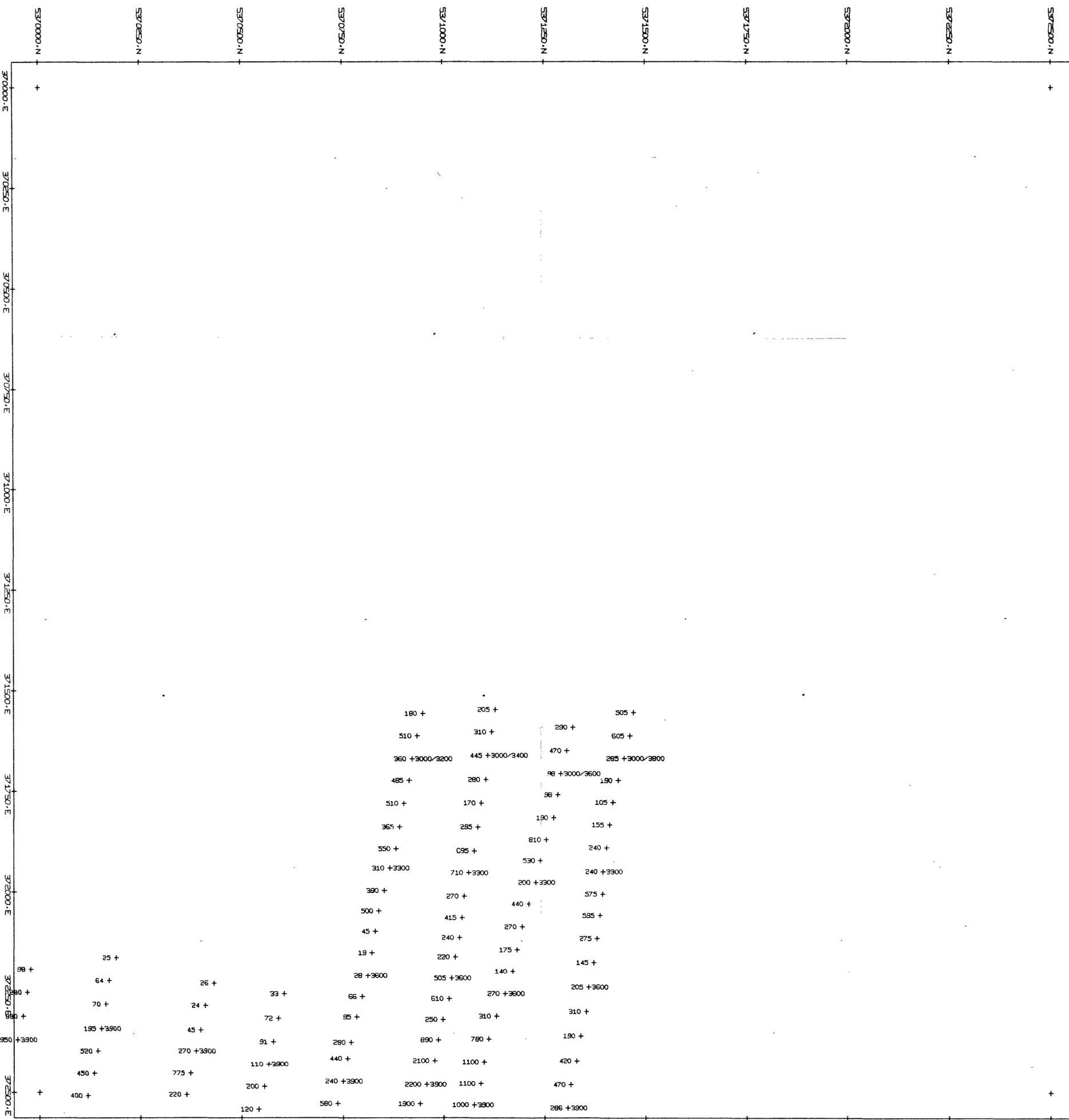
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COMSTAFF PROPRIETARY LIMITED
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 DATE 3 / 6 / 78
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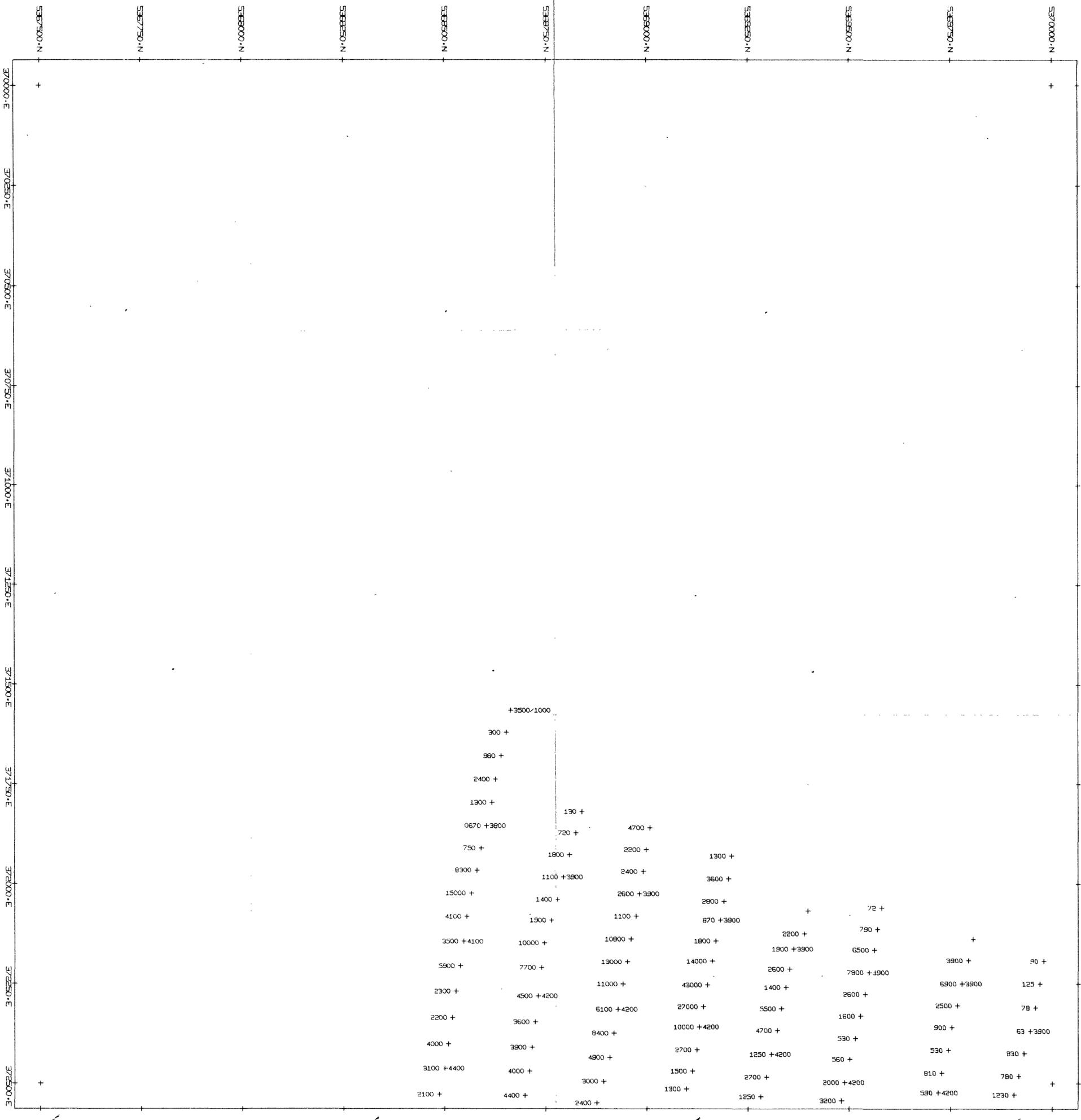




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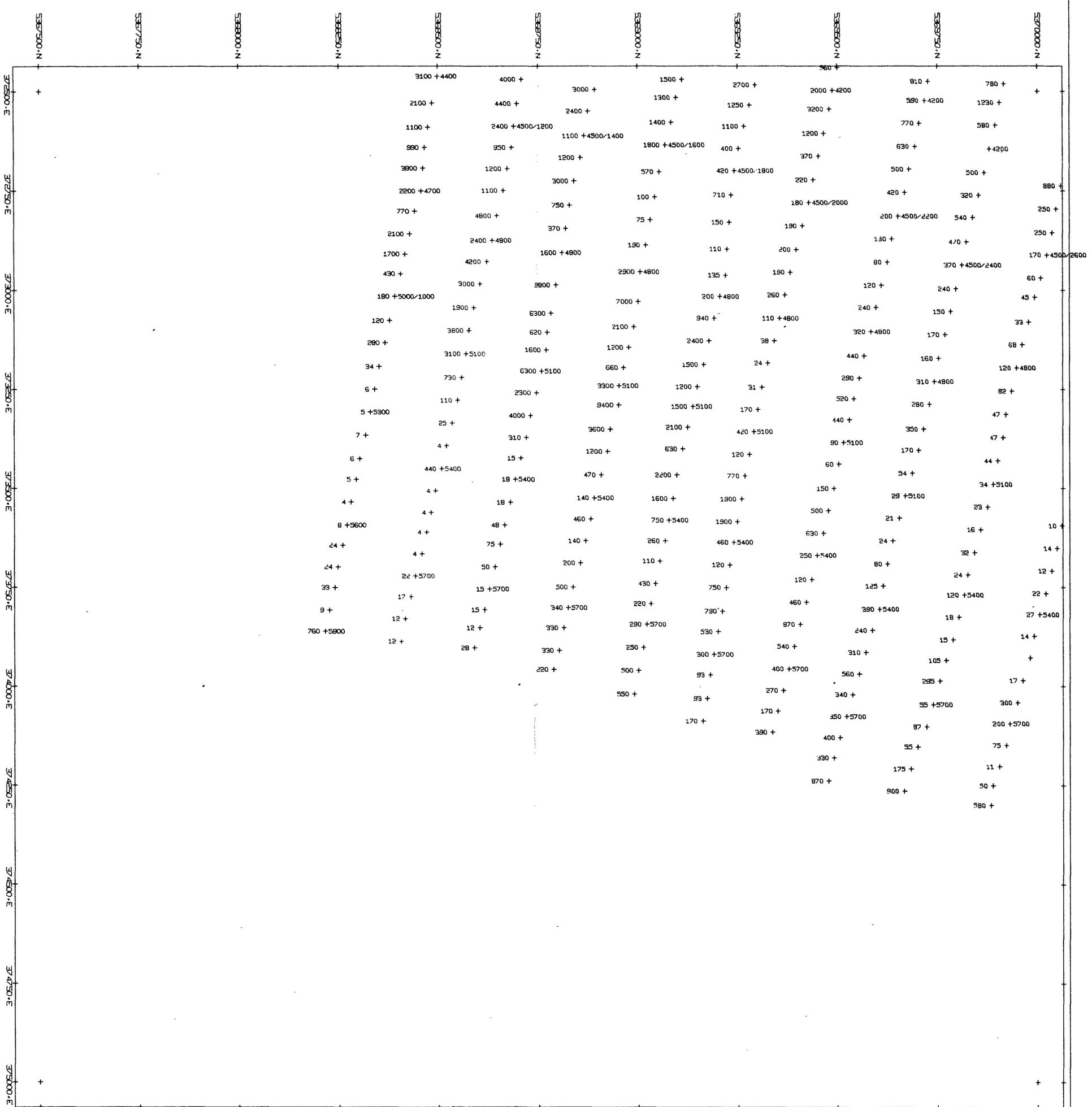
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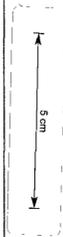
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 3/6/78
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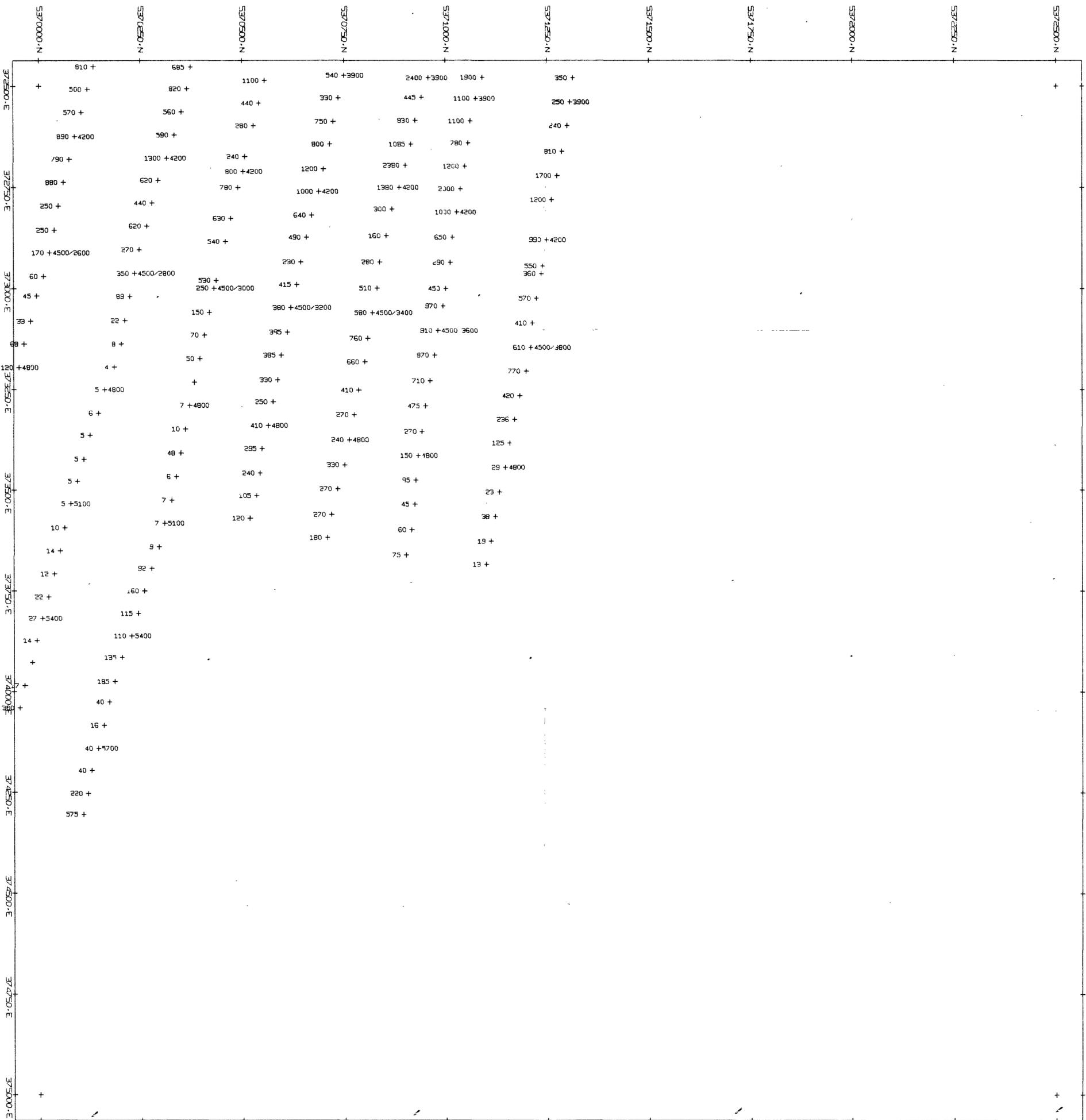
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COMPUTER
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TAS/2/1535

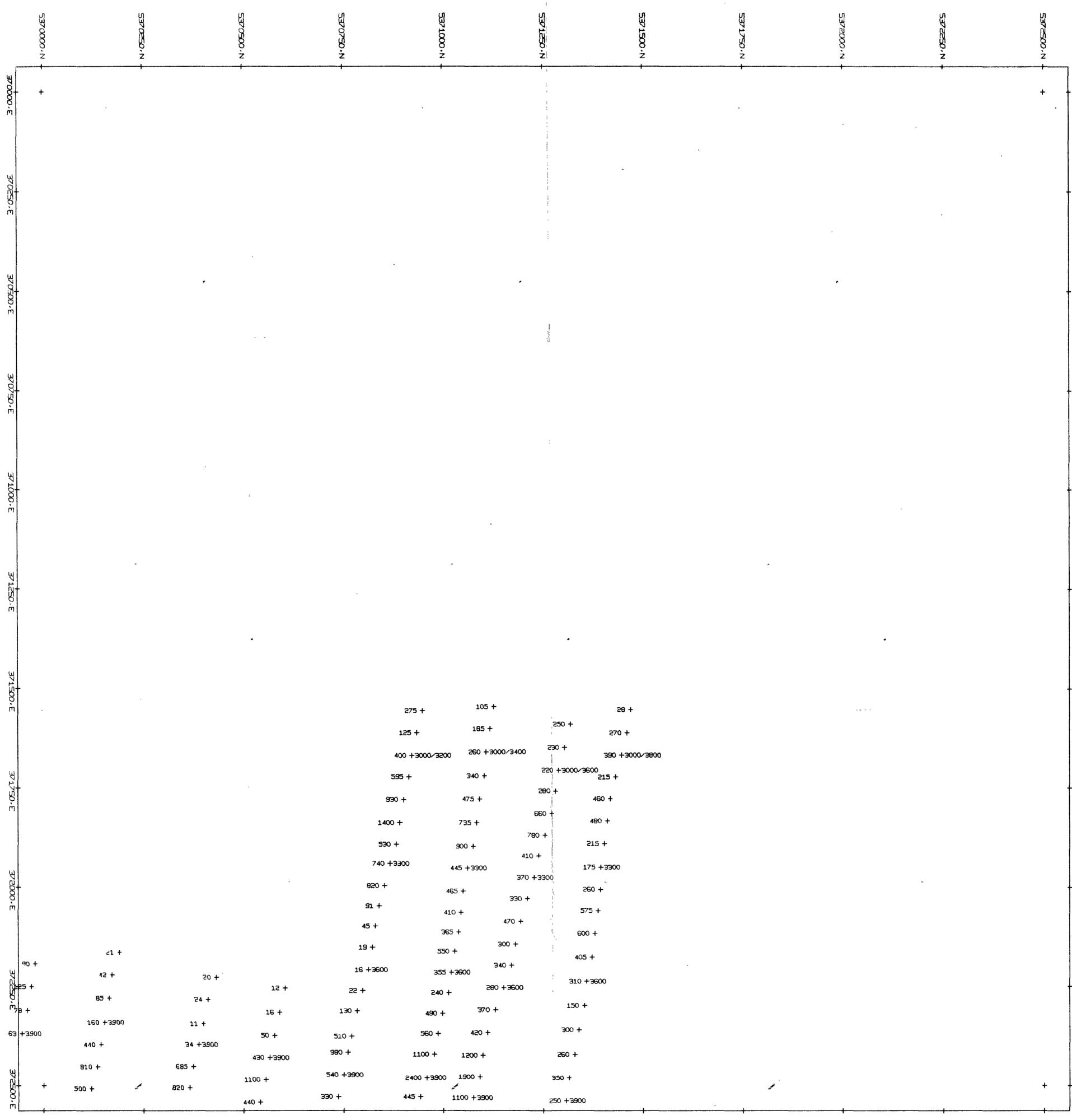


78-316 Rpp 1

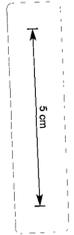


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 DATE 3/6/78
 COMPUTER
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 TAS/2/1536



COMSTAFF PROPRIETARY LIMITED
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 SHEET 370370 - D
 GEOPHYSICAL PLAN
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 DRAWN BY: TAS/2/1537
 DATE: 3/6/78
 SCALE: 1:5000



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PROJECT NAME: APPENDIX II
TITLE: PHOTOGEOLOGICAL INVESTIGATION OF THE
COMSTAFF TENEMENTS AND ADJACENT AREAS
IN TASMANIA

AREA NAME/S, STATE 1: 250,000 SHEET NO/S & COORDINATES: Burnie K55/3 Queenstown K55/5
Tasmania

COMMODITY/IES: Cu, Pb, Zn, Ag, Sn

TEXT PAGES NO: 5
PLAN NOS: TAS-2-782, 785-789, 1408

TABLE NOS: 1

APPENDICES:

AUTHOR/S: M. C. Hussey

DATE: 16th January 1979

TAS-2-766 Sheets 1 & 2 TAS 2-768 Sheets 1 & 2 TAS 2-790 → 79

AUSTRALIAN ANGLO AMERICAN LIMITED

Incorporated in the State of Victoria

PHOTOGEOLOGICAL INVESTIGATION OF THE COMSTAFFTENEMENTS AND ADJACENT AREAS IN TASMANIAINTRODUCTION

Ninety 1:40 000 Scale aerial photographs (45 Stereo models) were interpreted to fully cover the Comstaff Tenements and adjacent areas. The southern portion of the area was also covered by an interpretation of the 1:500 000 Scale MSS Band 7 Landsat 1 image, which covers the north east of Tasmania. An initial interpretation was completed and compiled at photoscale this was then reduced to 1:50 000 as this is the scale of the topographic maps of the area. A ground reconnaissance was made of the area and the original interpretation modified. This has resulted in the production of 1:50 000 scale photogeological maps corresponding to the 1:50 000 topographic sheet layout. The photogeological maps show major fractures (faults?) photolinears (which may relate to bedding, jointing or faulting) and contacts between rock units of differing photogeological appearance. Photogeologically distinct rock units have been defined and where possible related to the rock units determined from ground checking and existing geological maps. The area is strongly dissected by streams and rivers which drain to the south, south west and west. Within the area soil cover is well developed and there are also glacial deposits which cover some parts of the area. The vegetation is undisturbed and is controlled by the major rock units, though it obscures minor geological differences.

The uniform vegetation cover, the soil/glacial cover and lack of distinct marker bands within the sedimentary units prevents the determination of the attitude of the rocks and consequently the location of fold axes in the east of the area. Though the major rock units can be distinguished on the Landsat image, its interpretation is of greater significance structurally.

Analysis of the major fractures density and trends have been made. A reduction of the photogeological interpretation to a scale of 1:250 000 accompanies this report and the 1:50 000 maps are available if required.

STRATIGRAPHY (PHOTOGEOLOGICAL) See Table 1 and TAS-2-786

Within the area there are nine main photogeological groups that can be distinguished excluding cover material such as alluvium, swamp and glacial till. These groups have been determined from 44 units which have distinct photogeological characteristics. The criteria for the classification of the units into the groups are differences in vegetation cover, results of field checking, and the locations and similarities between the units. On the maps contacts are shown within some of the units (mainly the sedimentary units) which indicate that the units are not homogeneous in composition and can be further subdivided.

From the photogeological interpretation the following stratigraphic sequence is apparent.

<u>Rock Unit</u>	<u>Rock Type-Types</u>	<u>Group or Formation</u>
B	Basalt	(Tertiary Float Basalt)
G	Granite	Meredith Granite
GH	Granite Aureole/Hornfels	-
M	Mafic Intrusives (Phacoliths/lopoliths)	-
MS	Mafic Intrusives (Sills)	-
S3	Meta Sediments (Calcareous, Quartzite, Dolomite)	-
S1	Meta Sediments, Volcanics, Schists	-
S2	Meta Sediments and Volcanics	Mt. Read Volcanics
S4	Unmetamorphosed sediments (Sandstone/Shales)	-

When compared to the existing 1:250 000 geology map it is apparent that the boundaries of the Meredith Granite, Tertiary Basalt and most of the mafic to ultra mafic intrusives have been outlined by this interpretation. All of the groups have photogeological expression typical of such rocks under these climatic conditions.

In the sedimentary/volcanic sequences the photogeological groupings do not correspond precisely with the existing geological maps. Some of the major contacts have photo expression but similar photo characteristics of many of the volcanic and sedimentary rocks prevent a precise subdivision and identification of the various units. Similarly a precise stratigraphic relationship of the various units and groups can not be determined.

The similarity in photogeological characteristics of many of the rock groups/units may be due to the uniform grade of metamorphism in the area.

Detailed ground checking would be required to identify the rock types of all the photogeological units and their stratigraphic relationships.

Landsat (TAS-2-782) On the Landsat image it is possible to distinguish the Meredith Granite and Huskisson Syncline sediments as distinctly different lithologies. Other rock groups in the area have similar characteristics on the image.

003

TABLE 1.

210202

CODE	TONE	TEXTURE	RESISTANCE	BEDDING	CONTACTS	COMMENTS	ROCK TYPE/UNI
B	3	1/11	3	3	2	+J. 5° Swamps	Basalt
G a	3	3/10	3	1	2	+J Light bre rock	Granite
b	5	1/7	5	3	1	+J Bre rock	Granite
c	4	3/8	4	1	2	Bre rock	Mt. Bischoff Porph
GHa	3	3	4	2	2		Granite Hornfels?
b	5	1	4	1	2		" "
c	2	4/7	4	2	1		" "
Ma	4	3/6	3	3	1	Patchy Forest	Mafic Intrusive
b	4	4/6	3	1	1	" "	" "
c	4	4/6	2	2	1	No forest	" "
d	4	3/5	3	3	1	Patchy forest	" "
e	3	4	3	1	2	No forest	" "
f	2	3	1	1	1	Circular depression	" "
g	3	4	2	3	1	Patchy forest	" "
h	4	3	4	1	2	No forest	" "
j	3	1/6	4	2	1	Patchy forest	" "
k	3	4	1	1	1	Scrub bush	" "
MSa	2	4	1	1	1	Scrub bush	Mafic Sill/ Volcanic
b	3	4	1	1	1	" "	" "
c	4	3/11	2	2	1	" "	" "
S4a	5	3	3	3	1	Patchy forest/ grass	Unmeta Seds
b	4	3/5	3	4	1	" "	" "
S3a	4	3/7	4	2	1)	Patchy forest and grass areas)	Meta Seds & Quartzite/ Cong. distinctly inter banded.
b	3	3	2	1)			
c	3	3 and 5	3	3)			
d	3	2/6	4	3)			
e	4	1/7	5	4)			
f	4	1/7	4 to 5	2)			
g	3	4	3	4)			
j	4	2	4	4)			
S3	3	4/7 1/6	4	4	1	Forest covered with few grassy areas)	Sediments/ greywacke s.ales etc. plus interbedded volcanics
S2 b	2	4/8	2	3	2)		
c	4	1/7	3	3	2)		
d	2	4/10	3	3 or 4	lor2)		
e	4	2/3	4	4	1)		
S1a	3	4/5	3	2	1)	Uniform Dense forest cover)	Sediments/ Meta Sed. Schists, Dolomits Greywacke s.ales minor volcanics
b	3	4(5)	3	3	1/2)		
c	3	1/6	3	3	1)		
d	4	4/7	3	4	1)		
e	3	4/6	3	4	1)		
f	2	3/6	3	3	2)		
g	2	1/7	2	2	1)		
h	3	4	2	2	1)		

KEY

TONE T.	TEXTURE Te	RESISTANCE R	JOINTING J	CONTACTS C
1. dark	1. coarse	1. very low	1. none	1. sharp
2. dark grey	2. fine	2. low	2. one direction	2. vague
3. medium grey	3. smooth	3. moderate	3. several directions	3. persistent
4. light grey	4. rough	4. high	4. persistent	4. not persistent
5. light	5. even	5. very high	5. not persistent	
	6. uneven		6. low density	
	7. banded		7. medium density	
	8. speckled		8. high density	
	9. granular			
	10. linear			
	11. blocky			
	12. matted			
	13. numocky			

STRUCTURE

Photolinears Photolinears express the strike of the bedding/foliation of the sedimentary rocks and probable banding in the mafic rocks. In the granite and basalts they are the expression of jointing. Locally zones of anomalous aligned photolinerers may indicate shear zones.

The photoliner pattern indicates a major swing in the regional strike in the area. In the south of the area the regional strike is SE and in the north of the area SW. The Meredith granite occurs at the axis of this change.

Folding A number of fold closures are indicated by the trends of the photolinerers (bedding) and contacts. The closures of the Heazlewood Syncline, Huskisson Syncline and Sophia Syncline are all apparent. Immediately north of the Chester Pinnacles are two near circular domal features faulted together. There is no photogeological evidence for the large drag fold shown on the 1:50 000 scale geological map of the Comstaff Tenements (see Maps accompanying Appendix 1 Comstaff Report for 6 months ending December 1978 by D.B. Orr). Neither the Just in Time Anticline nor Que Syncline can be detected on the photographs in the sedimentary areas. However the Que Syncline is expressed by an inlier of sediments in the basalt cover (Mount Pearce) east of Waratah. There are a number of minor folds, some of which affect the mafic intrusives in the south east of the area and these are probably drag folds associated with the folding which produced the Huskisson Syncline and Renison Bell Anticline.

Major Fractures There are three major fracture trends in the area NE, NW and NS with a subordinate E-W trend apparent in the South of the area. On the Landsat image the N-S to NE trend is emphasised.

As these major fractures often coincide with changes in photogeological (and so probable lithological) units and also displace the units it is probable that they are faults. Some within the granite may be tension fractures and shears associated with the intrusion.

The N-S fractures generally exceed 7 km. in length and as they frequently define contacts they are possibly gravity faults.

Analyses of the frequency and trends of these fractures have been made.

LINEAMENT ANALYSIS (MAJOR FRACTURE)Intersection (Frequency) Analysis (TAS-2-787)

A map has been drawn of the number of fracture intersections per 6.25 km² obtained from a random grid drawn over the 1:250 000 reduction of the photointerpretation maps.

This map defines several zones of higher intersection density, intersection zones, the trend of which parallel both the regional strike (and changes of) and major fault trends. These zones emphasise the swing in the regional strike and the occurrence of a subordinate E-W structural trend in the southern half of the area.

The area of highest intersection frequency coincides with the Meredith granite and indicates that this is a lithological effect.

Fracture Trend Analysis (TAS-2-788)

This is a statistical method based on the relative intensities of fractures within directional classes. The method utilised is described by Huntingdon in "Methods and Application of Fracture Trace Analysis in the Quantification of Structural Geology" (Geol. Mag. Vol. 106, No. 5, 1969).

In this case blocks, based on the photogeological/topographic maps, with over 100 major fractures were determined. These blocks are Arthur River II, Huskisson North and South, Tullah North and South, Zeehan and Rosebery.

All major fracture directions in each block were recorded in a 5° classes from 0° - 180°. Rose diagrams were then drawn from the percentage of mega fractures in each class. A parallelogram is then constructed on the rose diagrams, such that the sides are parallel to the two principal fracture directions and pass through their apexes. The diagonals of these parallelograms are the direction of the main horizontal stresses that have affected the area which the rose diagram represents. Calculations with data on percentages and angles from these diagrams gives the relative dimensions of possible folds within the areas. The direction of the longer diagonal of the parallelogram should approximate the regional strike of the sedimentary rocks. In this case, apart from the Huskisson North block, which is mainly granite, the longer diagonal does equate with the regional strike and indicate a swing from SE in the South to NE in the North.

The rose diagrams themselves reflect the prominent major fracture trends and indicate that the E-W trend is only developed in the central eastern part of the area.

Calculations of the ratios of fold dimensions based on the data from the rose diagrams indicate that the folds are laterally symmetrical, this agrees with the observed fold patterns. The length to width and pericline ratios do not correspond well with observed folding and this is probably due to the polyphase deformation history of the area.

ECONOMIC GEOLOGICAL DEDUCTIONS FROM THE
PHOTOGEOLOGICAL INVESTIGATION

Photogeological Expression of Mineral Occurrences

Lithological/Stratigraphic

Most of the known mineral occurrences in the area (Mt. Bischoff, Rosebery, Renison Bell, Savage River, Magnet Mine and Chester Pinnacles/Chester Mine) are located on or in topographically positive features lacking in vegetation/forest cover and have very light outcrop areas.

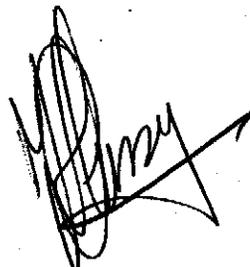
However, since these mineral occurrences are of a variety of differing types it is considered that these characteristics are partly coincidental and partly cultural (post discovery/exploitation) and can not be used as a exploration anomaly guide. They may, however, be positive factors in assessing an anomaly located by other prospecting techniques.

Structural

Local Only the mineral occurrences at Chester Pinnacles/Chester Mine are closely associated with folding, the domal features north and east of these occurrences.

Several of the known occurrences are located at or close to the intersection of NE and SE trending faults e.g. Renison Bell, Rosebery, and Tullah.

Regional From the intersection analysis it appears that the Luina and Bischoff deposits are located on NE trending intersection zones, which correlate with magnetic highs. The Tullah deposit also lies on a intersection zone. In an area between Mt. Ramsay and the Chester Pinnacles i.e. the confluence of the Ramsay and Hatfield rivers several intersection zones intersect (NE, SE and E-W). A strong linear N-S trending magnetic high also passes through this area and the Just in Time Mine is situated in this area. It is deduced that this area is one of high potential for mineral occurrences. Two other areas of interest are the Heazelwood Syncline (anomalous intersection high) and the Mt. Block area (anomalous intersection high and intersection of intersection zones (SE and EW).

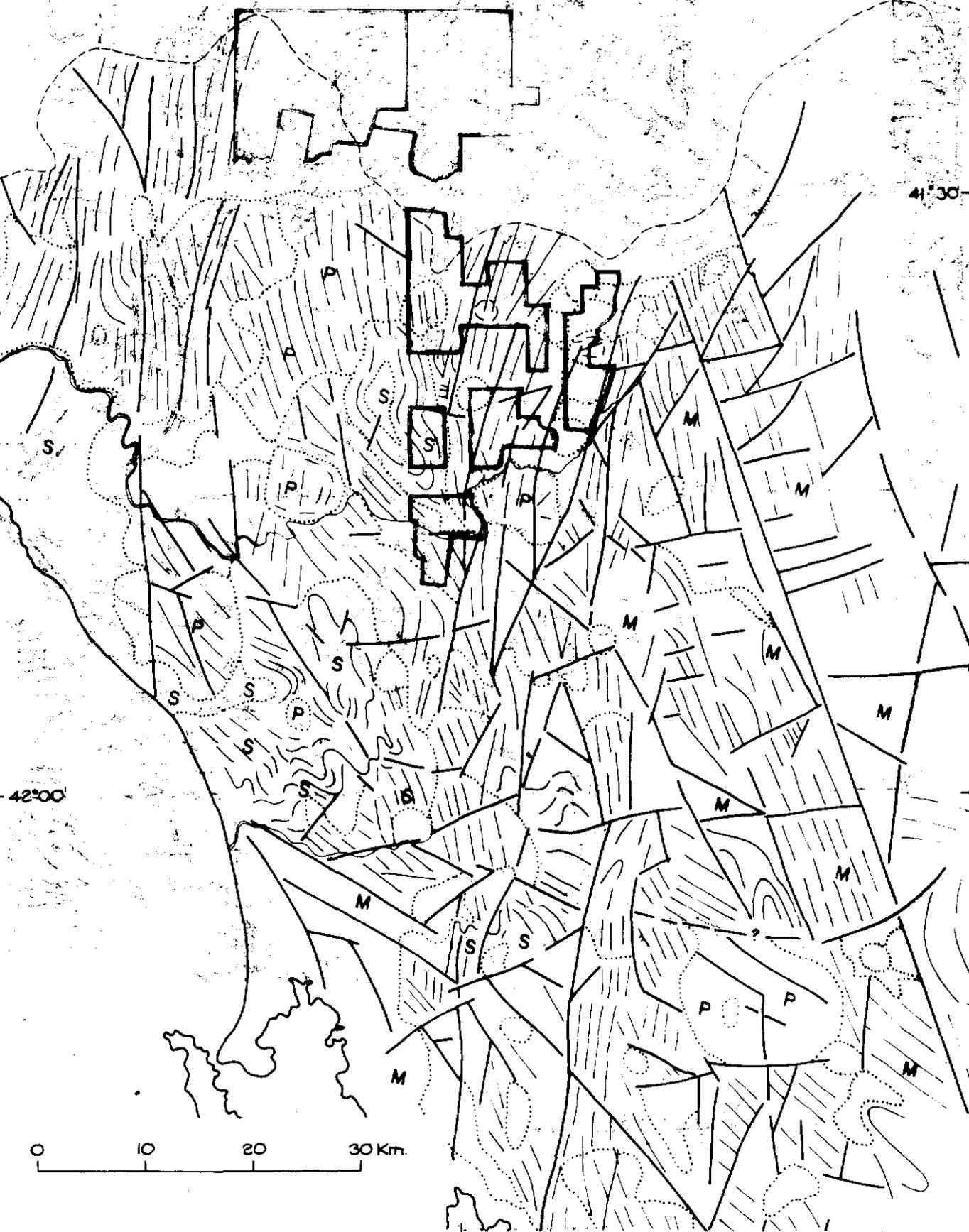


M. C. Hussey

210206

145°30'

41°30'



0 10 20 30 Km.

-  Megafractures (fault?)
 -  Lineaments (foliation)
 -  Geological contact
 - P Plutonic rocks ?
 - S Sedimentary rocks ?
 - M Metamorphic rocks ?
- Photo Lineaments

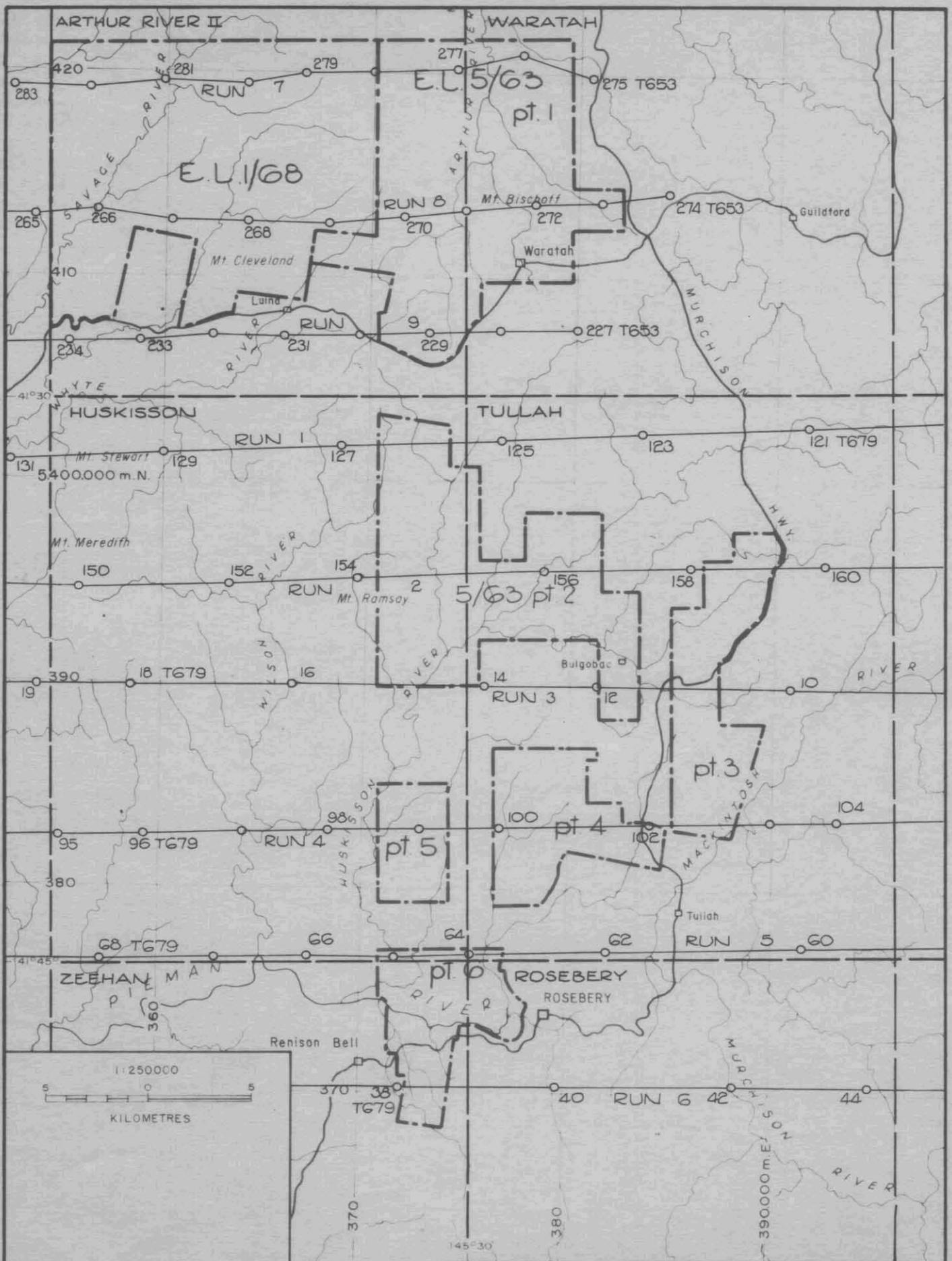
5 cm

AUSTRALIAN ANGLo AMERICAN LIMITED

COMSTAFF PROJECT
 PHOTO GEOLOGICAL INVESTIGATIONS
 LANDSAT I INTERPRETATION

COMPILED MCH DRAWN NNN SCALE 1:500,000 TAS-e-76c

007
210207



— 1:50000 Sheet Break up

LOCATION



COMSTAFF PROPRIETARY LIMITED

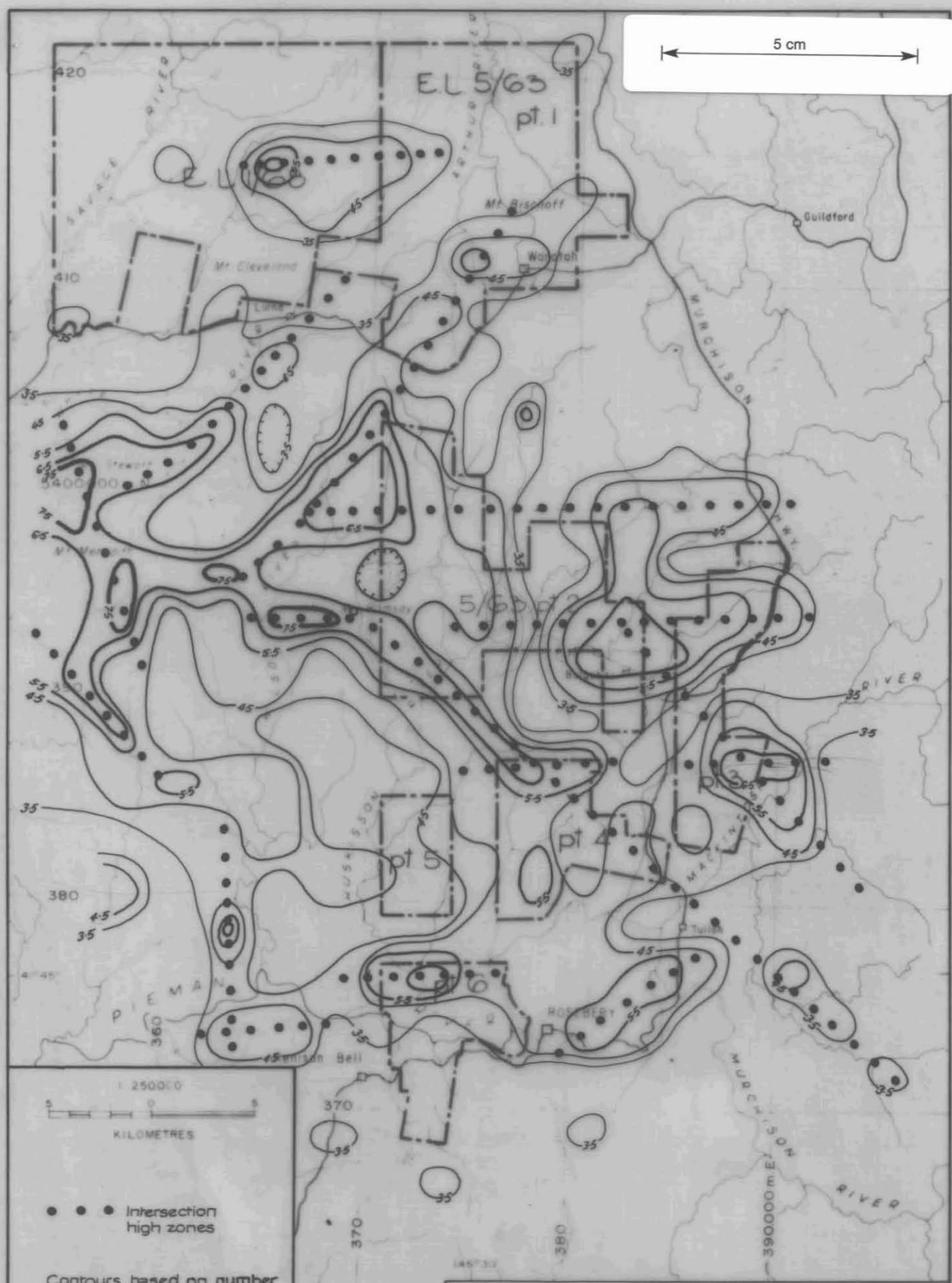
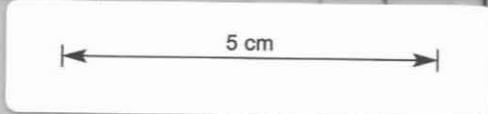
COMSTAFF PROJECT
PHOTO GEOLOGICAL INVESTIGATIONS
PHOTO INDEX MAP

DRAWN	HMD	COMPILED	MCH	SCALE	1:250,000	TAS - 2 - 785
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210209



● ● ● Intersection high zones

Contours based on number of intersections per 6.25 sq. Km.

LOCATION



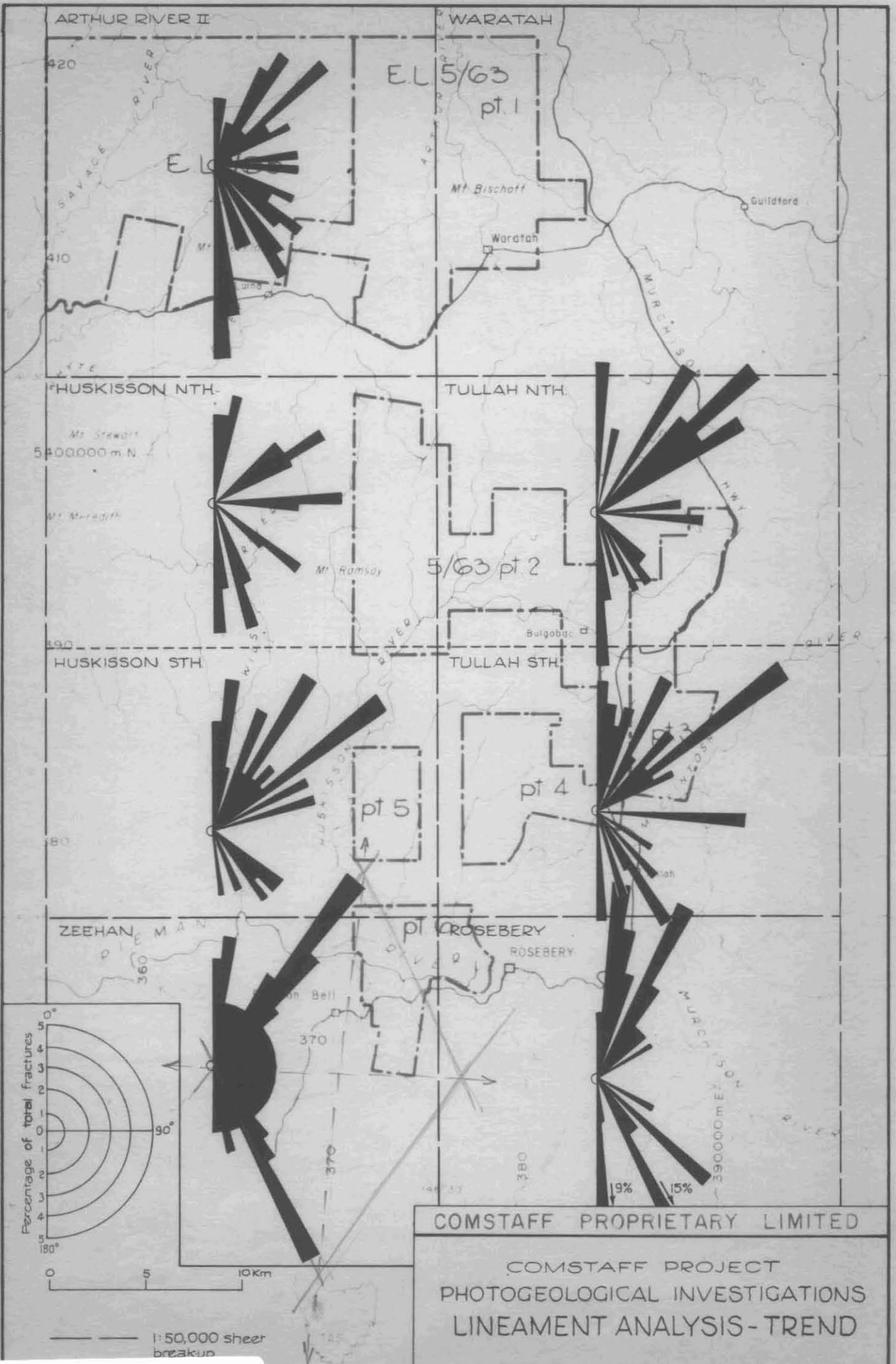
COMSTAFF PROPRIETARY LIMITED

COMSTAFF PROJECT
PHOTOGEOLOGICAL INVESTIGATIONS
LINEAMENT ANALYSIS - FREQUENCY

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011

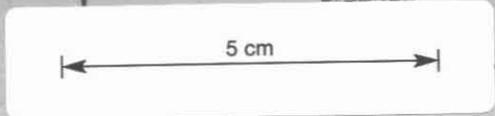
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COMSTAFF PROPRIETARY LIMITED

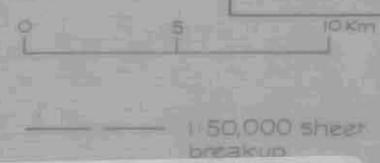
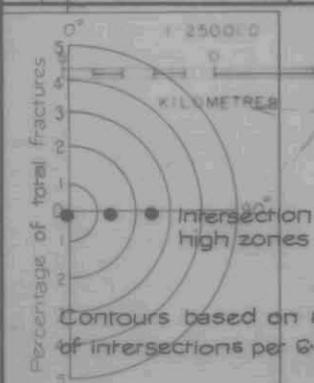
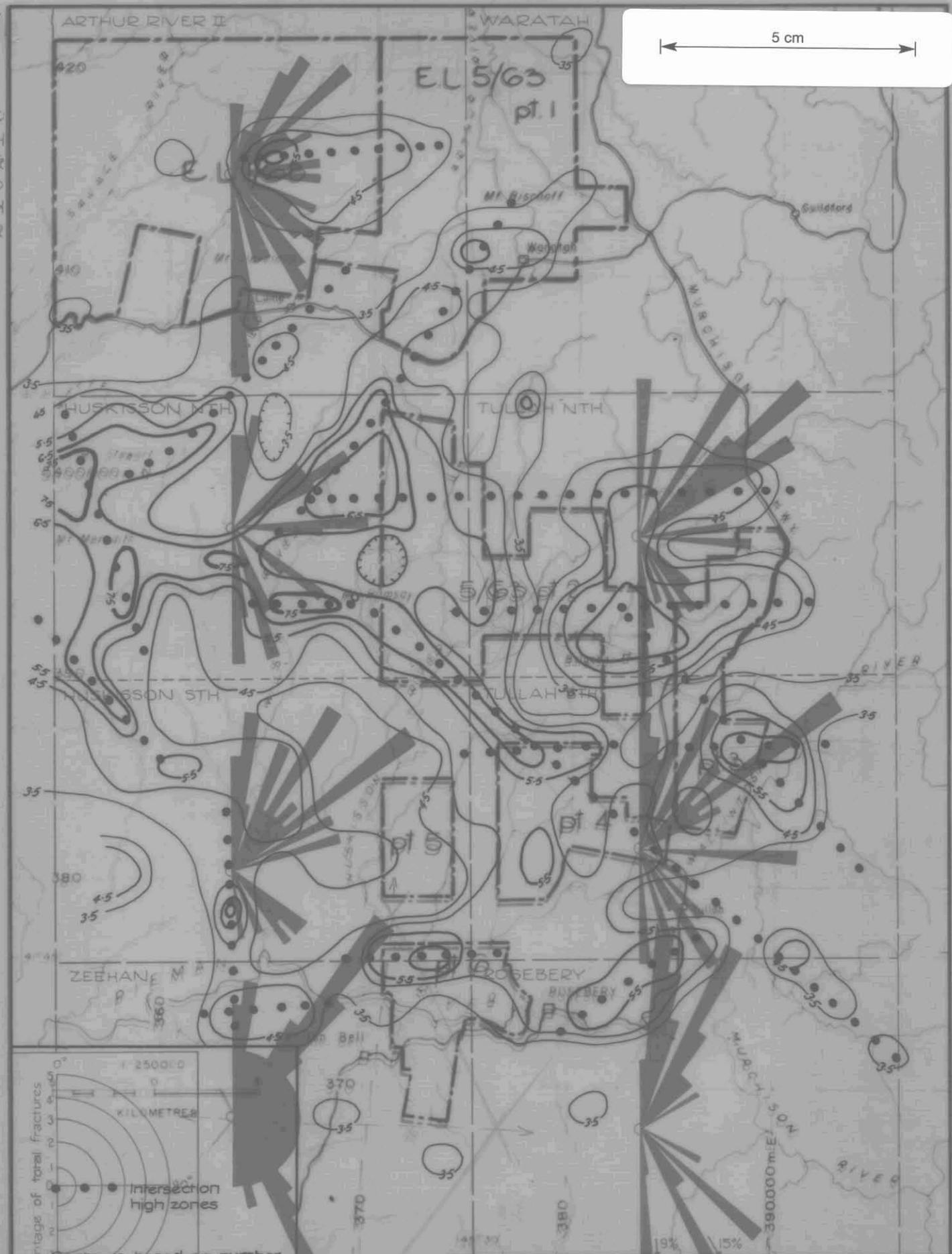
COMSTAFF PROJECT
PHOTOGEOLOGICAL INVESTIGATIONS
LINEAMENT ANALYSIS-TREND

HMD	MCH	1:250,000	TAS-2-788
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011
210209
210210

5 cm



COMSTAFF PROPRIETARY LIMITED

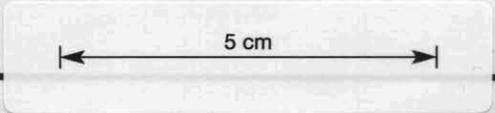
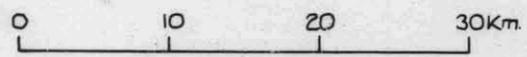
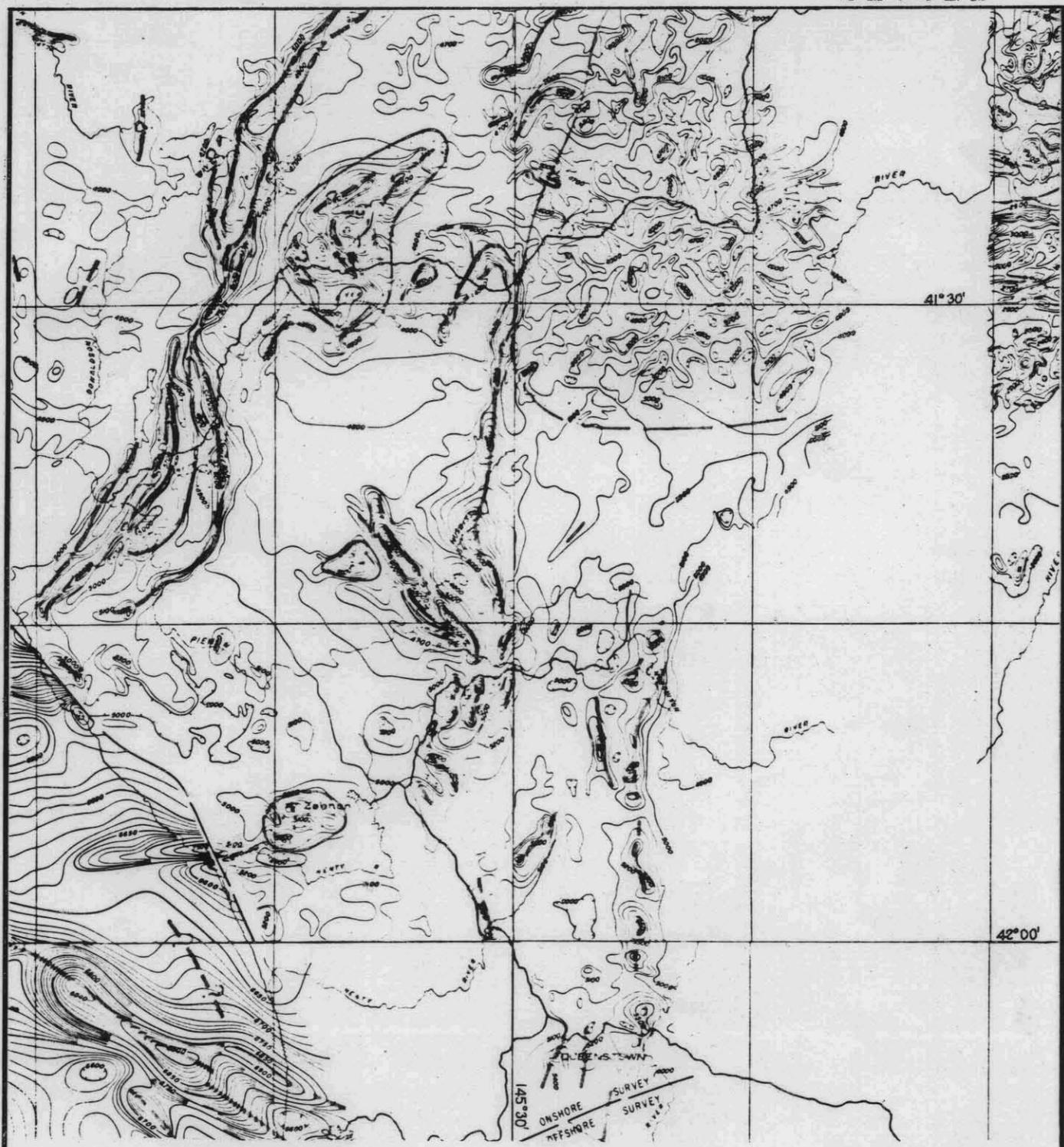
COMSTAFF PROJECT
PHOTOGEOLOGICAL INVESTIGATIONS
LINEAMENT ANALYSIS FREQUENCY

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5 cm

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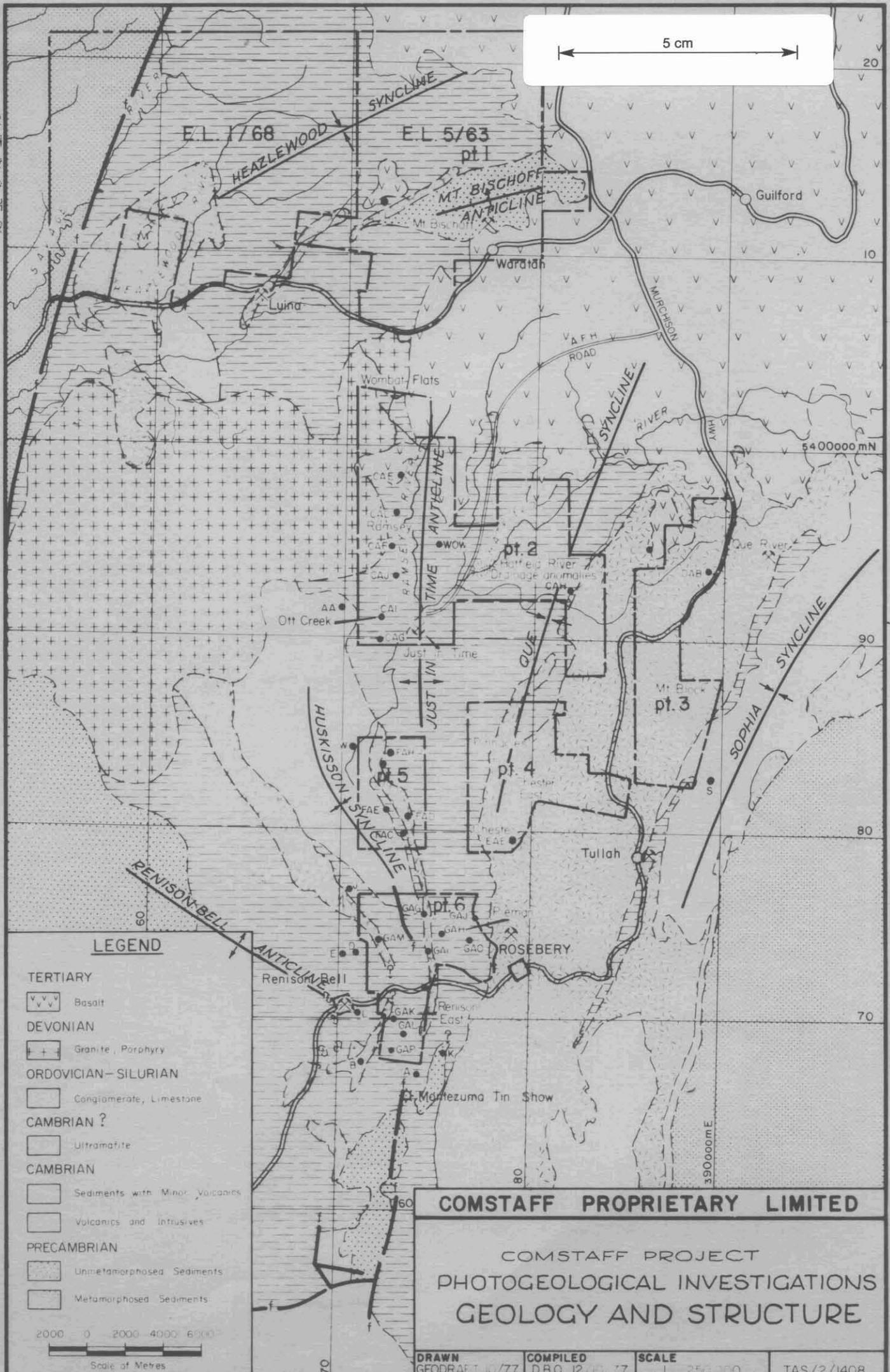
AUSTRALIAN ANGLO AMERICAN LIMITED

COMSTAFF PROJECT
 PHOTOGEOLOGICAL INVESTIGATIONS
 MAGNETICS

DRAWN 1/79 COMPILED MCH SCALE 1:500,000 TAS-2-789

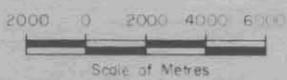
008

210212



LEGEND

- TERTIARY**
 Basalt
- DEVONIAN**
 Granite, Porphyry
- ORDOVICIAN-SILURIAN**
 Conglomerate, Limestone
- CAMBRIAN ?**
 Ultramafite
- CAMBRIAN**
 Sediments with Minor Volcanics
 Volcanics and Intrusives
- PRECAMBRIAN**
 Unmetamorphosed Sediments
 Metamorphosed Sediments



COMSTAFF PROPRIETARY LIMITED

COMSTAFF PROJECT
PHOTOGEOLOGICAL INVESTIGATIONS
GEOLOGY AND STRUCTURE

DRAWN GEODRAFT 10/77	COMPILED DBO 12/10/77	SCALE 1:250 000	TAS/2/1408
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371 000mE

372 000mE

373 000mE

374 000mE

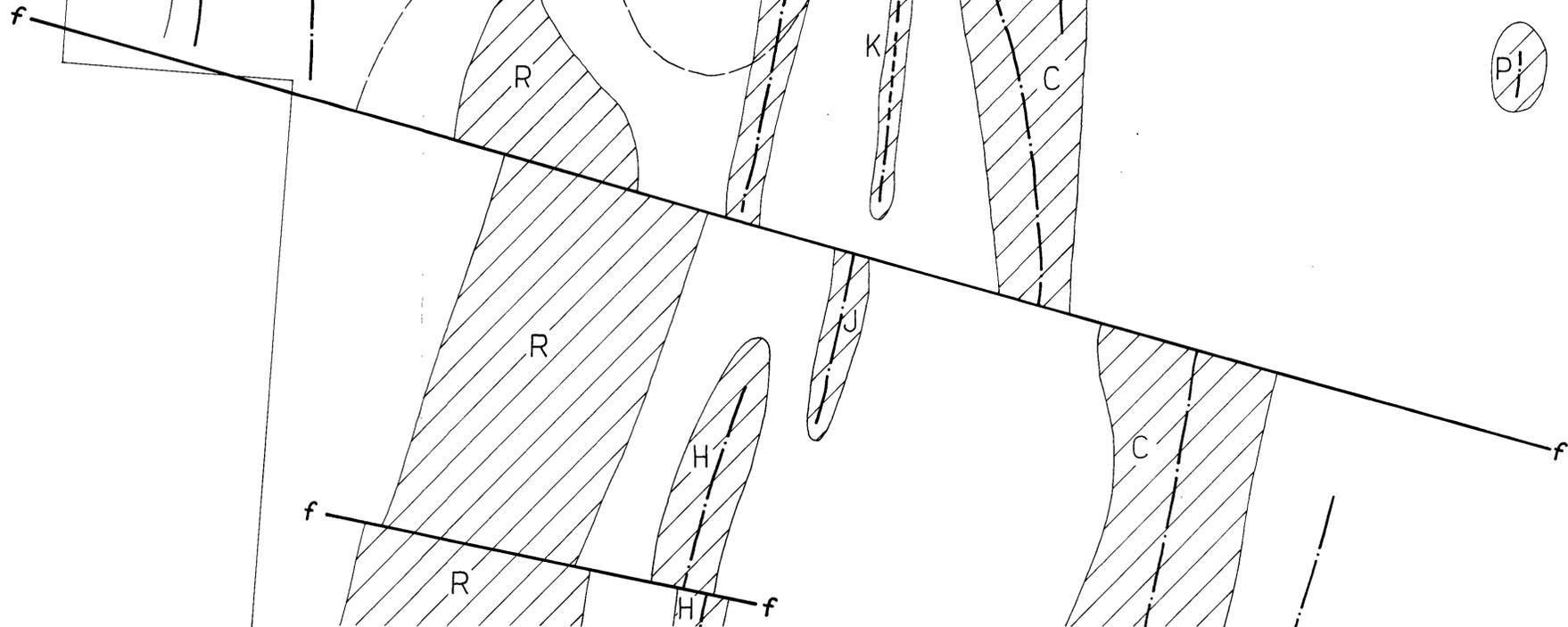
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5 370 000mN

Boundary of EL 5/63 PT 6

AREA OF
MAGNETIC NOISE



210213

AUSTRALIAN ANGLO AMERICAN LIMITED

SHEET ONE
SHEET TWO

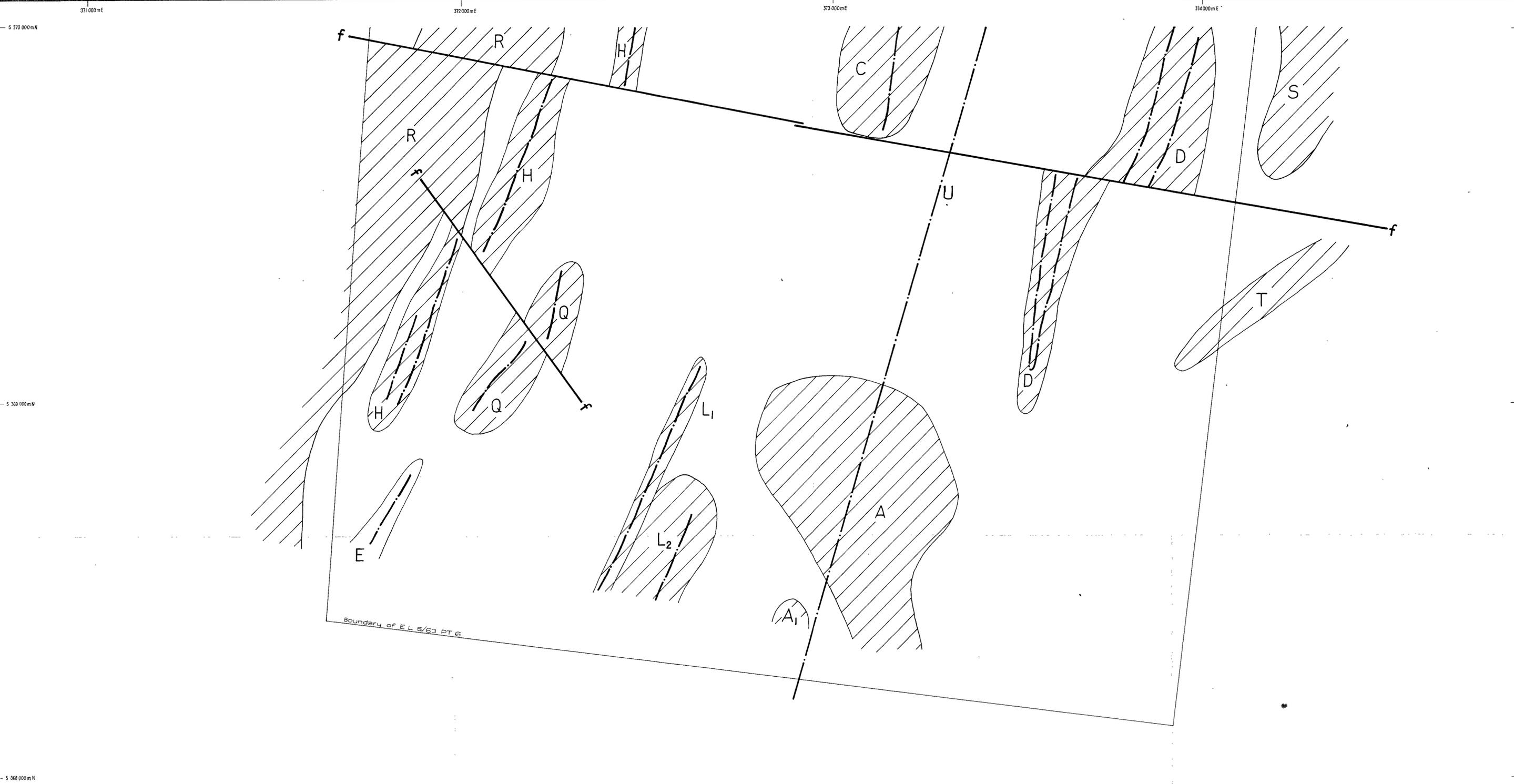


For legend see sheet two
PLAN TO OVERLAY TAB - 2 - 1482

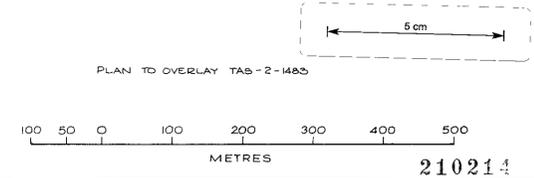
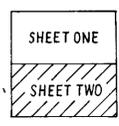
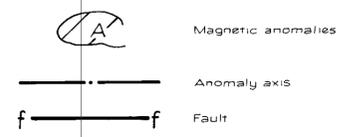
RENISON GRID - GAP
MAGNETIC INTERPRETATION

COMPILED	DBT
DRAWN	DATE 6/78
AMENDED	
SCALE	1 5000
PLAN No	TAS - 2 - 768

28 13/6



Boundary of E.L. 5/63 PT 6



AUSTRALIAN ANGLo AMERICAN LIMITED	
COMPILED	DBT
DRAWN	DATE 6/78
AMENDED	
SCALE	1 5000
PLAN No	TAS-2-766

781316

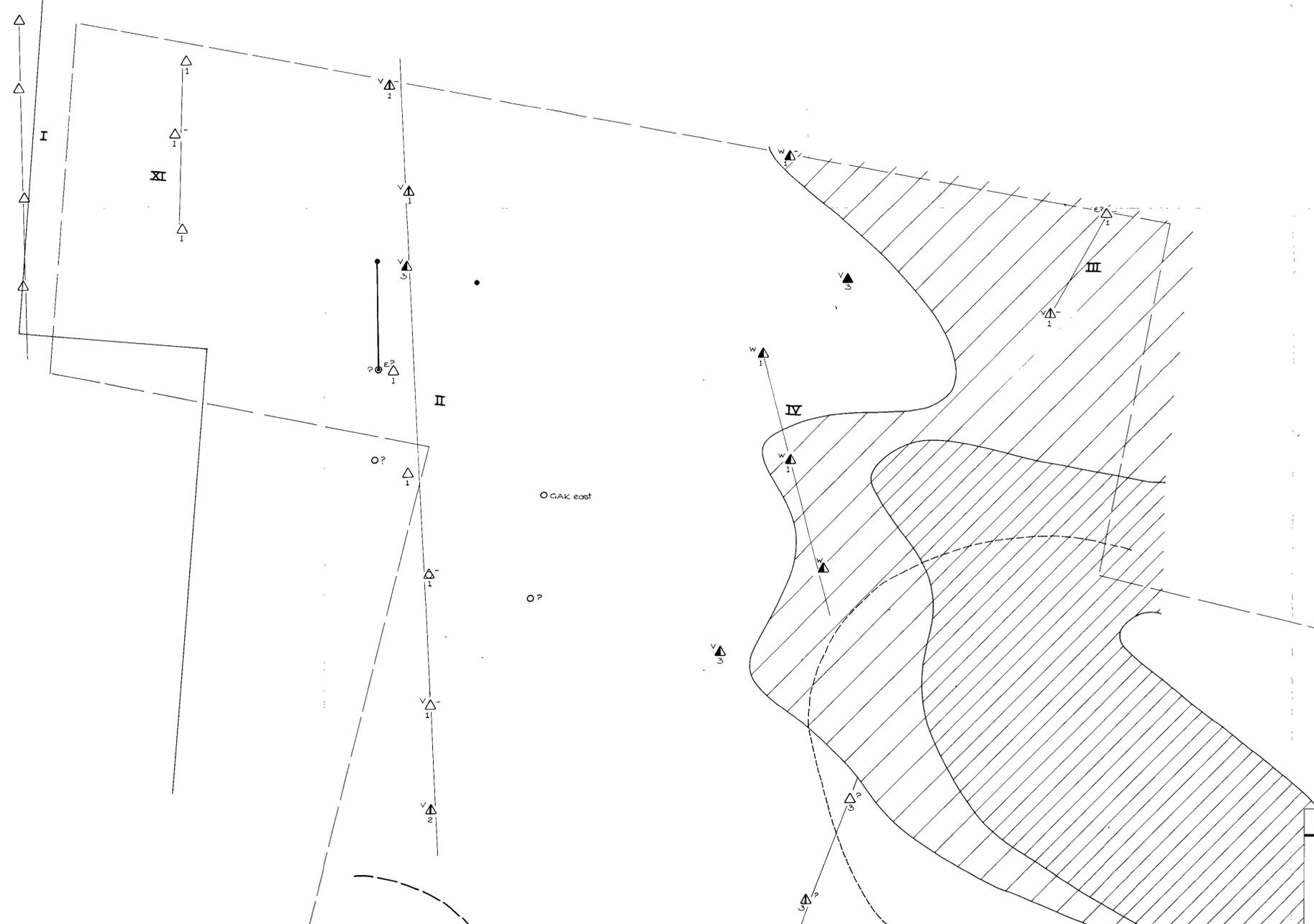
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5 372 000mN

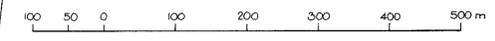
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5 370 000mN

Boundary of E.L. 5/63 Pt 6



FOR LEGEND SEE SHEET TWO
PLAN TO OVERLAY TAS-2-1482



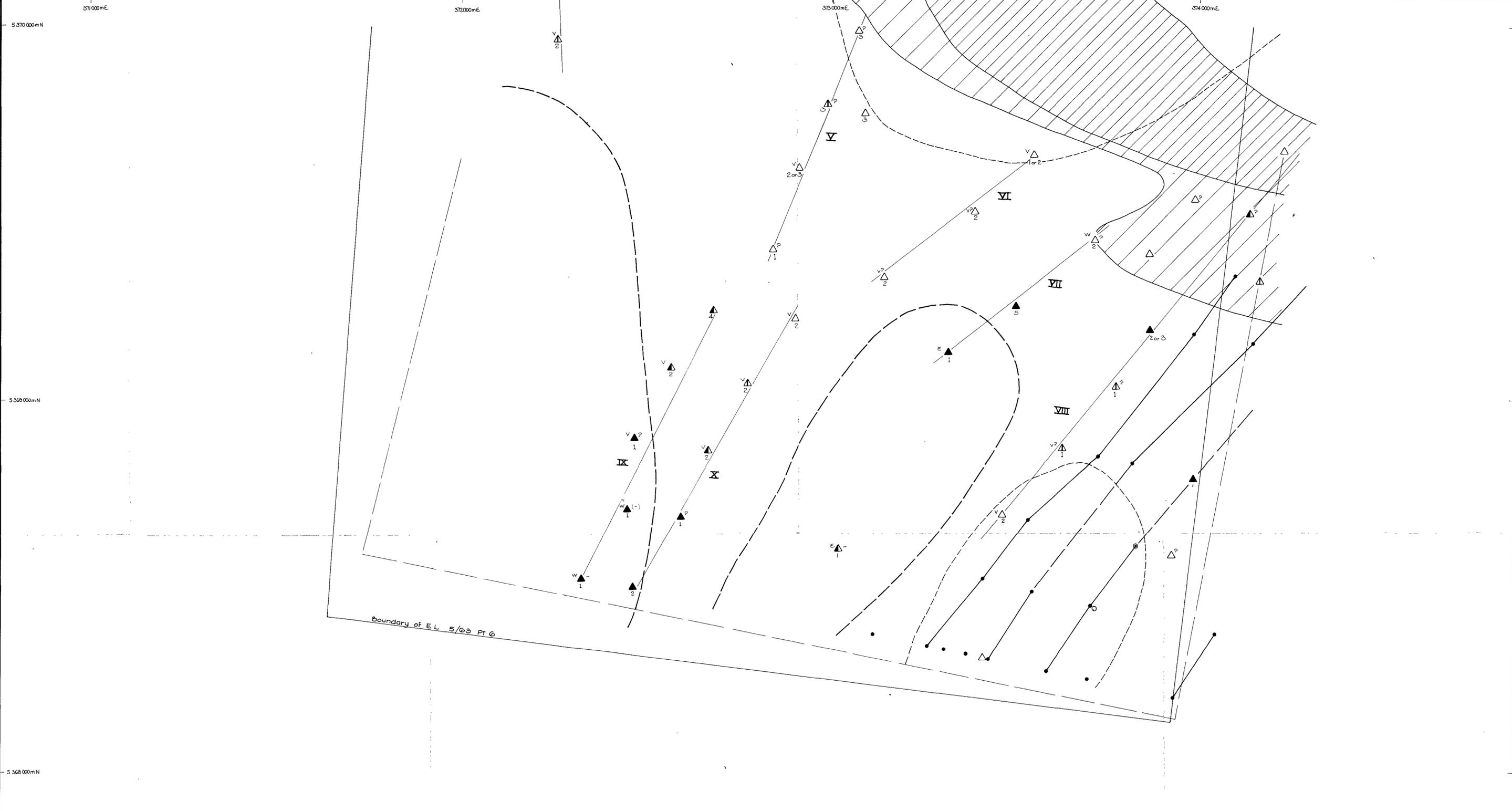
210215

AUSTRALIAN ANGLO AMERICAN LIMITED

RENISON GRID - GAP
INTERPRETATION OF ELECTRICAL SURVEYS

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DRAWN	DATE
AMENDED	6/78
SCALE	1 5000
PLAN No	TAS-2-768

78-1316



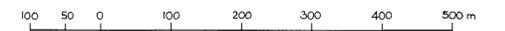
- ZONE OF VERY HIGH CHARGEABILITY
- ZONE OF HIGH CHARGEABILITY
- ZONE OF HIGH RESISTIVITY
- ZONE OF LOW RESISTIVITY
- S.P. ANOMALIES
- E.M. ANOMALIES
- I.P. ANOMALY - VERY LOW RESISTIVITY
- I.P. ANOMALY - LOW RESISTIVITY
- I.P. ANOMALY - MEDIUM RESISTIVITY
- I.P. ANOMALY - HIGH RESISTIVITY
- INDICATES DEPTH ESTIMATE
- VERTICAL
- WEST DIP
- EAST DIP
- NEGATIVE CENTRE - THIN?
- VAGUE RESPONSE
- EXTENT OF I.P. COVERAGE

SHEET ONE

 SHEET TWO



PLAN TO OVERLAY TAB-2-1463



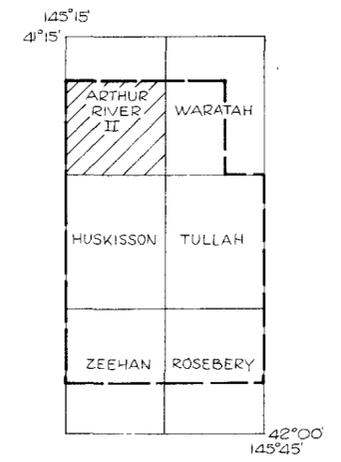
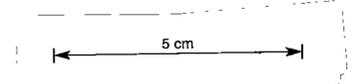
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AUSTRALIAN ANGLo AMERICAN LIMITED

RENISON GRID - GAP
 INTERPRETATION OF ELECTRICAL
 SURVEYS

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DRAWN	DATE
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SCALE	1 5000
PLAN No	TAS-2-768

13/6



For legend see Rosebery sheet
 210217 78-1316 App 2

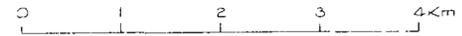
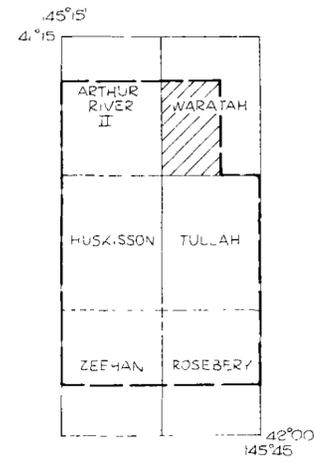
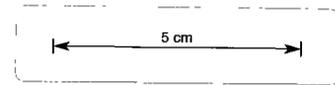
AUSTRALIAN ANGLO AMERICAN LIMITED

COMSTAFF PROJECT
 PHOTOGEOLOGICAL INVESTIGATIONS
 PHOTOGEOLOGICAL INTERPRETATION
 PART ARTHUR RIVER II 1:50,000

COMPILED MCH DRAWN MCH SCALE 1:50,000 TAS-2-790

41°30' 145°15'

145°30'



For legend see Rosebery sheet

78-1316 App 2
 AUSTRALIAN ANGLo AMERICAN LIMITED

COMSTAFF PROJECT
 PHOTOGEOLOGICAL INVESTIGATIONS
 PHOTOGEOLOGICAL INTERPRETATION
 PART WARATAH 1:50,000

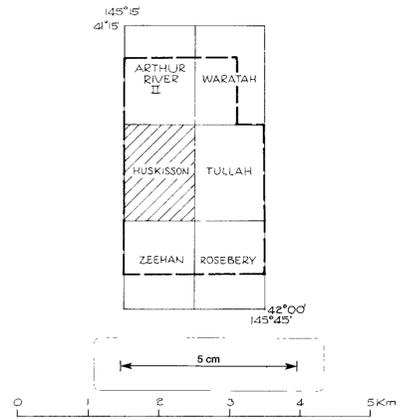
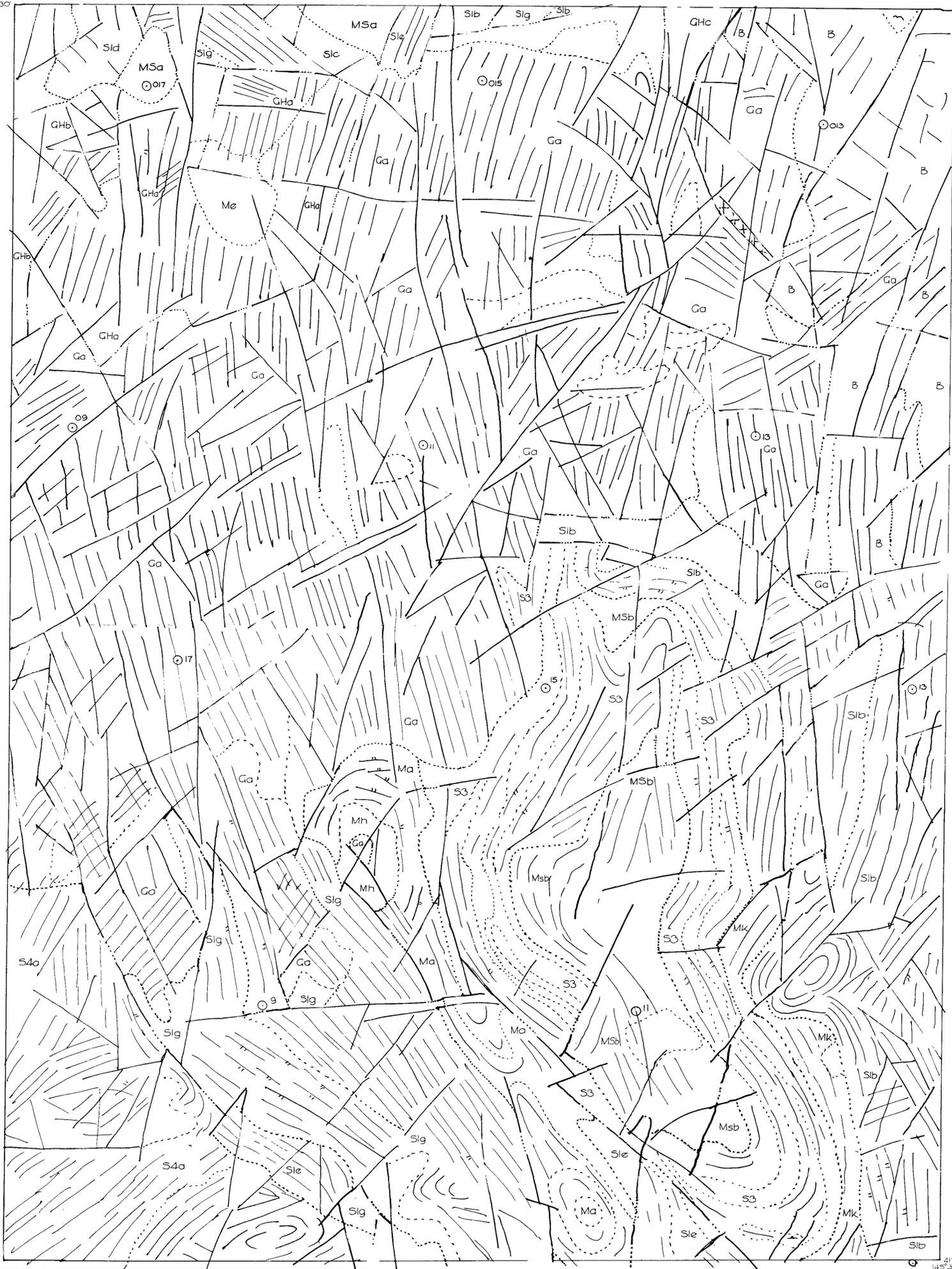
210218

COMPILED MCH DRAWN MCH SCALE 1:50000 TAS-2-791

41°30' 145°30'

145°45'

145°15'
41°30'

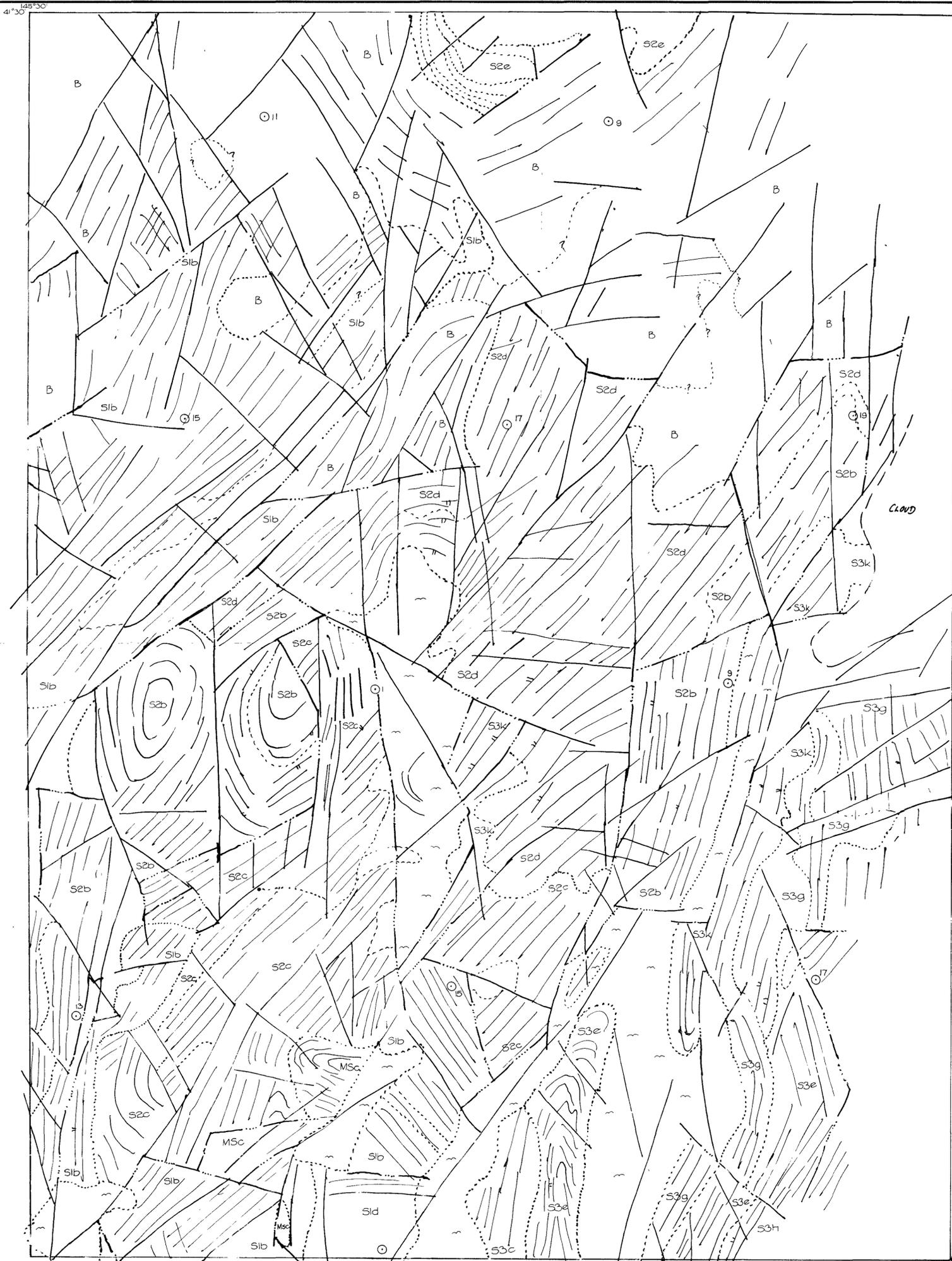


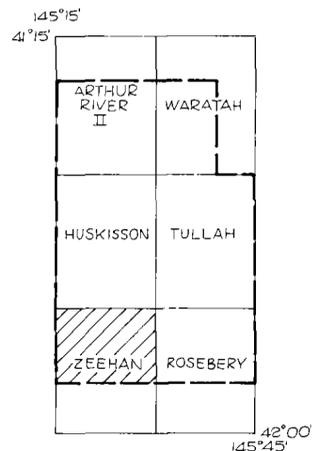
For legend see Rosebery sheet 78-1316

210219
AUSTRALIAN ANGLO AMERICAN LIMITED

COMSTAFF PROJECT
PHOTOGEOLOGICAL INVESTIGATIONS
PHOTOGEOLOGICAL INTERPRETATION
HUSKISSON 1:50,000

COMPILED	MCH
DRAWN	DATE
AMENDED	1/78
SCALE	1:50,000
PLAN No.	TAS-2-792





For legend see Rosebery sheet

App 1 78-13/4

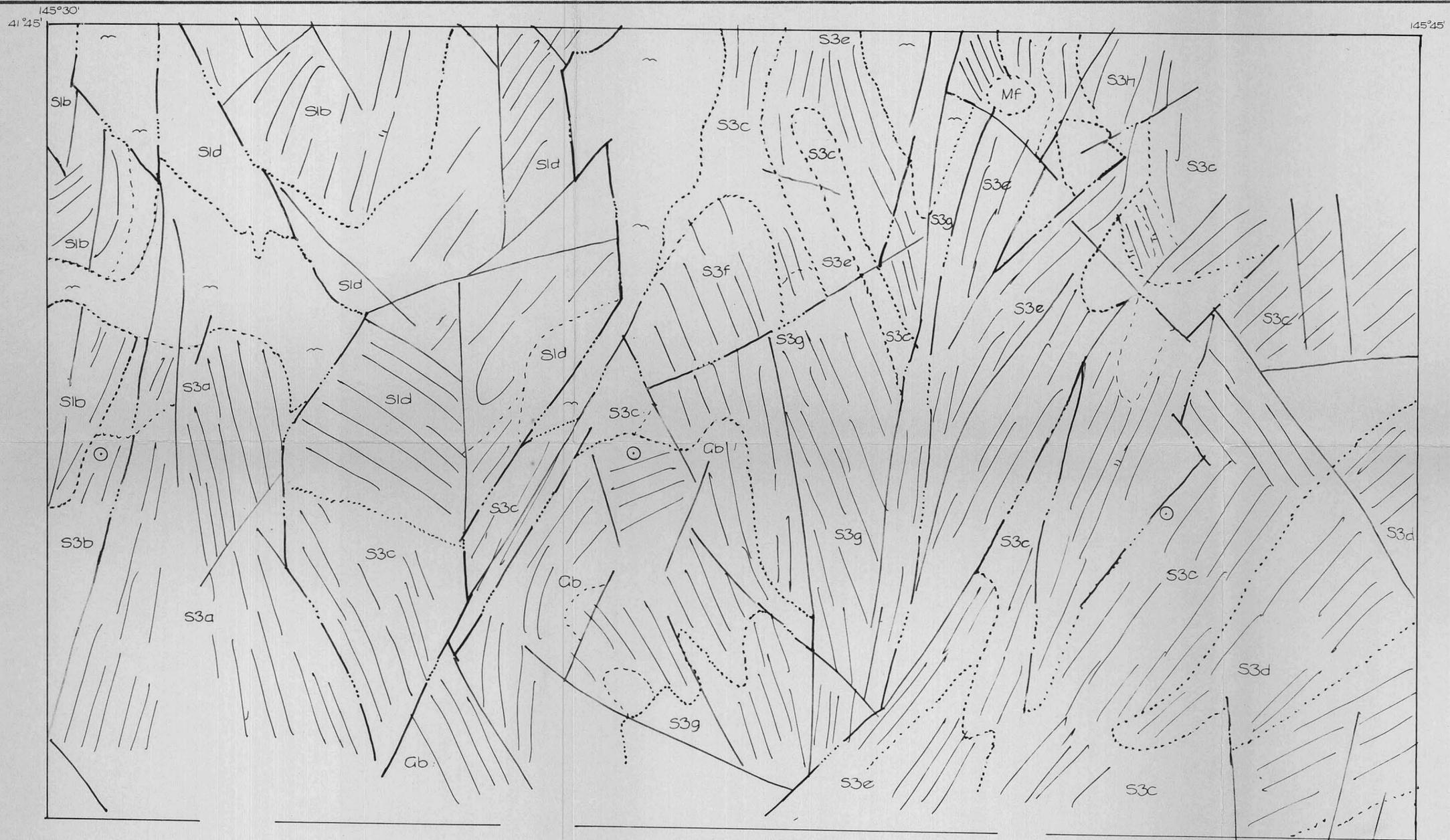
AUSTRALIAN ANGLIO AMERICAN LIMITED

COMSTAFF PROJECT
 PHOTOGEOLOGICAL INVESTIGATIONS
 PHOTOGEOLOGICAL INTERPRETATION
 PART ZEEHAN 1:50,000

COMPILED MCH DRAWN MCH SCALE 1:50,000 TAS-2-794

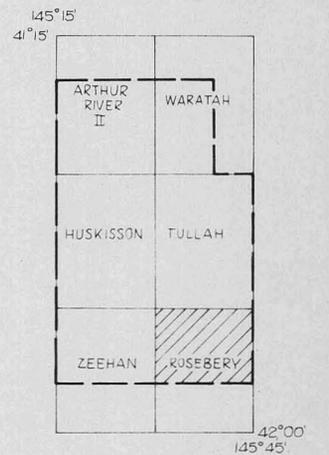
210221





ROCK UNIT	ROCK-TYPE TYPES	GROUP OR FORMATION
B	Basalt	(Territory Floor Basalt)
G	Granite	Meridith Granite
GH	Granite aureole/Hornfels	—
M	Mafic Intrusives (Phacoliths/Iopoliths)	—
MS	Mafic Intrusives (Sills)	—
S3	Meta Sediments (calcareous, Quartzite, Dolomite)	—
S1	Meta Sediments, Volcanics, Schists	—
S2	Meta Sediments and Volcanics	Mt Read Volcanics
S4	Unmetamorphosed sediments (Sandstone/Shales)	—

—	Major fracture (fault?)	
—	Photo linear (bedding, jointing)	
—	Photo linear showing dip direction	
—		< 30°
—		> 60°
—	Geological contact	
—	Unit boundary	
—	Faulted unit boundary	
X X X X X	Dyke	



0 1 2 3 4 Km

See Table One of text for rock sub-units -

Photogeological Investigation of the Comstaff Tenements and adjacent areas in Tasmania report

AUSTRALIAN ANGLO AMERICAN LIMITED

COMSTAFF PROJECT
 PHOTO GEOLOGICAL INVESTIGATIONS
 PHOTO GEOLOGICAL INTERPRETATION
 PART ROSEBERY 1:50,000

COMPILED MCH DRAWN MCH SCALE 1:50,000 TAS-2-795

210222

78-1316

APP 2

5 cm

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OPEN FILE

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MICROFILMED

PROJECT NAME: APPENDIX III

TITLE: SIX MONTHLY REPORT TO THE DEPARTMENT OF
MINES, TASMANIA
GEOLOGICAL ASSESSMENT OF THE COMSTAFF
LICENCE AREAS

AREA NAME/S, STATE 1:250,000 SHEET NO/S & COORDINATES: Burnie Sheet SK 55/3
Queenstown Sheet SK 55/5

COMMODITY/IES: Copper, Lead, Zinc, Tin

TEXT PAGES NO: 13
PLAN NOS: See List of Plans

TABLE NOS: 2
APPENDICES: See List of Appendices

AUTHOR/S: D. B. Orr

DATE: 10th December 1978

AUSTRALIAN ANGLO AMERICAN LIMITED

Incorporated in the State of Victoria

AUSTRALIAN ANGLO AMERICAN LIMITEDCOMSTAFF PROPRIETARY LIMITEDGEOLOGICAL ASSESSMENT OF THE COMSTAFF LICENCE AREAS1. INTRODUCTION

An assessment of the Comstaff tenements has been done by D. Orr, over Exploration Licence 5/63 parts 2, 3, 4 and 6, and by A.P. Bravo, over Exploration Licence 5/63 parts 1 and 5 and Exploration Licence 1/68. The attached assessments for individual areas were submitted with monthly reports. D. Orr spent 33 working days and A.P. Bravo 28 working days on these assessments.

In 1976, minerals worth \$228 466 800 were produced in Tasmania, most of which were mined on the West Coast.

Table 1: Major mineral production in Tasmania in 1976
(From the Director of Mines' Report for 1976)

Commodity	Quantity	Value
Copper (tonnes)	24 566	\$28 507 660
Gold (kg)	1 314	\$ 4 246 862
Iron Ore (tonnes)	2 221 805	\$40 616 387
Lead (tonnes)	12 070	\$ 4 415 664
Silver (kg)	54 421	\$ 6 341 438
Tin (tonnes)	2 204	\$20 768 806
Zinc (tonnes)	49 697	\$34 683 132

The major deposits in Tasmania are copper in acid volcanics at Mt. Lyell, polymetallic deposits in acid volcanics at Rosebery, Hercules and Que River, hydrothermal tin at Renison, Cleveland and Mt. Bischoff, magnetite at Savage River and scheelite on King Island.

The Comstaff tenements cover areas which are highly prospective for either stratiform polymetallic sulphide deposits or hydrothermal tin deposits.

2. GEOLOGICAL HISTORY OF NORTH WESTERN TASMANIA

The oldest rocks in Tasmania are probably those in the Central Highlands which form the Tyennan Geanticline. Although they have similar lithologies consisting of quartzites and slates with minor dolomites, conglomerates

and volcanics, the relationship between the older and younger Precambrian is not clear. The main difference is that the younger rocks are relatively undeformed, whereas the older rocks have undergone at least two pre-Cambrian deformations. Precambrian sedimentation was interrupted by the Penguin Orogeny which included the intrusion of dolerites and gabbro, e.g. at Savage River, and possibly the intrusion of the Granite Tor stock.

Following the Penguin Orogeny, sandstones, siltstones and dolomites were deposited in a relatively stable basin between the Rocky Cape Geanticline and the Tyennan Geanticline. The sediments of this transgressive phase include the Success Creek phase at Renison, the Smithton dolomites, the Mount Bischoff sequence and possibly the siltstone dolomite sequence in the core of the Just-in-Time anticline in the Ramsay area, and the siltstone dolomite sequence in the Heazlewood area. The dolomites are economically important since they host the replacement tin deposits at Renison, Cleveland and Mount Bischoff, and the tungsten deposits on King Island. Deepening of this relatively stable basin during early Cambrian times was accompanied by a thick deposition of the greywackes and submarine basic volcanics of the unfossiliferous Crimson Creek Group.

There would appear to be a marked change in sedimentation in middle Cambrian times. The greywackes give way to black pyritic shales with interbedded acid pyroclastics and only minor greywackes of the fossiliferous Dundas Group.

An important feature of the Cambrian Basin was the development of a thick acid volcanic pile, the Mount Read Volcanics, which formed an island arc around the western and northern margins of the Tyennan Geanticline. Interbedded siltstones within this volcanic pile at Sock Creek contain fossils of lower middle to middle upper Cambrian age. Archetarcs from the Rosebery Shale, however, indicate a pre-Cambrian age to those rocks.

Sedimentation ceased abruptly in the upper Cambrian with the onset of the Jukesian Orogeny which produced arcuate folds parallel to the margins of the Tyennan Geanticline. Major rift faulting, which uplifted the Rocky Cape and Tyennan Geanticlines, also occurred. It is possible that this Orogeny accounts for the faulted emplacements of ultramafic bodies at Renison, Pieman and Huskisson. The rift valley left by the faulting was filled initially

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by the Jukes Conglomerate derived from the Mount Read Volcanics, and subsequently by the Owen Conglomerate derived from Precambrian rocks.

The basal conglomerate, sandstones and limestones which occupy the core of the Huskisson Syncline were deposited towards the end of the Ordovician period.

The Silurian and Lower Devonian are represented by about 3000m of sandstones, mudstones and limestones forming the Eldon Group, none of which have been recognised in the Comstaff tenements.

The Tabberabberan Orogeny in Middle Devonian times may have taken place in two stages. An early stage which followed the Jukesian trend of arcuate folds parallel to the margin of the Tyennan Geanticline, and a later stage which produced north-west trending folds, such as the Huskisson Syncline and the Renison Bell Anticline.

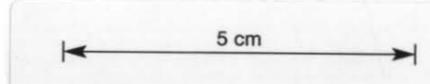
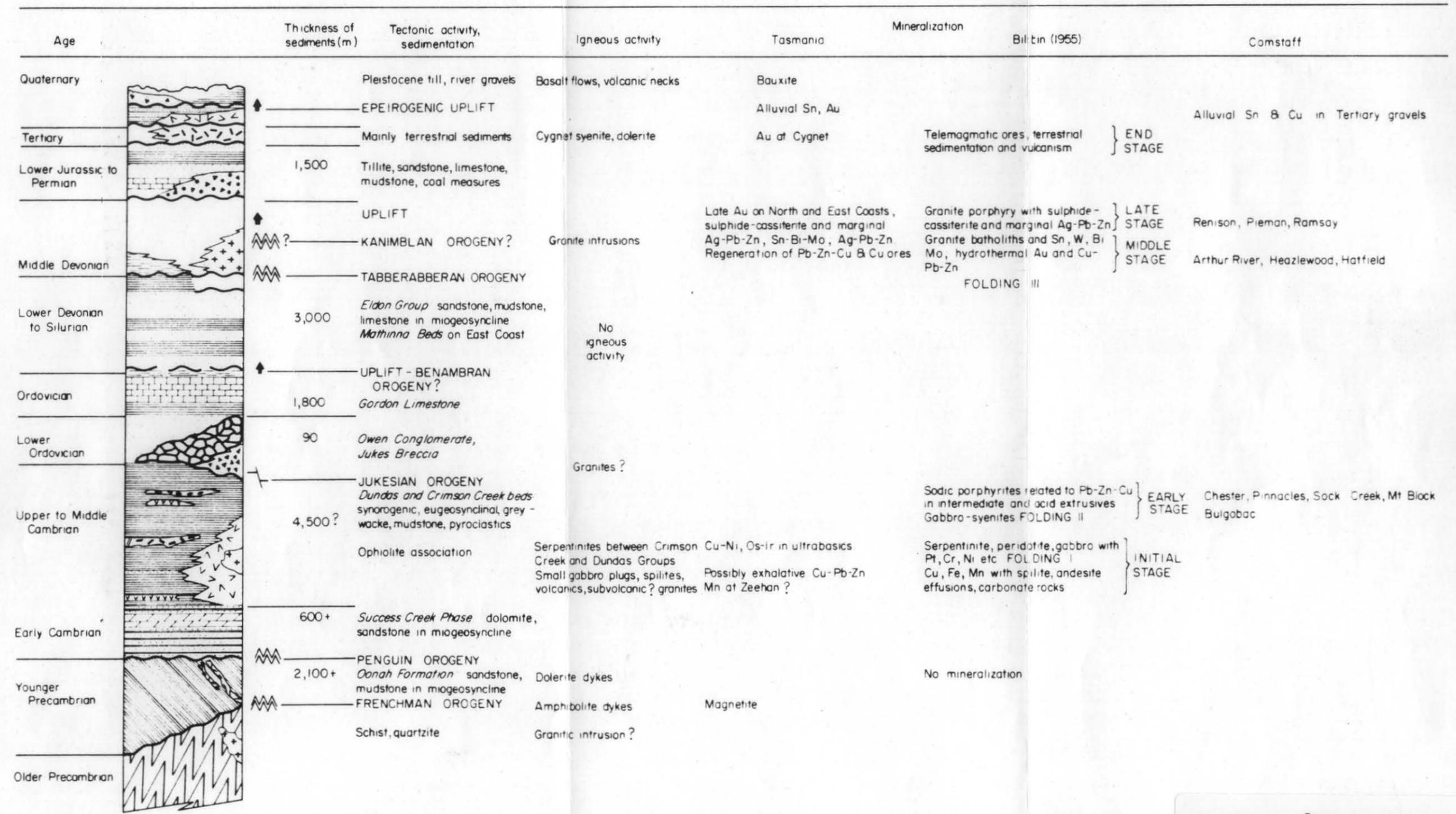
A number of stocks of granite, including the Meredith Granite, were intruded late in the Tabberabberan Orogeny or during the Kanimlan Orogeny. The tin deposits at Luina, Renison Bell and Waratah, and the tungsten deposits on King Island and at Kara and Moina, are considered to be related to this granitic phase.

In Jurassic times, tillite, sandstone, limestone, mudstone and coal measures were deposited in Central and Eastern Tasmania. An extensive dolerite was also formed at this time. None of these rocks have been identified in the Comstaff areas, although tillite occurs in the Hellyer Gorge north of the area.

Basalts were extruded again during Tertiary times, and these rocks occur above 600m above sea level in the Comstaff areas north of latitude $41^{\circ}35'S$ and east of longitude $145^{\circ}30'E$.

Evidence of glaciation is restricted to the areas south of the Tertiary basalt. Ground moraine covers large parts of the Chester, Pinnacles, Pieman and Renison areas, and fluvio-glacial deposits infill many of the valleys.

TAS/2/1692 summarises the geological history of Tasmania, and includes a reduced version of Bilibin's mineralising epochs associated with geosynclines. It also relates the Comstaff prospects to these epochs.



COMSTAFF PROPRIETARY LIMITED

SUMMARY OF GEOLOGICAL HISTORY & MINERALIZATION OF TASMANIA

DRAWN GEODRAFT 11/78	COMPILED D B O 11/78	SCALE
		TAS / 2 / 1692

3. GEOLOGY OF THE COMSTAFF TENEMENTS

During the regional stream sediment sampling programme from 1969 to 1972, most of the streams within Exploration Licence 5/63 were mapped, but in Exploration Licence 1/68, only part of the Heazlewood River Basin was covered and the area to the west of the river is unknown. Fact mapping was plotted on imperial sheets at a scale of 1:10 000 and coloured pencils were used to distinguish the varying lithologies which makes these plans unprintable. Geological data was transferred to the new metric base plans at a scale of 1:5000. Due to discrepancies in topography, the transfer of data was on a best fit basis, and as the mapping was done by different geologists, differences in rock descriptions occur. Generally the rocks get younger towards the east, but this pattern is modified by arcuate anticlines and synclines. Although mineralising epochs in Tasmania are regarded as being Cambrian and Devonian in age, the latter mineralisation appears to favour dolomites within the Success Creek Phase for replacement massive pyrrhotite/cassiterite mineralisation. This is probably because these rocks are near the base of the Dundas Trough sedimentary basin and thus closer to the granite source. The differences between the Dundas and Crimson Creek Groups, defined by G. Pigott in his work in the Renison East area, have been used in the interpretation of the mapped area to form the basis for the geological map.

The oldest rocks mapped in the Comstaff tenements are siltstones and quartzites with minor dolomites which have been equated with the Success Creek Phase. They occur in the cores of the Mount Bischoff and Just-in-Time Anticlines and on the western limb of the Heazlewood Syncline.

Overlying these rocks, generally with an unconformable contact, is the unfossiliferous Crimson Creek Group which consists of greywackes, basic volcanics and minor siltstones and shales. These rocks are found in the Heazlewood and Arthur River basins, the Hatfield-Coldstream areas and south of the Pieman River Fault in Renison East.

A change in the sedimentation pattern marks the base of the Dundas Group which consists of interbedded shales and acid pyroclastics with minor greywacke horizons. These rocks occur north of the Pieman Fault in the Pieman area, in the south-eastern part of Renison East and in the

006

cores of the Que River and Burns Peak Synclines. These latter rocks have been regarded as part of the Mount Read Volcanics, but because they have lithologies indistinguishable from those in the Pieman area they have been included in the Dundas Group. In addition, the shales on the Murchison Highway near Sock Creek contain fossil trilobites which equate with fossils from the Dundas rocks north of the Pieman River.

The Mount Read Volcanics are a thick acid volcanic pile forming an Island Arc System along the margin of the Tyennan Geanticline. In the Comstaff tenements they are restricted to Exploration Licence 5/63 parts 2, 3 and 4. Due to the absence of marker bands, these rocks are difficult to map, but they appear to get thinner north of Mt. Black. This may be more apparent than real since the younger rocks, forming the core of the Sophia Syncline, conceal a large proportion of the Mount Read Volcanics.

The serpentinites south of the Meredith Granite are apparently fault controlled and are enclosed in rocks belonging to both the Crimson Creek Group and the Dundas Group. The emplacement of these rocks during the Jukesian Orogeny is therefore probable.

Ordovician rocks, consisting of a basal conglomerate, sandstones and a limestone, are found only in the core of the Huskisson Syncline.

Devonian rocks within the Comstaff tenements are restricted to intrusive granites. They include the Meredith Granite, within and west of Exploration Licence 5/63 part 2, and the quartz porphyries at Mount Bischoff. The Pine Hill Adamellite is close to the south-western corner of Exploration Licence 5/63 part 6.

Tertiary rocks consist of basal gravels and a capping of basalt, the base of which is at approximately 600m above sea level, but are restricted to the north-eastern part of the area.

Glacial deposits occur as ground moraine over many of the hills south of the Tertiary Basalt, and as fluvioglacial deposits in the valleys.

The geological interpretation of the various areas, TAS/2/1697, has been plotted at a scale of 1:50 000 and replaces TAS/2/450. A section from Mt. Ramsay to Mt. Charter (TAS/2/1695) shows an interpretation of the structure and relationship of the various rock types.

4. MINERAL POTENTIAL

Volcanogenic and hydrothermal sulphide deposits are the major targets for exploration within the Comstaff licence areas. In Tasmania, two major mineralising epochs have been recognised. The earlier epoch is volcanogenic and is associated with the extrusion of the Mount Read Volcanics. The later epoch is hydrothermal and is associated with the intrusion of the Devonian granites (see TAS/2/1693).

Fossils from the Mount Read Volcanics within the Sock Creek and Queenstown areas indicate a lower middle to middle upper Cambrian age. G.R. Green stated, in a paper presented at the 1976 International Geological Conference in Sydney, that archetarcs indicate a pre-Cambrian age for the Rosebery Shale. Dating of galena from the Rosebery Mine gives an age of 161×10^6 years, i.e. Jurassic, (R.G. Ostic, R.D. Russel, R.L. Stanton, Additional measurements of the isotopic composition of lead from stratiform deposits. Can. Jour. of Earth Sciences, Vol. 4, 1967).

An examination of the lithologies of the various rock groups indicates that acid volcanic rocks first appear within the Dundas Group (see Section 3 Geology). This lithological difference, plus supportive evidence from fossils, indicates to the writer that the Mount Read Volcanics are lower middle to middle upper Cambrian in age. The lead isotope data indicate remobilisation of the galena by temperature increases in the earth's crust during the formation of the Jurassic dolerites in Tasmania.

4.1. Stratiform Massive Polymetallic Sulphide Deposits

The following parameters are required for the formation of a stratiform massive polymetallic sulphide deposit:

- a) A source for the cations
- b) A sedimentary basin
- c) A low Eh
- d) A neutral to slightly alkaline pH

Many stratiform massive polymetallic sulphide deposits are associated with an acid volcanic pile, e.g. the Rosebery deposit, the Kuroko deposits and the Archaean deposits in Canada. Some deposits, however, do not have any direct relationship with

acid volcanics, e.g. Mt. Isa, McArthur River and Rammelsberg.

In the Comstaff tenements the Mount Read Volcanics, south and east of the Burns Peak Syncline, are predominantly massive volcanic rocks in which no sedimentary basins have been identified. North and west of these rocks, the interbedded shales, siltstones and acid pyroclastics, which have been equated with the Dundas Group, indicate a depositional environment favourable for the formation of large stratiform massive sulphide deposits.

The highest priority area is within the Burns Peak and Que Synclines, between Burns Peak and the Tertiary Basalt. The line of exhalative vents which forms the core of the Pinnacles Anticline is an obvious source for cations. Massive sulphides, grading >20% Zn, have been exposed in costeans on grid EAA, and diamond drilling intersected the following grades of mineralisation at 0.5% Zn cut off:

Section	B/H	From	To	% Zn	Drilled Width
2400S	CP15	40m	56m	1.71%	16m
2000S	CP13	29m	61m	1.08%	32m
1800S	CP12	107m	128m	1.32%	21m
1600S	CP14	127m	158m	1.01%	31m

The intersections were made at the base of an overturned black shale horizon and the mineralisation occurs in net vein fractures. This mineralisation is cut in depth by the Owen Shear and any extensions down dip will be difficult to locate.

The sedimentary basins north and north-east of the Pinnacles are poorly explored, but channel sampling of costeans has shown values >1% Zn. At the northern end of the Burns Peak Syncline, diamond drilling at Sock Creek intersected a weighted grade of 5.9% Zn over a width of 5m and a strike length of 240m. This latter mineralisation was interpreted as being due to remobilisation of sphalerite by hydraulic fracturing caused by movement on the Sock Creek Fault. This explanation may not be entirely correct since the mineralisation has features consistent with stratiform deposits.

In the Hatfield area, the contact between the

Crimson Creek greywackes and the interbedded shales and pyroclastics of the Dundas Group has highly anomalous zinc values in stream sediment samples (anomalies H1 and H2). This contact may be the northern continuation of the Owen Shear.

West of the Owen Shear, in the Pieman and the Renison areas, rocks with similar lithologies to those in the Burns Peak and Que synclines have a depositional environment suitable for stratiform massive sulphide deposits, but there is no obvious source for the cations. The source for the cations in these rocks could be either the same source as the Rosebery and Hercules deposits, or a deep seated lineament could have tapped a different source to produce Mt. Isa style mineralisation.

The massive volcanics south and east of the Burns Peak Syncline are given low priority, since the absence of obvious sedimentary horizons indicates that any sulphide deposits will probably be relatively small and similar in size to the Que River deposit.

4.2. Hydrothermal Deposits

The target for exploration is a tin deposit of the order of 10 million tonnes grading 1% Sn. To meet this target the following parameters are most favourable:

- a) A granite source
- b) A conduit for tin bearing solutions
- c) A host rock which can be replaced

In a previous section it was stated that the tin rich Devonian granites form an arcuate pattern parallel to the margin of the Tyennan Geanticline. There is strong evidence that these granites underly a large part of the western and northern licence areas (see TAS/2/1693).

There is extensive faulting at both the Renison and Cleveland Mines, and it has been shown conclusively at Renison that the Bassett-Federal Fault acted as a conduit for the tin bearing solutions. Published ore reserves of Renison Limited give 5.15 million tonnes grading 0.94% Sn in the Bassett-Federal Lode, and a similar size deposit is possible on one or more of the faults in Renison East or Pieman.

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Within the Comstaff areas, the faulted serpentinite bodies have been shown to have enhanced cation concentrations indicating the presence of hydrothermal solutions.

A dolomite is the most common host rock for replacement hydrothermal tin mineralisation at Renison, Cleveland and Mount Bischoff. Within the Comstaff tenements, older dolomites have been identified in the Heazlewood and Ramsay areas and at Mount Bischoff. These areas have anomalous tin contents in stream sediment samples. The Ramsay area has evidence of contact metamorphism from the Meredith Granite, and a well defined high conductivity zone CS 24. In the Heazlewood area, photointerpretation has shown a circular structure which may represent a hidden granite.

In the Renison area, which is the most anomalous tin province and equates geochemically with Mount Bischoff, there are no known dolomitic horizons. However, the ultramafic bodies are chemically similar to dolomite and could therefore host replacement tin deposits. Borehole RBE 2 has intersected carbonitised serpentinite with disseminated pyrrhotite, sphalerite, chalcopyrite and pyrite. Some carbonate veins have galena in addition to the above minerals. The lead and zinc minerals may be in the form of a halo surrounding a tin rich core.

The Ordovician dolomites in the core of the Huskisson Syncline, in the north western part of Exploration Licence 5/63 part 6 and the south-western part of Exploration Licence 5/63 part 5, could host replacement tin deposits. These rocks are considered to be of low priority due to the vast thickness of sediments between the underlying granite and the outcrop of the dolomites. There is an axial plane fault which could act as a conduit.

5. CONCLUSIONS

Exploration Licence 5/63 was granted in 1963 and for the first five years exploration was confined almost entirely to the tin deposit at Mount Bischoff. Lack of access and thick vegetation hampered the regional mapping and sampling programme. Progress through the thick bush can only be achieved by cleared walking tracks and bulldozed roads. Helicopters are useful, but can only

be used with confidence in January and February, and helicopter sites have to be cleared.

Most of the Comstaff Licence areas have been covered by stream sediment sampling, but not all anomalies have been followed up by detailed soil sampling and mapping, for example, the zinc anomalies H1 and H2 in the Hatfield area. The attached assessments for the various areas indicate where additional work is required.

The southern half of Exploration Licence 5/63 was covered by an Input survey which produced some excellent anomalies, less than half of which have been followed up on the ground. It has been proposed that an airborne EM system be used to survey Exploration Licences 1/68 and 5/63 part 1. Such a survey is urgently required to test this area for tin bearing massive sulphide deposits.

The exploration target is a massive sulphide deposit of the order of 10 million tonnes, either as a polymetallic volcanogenic deposit or a massive pyrrhotite body containing circa 1% Sn. Such a deposit is relatively small and would fit into a cube having sides 130m long or its equivalent as a tabular body.

Sphalerite, which does not respond to geophysical techniques, is the dominant sulphide in volcanogenic deposits in Tasmania. The soils are highly leached and acidic over most of the Comstaff tenements, and any cations released during the weathering process are removed by ground water so that geochemistry is not entirely reliable. Since geochemical and geophysical techniques have limitations, it is essential to maximise geological control by costeaning and diamond drilling. Costeaning is becoming increasingly difficult due to the conditions imposed by the Department of the Environment, and if these become more stringent, it may be necessary to provide drilling funds for stratigraphic boreholes.

Table 2 summarises the work required on the various anomalies which have been outlined by either airborne EM or regional geochemistry.

The following areas have been listed in order of priority for future work:

a) Volcanogenic Targets

Burns Peak Syncline
Que Syncline

AREA	PROSPECT	Priority	Gridding	Surveying	Sampling	Mapping	EM	SP	Magnetics	IP	Access	Costeaining	REMARKS
EL 1/68	Grid HAB	2				+		+	+	?		+	
EL 5/63 pt 1	Deep Gully Creek	3		+	+	+							Check stream samples
	Magnet South	3			+	+							Check cation anomalies
EL 5/63 pt 2	Input CAG	1	+	+	+	+	+	+	+		+	?	
	Input CAI	1										+	Relocate anomaly
	Input CAM	2	+	+	+	+	+	+	+		+		On lease boundary
	Input CAJ	1	+	+	+	+	+	+	+		+		
	Input CAB	2											Not found by previous grid
	Input CAF	1	+	+	+	+	+	+	+		+		Includes CAF (W)
	Input CAE	1	+	+	+	+	+	+	+		+		Includes CAE (E)
	Input CAL	1	+	+	+	+	+	+	+		+		
	Ramsay Streams	1		+	+	+		+					S/S sampling Ramsay tributaries
	Hatfield H1	2	+	+	+	+			+	?	+		
	Hatfield Q1	2	+	+	+	+		+	+	?	+		
EL 5/63 pt 3	Input anomaly CS 20	2	+	+	+	+	+	+	+				
	Grid DAC	3				+		+	+				On strike from Que River
EL 5/63 pt 4	Burns Peak Syncline	1	+	+	+	+		+	+	+			
	Que Syncline	1	+	+	+	+		+	+	+			
	Tramway Creek	2	+	+	+	+		+	+		+		
	Owen Shear	3											Requires assessment
EL 5/63 pt 5	Huskisson	3	+	+	+	+		+	+				
EL 5/63 pt 6	Grid GAP	2	Geophysical and geochemical anomalies to be explained										
	Fenton's Grid	1				+	+	+	+	+		+	
	Input GAG	2										+	Follow up anomalies
	Input GAM	3	+	+	+	+	+	+	+		+		
	Input GAO	1	+	+	+	+	+	+	+	+	+	+	Difficult access
	Input GAN	2	+	+	+	+	+	+	+				

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TABLE 2:

Hatfield geochemical anomalies.
 Input anomalies CS 30 and CS 30A, north of Sock Creek.
 Input anomaly GAO in Pieman.
 The Dundas sediments in the south-western part of grid GAP in Renison East.
 The northern plunge of the Chester Pyrite Mine.
 The geochemical anomalies in the north-western part of the Chester grid.
 Down dip extensions of the Pinnacles mineralisation.
 The contacts of the andesite at East Chester.
 Exploration Licence 5/63 part 4, east of the Emu Bay Railway.
 Exploration Licence 5/63 part 3, south and east of the Murchison Highway.

b) Hydrothermal Targets

The metasomatic halo around the Meredith Granite in Exploration Licence 5/63 part 2.
 The dolomites in Exploration Licence 1/68.
 Fenton's Prospect in Renison East.
 The faulted contacts of the serpentinites in Renison East, Pieman and Huskisson.
 The geochemical anomalies south of Magnet Creek.
 The tin anomalies in Deep Creek Gulley.
 The mineralisation below the workings of the Magnet Mine.

Although exploration in Tasmania is very expensive when compared with areas on the mainland of Australia, the existing infrastructure, combined with highly prospective tenements, compensates for the high exploration costs.



10th December 1978

D.B. Orr

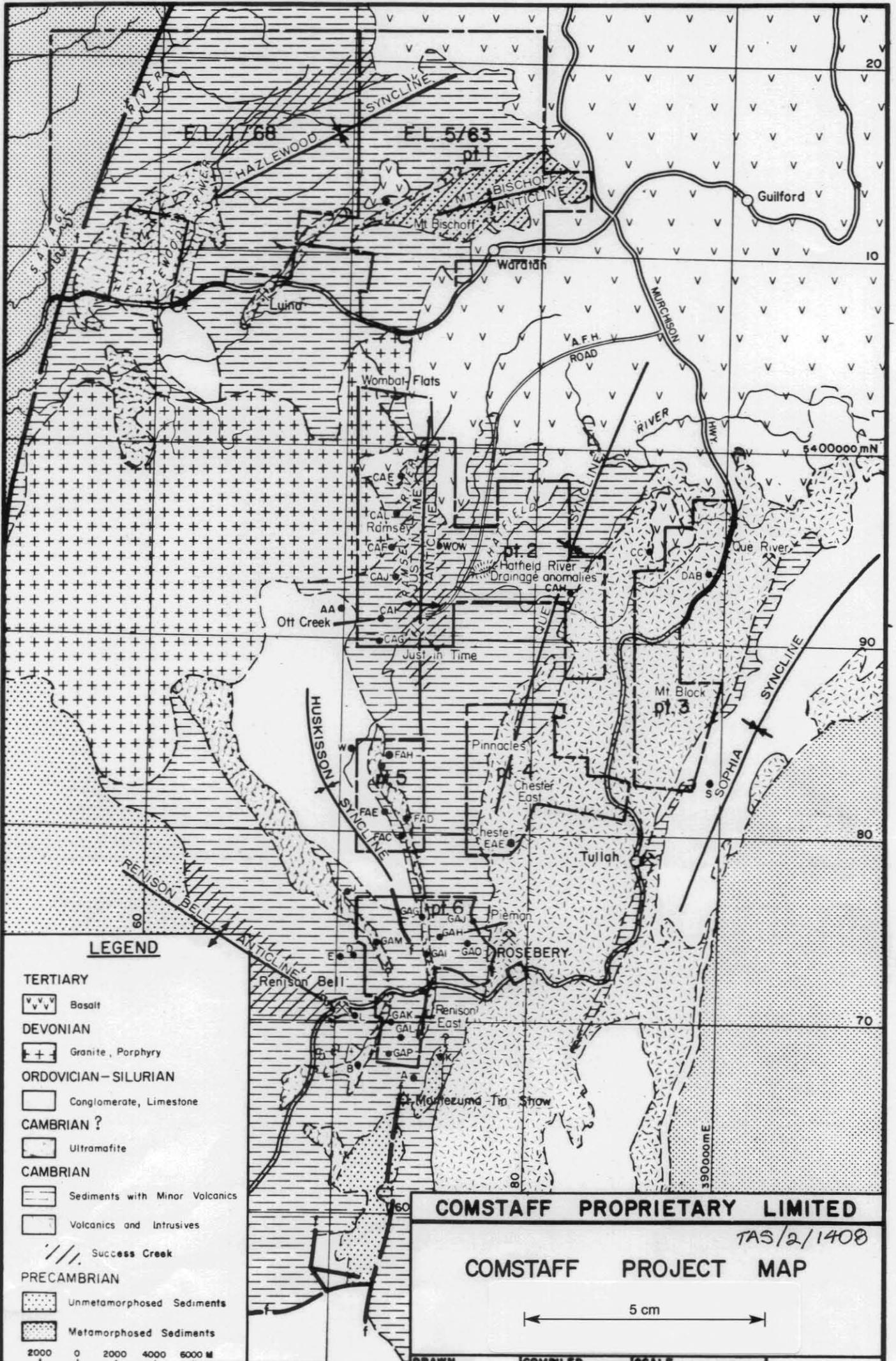
6. LIST OF PLANS

- TAS/2/1408 Project Map
- TAS/2/1662 Metric Sheet Index, showing location of assessed areas
- TAS/2/1693 Relation of Devonian Granites to major folds
- TAS/2/1697 Geological Interpretation Plan
- TAS/2/1695 Geological Section from Mt. Ramsay to Mt. Charter
- Location of Mineral Occurrences
- Generalised Strike and Dip Measurements

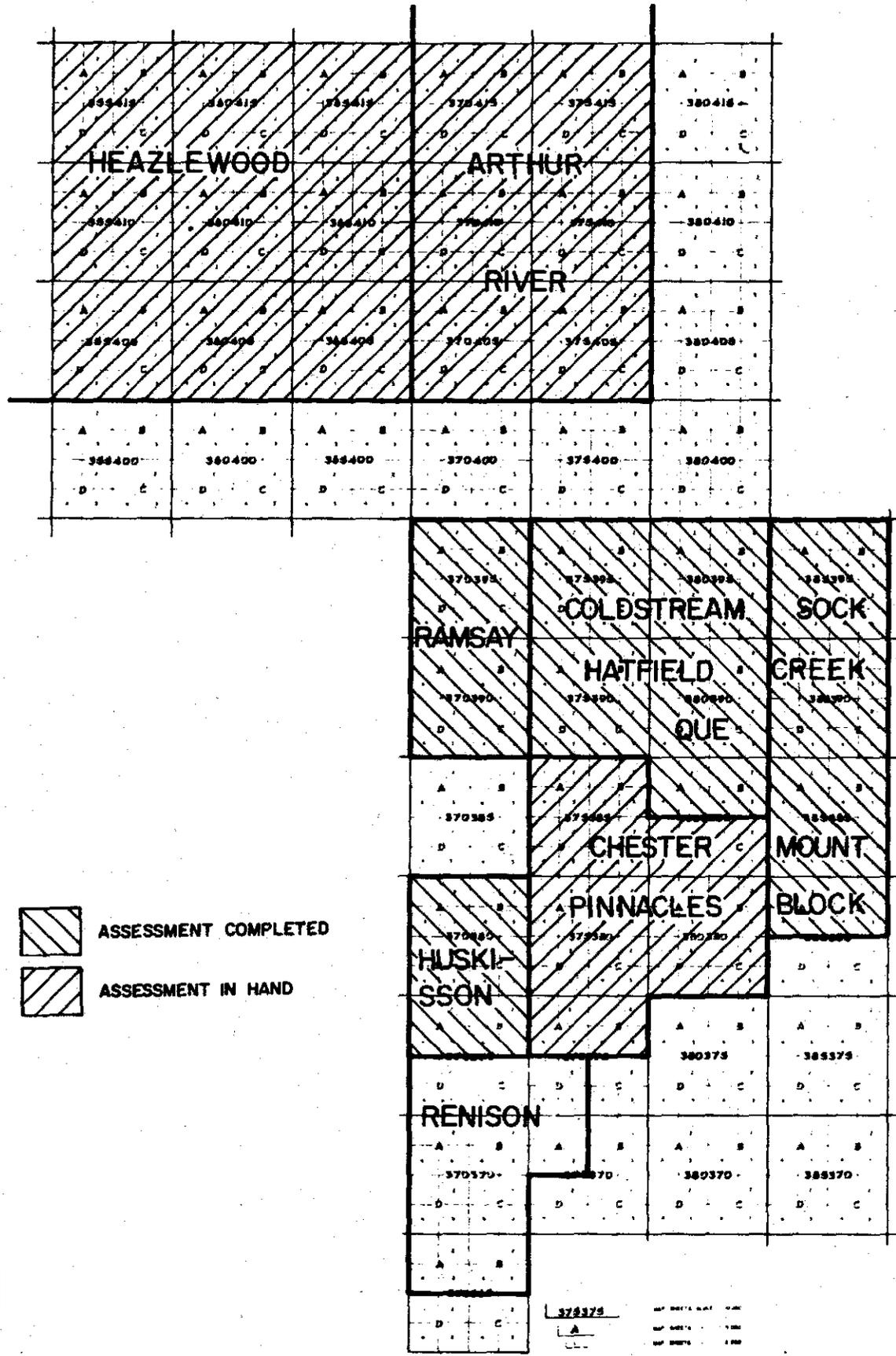
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7. APPENDICES

- Preliminary Assessment of the Heazlewood Area
- Arthur River-Magnet Area Reassessment
- Preliminary Assessment of the Ramsay Area
- Preliminary Assessment of the Hatfield, Que River and Coldstream Drainage Basins
- Preliminary Assessment of the Mount Block Area
- Assessment of Exploration Licence 5/63 Part 4
- Huskisson Area Reassessment
- Assessment of Exploration Licence 5/63 Part 6



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NOTE: THIS PLAN OVERLAYS TAS/2/1408

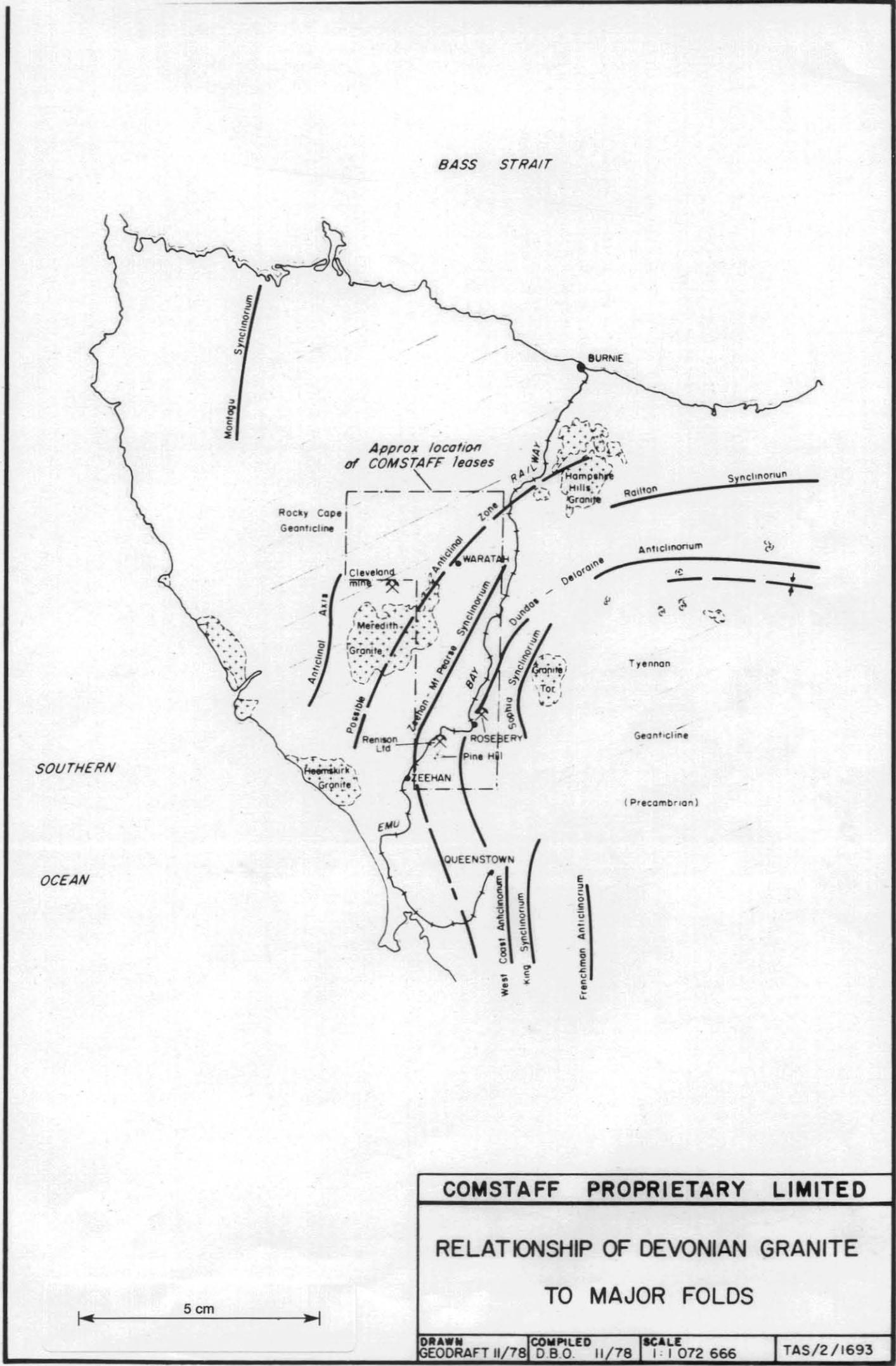
COMSTAFF PROPRIETARY LIMITED

METRIC SHEET INDEX

STATUS OF ASSESSMENT OF

COMSTAFF LEASE AREAS AS AT 27/9/78

TAS/2/1662



COMSTAFF PROPRIETARY LIMITED

RELATIONSHIP OF DEVONIAN GRANITE TO MAJOR FOLDS

DRAWN GEODRAFT 11/78	COMPILED D.B.O. 11/78	SCALE 1:1 072 666	TAS/2/1693
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AUSTRALIAN ANGLO AMERICAN LIMITEDCOMSTAFF PROPRIETARY LIMITEDPRELIMINARY ASSESSMENT OF THE HEAZLEWOOD AREA1. LOCATION

EL 1/68 designated the Heazlewood area is located west of Waratah on the Burnie 1: 250 000 Sheet (SK55-3). The relevant 1:5 000 Sheets are 355405A; 355410 A,B,D; 355415 A,B,C,D; 360405 A,B; 360410 A,B,C; 360415 A,B,C,D; 365405A; 365410 A,B,D; 365415 A,B,C,D.

2. PHYSIOGRAPHY AND ACCESS

The area is thickly forested with deeply incised drainage. Despite the steep nature of the country, soil cover is almost ubiquitous and geological outcrop away from the creeks is poor. Access is very limited.

3. PREVIOUS WORK

The upper Heazlewood River drainage system was explored in 1972/1973 by stream sediment sampling and geological mapping utilising a helicopter for access. (For results see: W. Herrmann Regional Exploration, Heazlewood and Arthur River 1972/73; Summer Field Season Report). As a result of this work two grids were established over the most interesting stream geochemistry. These are shown on TAS 2/704. The eastern grid was apparently cut but never sampled. The western or Friday Creek grid was soil sampled and computer print outs of the data are available but no further assessment was made. Prior to 1970 a few 'sorties' were made into the Bald Hill area to look at the old precious metals mines associated with unltrafics in that area.

So far, no geophysical techniques have been used to explore the area.

4. GEOLOGY

Herrmann recognised two distinct lithological sequences and noted that dolomitic shales occur at the interface between a quartzite/shale sequence and mudstone/greywackes. The quartzite/shale sequence forms part of a large anticlinal structure which is thought to have been deformed prior to deposition of the dolomite and mudstone/greywacke sequence raising the possibility that the dolomitic shales were deposited on the flanks of the early formed anticlinal ridges.

2.

Highly serpentinitised ultramafic, obviously the same intrusion as at Huskisson, has been intruded into the sediments in the SW corner of the area. As at Huskisson there is evidence of sill-like bodies of mafic intrusives ranging from basalt to gabbro flanking the serpentinite suggesting an emplaced ophiolite sequence. The proximal relationship between serpentinite and dolomitic limestone perhaps implies that this may have been a selective horizon for emplacement.

The rocks are well described in the report.

5. AREAS OF INTEREST

The stream sediment geochemistry greyscale plots outline a broad pattern of Cu, Zn and Ni enhancement on the east side of the Heazlewood River. The anomalous zone is most likely formational as it corresponds with a belt of coarse grained basic rocks mapped by the Geological Survey and indicated from our geology. Alternatively, the enhanced metal values could be derived from the contact of these rocks with the basic to intermediate volcanics further east. Within this zone, however, there are drainage trains with copper value in excess of 100 ppm Cu and nearly always high coincident zinc. These anomalies occur mostly in the north-east part of the lease area and a group of them have been covered by the Friday Creek grid. The anomalies appear to be associated with a tuff greywacke, andesite sequence often intruded by dolerite.

Monday Creek has the strongest geochemical enhancement of Cu and Zn but perhaps significantly there are also Sn values of 20-50 ppm associated. Soil sampling (B horizon) within the grid has confirmed the anomalous tin which is generally associated with copper in a restricted pattern that has a NNE trend. High zinc values are dispersed over the grid with a slight enhancement in the area of the general Cu/Zn anomaly.

Anomalous tin values were obtained from the Heazlewood River where it crosses the lease boundary with Abminco. Three streams, which appear to traverse a dolomite/ultramafic boundary in the same area, flow west into the Heazlewood River and have anomalous Cu values. The position of the lease boundary in this area has to be accurately established.

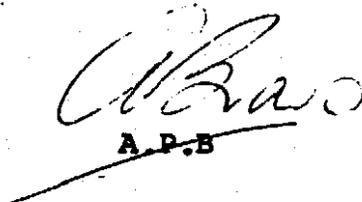
Anomalous tin values were also obtained from the Whyte River and a minor tributary north of Luina both inside and outside the northern boundary of the lease. A similar geological environment of serpentinite and basic volcanics is indicated.

3.

6. RECOMMENDATIONS

- (i) As 30% of the lease area remains to be explored and access is difficult, some form of airborne EM survey would be the best technique to utilize in this area as it would be useful for delineating the ultramafic and zones of basic volcanics as well as generating zones of interest and locating sulphides.
- (ii) It is recommended that airphoto interpretation be carried out utilising the geological data available in order to advance any geological interpretation into the unexplored NW corner of the lease area.
- (iii) The Friday Creek grid should be refurbished and geologically mapped, with costeaning to explore rocks in the area of anomalous geochemistry, followed by ground geophysics if required.
- (iv) Having established the nature of the Cu/Zn/Sn anomaly covered by the Friday Creek grid, attention should be given to the geology associated with similar Cu/Zn anomalies east of the Friday Creek area.
- (v) As part of the follow up of the scattered anomalous Sn situations it is necessary to be familiar with lithologies of the Cleveland area especially Halls Formation. To this end, detailed photo interpretation is required to check the Cleveland structures and geology to see whether they strike into the lease area.
- (vi) Research is required into the precious metal occurrence at Bald Hill.

APB.LS


A.P.B.

AUSTRALIAN ANGLO AMERICAN LIMITED
COMSTAFF PROPRIETARY LIMITED
ARTHUR RIVER - MAGNET AREA REASSESSMENT

1. LOCATION

The Arthur River - Magnet area (EL 5/63 Part 1) is located north and west of Waratah on the Burnie 1:250,000 Sheet (SK 55-3).

The relevant 1:5000 sheets are 365410 C; 370405 A, B, C, D; 370410 A, B, C, D; 370415 A, B, C, D; 375410 A, B, C, D; 375415 A, B, C, D and 380410 A.

2. PHYSIOGRAPHY AND ACCESS

The area is thickly forested with deeply incised drainage. Despite the steep nature of the country soil cover is almost ubiquitous and geological outcrop away from the creeks is poor.

The northern half of the area has been heavily explored and access is adequate but should present a problem in the NW corner. A graded logging road gives access along the Arthur River.

3. PREVIOUS WORK

Arthur River, downstream from its confluence with the Waratah River, Deep Gully Creek and tributaries flowing in from the west were sampled by W. Herrmann during the 1972/73 stream sediment sampling programme. Then 5 grids were cut and sampled in the 1973/74 field season (See Tas. 2-442 for details) over areas considered interesting.

Besides specific exploration at Mt. Bischoff and Magnet Mine a large grid was cut and sampled east of Mt. Magnet. This covers the BAB anomaly which was recently drilled without success.

4. GEOLOGY

The basic volcanics/mudstone sequence which is closely associated with the ultramafic intrusion in the Heazlewood area strikes NE across the northern part of EL 5/63.

- 2 -

Interestingly, along the Arthur River logging track Herrmann has mapped gabbro and serpentinite proximal to the basic volcanics but separated by a mudstone/tuff sequence as at Huskision. Hence, there is evidence that part of the ultramafic intrusion may swing NE across the Arthur River, in the area of Dalco Creek, in the same way as the regional structure.

Further south, mudstone and greywacke with chert, dolomitic sandstone and occasionally pillowed basaltic lava and tuff correlate with rocks in the Mt. Bischoff - Cleveland area and probably belong to the Crimson Creek Argillite.

5. DISCUSSION OF RESULTS

Contamination from Bischoff and Magnet Mines is the first thing that is apparent in the stream geochemistry. Despite this, several obvious patterns of enhancement have been recognised and are covered by the gridding.

The large grid covering the Dalco-Happy Day Creek area appears to have been put down to cover anomalous Cu/Zn and Sn stream geochemistry. Costeaming produced values which averaged 378 ppm Cu and 955 ppm Zn over 60m supporting the encouraging soil geochemistry in this area. The geology is suspected to be similar to that in the upper reaches of the Heazlewood River viz. basic volcanics/mudstone but insufficient work has been carried out to allow further comment.

South of the area gridded to cover BAB there is a prominent Pb anomaly with associated Zn and minor Cu that does not appear to have resulted from contamination produced by Magnet Mine. If so, follow up work is required to explain the anomaly. This same stream, which is a major tributary of Magnet Creek and the Arthur River has a pronounced Sn anomaly. But, like most of the tin anomalies in this area it occurs downstream from the tertiary basalt capping suggesting that tin is being derived from gravels being eroded from below the basalt. A long train of anomalous Sn in Deep Gully Creek may also have accumulated following erosion and retreat of the basalt cover.

6. RECOMMENDATIONS

- (i) Exploration and assessment of the Happy Day Creek area covered by Grid E was never completed and high soil and costean Cu/Zn values were never explained. Mapping of the grid is required to establish the geological environment followed by additional costeaning. A final appraisal may depend on results

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- 3 -

obtained from the upper Heazlewood River and Huskisson work because information to date suggests that the geology and geochemistry are similar in all these areas.

- (ii) Further stream sampling is required to confirm the high Pb/Cu/Zn/Sn in the headwaters of Magnet Creek west of Waratah.
- (iii) An orientation stream sediment survey is required to establish the amount of tin being derived from the gravel horizon below the Tertiary basalt.
- (iv) Detailed air photo interpretation of the geology and structure to try and relate the geological environments of the Heazlewood and Arthur River areas.


S. P. Bravo

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File. 24/08/78

AUSTRALIAN ANGLO AMERICAN LIMITED

COMSTAFF PROPRIETARY LIMITED

PRELIMINARY SUMMARY ASSESSMENT OF THE RAMSAY AREA

1. LOCATION

The Ramsay area is that part of Exploration Licence 5/63, Part 2, covered by map sheets 370 385 A and B, 370 390 A, B, C and D, 370 395 A, B, C, D and 370 400 C and D.

2. TOPOGRAPHY

The rivers are deeply incised and run from north to south with valley slopes generally greater than 30°.

3. ACCESS

3.1. Old Will O'Wisp Road

This road became unusable during the Will O'Wisp drilling programme in 1973. Four wheel drive vehicles were pulled out on sledges by bulldozers.

3.2. Associated Forest Holdings' Hatfield Road

A major logging road is being constructed to the junction of the Hatfield and Coldstream Rivers. When completed it will connect with the Will O'Wisp road, and will provide year long access to the southern part of the area.

3.3. Possible Additional Access

There will still be problems of access into the Input anomalies along the western slopes of the Ramsay River. It may be possible to extend the road from Input Anomaly CAI. An alternative is to extend the Wombat Flats road southwards along the eastern contact of the Meredith Granite.

4. EXISTING GRIDS

- 4.1. Will O'Wisp Grid
- 4.2. Ramsay Grid
- 4.3. Ott Creek Grid, including Input Anomaly CAI.

5. PREVIOUS REPORTS

- 1969-1970 A Rapid Reconnaissance of the Coldstream-Ramsay River Systems, M.P. Everett
- 1969-1970 Webb Creek, H.R. Robison
- 1971 Hatfield Regional, T. Chisholm
- 1971 Wombat Flat Area, T. Chisholm
- 1971-1972 Coldstream-Hatfield-Que Regional Reconnaissance Project, M.P. Everett
- 1972 Ramsay Area Project, C.S. Rugless
- 1972 Will O'Wisp Follow up Project, M.P. Everett
- 1972-1973 Will O'Wisp Report on Drilling Programme, M.P. Everett and M. Pigott

6. GEOLOGY

The Ramsay area covers the eastern contact of the Meredith Granite. Rugless states (1972), "The Ramsay River group of rocks can be divided into two distinct sequences based on:

- a) Differing types of rock reflecting contrasting deposition environments.
- b) Differing stages of metamorphism.
- c) The intensity of tectonic activity."

The older sequence consists of possible Precambrian metaquartzites, metasilstones and foliated black shales similar to the rocks at Mount Bischoff. The younger sequence, consisting of quartzites, shales, mudstones, dolomites and dolomitic conglomerates, rests unconformably on the older rocks.

Everett (1971-1972) and Rugless (1972) differ slightly in their interpretation of the structure of the area, although both emphasise the importance of the "Just in Time Anticline".

The fine grained greywackes and yellow shales on the west limb of the Just in Time Anticline are equivalent to the coarser greywackes of the Hatfield Group and support a north-east source for these rocks.

The following succession is postulated:

- Younger Greywacke, mudstone, shale
- Siltstone, mudstone
- Dolomite, dolomitic conglomerate

026

Sandstone, sandstone conglomerate
Black shale

Older ----- Disconformity

Highly contorted and foliated grey to black
shales and metaquartzites

It is postulated that the dolomite sequence may be
equivalent to the Success Creek Group at Renison, on the
eastern limb of the Huskisson Syncline.

The most important effect of the granite intrusion is
the blanket metasomatism of the sediments for about
1500m from its contact. This is most evident west of
the Just in Time Anticline, where the rocks have been
altered to metasomatised dolomitic conglomerates and
tourmalinised quartzites. Pyrite quartz veining is
common.

7. GEOPHYSICS

In April 1975 an Input survey was flown over the
southern part of the Comstaff exploration licences
(EL 5/63, parts 2, 3, 4, 5 and 6). Within the Ramsay
area, anomaly CS 24 follows the contact of the Meredith
Granite. Although it has a coincident magnetic
anomaly, there are no known ultrabasic or basic rocks
to account for the high magnetics.

The following anomalies are considered worth ground
follow up work:

Line	Fid.	Anomaly type	Channels	Ratio	Mag.	Alt. ft.	Code
228AW	121.30	SP	4	1.5/0.2	30nT	510	CAG
234AW	15.65	BF	6	8/1.4	160nT	420	CAI
234AW	16.97	?	5	2/0.3	-	660	CAM
237AE	17.83	BP	6	4/1.0	620nT	710	CAJ
239W	247.93	BF	6	4/0.8	10nT	580	CAB
241AE	215.55	BF	4	3.5/0.3	100nT	450	CAF West
241AE	215.84	BP	5	3/0.6	350nT	500	CAF
244E	132.40	BP	6	8/1.3	400nT	420	CAL
247W	63.60	BF	6	13/2.3	800nT	420	CAE
247E	69.12	BP	4	5/0.4	20nT	580	CAE East

Anomalies CAI and CAB were examined on the ground.
Anomaly CAI was confirmed on the ground with sympathetic
soil anomalies in zinc and lead. Anomaly CAB was not
confirmed on the ground.

8. GEOCHEMISTRY

The major drainages were sampled during the summer seasons 1969 to 1972. All samples were analysed for Cu, Zn and Ni, and some samples were also analysed for Pb and Sn.

The following table summarises the results:

	Cu	Pb	Zn	Ni	Sn
High	200	130	2400	208	350
Low	BLD	5	2	BLD	BLD
Mean	32.14	33.33	139.06	51.68	21.55
Standard deviation	24.85	18.17	149.45	43.89	35.44
Number of samples	554	370	553	523	398
Population 1	<20	<25	<45	<20	<25
Population 2	20-64	25-49	45-119	20-79	25-46
Population 3	65-84	>49	200-259	>79	47-139
Population 4	>84		>259		>139

11 anomalous areas are outlined by the stream sediment samples confirming those outlined by Rugless (1972):

- R1 This is a tin anomaly in a creek draining the metasomatised sediments in contact with the granite.
- R2 This is a zinc-nickel anomaly, and probably reflects remnant Tertiary Basalt along the ridge between the Ramsay and Coldstream Rivers.
- R3 This is a complex copper, lead, zinc and tin anomaly on the Ramsay River and south of the Ramsay grid. The anomalous lead values have been followed up by the Ramsay grid, but the tin coincides with the Ramsay gossan and has not been adequately followed up.
- R4 This is a large tin anomaly in the upper reaches of the Ramsay River in the Wombat Flats area. Anomalous nickel values in the eastern tributaries of the Ramsay River can be explained by Tertiary Basalt. However, the anomalous nickel values in the western tributaries are difficult to explain from the mapping, although the Input outlines high magnetics.
- R5 This anomaly drains the Will O'Wisp grid where anomalous zinc, copper and lead values occur in soils over a carbonate.

028

R6 This is a complex copper, lead, zinc and tin anomaly which has been covered by the Ott Creek grid.

R7 and R8 These are from one creek draining Input anomaly CS 24 and are lead anomalies close to the postulated Precambrian-Cambrian contact.

R9, R10 and R11 These are tin anomalies which have not been explained. It is of interest to note that they occur close to the postulated Precambrian-Cambrian contact. They align with tin anomalies R3 and R4.

9. DISCUSSION OF RESULTS

Although the Will O'Wisp, Ramsay and Ott Creek grids have been cut, sampled and mapped, additional work is required.

The Ramsay grid did not cover the western bank of the Ramsay River, and the exposure on all grids was insufficient to define the geology of the areas.

The high magnetic anomalies associated with Input anomalies CS 22 and CS 24 cannot be explained by geological mapping, although anomalous nickel values indicate the presence of basic rocks west of the Ramsay River.

The new Associated Forest Holdings road will give access to the lower reaches of the Ramsay River. It may be possible to bulldoze a track along the Ramsay River as far as the Ramsay grid. Since most of the Input anomalies are located close to the granite contact, alternative access from the Corinna road along the granite should be considered.

10. POTENTIAL OF THE AREA

The Ramsay area has a potential for high grade tin deposits as replacement bodies within the metasomatised sediments in contact with the granite.

The carbonate horizons are considered to be time equivalents of the Mount Read Volcanics, and therefore have potential for massive base metal deposits similar to Mount Isa.

11. RECOMMENDATIONS

11.1. Access

- 11.1.1. The Associated Forest Holdings road is connected to the Will O'Wisp access track.
- 11.1.2. This track is extended south-westwards into the Ott Creek grid to explore anomaly CAI by costeaning.
- 11.1.3. Four wheel drive access is made along the Ramsay River northwards to the Ramsay Gossan.
- 11.1.4. The Mount Ramsay pack track is examined to determine whether it can be upgraded into a four wheel drive track.

11.2. Follow up Work

- 11.2.1. All western tributaries of the Ramsay River are mapped and sampled every 100m. Heavy mineral concentrates should be collected every 500m.
- 11.2.2. The Ramsay grid is extended southwards to examine tin anomaly R3.
- 11.2.3. Grids are cut over all Input anomalies where ground follow up work has been recommended.

12. ESTIMATES OF WORK INVOLVED

Apart from the Will O'Wisp grid which was resampled in 1976, it is unlikely that any of the existing grids will be retrievable and will probably require to be re-cut.

12.1. Access

Access into CAI will take at least 1 month.

Access into the Ramsay grid is estimated to take an additional month.

Access south from Wombat Flats involves about 12km on a straight line, but the time required to bulldoze the track is difficult to estimate.

12.2. Grid Cutting

Six standard Input grids will need to be cut.

Each of these will have three lines 640m long with two tie lines, each 240m long; giving a total of 2.4km per grid. Grids CAF and CAE will be

extended to cover the western and eastern anomalies respectively. Grid CAF will have lines 1140m long with tie lines, and grid CAE will have lines 1250m long with tie lines; giving a total of 23 line km of grid cutting to follow up the Input anomalies.

Additional grid cutting will be required to follow up the tin anomaly associated with the Ramsay Gossan. Five lines, spaced 100m apart, should be cut which, with tie lines, gives a total of 6km.

12.3. Geochemistry

Grid lines should be sampled every 20m, giving a total of 1200 soil samples. Approximately 200 stream sediment samples will be collected.

12.4. Geophysics

EM, magnetics and SP will be done over the 24 km of grid lines.

20th August 1978

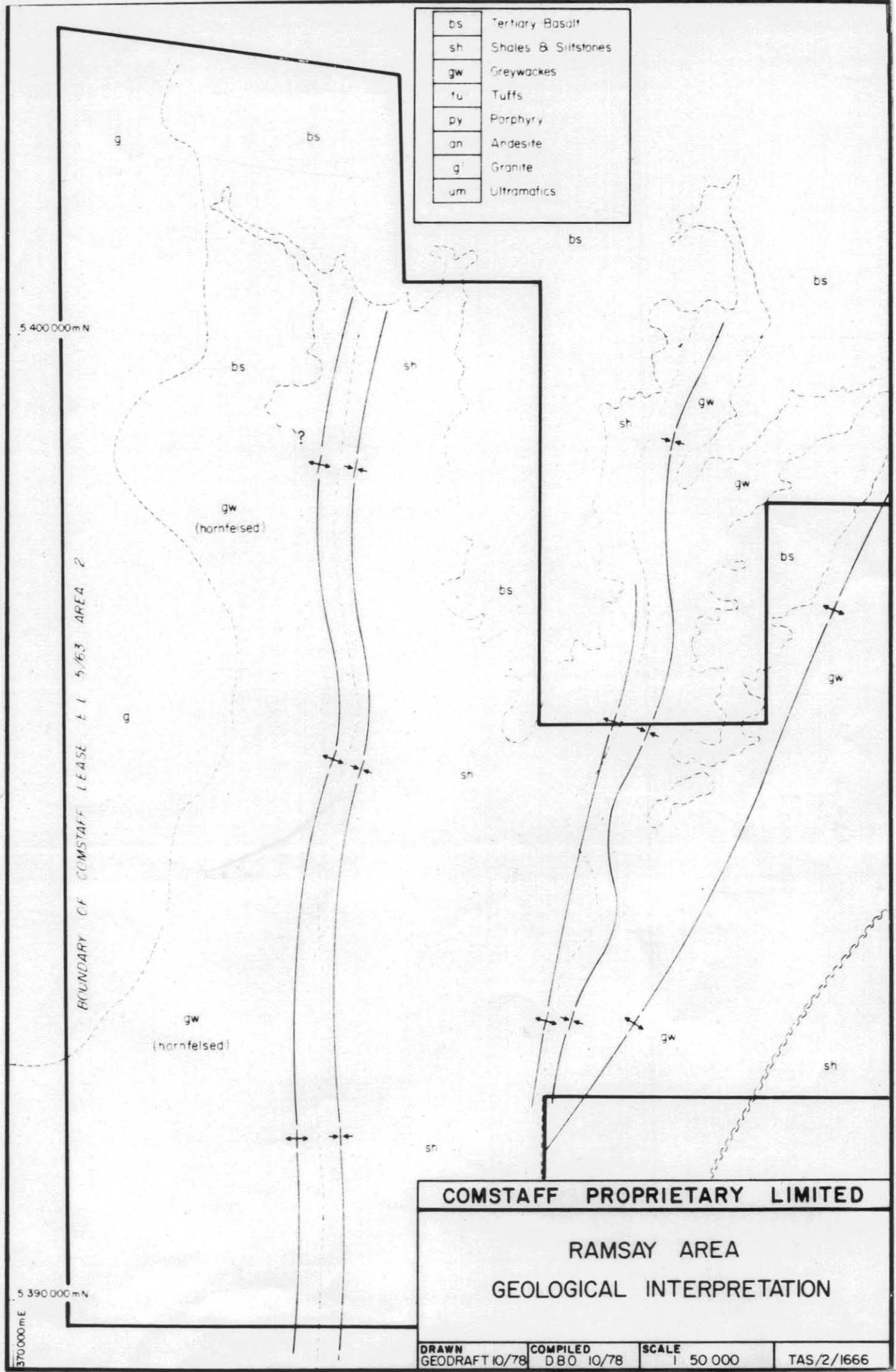
D.B. Orr

13. ENCLOSURE

TAS/2/1554: Ramsay Area: Location of Geochemical and Input Anomalies.

031

bs	Tertiary Basalt
sh	Shales & Siltstones
gw	Greywackes
tu	Tuffs
py	Porphyry
an	Andesite
g	Granite
um	Ultramafics



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RAMSAY AREA
GEOLOGICAL INTERPRETATION

DRAWN GEODRAFT 10/78	COMPILED DBO 10/78	SCALE 1 50 000	TAS/2/1666
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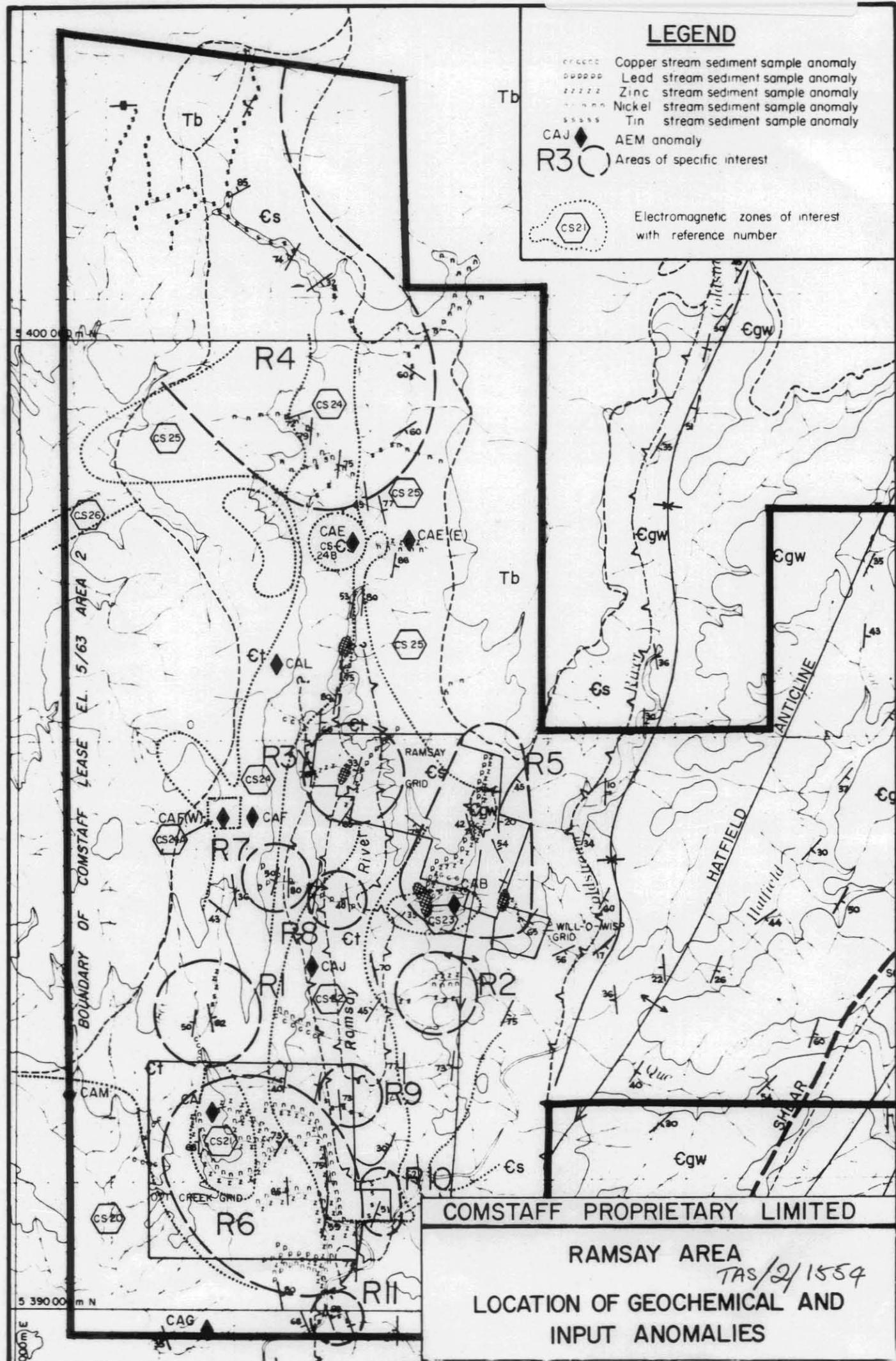
032

210255

5 cm

LEGEND

- Copper stream sediment sample anomaly
- Lead stream sediment sample anomaly
- Zinc stream sediment sample anomaly
- Nickel stream sediment sample anomaly
- Tin stream sediment sample anomaly
- CAJ ◆ AEM anomaly
- R3 ○ Areas of specific interest
- CS21 ○ Electromagnetic zones of interest with reference number



COMSTAFF PROPRIETARY LIMITED

RAMSAY AREA

TAS/2/1554

LOCATION OF GEOCHEMICAL AND
INPUT ANOMALIES

AUSTRALIAN ANGLO AMERICAN LIMITEDCOMSTAFF PROPRIETARY LIMITEDPRELIMINARY ASSESSMENT OF THE HATFIELD, QUE RIVER
AND COLDSTREAM DRAINAGE BASINS1. DEFINITION OF AREA

This assessment covers map sheets 375 390 A, B, C and D, 375 395 A, B, C and D, 380 390 A, B, C and D, 380 395 A, B, C and D and 380 385 A and B.

2. GEOLOGY

The area is east of the Ramsay area and is influenced by the Just in Time Anticline to the west.

From west to east, the rocks are apparently getting younger. Along the western boundary of the area the older shales and quartzites, equated with the Bischoff Series by Rugless, are overlain by a thick sequence of predominantly greywackes. The dolomites close to the contact may be time equivalents of the dolomites at Renison in the Success Creek Phase. The overlying greywackes can be equated with the Crimson Creek Group.

East of the greywackes, the character of the rocks changes to a sequence consisting of shales, siltstones, mudstones and interbedded pyroclastics. Previously geologists have included these rocks within the Mount Read Volcanics, but it is postulated that they are equivalent to the Rosebery (Dundas) Group. These rocks occupy the trough of the Que Syncline.

East of these rocks the porphyries, with a few interbedded shales containing Middle Cambrian fossils, have been mapped.

Tertiary gravels and basalt occur above the 550m elevation in the northern part of the area.

3. GEOPHYSICS

The area was covered by an Input survey in 1975, but only one anomaly, CAH, was considered worth ground follow up work. Geoterrex consider this anomaly to be cultural as it is on the Emu Bay Railway.

034

4. GEOCHEMISTRY

Stream sediment samples were collected every 500 ft. along the major streams and tributaries.

The following table outlines the statistics:

Element:	Cu	Pb	Zn	Ni	Sn
High	150	4080	2400	260	200
Low	BLD	BLD	2	BLD	BLD
Mean	16.21	66.45	93.39	45.52	7.41
S.D.	16.75	218.02	93.29	42.66	10.44
Samples	947	388	942	652	662
Pop. 1	<52	<23	<100	<50	<12
Pop. 2	52-71	23-59	100-319	50-104	12-21
Pop. 3	72-104	60-199	>319	105-194	22-31
Pop. 4	>104	>199		>194	>31

As the above table illustrates, there was no consistency in the elements analysed. Only one third of the samples were analysed for lead, and only two thirds of the samples were analysed for tin and nickel. The attached plans show the reliability of the areas sampled.

The streams draining the Tertiary gravels and basalts have high values for nickel, tin and zinc. The tin is probably derived from the gravels and the nickel and zinc from the basalt.

Seven areas have been outlined for further work:

Anomaly R5

This is a zinc anomaly draining the Will O'Wisp grid area; the samples were not analysed for lead.

Anomalies H1 and H2

These are zinc anomalies which occur in streams draining the contact of the Crimson Creek Group and the Dundas Group. Anomaly H2 has a coincident high lead content, but the samples in anomaly H1 were not assayed for lead.

Anomaly Q1

This is a multi-element anomaly and may be due to contamination from the Emu Bay Railway. However, it occurs at the contact of the Mount Read Volcanics with sediments and is, therefore, a favourable geological horizon.

Anomaly Q2

This is on strike from anomaly Q1 and is a lead anomaly. Input anomaly CAH is between anomalies Q1 and Q2.

Anomaly Q3

This is upstream from anomaly Q2 and is a lead-zinc anomaly, probably due to contamination from the Emu Bay Railway.

Anomaly Q4

This is a lead anomaly which was followed up by the Bulgobac No. 4 Grid. The soil sample results do not reflect the high lead values in the stream sediments. This anomaly is associated with interbedded shales and tuffs within the Mount Read Volcanics and may be on strike from the intravolcanic sedimentary basin identified in the Burns Peak Syncline of East Chester.

5. POTENTIAL OF AREA

- 5.1. The Tertiary gravels may have potential as a low grade tin deposit, but the thick basalt cover excludes it as a mining proposition at the present time.
- 5.2. The Mount Read Volcanics with interbedded sediments have potential for massive volcanogenic base metal sulphide deposits.
- 5.3. The interbedded tuffs and sediments of the Rosebery Group have potential for volcanogenic base metal sulphide deposits.
- 5.4. The contact between the older sediments and the greywackes on the east limb of the Just in Time Anticline has limestones which may be host to either Mississippi type base metal deposits or replacement hydrothermal deposits similar to Renison.

6. RECOMMENDATIONS

- 6.1. Anomalies H1 and H2 should be followed up by grid cutting, soil sampling, geological mapping, induced polarisation, self potential and magnetics.
- 6.2. The contact between volcanics and sediments, which

is reflected by geochemical anomalies Q1 and Q2 and Input anomaly CAH, should be soil sampled on lines 200m apart, and followed by EM, SP, magnetics and IP.

- 6.3. The sedimentary horizon reflected by geochemical anomaly Q4 should be followed up by grid cutting, soil sampling, SP and IP.
- 6.4. The western tributaries of the Coldstream and Huskisson Rivers should be resampled and analysed for lead as well as copper, nickel, zinc and tin.
- 6.5. An access track should be constructed to anomalies H1 and H2.



D.B. Orr

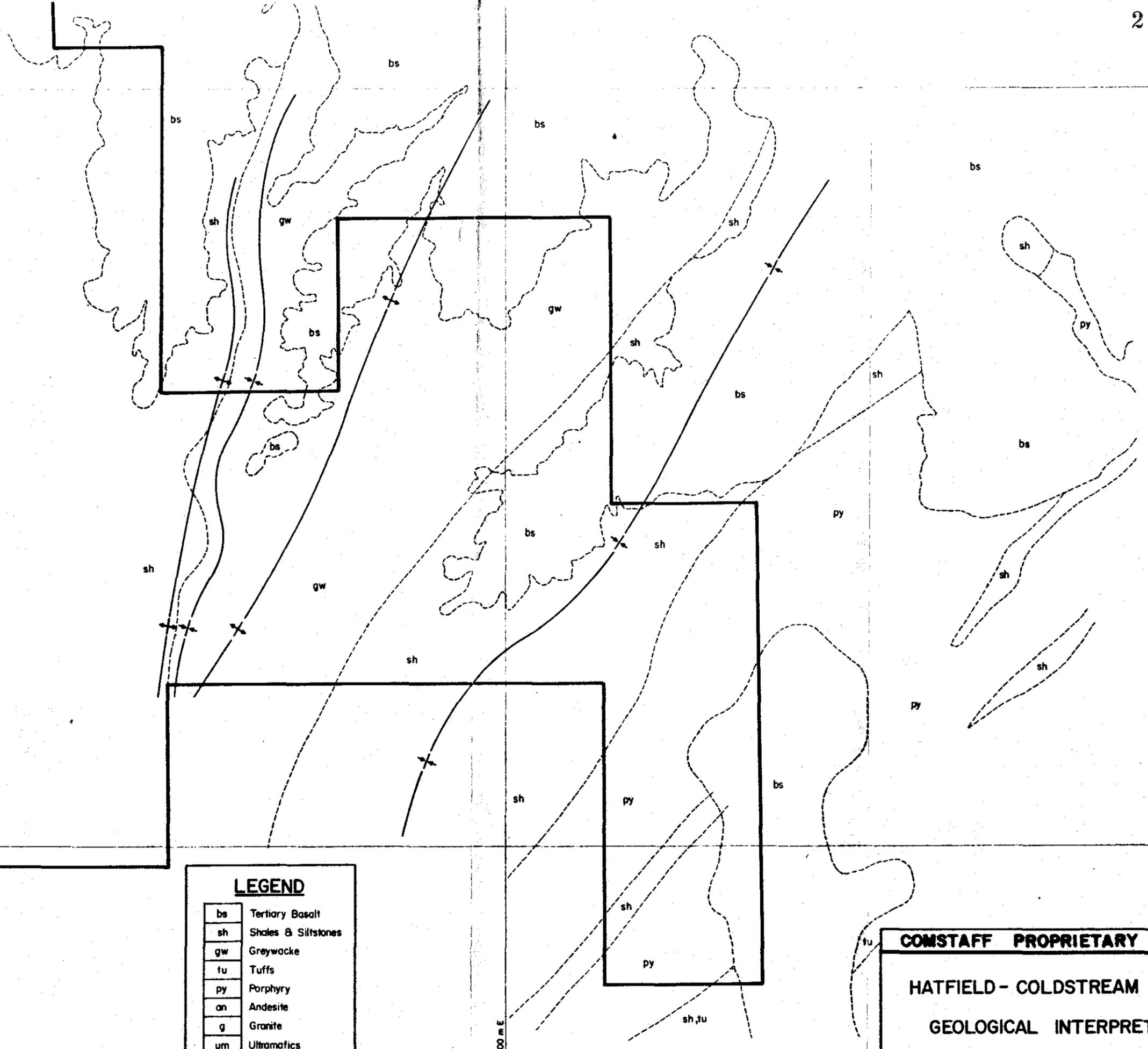
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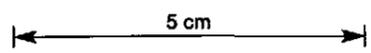
5 390 000 mN

BOUNDARY OF COMSTAFF LEASE E.L. 5/63 AREA 2



LEGEND

bs	Tertiary Basalt
sh	Shales & Siltstones
gw	Greywacke
tu	Tuffs
py	Porphyry
an	Andesite
g	Granite
um	Ultramafics

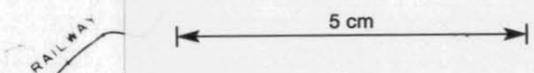


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HATFIELD - COLDSTREAM AREA

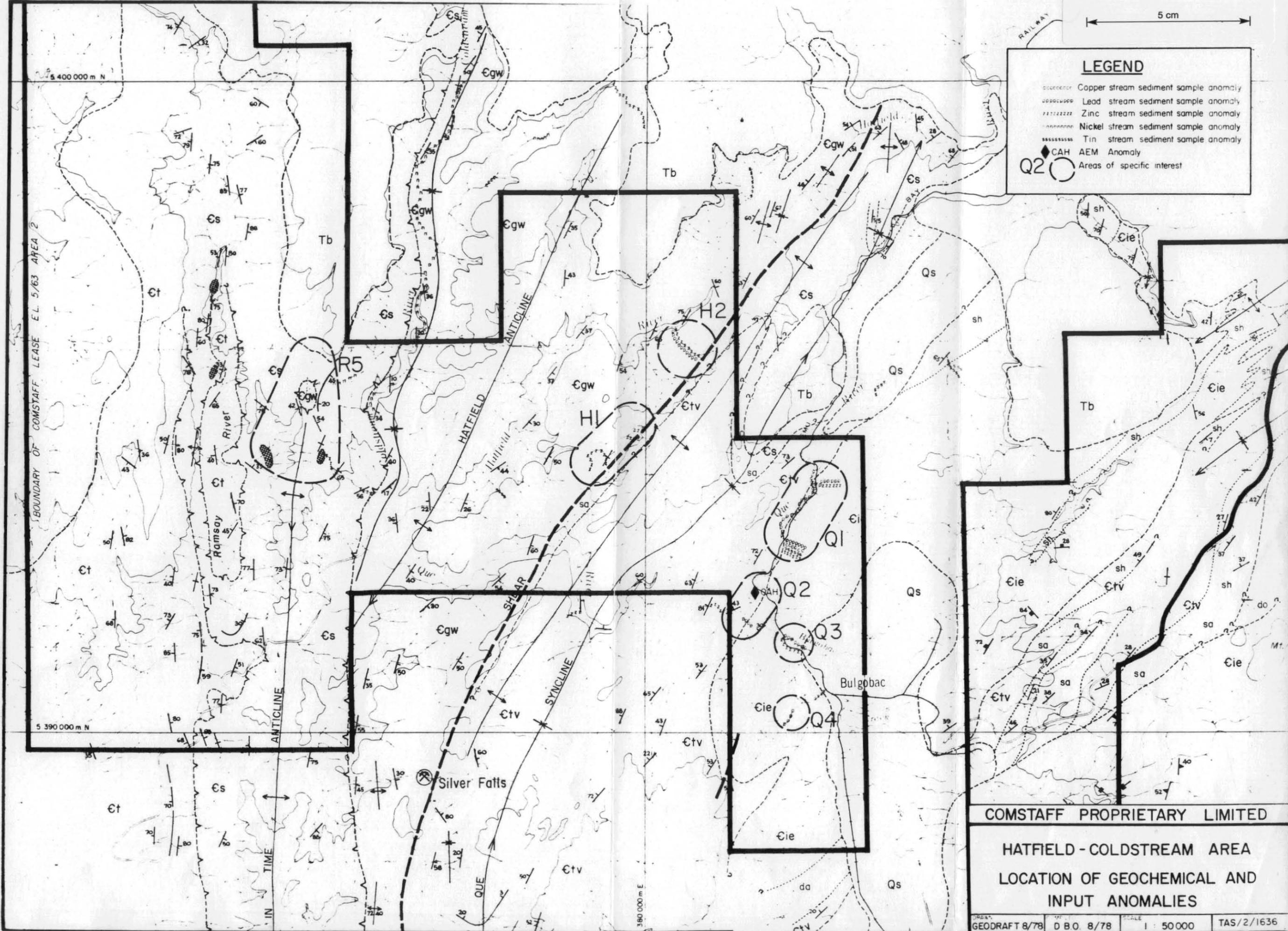
GEOLOGICAL INTERPRETATION

GEORAFET 10/75 D.R. 10/78 SCALE 1:50000 TAS/2/1967



LEGEND

- Copper stream sediment sample anomaly
- Lead stream sediment sample anomaly
- Zinc stream sediment sample anomaly
- Nickel stream sediment sample anomaly
- Tin stream sediment sample anomaly
- ◆ CAH AEM Anomaly
- Q2 Areas of specific interest



BOUNDARY OF COMSTAFF LEASE EL 5/63 AREA 2

IN TIME

COMSTAFF PROPRIETARY LIMITED

HATFIELD - COLDSTREAM AREA

LOCATION OF GEOCHEMICAL AND

INPUT ANOMALIES

AUSTRALIAN ANGLO AMERICAN LIMITEDCOMSTAFF PROPRIETARY LIMITEDPRELIMINARY ASSESSMENT OF THE MOUNT BLOCK AREA1. DEFINITION OF AREA

This assessment covers map sheets 385 380 A and B, 385 385 A, B, C and D, 385 390 A, B, C, D and 385 390 C and D.

2. TOPOGRAPHY

Most of the area is undulating with a fairly mature drainage pattern, but the south eastern part is very incised with steep slopes falling away to the Mackintosh River.

3. ACCESS

In the northern part of the area, the Murchison Highway forms the eastern boundary of the Exploration Licence. A track for four wheel drive vehicles was constructed to the Sock Creek Prospect (geochemical anomaly S1). This track has been upgraded by Associated Forest Holdings and active tree felling is being done in the area. In the southern part of the area, the Hydro-Electric Commission have constructed roads to the proposed Mackintosh Dam and these will provide access to the south-eastern part of the area.

4. EXISTING GRIDS

Three grids have been cut for follow up soil sampling:

Sock Creek Grid (DAA)
Mount Block Grid (DAC)
Grid DAB

5. PREVIOUS REPORTS

1971 Mackintosh Regional, T. Chisholm
1976 Report on a Visit to the Que River Base Metal Sulphide Deposit, D. Orr
1977 A Brief Assessment of the Sock Creek and Chester-Pinnacles Prospects, Dr. T. Hopwood

6. GEOLOGY

The following succession can be recognised:

Quaternary	Alluvium
	Glacial moraine
Tertiary	Basalt
	Gravel
Cambrian	Porphyry with minor sediments
	Interbedded tuffs and sediments
	Porphyry (including andesite)
	Schists and sediments

The rocks form the eastern limb of a major syncline which has its axis west of the area in the Hatfield-Que River area. Middle Cambrian fossil trilobites have been located in the siltstones exposed along the Murchison Highway. Although these rocks appear carbonaceous, they contain only 1% organic carbon (Gee, Jago and Quilty, University of Tasmania, 1969).

7. MINERALISATION

Sphalerite with minor galena and chalcopryrite was intersected in boreholes at the Sock Creek prospect.

The Que River Deposit occurs in rhyolites between major andesite horizons, 2 km east of the Murchison Highway.

The silver-lead-zinc deposits at Tullah are within rocks similar to, and on strike from, the schists and sediments in the south-east corner of the area.

8. GEOPHYSICS

The area was covered by an Input survey in April 1975. Geotrex anomaly CS 30 A is a broad anomaly which is coincident with the northern part of the interbedded tuffs and sediments along the Murchison Highway. Input anomaly DAB, within CS 30 A, was followed up on the ground and was considered to be due to pyritic shales.

9. GEOCHEMISTRY

Streams in the area were sampled every 500ft. (152m), but only small sections were analysed for lead.

The following table outlines the statistics:

Element:	Cu	Pb	Zn	Ni	Sn
High	150	440	8000	250	100
Low	BLD	BLD	2	BLD	BLD
Mean	9.72	62.81	66.92	20.06	6.24
S.D.	10.95	68.58	226.93	27.62	8.12
Samples	1342	390	1351	1226	1284
Pop. 1	<17	<52	<22	<8	<6
Pop. 2	17-41	52-99	22-189	8-21	6-22
Pop. 3	>41	100-199	>190	22-89	>22
Pop. 4		>199		>89	

Seven anomalies are outlined using the highest population group:

S1: A lead-zinc anomaly associated with a shale horizon in the western porphyry horizon of the Mount Read Volcanics. The southern part of the anomaly contains the Sock Creek mineralisation.

S2: A lead anomaly west of S1 in porphyry.

S3: A zinc anomaly associated with the shales exposed on the Murchison Highway. It coincides with Input anomaly CS 30 A.

S4: A nickel anomaly reflecting Tertiary basalt.

M1: This is outside the licence area.

M2: A lead-zinc anomaly upstream from M1.

M3: A zinc anomaly located on two creeks in the south-east of the area, on strike from anomaly M2.

10. DISCUSSION OF RESULTS

Geologically the area west of the Murchison Highway is the most interesting and has the best potential as host to base metal sulphide deposits. Sulphides were intersected in the boreholes at Sock Creek, and the presence of shales interbedded with tuffs and porphyries indicates a subaqueous environment. An Input anomaly, CS 30 A, over shales with \pm 1% organic carbon, indicates that the anomaly is not due to graphite. The shale horizons have above normal zinc content which indicates

that the depositional environment was suitable for the deposition of base metals. Although no stream anomalies have been identified east of the Murchison Highway, in the massive porphyries, these rocks are host to the Que River massive sulphide deposit. The sheared schists and sediments in the south-east corner of the licence area are on strike from the base metal sulphides at Tullah.

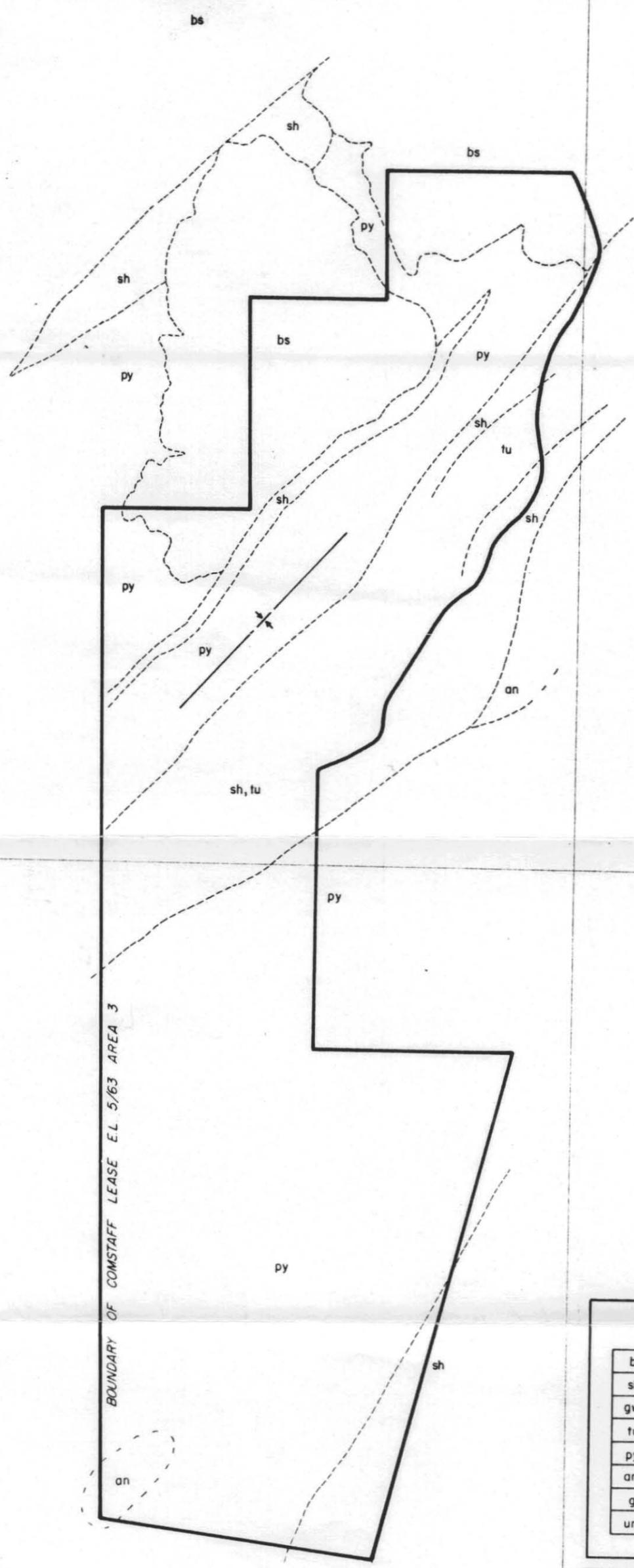
The anomalies have very poor drainage trails, and therefore the Mount Block area, with poor drainage development, is unexplored although it is on strike from the Que River deposit.

11. RECOMMENDATIONS FOR FUTURE WORK

- 11.1. The interbedded tuffs, sediments and porphyries, coincident with Input anomaly CS 30 A, should be re-examined by grid cutting, mapping and EM.
- 11.2. The strike extension of the Sock Creek anomaly S1 should be examined in more detail.
- 11.3. The lead anomaly S2 should be checked by resampling, plus bank or seepage sampling.
- 11.4. The south-east corner of the licence area should be examined by cutting grid lines, mapping and EM.
- 11.5. The access track into grid DAC should be examined by EM, magnetics, IP and SP to determine whether there are any properties which can be used to explore the massive porphyries.

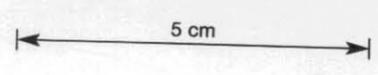


D.B. Orr



LEGEND

bs	Tertiary Basalt
sh	Shales & Siltstones
gw	Greywacke
tu	Tuffs
py	Porphyry
an	Andesite
g	Granite
um	Ultramafics



COMSTAFF PROPRIETARY LIMITED

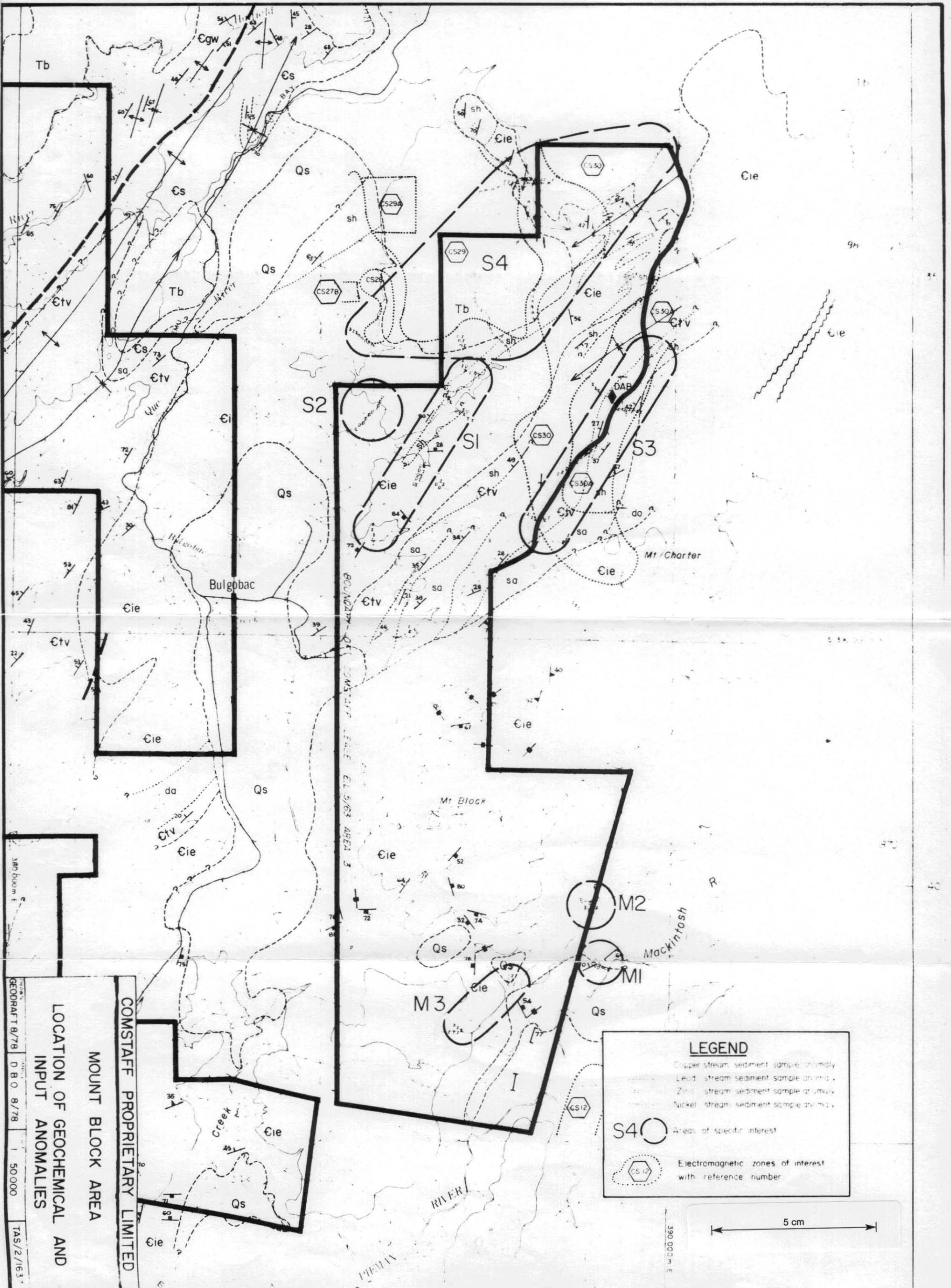
MOUNT BLOCK AREA

GEOLOGICAL INTERPRETATION

380 000 m E

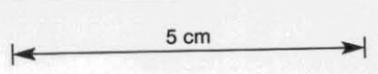
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 COMPILED: D.B.O. 10/78
 SCALE: 1:50 000
 T.A.S./2/1968

390 000 m E



LEGEND

- Copper stream sediment sample anomaly
- Lead stream sediment sample anomaly
- Zinc stream sediment sample anomaly
- Nickel stream sediment sample anomaly
- S4 ○ Areas of specific interest
- (with number) Electromagnetic zones of interest with reference number



COMSTAFF PROPRIETARY LIMITED
 MOUNT BLOCK AREA
 LOCATION OF GEOCHEMICAL AND
 INPUT ANOMALIES

GEORAF 8/78 DBO 8/78 1:50 000 TAS/2/163

10207

30

390 000 M E

AUSTRALIAN ANGLO AMERICAN LIMITEDCOMSTAFF PROPRIETARY LIMITEDASSESSMENT OF EXPLORATION LICENCE 5/63 PART 41. LOCATION

Exploration Licence 5/63 part 4 is covered by 1:5 000 map sheets 375 375 A and B, 375 380 A, B, C and D, 375 385 A, B, C and D, 380 380 A, B, C and D and 380 385 C and D.

2. TOPOGRAPHY

The rivers are deeply incised and drain southwards into the Pieman River. The area has been glaciated and remnant moraine covers large parts of the hills, and the valleys are filled with fluvioglacial deposits.

3. ACCESS

Good access is available by four wheel drive vehicle throughout the year.

4. EXISTING GRIDS

A large part of the area west of the Emu Bay Railway has had grid lines cut at least once. Usable grids are Chester (EAD), Pinnacles (EAA) and East Chester (EAB).

5. PREVIOUS REPORTS

- 1970 An Assessment of the Chester-Silver Falls-Pinnacles Area, M.P. Everett
- 1971 Chester-Pinnacles Regional Interim Report, M.P. Everett
- 1974 Chester Area - Summer Field Season, R.N. Smith
- 1974 The Geology and Mineralisation of the Chester-Pinnacles Area: Honours Thesis, A.G. Stevens
- 1975 Interim Report on Chester and Pinnacles, D.B. Orr and R.N. Smith
- 1977 Interim Report on the Chester Area, D.J. Perkin
- 1977 Progress Report on the Pinnacles Area, G. Krummei
- 1978 Progress Report on the Chester-Pinnacles Area, D.B. Hall

6. GEOLOGY

Almost the whole of EL 5/63 part 4 is underlain by Mount Read Volcanics or their sedimentary equivalent. These rocks have been thrust by the Owen Shear over sedimentary rocks of the Dundas and Crimson Creek Groups to the west.

A line of volcanic vents is thought to occur along a line stretching from Mount Kershaw through the Pinnacles Peaks. Rock types show a gradational change from sub-aerial ignimbrites at Chester, to submarine pyroclastics and sediments north of Burns Peak.

Structurally the geology of the area is very complex. The volcanic sequence at Chester is dipping and facing east, whereas, in the northern part of the area, at least two major synclines have been defined, but are thought to be cut off by the Owen Shear.

7. GEOPHYSICS

EL 5/63 part 4 was included in the Input Survey in 1975, but no anomalies were defined. Ground geophysics on grids has included gradient array IP, dipole dipole IP, SP, vertical shootback EM and magnetics. EM has proved unresponsive, even over the massive pyrite deposit at Chester. Best geophysical response has been given by dipole dipole IP, which has outlined pyritic black shales at East Chester, and two sub-parallel anomalies at Chester.

8. GEOCHEMISTRY

8.1. Stream Sediment Sampling

Stream sediment sampling results are disappointing, although they do show the mineral occurrences at Thomas' Tunnel and Silver Falls. Cumulative frequency plots of results indicate several populations, but the high background values for zinc and nickel over the Crimson Creek basic rocks masks more subtle effects over the Mount Read Volcanics. The paucity of lead values over the area is a disadvantage as lead is a more stable element than zinc.

Samples west of the Owen Shear were treated separately from those over the Mount Read Volcanics. The following tables summarise the results:

East of the Owen Shear

Element:	Cu	Pb	Zn	Ni	Sn
High	220	5300	1700	200	60
Low	BLD	BLD	BLD	BLD	BLD
Mean	7.88	62.21	52.79	10.28	6.78
S.D.	12.01	299.21	110.90	12.78	6.66
Samples	1169	379	1165	933	969
Pop. 1	<20	<30	<140	<62	<14
Pop. 2	20-64	30-64	140-509	>62	14-29
Pop. 3	65-99	65-159	>509		>29
Pop. 4	>99	160-359			
Pop. 5		>359			

West of the Owen Shear

Element:	Cu	Pb	Zn	Ni	Sn
High	150	270	390	200	20
Low	BLD	9	5	2	BLD
Mean	15.74	51.20	79.35	34.65	4.05
S.D.	16.78	41.14	75.39	35.36	4.18
Samples	258	61	260	215	96
Pop. 1	<5	<30	<55	<20	<20
Pop. 2	5-19	30-99	55-99	20-119	
Pop. 3	20-49	>99	100-299	>119	
Pop. 4	>49		>299		

The Silver Falls mineral occurrence, Anomaly 3, and Thomas' Tunnel, Anomaly 1, can be explained by known mineralisation. Anomalies 4 and 5 may be due to contamination from the Emu Bay Railway and Murchison Highway respectively.

Anomaly 2 is a one sample anomaly which has 200 ppm Ni, 120 ppm Cu, 1700 ppm Zn and 400 ppm Pb.

Anomaly 6 is a copper anomaly on one of the tributaries of Farm Creek.

8.2. Soil Geochemistry

Generally only the A⁰ and A¹ soil horizons are developed over bedrock, colluvium or glacial deposits. The very acid ground waters, pH 3-4.5, remove any base metals released during the weathering process and, therefore, soil sampling is not always effective. Glacial deposits are very thick in places, and auger sampling below the leached zone is

not possible. A° sampling, although having limitations, is the most cost effective soil sampling technique at present.

9. DISCUSSION OF RESULTS

In an area where the target is a massive sphalerite deposit with minor galena, chalcopyrite and pyrite, the use of geophysics as a prospecting technique is of limited value. Experience has shown that dipole dipole IP is the most effective method, but it must be realised that only the pyritic halo can be detected. The case history presented by S. Webster and H. Skey on the Que River deposit shows that only the copper rich S lens and the northern and southern extremities of P lens respond to IP.

The highly leached organic soils over most of the area will not give very high values, and therefore techniques such as factor analysis should be used to highlight geochemically anomalous areas.

Geological mapping and costeaning must be used in conjunction with geochemistry and geophysics to give an integrated approach to prospecting.

Diamond drilling targets need not necessarily have high geochemical values and geophysical response. Budgets should allow provision for stratigraphic drilling in geologically favourable environments.

The Que Syncline and Burns Peak Syncline are both favourable environments for volcanogenic deposits and should be vigorously prospected.

Diamond drilling at Pinnacles has shown that >3% Zn is present at the base of a shale lens over a strike length of 600m. The sediments below the Owen Shear are black pyritic shales with visible sphalerite, galena and chalcopyrite, indicating that these rocks may host a massive base metal deposit.

10. RECOMMENDATIONS

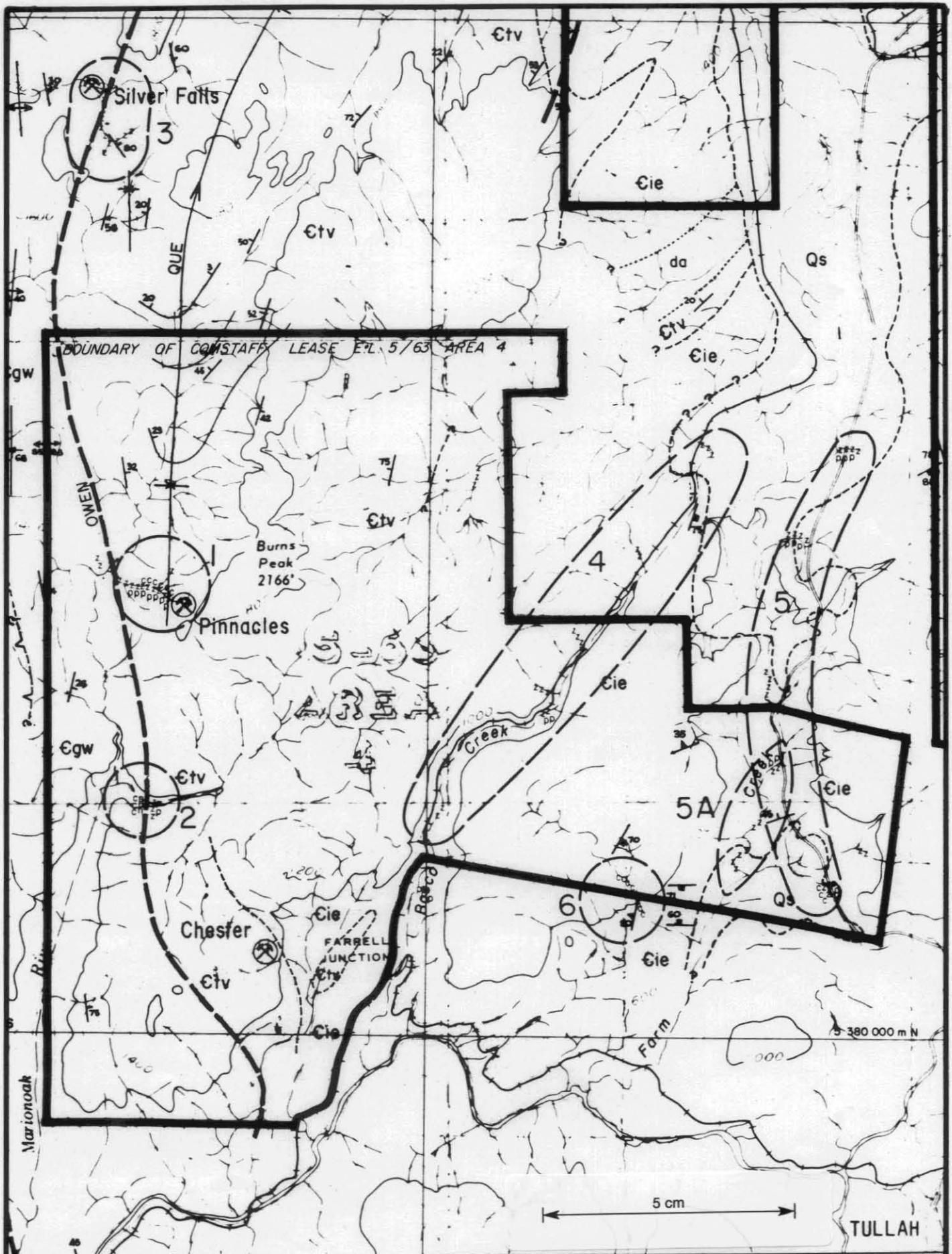
10.1. The interbedded tuffs and shales in the Que and Burns Peak Synclines should be prospected by grid line cutting, followed by soil sampling, IP and geological mapping.

- 10.2. The sediments close to the Owen Shear should be carefully examined for any enhanced base metals.
- 10.3. Geochemical Anomaly 2 should be checked by resampling every 100m and taking left and right bank samples at break of slope to check hydromorphic effects.
- 10.4. Tributaries draining into Boco Creek along the Emu Bay Railway should be carefully sampled as for 10.3.
- 10.5. The copper Anomaly 6 should be prospected by soil sampling.
- 10.6. Consideration should be given to cutting grid lines over the entire licence area.
- 10.7. The possible northward plunge of the Chester Pyrite deposit should be tested by diamond drilling.



October 1978

D.B. Orr



LEGEND

	Copper stream sediment sample anomaly
	Lead stream sediment sample anomaly
	Zinc stream sediment sample anomaly
	Nickel stream sediment sample anomaly
	Tin stream sediment sample anomaly
	Areas of specific interest

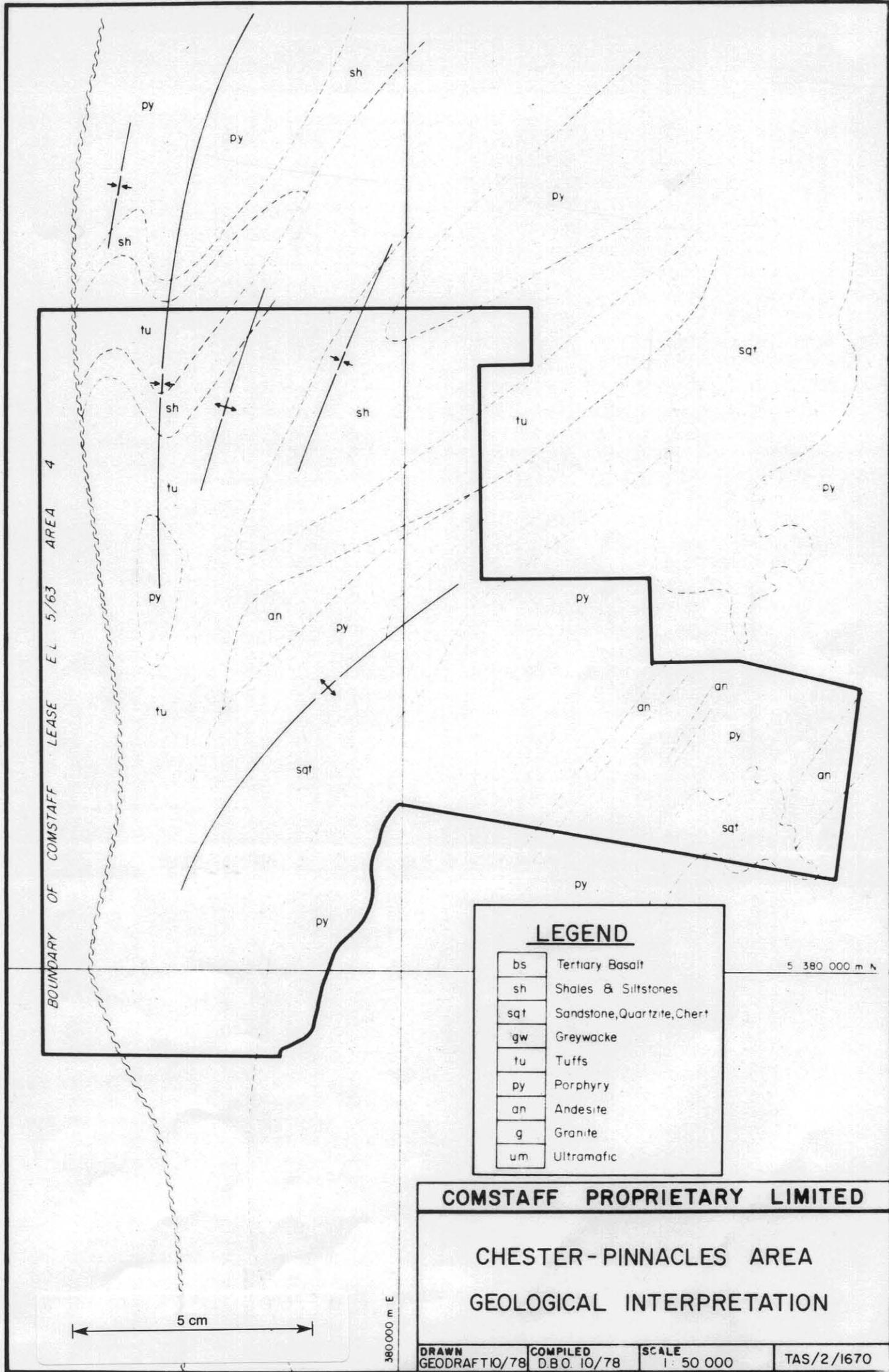
COMSTAFF PROPRIETARY LIMITED

CHESTER- PINNACLES AREA

LOCATION OF GEOCHEMICAL ANOMALIES

DRAWN GEODRAFT 10/78 COMPILED D.B.O. 10/78 SCALE 1 : 50000 TAS/2/1672

051



BOUNDARY OF COMSTAFF LEASE E L 5/63 AREA 4

LEGEND

bs	Tertiary Basalt
sh	Shales & Siltstones
sqt	Sandstone, Quartzite, Chert
gw	Greywacke
tu	Tuffs
py	Porphyry
an	Andesite
g	Granite
um	Ultramafic

5 380 000 m N

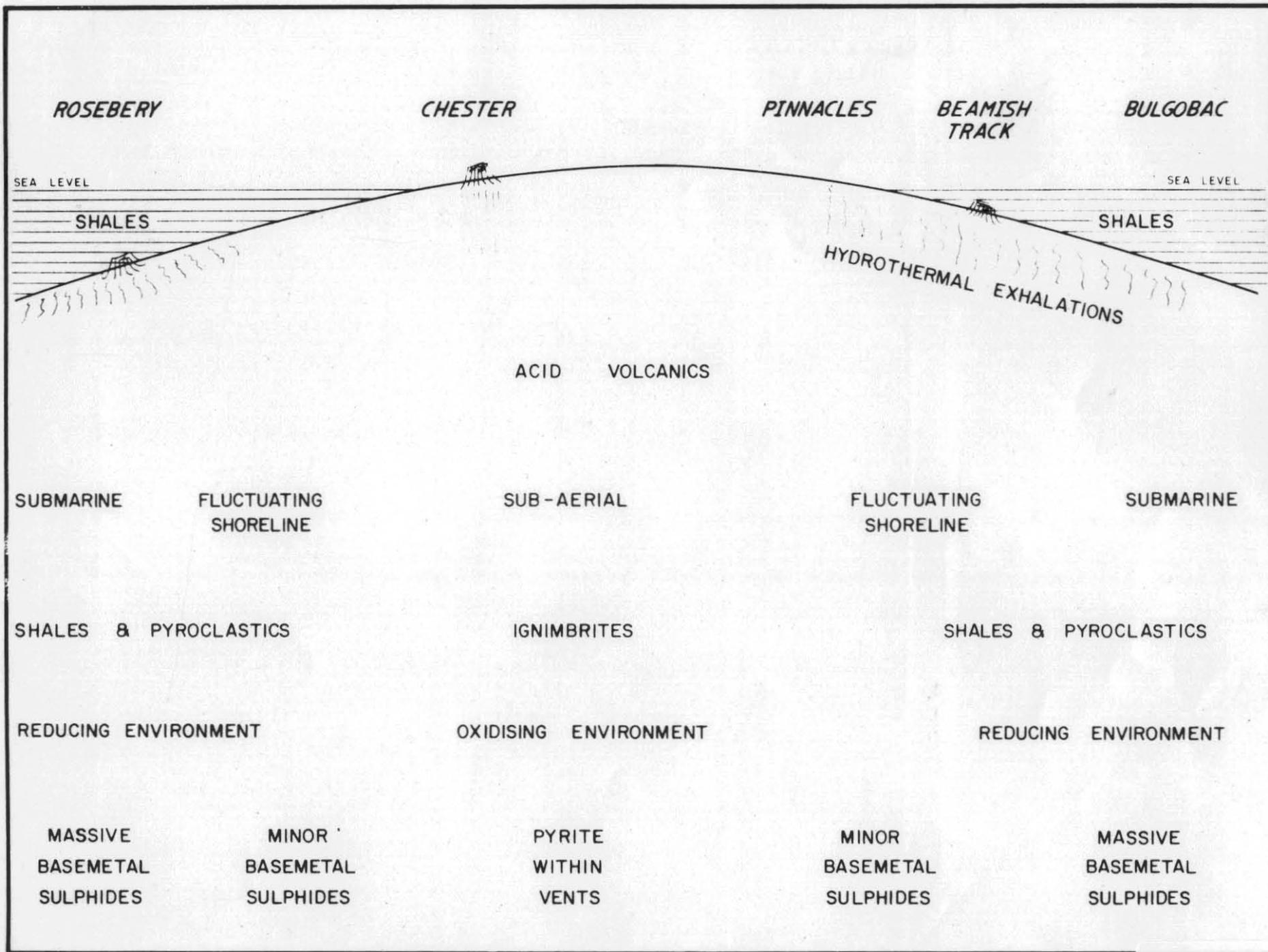
COMSTAFF PROPRIETARY LIMITED

**CHESTER-PINNACLES AREA
GEOLOGICAL INTERPRETATION**

5 cm

380 000 m E

210275

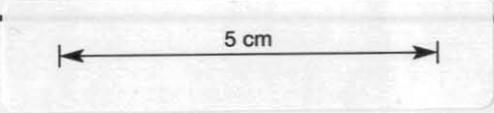


COMSTAFF PROPRIETARY LIMITED

CHESTER-PINNACLES AREA

IDEALISED LONGITUDINAL SECTION
FROM ROSEBERRY TO BULGOBAC

DRAWN GEODRAFT10/78 | COMPILED DBO 10/78 | SCALE 1 : 50 000 | TAS/2/1676



052

AUSTRALIAN ANGLO AMERICAN LIMITED
COMSTAFF PROPRIETARY LIMITED
HUSKISSON AREA REASSESSMENT

1. LOCATION

This area, EL 5/63 Part 5 is covered by 1:5 000 Sheets 370 380 A,B,C,D and part of 370 375 A and B.

2. ACCESS

The area has been previously explored so access should still be available.

3. GEOMORPHOLOGY

Deeply incised streams drain into Lynch Creek and the Huskisson River. There is a distinct botanical change over the serpentinite which is visible on the air photographs.

4. PREVIOUS WORK

Stream and soil geochemistry, geological mapping, as well as airborne EM and ground follow up have been completed. The Huskisson Serpentinite was initially considered an exploration target for nickel and asbestos mineralisation after chrysotile was exposed in four localities.

A diamond drill hole to test 'gossanous' material at the ultramafic contact failed to intersect any significant mineralisation.

The asbestos potential of the serpentinite was downgraded.

Input anomalies FAE, FAD, FAC and FAH were gridded and follow up completed in the customary way.

5. PREVIOUS REPORTS

1969-1970	:	Huskisson Serpentinite - D. Lascelles
1969-1970	:	Rapid Reconnaissance of the North Huskisson - Lynch Creek Serpentinite - I. Briggs
1970-1971	:	Huskisson Regional Report Summer 1970/71 - D. Wallis.
1970-1971	:	Huskisson South Regional Report - M.P Everett.
1971-1972	:	Summer Field Season Report - Huskisson Grids. G. Pigott.
1971-1972	:	Summer Field Season Report - Pieman Area. G. Pigott
1972	:	Huskisson Diamond Drill Hole No 1. R. Armfield

2.

- 1971-1972 : Summer Field Season - Huskisson Asbestos Project - M. Pigott.
1975 : Interpretation Report Airborne EM Survey - Geoterrex Pty Ltd.
1977 : Final Report on Follow Up Work on Input Anomaly FAH - G. Pigott.

6. EXISTING GRIDS

Besides the gridding over the input anomalies there is a grid along the eastern contact of the serpentinite which was used for the nickel-asbestos investigation. Also, there are three grids, Huskisson 1, 2 and 3 that are relevant to the area (see Plan TAS-2-230).

7. GEOLOGY

An arcuate belt of serpentinite overlain by Ordovician sediments is flanked to the east by a Cambrian basic volcanic suite containing amphibolite, grey and black shale and minor tuff intruded by gabbro. The tuff was described as medium grained, highly feldspathic with crystal and lithic fragments. East of this again, a thick sequence of sandstone, greywacke, and shale form part of a synclinal structure coupled to the Just in Time anticline.

M. Pigott suggested that "the presence of xenoliths of country rock caught up in the serpentinite, the intense shearing, fracturing and brecciation, especially at the contacts and the surrounding relatively low grade of regional and contact metamorphism, indicate a tectonic emplacement, probably before development of the Huskisson syncline."

Carbonaceous siltstone and shale intruded by amphibolite at FAH contains fine disseminated pyrite presumably remobilised and recrystallised along contact zones. No other mineralisation has been reported.

8. GEOPHYSICS

The airborne input survey indicated four interesting conductors which were investigated by ground follow up. Results were not very encouraging and the conclusions are set out on the following page.

055

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3.

CODE	ZONE	INDICATED SOURCE	FIELD INTERPRETATION
FAC FAE	CS14) CS14)	Bedrock - fair conductor with strong magnetic support. Formational.	Margin of ultramafic. Serpentinised zones within ultramafic. In both cases no enhanced metal values to suggest mineralisation.
FAD	CS16	Narrow response. No magnetic support.	Thin ? amphibolite by Cu Ni geochemistry.
FAH	CS18	Near surface narrow response. No magnetic response.	Pyrite associated with amphibolite intruded into sed. sequence of carb. and graphitic shale.

9. GEOCHEMISTRY

Most of the area has been covered by stream sediment sampling. All samples were analysed for Cu, Ni and Zn, and some samples were also analysed for Pb and Sn.

STATISTICAL SUMMARY

ELEMENT	NO. OF VALUES	RANGE		MEAN	STANDARD DEVIATION
		LOW	HIGH		
CU	659	2.00	150.00	31.88	22.69
NI	660	4.00	4000.00	225.55	475.43
PB	146	BLD	1400.00	77.75	140.52
SN	119	BLD	30.00	5.78	6.19
ZN	661	5.00	5000.00	163.48	291.07

Log-probability, cumulative frequency plots typically produced linear segments diverging from one another indicating multiple populations for each element.

The high range populations calculated were:

Zn	370+
Pb	320+
	120-320
Cu	100+

4.

When these were plotted an associated Pb/Zn and minor Cu stream anomaly was immediately obvious near the eastern margin of the serpentinite in a tributary of Lynch Creek (Area A).

A train of Cu anomalies (100-200 ppm) in a stream draining southwards into Lynch Creek, with possibly anomalous Zn is also notable (Area B).

The only other interesting stream geochemistry is a Zn with minor Pb anomaly in tributaries draining northeast and southwest parallel to the serpentinite margin in the central part of the area.

10. DISCUSSION OF RESULTS

Area A has been gridded (Huskisson Grid 1) and soil sampled for Ni, Co, Zn, Cu and Pb (TAS-2-1271) but neither the orientation of the grid nor its exact location is known. On one line, enhanced lead values to a high of 6000 ppm were obtained over a zone 150-200 m wide. The anomalous values continue out of the grid to the south and end abruptly within the grid about 300 m north of the southern most sample line. There is an associated enhancement of Cu values and slightly enhanced zinc with the anomalous lead.

The anomalous zone has an arcuate trend across the grid apparently associated with shales in the basic volcanic suite in contact with the serpentinite (Plan TAS-2-290). The soil geochemistry does not seem to support a large width of serpentinite at this point but rather lenses of serpentinite in basic volcanics.

The ultramafic appears to thin out in this area and there is a associated flexure in the magnetics. The geological environment is similar to that in the area of the FAH anomaly and Area A is on strike with FAH so the two occurrences could be related. Still, a mineralised horizon of some interest has been defined but never explained.

The ground to the north of Area B and outside the lease area was investigated by grid soil sampling (Huskisson Grid 2) with the conclusion being that the recorded values were not significant. Again, however, possibly anomalous Sn and Cu associated with basic tuff and graywacke highlights the high background metal values of these rocks. Also, there is some conjecture that the old Lynch Creek

Mine is located in this area. Whether it contributed to the anomalous stream Cu response is not known.

A third area of interest (Area C) located just outside the eastern boundary is probably of low priority but of some interest because it consists of a geophysical anomaly (CS 17) associated with sediments and a Zn stream anomaly.

11. CONCLUSIONS

The geophysical anomalies appear to have been adequately tested and the more obvious geochemical anomalies have been followed up.

The work has established a suite of sediments and basic volcanics proximal to the ultramafic intrusion which have high background metal values. Huskisson DDH 1 intersected tuff with values up to 0.1% Cu, and soils overlying the same rocks in Area A contain anomalous lead with enhanced zinc and copper. Therefore, it seems that a mineralised horizon of some interest has been defined but never explained.

12. RECOMMENDATIONS

- (i) Relocate Huskisson Grid 1 if possible to at least establish the sampling extremities.
- (ii) Cut a new grid to cover the area of anomalous lead if the old grid can be established with any certainty. Initially 5 lines of about 500 m length and 200 m apart would be required.
- (iii) Soil sampling to redefine the anomalous zone (whether A° or auger subject to discussion, 3-11-78).
- (iv) Costeaming to establish the nature of the mineralisation.
- (v) Depending upon results EM, magnetics and SP as required.
- (vi) The other areas of interest have a low priority and do not require attention for the time being.
- (vii) Because of the proximity and geochemical similarity between area A and FAH, two grid lines and a costean might suffice to establish the significance of the soil anomalies should there be tight budget requirements.

6.

3. ESTIMATES OF WORK INVOLVED

(i) Grid Cutting

Allowing for five lines, a base line and tie lines a total of 4.1 km will have to be cut.

(ii) Geochemistry

Grid lines should be sampled every 20m giving a total of 130 soil samples.

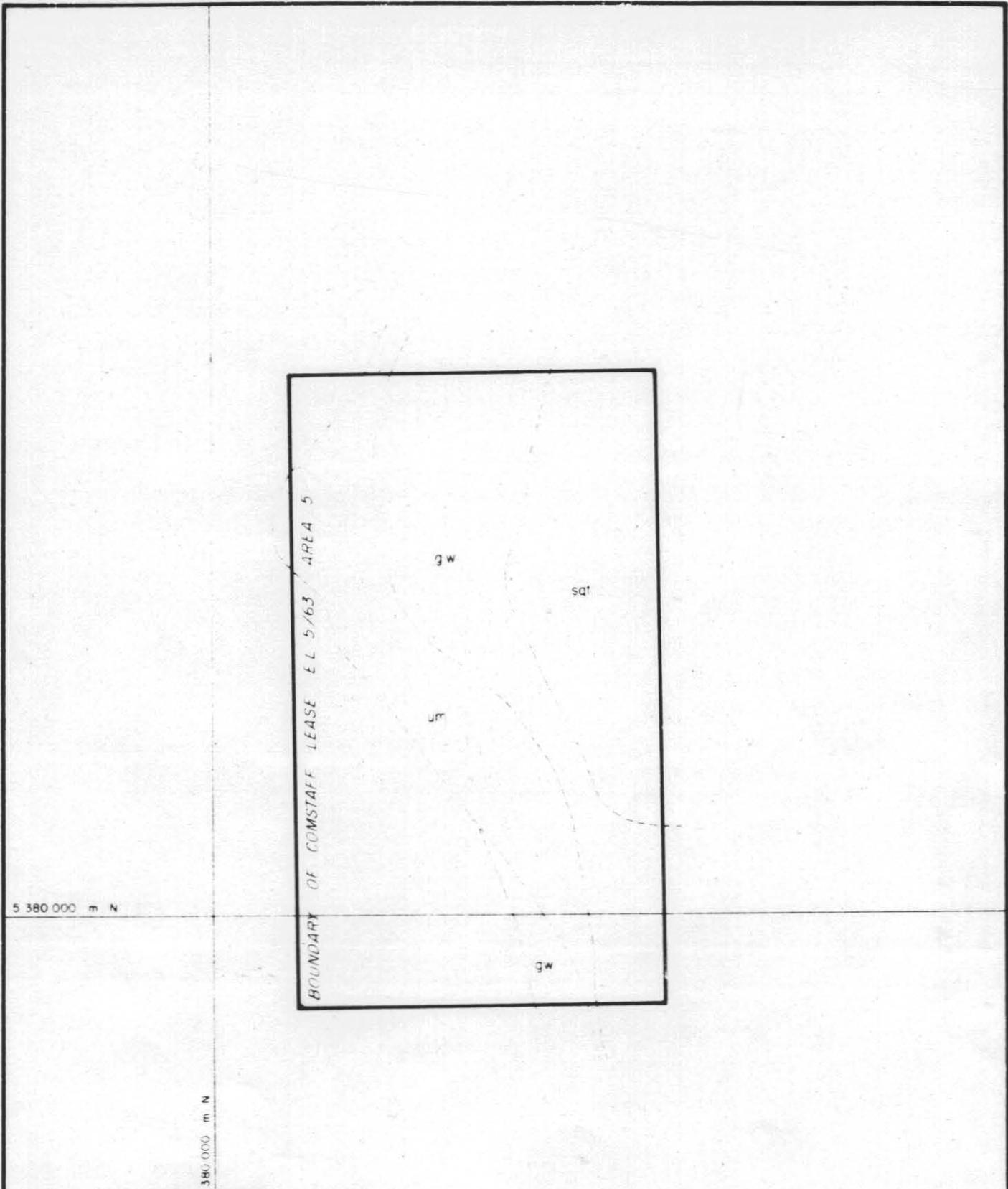
(iii) Costeaining

The anomalous zone appears to be about 200m wide. So say about 300m costeaining will be required.

APB.LS.CC
5.10.78

A.P.B.
A.P.B.

059



LEGEND

bs	Tertiary Basalt
sh	Shales & Siltstones
sqf	Sandstone, Quartzite, Chert
gw	Greywacke
tu	Tuffs
py	Porphyry
an	Andesite
g	Granite
um	Ultramafic

5 cm

COMSTAFF PROPRIETARY LIMITED

HUSKISSON AREA

GEOLOGICAL INTERPRETATION

AUSTRALIAN ANGLO AMERICAN LIMITEDCOMSTAFF PROPRIETARY LIMITEDASSESSMENT OF EXPLORATION LICENCE 5/63 PART 61. LOCATION

Exploration Licence 5/63, part 6, is covered by map sheets 370 365 A and B, 370 370 A, B, C and D, 370 375 C and D, 375 370 A and 375 375 D. The Renison East block is south, and the Pieman block is north, of the Pieman River.

2. TOPOGRAPHY

The Pieman River is deeply incised and has cut through a very thick fluvioglacial deposit which covers most of EL 5/63, part 6, north of the Pieman River. Serpentinites form the topographic highs in the area.

3. ACCESS

The Murchison Highway and Emu Bay Railway cross the Renison East block, and a bulldozed road provides access by four wheel drive vehicles from the Murchison Highway to the southern boundary of EL 5/63 part 6.

North of the Pieman River, the Hydro-Electric Commission road crosses the Huskisson River between parts 5 and 6 of EL 5/63. A bulldozed track gives access to the north bank of the Pieman River.

4. EXISTING GRIDS4.1. Renison East

Grids 0, 1, 2, 3, 4 and 5 and grid GAP.

4.2. Pieman

Pieman South grid, Input grids GAI, GAH and GAG.

5. PREVIOUS REPORTS

1970 Renison Bell East, G. Pigott
1971 Renison Bell East, Ring River Area, G. Pigott
1972 Pieman Regional, G. Pigott
1974 Pieman South, D. Orr

1974 Renison East, G. Cammell
 1977 Follow up of Input Anomaly GAG, G. Pigott
 1978 Progress Report Renison East, G. Pigott

6. GEOLOGY

Due to the extensive glacial cover, the geological interpretation is highly interpolative.

6.1. Stratigraphy

The following represents the stratigraphy in the area:

Quaternary	River gravels and glacial deposits
Ordovician	Gordon Limestone Basal Conglomerate
Cambrian	Dundas Group shales and siltstones with interbedded acid pyroclastics. Minor gabbro and dolerite sills. Crimson Creek Group greywackes, basalts and conglomerates.

The fault controlled serpentinites are presumably post Dundas since they occur in both the Crimson Creek Group and the Dundas Group.

The Crimson Creek Group is a predominantly basic suite of rocks with only minor acid volcanics, whereas the Dundas Group has a high proportion of interbedded acid pyroclastics.

6.2. Structure

The north plunging Huskisson Syncline is the dominant structural feature of EL 5/63, part 6. The Gordon Limestone occupies its core in the north-west, and the age of the rocks increases southwards.

Faults are important because the observed contacts of the serpentinites are faulted. East-west faults have been identified and one is interpreted to exist, either along the Pieman River or between the Pieman River and the Murchison Highway, to explain the absence of the Colebrook Hill Serpentinite in the Pieman River and the change from Dundas Group sediments, in the Pieman area, to Crimson Creek Group sediments in Renison East.

Another major fault has been identified along the axial plane of the Huskisson Syncline which down-throws Silurian rocks against Dundas rocks.

7. GEOPHYSICS

The Input survey flown in 1975 outlined the ultramafic rocks, the hornfelsed sediments associated with the Exe Proprietary Mine and the Godkin Prospect. Ten anomalies were considered to be worth follow up.

Anomaly GAK is the only anomaly confirmed by ground EM, although anomaly GAG has pyrite in contact with serpentinite.

Induced polarisation on grid GAP outlined 11 anomalies, none of which have been explained.

8. GEOCHEMISTRY

8.1. Stream Sediment Sampling

Stream sediment sampling results reflect ultramafic rocks by anomalous nickel and zinc values. However, high tin values occur in tributaries of the Ring River, Colebrook Creek and the Exe River. One sample from the Huskisson River, close to the Huskisson fault, has an anomalous tin value. Heavy mineral concentrates within the Renison East area have very high cassiterite contents, indicating a source within EL 5/63, part 6.

The following table summarises the results:

Element	Cu	Pb	Zn	Ni	Sn
High	>1%	2100	>1%	2750	4800
Low	BLD	3	BLD	BLD	BLD
Mean	95.38	154.94	517.74	123.49	155.01
S.D.	516.92	387.61	1778.89	238.38	453.62
Samples	511	64	509	511	483
Population 1	<10	<28	<30	<70	<20
Population 2	10-24	28-44	30-169	70-324	20-54
Population 3	25-49	45-89	170-459	325-949	55-94
Population 4	50-129	90-499	460-1149	>949	95-244
Population 5	>129	>499	>1149		>244

8.2. Soil Geochemistry

Soil geochemistry has some unusual patterns. The

serpentinites, for example, are outlined by anomalous nickel, zinc and lead and the highest tin values on the grid are on the eastern contact of the Serpentine Hill Complex.

The glacial cover acts as an impervious layer through which cations cannot penetrate, and auger drilling is ineffective through the boulders. Tin anomalies were outlined on grid 4, grid 5 and grid 0 where the glacial cover is thin or absent.

9. DISCUSSION

The Input survey covered the Renison Tin Mine and gave excellent response over both the Federal-Bassett Lode and the replacement lodes. Similar responses occur within the Comstaff Licence areas, but most of these appear to be due to serpentinites. Anomalies GAG and GAK have not been adequately explained and additional work is recommended.

Flight line 117W flew over Fenton's Prospect and produced a six channel anomaly with a ratio of 16/1.6. Anomaly GAO is in the inaccessible fluvioglacial area of the Pieman block. From experience elsewhere, e.g. BAB, the anomaly may be due to an old river channel and therefore should be checked by IP.

The area south of the Pieman River has extensive development of hornfels indicating close proximity to a granite. The large faults would be excellent conduits for hydrothermal solutions and should, therefore, be carefully explored by diamond drilling.

Age dating of galena from the Rosebery Mine gives an age for the galena of 161×10^6 years. This is somewhat later than the Proterozoic-Cambrian age which is presently accepted for the Rosebery Deposit. It is also much later than the last major orogenic episode, the Kanimblan Orogeny, with which the Devonian Granites are considered to be related. If the cations at Rosebery are related to the Devonian Granites and not to volcanogenic activity, an epigenetic origin must be accepted. Such a hypothesis makes the pyritic shales in the south-eastern part of grid GAP a very attractive target for a stratabound lead-zinc deposit.

The Huskisson Syncline axial plane fault may act as a conduit for hydrothermal solutions and replacement of the Gordon Limestone is possible. It is not regarded as

highly prospective due to the apparent thickness of Cambrian sediments below. However, granite may not be at too great a depth.

Work in EL 5/63, part 6, has been predominantly of a reconnaissance nature. Close spaced grid lines will be required to follow up any anomaly.

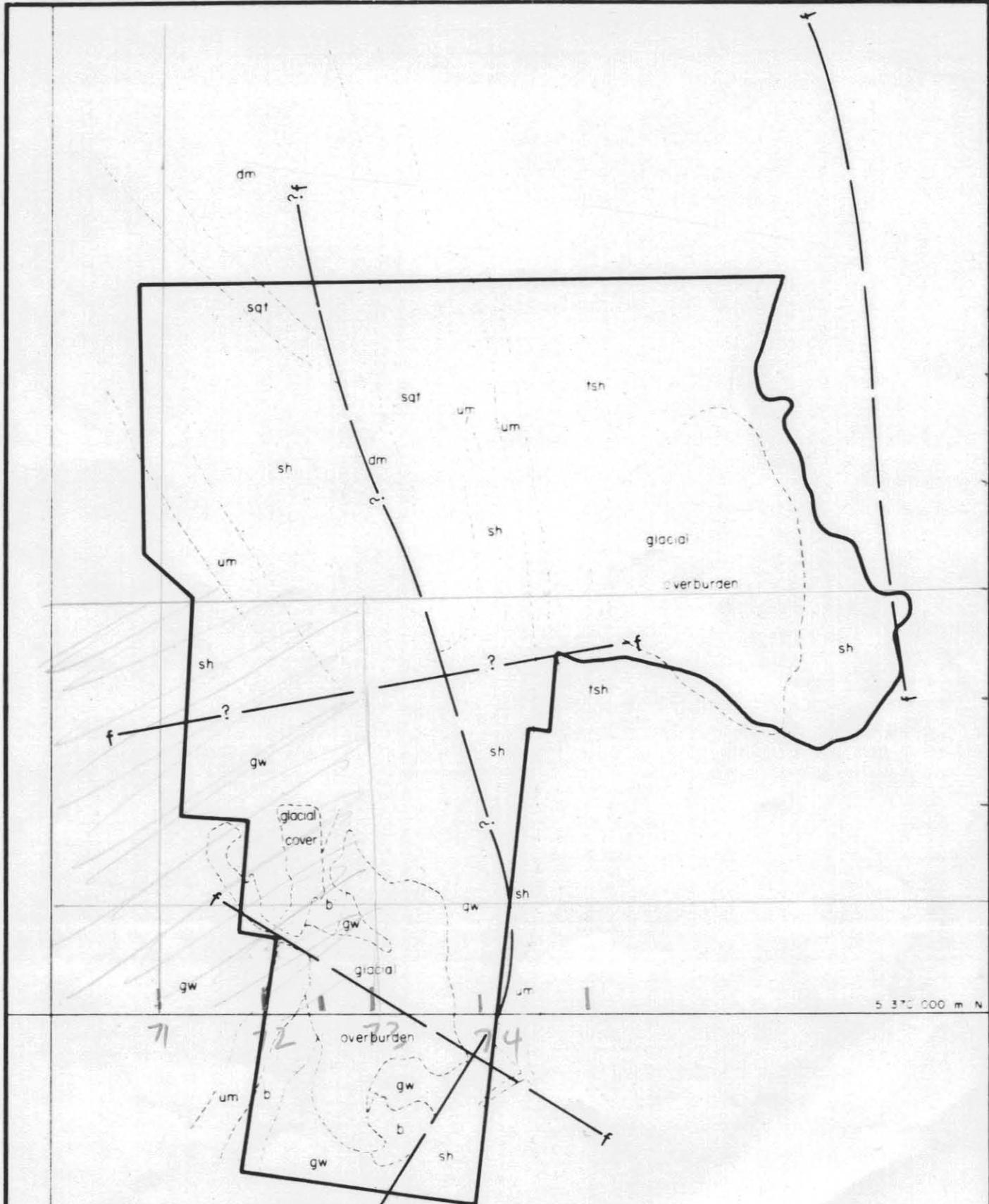
10. RECOMMENDATIONS

- 10.1. The Fenton Lode should be examined by geophysical techniques to test the origin of the Input response.
- 10.2. The excellent geophysical response over the Dundas sediments in the south-east part of grid GAP should be explained.
- 10.3. The relationship of the tin mineralisation at Fenton's prospect and the Exe Proprietary Mine with IP anomaly III of grid GAP should be established.
- 10.4. The prospective contacts of the serpentinites should be explored by diamond drilling.
- 10.5. The apparent change of plunge of the Huskisson Syncline to a southerly plunge at the southern end of grid GAP should be confirmed since, if it is only a local change, the Godkin Prospect may contain rocks equivalent to the Success Creek Sediments which are host to the tin mineralisation at Renison.
- 10.6. All Input anomalies should be located and confirmed on the ground.
- 10.7. All IP anomalies in grid GAP should be explained.

10th November 1978


D.B. Orr

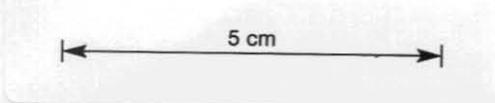
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370 000 m E

5 370 000 m N

b	Basic rocks
sh	Shales & Siltstones
sqt	Sandstone, Quartzite, Chert
dm	Dolomite
gw	Greywacke
tsh	Tuffaceous shale
an	Andesite
g	Granite
um	Ultramafic



COMSTAFF PROPRIETARY LIMITED

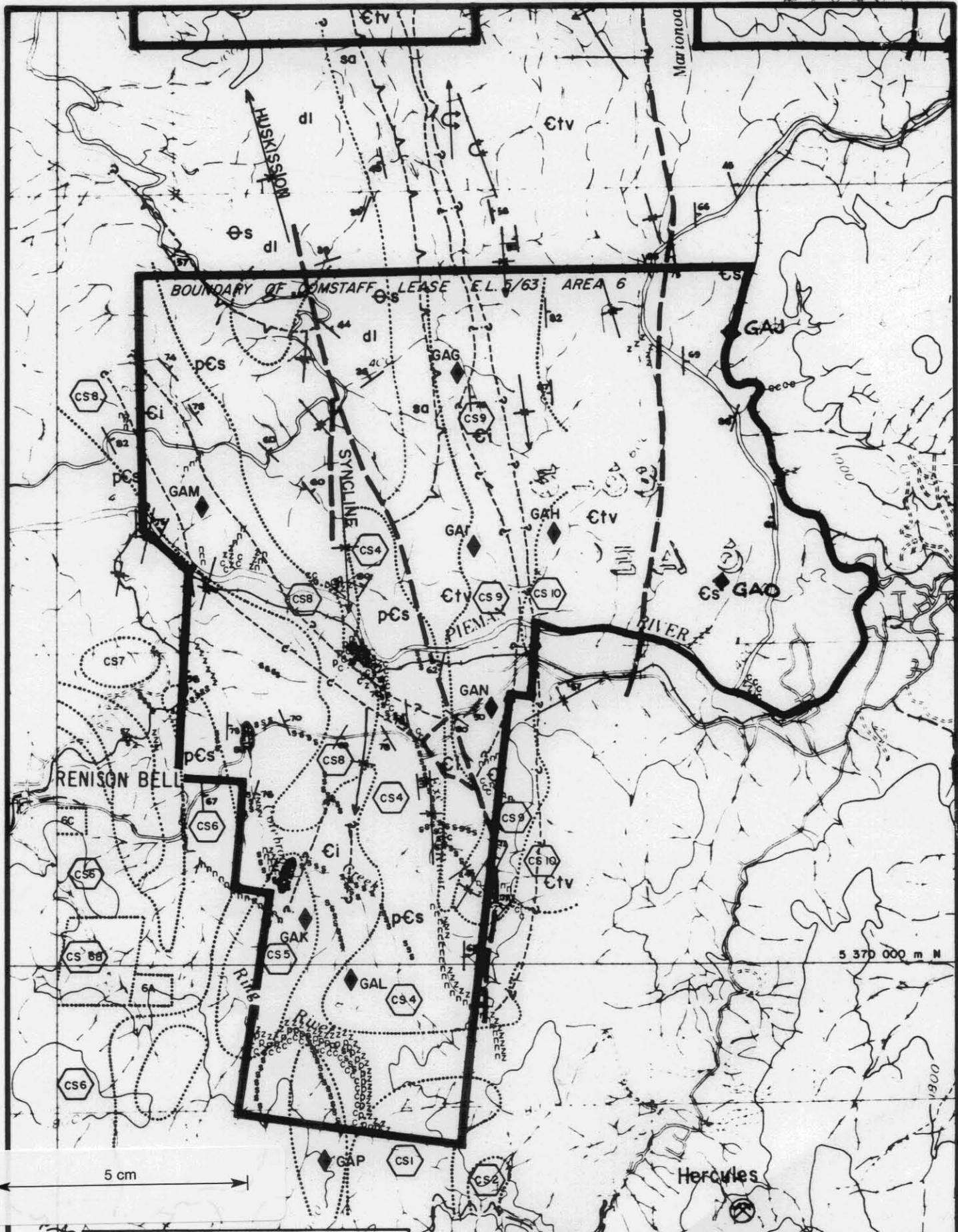
RENISON AREA

GEOLOGICAL INTERPRETATION

DRAWN: GEODRAFT 10/78 COMPILED: GEP.DRO 10/78 SCALE: 1:50,000 TAS/2/1677

067

210290



5 cm

LEGEND	
.....	Copper stream sediment sample anomaly
-----	Lead stream sediment sample anomaly
zzzzz	Zinc stream sediment sample anomaly
.....	Nickel stream sediment sample anomaly
-----	Tin stream sediment sample anomaly
◆	AEM Anomaly

COMSTAFF PROPRIETARY LIMITED

RENISON AREA
 LOCATION OF INPUT AND GEOCHEMICAL
 POPULATION I ANOMALIES

DRAWN GEODRAFT 11/78	COMPILED D.B.O. 10/78	SCALE 1 : 50 000	TAS/2/1686
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OPEN FILE

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MICROFILMED

PROJECT NAME:

APPENDIX IV

TITLE:

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

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

COMSTAFF PROPRIETARY LIMITEDREPORT ON EXPLORATION IN EXPLORATION LICENCE 5/63,PART 4, IN TASMANIA, AUSTRALIACONTENTS

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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

Perkin (1). A series of north to north-east plunging anticlines 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^o 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).

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.

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

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 A⁰ 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

<u>Activity</u>	<u>Area</u>			<u>Total</u>
	EAA	EAB	EAD	
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. Costeaming:				
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

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

is 1:5000. This has been found most suitable for all types of surveys, as two A1 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 A⁰ 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 A⁰ 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 pedological 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 A⁰ sampled, and for the sake of continuity, all grid lines were sampled using the A⁰ 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 A⁰ responses. Also, it proved to be convenient to collect the A⁰ 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 A⁰ 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.

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 $n=6$.

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

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, volcanoclastics, basic to acid lavas 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), in turn 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

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

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.

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 volcanoclastics) 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 volcanoclastics 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.
- Unit 1 Medium grained ash fall tuff (aquagene quartz-plagioclase crystal acid tuff) minor disseminated galena and sphalerite.
- Oldest ?

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

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 inter-bedded 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.

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°.

The costean on 400N was excavated to try and expose the source of A° 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.

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

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

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. 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 schistosity 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 CPl/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

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 schistosity 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

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 microporphyr-itic in plagioclase, with flow attenuated vesicles filled by deuteric quartz. The groundmass is flow textured, glassy to micro-crystalline and clouded by chlorite-sericite alteration. Sections show minor fracturing, variably continuous, with some development of localised breccia, invaded and filled by hydro-thermal 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.

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 micro-porphyr-itic, 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

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, in turn 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° north-west. The dip increases upwards to about 40°, with some possible graded bedding facing north-west.
- 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, 1699.26

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

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

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° magnetic and dips 70° 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.

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 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 chalcocopyrite 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.

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

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 A⁰ 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 A⁰ 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.

When these values are contoured, they show three distinct zones. These zones can be correlated with the sedimentary facies within the andesites. Costeaining 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 A⁰ 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 costeaining 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 A⁰ 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

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 noticeable 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 A⁰ 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 A⁰ 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

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 A⁰ and C horizon soils. Comparison of the A⁰ and C horizon values shows reasonable correlation, but with significant

TABLE 1PINNACLES (EAA) GRID: 1978 A° GEOCHEMISTRYSTATISTICAL SUMMARY

Element	No. of Values	Range		Mean	Standard Deviation	Variance	Coefficient of Variation
		Low	High				
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	

TABLE 1 (a)PINNACLES (EAA) GRID: 1978 A° GEOCHEMISTRYELEMENT 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 2EAST CHESTER (EAB) IMPERIAL GRID: 1973 IMPERIAL GRID GEOCHEMISTRYSTATISTICAL SUMMARY

Element	No. of Values	Range		Mean	Standard Deviation	Variance	Coefficient of Variation
		Low	High				
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 GEOCHEMISTRYSTATISTICAL SUMMARY

Element	No. of Values	Range		Mean	Standard Deviation	Variance	Coefficient of Variation
		Low	High				
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		Mean	Standard Deviation	Variance	Coefficient of Variation
		Low	High				
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^o GEOCHEMISTRY

Element	No. of Values	Range		Mean	Standard Deviation	Variance	Coefficient of Variation
		Low	High				
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	

TABLE 3 (a)CHESTER GRID (EAD): TOTAL GRID A° GEOCHEMISTRYELEMENT 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

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 A⁰ 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. East Chester Grid (EAB)

This grid presents a rather complex magnetic picture (TAS/2/), 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

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.

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 response 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.

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)

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

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.

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
2750S: 120E - 600W
3150S: 120E - 600W

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

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.

Costeaming 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 costeaming 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

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.

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 budgetary 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. AO 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.

057

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 21000 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

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

10. REFERENCES

1. Perkin, D.J. 1977 Interim Report on the Chester Area: Preussag Report Tas/6.
2. Krummei, G.K. 1977 Progress Report on the Pinnacles Area: Preussag Report Tas/9.
3. McIntosh Reid, A. 1918 The North Pieman and Huskisson and Sterling Valley Mining Fields: Tas. Dept. of Mines, Geol. Survey Bulletin No 28.
4. Hopwood, T. 1977 A Brief Assessment of the Sock Creek and Chester-Pinnacles Prospects, Tasmania: A Report Prepared for Comstaff Pty. Ltd.
5. Williams, E. 1975 The Geological Setting of
Solomon, M. and
Green, G.P. Metalliferous Ore Deposits in
Tasmania: Aus. I.M.M. Monograph,
No. 5.
6. Solomon, M. 1976 Geological History of Western
Green, G.R. and
Reid, K.O. Tasmania. Excursion Guide
No. 31AC for 25th International
Geological Congress.
7. Gee, C.E. 1970 The Age of the Mt. Read Volcanics
Jago, J.B. and
Quilty, P.G. in the Que River Area, Western
Tasmania: J. Geol. Soc. Aust.
16, pp 761-763.
8. Campana, B. and 1963 Palaeozoic Tectonism, Sediment-
King, D. ation and Mineralisation in
West Tasmania: J. Geol. Soc.
Aust. 10, pp 1-53.
9. Anderson, W.B. 1972 The Mt. Read Volcanics in the
Rosebery-Tullah Area. Unpub-
lished B.Sc. thesis from the
University of Tasmania.
10. Hall, D.B. 1977 A^o Geochemical Sampling: A
Critique: Preussag Report Tas/8.
11. Braithwaite, R.L. 1974 The Geology and Origin of the
Rosebery Ore Deposit, Tasmania:
Economic Geology, Vol 69, 1974
pp 1086-1101.

OPEN FILE

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MICROFILMED

PROJECT NAME:

APPENDIX IV

TITLE:

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

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:

APPENDICES:

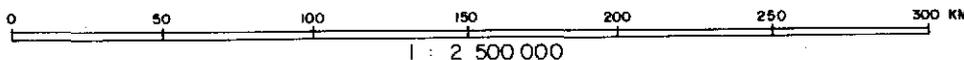
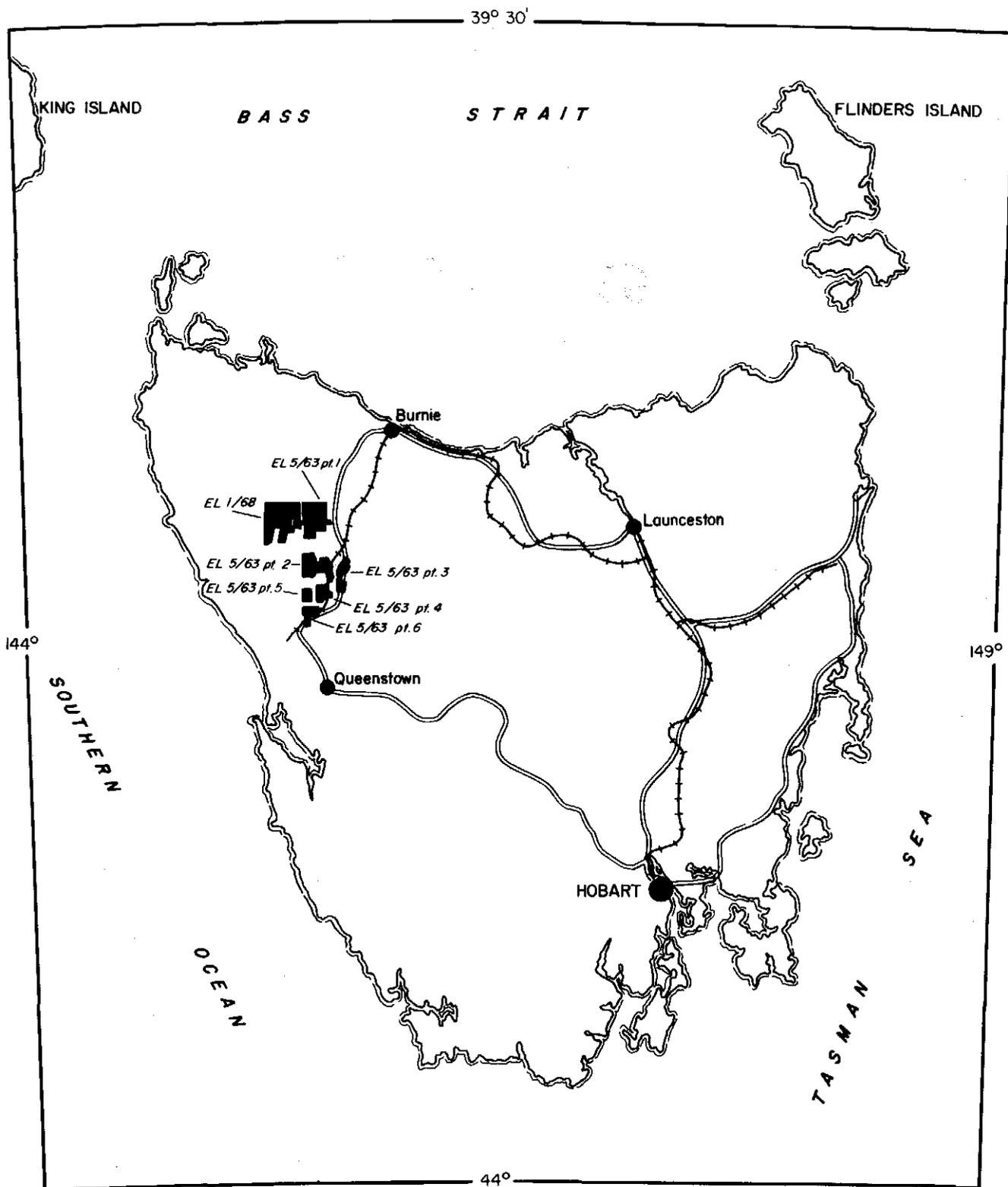
AUTHOR/S: D. B. Hall

DATE: September 1978

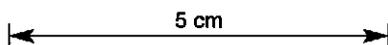
AUSTRALIAN ANGLO AMERICAN LIMITED

061

210352



-  Major roads
-  Major railways
-  Major towns
-  Comstaff lease areas



COMSTAFF PROPRIETARY LIMITED

**LOCATION OF COMSTAFF LEASES
IN TASMANIA**

DRAWN
GEODRAFT 7/78

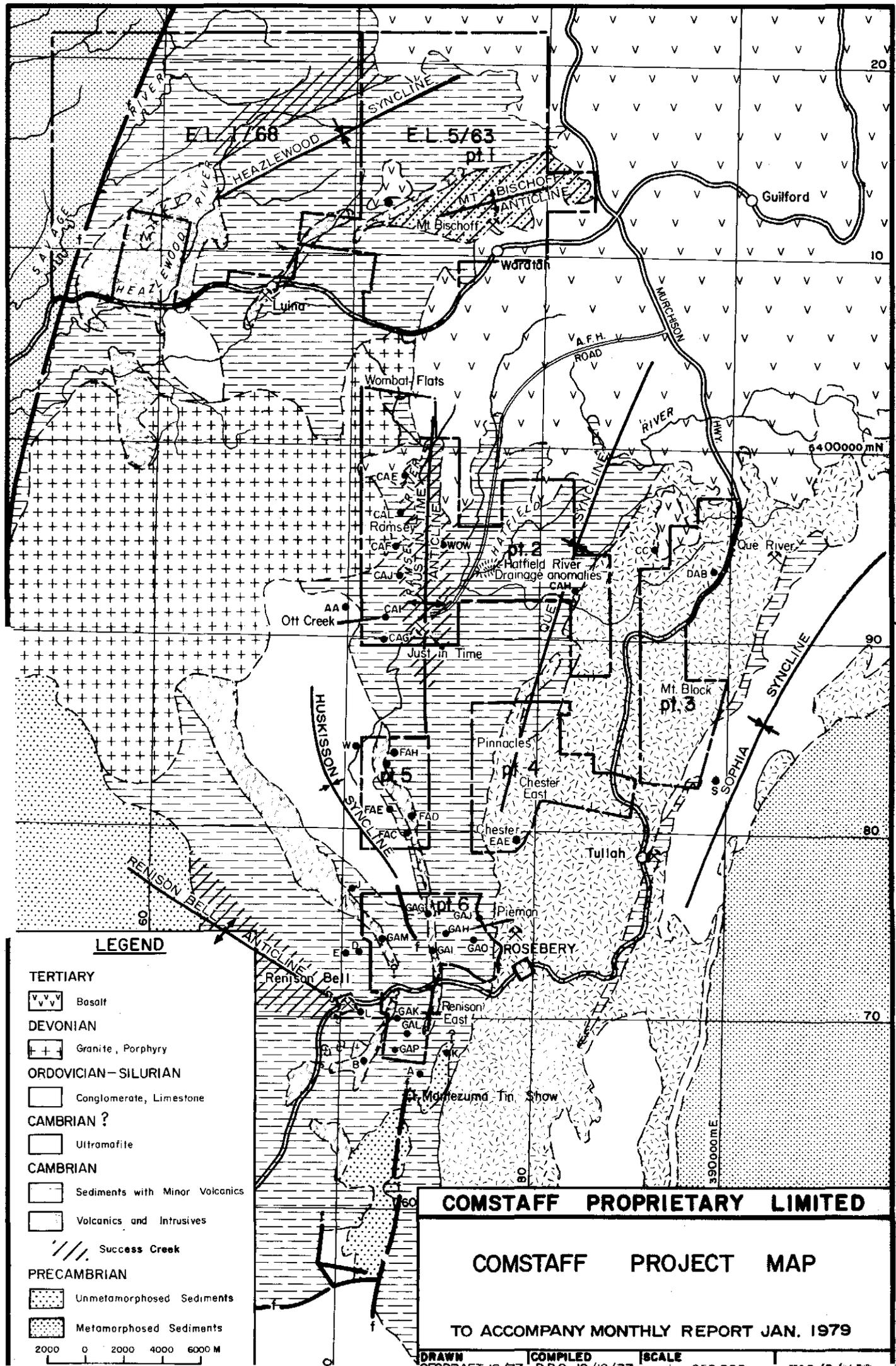
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SCALE
1 : 2 500 000

TAS/2/1586

062

210353



5 cm

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

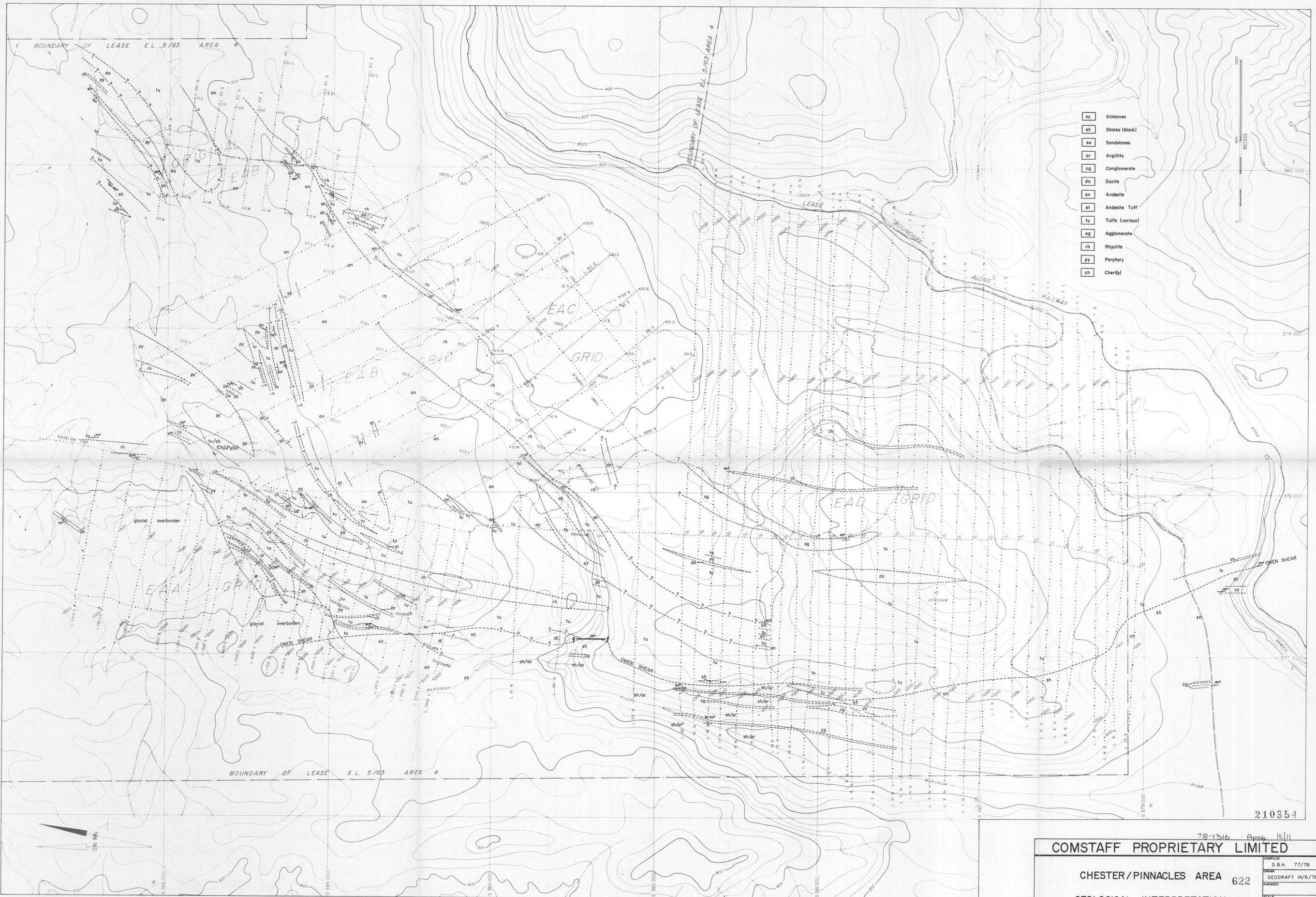
2000 0 2000 4000 6000 M

COMSTAFF PROPRIETARY LIMITED

COMSTAFF PROJECT MAP

TO ACCOMPANY MONTHLY REPORT JAN. 1979

DRAWN GEODRAFT 10/77 COMPILED DBQ 12/10/77 SCALE 1:250 000 TAS/2/4/79



- ss Siltstones
- sh Shales (black)
- sa Sandstones
- ar Argillite
- cg Conglomerate
- da Dacite
- an Andesite
- at Andesite Tuff
- tu Tufts (various)
- ag Agglomerate
- rh Rhyolite
- py Porphyry
- ch Cherty

78-1316 Appy. 13/11

COMSTAFF PROPRIETARY LIMITED

CHESTER/PINNACLES AREA 622

GEOLOGICAL INTERPRETATION

5 cm

<small>COMPILED</small> D.B.H. 77/78	<small>DRAWN</small> GEO DRAFT 14/6/78
<small>REVISED</small>	<small>SCALE</small> 1 : 10 000
<small>PLAN NO.</small> TAS/2/1555	

210354

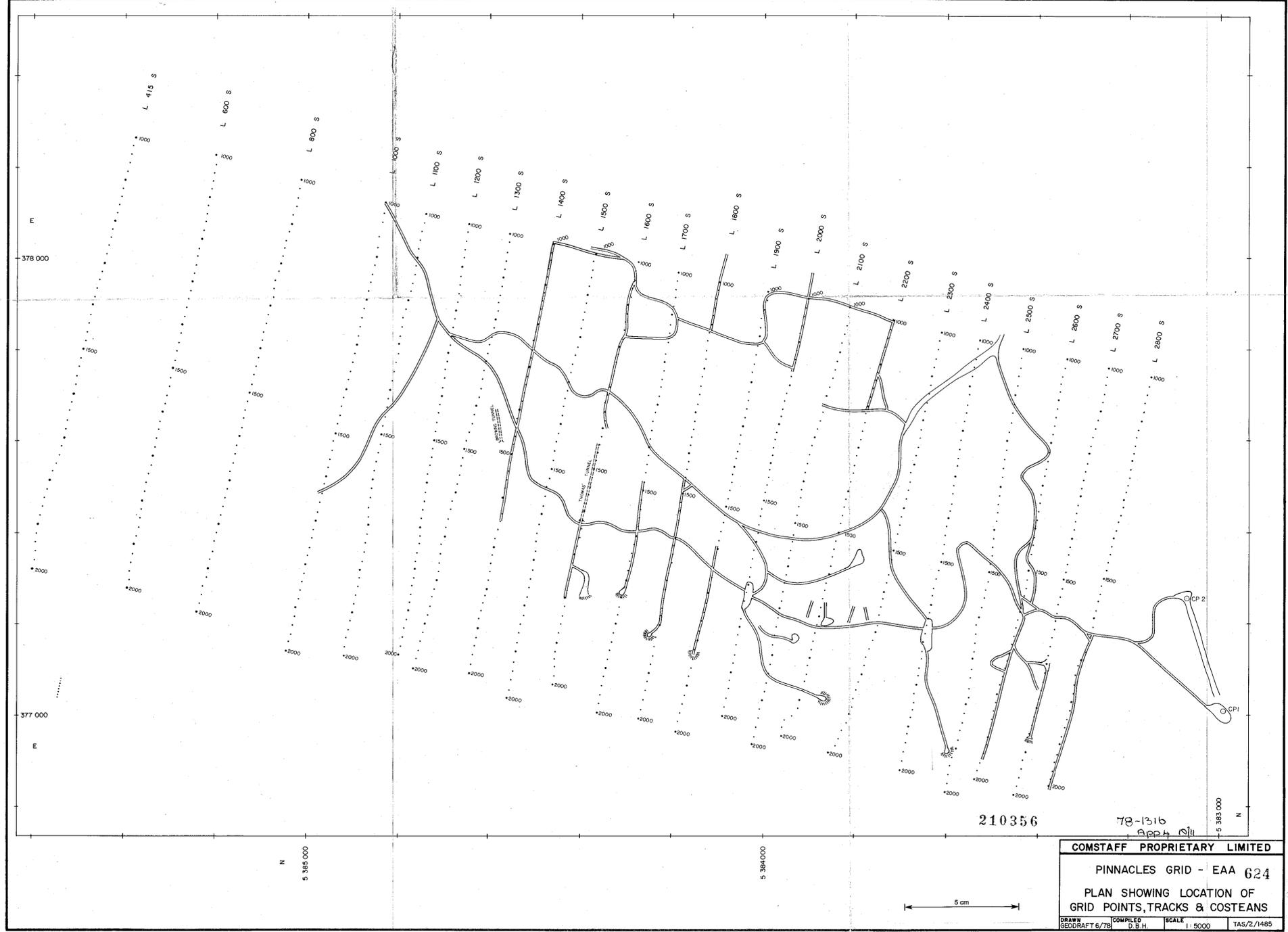


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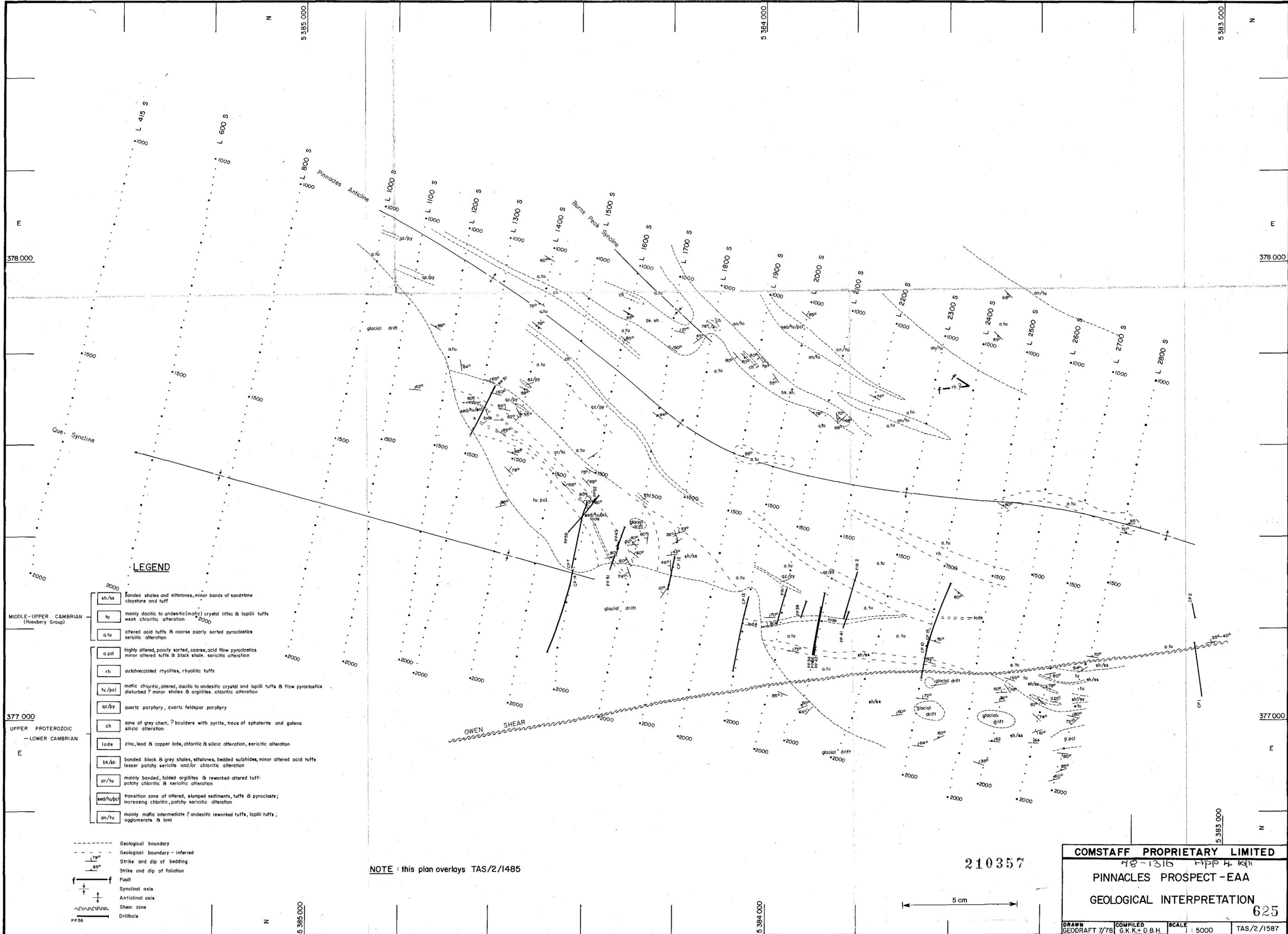
- Lines traversed by MAGNETOMETER survey
- ~~~~~ Lines traversed by SELF POTENTIAL survey
- Lines traversed by INDUCED POLARISATION survey

210355 78-316 1904 10/11

COMSTAFF PROPRIETARY LIMITED	
CHESTER - PINNACLES AREA	623
SHOWING LINES TRAVERSED BY GEOPHYSICAL METHODS	SCALE 1 : 10 000
5 cm	PLAN NO. TAS/2/1571



COMSTAFF PROPRIETARY LIMITED
 PINNACLES GRID - EAA 624
 PLAN SHOWING LOCATION OF
 GRID POINTS, TRACKS & COSTEANS
 DRAWN: GEODRAFT 6/78
 COMPLETED: D.B.H.
 SCALE: 1:5000
 TAS/2/1485



LEGEND

- 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
- a.pol highly altered, poorly sorted, coarse acid flow pyroclastics minor altered tuffs & black shale, sericitic alteration
- rh autobrecciated rhyolites, rhyolitic tuffs
- tu/pol mafic chloritic, altered, dacitic to andesitic crystal and lapilli tuffs & flow pyroclastics disturbed? minor shales & argillites, chloritic alteration
- qtz/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/pol 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 Fault
- ↑↓ Synclinal axis
- ↑↓ Anticlinal axis
- ~~~~~ Shear zone
- Drillhole

NOTE: this plan overlays TAS/2/1485

210357

5 cm

COMSTAFF PROPRIETARY LIMITED
 78-1316 App 4 1978
PINNACLES PROSPECT - EAA
GEOLOGICAL INTERPRETATION
 625

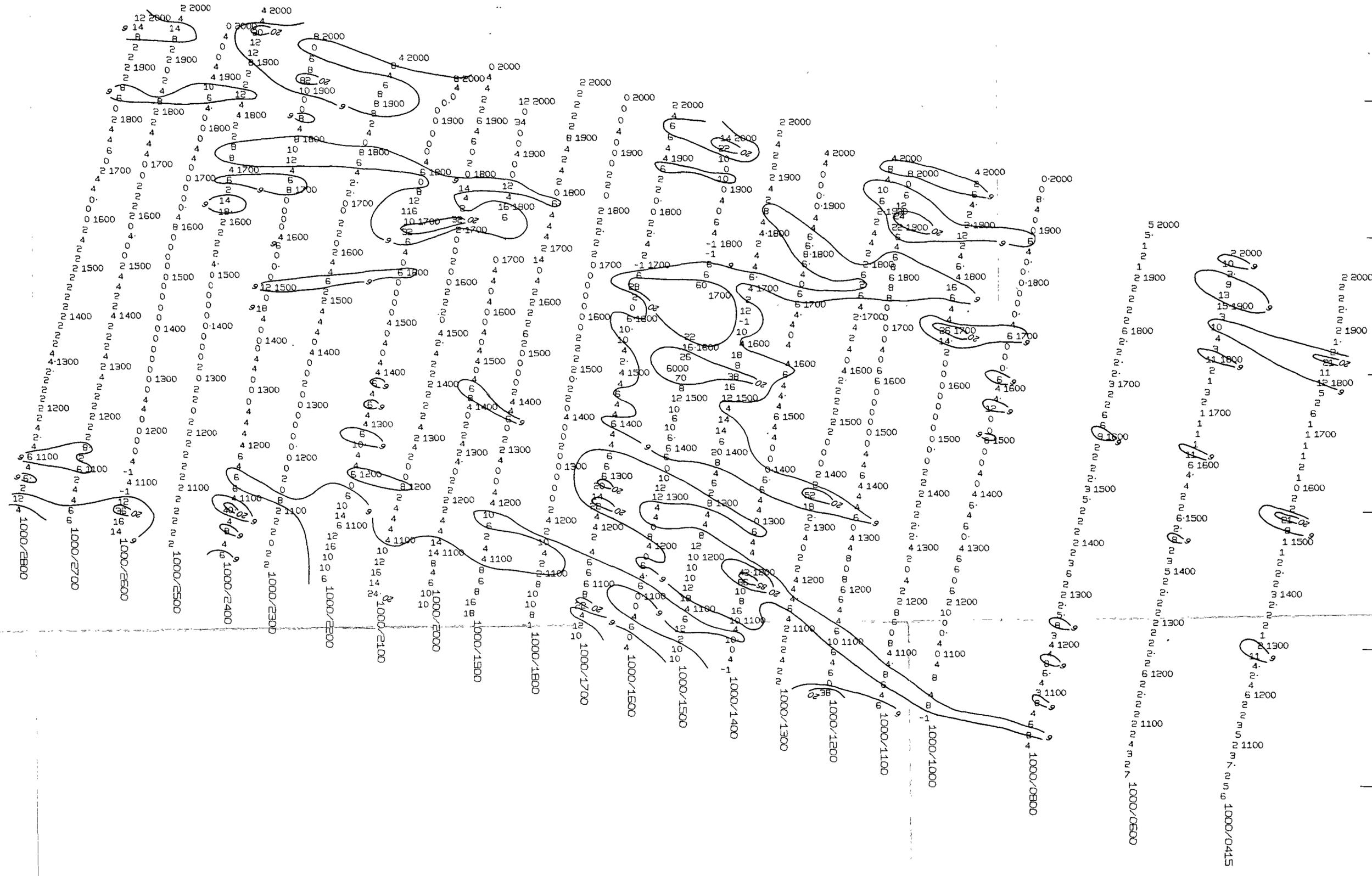
DRAWN GEODRAFT 7/78	COMPILED G.K.K. + D.B.H.	SCALE 1:5000	TAS/2/1587
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GRID (EAA) PINNACLES SCALE 1 TO 5,000 4155-28005 CU PPM 6-7-78

210358

78-1316 App 4

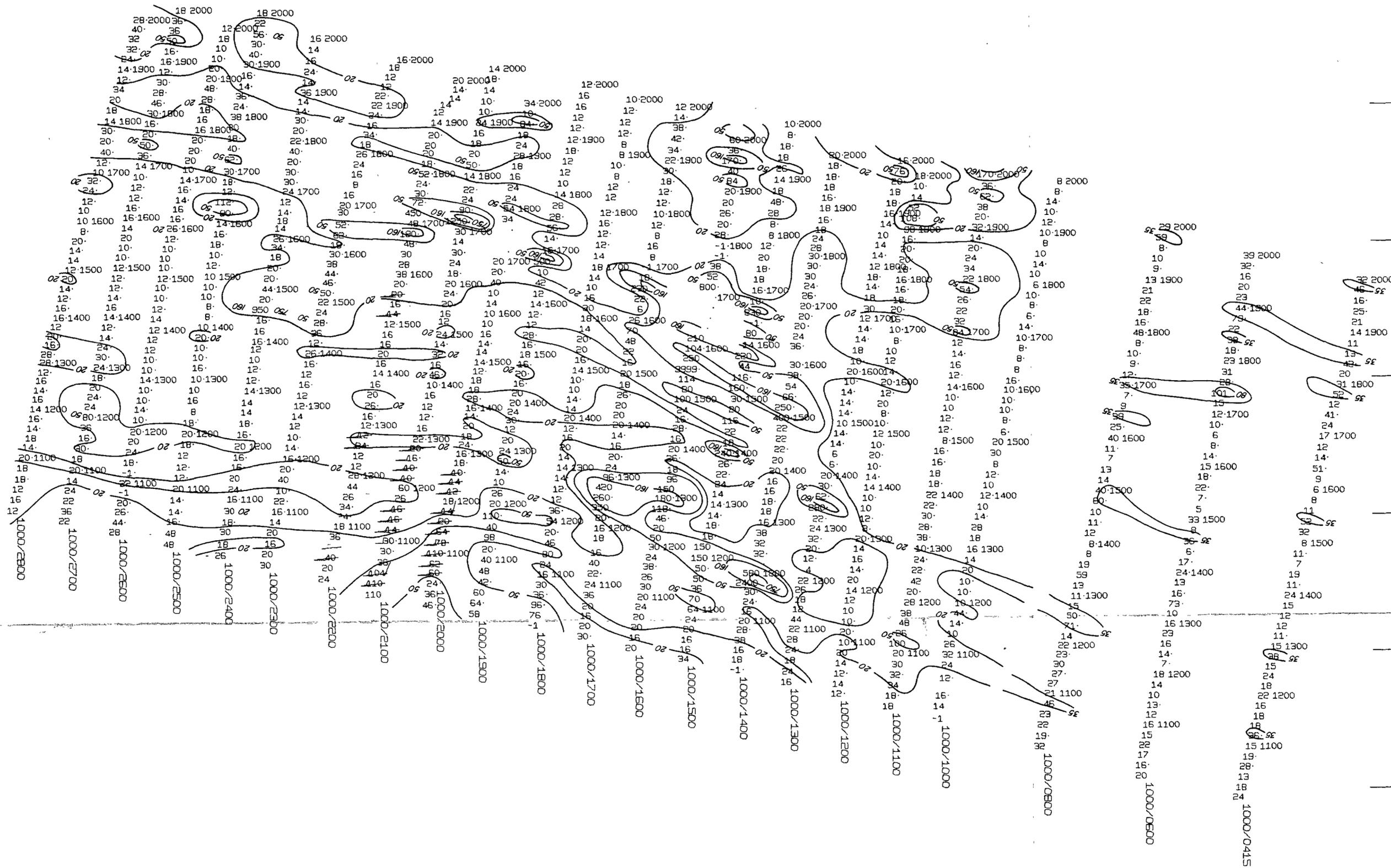
5 cm



COMSTAFF PROPRIETARY LIMITED
PINNACLES PROSPECT - EAA
GRID GEOCHEM SAMPLING
LEAD RESULTS in ppm
627

Vol. II
48-1316 Appx

GRID (EAA) PINNACLES SCALE 1 TO 5,000 4155-28005 PB PPM 6-7-78



210359

5384 000

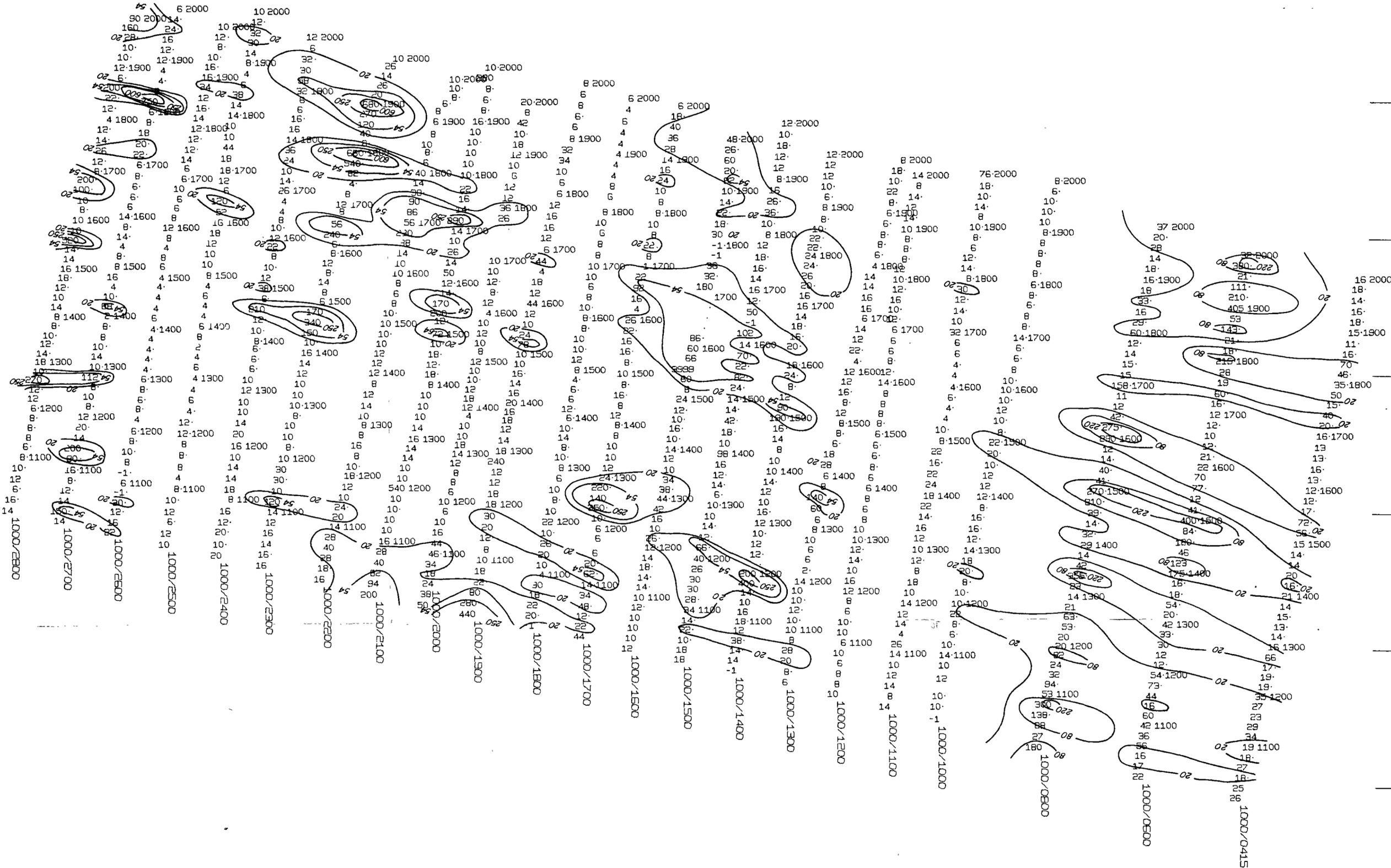
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210360

48-1316

5 cm



375000.E

375500.E

376000.E

376500.E

377000.E

377500.E

378000.E

378500.E

5384000

5385000

N

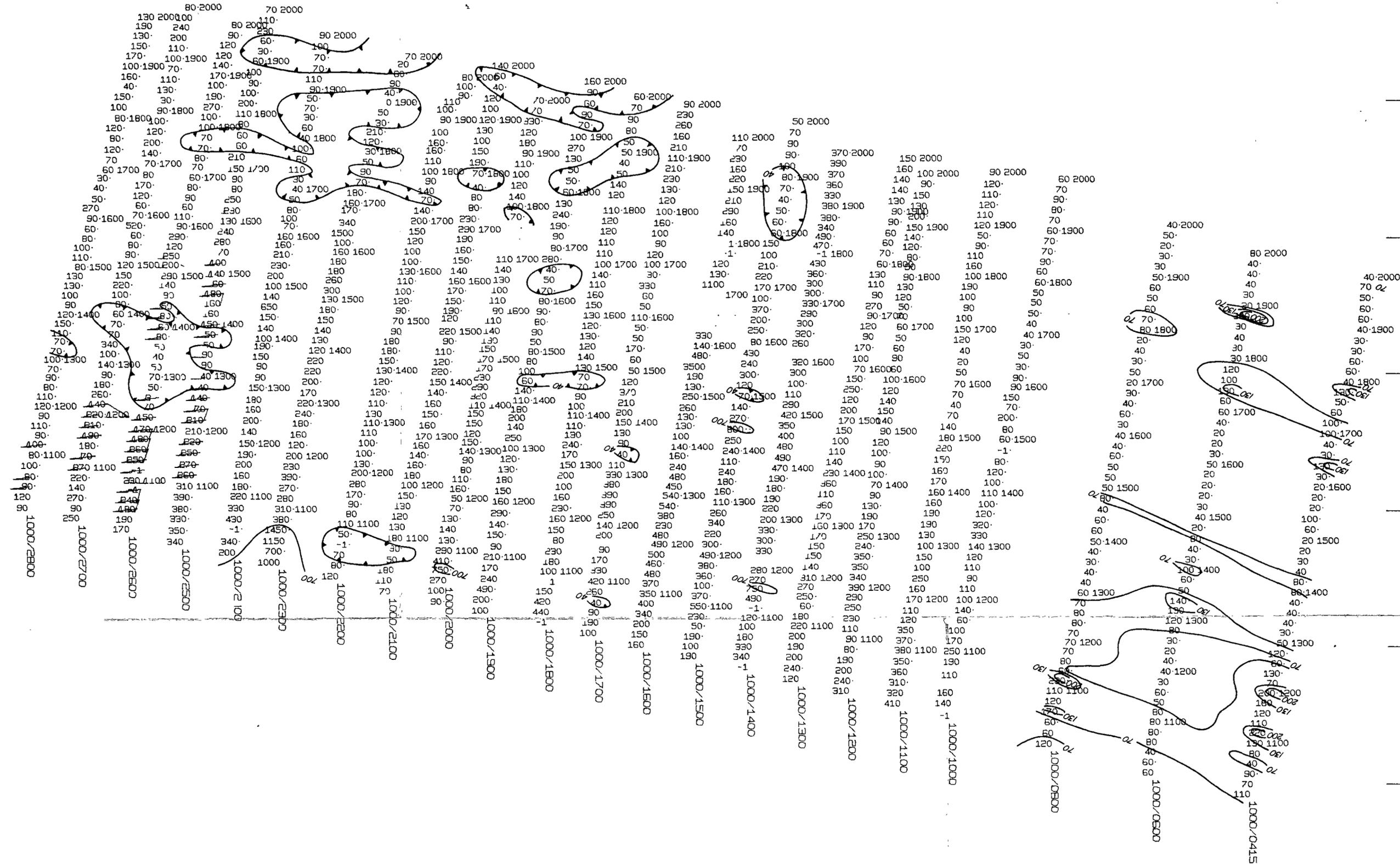
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GRID (EAA) PINNACLES SCALE 1 TO 5,000 4155-28005 BA PPM 6-7-78

5 383 000

5 cm

48-1316



5 384 000

5 385 000

N

379500-E

378250-E

379000-E

377500-E

377000-E

377500-E

377000-E

377500-E



- LEGEND**
- △ Drainage & water race survey point
 - + Road survey point
 - ⊕ Costean sample point
 - Grid sample point

5 cm

78-126
APP 7 1978

COMSTAFF PROPRIETARY LIMITED

EAST CHESTER - EAB
DETAILED GEOLOGICAL PLAN
210362

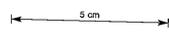
BY	GEODRAFT
COMPILED	D.B.H.
DATE	JUNE 1978
SCALE	1 : 5000
	TAS/2/1565

630



- Ch/Sec Cherty sediments or silicified rocks
- Sh Black grey shales, interbedded arenaceous units
- Qz/f/Pg Quartz feldspar porphyry extrusive ?
- A/tu Tuffs acid, crystal, lithic, lapilli (altered)
- An Andesite vesicular, flow textured, tuffaceous
- An/tu Andesite tuff clonitic, pyritic
- Tu Tuff water-lain, bedded, interbedded siliceous sandy units
- Rh Rhyolite flow textured, vesicular ?
- Avo Sub aereal acid volcanics flow banded, brecciated, ashfall tuffs, trachyandesites, ignimbrites ? Fiamme
- Pcl Coarse pyroclastic, volcanic breccia

- Geological boundary
- - - Fault, fault inferred
- Glacial cover
- Costean

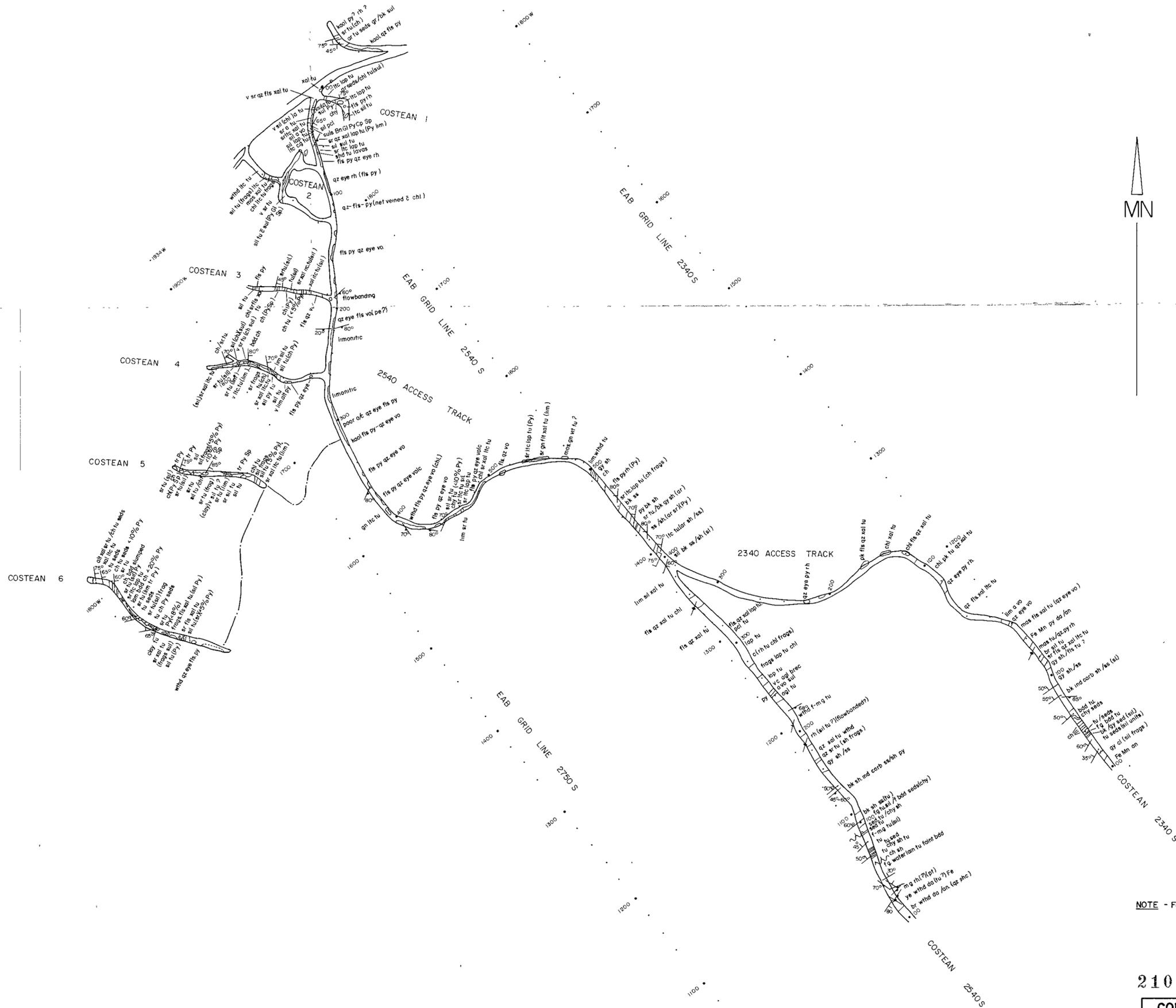


210363 78-1316
 27/11/78

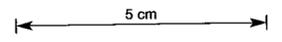
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EAST CHESTER - EAB
 GEOLOGICAL INTERPRETATION

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COMPILED	D.B.H.
DATE	Jan 78
SCALE	1:5000
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NOTE - For abbreviation index see plan TAS/2/1566

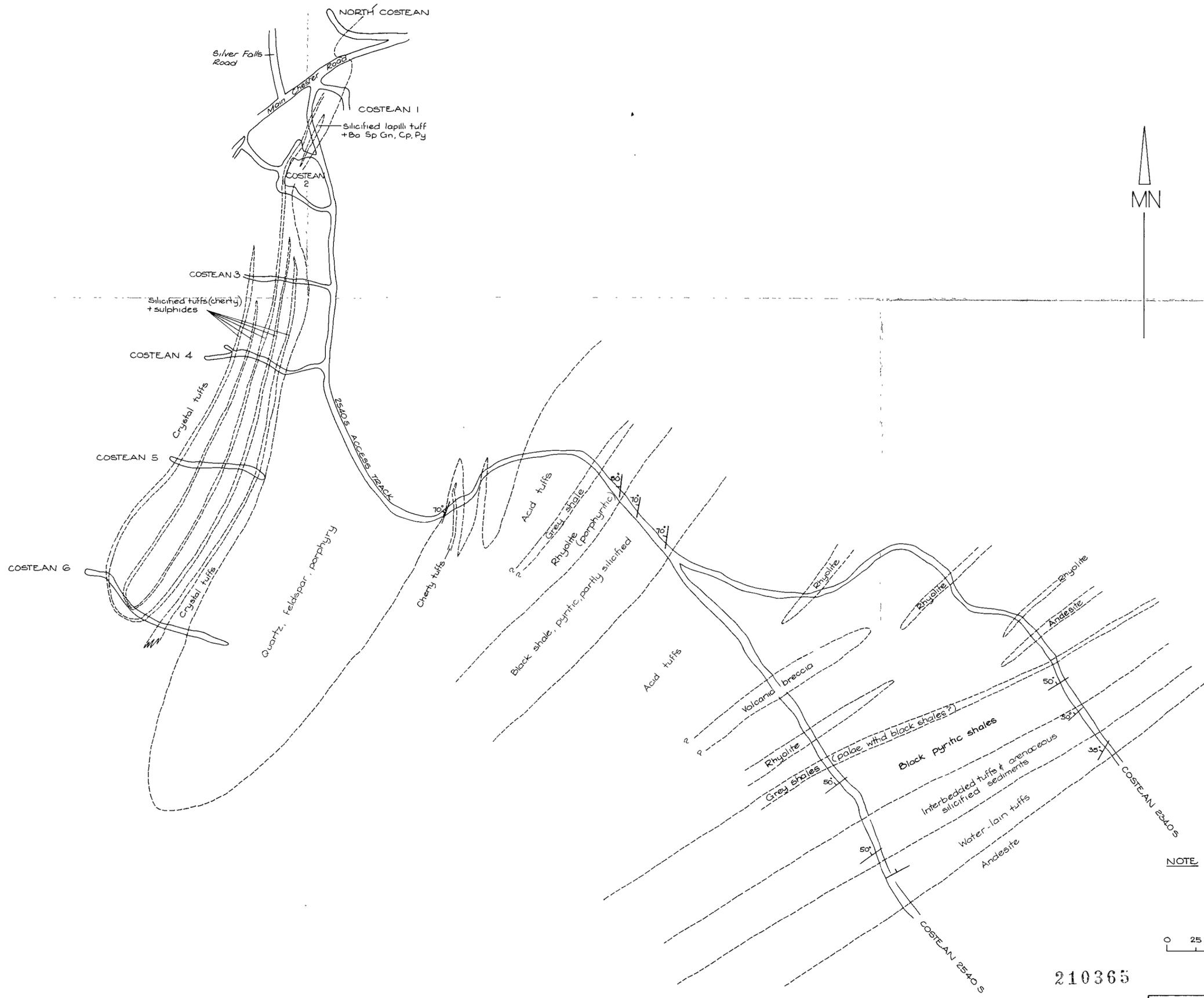


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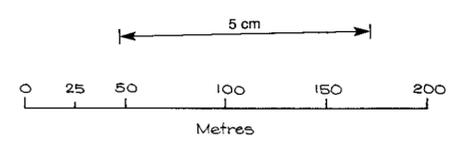
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EAST CHESTER GRID - EAB
 2340S & 2540S COSTEANS
 DETAILED GEOLOGY 632

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NOTE For abbreviation index see plan TAS/2/1566



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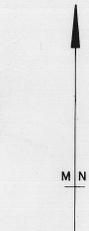
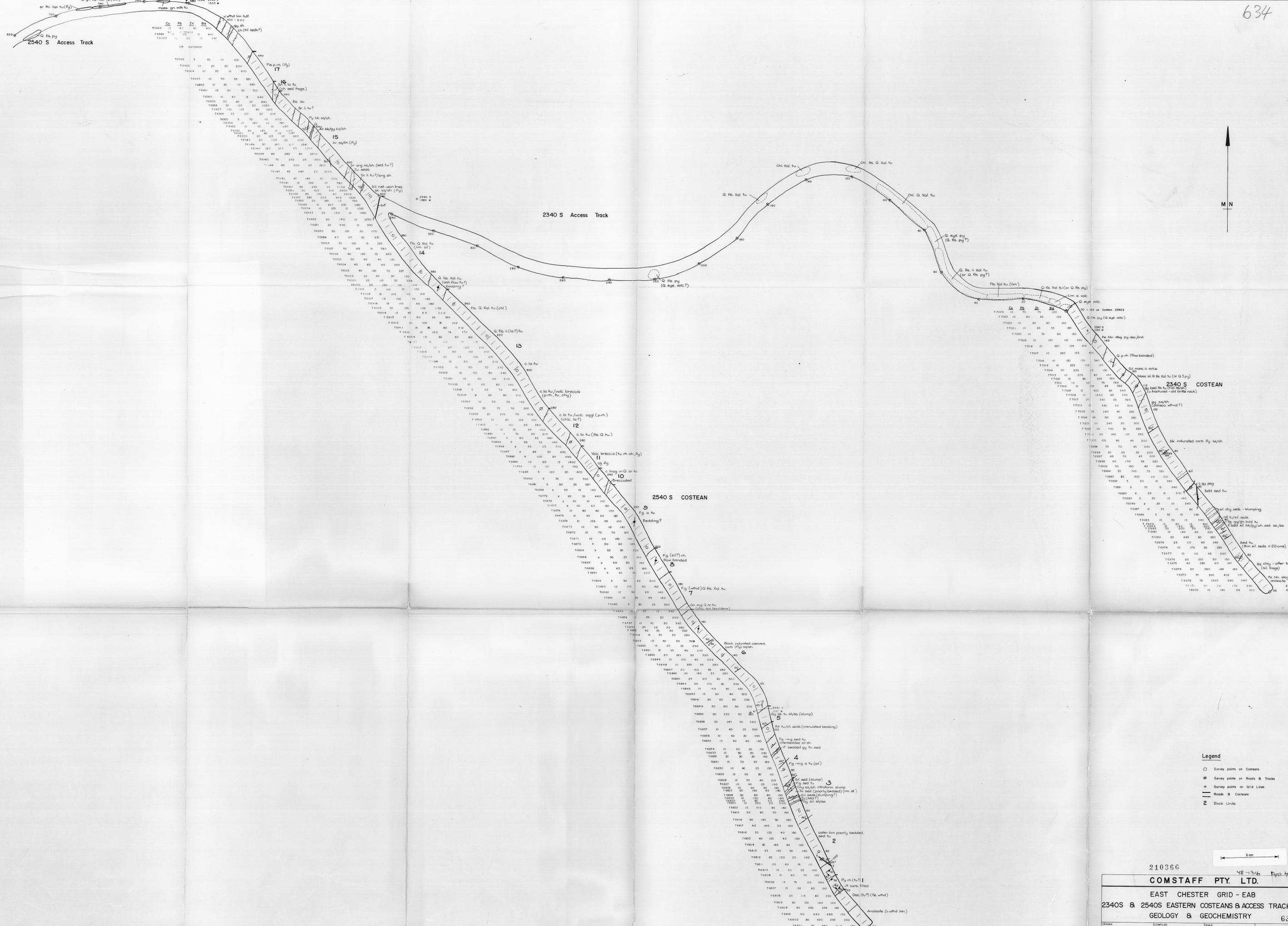
78-1316 App. 4

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EAST CHESTER GRID - EAB
2340S & 2540S COSTEANS 633

GEOLOGICAL INTERPRETATION

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- Legend**
- Survey points on Costeans
 - ⊗ Survey points on Roads & Tracks
 - Survey points on Grid Lines
 - Roads & Costeans
 - 2 Rock Limits

5m

210366
 YS-15/16 Prep by
COMSTAFF PTY. LTD.
 EAST CHESTER GRID - EAB
 2340S & 2540S EASTERN COSTEANS & ACCESS TRACKS
 GEOLOGY & CHEMISTRY 634
 DRAWN A. Murray 6-78 COMPILED D. Hill SCALE 1:500 TMS/2/1613



210367

COMSTAFF PTY LTD

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

635

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

Section

Plan

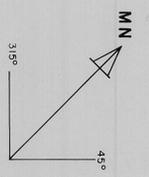
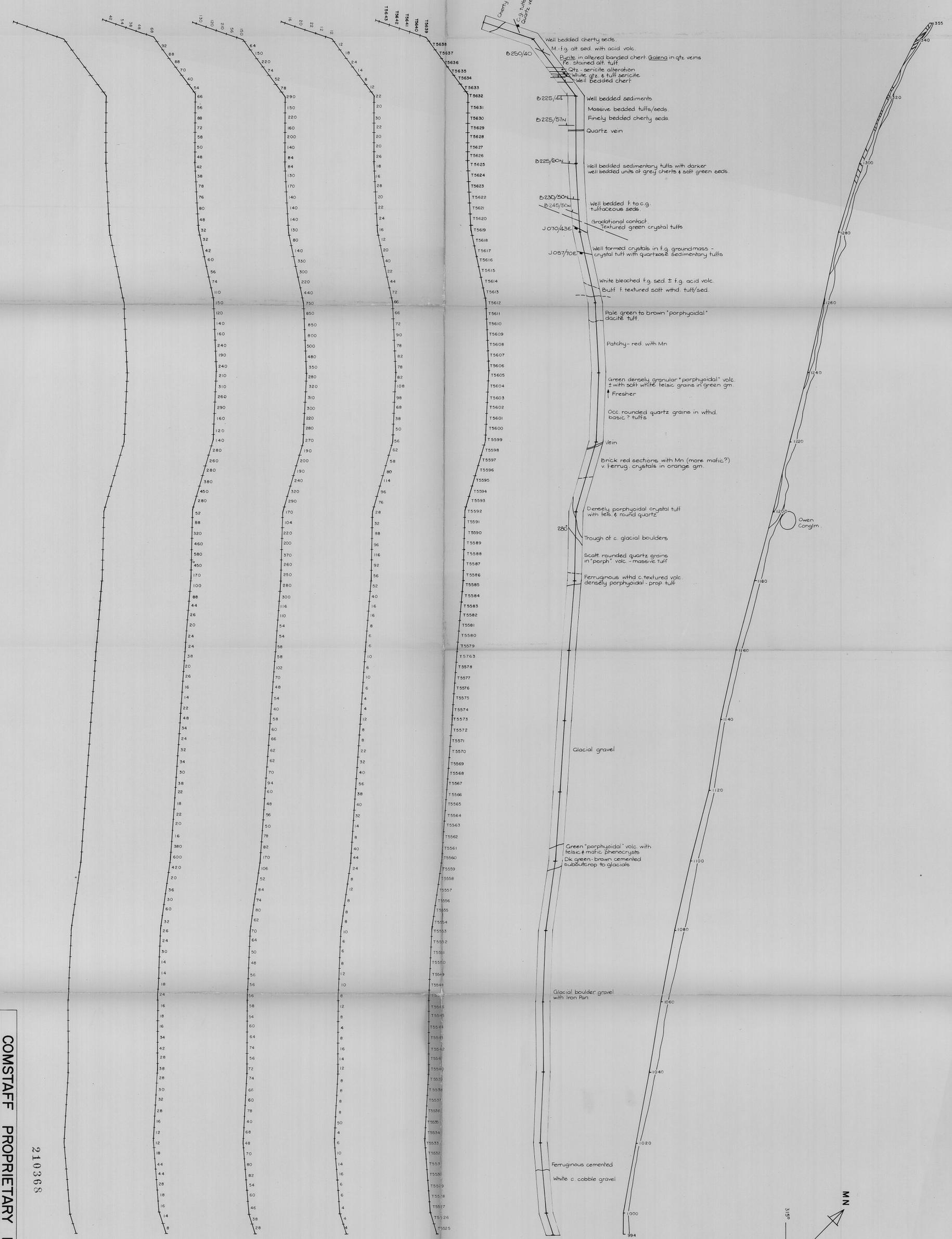
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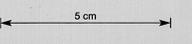
Pb

Cu



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18-1-316 ppp 4



COMSTAFF PROPRIETARY LIMITED
 EAST CHESTER GRID - EAB
 2950 S. COSTEAN
 GEOLOGY & GEOCHEMISTRY
 636
 TAS/2/1301

DRAWN A.M.
 DATE 5-77
 COMPILED G.P.
 SCALE 1:500
 TAS/2/1301

Section

Plan

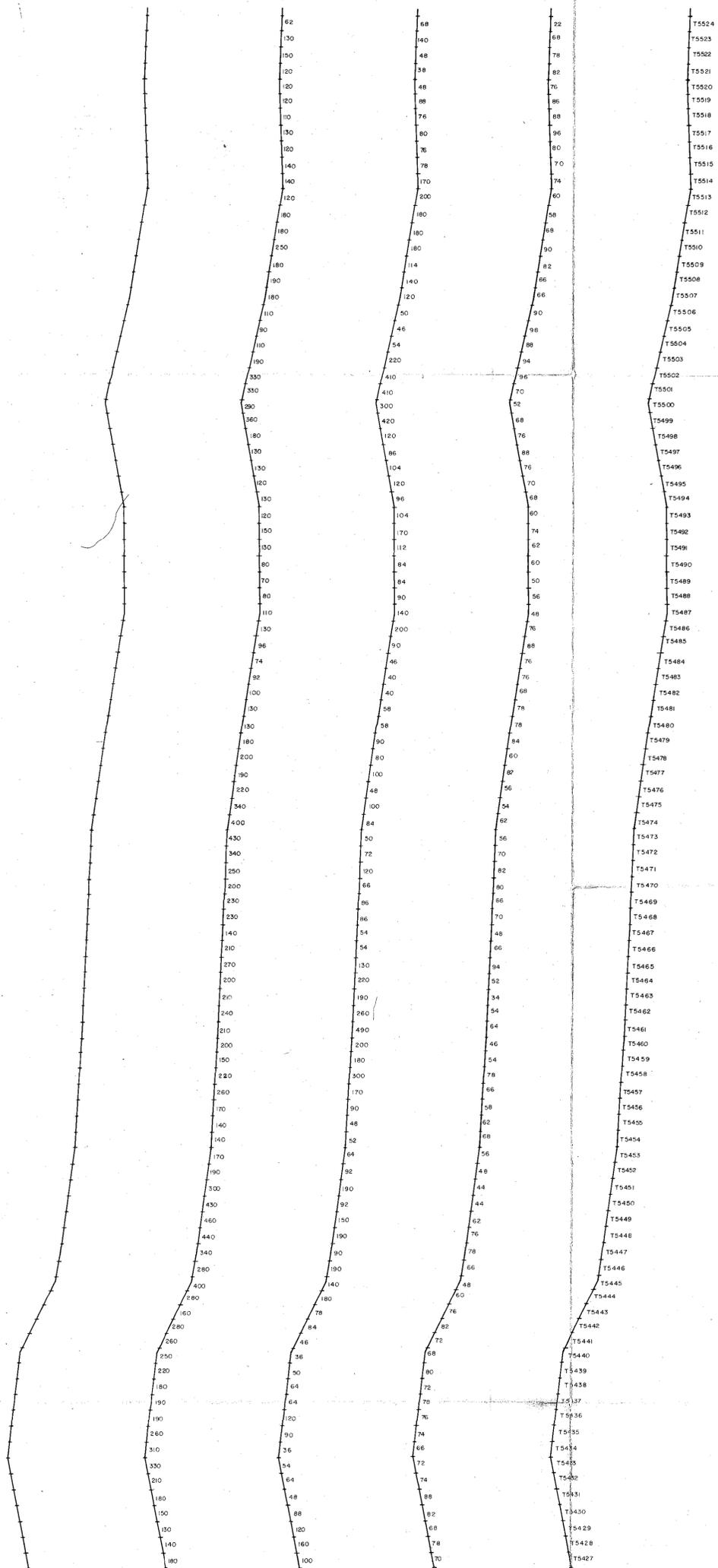
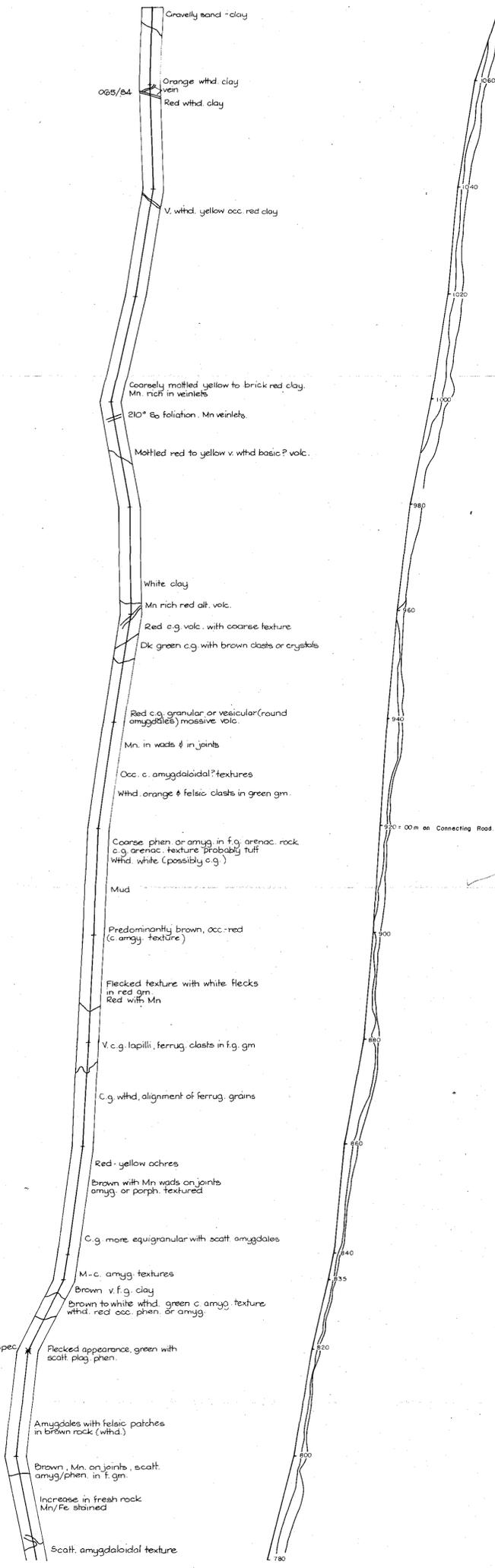
Sample points

Cu

Pb

Zn

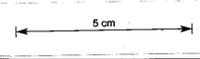
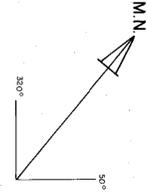
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18-1-2016

COMSTAFF PROPRIETARY LIMITED
 EAST CHESTER GRID - EAB
 2750 S COSTEAN (WEST)
 GEOLOGY & GEOCHEMISTRY
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 TAS/2/1302



Section

Plan

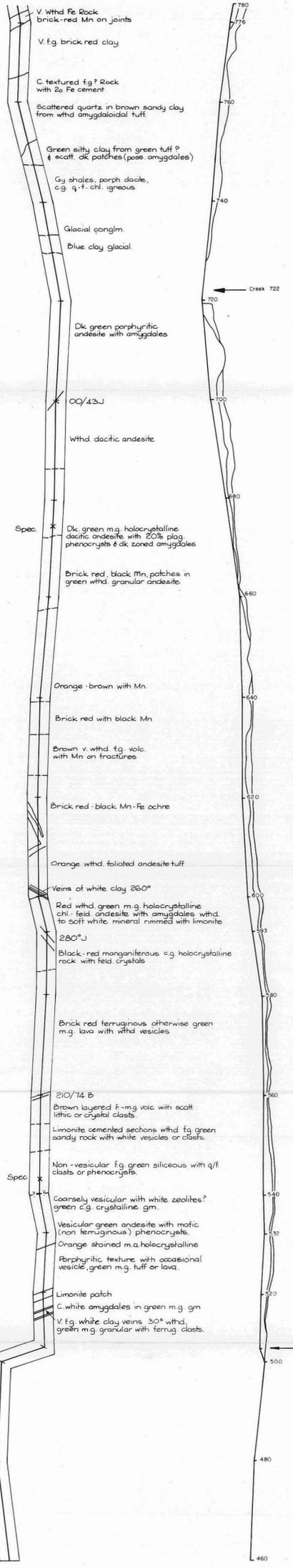
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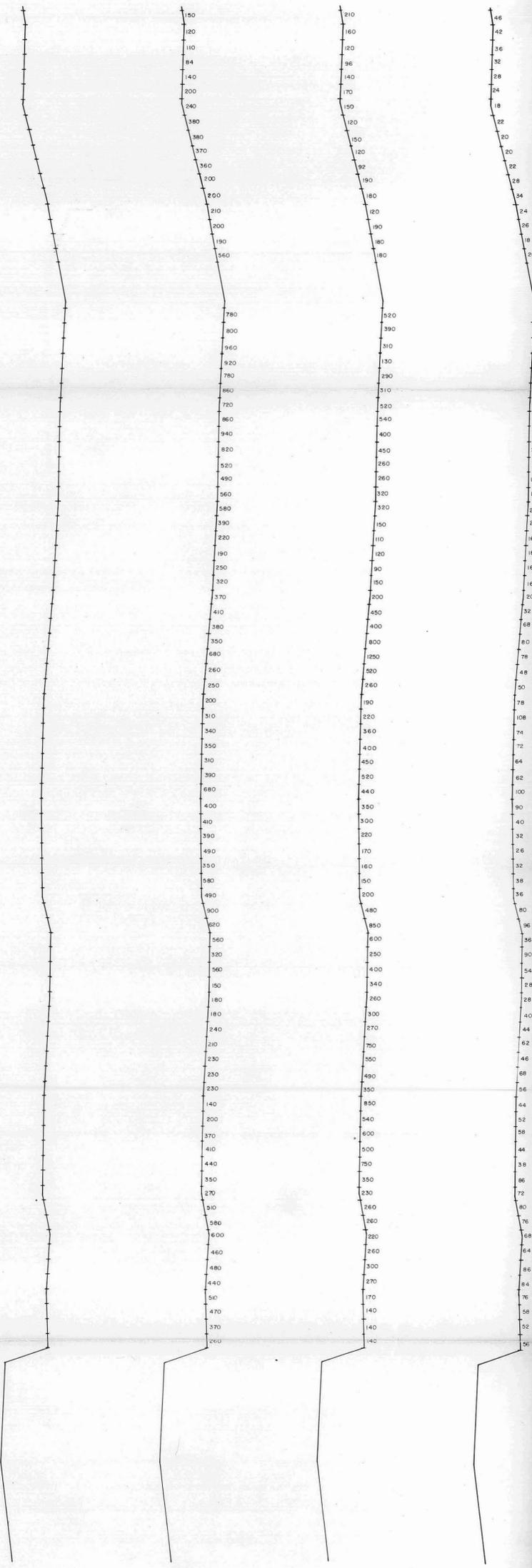
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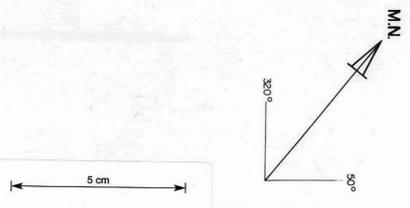
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COMSTAFF PROPRIETARY LIMITED

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

638

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



Zn

Pb

Ni

Cu

Sample points

Plan

Profile

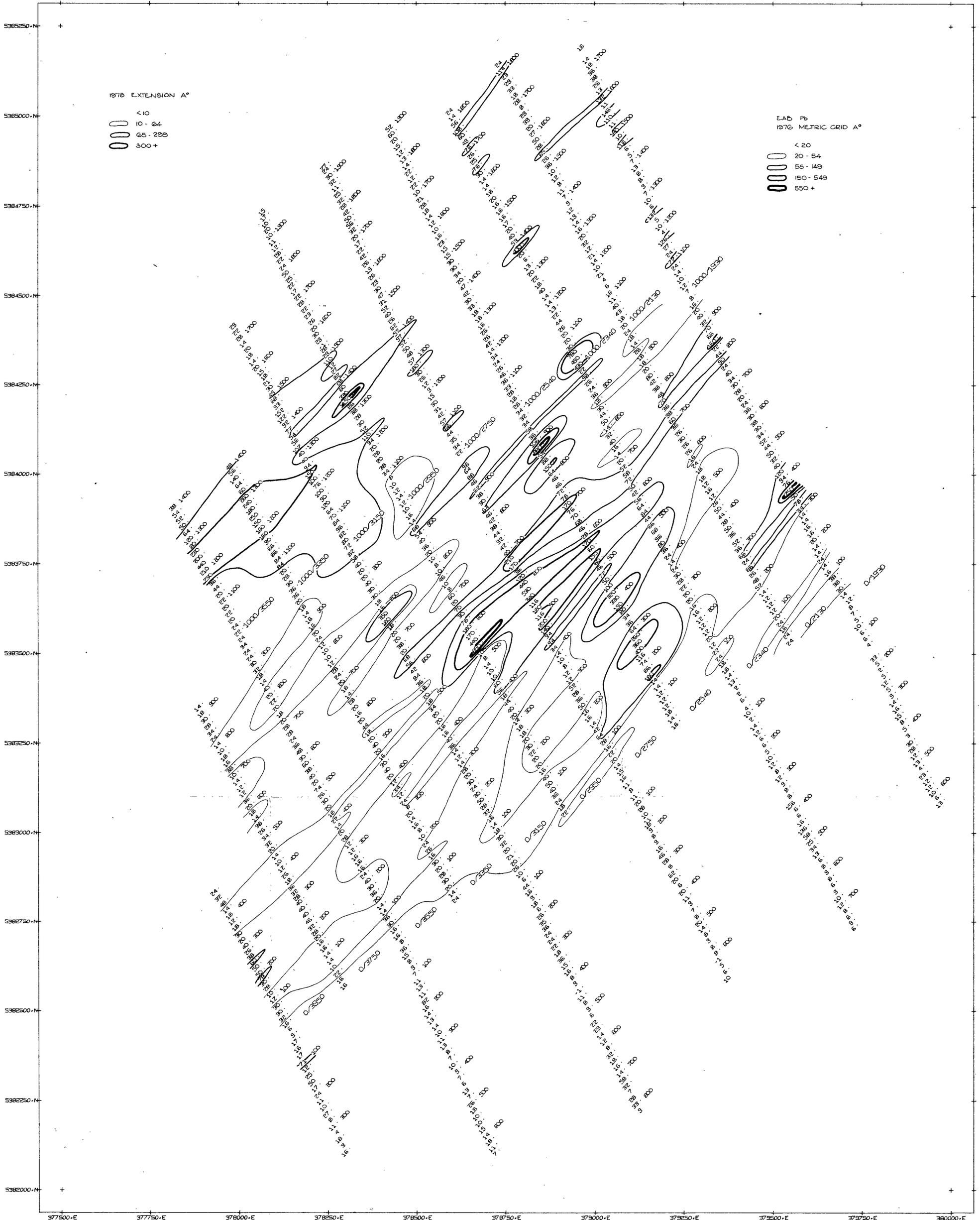
MN

210371

78-1316 8pp/4

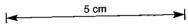
COMSTAFF PROPRIETARY LIMITED
 EAST CHESTER GRID - EAB
 3350 S COSTEAN
 GEOLOGY & GEOCHEMISTRY
 639
 TAS/2/1304

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



1978 EXTENSION A°
 < 10
 10 - 64
 65 - 299
 300 +

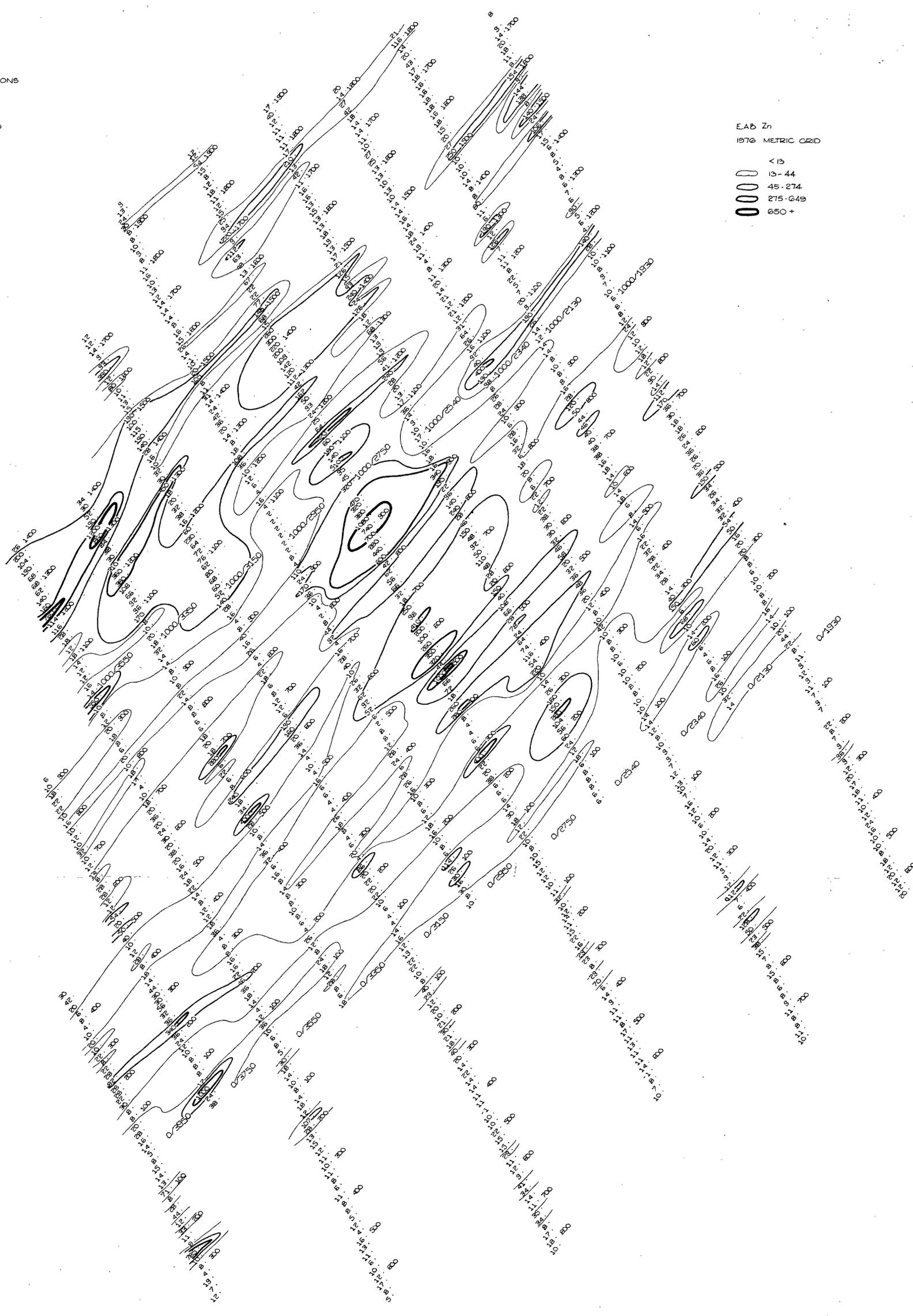
EAB Pb
 1976 METRIC GRID A°
 < 20
 20 - 54
 55 - 149
 150 - 549
 550 +



5385250.N
5385000.N
5384750.N
5384500.N
5384250.N
5384000.N
5383750.N
5383500.N
5383250.N
5383000.N
5382750.N
5382500.N
5382250.N
5382000.N

1976 EXTENSIONS
 ○ < 25
 ○ 25 - 99
 ○ 100 - 399
 ○ 400 +

EAB Zn
 1976 METRIC GRID
 ○ < 15
 ○ 15 - 44
 ○ 45 - 274
 ○ 275 - 649
 ○ 650 +

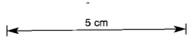


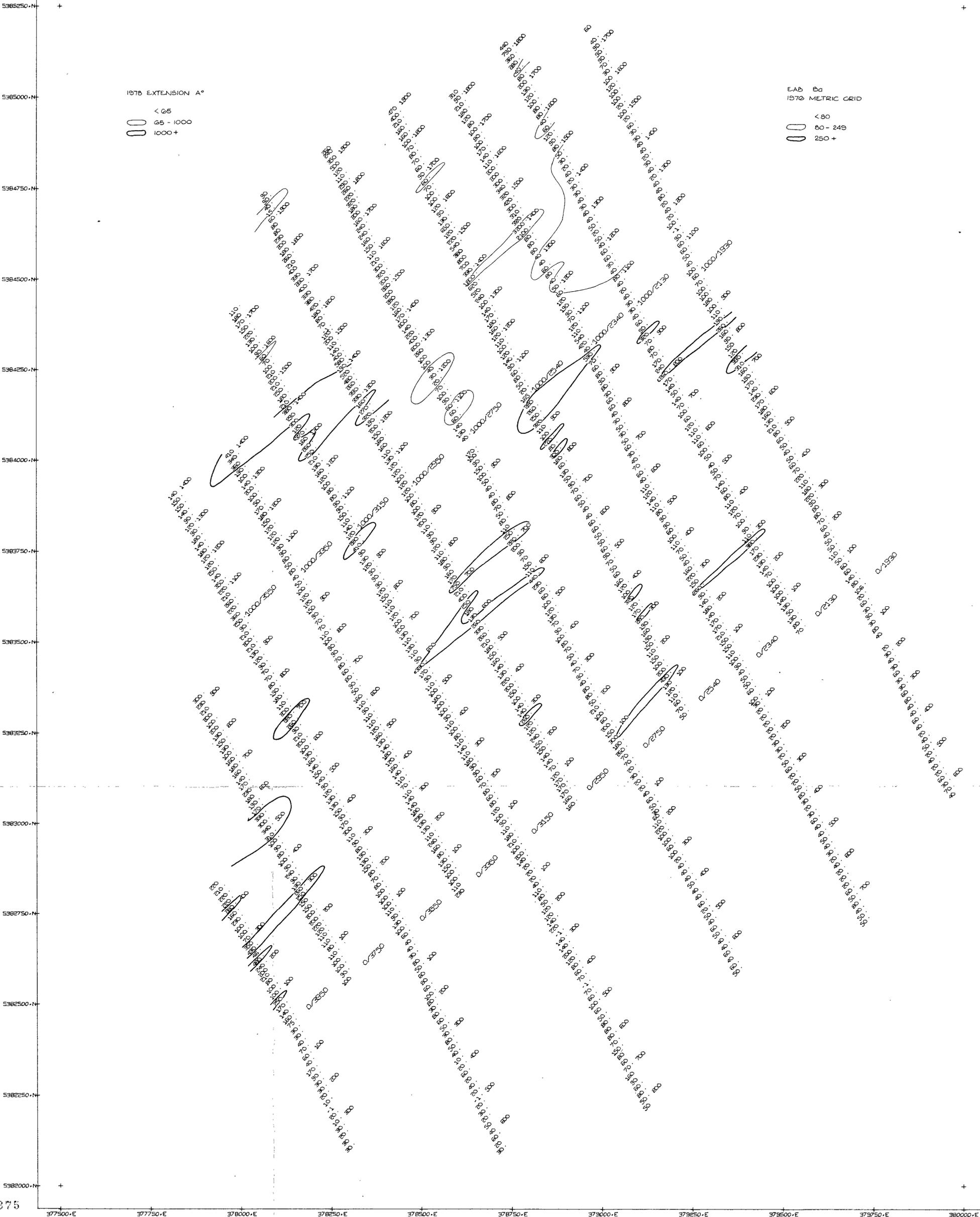
210374

377500.E 37750.E 378000.E 378250.E 378500.E 378750.E 379000.E 379250.E 379500.E 379750.E 380000.E

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

TAS/2/1702
 642 48-1316 App 4





1978 EXTENSION A°
 < 65
 65 - 1000
 1000 +

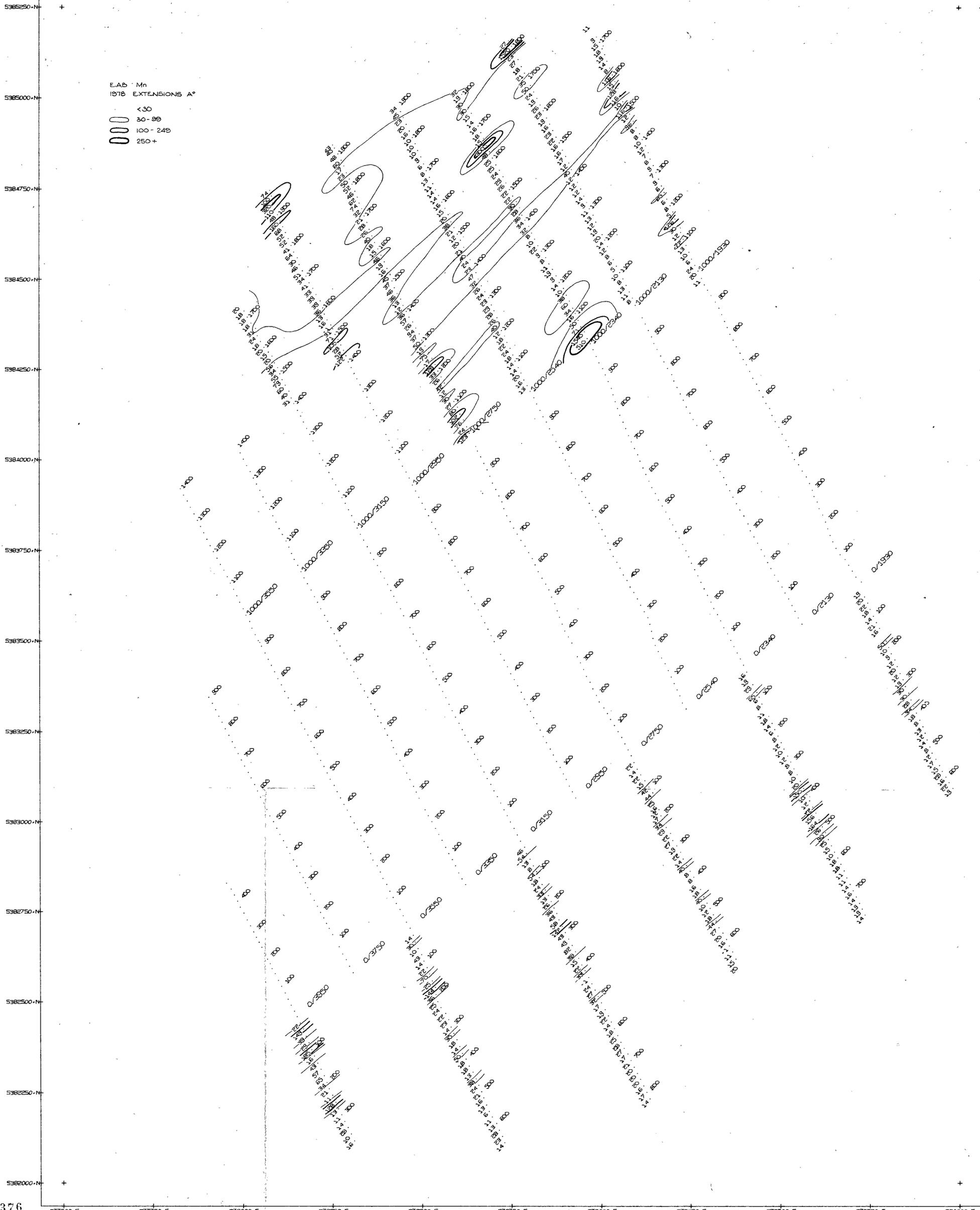
EAB Ba
 1978 METRIC GRID
 < 80
 80 - 249
 250 +

210375

5 cm

377500.E 377500.E 378000.E 378250.E 378500.E 378750.E 379000.E 379250.E 379500.E 379750.E 380000.E
 COMSTAFF METRIC GRID (EAB) SCALE 1 TO 5,000 ADJ. CO-ORDS BA PPM. 16-8-78

TAS/2/1703
 643 78-1316 App 4



E.A.B. Mn
 1978 EXTENSIONS A*

 <30
 30-99
 100-249
 250+

210376

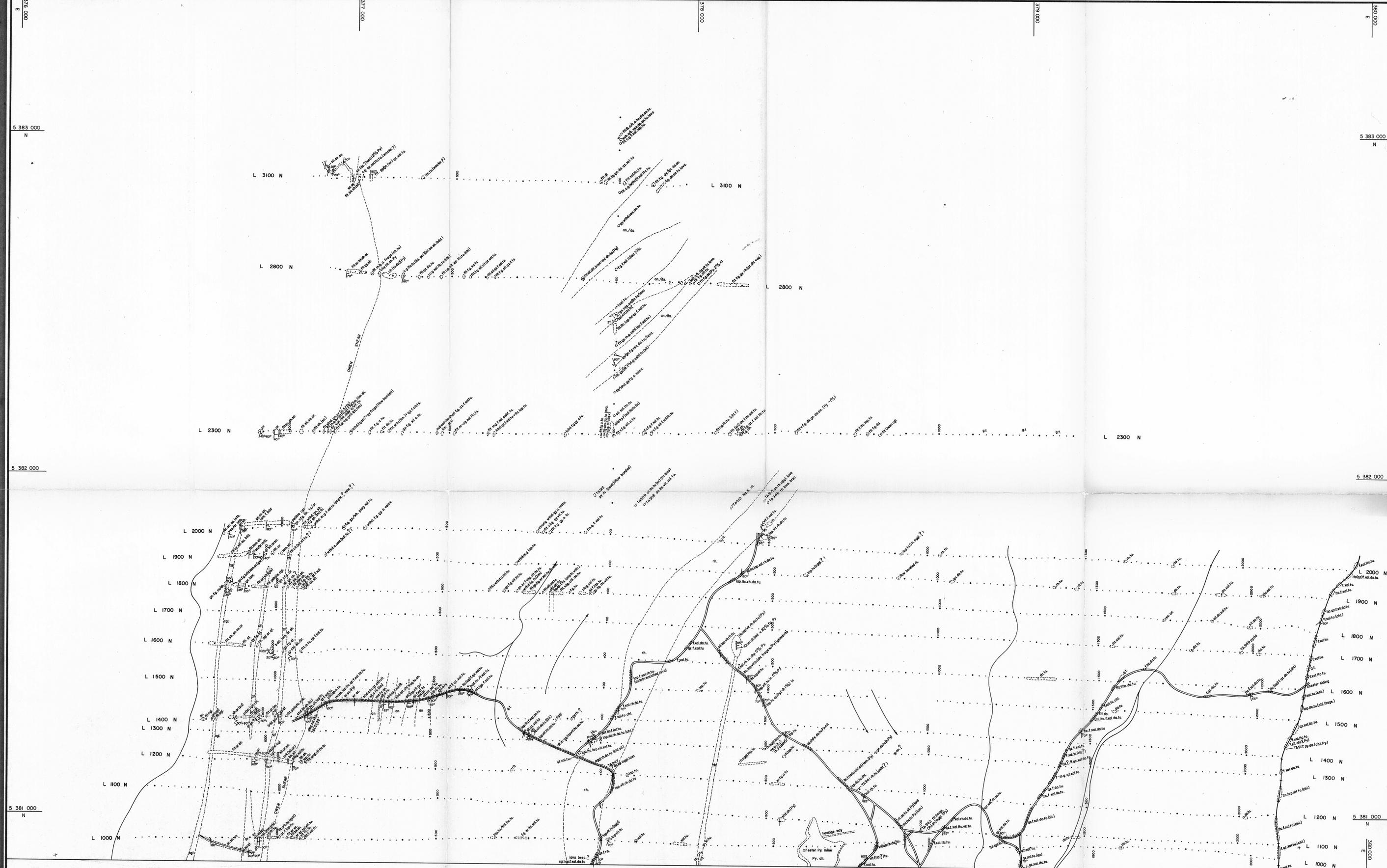
5 cm

377500.E 377750.E 378000.E 378250.E 378500.E 378750.E 379000.E 379250.E 379500.E 379750.E 380000.E

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

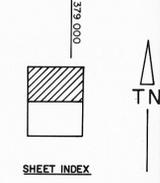
TAS/2/1704 644

78-1316 App4



TAS/2/1557 ADJOINS

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



210377

78-1316 App4

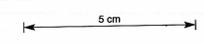
COMSTAFF PROPRIETARY LIMITED

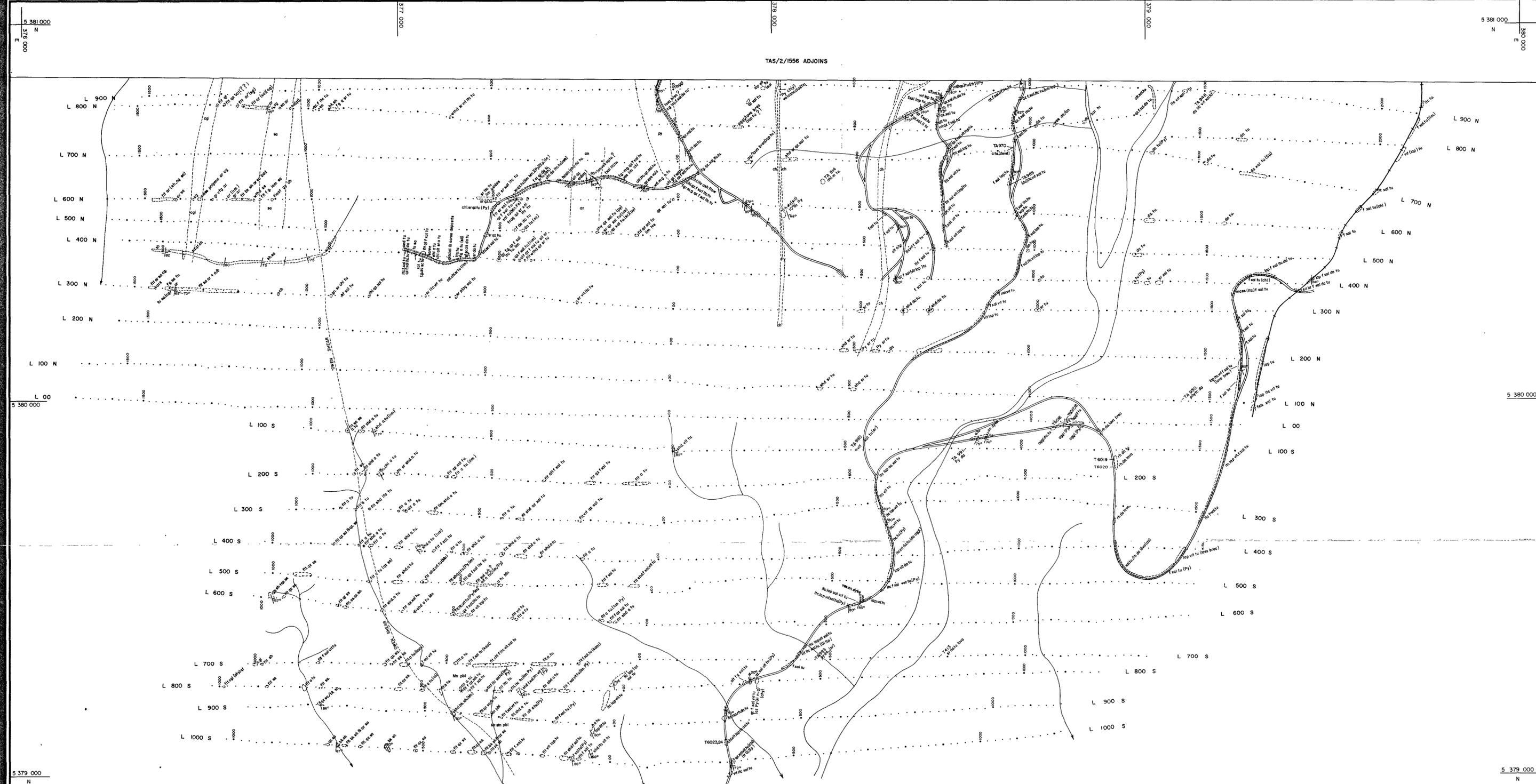
CHESTER-PINNACLES GRID - EAD

DETAILED GEOLOGICAL PLAN

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

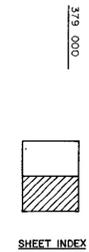
645





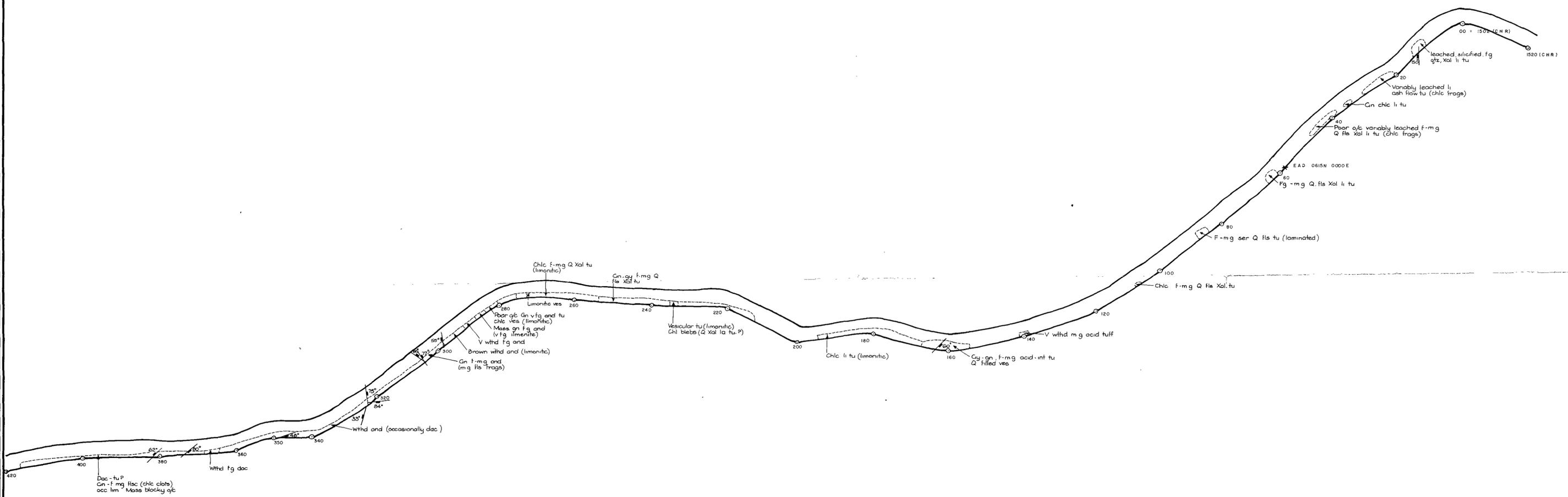
TAS/2/1556 ADJOINS

NOTE: FOR ABBREVIATION INDEX SEE PLAN TAS/2/1556



210378 78-1316 App B

COMSTAFF PROPRIETARY LIMITED	
CHESTER - PINNACLES GRID - EAD	<small>COMPILED D.B.H. 6/78</small> <small>DRAWN GEODRAFT 15/6/78</small> <small>AMENDED</small>
DETAILED GEOLOGICAL PLAN	<small>SCALE 1:5000</small> <small>PLAN No TAS/2/1557</small>
646	



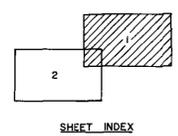
5 cm

210279 78-1316 App 4

COMSTAFF PROPRIETARY LIMITED

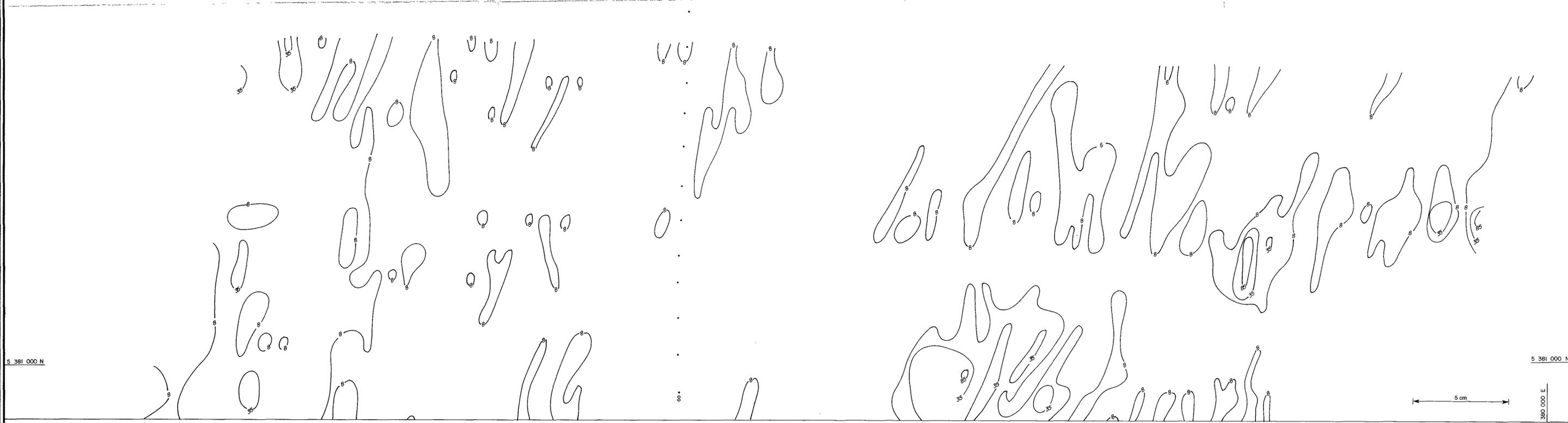
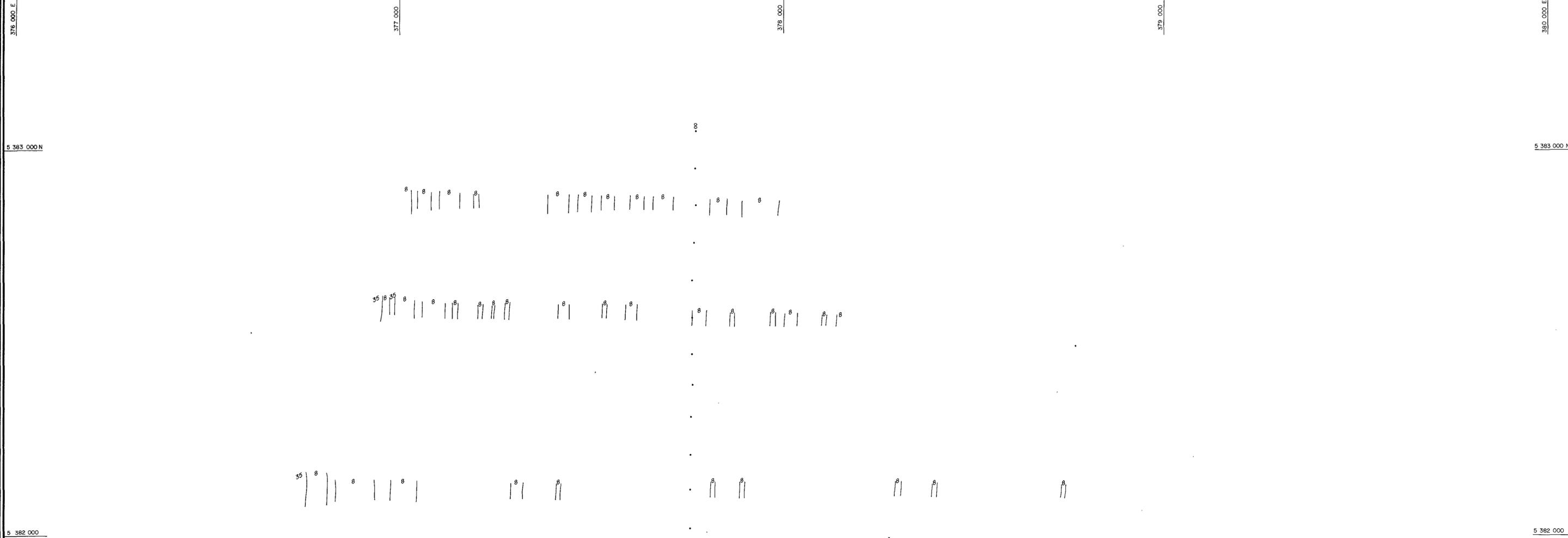
EAD
 4N Costean and Access Track.
 GEOLOGY & GEOCHEMISTRY
 Sheet 1.

COMPLETED	D B Hall
DRAWN	DATE
AMENDED	6 - 78
SCALE	1 : 500
PLAN No	TAS/2/1582

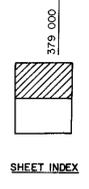


SHEET INDEX

647



TAS/2/1573 ADJOINS



210381		78-1316		APP4	
COMSTAFF PROPRIETARY LIMITED					
CHESTER GRID - EAD					
GEOCHEMICAL SOIL SAMPLING					
COPPER A° CONTOURS in ppm					
COMPILED	D B H		DATE	7/7/78	
DRAWN	GEOGRAFT		AMENDED		
SCALE	1 : 5000		PLAN No	TAS/2/1572	

643

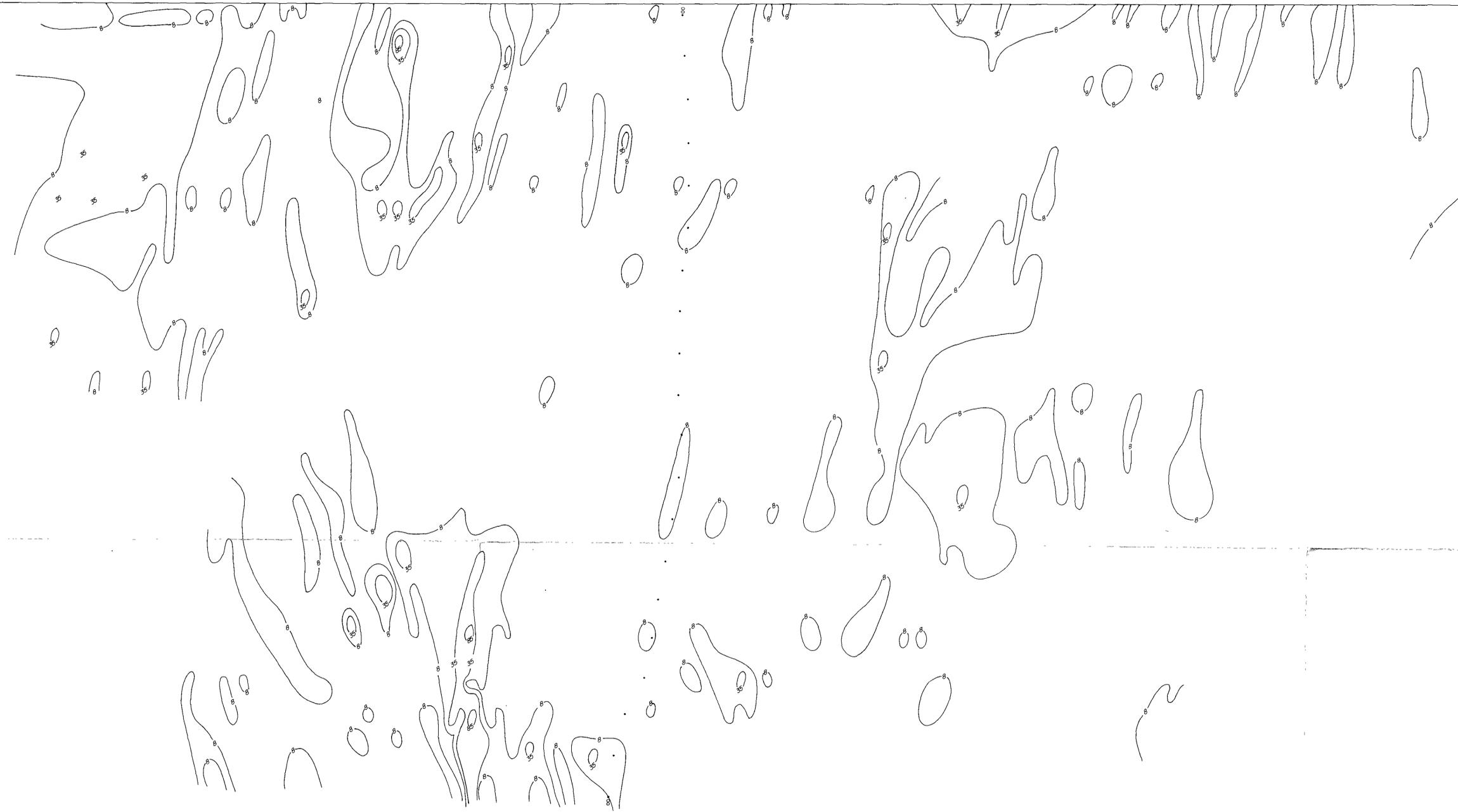
376 000 E 5 381 000 N 377 000 378 000 379 000 380 000 E

TAS/2/1572 ADJOINS

5 380 000

5 379 000 N

376 000 E 377 000 378 000 379 000 380 000 E



379 000

5 cm



SHEET INDEX



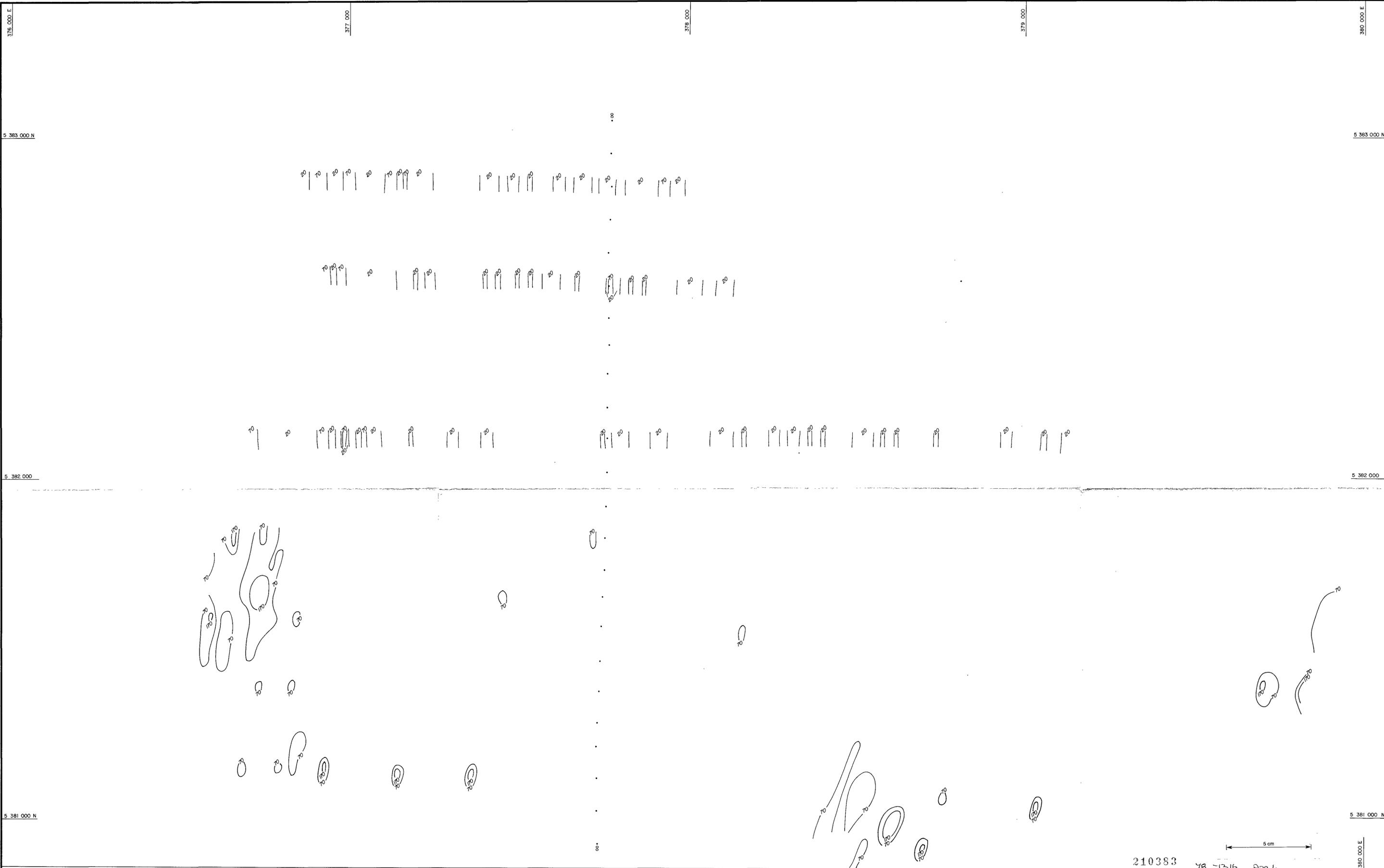
210382 78-1316 App 4

COMSTAFF PROPRIETARY LIMITED

CHESTER GRID - EAD

GEOCHEMICAL SOIL SAMPLING
COPPER A^o CONTOURS in ppm 650

COMPILED	D B H
DRAWN	DATE
GEOGRAPH	7/7/78
AMENDED	
SCALE	1 : 5000
PLATINUM NO	TAS/2/1573



376 000 E

377 000

378 000

379 000

380 000 E

5 383 000 N

5 383 000 N

5 382 000

5 382 000

5 381 000 N

5 381 000 N

380 000 E

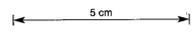
TAS / 2 / 1575 ADJOINS



SHEET INDEX



210383 78-1316 App 4



COMSTAFF PROPRIETARY LIMITED

CHESTER GRID - EAD

GEOCHEMICAL SOIL SAMPLING
LEAD A° CONTOURS in ppm

651

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

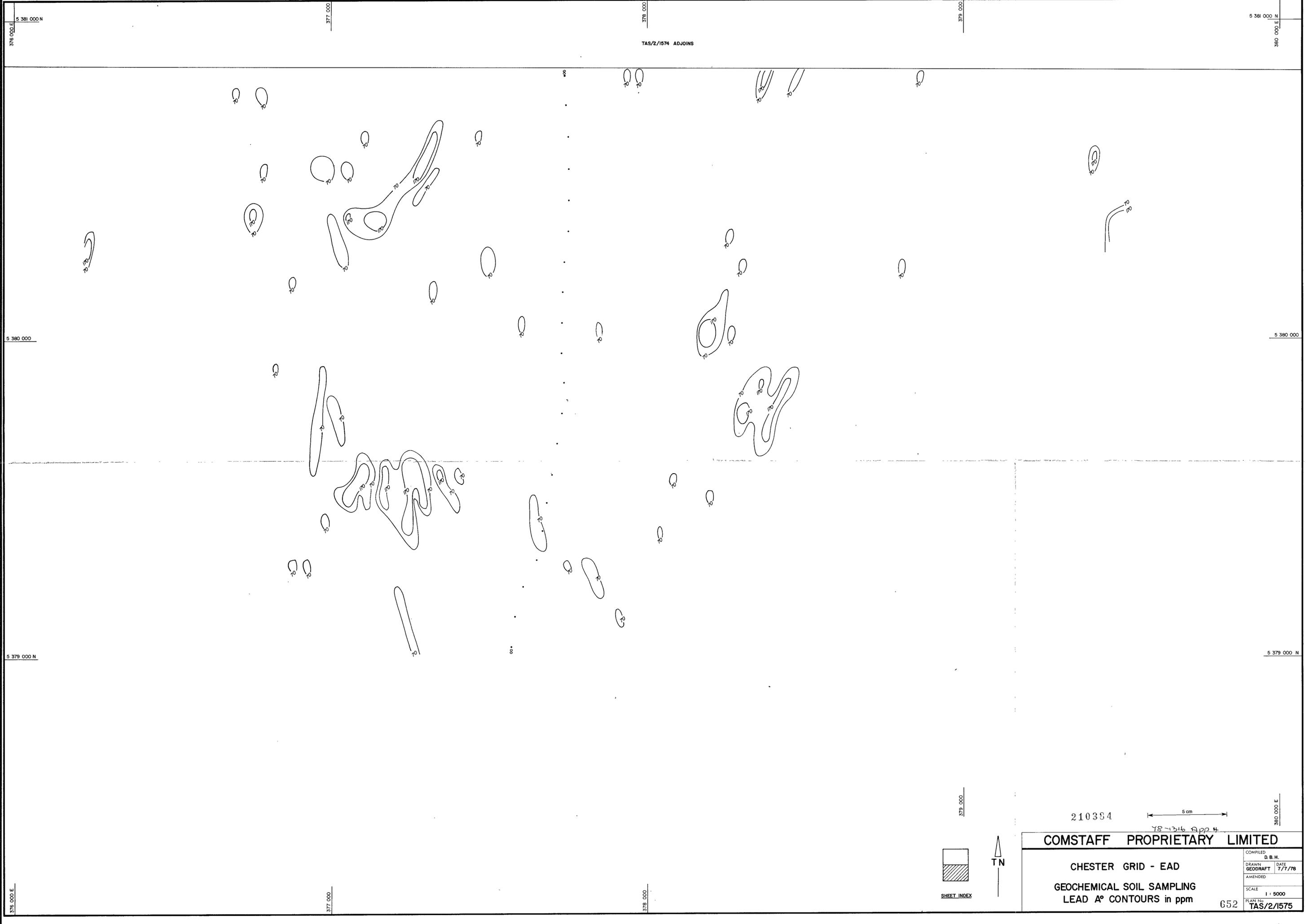
376 000 E

377 000

378 000

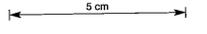
379 000

380 000 E



TAS/2/1574 ADJOINS

210384



78-1316 app 4



SHEET INDEX

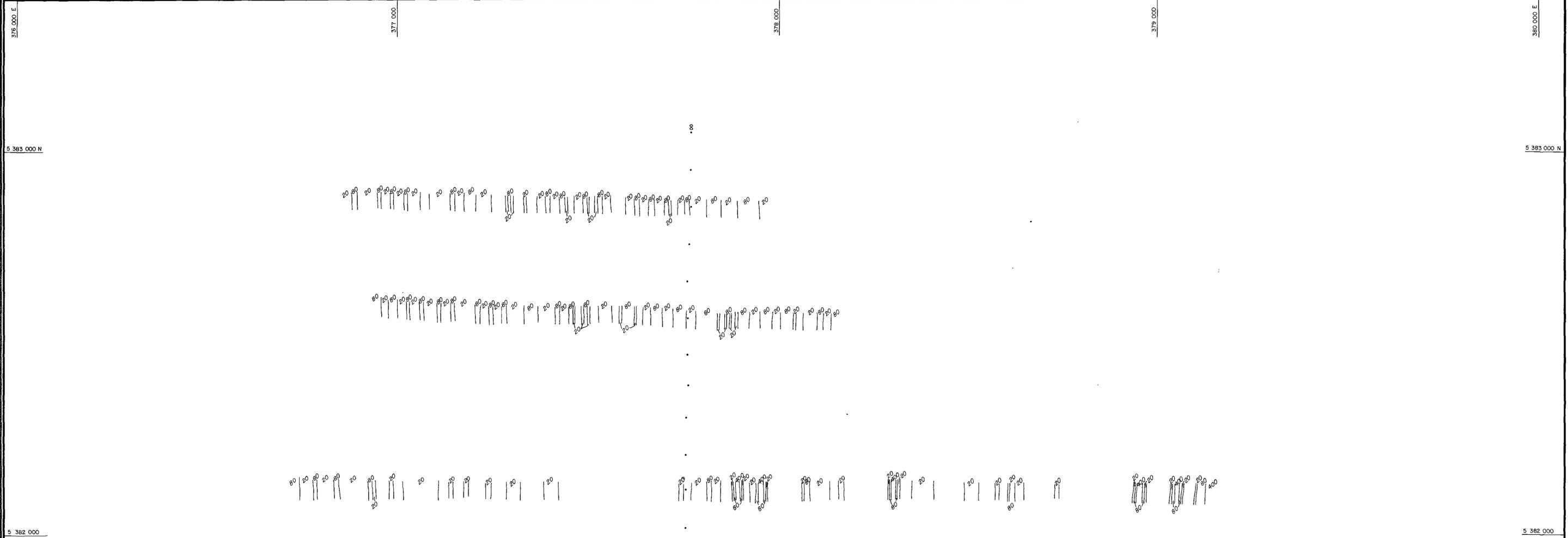


COMSTAFF PROPRIETARY LIMITED

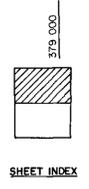
CHESTER GRID - EAD
 GEOCHEMICAL SOIL SAMPLING
 LEAD A° CONTOURS in ppm

COMPILED	D. B. H.
DRAWN	DATE
GEO DRAFT	7/7/78
AMENDED	
SCALE	1 : 5000
PLAN NO	TAS/2/1575

652



TAS/2/1577 ADJOINS



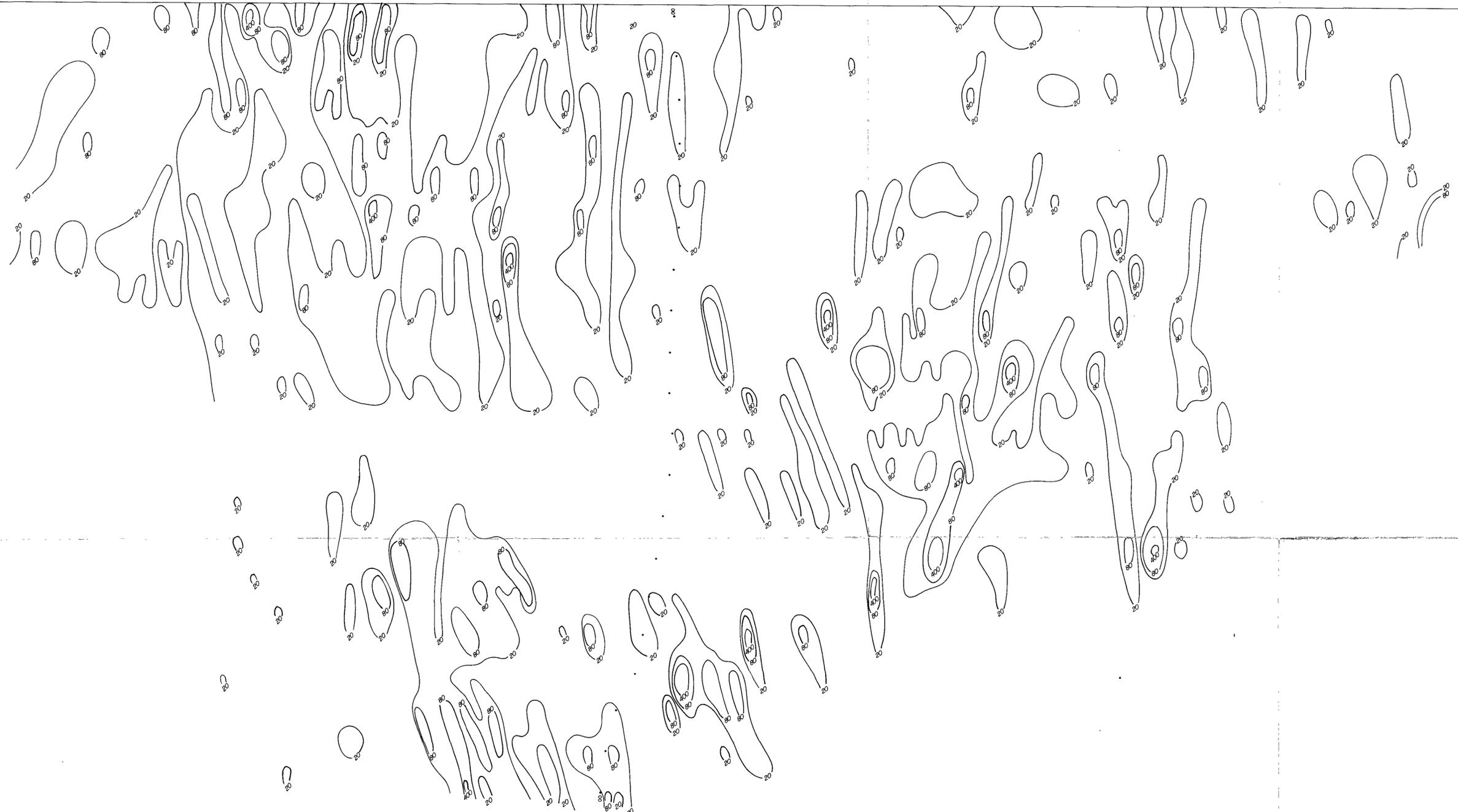
210385 78-1316 App 4

COMSTAFF PROPRIETARY LIMITED

<p style="text-align: center;">CHESTER GRID - EAD</p> <p style="text-align: center;">GEOCHEMICAL SOIL SAMPLING</p> <p style="text-align: center;">ZINC A° CONTOURS in ppm</p>	<p style="text-align: center;">653</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="font-size: 8px;">COMPILED</td> <td style="font-size: 8px;">D.B.H.</td> </tr> <tr> <td style="font-size: 8px;">DRAWN</td> <td style="font-size: 8px;">DATE</td> </tr> <tr> <td style="font-size: 8px;">GEO DRAFT</td> <td style="font-size: 8px;">7/7/78</td> </tr> <tr> <td style="font-size: 8px;">AMENDED</td> <td></td> </tr> <tr> <td style="font-size: 8px;">SCALE</td> <td style="font-size: 8px;">1 : 5000</td> </tr> <tr> <td style="font-size: 8px;">PLAN NO</td> <td style="font-size: 8px;">TAS/2/1576</td> </tr> </table>	COMPILED	D.B.H.	DRAWN	DATE	GEO DRAFT	7/7/78	AMENDED		SCALE	1 : 5000	PLAN NO	TAS/2/1576
COMPILED	D.B.H.												
DRAWN	DATE												
GEO DRAFT	7/7/78												
AMENDED													
SCALE	1 : 5000												
PLAN NO	TAS/2/1576												

376 000 E 5 381 000 N 377 000 378 000 379 000 380 000 E 5 381 000 N

TAS/2/1576 ADJOINS

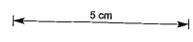


5 380 000 5 380 000

5 379 000 N 5 379 000 N

376 000 E 377 000 378 000 379 000 380 000 E

379 000
SHEET INDEX



210386 78-1316 App 4

COMSTAFF PROPRIETARY LIMITED

CHESTER GRID - EAD

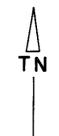
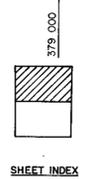
GEOCHEMICAL SOIL SAMPLING

ZINC A° CONTOURS in ppm 654

COMPILED	D.B.H.
DRAWN	DATE
GEOGRAFT	7/7/78
AMENDED	
SCALE	1 : 5000
PLANNING	TAS/2/1577

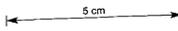


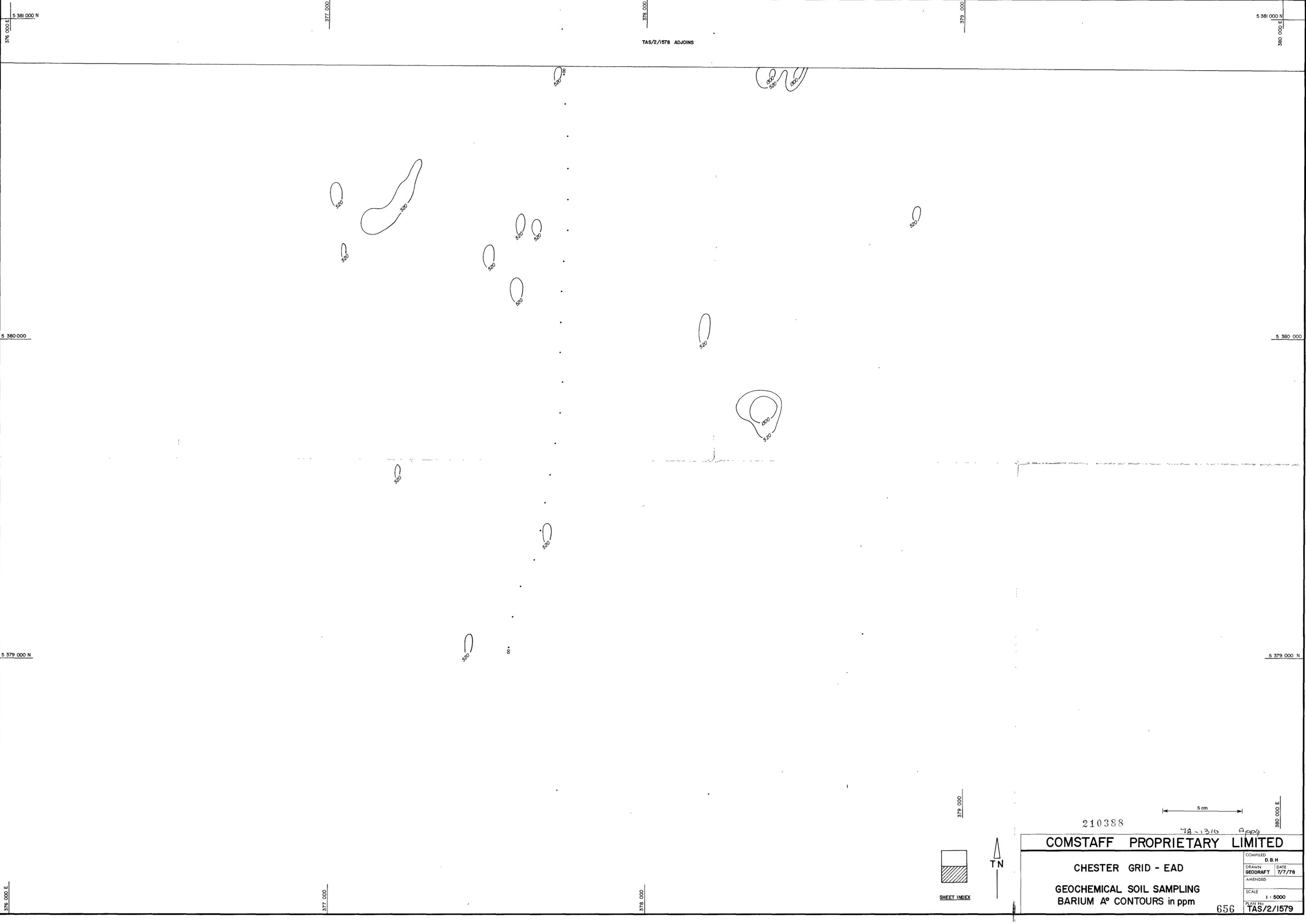
TAS / 2 / 1579 ADJOINS



COMSTAFF PROPRIETARY LIMITED	
CHESTER GRID - EAD	
GEOCHEMICAL SOIL SAMPLING	
BARIIUM A° CONTOURS in ppm	
655	TAS/2/1578
COMPILED DB H	DATE 7/7/78
DRAWN GEDDRAFT	AMENDED
SCALE 1 : 5000	PLAN No

210387 78-1316 App 4





TAS/2/1578 ADJOINS

376 000 E 5 381 000 N 377 000 378 000 379 000 380 000 E

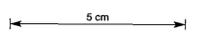
5 380 000 5 379 000 N

376 000 E 377 000 378 000 379 000 380 000 E

379 000



SHEET INDEX



210388
78-1316 A copy

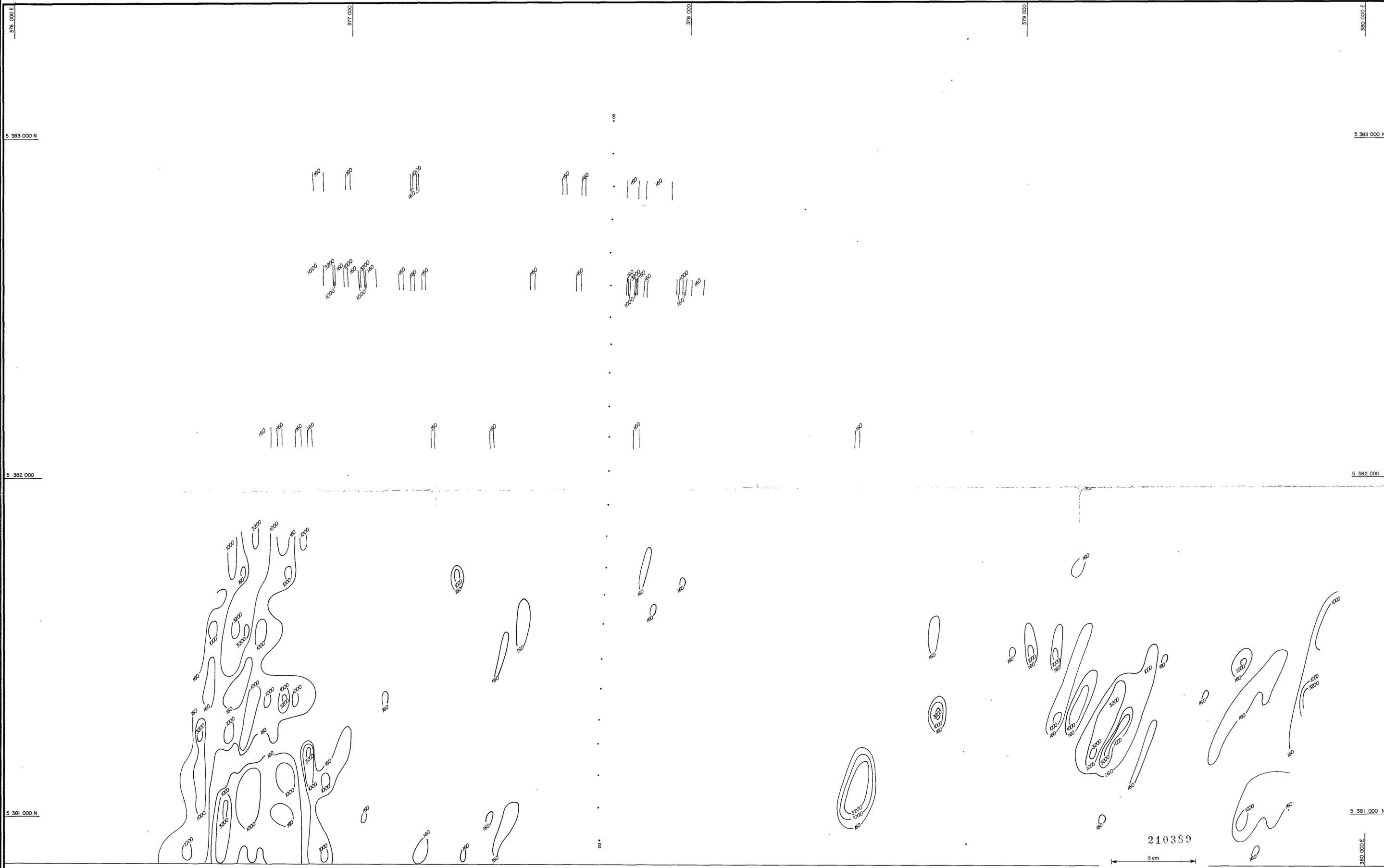
COMSTAFF PROPRIETARY LIMITED

CHESTER GRID - EAD

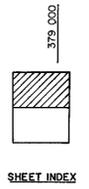
GEOCHEMICAL SOIL SAMPLING
BARIUM A° CONTOURS in ppm

656

COMPILED	D.B.H
DRAWN	DATE
GEO DRAFT	7/7/78
AMENDED	
SCALE	1 : 5000
PLAN NO.	TAS/2/1579



TAS/2/1581 ADJOINS



78-1316 APP. 4.

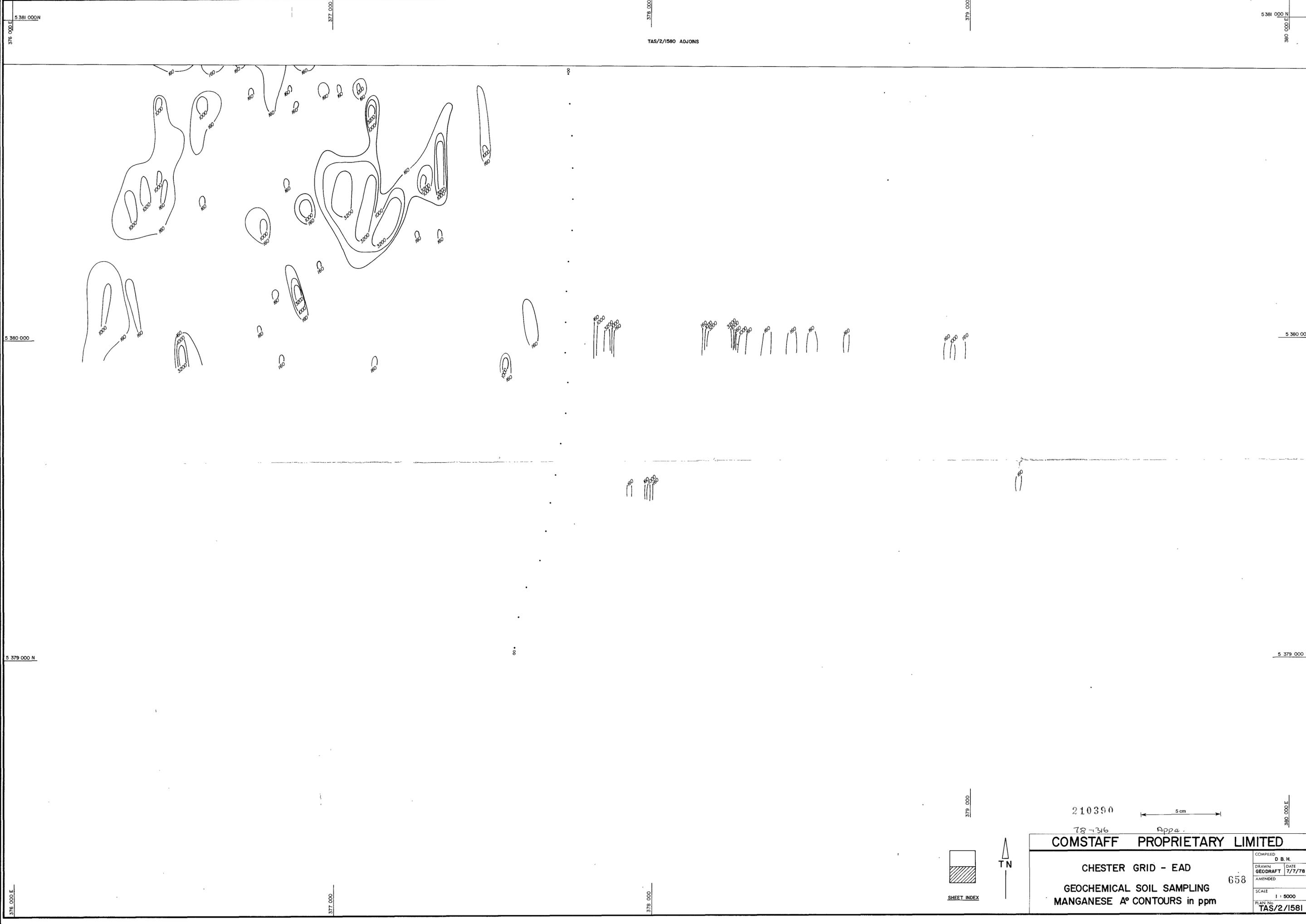
COMSTAFF PROPRIETARY LIMITED

CHESTER GRID - EAD

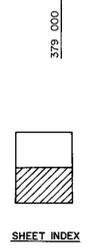
GEOCHEMICAL SOIL SAMPLING 657

MANGANESE A° CONTOURS in ppm

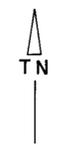
COMPILED	D.B.H.
DRAWN	DATE
GEDDRAFT	7/7/78
AMENDED	
SCALE	1 : 5000
PLAN NO.	TAS/2/1580



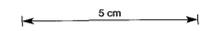
TAS/2/1580 ADJOINS



SHEET INDEX



210390



78-1316

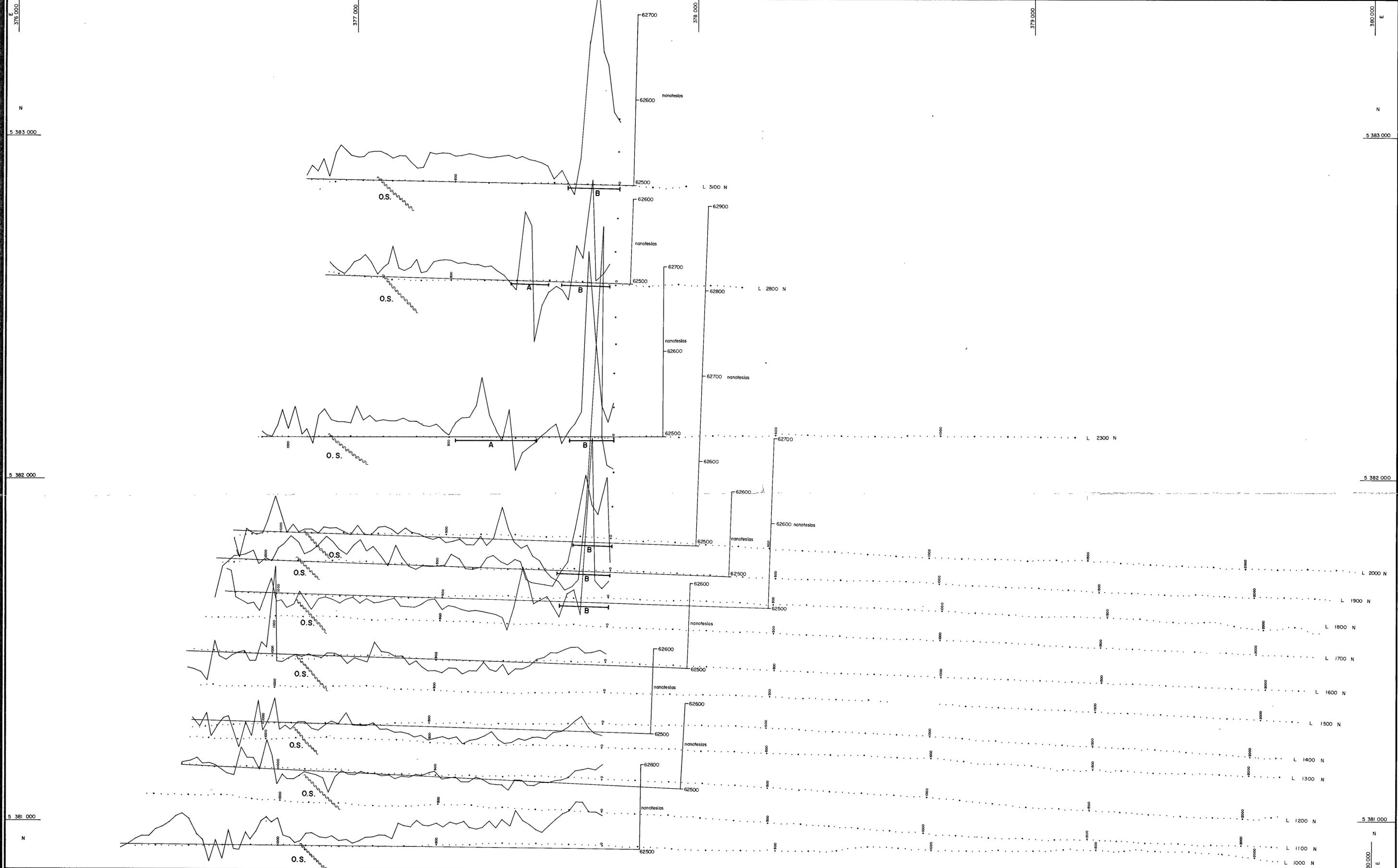
Appa.

COMSTAFF PROPRIETARY LIMITED

CHESTER GRID - EAD
 GEOCHEMICAL SOIL SAMPLING
 MANGANESE A° CONTOURS in ppm

658

COMPILED	D. B. H.
DRAWN	DATE
GEO DRAFT	7/7/78
AMENDED	
SCALE	1 : 5000
PLANT NO.	TAS/2/1581



TAS/2/1603 ADJOINS

379 000



SHEET INDEX



5 cm

210391 78-1316 0024

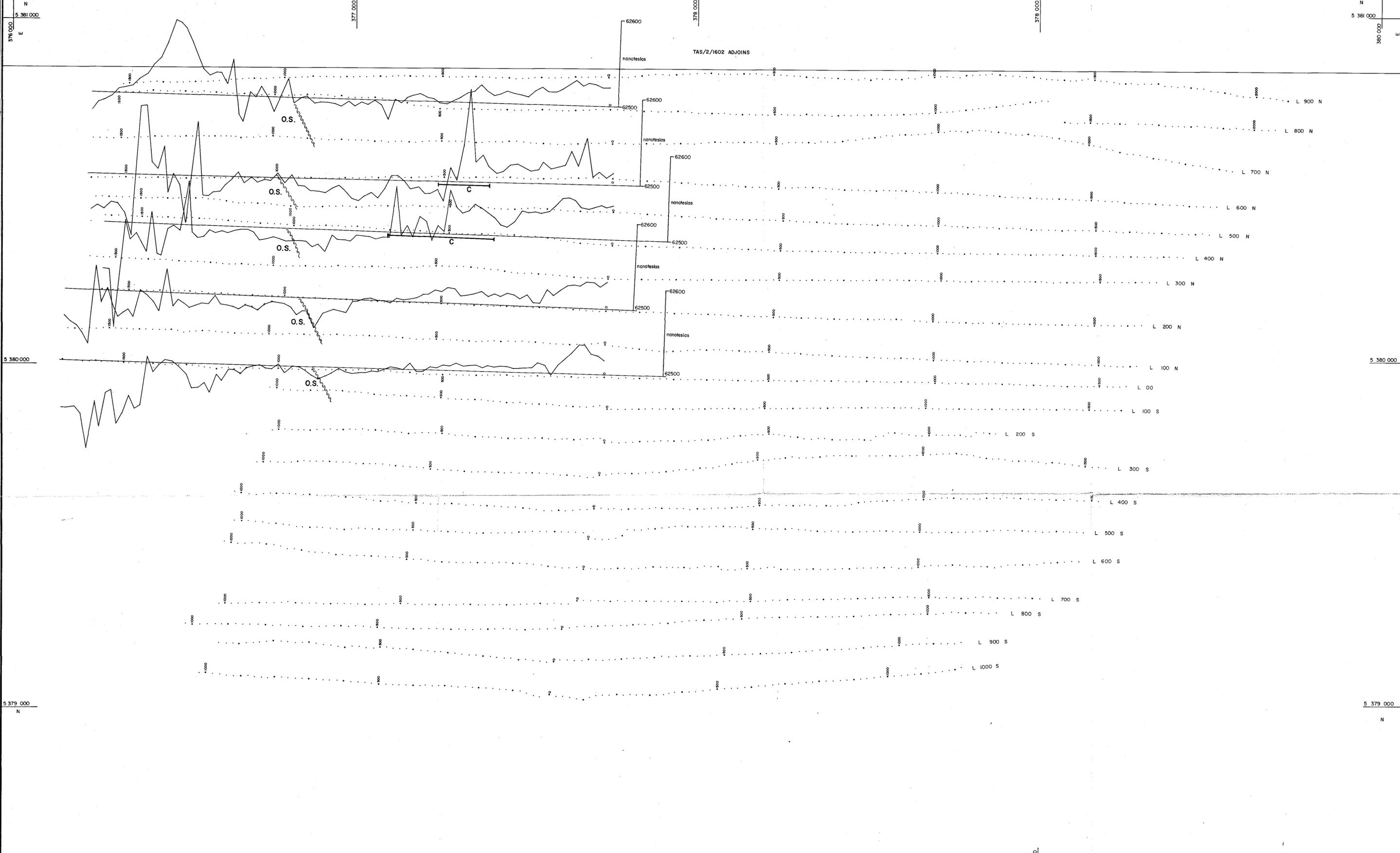
COMSTAFF PROPRIETARY LIMITED

CHESTER GRID - EAD

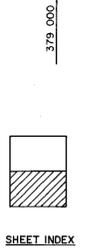
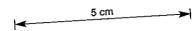
STACKED
GROUND MAGNETIC PROFILES

659

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



210392 78-1316 App k



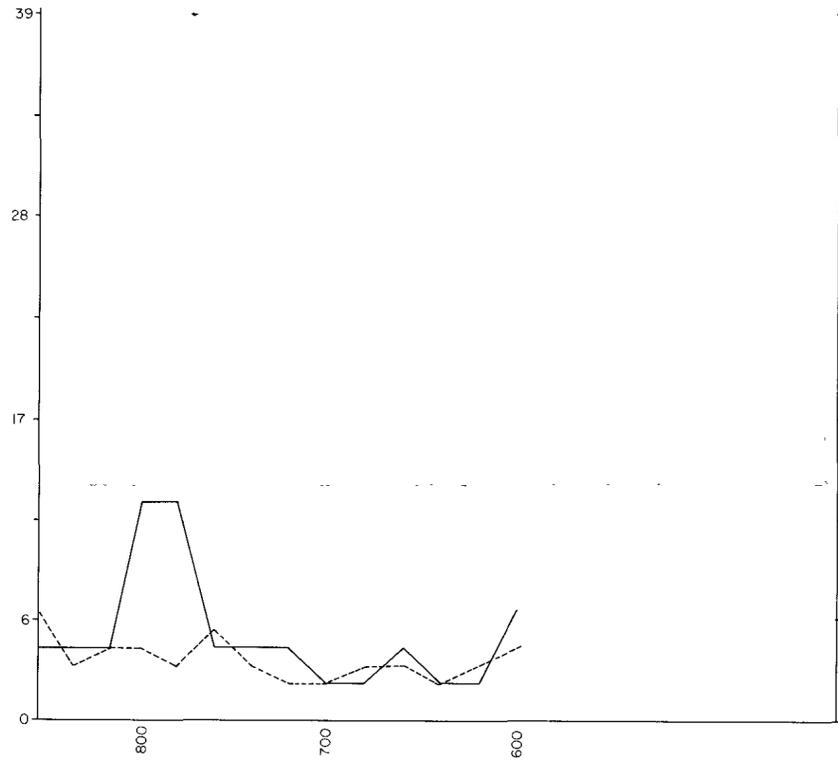
COMSTAFF PROPRIETARY LIMITED

CHESTER GRID - EAD

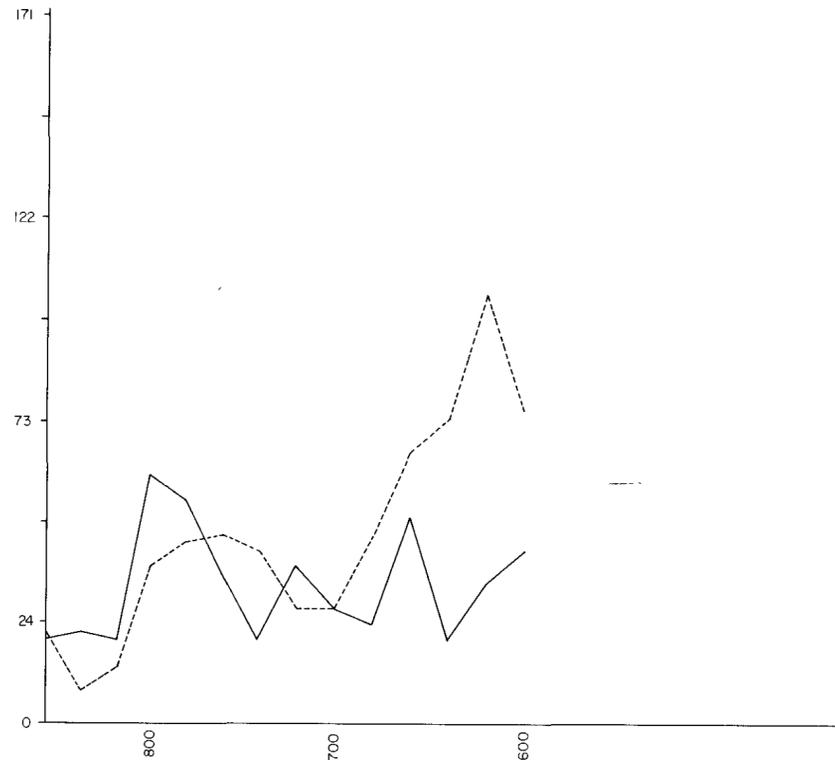
STACKED
GROUND MAGNETIC PROFILES

660

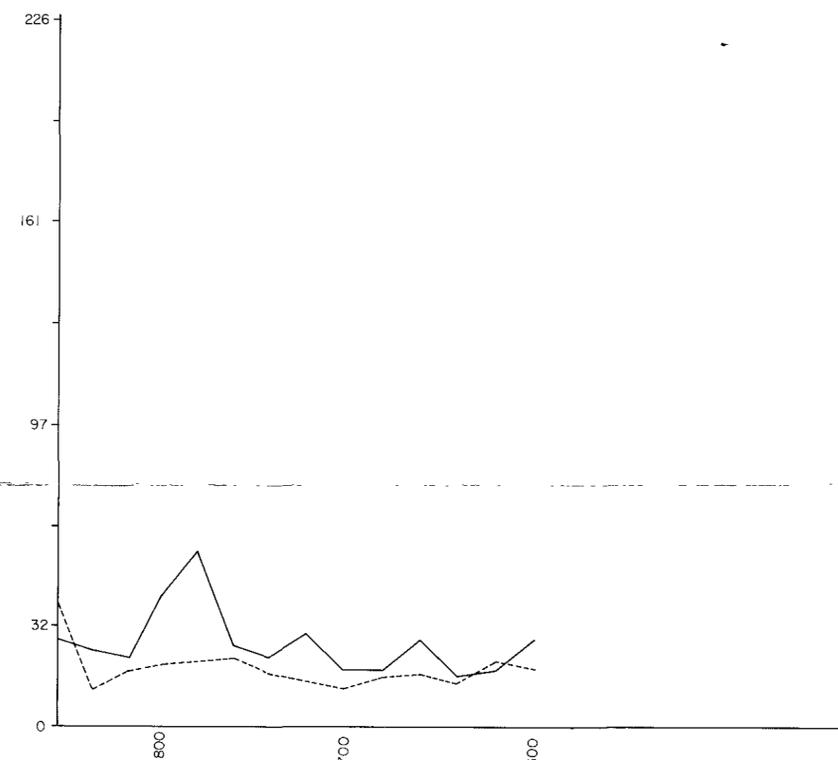
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DRAWN	DATE	28/7/78
GEO DRAFT	AMENDED	
SCALE	1 : 5000	
PLAN No.	TAS/2/1603.	



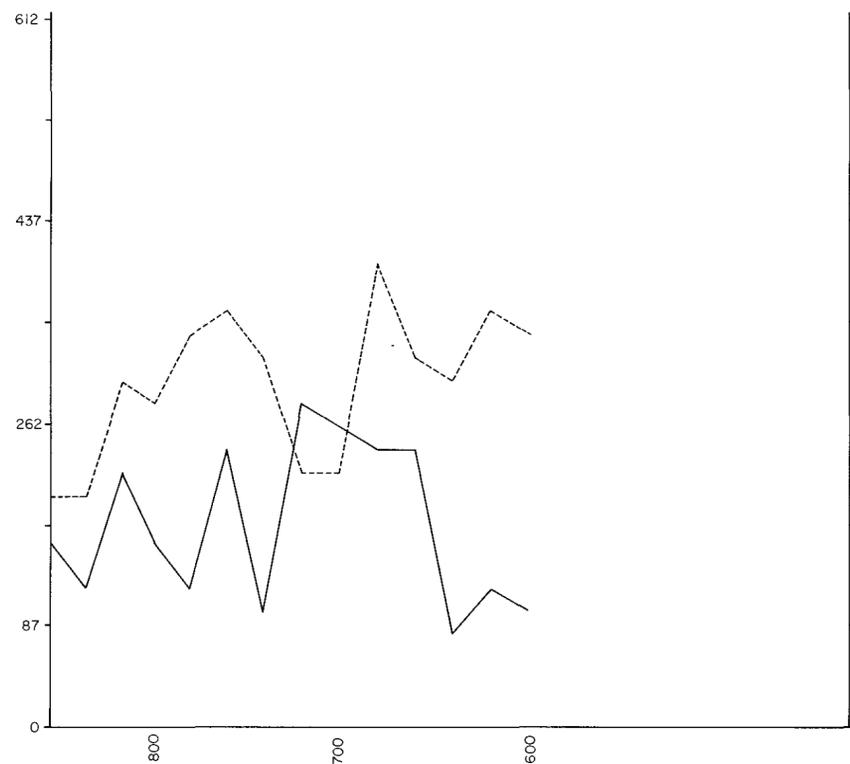
COPPER



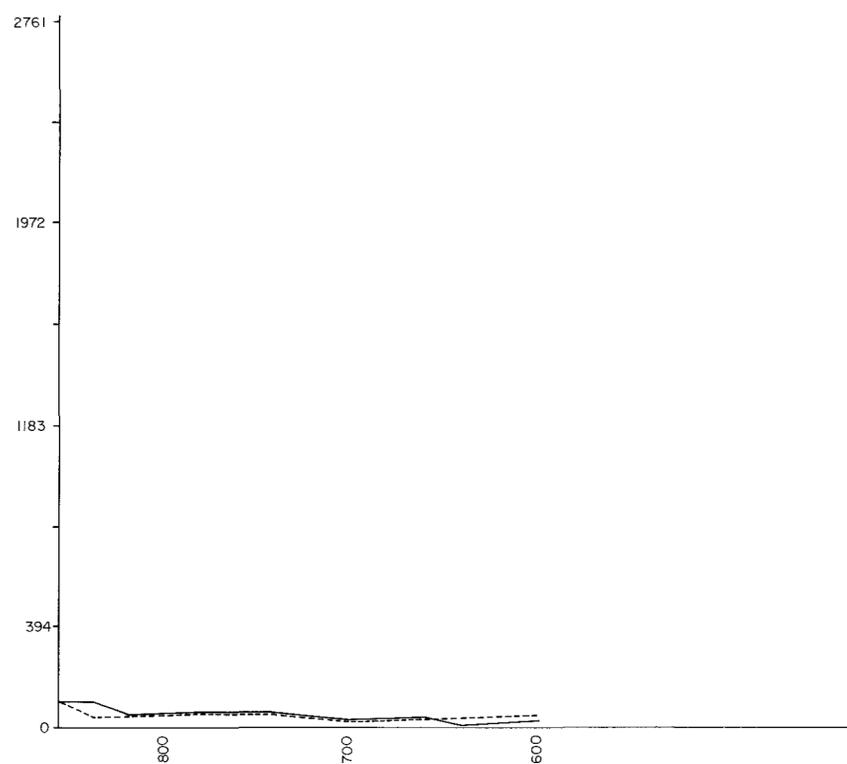
LEAD



ZINC



BARIUM



MANGANESE

LEGEND

- A° Horizon
- - - C Horizon

5 cm

78-1316 App 4

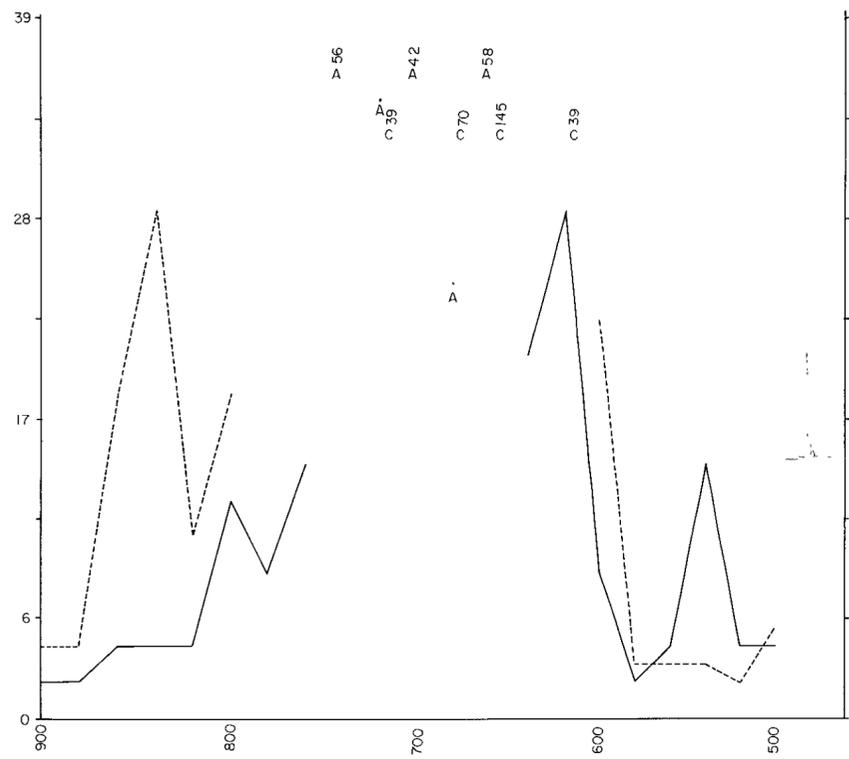
COMSTAFF PROPRIETARY LIMITED

CHESTER/PINNACLES GRID - EAD

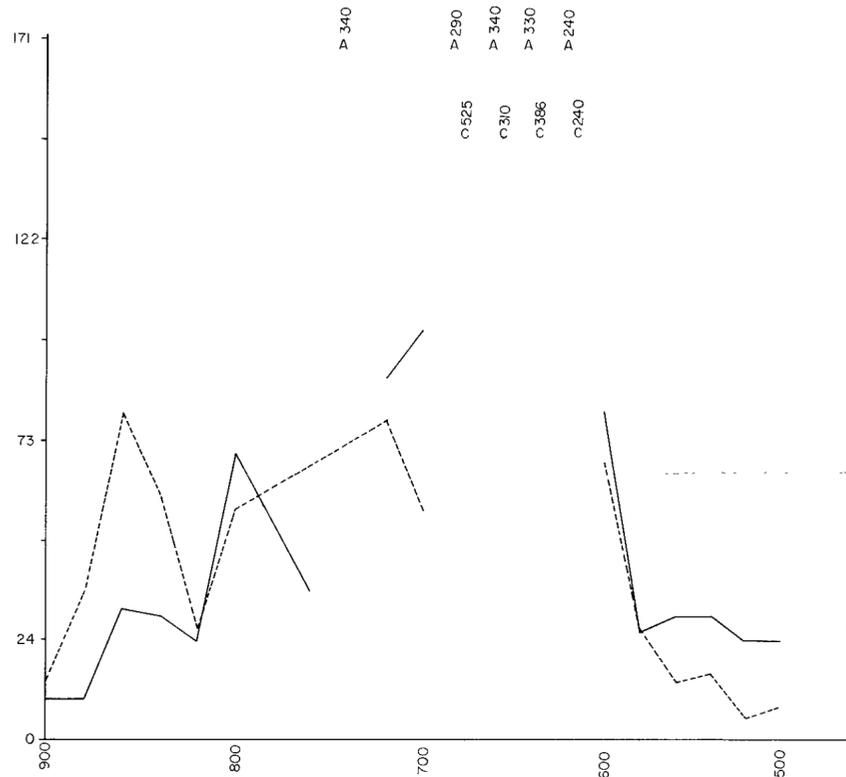
L 200 N 661

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

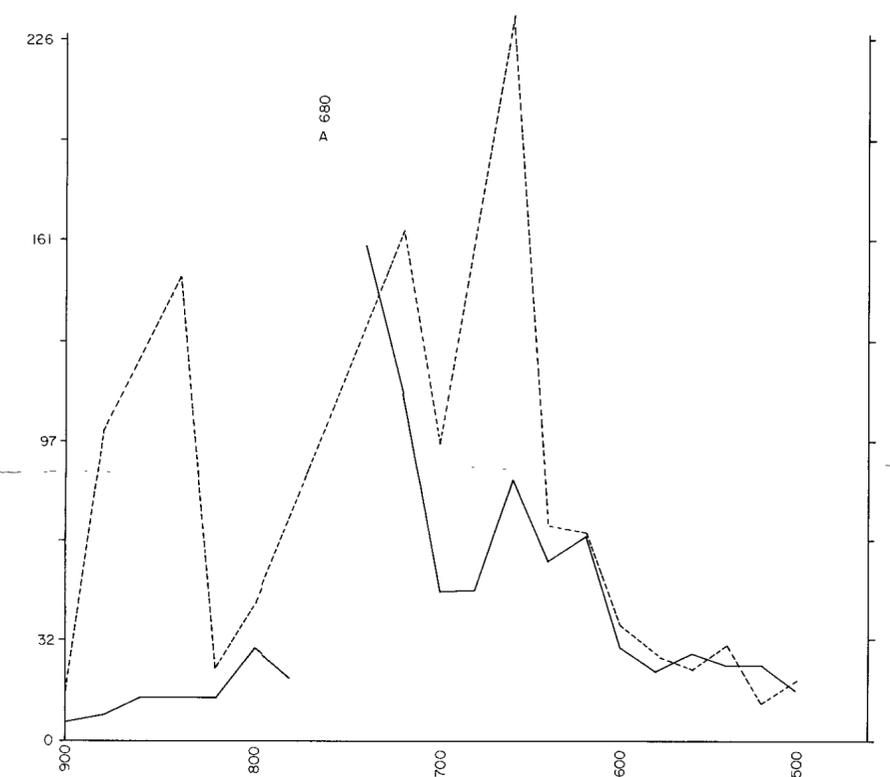
210393



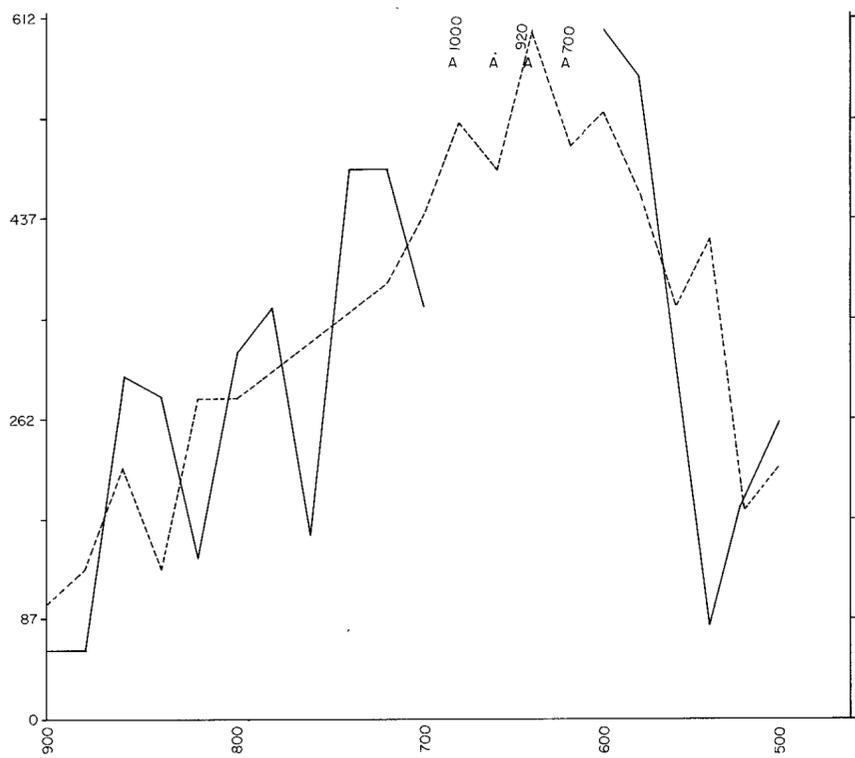
COPPER



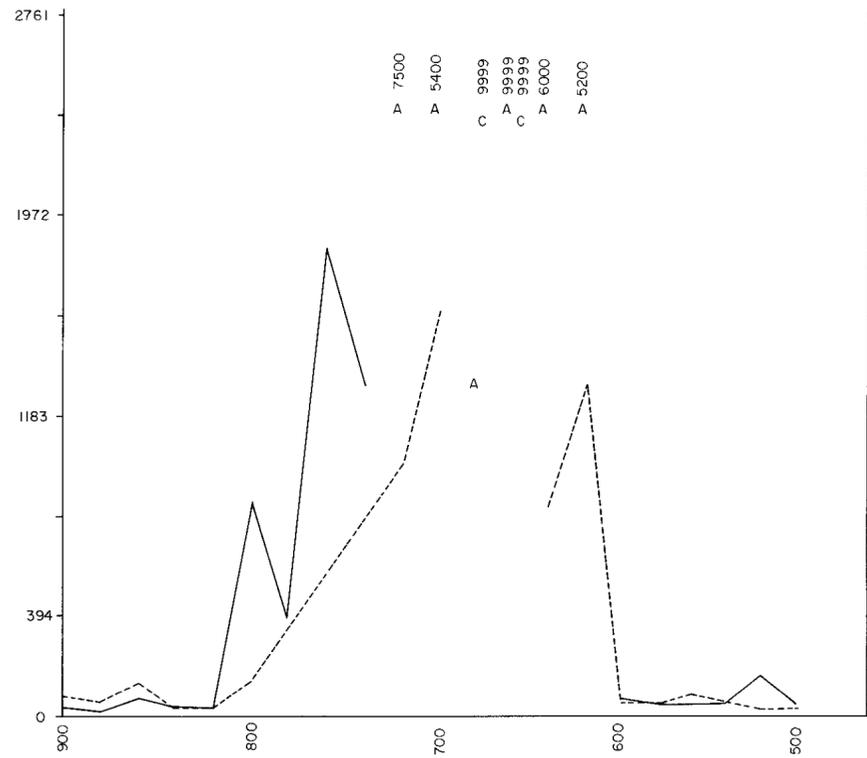
LEAD



ZINC



BARIUM



MANGANESE

LEGEND

- A° Horizon
- - - C Horizon

5 cm

210394

662

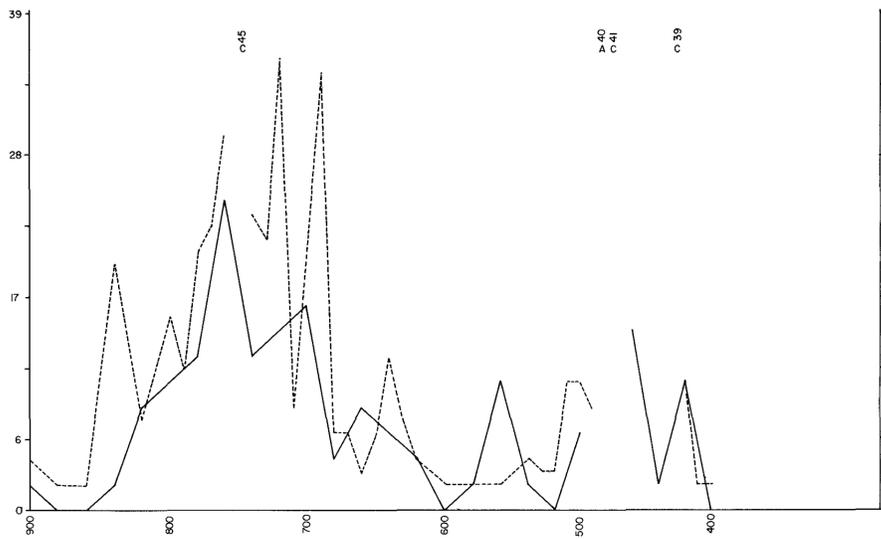
78-1316 App 4

COMSTAFF PROPRIETARY LIMITED

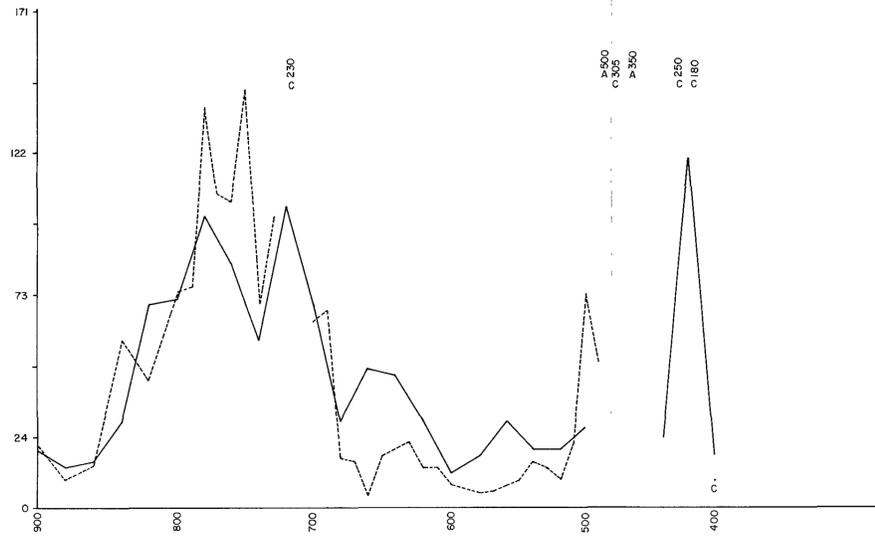
CHESTER/PINNACLES GRID - EAD
L 400 N

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

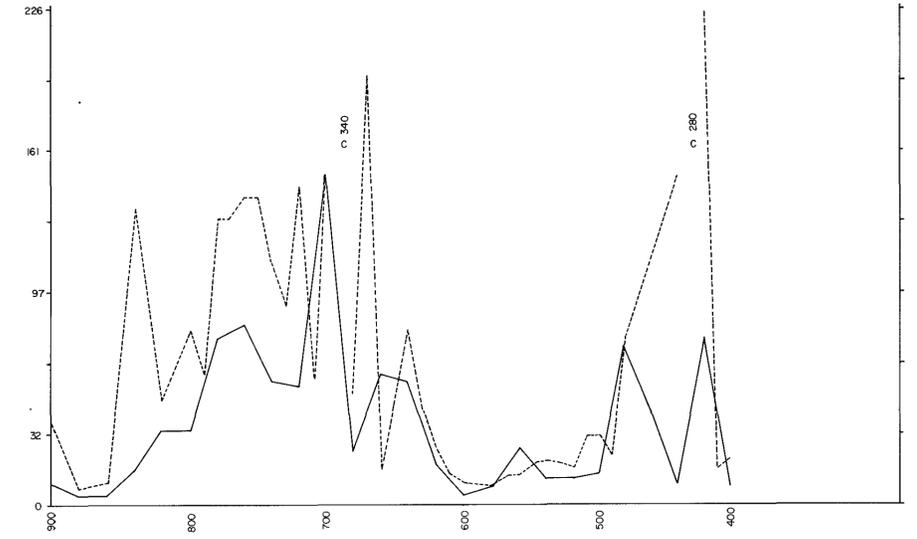
DRAWN
GEOGRAFT 8/78 COMPILED
D B H 6/78 SCALE
1 2500 TAS/2/1610



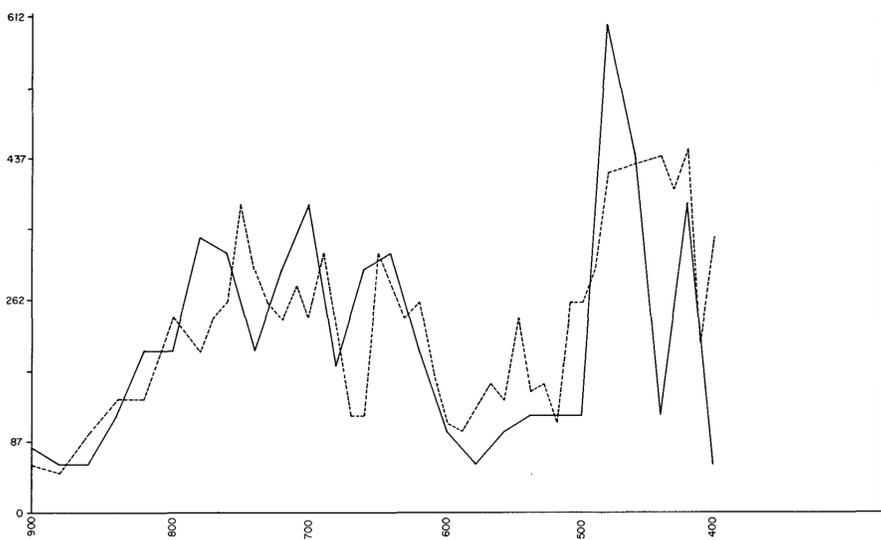
COPPER



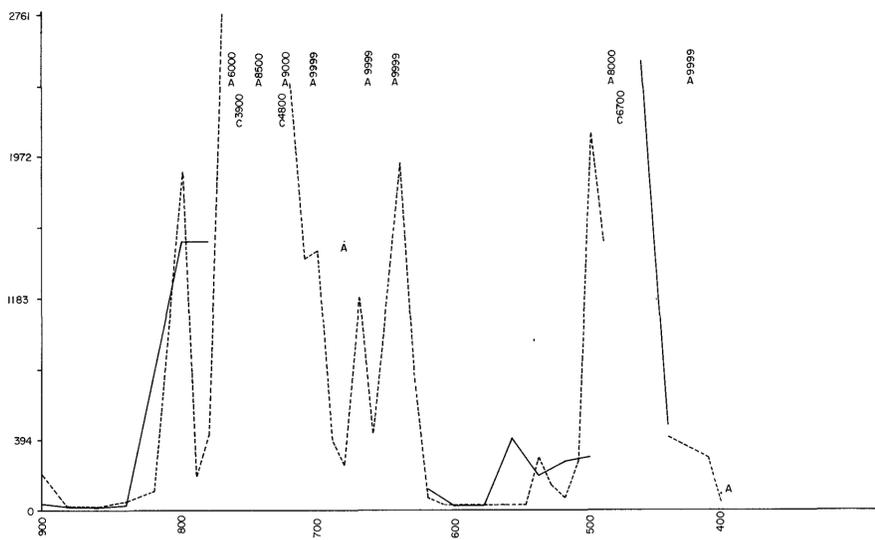
LEAD



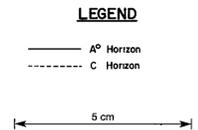
ZINC



BARIUM



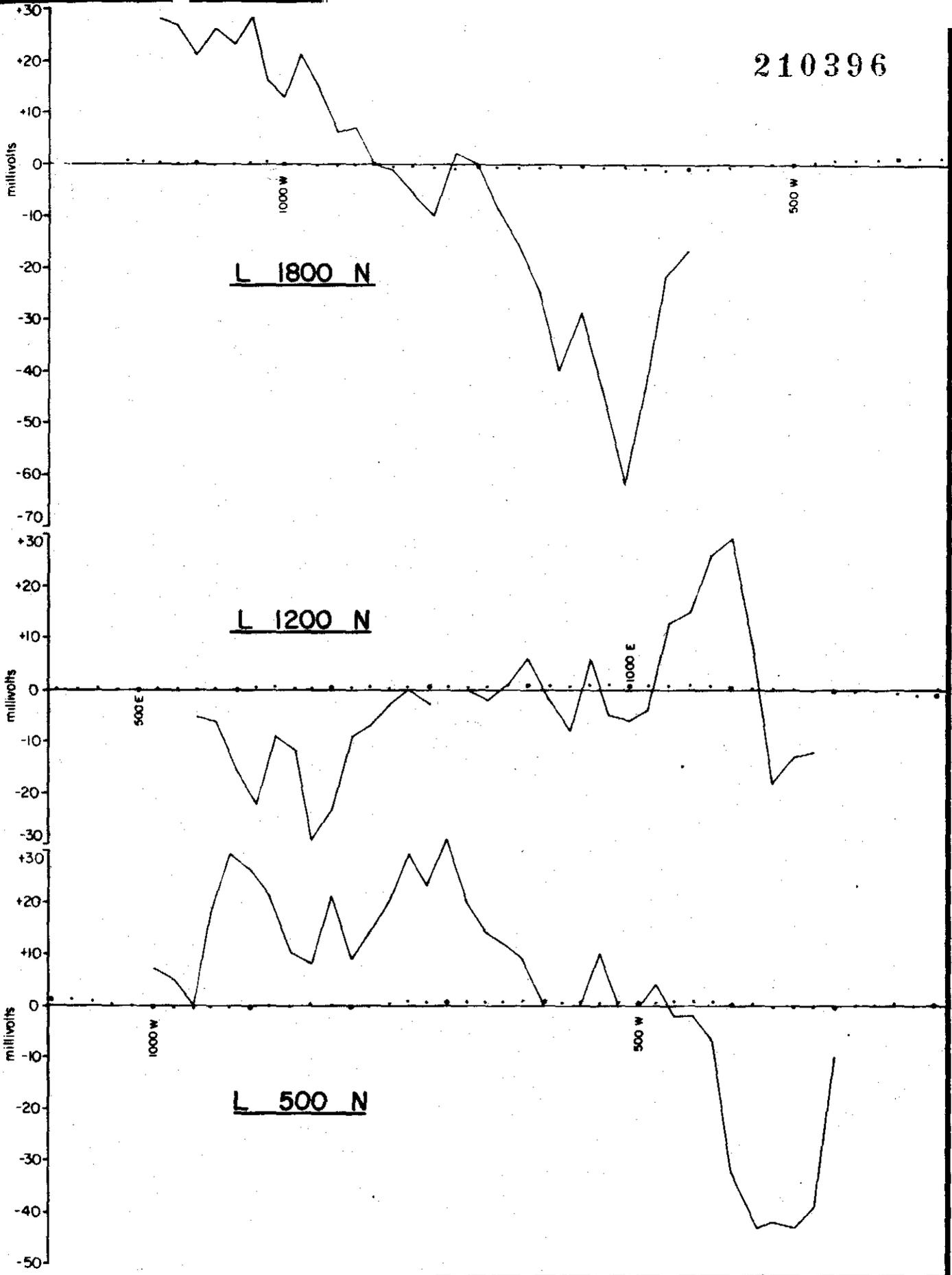
MANGANESE



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AUSTRALIAN ANGLo AMERICAN LIMITED	
CHESTER/PINNACLES GRID - EAD	
L 600 N	
COMPARISON OF A° & C GEOCHEMICAL SAMPLING	
FOR Cu, Pb, Zn, Ba, Mn 663	
COMPILED D. B. H. 6/78	DATE 1/6/78
DRAWN GEOGRAFT	DATE 1/6/78
AMENDED	
SCALE 1 : 2500	
PLAN No. TAS/2/1611	

210396



5 cm

COMSTAFF PROPRIETARY LIMITED
CHESTER/PINNACLES AREA - EAD
SELF POTENTIAL PROFILES
FOR LINES 500 N, 1200 N, 1800 N
DRAWN GEODRAFT 7/78 COMPILED D.B.H. 6/78 SCALE 1 : 5000 TAS/2/1608